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of the
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Capital flows, exchange rates and policy frameworks in emerging Asia

A report by a Working Group established by
the Asian Consultative Council of the Bank for International Settlements

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Reserve Bank of Australia

People's Bank of China

Hong Kong Monetary Authority

Reserve Bank of India

Bank Indonesia

Bank of Japan

Bank for International Settlements (Working Group secretariat)

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Contents

Preface	2
Executive summary	3
1. Introduction	5
2. Why exchange rates and capital flows matter for policy.....	6
3. Transmission channels.....	8
4. Modelling and analytics.....	11
5. Monitoring indicators and information provided to decision-makers	13
6. Responding to exchange rate volatility and capital flows.....	15
6.1 <i>When and how central banks intervene in FX markets</i>	15
6.2 <i>Determining the response to capital flows</i>	16
6.3 <i>Responses to exchange rate volatility and capital flows within the evolving policy framework</i>	17
6.4 <i>Unwanted side effects and policy constraints</i>	18
6.5 <i>Role for international cooperation</i>	18
7. Policy frameworks during Covid-19: a stress test.....	19
7.1 <i>Using existing instruments in their policy frameworks</i>	20
7.2 <i>Expanded use of tools within policy frameworks</i>	21
7.3 <i>Factors affecting the choice of tools</i>	22
8. Conclusions	23
Annex A – Comparison with advanced economies in the region	25
Annex B – Policy interventions in Asia-Pacific economies	28
Annex C – Primary questionnaire.....	32
Annex D – Supplementary questionnaire	36
Working Group participants.....	37

Preface

The Asian Consultative Council (ACC) of the Bank for International Settlements (BIS) was established in March 2001 to facilitate communication between the BIS shareholding central banks in the Asia-Pacific region and the BIS's Board and Management on matters of interest to the Asia-Pacific central banking community. As of September 2020, the ACC comprised the Governors of the central banks and monetary authorities of Australia, China, Hong Kong SAR, India, Indonesia, Japan, Korea, Malaysia, New Zealand, the Philippines, Singapore and Thailand.

Under the direction of the ACC at its February 2019 meeting, the BIS Representative Office for Asia and the Pacific set up a Working Group of regional central banks to examine their policy frameworks, focusing on capital flows, exchange rates, and the joint use of monetary, macroprudential, exchange rate and capital flow management policies. The Working Group is made up of members from the central banks and monetary authorities of China, Hong Kong SAR, India, Indonesia, Korea, Malaysia, the Philippines, Singapore and Thailand, as well as observers from the central banks of Australia, Japan and New Zealand.

This report is the summary of the responses to two questionnaires, organised by different elements of policy frameworks. First, a detailed questionnaire, intended to provide a stocktake of how central banks model exchange rates and capital flows and incorporate these into their policy frameworks, and how they use various policy instruments to deal with challenges related to capital flows and exchange rates. Second, a short supplementary survey, added to assess changes in response to the Covid-19 pandemic, a shock that is serving as a severe stress test of policy frameworks in many jurisdictions in the Asia-Pacific region.

Executive summary

The BIS set up a Working Group on “Capital flows, exchange rates and policy frameworks in emerging Asia” under the direction of its Asian Consultative Council (ACC) to focus on the joint use of monetary, macroprudential, exchange rate and capital flow management policies to deal with capital flows and exchange rate volatility. This report is based on responses to two surveys of ACC members.

The Working Group members view ample global liquidity as the most important driver of capital flows, followed by the higher growth prospects of the recipient countries and, for some economies, capital account liberalisation. In general, exchange rates are considered important because of what they imply for monetary and financial stability, rather than because they are a target in their own right.

The members agree that the effects of the exchange rate can be summarised into three channels: trade competitiveness, pass-through to inflation, and financial channels. The trade channel and the inflation pass-through channel have become less important over time, while the financial channel has increased in importance. Moreover, the importance of the different channels is state-dependent: during normal times, no single channel is dominant across members, while the financial channel is dominant during volatile times. The overall effect is that currency depreciation is expansionary during normal times, but it is contractionary during volatile times for most members. In approximate order of importance, the largest sources of spillovers to domestic financial conditions are the monetary policy decisions of major economies, global investors’ risk appetite and the strength of the US dollar.

The member central banks’ modelling efforts, as they relate to capital flows and exchange rates, divide into two broad camps: large-scale, theory-based models used to model the macroeconomy and produce forecasts of main macro variables; and smaller-scale models with less theory behind them (eg vector autoregressions, composite indices and stress-testing exercises) used to assess financial stability risks. One reason behind this distinction is that theory-based models do not generally account for the possibility of the relationships between macroeconomic variables changing when there are threats to financial stability. Relatedly, theory-based models generally exclude the effects of policy tools other than interest rates.

Determining the appropriate policy response to exchange rates and capital flows generally relies on the careful monitoring of FX liquidity, including the speed of exchange rate change, and the effects of capital flows on asset prices, with a view to ensuring orderly market functioning. Many Working Group members report that they allow exchange rates to be flexible and market-determined during normal times, but all stand ready to intervene in FX markets in response to excessive FX volatility to maintain external stability. In addition, some are prepared to utilise capital flow management measures when intervention is insufficient. Meanwhile, reliance on macroprudential measures to target specific domestic financial stability objectives has generally increased over time.

A majority of Working Group member central banks come close to the Tinbergen principle of one instrument for one objective. At the same time, in practice, some tools can affect multiple objectives. Moreover, employing a combination of tools in a complementary manner can strengthen the effectiveness of policies, and also help to mitigate some of the unwanted side effects of policies.

The Covid-19 pandemic has served as a stress test of current policy frameworks. Central banks from the region used the full range of conventional policy tools in response to the crisis, and also expanded their toolbox, to ensure sufficient liquidity, both in their own currency and in US dollars, as well as bought assets, provided lending to key sectors and relaxed regulatory requirements, all in an attempt to prevent negative feedback loops between the real and financial sectors. Cooperation with the government has been a key element of the policy response. The member central banks generally view their responses as having delivered a positive impact on external and financial stability in the near term, but such unprecedented measures are also seen as set to have a significant impact on their economies for some time to come.

Financial channels are weaker overall for the three Working Group observers than for the members. Therefore, the implications of exchange rates and capital flows for financial stability are less of a concern.

1. Introduction

The relationship of exchange rates and capital flows with monetary policy is a critical issue for central banks in emerging Asia. Changes in advanced economy monetary policy, trade tensions and, most recently, major challenges from the economic and financial fallout from Covid-19 point to heightened uncertainty, with greater volatility of both exchange rates and capital flows going forward.

This report lays out how monetary policy frameworks in Asia have responded to volatile exchange rates and capital flows, using a rich survey of central banks in the region.¹ In addition to discussing conventional policy in the form of short-term interest rates, this report documents how foreign exchange intervention has been used to lean against undesired exchange rate developments. Some central banks have also relied on macroprudential tools and capital flow management measures at times.

The report focuses primarily on the practices of the nine central banks in emerging Asia that are members of the Working Group, while Annex A compares them against those of the advanced economies in the region that were observers of the Working Group.²

The following key findings emerge. Increasing exposure to swings in global risk appetite and increased exchange rate and capital flow volatility since the Great Financial Crisis (GFC) of 2007–09 have occasioned an evolution in Working Group member central banks' policy frameworks. The Working Group members view ample global liquidity as the most important driver of capital flows, followed by the higher growth prospects of the recipient countries. In addition, all members view the level of the effective exchange rate as crucial for trade competitiveness, while most members regard the volatility of the bilateral exchange rate against the US dollar as central to financial stability.

Among the three channels through which exchange rates affect the real economy, all members agree that the trade channel and the inflation pass-through channel have become less important over time, while the financial channel has become more important. All members recognise the financial channel as the most important during volatile times, when exchange rate depreciations tend to have contractionary effects on the domestic economy. This contrasts with more normal periods, when most members view exchange rate depreciations as expansionary due to the trade channel. Most members see advanced economy monetary policy as the most important source of spillovers to domestic financial conditions, with global investors' risk appetite and swings in the US dollar also playing a role. For the Working Group observers, the financial channel of the exchange rate is weaker than in the member economies, or could even work in the opposite direction, in part due to structural factors such as widespread hedging of FX exposures.

From an analytical point of view, the financial channel is increasingly captured in stress testing and other scenario analyses, and to a lesser extent in larger macro models. The financial channel then feeds into decision-making through considerations about the effects of exchange rates and capital flows for domestic monetary conditions and financial stability.

For most economies, the reported policy response entails allowing exchange rate flexibility in normal times, but remaining vigilant and ready to use FX intervention and/or capital flow management measures (CFMs) during episodes of excessive volatility. Indeed, all Working Group members report using FX intervention, at least occasionally, to maintain external stability. Meanwhile, reliance on macroprudential measures to target specific domestic financial stability objectives has generally increased. Moreover, a majority of Working Group members tend to use each instrument mainly with the aim of affecting a particular, well defined objective. At the same time, employing a combination of

¹ The questionnaires are contained in Annexes C and D. Sections 2 to 6 are based on survey responses received in mid-December 2019. Any policy changes since then are excluded from the discussion in this report.

² See Annex A for a comparison of the responses by the Working Group members with those by the Reserve Bank of Australia and the Reserve Bank of New Zealand and, in the case of responses to Covid-19, also the Bank of Japan.

tools in a complementary manner can strengthen the effectiveness of policies, as suggested by the large number of instruments that many central banks report using to maintain external stability.

The Covid-19 pandemic has served as a stress test of current policy frameworks. To manage public health risks, governments have taken drastic measures, including lockdowns and social distancing rules, which have frozen domestic economic activity to varying degrees. Disruptions in global value chains, in turn, have led to plummeting exports, investment and consumption. The overall effect is extraordinarily adverse monetary and financial conditions. Central banks from the region responded forcefully. They used the full range of conventional policy tools in response to the crisis, including policy rate cuts, reserve requirement reductions, increased liquidity injections using repos, and intervention in FX markets. They also expanded their toolbox to ensure sufficient liquidity, both in their own currency and in US dollars, bought assets, supported lending to key sectors, especially to small and medium-sized enterprises (SMEs), and relaxed regulatory requirements. Meanwhile, financial stability policies were adapted to facilitate continued access to funding. Several of these policies required high levels of cooperation with governments and other financial authorities.

This report is structured as follows. The next section provides background as to why exchange rates and capital flows matter for policy, followed, in Section 3, by central banks' views on the different transmission channels. Section 4 reports on the analytical frameworks in place at central banks to assess exchange rates and capital flows, while Section 5 discusses the information that staff provide to decision-makers to inform their views. In Section 6 we examine how central banks respond to exchange rate volatility and capital flows in terms of the choice of policy tools, the ordering of their use and calibration of the response. Section 7 provides an early evaluation of how monetary policy frameworks fared during the fallout from the Covid-19 pandemic. Finally, Section 8 offers some concluding comments.

2. Why exchange rates and capital flows matter for policy

This section discusses the reasons central banks give for focusing on capital flows and exchange rates. The **volatility of capital inflows** into emerging Asia is perceived to have increased since the GFC, posing challenges for central bankers seeking to insulate their economies from destabilising external shocks.

In addition to the increase in volatility cited by most Working Group members (Table 1), the high level of inflows is seen as important for Thailand. China notes that sharp exchange rate fluctuations and large capital flows would threaten financial stability and have negative real economic consequences. In Korea these developments have been partially mitigated through the strengthening of FX sector macroprudential policy measures, and in Malaysia through restrictions on the facilitation of speculative offshore FX trading. In the Philippines, Bangko Sentral ng Pilipinas (BSP) reports that the volatility of foreign direct investment (FDI) inflows has decreased even as their level has increased. Bank Indonesia (BI) cites the high growth of short-term flows.

Key contributors to these capital flow developments include global liquidity, differential growth prospects and structural reforms in the region, including the easing of capital account restrictions (Table 1). Most respondents cite **ample global liquidity**, reflecting advanced economies' expansionary monetary policies and especially quantitative easing, as an important driver of portfolio inflows. In addition, relatively advantageous **growth prospects** for the region have attracted capital in search of higher returns, notably in Indonesia, Malaysia, the Philippines and Singapore. A final factor mentioned by some respondents is **structural reforms, in particular capital account liberalisations**, within emerging Asia. According to the central banks surveyed, such reforms have made the region a more attractive destination for some kinds of flows, and increased financial integration.

Why exchange rates and capital flows matter for policy

Table 1

	Increasing exchange rate volatility (Y/N) Increasing exposure to global risk-on, risk-off dynamics (Y/N)		Key factors driving capital flows and exchange rates by rank (1 = highest)			Which exchange rate matters more:				
						For competitiveness		For financial stability		
			Ample global liquidity	Higher growth prospects	Structural changes in Asia ¹	Effective (trade-weighted) exchange rates	Bilateral (USD)	Level (L) or volatility (V)?	Effective (trade-weighted) exchange rates	Bilateral (USD)
CN	Y	Y	1	2		√	L		√	V
HK	Y	Y	1	2		√	L		√	L
ID	Y	Y	1	2		√	L		√	V
IN	Y	Y	1	2	3	√	L		√	V
KR	Y	Y	1	2		√	L		√	V
MY	Y	Y	1	2		√	L		√	V
PH	Y	Y	1	2	3	√	L		√	V
SG	Y	Y	1	1	3	√	L		√	V
TH	Y	Y	1	2		√	L		√	V

¹ Including the easing of capital account restrictions.

The easing of capital flow restrictions has allowed increased borrowing from abroad. In India, regulations on the use of external borrowing were relaxed, encouraging inflows. Banks have also become more regionally integrated. In the Philippines, the expansion of foreign banks accounts for half of all FDI inflows into the financial intermediation sector, while external funding of banks more widely has also increased.

One consequence of increased financial integration is **greater exposure to global risk-on, risk-off dynamics**. While the build-up of inflows tends to be gradual, their reversal can be sudden and destabilising, as illustrated by the taper tantrum episode. The growing role of global asset management companies and benchmark tracking funds is also cited by the Central Bank of Malaysia (CBM) as a source of greater co-movement in asset prices across the region. By contrast, the Monetary Authority of Singapore (MAS) reports that institutional investors have tended to act countercyclically in Asian bond markets and thus to support financial stability. Even then, not all economies are treated equally: Thailand, with the perception of being a relative safe haven, has seen capital inflows even during risk-off periods. More generally, most jurisdictions cite a preference for longer-term investors and direct investment over portfolio flows to try to limit destabilising dynamics.

With increased international financial exposures – especially in the form of external funding in foreign currency or foreign investment in local currency assets – both exchange rates and capital flows have become increasingly **important inputs into domestic policy discussions**. Exchange rates are key for policy, not because they are themselves a policy target or instrument (except, notably, in Hong Kong SAR and Singapore) but **because of what they imply for monetary and financial stability**, including the effective transmission of monetary policy. Capital flows are important drivers of interest rates and asset prices, including the exchange rate, which in turn influence the quantity and price of trade and, via exchange rate pass-through, the overall price level.

So, while most central banks characterise exchange rates as being primarily market-determined, they report a **role for policy intervention to avoid excessive FX and capital flow volatility**. Volatile capital flows pose particular risks to financial stability. Many respondents point out that large capital outflows tighten financial conditions and may affect financial intermediation and hence the effective stance of monetary policy, leading to a reliance on macroprudential or capital flow management measures. In the case of the Hong Kong Monetary Authority (HKMA), with foreign exchange interventions triggered automatically under the Linked Exchange Rate System (LERS), macroprudential measures are the primary means of discretionary intervention.

Most central banks rely on **multiple ways of measuring exchange rate** movements to inform different aspects of their policy discussions. **Nominal** and/or **real effective exchange rates** (NEER/REER) are used to assess competitiveness, and hence the real effects of the value of the currency, in all member jurisdictions (Table 1). In Singapore, the NEER is also the monetary policy instrument, and intervention is used to ensure that the NEER stays within a path projected to be consistent with medium-term price stability.

The **bilateral exchange rate against the US dollar** plays a pre-eminent role in Hong Kong SAR due to the LERS, but it is also important elsewhere due to the dollar's dominance as an invoicing currency and use in trade finance. Moreover, the bilateral exchange rate is important for comparing asset returns, such that large changes may trigger destabilising financial dynamics. Furthermore, as an easily understood price, particular levels of the bilateral US dollar exchange rate can play psychological roles.

Most jurisdictions stress the importance of higher moments – the **volatility and/or rate of change in the exchange rate** – as important variables in considering intervention, primarily due to the implications for tail risks and financial stability (Table 1). The Bank of Thailand (BoT) notes that while too much exchange rate volatility is clearly costly, too little volatility will deter financial market development, including the availability and use of hedging instruments, and can encourage destabilising hot money inflows from non-resident investors.

In summary, exchange rates and capital flows play a key role for monetary policy for most Working Group members, and one that has been increasing in importance since the GFC. We next discuss the transmission channels via which they affect the economy.

3. Transmission channels

This section discusses the different transmission channels of exchange rates and capital flows to the wider economies in emerging Asia, as highlighted in questionnaire responses. Exchange rates and capital flows affect the economy through three main mechanisms: trade competitiveness, pass-through to inflation, and financial channels. The relative strength of these three channels evolves over time. A priori, the overall effects of exchange rate changes are likely to be multiple and state-dependent.

Exchange rate depreciations tend to increase competitiveness due to their effect on export prices, import prices and firm profits, and hence support net export increases and economic growth. The price effects may be somewhat muted by firms seeking to protect their market shares, and can be weakened when exchange rate volatility is high. Larger firms may be able to offset some of these effects through hedging, whereas SMEs are likely to face greater consequences from exchange rate changes. The size of these effects also depends on the structure of the economy. In Indonesia, exports and investment rely heavily on imported raw materials and capital goods, so that a weaker domestic currency does not necessarily lead to an increase in exports and output, and may actually reduce growth. In the Philippines, remittances are a persistent source of foreign income that affects a large share of the population and tends to increase in response to a depreciation.

Exchange rate depreciations also imply increased prices of imports which, via **exchange rate pass-through**, fuel higher rates of domestic inflation. For India, a 10% depreciation of the trade-weighted rupee is estimated to translate into a 1.5 percentage point increase in headline inflation in 2014, and the exchange rate pass-through had increased over time up to 2014 due to greater openness and exchange rate volatility. However, exchange rate pass-through has since declined. In Thailand, pass-through is most clearly observed for oil prices, with an asymmetric effect: lower oil prices bring down inflation, whereas the effects of oil price rises tend to be offset by domestic oil subsidies. For the HKMA, any disequilibrium in the foreign exchange market is corrected primarily through the adjustment of wages and prices, given the LERS.

The central banks surveyed generally perceive that, over time and with economic development, the macroeconomic importance of both exchange rate pass-through and export competitiveness has tended to decline across the region (Table 2).

Transmission channels Table 2

	Becoming more (M) or less (L) important through time?			Ranking of importance during normal times (1 = highest)			Ranking of importance during volatile times (1 = highest)			Depreciation is expansionary (E) or contractionary (C) during...		Sources of spillovers to domestic financial conditions; ranking of importance (1 = highest)			
	Trade competitiveness			Trade competitiveness			Trade competitiveness			...normal times	...volatile times	Monetary policy decisions of major central banks	Global investors' risk appetite	USD appreciation or depreciation	Changes in AE regulatory frameworks, inflation rates and bond yields
	Pass-through to inflation	Financial channels		Pass-through to inflation	Financial channels		Pass-through to inflation	Financial channels							
CN	L	L	M	1	3	2	2	3	1	E	E	1	3	2	4
HK	L	L	M	1	3	2	2	3	1	E	E	1	1	1	4
ID	L	L	M	1	3	1	2	3	1	C	C	2	1	2	2
IN	L	L	M	2	1	3	3	2	1	E	C	1	1	1	4
KR	L	L	M	1	2	3	2	3	1	E	C	1	3	2	4
MY	L	L	M	1	3	2	2	3	1	E	C	1	1	3	4
PH	L	L	M	2	1	3	3	2	1	E	C	1	1	3	4
SG	L	L	M	2	1	3	2	2	1	E	C	1	4	2	3
TH	L	L	M	1	2	3	2	3	1	E	E	1	3	2	4

Capital flows work through multiple channels. First, capital outflows exert downward pressure on the price of domestic currencies, increasing competitiveness and boosting inflation pressures. Second, capital flows have important financial effects. These financial channels in general work in the opposite direction to the competitiveness channel, and may contribute to resource misallocation. Outflows are associated with revaluations of foreign currency-denominated assets and liabilities. In economies with net short foreign currency positions, the negative wealth effect tends to lead to credit contractions. Even if there is no foreign currency debt, exchange rate depreciation may be contractionary if sovereign yields rise when the local currency depreciates. Capital inflows, in contrast, contribute to asset price overvaluation and excessive risk-taking. The effects of capital flows on asset

prices tend to be self-propagating, and can influence the real economy through wealth effects and collateral channels. Market expectations about the direction and volatility of capital flows and exchange rates have an important role to play in this context. In Singapore, easier domestic financing conditions associated with capital inflows can encourage overinvestment, especially in real estate. In the Philippines, a period of strong capital inflows following the GFC saw a divergence in market interest rates from the policy rate due to excessive liquidity growth, necessitating refinements to the monetary policy framework.

Central banks see the financial channels of the exchange rate as having important **financial stability implications**, especially at times of large depreciations driven by sudden changes in the risk appetite of global investors. Large appreciations, when driven by capital inflows, also have negative effects – artificially boosting asset prices and causing resource misallocations. Most of the time, when exchange rate movements are modest, competitiveness and inflation channels receive the most focus. But larger changes in capital flows and exchange rates lead to financial stability tail risks and negative effects on growth. In Thailand, these effects work through prices in bond and equity markets. The Bank of Korea (BoK) reports that the effects of the financial channel on real economic variables have declined since the GFC due in large part to a persistent current account surplus and macroprudential policy measures that have reduced foreign loans to the banking sector. In Singapore and Thailand, financial channels appear to have been more muted recently.

Sensitivity to all three channels varies by both the size of the economy and the extent of the exposures that the economy faces. In particular, the size of financial channels reflect balance sheet compositions, the level of foreign participation in domestic asset markets, exposure to foreign currencies, and the responsiveness of capital flows. For China, the People's Bank of China (PBC) reports that the size of the country's economy and levels of foreign participation in domestic capital markets impact all three channels. The BoT finds that the financial channel was the most important one at the time of the regional crisis (in 1997–98), but its prominence subsequently declined as the dependence on external funding fell. More generally, a heavy reliance on external funding, whether in terms of foreign currency borrowing or foreign investment in local currency bond markets, is seen to complicate the transmission of exchange rate and capital flow shocks.

Taking all the channels together, most central banks consider **exchange rate depreciations to be expansionary during normal times**, and the exchange rate to work as a shock absorber during such periods (Table 2). However, **the dynamics switch with large exchange rate fluctuations and capital outflows**, when non-linear dynamics, working through amplification mechanisms, strengthen financial channels. Further, several central banks mention that depreciations tend to be contractionary when the economy is slowing.

Different factors, however, are highlighted for different economies. For India, as a net commodity importer, the exchange rate generally acts as a shock absorber, although may act as a shock amplifier when conditions are volatile. For the Philippines, buffers built into the economy against external shocks have reportedly allowed the central bank to avoid reacting aggressively to exchange rate developments without a deterioration in macroeconomic performance.

Another way to interpret the survey responses is in terms of the implications for financial stability. Whereas small shocks are of little importance, **large exchange rate and capital flow shocks have a material effect on financial stability**, especially in the presence of currency mismatches, requiring different policy responses. Memories of 1997–98 remain informative for how policymakers in the region think about these issues. In many jurisdictions, financial stability concerns are the basis for attempts to reduce exchange rate volatility. In some, macroprudential tools play an important role. In Singapore, the monetary policy framework automatically implies a stronger response to large, disorderly shocks: a policy band around the target exchange rate path provides room for the exchange rate to fluctuate in response to modest shocks, but triggers intervention in the short term if the exchange rate swings sharply towards the boundaries of the band.

Regional central banks see the **financial spillovers from advanced economy monetary policy, and the bilateral exchange rate against the US dollar in particular**, as key drivers of domestic financial conditions (Table 2). The most important mechanism for this is through the effect of advanced economy monetary policy on global risk appetite. BSP reports, for example, that US monetary policy and the global risk appetite (proxied by the VIX) affect foreign portfolio inflows, equity returns and domestic credit growth. US quantitative easing policies saw large, sharp increases in gross foreign portfolio inflows. For the CBM, capital flows at risk (defined as downside risks to capital outflows under a severe adverse shock) indicate that global factors such as investor risk aversion and broad dollar strength are significant predictors of large capital outflows. The HKMA was concerned that the taper tantrum would result in serious financial market disruption, in particular in the FX swap market, if it led to a dollar shortage in the global financial markets. Liquidity risks associated with the flow of international US dollar credit can be high due to the non-linear dynamics they can generate, and can pose significant ongoing challenges for policymakers.

Changes in regulatory frameworks in the advanced economies also play a role, as mentioned by India, Indonesia, Korea, the Philippines and Singapore: regulation affects risk sentiment and the degree of global liquidity, and hence influences financial conditions globally.

4. Modelling and analytics

Using the survey responses on the transmission channels discussed in Section 3 as a backdrop, this section outlines the modelling and analytics mentioned by central banks as being useful for assessing exchange rate dynamics and capital flows. Models are used to produce forecasts, conduct policy simulations, compare different scenarios, provide structure to policy discussions and measure policy effectiveness. Most respondents rely on multiple types of models, including some that are largely empirical in nature (eg based on vector autoregression (VAR) models or error correction mechanisms (ECMs)), and others that have New Keynesian theoretical foundations. Models intended to address longer-horizon questions tend to be more structural in nature, while shorter-term forecasting models are primarily empirical.

The types and use of models are linked to the monetary policy frameworks whose decisions they inform. For economies where the exchange rate plays a central role, **exchange rate objectives are generally derived based on models**. For example, MAS utilises a suite of models that includes a computable general equilibrium model, a reduced-form dynamic stochastic general equilibrium (DSGE) model and a variant of the global VAR model. These models incorporate key macroeconomic variables, including the exchange rate as the monetary policy instrument.

Forecasting inflation occupies a core role in modelling efforts, especially for economies with inflation targets such as Korea and the Philippines. Models provide a means to translate exchange rate and capital flow behaviour into implications for inflation outcomes at horizons appropriate for both setting policy and assessing the performance of the inflation targeting framework. The BoK relies on three different models to analyse the effects of exchange rates and capital flows on domestic variables. BSP uses a multi-equation model based on ECMs for comprehensive assessment of the inflation outlook, and less structural approaches for short-term nowcasting. At the CBM, partial equilibrium models based on the Phillips curve are applied to forecast inflation over a one- to two-year horizon, while autoregressive integrated moving average (ARIMA) models are used for shorter horizons.

Most central banks also **rely on a suite of different models** to improve their understanding of exchange rate behaviour and gauge the effects of shocks, **and a mixture of calibration and estimation** (Table 3). The more theoretically grounded models generally have New Keynesian foundations and, in the cases of India and the Philippines, are based on the Forecasting and Policy Analysis System developed in consultation with the International Monetary Fund. They feature a forward-and-backward-

looking Phillips curve and monetary policy described using an augmented Taylor rule. These models allow the assessment of the dynamic path of key macroeconomic variables in a theoretically consistent manner. BSP also uses a DSGE model incorporating financial frictions in the form of a credit constraint on banks' balance sheets as a complementary tool to assess both monetary policy and macroprudential regulation. The BoT relies on both a semi-structural DSGE model and an ECM-based model. Meanwhile, the CBM applies a structural VAR model to capture the transmission channels through which capital flows and exchange rate movements affect key domestic real and financial variables.

Empirical models are used in many jurisdictions to assess financial stability risks (Table 3). Most of the theoretically based models discussed above are linear in macroeconomic variables, and hence not well suited to assess episodes of financial instability. Thus, other approaches are used instead. For example, the HKMA uses a VAR-based Financial Conditions Index (FCI) to track overall financial conditions and draw macro-financial implications. Similarly, MAS uses an FCI along with a Financial Vulnerabilities Index and Growth-at-Risk for financial stability purposes. The BoK compiles a Financial Stability Index based on 20 variables to comprehensively assess the stability of financial markets and financial institutions, and also uses a foreign currency liquidity stress test model to analyse the impact of abrupt capital outflows in times of crisis through scenario analyses. BSP uses the Philippine Composite Index of Financial Stress, composed of 13 indicators, as an early warning indicator.

Modelling and analytics

Table 3

	Primary means for forecasting inflation and output		Primary means for assessing risks to financial stability		Regarding primary structural model:	
	Large-scale structural models (eg DSGE)	Small-scale empirical models (eg ECM, VAR)	Large-scale structural models (eg DSGE)	Small-scale empirical models (eg ECM, VAR)	Assumes uncovered interest parity (UIP)? (Y/N)	Captures FX intervention, CFM and macroprudential tools? (Y/N)
CN	√			√	N	N
HK	√			√	Y	N
ID	√			√	Y	Y
IN	√			√	Y	N
KR	√			√	Y	N
MY		√		√	Y	N
PH	√			√	Y	N
SG	√			√	Y	N
TH	√			√	Y	N

Another use of models at some central banks is to **estimate the equilibrium exchange rate**, either to assess the degree of exchange rate misalignment or for more general monitoring purposes. This continues even as trade competitiveness channels are perceived to have weakened in recent years. Central banks generally rely on several different measures, which can give very different answers. Some, such as those used by Hong Kong SAR, Malaysia and Thailand, are based on estimating the value of the REER that may be justified based on fundamentals, be they the terms of trade and productivity differentials, a sustainable current account or stabilising net foreign asset positions. In Indonesia and Singapore, consistency with inflation objectives is also a consideration. BSP relies on a number of empirical models, including deviations from a long-run trend, ARIMA and VAR models.

Within the models, **exchange rates are assumed to affect the economy through** two main channels: the value and volume of **trade** and, via exchange rate pass-through from the prices of commodities and/or other imports, the **overall price level**. The pass-through channel has been seen to weaken in several economies over time as inflation performance has improved. But **key relationships involving financial channels are not part of workhorse macro models**, and are typically missing

from those models used at central banks that have theoretical foundations. For instance, uncovered interest parity (UIP) is an assumption made by most members (Table 3). Further, interactions among the different policy tools – especially capital flow management tools and foreign exchange intervention – are generally not explicitly modelled. Where there is room for judgment in the calibration of model inputs, they can be implicitly taken into account. In some economies, such as India and the Philippines, work is ongoing to incorporate these effects more explicitly. Such absences from models are hard to avoid, given the complexity of the underlying relationships, leaving an important role for judgment in assessing the output of models.

5. Monitoring indicators and information provided to decision-makers

This section discusses the survey respondents' description of information that is made available to policymakers – partly arising from the modelling efforts discussed in Section 4 – in order for them to decide how to respond to exchange rates and capital flows. We discuss the various indicators that central banks monitor and the rationale for paying attention to them, focusing first on measures of FX liquidity and then on other financial market and macroeconomic indicators.

In response to the questionnaire, central banks report that **they monitor various FX liquidity and market development indicators** on a regular basis. While the list of indicators is long, it includes both price and quantity indicators: those in spot and derivatives markets, as well as demand for FX by both residents and non-residents. It also features factors that affect supply and demand in the FX market, such as import and export data, and FX flows stemming from current, capital and financial transactions. The liquidity indicators that are being monitored include FX volumes, bid-ask spreads on currencies, measures of FX volatility, and data on net open positions related to FX.

The central banks report that they monitor FX liquidity largely with a view to **promoting orderly market functioning** (Table 4). This objective features prominently in responses by most central banks, although details vary across the economies. In the case of Malaysia, the central bank's financial stability mandate includes maintaining orderly market conditions. The BoK notes that foreign currency liquidity conditions affect the currency and rollover risks of non-financial corporations and financial institutions with foreign currency-denominated liabilities. In China, low levels of FX liquidity can be seen as hindering the normal operation of the foreign exchange market and price discovery. And, in the case of the Philippines, BSP assesses FX liquidity in terms of its implications for price stability and financial stability, including the orderly functioning of markets.

At the same time, some central banks monitor FX liquidity also because of its **exchange rate implications**. Indeed, the RBI argues that, while important for orderly market functioning, FX liquidity will have a bearing on the exchange rate. BI reports that developments in FX liquidity may generate exchange rate dynamics of overshooting and undershooting. In Thailand, US dollar funding liquidity affects the exchange rate and market functioning through the Thai baht implied swap rate. Additionally, US dollar liquidity is one of the key determinants of the BoT's FX swap operations. By contrast, in Hong Kong SAR, the rule-based exchange rate regime is seen to provide the basis for currency stability, rendering FX liquidity less directly relevant for either the exchange rate or orderly market functioning.

Not surprisingly, decision-makers are provided with a **broad spectrum of macroeconomic and financial market indicators** to inform their views. These indicators comprise a number of risk factors and vulnerabilities, as well as forecasts, typically of key macroeconomic variables. The CBM mentions the use of scenario analyses on both exchange rates and capital flows. For capital flows, this includes the adequacy of international reserves and the estimated impact on various macroeconomic and financial indicators under stressed conditions. The indicators provided to policymakers can vary with the state of the economy: in the case of China, the PBC dynamically adjusts indicators according to economic and financial developments.

Information for decision-makers

Table 4

	Do you monitor FX liquidity because of its implications for...		Macro forecasts provided with horizon of one to two years (Y/N)			
	...the exchange rate?	...orderly market functioning?	Inflation	Output	Exchange rate	Capital flows
CN	N	Y	Y	Y	N	N
HK	N	N	Y	Y	N	N
ID	Y	Y	Y	Y	Y	Y
IN	Y	Y	Y	Y	N	N
KR	Y	Y	Y	Y	N	N
MY	N	Y	Y	Y	Y	Y
PH	N	Y	Y	Y	Y	Y
SG	N	Y	Y	Y	N	N
TH	Y	Y	Y	Y	Y	N

At some central banks, in addition to other macro variables, decision-makers are provided with **forecasts of exchange rates and capital flows** (Table 4). In the case of Indonesia, this includes a projected path for both the exchange rate and the financial account of the balance of payments; for Malaysia and the Philippines, the outlook for both capital flows and exchange rates. At the BoT, model-based simulations are occasionally used to assess the effect of the Thai baht exchange rate on the economic outlook. A number of central banks report that the typical forecasting horizon for macroeconomic variables is two years.

In addition to forecasts, exchange rates and capital flows also feature in stress testing, vulnerability analyses and other assessments that are reported to decision-makers. The **effects on financial stability** are prominent. In particular, in Korea, Malaysia and the Philippines, policymakers receive information about the implications of exchange rates and capital flows for domestic financial stability. In the case of the CBM, this information includes implications for the institutional resilience of the banking system and the need for prudential guidelines or supervisory intervention. At the BoT, assessments about the sensitivity of the economy to the exchange rate are provided to decision-makers. Moreover, in India, Korea, Malaysia, the Philippines and Thailand, among others, the decision-makers in monetary policy meetings receive information on exchange rate developments.

Central banks also use **model-based simulations** to compare the effects of alternative policy decisions. At some central banks, including those of Indonesia, India, Korea, the Philippines and Singapore, these simulations are done regularly, to coincide with policy meetings. Sometimes they are undertaken without a predetermined schedule, should risk assessments or other factors suggest a need. At the CBM, simulations are used as a complement to the overall risk assessments. In the case of the BoT, they are employed to assess the impact of the exchange rate on the economic outlook. At the same time, the BoT notes that the results from such simulations are used with caution, as the models require a number of assumptions and cannot address uncontrollable market factors.

In regimes where the exchange rate is targeted, **information related to intervention activity** is important. In Hong Kong SAR, a currency board subcommittee, which is responsible for ensuring that the currency board's operations are in accordance with established policy, reviews reports on intervention operations, and also risk and vulnerability reports. The subcommittee may also recommend improvements to the currency board system and ensure a high degree of transparency in its operation. Similarly, at MAS, decision-makers receive information on FX intervention operations and market developments in regular reports on the implementation of monetary policy.

We now turn to how this information is used by policymakers, in terms of formulating policy responses.

6. Responding to exchange rate volatility and capital flows

This section examines how central banks describe their responses to exchange rate volatility and capital flows in terms of the choice of policy tools, the ordering of their use and the calibration of the response. Working Group members have used a mixture of policy tools in pursuit of their policy objectives, including interest rates (Annex Graph B1), intervention in FX markets (as proxied by changes in FX reserves and net forward positions; Graph B2), CFMs (Table B1) and macroprudential measures (Table B2).

6.1 When and how central banks intervene in FX markets

Many central banks in the region **allow their exchange rates to be flexible and market-determined during normal times**. For India, Korea, Malaysia, the Philippines and Thailand, the exchange rate generally works as a shock absorber, so that the initial response in the face of exchange rate pressures is to let the exchange rate move. Another consideration is that central banks may be willing to accommodate persistent exchange rate movements due to productivity advances – for example, while seeking to offset more temporary fluctuations. Of course, Hong Kong SAR and Singapore differ from other economies in the region, as the exchange rate plays a role as a target.

That said, even central banks with flexible exchange rates stand **ready to intervene in response to excessive FX volatility**. Notably, all Working Group members report using FX intervention, at least occasionally, to maintain external stability (Table 5). Indeed, the BoT notes a willingness to trigger FX intervention to ensure that markets function well. The RBI intervenes in response to excessive volatility, while the CBM's interventions are driven by an assessment that excessive and volatile FX movements create risks. In addition to tempering sharp fluctuations by FX intervention, BSP mentions that, when warranted, the central bank provides liquidity and ensures that legitimate demands for FX are satisfied.

While many central banks monitor measures of equilibrium exchange rates (Section 4), the level of the real exchange rate is not itself a direct objective of policy. However, policy responses may be considered warranted if inflation or financial stability objectives are threatened.

Besides intervention in spot markets, other markets also play a role. For instance, the RBI does operations in over-the-counter and exchange-traded currency derivatives markets, while the BoT also mentions verbal intervention.

When intervention is insufficient, some authorities are also **willing to use CFMs in response to large FX movements**. Three Working Group members report that they have CFMs in their policy frameworks (Table 5). The BoT mentions that if FX volatility results from speculative flows from non-residents, appropriate CFMs are considered. BI may use CFMs in combination with interest rate policy when there is persistent exchange rate volatility. Similarly, the RBI's past interventions were often combined with CFMs to help ensure that reductions in FX volatility are durable. Regarding other central banks, the CBM has not used CFMs for external stability post-GFC, but they remain an option in the policy toolkit.

Instruments and policy objectives in the policy framework (pre-Covid-19)

Table 5

Objective and instruments	CN	HK	ID	IN	KR	MY	PH	SG	TH
External stability (including exchange rate stability and capital flow issues)									
CFM			√	√					√
FX intervention	√	√	√	√	√	√	√	√	√
Intervention in bond and money markets			√						
Macroprudential measures	√			√	√		√		
Policy interest rates			√				√		√
Capital account liberalisation, excluding (cyclical) CFMs				√		√	√		√
Liquidity provision						√	√	√	
Domestic financial stability									
CFM									
FX intervention									
Intervention in bond and money markets									
Macroprudential measures	√	√	√	√	√	√	√	√	√
Policy interest rates					√				√
Capital account liberalisation, excluding (cyclical) CFMs									
Liquidity provision				√					
Macroeconomic stability (including price stability)									
CFM									
FX intervention								√	
Intervention in bond and money markets									
Macroprudential measures		√						√	
Policy interest rates	√		√	√	√	√	√		√
Capital account liberalisation, excluding (cyclical) CFMs									
Liquidity provision									

6.2 Determining the response to capital flows

Central banks do not treat all capital flows equally: some require stronger responses than others.

Two relevant dimensions relate to the **types of flow** and the **types of investor**. Five out of nine Working Group members report that policy responses depend on either or both aspects (Table 6). For example, Korea applies macroprudential limits on financial institutions' short-term FX positions, including on currency-related derivatives. This is done to curb risks from the foreign currency borrowing of financial institutions, as well as to encourage them to lengthen the maturity structure. The BoT, meanwhile, is likely to use CFMs when capital flow volatility arises from the behaviour of non-resident investors, such as from speculative short-term flows from non-residents. In China, the financial sector has been opened up in order to promote more stable two-way flows, with recent measures covering institutions such as wealth management companies and pension funds.

For the CBM, the policy response to exchange rate- and capital flow-related risks depends on the **source of stress**, as each episode of exchange rate depreciation or volatility is different. During 2014–15, when the economy saw large non-resident capital flows and there was a terms-of-trade shock,

the authorities allowed the exchange rate to adjust flexibly as a shock absorber. By contrast, during the capital flow reversal of late 2016 there were spillovers from more opaque markets (eg for non-deliverable forwards) as well as imbalances in the domestic FX market, leading the authorities to take additional measures to maintain orderly FX market conditions. These considerations are consistent with the more general point that some of the variation in policy responses across countries reflect differences in the macroeconomic and financial environments that these countries face.

Aspects of policy frameworks

Table 6

	CN	HK	ID	IN	KR	MY	PH	SG	TH
One tool is (mainly/strictly) assigned to each objective (one-to-one mapping)		√			√	√	√	√	√
There is a preferred order in using the tools	√		√	√	√				√
Policies to manage capital flows or exchange rate volatility have unwanted side effects			√			√	√		√
Policy response depends on types of capital flow/types of investor	√		√	√	√				√

6.3 Responses to exchange rate volatility and capital flows within the evolving policy framework

Applying a combination of policy tools to address macroeconomic and financial stability risks, while following an inflation target, is characteristic of monetary policy in the post-GFC period for many regional economies. One common feature, as noted by BI, is policy responses to risks associated with capital flows and exchange rate dynamics. Another is the introduction of additional instruments, including FX-related macroprudential measures by the BoK. The ordering of the different policy tools is also highly relevant – five Working Group members state that they have a preferred order of using the instruments in their toolbox (Table 6).

Yet, post-GFC, the policy mix shifted also in economies that were not explicitly targeting inflation. As noted by the CBM, the changing nature of risks necessitated a broader range of policy options to address them. For instance, the PBC and MAS introduced macroprudential measures to contain risks related to short-term capital flows.

In these post-GFC frameworks, emerging Asian central banks tend to use each instrument mainly with the aim of affecting a particular, well defined, objective. This feature – mentioned in six survey responses – is **consistent with the Tinbergen principle** (Table 6). Specifically, while there is some variation across institutions, monetary policy is generally aimed at maintaining macroeconomic stability; macroprudential policy at dealing with identified threats to domestic financial stability; and FX intervention, at times together with CFMs and other tools if necessary, at targeting external stability.

However, strict compliance with the Tinbergen principle is impossible because, as the BoT mentions, in practice some **tools affect multiple objectives**. Approaching the zero lower bound can also complicate trade-offs. MAS discusses that while macroprudential policy is primarily meant to address systemic financial risks, it can straddle multiple objectives, as asset prices matter for both price stability and financial stability. The RBI makes use of macroprudential tools for both external and domestic financial stability purposes. Using a combination of tools in a complementary manner can also strengthen the effectiveness of policies, as suggested by the large number of instruments the central banks report employing to maintain external stability (Table 5). Finally, BI notes that its instruments are not strictly assigned to singular objectives.

6.4 Unwanted side effects and policy constraints

Central banks also acknowledge unwanted side effects of the different tools used to manage capital flows and exchange rate volatility (Table 6).

Many side effects relate to FX intervention. BSP discusses the potential **financial losses** that stem from valuation changes and sterilisation costs. The BoT mentions that FX intervention reduces the private sector's incentives to manage exchange rate fluctuations with proper hedging tools, and could also lead to trade disputes and accusations of currency manipulation. In addition, excessive FX intervention could lead to price distortions and inhibit market efficiency. At the same time, not intervening could also have unwanted consequences: the BoT argues that excessive exchange rate volatility may deter economic agents' adjustments and have adverse implications for the economy.

Liberalised capital flows can also lead to unwanted dynamics. While the objective of liberalisation is to encourage greater two-way flows, domestic firms may be reluctant to repatriate assets from abroad during periods when the domestic currency is depreciating and capital is flowing out from the economy.

Further, central banks acknowledge various constraints in the use of the different tools. **Limits to FX intervention** can be binding, due to either the size of the central bank's balance sheet (capital or FX reserves) or the cost of sterilisation.

If the necessary **tools are outside the central bank**, policy responses could also be constrained. Yet central banks document various ways in which this concern, relevant especially for financial stability policy, is being alleviated. In Indonesia, the central bank maintains close coordination with financial regulators, the ministry of finance and other ministries in order to ensure aligned and coordinated policies. Similarly, MAS reports a relatively high degree of coordination across the different agencies to prevent policy conflicts or arbitrage. And, the RBI notes that formal and informal coordination mechanisms exist to deal with overlaps with other regulatory agencies.

6.5 Role for international cooperation

Moving beyond domestic frameworks, member central banks consider international cooperation and information-sharing useful when responding to capital flows and exchange rates. India notes that **cooperation helps to ensure that central banks obtain timely signals** and it facilitates faster policy responses, while BSP mentions that **varied experiences from different economies help assess policy responses** to different scenarios. That said, MAS argues that domestic price and financial stability objectives should in general not be compromised by international cooperation or coordination considerations.

The region's central banks are already active internationally along a number of dimensions. **Policy discussions** with other central banks, including those coordinated by regional and international organisations, play a key role. Another important component of cooperation is the **financial arrangements and safety nets among regional central banks**, such as the Chiang Mai Initiative Multilateralisation and repurchase agreements between EMEAP members. Moreover, arrangements for local currency settlement for trade and investment within ASEAN have been put in place.

As it is, central banks see the potential for further international cooperation. In its survey response prior to the Covid-19 outbreak, the RBI mentioned the possibility of **swap lines between advanced and emerging market economies** (see also Section 7). MAS also argues that policy cooperation or coordination could be in the area of **global safety nets** comprising multilateral swap lines and/or repurchase agreements. More generally, the RBI calls for greater recognition of the spillover effects of advanced economy monetary policies to emerging market economies.

7. Policy frameworks during Covid-19: a stress test

Prior to the Covid-19 pandemic, member central banks largely considered their current toolboxes to be adequate for responding to capital flow and exchange rate shocks, as well as domestic developments.³ However, some central banks were actively exploring the potential for new tools. For the BoT, this was motivated by limited policy space due to a historically low policy rate.

Then came Covid-19, perhaps a once-in-a-century shock that was not likely to be within the planning parameters of any policymakers. One interpretation of the impact of the pandemic on central banks is of a **real-life stress test of their existing policy frameworks**.⁴ To manage public health risks, governments have taken drastic measures, including lockdowns and social distancing rules, which have frozen domestic economic activity to varying degrees. Disruptions in global value chains, in turn, have led to plummeting exports, investment and consumption. Central banks responded forcefully, aiming to preserve jobs, avoid bankruptcies, and keep markets functioning and credit flowing. In contrast to previous crises, many of the measures being undertaken by the member central banks parallel those adopted in the large advanced economies. Monetary authorities have expanded liquidity provision (including in US dollars), announced large asset purchases and established lending programmes targeted at sustaining credit to the private non-financial sector (Table 7). Meanwhile, financial stability policies were adapted to facilitate continued access to funding, against concerns about the solvency of borrowing households and firms.

Responses to the Covid-19 pandemic

Table 7

	Cut policy rates	Increased domestic liquidity				FX		Introduced or conducted asset purchases	Supported lending to SMEs / key industries	Relaxed regulatory/ supervisory requirements, including macroprudential rules
		Lowered reserve requirements	Relaxed collateral constraints on lending facilities	Injected additional liquidity (eg through repo operations)	Reduced liquidity withdrawal	FX intervention	USD liquidity provision			
CN	√	√	√	√				√	√	
HK	√				√	√		√	√	
ID	√	√	√	√	√	√	√		√	
IN	√	√		√	√	√	√	√	√	
KR	√		√	√	√	√	√	√	√	
MY	√	√	√	√	√		√	√	√	
PH	√	√	√	√			√	√	√	
SG	NA		√	√	√	√		√	√	
TH	√		√	√	√	√	√	√	√	

³ Discussion in this section is based on survey responses received in early May 2020. Any policy changes since then are not covered in the discussion in this report.

⁴ One important difference between Covid-19 and the Asian financial crisis is that monetary and fiscal policy space was smaller in 1997–98, and policy measures were also constrained by IMF programmes in some economies at the time.

7.1 Using existing instruments in their policy frameworks

At the time of the supplementary survey in late April–early May 2020, the Working Group member central banks generally thought that their policy frameworks were performing well in the face of the extreme stress test. In China, short-term capital flows and the exchange rate fluctuated in early 2020, although these stabilised by April, leaving limited pressure on the PBC’s monetary policy framework to adjust. Hong Kong SAR experienced no significant capital outflows amid the extreme stresses seen elsewhere in international financial markets, which is a testament to the long and transparent operation of the LERS. BI found that its inflation target and external stability mandates could be met with accommodative monetary policy, while BSP was able to respond proactively on account of a manageable inflationary environment and ample monetary policy space. In Singapore, the nominal exchange rate acted as a shock absorber as intended. The CBM and the BoT also reported that their monetary policy frameworks were able to cope with the challenges to their economies.

To counter the large negative real shock, all member central banks saw **short-term interest rates fall**, as a result of policy measures. This was justified on account of disinflationary pressures while inflation expectations were perceived as solidly anchored. In contrast to most advanced economies, economies in the region still enjoyed policy rates well above the effective lower bound at the time of the survey. The PBC guided reverse repo rates, medium-term lending facility rates and loan prime rates down by 10–30 basis points. BSP (–125 bp), the CBM (–100 bp), the RBI (–75 bp), BI (–50 bp), the BoK (–50 bp) and the BoT (–50 bp) cut policy rates substantially by 5 May 2020, in some cases to all-time lows. Notably, no central bank reported that concerns about exchange rate depreciations hindered its interest rate response.

Besides policy rates, member central banks also applied **other conventional tools**. The PBC, the RBI and BSP lowered reserve requirements to inject liquidity into the banking system and encourage continued lending. In Malaysia, in addition to the lowering of the Statutory Reserve Requirement by 100 basis points, government bonds were made eligible to satisfy these requirements. Meanwhile, BI lowered the rupiah reserve requirement ratios by 200 bp for conventional commercial banks and by 50 bp for Islamic banks and Islamic business units to increase rupiah liquidity in the banking industry, and also halved FX reserve requirements to increase FX liquidity in the banking industry and simultaneously alleviate foreign exchange market pressures.

In keeping with the past practice of policy frameworks, many central banks **intervened in FX markets** in order to mitigate potentially destabilising exchange rate dynamics. BI strengthened the intensity of its “triple intervention policy” in FX spot, domestic non-deliverable forward and secondary government bond markets, in order to maintain rupiah exchange rate stability in line with its fundamental value and consistent with market mechanisms. The BoK, while not targeting a specific level for the exchange rate, intervened via smoothing operations aimed at minimising the negative effects of the sharp increase in exchange rate volatility caused by the Covid-19 outbreak. Meanwhile, the CBM employed targeted FX intervention to mitigate excessive exchange rate volatility and provide sufficient FX liquidity, and the BoT used “verbal and two-sided FX intervention” to cope with excessive FX movements.

For the exchange rate targeters, intervention took on different flavours. In Hong Kong SAR, the Hong Kong dollar exchange rate has remained near the strong side of the band defined by the LERS, triggering the strong-side Convertibility Undertaking where the HKMA sells Hong Kong dollars in exchange for US dollars. In contrast, MAS announced a recentering of the exchange rate band with a 0% appreciation rate, assessing that the equilibrium level of the real exchange rate had dropped in line with the weaker growth and inflation outlook due to the Covid-19 outbreak.

At the time of the survey, many economies continued to have **space to use their traditional instruments** to deal with the crisis fallout. BSP, for example, mentioned that they still had room for

policy rate easing, while the CBM highlighted the potential for further adjustments to domestic monetary policy, including the overnight policy rate, if necessary.

7.2 Expanded use of tools within policy frameworks

Central banks **expanded or adapted less frequently used tools** in their policy frameworks. This included liquidity measures, asset purchases, lending programmes and relaxation of regulatory requirements, which highlighted the inherent flexibility in existing frameworks to adjust as necessary. In addition to ensuring that markets continued to function, one overarching aim was to provide cashflow relief to borrowers and ensure that the banking system's intermediation capabilities are not constrained, while supporting the improvement in economic activity once the health crisis abates.

Existing **tools to ensure sufficient liquidity** were expanded. The measures varied across economies, reflecting specific needs and infrastructures within individual markets. China, Indonesia and Malaysia increased liquidity injections using reverse repos. The BoK adopted an unlimited liquidity support facility and also expanded the scope of eligible collateral and the range of institutions eligible for borrowing funds through reverse repo transactions. The RBI increased commercial banks' overnight borrowing limits under its marginal standing facility, and used special open market operations involving the simultaneous sale and purchase of government securities with a view to lowering the cost of funds for economic agents at the long end. Meanwhile, the RBI and the BoT instituted measures to support the liquidity needs of mutual funds.

Some central banks also reduced issuance of some instruments to increase liquidity. The BoT reduced the issuance of BoT bonds, and MAS altered its daily money market operations to ensure that more liquidity remained in the banking system, while the HKMA reduced issuance of Exchange Fund Bills and provided greater clarity to the market regarding its willingness to increase Hong Kong dollar liquidity when needed. Meanwhile, BSP temporarily suspended term deposit facility auctions for certain tenors, and lowered the interest rate spread on its rediscounting facilities to zero, regardless of loan maturity.

Other liquidity measures focused on increasing the maturity of operations, including in Indonesia, where maturities were lengthened out to one year. The RBI has used long-term repo operations with maturities of one to three years to provide cheap liquidity to banks for onlending, and targeted some long-term repo operations to alleviate the pressures on non-banking finance companies and micro finance institutions.

Ensuring adequate **liquidity in foreign currencies**, especially the US dollar, has been another focus of some central banks. The RBI provided sell/buy swaps via auctions, while BI increased the frequency of FX swap auctions for one-, three-, six- and 12-month tenors from three times per week to daily, in order to ensure adequate liquidity. Drawing on swap lines with the US Federal Reserve, the BoK and MAS established new US dollar facilities and provided US dollar funding to their respective markets. Meanwhile, the HKMA launched the US Dollar Liquidity Facility to channel US dollar liquidity obtained from the Federal Reserve's FIMA Repo Facility to Hong Kong SAR's banking system.

An important new policy for some central banks introduced during the pandemic is directly supporting markets through **asset purchases**. BSP purchased government securities outright in the secondary market. Meanwhile, BI was active in the primary market to support government measures for mitigating the pandemic and to boost the economic recovery. In Korea and Thailand, the focus has been on stabilising the corporate bond market. The BoK's Corporate Bond-Backed Lending Facility operated as a standing lending facility, allowing ready access to credit from the central bank against high-quality corporate bonds as collateral, while the BoT's Corporate Bond Stabilisation Fund provided bridge financing to firms by purchasing investment grade bonds maturing during 2020–21.

Central banks have also taken steps to **encourage lending, especially to SMEs** and other key sectors. For example, the BoT provided “soft loans” via banks to SMEs, with the government partially compensating banks for losses and subsidising interest payment for the first six months. In China, relending and rediscounting facilities were expanded to support, at low interest rates, manufacturers of medical supplies, micro, small and medium-sized enterprises (MSMEs) producing daily necessities, and the agricultural sector. China’s policy banks increased credit to support private, micro and small enterprises with preferential interest rates. Meanwhile, India provided special refinance facilities to select institutions to meet sectoral credit needs. MAS launched a Singapore dollar liquidity facility to support lending by financial institutions to SMEs under the government’s loan guarantee schemes, to ease credit conditions for such companies. In the Philippines, BSP temporarily allowed the inclusion of loans to MSMEs and large corporations as part of banks’ compliance with the required reserve ratio. Korea and Malaysia have also increased the size of existing facilities targeting SMEs, and lowered interest rates applied to these facilities.

Regulatory stances too have been softened to reduce impediments to lending. In India incremental retail loans to specific sectors and loans to MSMEs were exempt from the Cash Reserve Ratio, while in Indonesia reserve requirements were reduced for the financing of exports and imports, MSMEs and other priority sectors.⁵ Banks in Malaysia and Thailand were temporarily allowed to operate below the minimum Liquidity Coverage Ratio and the Net Stable Funding Ratio. BSP temporarily reduced the credit risk weight of MSME loans that are current in status and broadened the assignment of 0% risk weights to MSME loans with government guarantee. MAS adjusted banks’ capital and liquidity requirements to help sustain lending and deferred financial institutions’ implementation of the final set of Basel III reforms, margin requirements for non-centrally cleared derivatives, and other new regulations and policies, to ease operational burdens. The regulatory response also included **loan moratoriums**, notably on SME loans, in India, Malaysia, Singapore and Thailand.

7.3 Factors affecting the choice of tools

In the choice of particular policy mix, the **interaction between policy responses** was an important consideration for the member central banks. The CBM made use of a range of macro- and microprudential tools, keeping an eye on complementarities between them, to ensure that financial institutions intermediate funds effectively and to alleviate tighter financial conditions from external sector stresses. Meanwhile the BoT points out the complementarity between cutting policy rates and ensuring sufficient liquidity, along with banks providing adequate credit flexibly to households and firms. To prevent an adverse macro-financial feedback loop between the real sector and the financial sector, the BoT stresses the importance of ensuring the smooth functioning of financial markets.

Another crucial dimension of interaction is **cooperation between the central bank and the government**. In general, cooperation is important for avoiding working at cross purposes, and to ensure successful outcomes. MAS stresses that the scale and complexity of the crisis have necessitated the rollout of whole-of-government policy measures to ensure, among other things, sufficient liquidity in money markets, easier credit conditions for cash-strapped businesses and households, and the provision of adequate income support to a broad spectrum of the population. BI’s policy mix has been implemented in close coordination with both the government and the Financial Services Authority, with the former introducing fiscal and economic stimuli to ease household and corporate burdens, while the

⁵ BI also raised the Macroprudential Liquidity Buffer (MLB) by 200 bp for conventional commercial banks and by 50 bp for Islamic banks and Islamic business units, the same amount by which required reserve ratios were reduced, to strengthen liquidity management in the banking industry. The banking industry is required to meet the additional MLB through purchases of government bonds issued in the primary market. In the event of a need for liquidity, the banks may repo their government bonds to BI.

latter seeks to maintain the health of the banking industry, non-bank financial institutions and capital markets.

In some cases, the policy response depended on explicit cooperation between the central bank and the government, with authorisation for particular measures requiring new legislation (eg the BoT's soft loan programme targeting SMEs) or financial measures supported by government funding (eg some measures in Korea and Singapore). Sometimes the flow of funds is in the opposite direction. In the Philippines, BSP has entered into a repurchase agreement with the Bureau of Treasury, for an initial term of three months, as an emergency funding mechanism for the government.

One challenge going forward will be to **maintain central bank independence**. As the BoT stresses, policy coordination is a key element under its policy framework for the fiscal-monetary policy mix to prevent an adverse feedback loop between the real and financial sectors. Therefore, the boundary between the roles of the fiscal authority and the central bank is important and needs to be clearly communicated to the public. BI has supported government measures for mitigating the pandemic and boosting the economic recovery while adhering to four basic principles: (i) prioritising market mechanisms; (ii) taking into account measurable impacts on inflation; (iii) limiting the central bank's purchases of government bonds to those that are tradable and marketable; and (iv) standing willing to act as the purchaser of last resort if the market cannot absorb the supply of bonds. BI has also committed to share the cost of economic recovery with the government in a prudent way, first by purchasing specific government bonds used to finance expenditure on public goods and bearing the interest cost for these, and second by bearing the cost of the issuance of government bonds relating to the support of SMEs and corporates. This mechanism is underpinned by the principle of transparency to preserve credibility in both fiscal and monetary prudence, while considering its impact on inflation. BI will also continue to work closely with the government and other authorities to take necessary steps to support economic recovery.

At the time of the supplementary survey, central banks generally thought that their response so far had delivered a **positive impact on external and financial stability amid heightened uncertainty**. While domestic financial markets had been affected by global risk aversion and the related non-resident portfolio outflows, the adjustments in the region thus far had been orderly. At the same time, both the health crisis and the unprecedented measures to contain the pandemic were seen to have a significant impact on the economy for some time to come. Moreover, potential further waves of the virus could highlight differences in countries' capacities in using the new policy instruments. The shock also brings to the fore **longer-term risks** associated with the growth models the region's economies, including their strong dependence on external demand and their vulnerabilities to changes in global or regional value chains.

8. Conclusions

Capital flow risks and exchange rate volatility generally increased after the GFC in emerging Asia. Central banks' policy responses, as well as their broader policy frameworks, have evolved accordingly. For exchange rates, central banks focus on a range of different measures, both of the exchange rate itself and of higher moments such as its volatility. Some efforts are taken to assess the equilibrium value of the exchange rate, although the general focus of policymakers is on the macroeconomic and financial consequences of exchange rate volatility rather than on its level. Large depreciations driven by sudden changes in the risk appetite of global investors are seen as the predominant risk because they can tighten financial conditions abruptly. Large appreciations, when driven by capital inflows, can also be costly – boosting asset prices and causing resource misallocations. The financial channel of the exchange rate has therefore influenced the design of monetary policy frameworks. By contrast, during normal times, most central banks consider the exchange rate working as a shock absorber. Then, depreciations remain expansionary, and appreciations contractionary, through the trade channel. Importantly,

progress in the anchoring of inflation expectations has limited the threats of moderate exchange rate fluctuations to inflation stability.

Zeroing in on financial stability concerns, most Working Group member central banks see spillovers from advanced economy monetary policy and the US dollar exchange rate as particularly relevant for domestic financial conditions. Determining the appropriate policy response generally relies on carefully monitoring FX liquidity, including the speed of exchange rate change, and the effects of capital flows on asset prices, with a view to ensuring orderly market functioning. In normal times, many central banks in the region allow their exchange rates to be fully flexible and market-determined, but they remain vigilant and ready to intervene during times of excessive volatility, when financial stability becomes threatened. From an analytical point of view, the underlying financial channels are increasingly captured using stress testing and other scenario analyses, and to a lesser extent via larger macro models.

In general, central banks tend to use each policy tool mainly with the aim of affecting one well defined objective, with monetary policy targeting domestic price stability, FX intervention and/or CFMs to reduce the risks to financial stability from exchange rate and capital flow volatility, and macroprudential measures to address specific domestic financial stability risks. Nevertheless, the demarcation between different policies is not completely clear-cut, as they operate partly through the same channels and can in practice affect multiple objectives.

The Covid-19 pandemic has served as a stress test of current frameworks. Central banks from the region used the full range of conventional policy tools, including reductions in interest rates and reserve requirements and FX intervention in the face of volatile exchange rates. Existing tools to ensure sufficient liquidity were expanded in terms of frequency, maximum tenor and acceptable collateral, and were targeted at specific sectors as necessary. Additional steps were taken in some economies to support financial institutions' access to US dollars. Other less conventional measures included asset purchases and providing support for corporate bond markets. Member central banks also took steps to encourage lending, especially to SMEs and other key sectors, including by relaxing regulatory impediments to offering credit and loan moratoriums. Successful outcomes of Covid-19-related policies have been enhanced in many cases by explicit cooperation with other financial authorities, which highlights the importance of policy complementarity. While member central banks generally view their responses as having delivered a positive impact on external and financial stability, they may eventually face the challenge of unwinding many of these measures while seeking to maintain their independence.

Annex A – Comparison with advanced economies in the region

The RBA and the RBNZ, as observers, also provided responses to the questionnaire that formed the basis for the above assessments of Working Group members' policy frameworks. Here we compare and contrast their responses with those of the Working Group members. This annex also includes information provided by the BoJ on its policy responses to the Covid-19 crisis.

A.1 Why exchange rates and capital flows matter for policy

In contrast to the members, for both Australia and New Zealand **the importance of capital flows has not increased** since the GFC. In Australia, net capital inflows have slowed, and even turned to outflows during 2019, and gross flows have also fallen. Hence, although capital flows are still drivers for variables that are important for policy, including asset prices, credit conditions and financial vulnerabilities, their importance is generally smaller than for the Working Group members.

As with those Working Group members that do not have exchange rate targets, while exchange rates are closely monitored, **the level of the exchange rate is not specifically targeted** by the RBA or the RBNZ. However, the transmission mechanism of monetary policy operates partly through its effect on the exchange rate and capital flows, working through freely floating exchange rates in both countries.

A.2 Transmission channels

The **transmission channels** of exchange rates and capital flows via competitiveness and pass-through to inflation are similar in Australia and New Zealand to those of the Working Group members. In Australia, exchange rate pass-through is low in aggregate, but faster and larger for the prices of manufactured goods. As with the BoT, the RBNZ stresses the immediacy of the effects of an exchange rate shock on inflation working through oil prices, while pass-through via other prices is slower.

Meanwhile, **financial channels** – for example, working through servicing debt denominated in foreign currency – **are weaker in Australia and New Zealand** since most foreign currency debt is hedged. As a result, the implications of exchange rates and capital flows for financial stability are less of a concern for policymakers in these two economies than in emerging Asia. Given the relative perceived weakness of the financial channels, **exchange rate depreciations are thought to be expansionary** for Australia and New Zealand, and not just during tranquil periods or those with moderate external shocks as in Working Group member economies.

Monetary policy in Australia and New Zealand is not mechanically linked to monetary policy settings in other advanced economies on account of floating exchange rates and the hedging of foreign currency borrowing. There is no clear link between monetary policies conducted by the major central banks and the cost of borrowing in Australia, while the RBNZ reports a link working through the term premium. However, there are still indirect links, as capital flows respond to changes in relative returns and move the exchange rate, which has implications for inflation and the real economy. Shifts in international risk appetite, meanwhile, influence the capacity and price at which banks and corporations can borrow offshore.

In common with Working Group members, **regulatory frameworks in other advanced economies are important for Australia and New Zealand**, since they directly affect the cost at which foreign banks provide credit, hence spilling over to local financial markets more broadly.

A.3 Modelling and analytics

Regarding the use of modelling and analytics to assess exchange rate dynamics and capital flows: as with the Working Group members, **both countries depend on a mixture of different models**. The primary model is largely estimated (rather than calibrated), and results are routinely cross-checked against a range of smaller models. Aside from exchange rates, which are explicitly modelled, the external sector, including capital flows, is treated as exogenous. The exchange rate depends on an ECM in the RBA's primary model and on uncovered interest parity in the RBNZ's.

As with most Working Group members, both countries **use models to estimate the equilibrium exchange rate**. In Australia this is based on an ECM of the REER, and in New Zealand it is based on the trend level of the REER, cross-checked against a suite of "fair value" exchange rate models.

A.4 Providing information for decision-makers

As with the Working Group members, the RBA and the RBNZ report that they monitor FX liquidity. This monitoring is conducted for a variety of reasons, including to assess whether markets are functioning in an orderly way. They closely monitor major FX markets and platforms on a daily basis, including through liaison with market participants.

Policymakers are also **provided with a broad spectrum of macroeconomic and financial market indicators and analysis** to form their views. At the RBA this includes forecasts of key macroeconomic variables on at least a quarterly basis up to two years ahead, and at the RBNZ out to a three-year horizon.

A.5 Responding to exchange rates and capital flows

When it comes to responding to exchange rates and capital flows, the behaviours of the Working Group members and those of the RBA and the RBNZ diverge. Working Group members that do not target the exchange rate allow exchange rate flexibility during normal times, but stand ready to intervene in response to excessive exchange rate volatility, and also to use CFMs if intervention seems insufficient. By contrast, the central banks of both **Australia and New Zealand intervene only rarely**. The motivations for intervention mentioned – due to either a disorderly or dysfunctional foreign exchange market (Australia and New Zealand) or an exchange rate that is far from fair value (New Zealand) – are not materially different from the conditions underlying intervention by the Working Group members. However, in practice, the bar for intervening in these two economies is very high and rarely crossed. The RBNZ also notes that intervention is unlikely to be successful if it works against the direction of monetary policy.

The choice of tools to respond to capital flows and exchange rates in these economies is therefore largely hypothetical. The RBNZ holds sufficient capital to maintain the possibility of intervening, and makes use of macroprudential policies in ways that broadly emulate those in the Working Group economies, but there is generally no distinction between financial stability risks fuelled from abroad versus domestically. **There is no current use of CFMs in either economy.**

A.6 Policy frameworks during Covid-19: a stress test

Similarly to the Working Group members, the measures undertaken by all three observers (the RBA, the BoJ and the RBNZ) in response to the pandemic include the use of conventional and unconventional policies. Since the beginning of March, the RBA has **cut its policy rate** by a total of 50 basis points to 0.25%, and the RBNZ by 75 basis points to the same level. All three central banks **provided liquidity injections** in their domestic currencies.

As with the Working Group members, the severity of the shock required the observer central banks to adjust their policy tools. The RBA increased the amount and maturity of its daily repo operations to support liquidity in the financial system, while the RBNZ expanded the range of bank liquidity facilities, in part to support the government's mortgage payment deferral and business finance guarantee schemes. The BoJ accessed an existing swap line with the US Federal Reserve in order to provide US dollar liquidity to market participants, while the RBA and RBNZ re-established swap lines in March 2020 that were last in place during the GFC. The BoJ intensified its asset purchase programmes with a view to maintaining stability in financial markets, and supported the financing of firms through a special programme totalling around JPY 120 trillion.

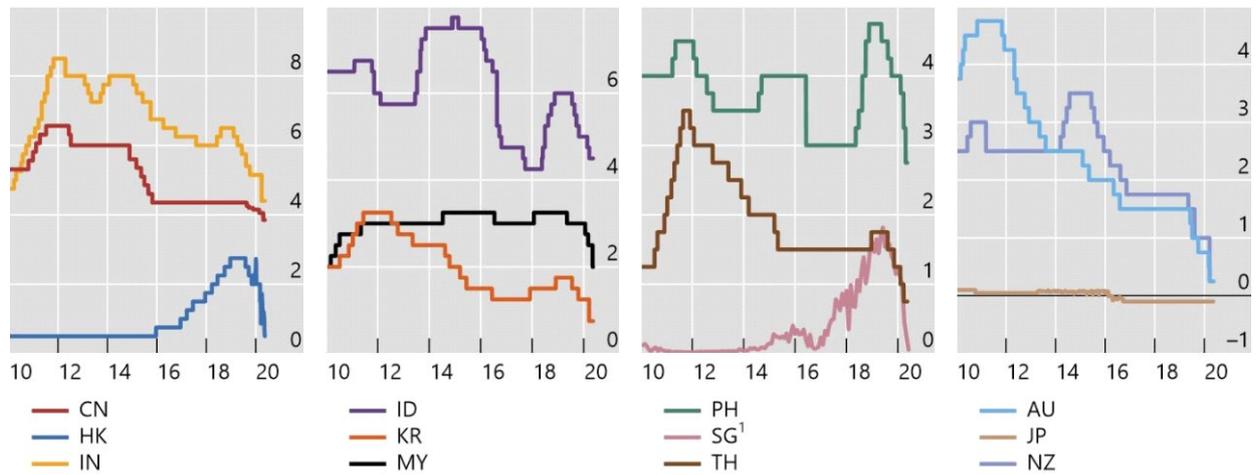
These central banks also used instruments that had not previously been part of their toolbox. The RBNZ implemented, for the first time in its history, a large-scale **asset purchase programme**. The RBA started purchasing government bonds in secondary markets with the aim of affecting yields, setting a target for the yield on three-year Australian Government Securities of around 0.25%. Other new measures in Australia included the introduction of a Term Funding Facility for the banking system, as well as the remuneration of exchange settlement balances at the RBA at 10 basis points rather than at zero to mitigate banks' costs from increasing settlement balances.

Annex B – Policy interventions in Asia-Pacific economies

Policy rates

In per cent

Graph B1



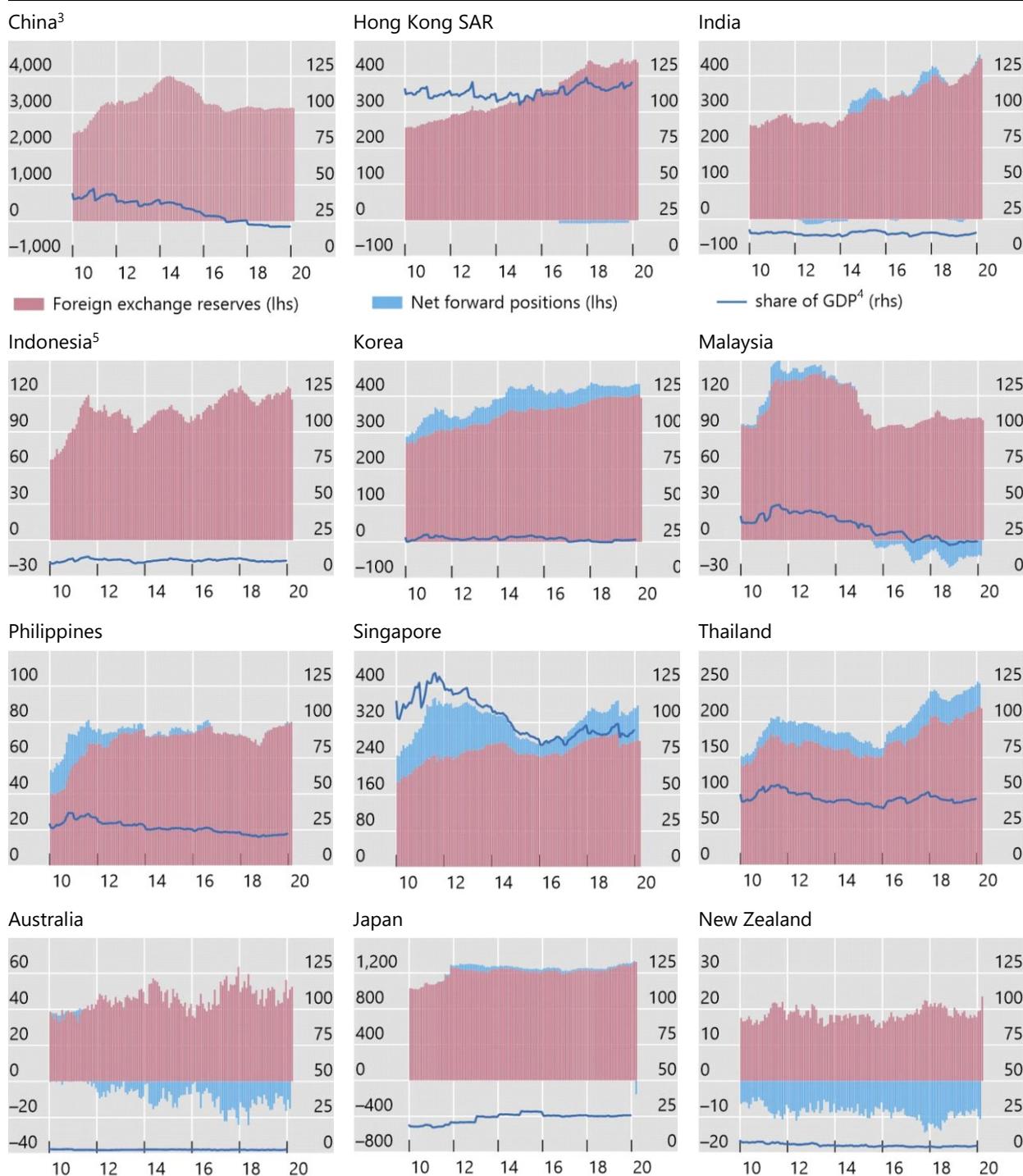
¹ Singapore Overnight Rate Average (SORA); monthly average data. MAS does not have a policy target for interest rates, as it uses the nominal exchange rate as the intermediate target of monetary policy.

Source: BIS.

Foreign exchange reserves¹ and net forward positions²

In billions of US dollars

Graph B2



¹ Official reserves excluding gold, in billions of US dollars. Includes SDRs and reserve positions with the IMF. ² Long positions in forwards and futures in foreign currencies vis-à-vis the domestic currency, minus short positions. ³ Data on net forward positions are not available for China. ⁴ Sum of foreign exchange reserves and net forward positions as a percentage of nominal GDP. ⁵ Data on net forward positions not included for Indonesia.

Sources: IMF, *International Financial Statistics* and *International Reserves and Foreign Currency Liquidity*; national data.

Capital flow management measures taken by emerging Asia, 2004–2015

Table B1

Type of measure	CN	HK	IN	ID	KR	MY	PH	SG	TH
Repatriation and surrender requirement	4	0	3	2	2	0	0	0	0
Controls on capital and money market instruments	34	0	38	8	11	23	8	0	21
Controls on derivative and other instruments	0	0	9	2	0	3	2	0	0
Controls on credit operations	3	0	23	0	0	3	0	0	0
Controls on direct investment	19	0	22	0	6	6	6	0	5
Controls on real estate transactions	9	5	10	0	8	6	0	5	3
Controls on personal transactions	18	0	38	1	17	17	18	0	18
Provisions specific to commercial banks and institutional investors	35	1	56	13	35	21	16	1	22
<i>Total</i>	<i>122</i>	<i>6</i>	<i>199</i>	<i>26</i>	<i>79</i>	<i>79</i>	<i>50</i>	<i>6</i>	<i>69</i>
Direction									
<i>Total tightening actions</i>	<i>30</i>	<i>5</i>	<i>27</i>	<i>14</i>	<i>23</i>	<i>4</i>	<i>14</i>	<i>6</i>	<i>10</i>
– Tighten inflow	29	5	19	13	22	4	12	5	9
– Tighten outflow	1	0	8	1	0	1	0	1	1
<i>Total loosening actions</i>	<i>59</i>	<i>0</i>	<i>131</i>	<i>9</i>	<i>39</i>	<i>57</i>	<i>28</i>	<i>0</i>	<i>40</i>
– Loosen inflow	37	0	85	5	18	32	6	0	15
– Loosen outflow	28	0	53	6	21	29	20	0	25

Source: Data set on CFMs, with last update on 6 September 2016, available from <https://sites.google.com/site/pornpinunchantapacdepong/dataset-on-capital-flow-management-measures>. This data set was initially introduced in P Chantapacdepong and I Shim, "Correlations across Asia-Pacific bond markets and the impact of capital flow measures", *BIS Working Papers*, no 472, December 2014, and *Pacific-Basin Finance Journal*, vol 34, September 2015, pp 71–101.

Use of macroprudential measures in emerging Asia, 1995–2018

Table B2

Policy target	Instrument category	CN	HK	ID	IN	KR	MY	PH	SG	TH	Total
Corporate credit	Maximum debt service-to-income ratio on commercial real estate mortgages	2	1	0	0	0	0	0	0	0	3
	Exposure limits on corporate credit	0	0	0	1	0	0	0	0	0	1
	Limits on FX lending to corporates	0	0	0	1	5	0	0	0	0	6
	Loan loss provisioning rules on corporate loans (including dynamic provisioning)	0	0	0	5	0	0	0	0	0	5
	Maximum loan-to-value ratio on commercial real estate mortgages and loan prohibitions	1	1	0	0	0	0	0	0	0	2
	Other capital surcharges	0	0	0	0	0	0	0	0	0	0
	Risk weights on corporate loans or commercial real estate loans	0	0	0	3	0	0	0	0	0	3
Credit to financial institutions	Limits on interbank exposure	0	0	0	1	0	0	0	0	0	1
	Limits on non-bank exposures (ie other financial institutions)	0	0	0	0	0	0	0	0	0	0
	Risk weights on exposures to financial institutions	0	0	0	1	0	0	0	0	0	1
General credit	Countercyclical capital buffers (CCyB) on general credit	0	3	0	0	0	0	0	0	0	3
	Limits on FX mismatches or FX positions (valuation)	1	0	0	0	4	1	2	0	1	9
	Forward-looking or dynamic provisioning (including statistical provisioning)	0	0	0	0	0	0	0	0	0	0
	Loan loss provisioning on FX loans	0	0	0	0	0	0	0	0	0	0
	General or specific loan loss provisioning rules	1	0	0	3	1	0	5	0	0	10
	Capital surcharges other than Basel III conservation buffers, domestic systemically important banks (SIB), other systemically important institution (O-SII) capital surcharges and systemic risk buffer (SRB)	0	0	0	0	0	0	0	0	0	0
	Other taxes	0	0	0	0	0	0	0	0	0	0
	Domestic SIB, O-SII capital surcharges and SRB	0	2	2	3	2	0	1	0	0	10
	General credit growth limits	2	0	0	0	0	0	0	0	0	2
	Loan-to-deposit ratio limits	0	0	1	0	1	0	0	0	0	2
	Liquid asset ratio	0	0	0	7	0	0	25	2	0	34
	Liquidity Coverage Ratio	1	2	0	4	7	4	0	4	3	25
	Net Stable Funding Ratio, core funding ratio, maturity mismatch limits	0	1	0	0	0	0	0	0	0	1
	Other liquidity requirements (FX liquidity ratio, etc)	0	0	0	0	0	0	0	0	0	0
	Asset (credit growth)-based marginal reserve requirements	0	0	0	0	0	0	0	0	0	0
	Capital inflows or FX liability-based reserve requirements	2	0	2	0	0	0	0	0	3	7
General liability-based average reserve requirements	45	0	3	34	4	11	18	0	0	115	
Household credit	Maximum debt service-to-income ratio and other lending criteria	0	0	0	0	0	0	0	0	0	0
	Maximum debt-to-income ratio and loan-to-income ratio	0	0	0	0	0	0	0	0	0	0
	Exposure limits on household credit	0	0	0	0	0	0	0	0	0	0
	Limits on FX lending to households	0	0	0	0	0	0	0	0	0	0
	Loan loss provisioning rules on household credit	0	0	0	0	3	0	0	0	0	3
	Maximum loan-to-value ratio for household loans	0	0	0	0	1	0	0	0	0	1
	Risk weights on household credit	0	0	0	0	0	0	0	0	0	0
Housing credit/price	Countercyclical capital buffers on housing credit (sectoral CCyB)	0	0	0	0	0	0	0	0	0	0
	Housing credit growth limits	0	0	0	0	0	0	0	0	0	0
	Maximum debt service-to-income ratio and other lending criteria	11	6	0	0	14	1	0	8	0	40
	Maximum debt-to-income ratio and loan-to-income ratio	0	0	0	0	0	0	0	0	0	0
	Exposure limits on the housing/household sector	0	1	0	1	0	4	4	1	0	11
	Limits on FX mismatches or FX positions on housing loans	0	0	0	0	0	0	0	0	0	0
	Loan loss provisioning rules on housing loans	0	0	0	6	1	0	0	0	0	7
	Maximum loan-to-value ratio and loan prohibitions	17	13	4	1	14	4	4	13	2	72
	Other capital surcharges	0	0	0	0	0	0	0	0	0	0
	Risk weights on housing loans	0	1	0	5	2	2	0	0	3	13
Housing-related taxes	1	3	0	0	6	6	0	13	6	35	
Non-housing household credit	Consumer credit growth limits	0	0	0	0	0	0	0	0	0	0
	Maximum debt service-to-income ratio and other lending criteria	0	0	1	0	0	2	0	3	3	9
	Maximum debt-to-income ratio and loan-to-income ratio	0	0	0	0	0	0	0	1	0	1
	Loan loss provisioning rules on consumer loans	0	0	0	5	0	0	0	0	0	5
	Maximum loan-to-value ratio for automobile or other vehicle loans	0	0	2	0	0	0	0	2	0	4
Risk weights on consumer loans (including vehicle loans)	0	0	0	1	0	0	0	0	0	1	
Total		84	34	15	82	65	35	59	47	21	442

Source: K Kuttner and I Shim, "Countercyclical macroprudential policy", work in progress, 2020.

Questionnaire for Working Group on “Capital flows, exchange rates and policy frameworks in emerging Asia”

Following up discussions at the February 2019 meeting of the Asian Consultative Council of the BIS, the BIS Representative Office for Asia and the Pacific has launched a working group of emerging Asian central banks on “Capital flows, exchange rates and policy frameworks” focusing on the joint use of monetary, macroprudential, exchange rate and capital flow management policies.

This questionnaire is intended to provide a stock-take of central banks’ policy frameworks and how exchange rates and capital flows are incorporated into them.

1. Exchange rates and capital flows in policy decisions

This section sets the context by investigating why the Working Group member central banks care about exchange rates and capital flows.

- 1.1. Have major structural changes in the global financial system since the Global Financial Crisis (GFC) (such as global banking system reforms, the emergence of non-bank finance and the financialisation of commodities) led to changes in the dynamics of capital flows and exchange rate volatility in your economy? If so, in what ways and what are the reasons behind these?
- 1.2. How important are exchange rates and capital flows for policy decisions? What roles do they play in your policy framework?
- 1.3. Which exchange rate(s) (eg the bilateral exchange rate against the US dollar, NEER, REER, the dollar index) matter and why? Is the level, the rate of change or the volatility that matters most for policy?
- 1.4. Regarding capital flows, does the type of investor behind the flows matter?

2. Models for policy decisions

This section investigates the role of modelling and analytics in policy decisions related to exchange rates and capital flows.

- 2.1. What analytical frameworks or models are used at your central bank to inform policy responses to exchange rates and capital flows? This could include theoretical

models (eg DSGE models), reduced form empirical models (eg multi-equation linear models), scenario analyses, early warning systems, heat maps, etc. Do you use any guiding principles or rules of thumb (eg a monetary conditions index)? Please briefly describe the scope of the model(s) (eg, which variables are included? Do they include an external sector?).

- 2.2. Are the models estimated, or calibrated, or some combination of these?
- 2.3. What role does the exchange rate play in the models?
- 2.4. Do your models control for other central bank policies used in response to capital flows and exchange rates?
- 2.5. More generally, how are the models used in the policymaking process?
- 2.6. Do you consider any equilibrium exchange rate in your policy formulations? If so, how is this determined and used in the policy making process? What equilibrium exchange rate model(s) do you use to gauge over- or under-valuation?

3. Transmission channels

This section explores the importance of different transmission channels for exchange rates and capital flows that make them relevant for central bank policymaking.

- 3.1. What are the key transmission channels through which capital flows and exchange rates affect the domestic real economy?
- 3.2. What variables do capital flows and exchange rates affect most?

The exchange rate can affect the economy through three main channels.

First, exchange rate pass-through to inflation: exchange rate swings directly impact domestic inflation through their effect on import prices.

Second, export competitiveness: a stronger domestic currency is generally associated with weaker exports, lower firm profits and slower growth.

Third, domestic financial conditions are affected by a set of 'financial' channels, the direction and size of which reflect balance sheet compositions and the responsiveness of capital flows. Market expectations on the direction and volatility of capital flows and exchange rates may have an important role to play.

- 3.3. What is the relative importance of these channel(s) for key macroeconomic and financial variables such as the balance of payments, inflation, output, asset prices and credit? Does this vary depending on the time horizon being considered?
- 3.4. Is an exchange rate depreciation thought to be expansionary or contractionary? In what context and under what circumstances (eg which phases in the business cycle and in the financial cycle)?

- 3.5. Under what circumstances does the exchange rate act as a shock absorber versus a shock amplifier? Does it depend on the particular shock affecting the economy?
- 3.6. How important are the different exchange rate channels for financial stability considerations?
- 3.7. Regarding the impact on domestic financial conditions, such as long-term interest rates and total credit growth, how do you assess as sources of spillovers the importance of (i) monetary policy decisions of major advanced economy central banks, (ii) global investors' risk appetite, (iii) US dollar appreciation (or depreciation), and (iv) changes in advanced economy regulatory frameworks, inflation rates and bond yields?

4. Information for decision makers

This section discusses the information that is made available to policymakers in order to decide how to respond to exchange rates and capital flows.

- 4.1. What key FX liquidity and market development indicators do you regularly monitor? Should FX liquidity be considered in terms of its implication for the exchange rate or orderly market functioning?
- 4.2. What information are decision-making bodies in central banks (eg the monetary policy committee, financial stability committee) provided with in order to inform their views?
- 4.3. Are decision makers provided with forecasts? If so, on which variables and at which horizon(s)?
- 4.4. How frequently would model-based simulations be used to compare alternative policy decisions?

5. Responding to exchange rates

This section examines how central banks respond to exchange rate volatility and capital flows in terms of the choice of policy tools, ordering of their use and calibration of the response.

- 5.1. How do you respond to fluctuations in (or volatile) exchange rates and capital flows?
- 5.2. What policy tools do you use?
- 5.3. When are the different tools (monetary policy, FX intervention, macroprudential policy, and capital flow management policy) most appropriate? Are tools strictly assigned to singular objectives (ie Tinbergen rule), or do some tools straddle multiple objectives? Have policies to manage capital flows or exchange rate

volatility resulted in unwanted side effects? For FX intervention, how do you balance the desire to minimise the disruptive effects of excessive exchange rate volatility and enabling efficient price-discovery?

- 5.4. Does the policy response depend on the types of capital flows and/or investors involved? Do reactions differ between unanticipated surges of capital outflows versus persistent trend outflows over several months?
- 5.5. Is there a preferred order in which to use the different tools? Does this depend on the circumstances? If so, how?
- 5.6. Are there constraints that limit your use of different tools?
- 5.7. Have your central bank's responses to capital flows and exchange rates changed in the post-GFC period? If so, can you describe the changes and the reasons behind them?
- 5.8. How did you communicate these changes in the policy framework to the public?
- 5.9. Is your current policy toolbox adequate?
- 5.10. What additional tools might be desirable?
- 5.11. When some of the tools are not in the hands of the central bank, but controlled by other national authorities (such as financial regulators or the ministry of finance), what determines which tools are used to deal with exchange rate and capital flow volatility?
- 5.12. Is there a role for coordination, or the exchange of information, across jurisdictions? If so, what should be the form of such cooperation/coordination? Has your central bank made any specific arrangements for international policy coordination or information sharing?

23 April 2020

Additional questions on policy responses to the Covid-19 outbreak

There was unanimous agreement on adding a small number of questions on responses to the Covid-19 outbreak to be used to frame the Working Group report in light of ongoing events. Here are the questions:

Context: Covid-19 has served as an extreme stress test of existing monetary policy frameworks across the globe. Demand for US dollars has soared, the exchange rates of many Asian economies have depreciated and capital outflows have intensified for most Working Group Members.

1. In what respects have your existing monetary policy frameworks been able to cope with the current extreme stresses?
2. Along what dimensions have you needed to adapt your frameworks on the fly to address these developments?
3. Has your policy response included the use of instruments that were not previously part of the toolbox? If so, which ones?

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