

IMF Publication

Toward an Integrated Policy Framework

INTERNATIONAL MONETARY FUND



IMF POLICY PAPER

TOWARD AN INTEGRATED POLICY FRAMEWORK

October 2020

IMF staff regularly produces papers proposing new IMF policies, exploring options for reform, or reviewing existing IMF policies and operations. The following documents have been released and are included in this package:

- A **Press Release** summarizing the views of the Executive Board as expressed during its September 28, 2020 consideration of the staff report.
- The **Staff Report**, prepared by IMF staff and completed on September 2, 2020 for the Executive Board's consideration on September 28, 2020.

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International Monetary Fund
Washington, D.C.



IMF Executive Board Discusses Paper “Toward an Integrated Policy Framework”

FOR IMMEDIATE RELEASE

Washington, DC – October 8, 2020: The International Monetary Fund’s Executive Board met on September 28, 2020 to discuss findings of staff’s analytical work on an Integrated Policy Framework (IPF) aimed at helping formulate appropriate responses to fluctuations in international capital flows and other shocks. A staff paper summarizes the key analytical findings, which will serve as an input into a forthcoming review of the IMF’s [Institutional View on the Liberalization and Management of Capital Flows](#). It does not propose changes to the IMF’s operational framework at the present juncture.

While generally beneficial, cross-border capital flows can generate or amplify shocks. To manage these flows and achieve domestic and external stabilization objectives, in practice policy makers resort to different strategies and instruments and provide various rationales for their choices.

The IPF aims to provide a systematic analytical approach to selecting an appropriate policy mix for managing large and volatile capital flows and more generally preserving macroeconomic and financial stability in the face of domestic and external shocks. It jointly considers the role of monetary, exchange rate, macroprudential and capital flow management policies and their interactions with each other and other policies, accounting for country circumstances. The analysis suggests that the appropriate policy mix depends on the nature of shocks, country characteristics, and initial conditions. This finding, however, does not rationalize indiscriminate use of multiple tools or support their deployment in all circumstances. Reliance on such tools is also not a substitute for warranted economic adjustment, deep markets, healthy balance sheets, and strong institutions.

The framework draws on modeling for small, open economies, empirical analysis, and a review of country experiences; and has been developed by IMF staff from various departments.

Executive Board Assessment¹

Executive Directors welcomed the opportunity to discuss the takeaways from the Integrated Policy Framework (IPF) analytical workstream. They noted that policymakers often face difficult tradeoffs in pursuing domestic and external stabilization objectives in the presence of volatile capital flows. In this context, they recognized the importance of jointly considering, under certain circumstances, the role of monetary, exchange rate (including foreign exchange intervention), macroprudential and capital flow management policies, and their interactions with each other and other policies. They noted that having a systematic framework can also

¹An explanation of any qualifiers used in summings up can be found here:
<http://www.IMF.org/external/np/sec/misc/qualifiers.htm>.

help central banks employing multiple tools communicate policy decisions and enhance credibility.

Directors agreed that the IPF offers valuable analytical insights into how country characteristics, initial conditions, and the nature of shocks affect whether the use of multiple policy tools is warranted. They appreciated the breadth and depth of the analysis, including advances in modeling, extensive empirical work, and informative case studies. Directors agreed that the paper highlights the main tradeoffs in the use of multiple tools, although many Directors also stressed the importance of other considerations, including integrating fiscal policy more fully into the analysis, exploring more deeply multilateral implications or spillovers of IPF policies, extending the analysis of intertemporal tradeoffs, and deriving lessons from the COVID 19 crisis. Some Directors also suggested other potential extensions of the framework.

Directors agreed that optimal policy combinations depend on the nature of shocks, country characteristics, and initial conditions. They noted the IPF finding that in countries with flexible exchange rates, deep foreign exchange markets, and continuous market access, allowing full exchange rate adjustment to economic and financial shocks is typically optimal. A few Directors emphasized that in such cases, the findings indicate no rationale for capital flow management measures. On the other hand, Directors noted that in the presence of frictions and vulnerabilities common in emerging market and developing economies, while flexible exchange rates continue to provide significant benefits, other tools can play a useful role for certain shocks. In particular, Directors took note of the analytical finding that macroprudential measures, foreign exchange intervention, and capital flow management measures can, under certain circumstances, help enhance monetary autonomy, improve financial and price stability, and reduce output volatility in countries with financial frictions and/or balance sheet vulnerabilities. A number of Directors highlighted the finding that the use of precautionary capital flow management measures can lower risks to financial stability under certain conditions, although a few Directors pointed out that such measures tend to become “sticky” and that policymakers’ ability to adjust them over the financial cycle needs to be taken into account.

Directors agreed that the deployment of policy tools should be guided by a clear framework and an assessment of costs and benefits. The macroeconomic and financial stabilization benefits of IPF policies need to be balanced against potential costs in terms of market development and other possible unintended consequences. The persistent use of IPF tools may perpetuate the very vulnerabilities that rationalize their deployment. Directors noted that the use of IPF tools is not a substitute for deep markets, healthy balance sheets, and strong institutions. The tools should not be used to support misaligned exchange rates or substitute for warranted macroeconomic adjustment. In this context, Directors highlighted the Fund’s role in assisting members in fostering deeper markets, strengthening institutions, and addressing underlying vulnerabilities. Directors also underscored that while models provide a useful guide, the complexity of real life situations and tradeoffs (particularly intertemporal ones), as well as other practical challenges (such as endogeneity of policy and country conditions and determining the nature and source of shocks) suggest a need for caution and judgment in the application of IPF tools and the importance of communicating clearly the actions and objectives. Similarly, country experiences should be assessed in detail and carefully integrated in the framework.

Directors emphasized that the analysis does not support indiscriminate use of IPF tools and that the operationalization of the findings should include safeguards to minimize the risk of inappropriate use of IPF policies. Directors noted that ensuring robustness and developing metrics to assess country characteristics will be essential for translating the framework's findings into implementable policy advice. Directors cautioned against the mechanical application of safeguards and emphasized the need for judgment when the framework is operationalized.

Directors affirmed that Fund policy advice remains guided by the Institutional View on the Liberalization and Management of Capital Flows and other existing Fund policies. In this context, they emphasized the importance of careful communication of the IPF's analytical findings, acknowledging its assumptions, limitations, and qualifications. Directors welcomed the intention to use the IPF's analytical findings as an input for the upcoming review of the Institutional View, along with the report by the Independent Evaluation Office on IMF Advice on Capital Flows.



September 2, 2020

TOWARD AN INTEGRATED POLICY FRAMEWORK

EXECUTIVE SUMMARY

Policymakers often face difficult tradeoffs in pursuing domestic and external stabilization objectives. Cross-border capital flows provide significant benefits but may also generate or amplify shocks. The challenges are particularly pronounced in emerging market and developing economies, although they are also relevant for small open advanced economies. Responses to domestic and external shocks, including financial and commodity price shocks, have varied across countries and over time, with notable differences in underlying approaches. Many countries use multiple tools in pursuit of multiple objectives without the benefit of a communicated framework.

The paper reflects staff's work to advance the understanding of the policy options and tradeoffs available to policymakers in a systematic and analytical way. The Integrated Policy Framework (IPF) considers jointly the role of monetary, exchange rate (including foreign exchange intervention), macroprudential and capital flow management policies, and their interactions with each other and other policies, focusing largely on countries with flexible exchange rates. It aims to clarify the conditions under which the use of these instruments is appropriate, and it guides the deployment of multiple tools in concert to achieve macroeconomic and financial stability objectives. A systematic framework can also help central banks employing multiple tools communicate policy decisions and enhance credibility where needed. The framework draws on modeling work, empirical analysis, and case studies.

Key findings from the analysis under the IPF umbrella can be summarized as follows:

- The difficult tradeoffs faced by policymakers (especially stemming from volatile capital flows as global financial conditions change) warrant the use of multiple tools under certain conditions. Their deployment should be guided by a clear framework and an assessment of costs and benefits.
- Optimal policy combinations depend on the nature of shocks, country characteristics, and initial conditions. They do not take the form of complete reliance on exchange rate flexibility under all circumstances for all countries. Neither do they take the form of "anything goes."
- The IPF tools should not be used to support a misaligned exchange rate.

- In countries with flexible exchange rates, deep foreign exchange markets and continuous market access, allowing full exchange rate adjustment to economic and financial shocks is typically optimal.
- In the presence of frictions and vulnerabilities common in emerging market and low-income countries, while flexible exchange rates continue to provide significant benefits, other tools can play a useful role for certain shocks. In those cases, there is no preset hierarchy or order in which these tools should be used—optimal combinations depend on country conditions and shocks.
- Macroprudential measures (MPMs), foreign exchange intervention (FXI), and capital flow management measures (CFMs) can help enhance monetary autonomy, improve financial and price stability and reduce output volatility in the presence of financial frictions and balance sheet vulnerabilities. Precautionary reserve accumulation during normal times creates buffers for bad times.
- For countries susceptible to sudden stops in capital inflows, precautionary CFMs on capital inflows, applied before shocks hit, can lower risks to financial stability. In some cases, CFMs can help plug gaps in MPM coverage.
- These principles do not rationalize indiscriminate use of multiple tools or support their deployment in all circumstances—they clarify when they should and should not be used. Moreover, reliance on such tools is not a substitute for deep markets, healthy balance sheets, and strong institutions.
- The stabilization benefits of using IPF tools need to be balanced against potential costs in terms of market development, communication challenges, and other undesirable consequences. Persistent use of these tools may perpetuate the very vulnerabilities that rationalize their deployment.
- The practical challenges and potential risks of using these tools both in the near term and at longer horizons suggest a need for caution and judgment in their application, and the importance of communicating clearly the actions and objectives.

The paper recognizes that the optimal path of the IPF tools depends on structural characteristics and fiscal policies. The fiscal stance as well as the level and composition of public debt affect initial conditions and may make the economy more vulnerable to certain shocks such as a sudden stop. CFMs and MPMs, however, are better targeted to address financial stability risks and in the short term easier to adjust than fiscal instruments. Conversely, the IPF tools are not a substitute for appropriate fiscal policies or needed structural reforms. Moreover, the use of IPF tools would continue to be appropriate after taking multilateral considerations into account. The optimal policy mix depends on policies of trading partners and the availability of global financial backstops.

Analytical work will continue to further incorporate fiscal considerations, explore more deeply multilateral implications of IPF policies, extend the existing analysis of intertemporal tradeoffs, including through greater understanding of the long-term effects of CFMs and FXI, and derive relevant lessons from the COVID-19 crisis.

The operational implications of IPF findings require careful consideration. The analytical work conducted under the IPF umbrella represents a significant advancement in thinking and modeling, building on developments in the economics profession over the past decade. Nevertheless, operationalizing these findings would require several additional steps. Ensuring robustness, developing metrics to assess country characteristics, and assessing the ability of countries to use multiple tools in a clear and credible manner will all be key in translating the framework's findings into implementable policy advice. Establishing the right balance between short- and long-term benefits and costs of using various tools is also a critical remaining challenge.

Developing safeguards to minimize the risk of inappropriate use of IPF policies will be essential. In the models, IPF tools are aimed at well-defined macroeconomic and financial stability objectives. In practice, however, the tools might be misused to support misaligned exchange rates, substitute for warranted macroeconomic adjustment, or impede price discovery and competition. CFMs or FXI should not be aimed at preventing exchange rate appreciation to support export industries. Neither should they be used to contain inflationary pressures in the face of an overly expansionary monetary policy. Differentiating between appropriate and inappropriate deployment of IPF tools will require developing suitable metrics for assessing their use.

Staff remains guided by the Fund's Institutional View (IV) on the Liberalization and Management of Capital Flows. Changes to that policy framework could be considered during the forthcoming review of the IV, tentatively scheduled for 2021. The work on the IPF will be a key input for this review, along with a report by the Independent Evaluation Office (IEO) on the *IMF Advice on Capital Flows*.

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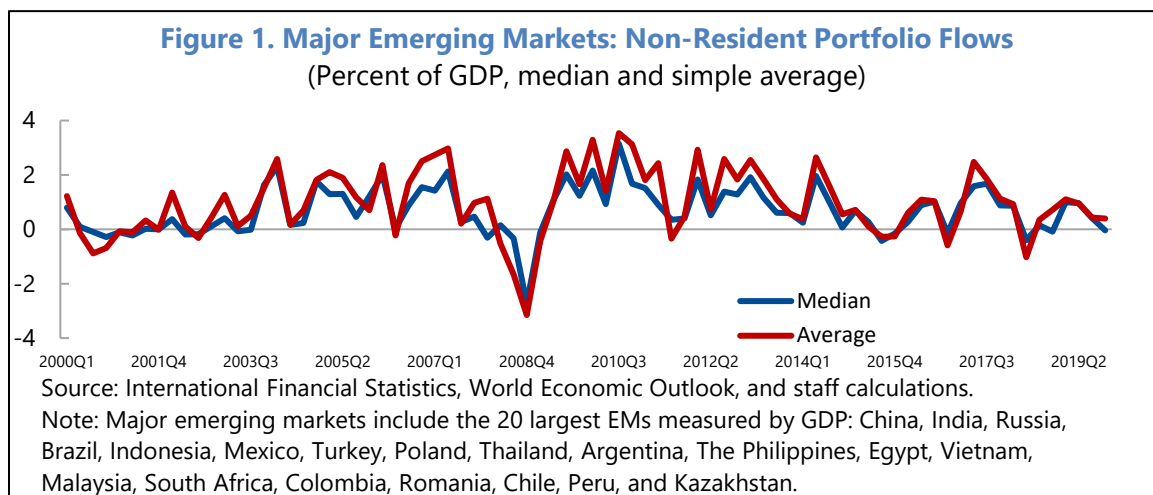
Glossary

AEs	Advanced Economies
CFMs	Capital Flow Management Measures
DCP	Dominant Currency Paradigm
EMs	Emerging Markets
EMDEs	Emerging Market and Developing Economies
FX	Foreign Exchange
FXI	Foreign Exchange Intervention
GFC	Global Financial Crisis
IEO	Independent Evaluation Office
IMFC	International Monetary and Finance Committee
IT	Inflation Targeting
MPMs	Macroprudential Measures
UIP	Uncovered Interest Parity

INTRODUCTION

1. Policymakers can face difficult tradeoffs in managing large and volatile capital flows when confronted with financial and real shocks while pursuing their stabilization objectives.

The benefits of capital flows are broadly recognized, but their volatility presents significant challenges. Capital flows to emerging market and developing economies (EMDEs) have exhibited large swings in the last two decades (Figure 1). Several periods of sustained inflows—in many cases driven at least in part by easy monetary conditions in major advanced economies (AEs)—have been interrupted by sharp reversals. Flows to commodity exporters have also been influenced by gyrations in commodity prices. Changes in global financial conditions—and attendant swings in capital flows—present particular challenges for many EMDEs, engendering difficult tradeoffs for monetary policy stemming from relatively shallow markets,¹ external borrowing constraints, and other vulnerabilities. Advanced economies are not necessarily immune to these shocks either.



2. Responses to shocks have been heterogeneous across countries and over time.²

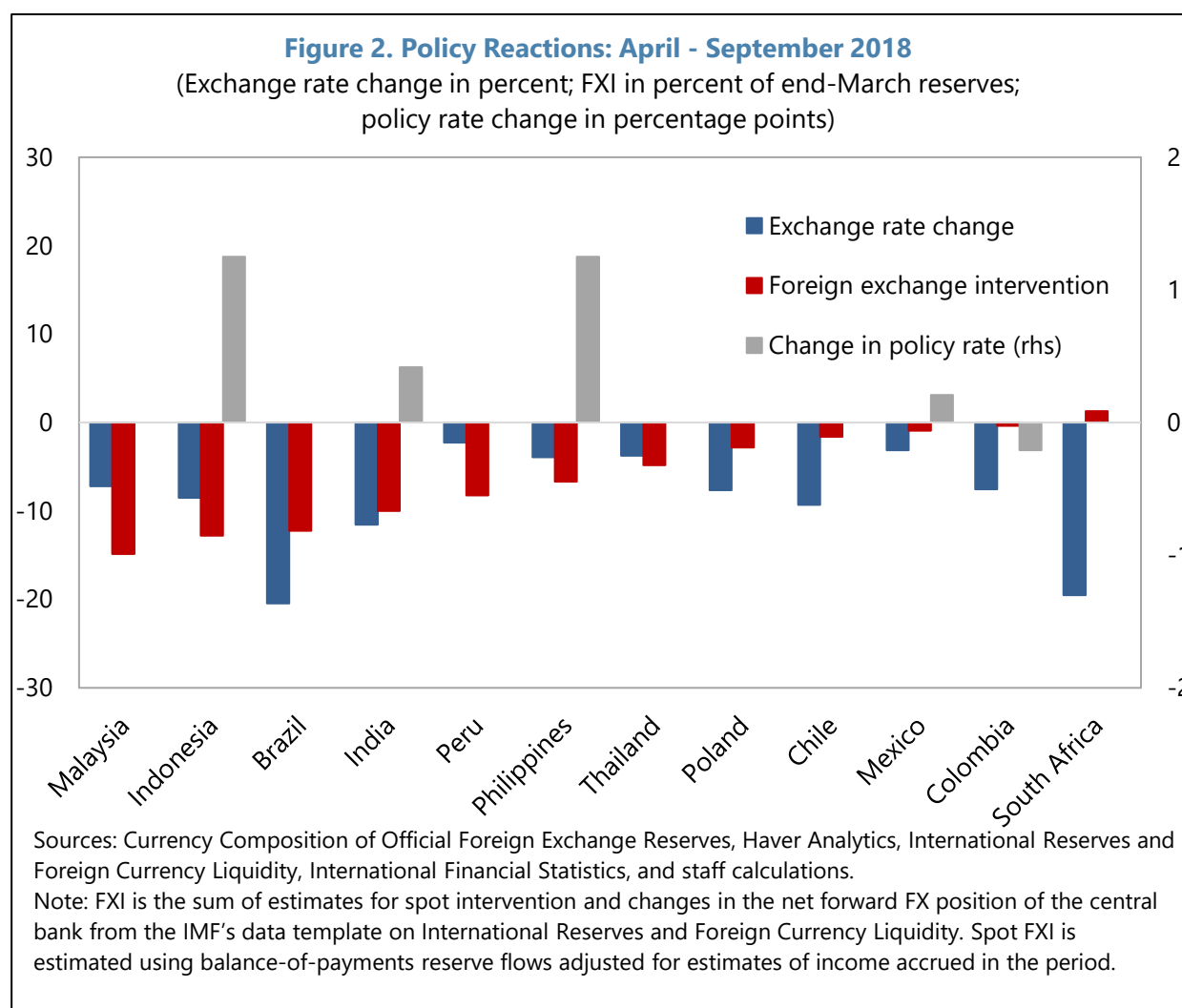
- Some countries broadly follow a “one target one instrument” approach. They aim monetary policy at domestic stabilization (full employment and low inflation) while allowing the exchange rate to adjust freely (with instances of foreign exchange intervention (FXI) exceptionally rare). Macroprudential measures (MPMs) are set so as to safeguard financial stability. Capital flow management measures (CFMs) are used sparingly if at all.³

¹ Where capital flight by some investors from domestic currency assets is not fully offset by the entry of others.

² The discussion focuses primarily on countries with flexible exchange rates. In fixed exchange rate regimes, foreign exchange intervention is endogenous and—if the capital account is open—room for independent monetary policy is limited.

³ In the last few years, some AEs—including generally non-interventionist ones—have introduced CFMs to curtail purchases of real estate by non-residents. These measures aim at maintaining housing availability and affordability for residents rather than macroeconomic objectives. As such, these measures are beyond the scope of this paper.

- Others follow alternative approaches, using a variety of tools for multiple objectives. Many use FXI quite frequently, and a few adjust CFMs relatively actively. Monetary policy is sometimes used to address financial and external stability concerns. Adjustments in MPMs are occasionally used to support economic activity, as seen in the current COVID-19 crisis, or slow it down—that is, for cyclical management. Some countries seem to care deeply about external competitiveness, others worry more about financial stability. Such “multiple targets multiple instruments” approaches have been noted, e.g., by Ostry, Ghosh, and Chamon (2012) and by Finger and Lopez Murphy (2019).
- This heterogeneity among countries’ policy motivations, frameworks and responses in the context of external shocks is documented in case studies summarized by Fayad and Poirson (forthcoming; see also Annex 1) and in a cross-country empirical analysis by Mano and Sgherri (2020). Figure 2 illustrates the diversity of responses to a broad retrenchment in capital flows to emerging markets (EMs) in 2018.



3. Country authorities note diverse rationales for their approaches. Policymakers in countries with (nearly) full exchange rate flexibility tend to believe that it allows monetary policy to focus on output and inflation stability. It also fosters market development to meet hedging needs and forestalls accumulation of vulnerabilities. Some hold a less benign view of exchange rate movements but consider them hard to influence through intervention given the size and depth of the foreign exchange (FX) market. Simpler frameworks are also easier understood by the markets, which may foster central bank credibility.⁴ On the other hand, the authorities in many EMDEs are concerned about relatively high passthrough from exchange rate movements into inflation. They may also worry about the impact of exchange rate fluctuations and unhedged FX positions of domestic agents on financial stability.⁵ This is often cited as a reason for tightening monetary policy in case of incipient capital outflows, even if the shock also depresses the domestic economy; or using FXI and/or CFMs to “free the hands” of monetary policy. Other rationales for intervention include the desire to smooth exchange rate movements to avoid costly overshooting (particularly if financial markets are shallow and if it is difficult to differentiate ex ante between permanent and transient shocks).⁶ The arguments for using or not using CFMs reflect differences in beliefs about their effectiveness and reputational risks. Some countries also use these tools for a range of objectives that do not pertain directly to macroeconomic or financial stability—for instance to promote social objectives (such as housing affordability).

4. The Integrated Policy Framework (IPF) aims to provide a systematic analytical approach to selecting an appropriate policy mix for achieving macroeconomic and financial stability.⁷ The eclectic approaches delineated above led to a number of theoretical and empirical studies (including at the Fund) seeking to understand and quantify the impact of these policies. Nevertheless, we still lack a clear normative framework featuring realistic trade and financial frictions to guide the deployment of multiple tools in concert to achieve macroeconomic and financial stability.⁸ The IPF workstream aims at providing such an analytical framework. It focuses on how policy tools can strengthen financial stability and help central banks better achieve their macroeconomic stabilization objectives by enhancing monetary policy autonomy.⁹ A body of practical experience with diverse approaches—and the evolution of related literature—have afforded both an impetus and an opportunity to seek to understand the rationale for using different

⁴ The High-Level Forum on Central Bank Communications in ASEAN-5 Countries in December 2019 discussed key communication challenges for regimes with multiple objectives and instruments.

⁵ As shown in Culiuc (2020) and in Kearns and Patel (2016), these balance sheet effects may more than offset the stabilizing effect through net exports.

⁶ Related to that may be fear that a temporary appreciation driven by capital inflows and unrelated to fundamentals may cause long-lasting damage to competitiveness and the real sector.

⁷ The Integrated Surveillance Decision (IMF, 2012a) and the Guidance Note for Surveillance under Article IV Consultation (IMF, 2015a) provide that the Fund’s policy assessment and advice will be based on a comprehensive analysis of members’ economic policies and strategy.

⁸ The challenge is common across income groups. For example, IMF (2015b) finds that “a pursuit of multiple objectives complicates policy formulation and reduces policy effectiveness” in many low- and lower-middle income economies.

⁹ The IPF objectives do not include sustaining a persistent undervaluation for external competitiveness reasons.

tools within a unified framework and to form analytical views on their optimal deployment depending on country characteristics and the nature of the shocks.

5. The IPF considers jointly the role of monetary, exchange rate, macroprudential and capital flow management policies, and their interactions with each other and other policies.¹⁰

- At a high level, analytical work under the IPF umbrella establishes that optimal policies do not take the form of complete reliance on exchange rate flexibility under all circumstances for all countries. However, this finding is not a justification for an indiscriminate use of the IPF tools. Optimal policies depend on the nature of shocks, country characteristics and initial conditions.
- The IPF tools should not be used to support a misaligned exchange rate. Developing safeguards to minimize the risk that IPF policies are used inappropriately will be key in translating the framework's findings into implementable policy advice.
- In countries with deep foreign exchange markets and continuous market access, fully flexible exchange rates are typically optimal.¹¹
- In contrast, frameworks that incorporate the types of frictions common in EMDEs suggest a role for other tools under certain circumstances. FXI, MPMs and CFMs can enhance monetary autonomy in countries with shallow FX markets when faced with global financial market shocks, allowing monetary policy to focus on domestic objectives.
- For countries liable to sudden stops in capital inflows, precautionary CFMs on capital inflows, applied before shocks hit, can lower risks to financial stability.
- Fiscal and structural frameworks, variables and policies are taken as given when deciding on the optimal mix of IPF policies—and that mix can be conditioned on alternative fiscal paths consistent with public debt sustainability. These policies tend to be less agile than the IPF tools most of the time—notwithstanding the role of automatic stabilizers and an occasional rapid discretionary fiscal response to very large shocks, such as the Global Financial Crisis (GFC) or COVID-19.¹² While the IPF is meant to be applicable both to “routine” shocks and to crisis situations, each major crisis has idiosyncratic features that require tailoring the response—including potentially a more active role for fiscal policy. Credible fiscal

¹⁰ The paper largely focuses on countries with flexible exchange rate regimes, where the questions surrounding the optimal use of these tools are often most difficult and contentious. It does not delve into the issue of optimal exchange rate regime choice. For a discussion of how exchange rate regimes affect the transmission of global financial conditions, please refer to Obstfeld et al. (2018, 2019). Some of the analysis conducted under the IPF umbrella, for example, the work on MPMs and CFMs, can also be relevant for countries with fixed exchange rate regimes. See also Csonto and Gudmundsson (2020) on the long-term association between exchange rate regimes and foreign currency debt.

¹¹ Pegged exchange rates may be appropriate for many countries. If countries with deep markets and continuous market access choose to float, they should generally allow fully flexible exchange rate adjustment.

¹² Ghosh et al. (2017) find no evidence of countercyclical fiscal policy in the face of capital outflows from EMDEs.

announcements can have frontloaded effects, including through asset prices and confidence, that may cushion downside risks and complement the use of IPF tools. However, fiscal policy, of itself, is less well suited to address issues related to capital flows and external debt levels as compared to CFMs and MPMs. Work on the links between fiscal and structural policies and capital flows will continue as part of the Fund’s wider research agenda.

- The optimal policy mix also depends on the actions of trading partners (including monetary and fiscal policies in major economies) and global institutions. These multilateral aspects are an important focus of ongoing work.
- While the framework is not applied specifically to the COVID-19 crisis in this paper, the analysis suggests how IPF tools can be used in concert to ease some of the pronounced financial stresses and capital outflow pressures evident during the recent crisis, especially by countries with shallower FX markets, substantial foreign currency debt, and less well-anchored inflation expectations.

6. The framework draws together modeling, empirical work, and a review of country experiences. It has been informed by a large body of studies on capital flows that have been written since the GFC, much of it by Fund staff. A set of case study discussions involving current and former policymakers helped reveal the diversity of the approaches and the motivations behind them.¹³ Cross-country empirical analysis explored whether these insights generalize and assessed the impact of various policy instruments individually and in combinations. Case studies also highlighted the features of the economies that policymakers found particularly relevant, informing the design of the models, while empirical work helped calibrate model parameters, and model predictions helped guide empirical analysis and focus discussions with policymakers. Models can yield prescriptions for optimal policy choices in the stylized worlds that they consider, and they rely on the other workstreams to make sure those stylized worlds are reasonable representations of reality. Of course, their application needs to be combined with the recognition that some important tradeoffs may not be reflected in the models. These three “prisms” have strengths and limitations, but collectively are helpful in gauging the benefits of the IPF tools in achieving core policy objectives—full employment, price stability, and financial stability.

7. The paper is organized as follows. The next section introduces two New Keynesian open-economy models—one conceptual and micro-founded and the other empirically-oriented and quantitative—featuring a number of real and financial frictions to allow considering jointly the potential benefits and costs of the multiple IPF tools taking into account different country circumstances. The following section presents empirical evidence on the tools’ usage and their effectiveness (individually and in combinations) and their unintended consequences, tradeoffs across time, costs and benefits of policies, and cross-border spillovers. The penultimate section

¹³ In addition to the case study series summarized in Fayad and Poirson (forthcoming), staff and management had numerous engagements with policymakers, academics and other experts including meetings with a group of AE and EMDE central bank governors during the Spring and Annual Meetings in 2019, high-level conferences (SNB-IMF in May 2019, BOT-IMF in November 2019), the Jackson Hole Symposium, and other fora.

discusses the importance of safeguards against inappropriate use of IPF policies and how such safeguards can be developed. The final section summarizes key takeaways.

CONCEPTUAL FRAMEWORK

8. In the standard workhorse macroeconomic model, countries with flexible exchange rates should allow its free adjustment in response to shocks.¹⁴ Following an adverse shock, monetary policy is eased. Exchange rate depreciation stabilizes the economy through an expenditure switching effect, which makes exports cheaper in foreign markets and imports more expensive in the home market.

9. Models need to incorporate realistic market frictions and imperfections in order to inform policymakers. Many exporters typically price their goods in dollars (Dominant Currency Paradigm, DCP) and those prices tend to be sticky (Gopinath, 2015). If dollar prices do not adjust, foreign demand does not vary with the country's exchange rate. This weakens the expenditure switching effects (which may be limited to affecting imports). Currency mismatches on borrowers' balance sheets are a key source of financial fragility. As the exchange rate depreciates following an adverse shock, it increases the burden of unhedged foreign currency debt liabilities. That reduces creditworthiness, leading to higher borrowing costs. Both DCP and currency mismatches reduce the automatic stabilizer role of the exchange rate. When currency markets are shallow, external shocks are not absorbed as easily by financial markets, amplifying their impact on the domestic economy. The focus is on these frictions because several studies point to their key role for macroeconomic and financial stability (see also Mano and Sgherri, 2020). These considerations may create a rationale for deploying alternative policy tools. FXI can have traction in affecting the exchange rate when FX markets are shallow. Currency mismatches and other credit frictions create a role for CFMs and MPMs in trying to discourage risky liability structures.

10. Staff has developed models that jointly consider the potential benefits and costs of the different IPF tools taking into account different country circumstances. An earlier literature analyzed the different policies for managing capital flows. But this analysis has been limited to a subset of the IPF policies.¹⁵ One exception is Ghosh et al. (2018), who consider the IPF policies in a reduced form model.¹⁶ The gap in the theoretical literature led staff to develop new models, with realistic frictions, to consider how to use policy tools to achieve macroeconomic and financial stability. Basu et al. (2020) provide a comprehensive macroeconomic model with micro-foundations that jointly analyzes all four IPF policies and analytically solves for their optimal combinations. This

¹⁴ Dating back to Mundell (1963), Fleming (1962), Dornbusch (1976) and continuing in modern New Keynesian models.

¹⁵ For example, Bianchi and Mendoza (2010), Jeanne and Korinek (2010), Bianchi (2011), Benigno et al. (2012), Rey (2015), Gabaix and Maggiori (2015), Farhi and Werning (2016), and Lama and Medina (2020). Please refer to Korinek (2020) and Basu et al. (2020) for a discussion of previous theoretical models.

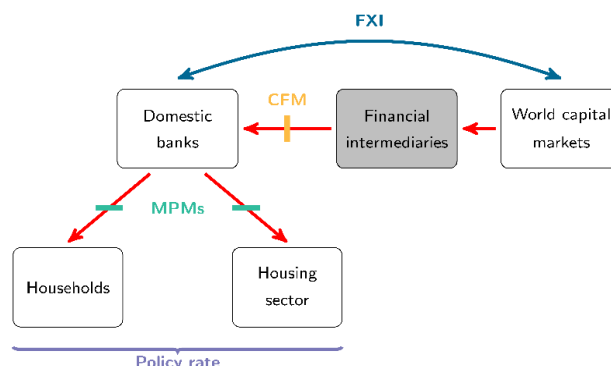
¹⁶ This work includes a positive reduced-form model of IPF policies complemented by discussions about normative considerations as well as fiscal policy. Together with Ostry (2019), it references a previous reduced-form theoretical workstream including Ostry, Ghosh, and Chamon (2012), Ghosh et al. (2016), and Blanchard et al. (2016, 2017).

framework provides a clear view of how all the four policies interact with different frictions and with each other and allows counterfactual policy analysis. That work is complemented by a quantitative approach. Adrian et al. (2020) use an empirically oriented model which enables them to quantify the policy tradeoffs countries face and how different policy tools can be used to mitigate them. Boxes 1 and 2 provide an overview of these models' key features.

Box 1. A Conceptual Model for the IPF

The analytical IPF model adds dominant currency pricing and financial frictions to an otherwise standard micro-founded small open economy New Keynesian model. The model (Basu et al. 2020)

features households and firms in tradable goods and housing sectors that save and borrow through domestic banks. Banks access world capital markets through financial intermediaries, which have a limited capacity for bearing currency risk. Both domestic and external borrowing is



constrained by the value of collateral. The model focuses on debt flows, both in FX and domestic currency, because they are the most important types of flows for macroeconomic and financial stability risks. It considers a range of real and financial shocks, including shocks to productivity, commodity prices, the world interest rate, domestic and external debt limits, and foreign appetite for domestic debt. The effects of these shocks depend on country characteristics, including the currency of trade invoicing, commodity export share, currency mismatches in balance sheets, domestic and international credit market imperfections, stock of debt, and the depth of the FX market. The combination of currency mismatches and collateral constraints can make some countries vulnerable to sudden stops and to fire sales of housing collateral.

The actions of some agents can impose externalities (distortive costs) on other agents, which the optimal IPF policies seek to correct. The analysis focuses on the following externalities:

- Households do not internalize the impact of their consumption decisions on aggregate demand. This is typically the key friction in models of monetary policy.
- Households and banks do not internalize the effects of their borrowing and lending decisions on external interest premia. This leads to excessive fluctuations in external premia and macroeconomic aggregates during both inflow and outflow episodes in countries with shallow FX markets.
- Households and banks do not internalize the effects of their decisions on the exchange rate and thereby, in economies with currency mismatches, on external FX borrowing constraints. This leads to overborrowing ex ante and severe sudden stops after adverse shocks.
- Housing sector firms do not internalize the effect of its borrowing on land prices. This leads to excessive leverage ex ante and fire sales in housing markets after adverse shocks.

The different IPF tools operate via different mechanisms, but policies interact with each other.

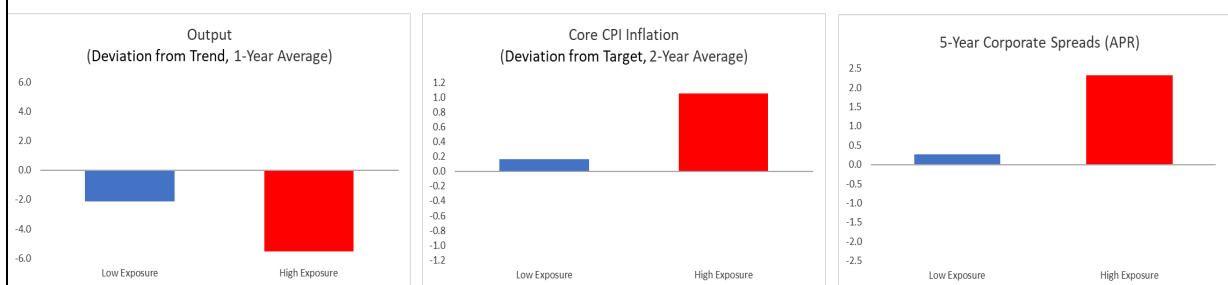
Monetary policy has its traditional role via interest rates. FXI affects the exchange rate through a portfolio balance effect, changing the premia financial intermediaries demand when lending to domestic banks. MPMs act as taxes on consumer and housing loans to discourage excessive borrowing. CFMs are a tax on external funding by banks. While policies can target flows between different agents, these flows are interconnected, so changing any one policy has implications for the others. For example, changing MPMs affects lending by domestic banks, with implications not only for monetary policy but also for optimal FXI and CFMs through the resulting change in bank demand for international funding.

Box 2. A Quantitative Model for the IPF

The quantitative model is empirically oriented and useful for assessing how alternative IPF tools may improve policy tradeoffs and mitigate risks. The model (Adrian et al., 2020) builds on a fairly standard class of New Keynesian open economy models that are widely used at central banks but incorporates additional frictions to help capture key features of many EMDEs and of financial stress episodes. Specifically, the model includes a nonlinear balance sheet channel—linking the Uncovered Interest Parity (UIP) risk premium to a country’s net foreign liabilities—which implies that a highly indebted economy is particularly susceptible to capital flow and exchange rate pressures when global risk sentiment deteriorates. In the spirit of Bruno and Shin (2018), it also allows exchange rate fluctuations to markedly affect domestic financial conditions (e.g., private borrowing spreads) to account for the effects of foreign currency mismatch. Finally, monetary policy credibility may be imperfect, so that exchange rate changes can have pronounced effects on inflation expectations (Carstens, 2019).

The model captures the key role of the exchange rate channel in determining policy tradeoffs for some EMDEs. Exchange rate shocks do not pose major challenges for large AEs: a depreciation increases output while exerting small and relatively transient effect on inflation. But shocks that cause the exchange rate to depreciate may pose very difficult tradeoffs for economies in which inflation expectations are poorly anchored, as in the case of some EMDEs. In this case, the central bank is forced to choose between sharp policy tightening to keep inflation stable—at the cost of a steep output decline—and pursuing a more passive policy that may allow inflation to become unmoored. EMDEs with large net foreign liabilities are even more vulnerable to external shocks (see chart below). They face higher increases in inflation than EMDEs with low net foreign liabilities even after adopting a tighter monetary policy stance. As a result, these more vulnerable EMDEs also experience deeper contractions in output and a deterioration in spreads. The use of different IPF tools can help manage these tradeoffs, as described below.

Effects of Shift in Risk Aversion and Weaker Foreign Demand



Note: High/low exposure refers to the size of countries’ net foreign liabilities and their associated exposure to external shocks.

Optimal Use of IPF Tools

11. The availability of a policy tool does not imply it should be used, and full exchange rate flexibility is appropriate in many cases. Countries with deep FX markets, continuous access to external financial markets and well-anchored inflation expectations can achieve both output and inflation stabilization using only monetary policy and allowing the exchange rate to adjust freely. This is true for all shocks considered in the models (including shocks to productivity, terms of trade,

and global financial conditions). High dollar invoicing in trade weakens macroeconomic stabilization benefits of exchange rate flexibility but does not create a role for the other IPF tools per se in the absence of financial market imperfections. Even when those imperfections are present, the active use of FXI, MPMs, and CFMs should generally be limited to shocks emanating from financial markets rather than the real economy (unless the shocks give rise to financial stability concerns). Thus, the standard macroeconomic model, which provides a good baseline for many AEs and some EMs, is nested within the broader IPF model. Using IPF tools to support misaligned exchange rates would be welfare-reducing in the models.

12. Where financial frictions and shocks justify using additional tools, there is no one-to-one assignment between policies and market imperfections. Policies typically affect several imperfections and interact with each other. For example, CFMs that restrict foreign funding by banks will have implications for the optimal monetary policy and MPMs on domestic lending, as well as on optimal FXI through the implications for the exchange rate. Any change in one policy will have implications for the optimal level at which the other policies should be set. As a result, there is no preset hierarchy of policies or the order in which they are used. This should not be taken to imply that there is no right or wrong use of the instruments—only that what is optimal depends on the specific circumstances. These circumstances are clearly laid out in the models. Their applications in a policy context would require the development of suitable metrics to guide judgment.

13. Precautionary CFMs on capital inflows, applied before shocks hit, can lower risks to financial stability in countries vulnerable to sudden stops. Such CFMs with macroprudential objectives would need to be adjusted as financial risks evolve, with the overall level calibrated to reflect structural features of the economy. A combination of trade and financial frictions may bolster the case for using these tools (e.g., dollar invoicing coupled with unhedged FX debt). It is important to bear in mind that the stock (and not just the flow) of risky liabilities is the appropriate metric for determining the vulnerability of the economy.¹⁷

14. MPMs and CFMs may be substitutes or complements when used to manage financial stability risks associated with capital inflows. They are (imperfect) substitutes with respect to the sectors at risk from external flows that MPMs cover. By curbing borrowing by domestic agents from domestic banks, MPMs indirectly curb external borrowing by banks. Similarly, CFMs that curb external funding by banks limit their lending to domestic agents. This substitutability may be particularly relevant for countries that cannot use CFMs (for example, due to treaty obligations). However, this substitutability does not hold when capital flows into unregulated corners of the financial sector, or MPMs are circumvented by borrowing directly from abroad. In that case CFMs can become complements of MPMs by helping plug leakages.¹⁸

¹⁷ The domestic and international macroeconomics literatures since the GFC have extended previous models to incorporate vulnerabilities related to unhedged debt stocks. Moreover, within the Vulnerability Exercise, staff assesses external crisis risks using models which prominently feature debt stocks as explanatory variables.

¹⁸ The substitutability and complementarity of certain MPMs and CFMs was previously discussed in Ostry et al. (2011) and Ostry, Ghosh, Chamon, and Qureshi (2012).

15. Appropriate use of FXI, MPMs and CFMs in the face of financial frictions and shocks can enhance monetary policy autonomy in addition to contributing to financial stability.

These tools reduce the need for monetary policy to respond to external shocks and allow it to focus on domestic objectives:

- **FXI:** If FX markets are shallow and FXI has traction, intervention that leans against inflow/outflow surges reduces excessive volatility of the exchange rate and interest rate premia. This benefit can be larger if inflation expectations are less anchored. FX sales during stressed depreciation episodes can relieve binding external borrowing constraints. Precautionary reserve accumulation during normal times creates buffers that allow intervention during bad times.
- **MPMs and inflow CFMs deployed during normal times:** These policies can prevent the buildup of risky liability structures. If they are adjusted over the cycle, e.g., tightened/loosened during surges/retranchments in domestic credit or external debt, they help insulate domestic aggregate demand from external shocks, allowing monetary policy to focus on domestic inflation pressures.
- **Outflow CFMs applied in crisis times:** They can attenuate exchange rate pressures from monetary policy easing and help preserve financial stability. However, outflow CFMs are associated with reputational costs. This use of CFMs may be more attractive for countries where the stock of reserves is limited, or where the shock is highly persistent and sustained FXI would imply large reserve losses.
- **Domestic financial sector development:** This contributes to resilience to external shocks. For example, increases in the ability to pledge and seize collateral will reduce the risk that borrowing constraints bind and fire-sales are triggered after a shock. The development of a domestic investor base can also contribute to resilience. The IMF provides Technical Assistance to facilitate the development of markets and policy institutions.

16. The calibrated IPF model quantifies the gains from using IPF tools to improve policy tradeoffs and mitigate downside risks. FXI can improve the inflation-output tradeoff in some EMDEs by limiting exchange rate and inflationary pressures and thereby allowing monetary policy to focus more on output stabilization. In the process, FXI attenuates the impact of shocks on the UIP risk premium and private borrowing spreads. In a similar vein, the use of CFMs (or MPMs, which are not explicitly included in the model) can also yield more monetary policy space as discussed above. FXI purchases can also help countries in a liquidity trap (consistent with the “foolproof way” suggested by Svensson, 2003). The weaker exchange rate stimulates output and inflation, lowering the real interest rate in a way that may otherwise be difficult to achieve in a country at the effective lower bound, and allowing the central bank to achieve its inflation objective. Even so, such a policy should not be used to maintain a misaligned exchange rate and may have adverse spillovers to other countries. These spillovers are amplified when more countries reach the effective lower bound (since depreciation in one country causes appreciation in others, including those that are also at the effective lower bound).

17. The appropriate policy mix depends on the type of shock and country characteristics.

The optimal response to shocks depends on the degree of currency mismatches and the depth of FX markets. Box 3 discusses the policy response to the Taper Tantrum shock, and how it compares with the models' prescriptions. Some examples of responses to different combinations of shocks and characteristics are as follows:¹⁹

- **Risk-off shocks:** Countries with deep FX markets do not need to adjust domestic policy settings to such shocks, except after severe shocks that give rise to financial stability concerns (which are heightened in the presence of currency mismatches).²⁰ Countries with shallow FX markets experience macro destabilization after such shocks and should use FXI, CFMs, and MPMs in a temporary fashion to stabilize interest premia (not the level of the exchange rate or reduce its volatility per se), which would free up monetary policy to focus on domestic objectives. Countries with shallow FX markets also need to be more alert to spillovers from risk-off shocks onto the nontradable sector and adjust MPMs appropriately.
- **Fundamental changes in world interest rates:** Countries with both deep and shallow FX markets should generally accommodate such shocks, except to contain any growth in unhedged FX liabilities and any subsequent tightening of domestic and external constraints.
- **Real shocks (including shocks to productivity and commodity prices):** If such shocks are permanent and external constraints do not bind, countries should only use exchange rate flexibility to accommodate the shocks, irrespective of FX market depth. This is because excessive stabilization of the exchange rate has adverse effects on interest premia and hence domestic stability. For temporary shocks, there is no case for additional policies under deep FX markets, while there is a limited case for easing adjustment of external debt levels after the shock under shallow FX markets. If the shocks are large enough that either domestic constraints or external constraints or both are binding, then a combination of IPF policies should be used to help alleviate those constraints (which may include smoothing exchange rate adjustment after permanent shocks).

18. Fiscal policies affect the appropriate mix of IPF tools but are not an adequate substitute for them.

The fiscal stance as well as the level and composition (e.g., currency, maturity and creditor base) of public debt affect initial conditions and may make the economy more vulnerable to certain shocks such as a sudden stop. Insofar as fiscal policy plays a key role in affecting macroeconomic developments as well as downside risks to the economy, it influences the appropriate mix of IPF policies and can potentially complement IPF tools in supporting macroeconomic and financial stability objectives. Even so, fiscal policies are not, of themselves, an adequate substitute for IPF tools, as the latter are better tailored for addressing financial stability risks and for responding quickly to shocks (such as a sharp rise in the UIP risk premium).

¹⁹ Please refer to Basu et al. (2020) for a more detailed discussion, including additional shocks and structural characteristics considered in the analytical model.

²⁰ In the model, risk-off shocks capture changes in foreign investors' appetite for domestic currency debt owing to irrational exuberance, panic, or financing constraints that are unrelated to domestic and external fundamentals.

- **External financial shocks:** CFMs and MPMs constitute taxes or quantity restrictions on risky external FX borrowing which can be adjusted as the level, composition, and hedging of FX debt evolves. In principle, other kinds of taxes may be used for this purpose. However, in practice, aside from automatic stabilizers, fiscal policy tends to be sluggish in its adjustment except following very large shocks, and is driven by a broad range of economic and social objectives such as redistribution. While credible announcements about the future fiscal stance can have more frontloaded effects—including through affecting asset prices and confidence—fiscal spending and transfers are nonetheless less well targeted to FX borrowing and their use to mitigate sudden stop risks relies on indirect mechanisms. For example, the government may cut public spending or transfers to reduce borrowing or accumulate FX assets during inflow episodes, and provide fiscal support during sudden stops. This use carries distortionary costs, and domestic agents who expect future fiscal support may engage in more FX borrowing. That would be difficult to limit without CFMs and MPMs, making fiscal policies a poor substitute for these tools.
- **Warranted fiscal adjustment:** Relative to what is required by an appropriate and credible fiscal framework, fiscal policies may be overly contractionary (weakening domestic demand and contributing to an excessively strong external position) or expansionary (leading to overheating and potentially endangering public debt sustainability). Adjusting IPF tools to address the side effects of inappropriate fiscal policy is inferior to correcting the inappropriate policies at their source.

19. While the models focus on a small open economy, modest extensions of our frameworks can provide some guidance for the use of IPF tools in the multilateral context.

Preliminary results from our ongoing analytical agenda suggest that the coordinated use of IPF tools may be desirable from a global perspective, including in response to a global shock such as COVID-19.²¹ However, these tools may also have negative spillovers under some conditions.

- **Capital flow spillovers between recipient countries:** Countries with deep FX markets, continuous access to financial markets, and well-anchored inflation expectations may continue to allow exchange rates to adjust freely, while countries with financial frictions may use an appropriate mix of IPF tools. While such use of IPF tools may generate capital flows into or out of other countries with fewer frictions, the tools could help the flows to be managed more efficiently and reduce the risk of crisis. However, negative spillovers may arise, for instance, if the use of IPF tools (such as CFMs) deflects capital flows to other countries with financial frictions.
- **Macroeconomic stabilization and spillovers:** To the extent that IPF tools help countries achieve their macroeconomic and financial stability objectives without depressing their exchange rates substantially or generating excessive capital flow volatility for other countries, net spillovers to other countries may be positive. However, IPF tools may

²¹ See Ostry, Ghosh, and Korinek (2012) and Korinek (2016) for earlier discussions on the multilateral implications of managing the capital account.

potentially also have negative macroeconomic spillovers if they induce substantial exchange rate depreciation, and trading partners are unable to offset the negative aggregate demand effects due to the effective lower bound on interest rates. The risk of negative spillovers is exacerbated to the extent that countries deploy IPF policies to support external competitiveness (i.e. misuse these tools).

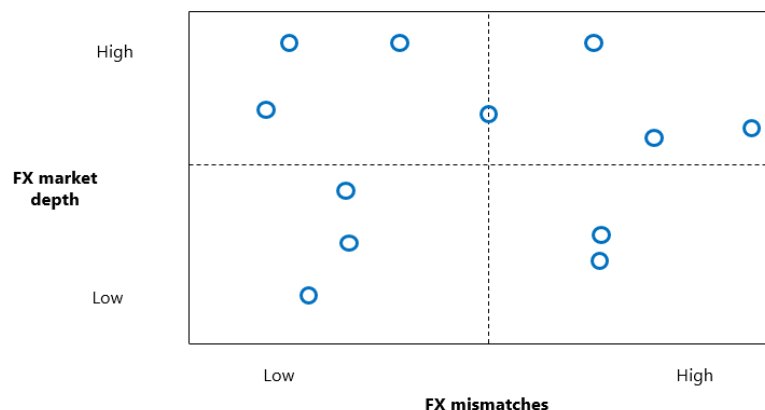
- **Source-to-recipient spillovers:** The models capture important aspects of multilateral spillovers from source countries, such as world interest rate shocks and the frequency and severity of risk-off shocks.

20. The models highlight the constructive role that IPF tools may play in a crisis environment, including in response to the COVID-19 crisis. Indeed, in the context of COVID-19, many countries experiencing sharply tighter financial conditions and capital outflow pressures—and with shallower foreign exchange markets—responded quickly through FX sales and easing MPMs. The use of CFMs has been more sparing, perhaps reflecting that resolute actions by AE central banks brought about a rapid turnaround in global financial conditions. Nonetheless, considerable downside risks remain that could warrant a more broad-based deployment of the full complement of IPF tools.

Box 3. Comparing the Models' Predictions with the Response to the Taper Tantrum Shock

Two key determinants of the optimal policy mix in the models are the extent of currency mismatches and the depth of FX markets. For the purposes of this exercise, we classify countries along these two dimensions and analyze their response to the Taper Tantrum shock of May 2013.

Currency mismatches are measured based on the non-financial private sector FX debt, and FX market depth is based on deviations from the UIP. Financial sector FX debt is excluded from the currency mismatch measure because it is typically well hedged, often as a result of prudential regulations. In a similar vein, government FX debt is excluded because of FX reserve holdings (which in turn is a policy response to private FX debt). There is no standard definition for FX market depth. The models equate FX market shallowness to larger deviations from UIP after a risk-off shock. This empirical exercise analogously proxies FX depth by the maximum UIP deviation in May–December 2013. The plot below shows where a mix of 1 AE and 11 EMs lay according to these two dimensions.



Box 3. Comparing the Models' Predictions with the Response to the Taper Tantrum Shock (concluded)

There are a number of countries for which the IPF models would have implied a role for additional policy tools. Ten out of twelve countries loosened their monetary policy in response to the Taper Tantrum shock, with the two exceptions being countries with low FX market depth. One of the countries with high market depth and low FX mismatches (top left quadrant) bought FX while another sold it, whereas the models would not have prescribed FX intervention in this case. Two other countries with high market depth and high FX mismatches also intervened, in contrast to model predictions. Most countries with low FX market depth sold FX. Two countries loosened CFMs (both had low FX market depth, but one had low mismatches while in the other it was high). Although virtually all EMs have MPMs in place related to the prudential regulation of FX in the financial sector, this is not the case for the non-financial firms. There were seven countries, spanning all combinations of market depth and mismatches, that tightened other types of MPMs. Supporting domestic demand under Taper Tantrum would have pointed in the direction of loosening of MPMs; however, there can be other domestic financial shocks in those economies at the same time that required a tightening. Overall, this exercise illustrates that some countries deviated from the optimal mix of policies based on the model when countering the risk-off shock, although the comparison is complicated by the fact that the countries might have been affected by other shocks at the same time and did not necessarily start from a steady state.

EMPIRICAL EVIDENCE ON POLICY APPLICATION AND EFFECTIVENESS

21. This section reviews empirical evidence on IPF tools and their effectiveness. It discusses findings on the various instruments both individually and in combination, their costs and benefits, intertemporal tradeoffs, unintended consequences, and cross-border spillovers. The review highlights specifically the IPF-related empirical work that has been undertaken by Fund staff in recent years. The results need to be considered in the broader context of the IPF. The empirical evidence both informs the models and helps verify and validate their results. This said, the evidence is inevitably based on how the tools have been used in practice and not on how the models indicate they should be used. Also, the available evidence speaks to the effectiveness of tools and their interactions but not necessarily to the optimality of policies in the way the modeling exercises do.

22. The main takeaways are as follows:

- There is evidence that MPMs, FXI and CFMs can help meet the goals of financial stability, price stability, and stabilizing output, and increase the autonomy of monetary policy;
- MPMs can reduce the domestic buildup of vulnerabilities stemming from easy global financial conditions and bolster resilience to shocks;
- CFMs can help reduce the volatility of capital flows and the buildup of domestic vulnerabilities from such flows. There is strong evidence that CFMs can affect the composition of such flows in line with financial stability objectives, even if they may not affect overall volumes;
- Empirical evidence specifically supports the effectiveness of existing/precautionary CFMs;

- There is less evidence available for the effectiveness of reactive CFMs in response to shocks;
- When reacting to a loosening of external financial conditions, tightening MPMs appear to offer the highest net benefit in terms of minimizing output and inflation volatility;
- FXI can materially affect the exchange rate, at least in the short term, and may assist in managing capital flows. Appropriate stocks of foreign exchange reserves reduce vulnerabilities;
- There is some evidence that FXI can encourage the buildup of unhedged FX liabilities;
- There is limited evidence so far that the use of MPMs, FXI or CFMs affects long-term growth prospects, or that FXI reduces the credibility of central banks.

The section starts with a brief discussion of the empirical findings regarding limitations of monetary policy before turning to an overview of the available evidence for the use of individual IPF tools (including spillovers), their joint use, and long-term effects.

A. Limitations of Monetary Policy and Exchange Rate Flexibility

23. Monetary policy autonomy is often circumscribed in many countries. Open economies can be subject to strong external influence, or what Rey (2015) has identified as a “global financial cycle,” that limits monetary policy autonomy.²² This is true even under fully flexible exchange rates, which help cushion such external factors, but do not insulate economies from them (Obstfeld, 2015, Rey, 2015). IMF (2017) finds that global financial conditions account for about 20 to 40 percent of the variation in countries’ domestic financial conditions. Similarly, Cecchetti et al. (2020) find that spillovers from U.S. monetary policy have a larger impact on financial firms’ leverage in recipient countries than the domestic monetary policy. Earlier work by Alter and Elekdag (2016) also found a large role for U.S. policy. Chen et al. (2014) show that spillovers to EMs have become stronger during the unconventional monetary policy phase. Such interconnectedness has implications for both macroeconomic and financial stability. Reflecting this, in many countries monetary policy decisions are not based on inflation and output alone. They also reflect external considerations or financial stability concerns. For example, Finger and Lopez Murphy (2019) find for EMs in Asia that monetary policy responds to U.S. interest rates, the exchange rate, and credit, besides inflation and output.

24. Empirical evidence also suggests that monetary policy may not always be effective in addressing external shocks. While studies indicate that monetary policy responds to external shocks, it is less clear that it is effective in mitigating them. For instance, Gelos et al. (2019) find no evidence that monetary policy mitigates the impact of shocks on the level or the distribution of future capital flows to EMs in the short or medium term. The lack of monetary policy effectiveness in

²² In some countries, low credibility of monetary policy may imply further constraints. Végh et al. (2017), for instance, identify a lack of policy credibility as a key constraint in some Latin American countries, often resulting in procyclical monetary policy responses, such as the need to raise interest rates in the face of a deflationary (external) shock. This finding is in line with IMF (2018), which shows how, following shocks, inflation expectations become unanchored more easily in countries with low policy credibility, thereby limiting their policy options. Kalemli-Ozcan (2019) shows that as a response to capital outflows and higher U.S. interest rates, regardless of the monetary policy response, spreads increase in emerging markets but not in advanced economies.

addressing external shocks is confirmed by Kalemli-Ozcan (2019) and Brandao-Marques et al. (2020), with the latter finding that using monetary policy to offset these shocks is costly. Separately, there is a literature that suggests that monetary policy is often an inefficient tool for addressing financial stability concerns (e.g., Svensson, 2017, Collard et al., 2017, Brandao-Marques et al., 2020).

25. Dominant currency pricing and financing can limit the benefits of exchange rate flexibility. Most EMDEs price their exports in dollars, purchase imports priced in dollars, and borrow in dollars. Gopinath et al. (2020) and Adler, Casas et al. (2020) document that with dominant currency pricing a country's exchange rate vis-à-vis the dollar (not vis-à-vis its trading partners) is the major determinant of passthrough and traded volumes in the short term. Exchange rate depreciation in these countries is associated with a cutback in imports but no significant increase in exports in the short term. Similarly, Adler, Casas et al. (2020) show that in countries whose corporates depend on dollar financing, a depreciation can lead to financial distress and a cutback in imports with no stimulative effect on exports. Overall, with dominant currency pricing and financing, the short-term response of trade volumes to exchange rates is likely to be more muted and manifested mostly through imports. Exchange rate adjustment remains key for achieving durable, medium-term external balance.

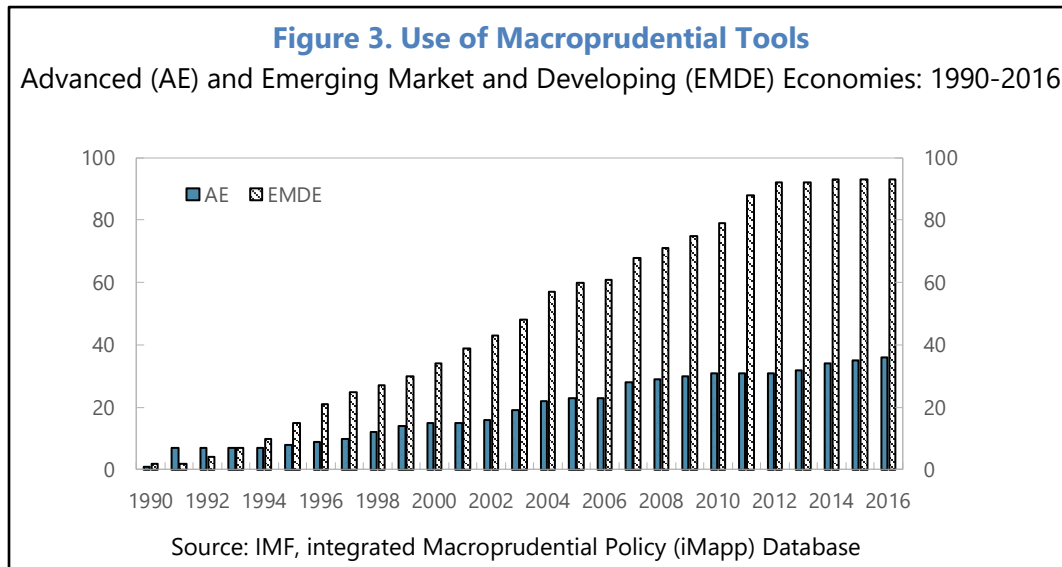
B. Empirical Evidence for IPF Tools

26. The limitations of monetary policy create a rationale for using additional tools, and there is an evolving literature on the effectiveness of these tools. While the impact of FXI and CFMs has been subject to many decades of research, empirical work on MPMs has gathered momentum only in recent years. In addition, the work on the IPF has spurred various empirical studies by IMF staff that seek to investigate the interactions and complementarity between the tools, and their usefulness in addressing external shocks. Key relevant studies on the use, effectiveness, and possible drawbacks of individual tools are summarized below, organized by instrument (a tabular summary is provided in Annex 2). It is important to note that the fact that a tool is effective in achieving a particular objective does not necessarily mean that it is appropriate for meeting broader macroeconomic objectives or maximizing the welfare of a country.

Macprudential Measures (MPMs)

27. MPMs have been deployed with increasing frequency, especially in response to rapid credit growth. Data from the IMF's integrated Macprudential Policy (iMaPP) database indicates that the use of macroprudential policy instruments has grown steadily in the past 30 years (Figure 3), with over 90 percent of reporting economies now using at least one such tool (Alam et al., 2019). Whereas real estate related measures, such as loan-to-value caps, tend to be popular in advanced economies, the most widely used tools among EMDEs are limits on FX positions, reflecting the concern of policymakers about exchange rate risks. To the extent that studies have examined the cyclical determinants of the use of MPMs, they often find that changes in macroprudential policy settings respond mainly to domestic financial variables, especially credit growth (e.g., Aikman et al., 2015; Brandao-Marques et al., 2020; Nier et al., 2020). However, there is some evidence that the use

of MPMs in EMDEs also responds to external factors such as U.S. interest rates and capital flows (IMF, 2020a; Finger and Lopez Murphy, 2019).



28. Studies suggest that MPMs can reduce the domestic buildup of vulnerabilities stemming from easy global financial conditions—and bolster resilience to shocks. A growing literature finds that MPMs are effective in moderating credit developments (Forbes, 2019; Alam et al., 2019; Araujo et al., 2020). The effects appear to be larger for emerging markets (Araujo et al., 2020). Newer, IPF-related studies have also started to examine whether MPMs can cushion the impact of external shocks on domestic outcomes and generally find this to be the case. For instance, Brandao-Marques et al. (2020) suggest that macroprudential tightening in response to easing global financial conditions can help contain tail risks to GDP. Some of this work also suggests that precautionary MPMs are most useful. Cecchetti et al. (forthcoming), for instance, find that existing macroprudential regulation is more effective than reactive tightening in limiting buildup of leverage among financial firms during episodes of loose U.S. monetary policy. In the same vein, IMF (2020a) finds that tighter existing MPMs can dampen the effects of global financial shocks on GDP growth in EMDEs. The strongest evidence is emerging for borrower-based MPMs, such as debt-service-to-income ratios (Fendoğlu, 2017; Brandao-Marques et al., 2020; Nier et al., 2020). However, there is also evidence that FX exposure limits help curb lending in foreign currencies (Forbes, 2019).

29. The short-run cost to output of MPMs seems small for the typical measure. Several studies suggest that MPMs' effectiveness in curbing risks and reducing long-term output volatility comes at relatively low short-term output costs (e.g., IMF, 2020a; Alam et al., 2019; Araujo et al., 2020), although Richter et al. (2018) find larger costs from loan-to-value caps. Costs seem sensitive to the prevailing level of MPMs and can rise when MPMs are already tight (Alam et al., 2019). A broad-based cost-benefit evaluation in terms of the effects of output and inflation volatility also suggests that when reacting to a loosening of external financial conditions, tightening MPMs offers larger net benefits than monetary policy or CFM tightening, or FXI (Brandao-Marques et al., 2020).

30. However, macroprudential policy may “leak” by encouraging the provision of credit by non-banks and from abroad. Circumvention and deflection can undermine the ultimate effectiveness of MPMs. For instance, Ahnert et al. (2018) find that while FX regulations on banks appear to be successful in mitigating the vulnerability of banks to exchange rate movements and the global financial cycle, they partially shift the FX vulnerability to other sectors. Similarly, Nier et al. (forthcoming) find that use of MPMs leads to increases in direct borrowing from abroad. Some studies find that such leakage effects appear stronger for borrower-based tools (see Cizel et al., 2016, for non-banks, and Nier et al., 2020, for cross-border leakage).

31. MPMs may generate external spillovers. IMF (2020a) finds some evidence that tighter macroprudential regulation in one country enhances resilience in others, possibly because greater domestic stability supports more stable cross-border financial and trade flows. However, McCann and O’Tool (2019) find that tighter regulation at home leads banks to increase loan-to-value and loan-to-income ratios on lending abroad. Buch and Goldberg (2017) note that effects vary across instruments and banks.

Foreign Exchange Intervention (FXI)

32. FXI is also used widely, including among inflation-targeting central banks in EMDEs with flexible exchange rates. Country authorities report that they use (sterilized) FXI for a multitude of objectives including (i) inflation control; (ii) building reserves; (iii) muting volatility in shallow FX markets; (iv) preserving financial stability in the presence of balance sheet mismatches; and (v) preventing overvaluation of the currency that may hurt competitiveness (Hofman et al., 2020; Poirson et al., forthcoming). Data suggests that interventions in EMDEs tend to be asymmetric, leaning more often against currency appreciation during inflow periods than against depreciation during outflows (Adler, Chang et al., 2020; Adler et al., forthcoming; Chamon et al., 2019; Poirson et al., forthcoming), possibly motivated by the objective to build reserves. Evidence suggests that countries with higher reserves face less asset price and capital flow volatility than those with low reserves (Sahay et al., 2014). Mano and Sgherri (2020) find that countries with larger balance sheet vulnerabilities and shallower FX markets intervene more than others in response to similar shocks.

33. The current literature suggests that FXI has a material effect on the exchange rate, at least in the short run. There has been a longstanding debate about the effectiveness of sterilized interventions in AEs, with no clear academic consensus (Sarno and Taylor, 2001). The evidence from EMDEs over the past 20 years, however, suggests that interventions affect the exchange rate, at least in the short term (Chamon et al., 2019; Fratzscher et al., 2019). FXI is most effective when it is consistent with fundamentals and the monetary policy stance (Adler and Tovar, 2014; Daude et al., 2016; Menkhoff, 2013). Evidence of a persistent impact remains scant (e.g., Blanchard et al., 2015; Chamon et al., 2019), although Gagnon et al. (2017) and Filardo et al. (forthcoming) find effects measured at annual and quarterly frequencies.

34. There is some evidence that interventions can help manage volatile capital flows. In particular, it is clear that FX sales can greatly reduce financial market stress (Domanski et al., 2016) as was evidenced, for those countries with access, by the large effects from the provision of dollar

liquidity through swap lines in allaying the effects of a scramble for dollar liquidity during the GFC and COVID-19 crises. In addition, Gelos et al. (2019) find that foreign exchange sales are somewhat effective in reducing capital outflows in response to external shocks. This paper also suggests that FXI can mitigate downside risks to portfolio inflows caused by changes in global conditions, though this effect seems limited to the short term. Blanchard et al. (2017) show that FXI can be particularly effective when responding to portfolio debt inflows. By muting short-term volatility, FXI may also help guard against the negative impact of overshooting of the exchange rate, which can carry high costs in terms of reducing competitiveness and amplifying balance sheet mismatches (Culiuc, 2020).

35. Foreign exchange reserves reduce external vulnerabilities, creating a case for precautionary accumulation where needed to meet adequacy metrics. Reserves are among the most consistent indicators of vulnerability that have emerged from the early warning literature (see Frankel and Saravelos, 2012, for a comprehensive review). Cubeddu et al. (forthcoming) update and broadly confirm this finding, reporting that foreign reserve assets reduce vulnerabilities from external indebtedness.²³ In a similar vein, Sgherri and Shao (forthcoming) find that having high reserve cover provides countries with extra policy space, allowing their monetary and fiscal policy to respond countercyclically to global shocks, while limiting their borrowing costs and credit risk. Reserves holdings are no free lunch, however, and are associated with sterilization costs (Rodrick, 2006; Levy Yeyati, 2008) and risks for central bank balance sheets (Filardo and Yetman, 2012).

Capital Flow Management Measures (CFMs)

36. CFMs comprise a wide range of diverse instruments affecting capital flows, which are difficult to measure quantitatively, thereby hampering empirical analysis of their effects.

CFMs come in many different shapes and forms and even measures of the same type may differ in coverage and restrictiveness. While several attempts have been made at constructing aggregate CFM indices to facilitate international comparison (e.g., Chinn and Ito, 2008; Quinn et al., 2011; Fernandez et al., 2016), measurement remains imperfect. The aggregation itself also poses a problem as it obscures differences between types of CFMs, which can be of critical importance. For instance, where the models suggest positive impacts from precautionary use of CFM/MPMs that limit FX mismatches, most empirical studies are based on aggregate measures of all CFMs, thereby effectively capturing impacts summed over both desirable and undesirable measures. With these important caveats, key takeaways from the existing CFM literature are summarized below.

37. In practice, the majority of CFMs seem to be structural in nature. While CFMs can and have been used as temporary, countercyclical responses to shocks (Erten et al., 2019), such active use is not the norm. Bhargava et al. (forthcoming) find that an overwhelming majority of CFMs are of administrative nature, structural, and do not change from year to year. This finding echoes those of earlier studies, e.g., by Eichengreen and Rose (2014) and Gupta and Masetti (2018). Regarding the drivers of CFMs, there is empirical evidence that countries use CFMs for both macroprudential and external competitiveness objectives (Pasricha, 2020).

²³ However, they also find diminishing returns to the benefits from building such reserves.

38. Substantial empirical evidence indicates that CFMs can be effective in changing the composition of capital flows to mitigate financial stability risks. A variety of studies have found strong evidence that CFMs can be effective in changing the composition of capital flows, for instance toward longer maturities or away from portfolio debt (see Erten et al., 2019 and Rebucci and Ma, 2019 for recent surveys). Less clear is whether CFMs also affect the overall size of flows, with some studies finding that they do (e.g., Nispi Landi and Schiavone, 2018; Binici et al., 2010), while other studies do not find this (e.g., Magud et al., 2018; Habermeier et al., 2011). The impact on composition may be more important for financial stability and certain types of CFMs are found to reduce financial fragility (Forbes et al., 2015; Frost et al., 2020). For other objectives the evidence is more mixed but several studies find that CFMs increase monetary policy autonomy (Aizenman et al., 2015; Pasricha et al., 2018; Georgiannis and Zhu, 2019; Magud et al., 2018) and help address exchange rate pressures (Forbes et al., 2015; Magud et al., 2018). The effectiveness of CFMs, however, appears to depend on external conditions and may change over time. Pasricha et al. (2018), for instance, find that the effectiveness of CFMs weakened in the post-GFC environment of abundant global liquidity. There is limited evidence on the persistence of the effectiveness of CFMs, which is a key area for future work.

39. Studies specifically point to beneficial effects from precautionary CFMs. Due to data limitations, the literature has mostly examined the impact of existing CFMs versus reactive tightening or loosening, without much concern for the objectives behind measures. Nonetheless, this literature contains useful information on the likely effectiveness of precautionary CFMs, suggesting they may be particularly useful. Klein (2012) finds that long-standing CFMs on a broad range of assets (“walls”) are more effective in achieving monetary policy autonomy than episodic measures on a narrower set of assets (“gates”). And Gupta et al. (2007) show that existing CFMs contain the fall in output during currency crises. Ostry et al. (2010) and Ostry, Ghosh, Chamon, and Qureshi (2012) find that CFMs on debt flows in place during boom periods are associated with greater resilience via lower shares of FX lending and external portfolio debt. In the same vein, Nier et al. (2020) find that existing CFMs on cross-border borrowing help contain such borrowing in local credit booms, and Cecchetti et al. (forthcoming) find that existing CFMs limit buildup in financial firms’ leverage during periods of loose U.S. monetary policy. Bhargava et al. (forthcoming) show that precautionary CFMs on nonresident inflows reduce the probability of inflow surges. Bouis et al. (forthcoming) find that countries with higher existing CFMs experience lower drops in nonresident inflows and resident outflows during a crisis. Similarly, Das et al. (forthcoming) find that countries with precautionary CFMs saw smaller increases in interest rate risk premia during risk-off shocks such as Taper Tantrum and COVID-19. While the empirical support for precautionary CFMs is consistent, the lack of evidence for effectiveness of reactive measures could be affected by the larger endogeneity issues associated with analyzing such use. Gelos et al. (2019) find that tightening CFMs in response to an adverse global shock is counterproductive and raises the risk of outflows.

40. CFMs can deflect capital flows to other borrowing countries with similar economic characteristics and have other unintended consequences. Multilateral aspects of CFM use need to be considered, as spillover effects from CFMs have become well documented. Using a large sample of EMDEs, Giordani et al. (2014) find strong evidence that CFMs redirect capital flows to

similar third countries. Forbes et al. (2016) also find evidence of deflection in the specific case of Brazil's tax on foreign portfolio investments. Pasricha et al. (2018) find that, during the 2000s, capital flow policies in large EMs—in particular net inflow tightening measures—had significant implications for other countries both via exchange rates and capital flows.

C. Empirical Evidence on the Joint Use of Tools

41. The appropriate use of MPMs, CFMs and FXI may afford greater room for monetary policy to focus on domestic stability objectives. Several recent studies find that using additional tools can alleviate the burden on monetary policy and help achieve a more effective policy mix. The evidence is strongest for MPMs. Brandao-Marques et al. (2020) find that MPMs help contain financial vulnerabilities and do this at little cost, in contrast to monetary policy leaning against the wind, which causes sizable welfare losses. The study does not find similar benefits from FXI or CFMs, however. Meanwhile, IMF (2020a) documents that higher levels of macroprudential regulation are associated with more countercyclical monetary policy responses to global shocks. On broader sets of tools, Mano and Sgherri (2020) find that monetary policy actions become more sensitive to expected inflation developments when countries implement CFMs or MPMs.

42. The literature also documents that IPF tools may interact in various ways. For example, Nier et al. (2020) find evidence that exchange rate appreciation is associated with increases in the credit-to-GDP gap but that a prior tightening of macroprudential policies can mitigate this effect, potentially reducing the need for FXI to lean against appreciation for financial stability purposes. They also find evidence that capital inflow CFMs can reduce leakages from MPMs and dampen feedback effects when strong domestic credit growth leads to increases in borrowing from abroad. These financial stability benefits are also stressed in Ostry, Ghosh, Chamon, and Qureshi (2012). Similarly, CFMs may enhance the effectiveness of FXI as studies typically find that that FXI has more traction in countries with a less open capital account (e.g., Adler and Tovar, 2014; Poirson et al., forthcoming).

43. There is some evidence that policy combinations can be more effective than using a single instrument. Cordella et al. (2014) find that, in response to negative shocks, emerging markets increase the policy rate to defend the currency at the same time that they reduce reserve requirements (as a macroprudential tool) to mitigate contractionary output effects. Brandao-Marques et al. (2020) find that macroprudential tightening together with monetary accommodation is more effective than macroprudential policy alone in containing the effects of easing global financial conditions on tail risks to GDP. Using a variety of approaches and empirical estimates to examine the effectiveness of pairwise policy combinations to stabilize economies in the face of shocks, Poirson et al. (forthcoming) find that combinations can be more effective than using a single instrument. For instance, combinations of monetary policy and FXI can help smooth the impact of external financing shocks better than either instrument individually. The results, however, as the IPF models discussed above predict, depend on the nature of the shock and country circumstances.

44. Benefits of additional instruments increase when monetary policy faces a lower bound constraint on interest rates. As a special case, Poirson et al. (forthcoming) also find that the usefulness of additional tools is accentuated when monetary policy is constrained by the effective lower bound. Indeed, Svensson (2000) and McCallum (2000), among others, have suggested that FXI should be used when conventional monetary policy instruments are no longer effective—and a few smaller AEs have experimented such use (Badescu, 2016; Lizal and Schwarz, 2013; and Caselli 2017).

D. Long-Term Effects

45. Several studies suggest that sustained FXI may encourage corporate leverage and foreign currency borrowing. Indirect cross-country evidence from studies that look at the relationship between exchange rate regimes and financial vulnerabilities have long suggested that exchange rate rigidity may contribute to dollarization and the buildup of FX mismatches (Hofman et al., 2020; Ghosh et al., 2015; Ye et al., 2014). Csonto and Gudmundsson (2020) confirm that countries that exhibit greater exchange rate flexibility experience lower vulnerability in the form of declining foreign currency debt. Some other new studies examine the impacts of FXI more directly. For instance, Kim et al. (2020) find that unhedged corporate borrowers in EMs with less developed financial markets raise their FX debt following periods of intense FX interventions. Reserves stocks resulting from accumulated FXI may matter, too. For a sample of 23 EMDEs, Tong and Wei (2019) show that foreign reserve accumulation leads to higher corporate leverage.

46. There is little empirical research, however, on the direct impact of FXI on long-term financial development or reforms. While it is frequently assumed that FXI—or the degree of exchange rate flexibility—has an impact on financial development (e.g., on the depth of FX and hedging markets), many other factors play a role in market development and the relationship with FXI remains unclear (Mohanty, 2013; Gadanez and Mehrotra 2013). Research into this nexus has been very limited to date and it is an important area for further study.

47. FXI could also potentially weaken central bank credibility, though evidence is limited. While the use of multiple instruments in pursuit of multiple objectives could, in principle, be coherently integrated into policy frameworks, central banks with such approaches appear to have less transparent practices that often suffer from inconsistencies (Unsal et al., forthcoming).²⁴ This, in turn, may impact central bank credibility. Empirical work investigating this relationship has started only recently, however, and thus far with mixed results. For instance, Adler et al. (forthcoming) report that more prevalent use of FXI increases the propensity to overshoot inflation targets, thus suggesting weakened credibility. Hofman et al. (2020), however, find no such evidence.

48. Empirical evidence of CFMs' impact on long-term growth is limited. The empirical relationship between capital flows and growth is well documented for foreign direct investment and nondebt flows (Dabla-Norris et al., 2010; Edwards, 2007; Henry, 2007; and Kose et al., 2008), but less so for

²⁴ For example, in some inflation targeting countries, policy formulation has deviated from centering around inflation towards an eclectic practice with a primary role for other objectives in the absence of a clear framework (Unsal et al., forthcoming).

debt-creating flows (Jeanne et al., 2012). Firm-level analysis finds that capital flows increase investment by lowering the cost of equity (Chari and Henry, 2008; Kacperczyk et al., 2018) and the local borrowing costs of multinationals (Desai et al., 2006). CFMs may also reduce discipline in financial markets and public finances, and tighten financing constraints (Aizenman and Glick, 2009; Forbes, 2005, 2007a and 2007b; Alfaro et al., 2017; Rajan and Zingales, 2003). Recent work, however, casts doubts on the overall impact on growth. For instance, Brandao-Marques et al. (2020) find that CFMs responding to easy global conditions have small effects on future growth. Bouis et al. (forthcoming) find that while countries that use outflow CFMs in a crisis see sharper drops in sovereign ratings, they recover their rating as fast as countries that did not rely on CFMs.

49. Overall long-term policy outcomes will ultimately depend on many policy dimensions.

Macroeconomic policies alone cannot solve all problems and additional micro and institutional development policies are of key importance (see e.g., North, 1990, 1991; Rodrik et al., 2002; Dincer and Eichengreen, 2014). These more structural policies must complement IPF tools and will affect—and can help mitigate—long-run tradeoffs. In this regard, the Fund’s capacity development efforts in areas such as the development of markets, banks, and institutional frameworks are important complements. The broader policy settings ultimately determine the deep parameters of the IPF models and can improve welfare over and above macroeconomic policy tools.

SAFEGUARDS AGAINST INAPPROPRIATE USE OF IPF TOOLS

50. In the model frameworks, IPF tools are aimed at well-defined macroeconomic and financial stability objectives. The rationale for their use is to help stabilize inflation and output by minimizing the incidence and severity of domestic and external crises, not to prevent necessary economic adjustment or allow unsustainable policies to persist. Precautionary CFMs should be used alongside MPMs to reduce FX mismatches, so that countries can benefit from greater exchange rate flexibility when shocks materialize. CFMs or FXI should not be aimed at preventing exchange rate appreciation to support export industries. Neither should they be used to contain inflationary pressures in the face of an overly expansionary monetary policy. In countries with shallow FX markets, FXI, MPMs, and CFMs should be used to stabilize excessive deviations in interest premia during global risk-on/risk-off shocks but should not be used to obstruct adjustment to permanent real shocks.²⁵

²⁵ Regarding changes in world interest rates, IPF tools may be appropriate to address the impact of such changes on excessive interest premia, financial stability, and de-anchoring of inflation expectations, but not the impact on the level of the exchange rate per se.

51. In practice, however, the IPF tools could be used inappropriately.²⁶ Given the difficulty of diagnosing country characteristics, shocks, and crisis risks in real time, there is a possibility that the IPF tools are used for objectives other than those laid out by the framework:

- **Exchange rate undervaluation.** The IPF tools may be used alongside excessively contractionary fiscal policy to limit exchange rate appreciation and preserve competitive advantages.²⁷ Such policies excessively curtail consumption, have adverse beggar-thy-neighbor spillovers, and cannot be justified in the model frameworks.
- **Substituting for warranted fiscal consolidation or monetary tightening.** If fiscal policy is not consistent with public debt sustainability, the use of IPF tools to delay consolidation may increase the risk of a disorderly adjustment. If the monetary policy stance is not consistent with well-anchored inflation expectations, the use of IPF tools in place of monetary adjustment both diminishes the credibility of the monetary framework and reduces the ability to use the IPF tools in an effective manner in the future.
- **Impediments to competition and price discovery.** CFMs and MPMs, when used for protectionist purposes or to erode FX market functioning, may yield short-term gains but increase the vulnerability of the country to future shocks, so such use is not recommended.

52. Developing safeguards to minimize the risk of policy abuses will be key in translating the framework's findings into implementable policy advice. The model frameworks establish well-defined conditions for when certain policies should be used. Together with other analytical tools (for instance, those used in the External Sector Report) and other evidence-based findings, they can guide the development of metrics to discriminate between appropriate and inappropriate use of IPF tools. While this is an important area for further work by staff, such metrics could, for instance, include:

- Measures of unhedged FX mismatch, debt levels, debt maturity, and domestic credit for the aggregate economy and for specific sectors (e.g., households, banks, corporates) that increase the risk of crises, potentially adjusting for government buffers such as FX reserves;²⁸
- Evidence on the degree of MPM circumvention and coverage, e.g., corporates' access to FX borrowing from abroad;²⁹

²⁶ Such a risk is not unique to the IPF tools. More broadly, fiscal, monetary, and structural policies recommended for short-term stabilization and long-term development can all be used for inappropriate objectives—a concern which has prompted the development of metrics by the Fund in order to help discipline their use.

²⁷ The External Sector Report (IMF, 2020b) provides an overview of current account imbalances and exchange rate misalignment.

²⁸ Chapter 2 of the External Sector Report (IMF, 2020b) confirms that FX debt liabilities are associated with a higher incidence of external crises in EMDEs. Box 2.1 shows that the risks for EMDEs arise especially from rollover risk, in particular from interbank debt and scheduled amortization (i.e. short-term debt plus maturing long-term debt).

²⁹ Di Giovanni et al. (2018) and Kalemli-Ozcan (2019) show that firms borrow in FX both from domestic banks and directly from international capital markets. Ahnert et al. (2018) show that in some emerging market economies, FX-

- Measures of excessive deviations in interest premia after global financial turbulence, to assess the ability of FX markets to absorb the shock;³⁰
- External sector assessments as provided by the External Sector Reports;
- Public debt sustainability assessment and fiscal crisis risk as provided by the MAC DSA and LIC DSF; and
- Monetary framework assessments covering credibility, anchoring of inflation expectations, independence, coherent policy and operational strategy, and clarity of communication with the existing set of tools.³¹

53. Transparent policy guidance based on metrics observable in real time could facilitate application of IPF tools, complemented by expert judgment. While the models cannot capture the full complexity of real-life situations, they can provide a useful benchmark to guide the use—and alert to misuse—of IPF policies. In due course, after gaining some experience the authorities could develop appropriate policy rules-of-thumb which would also aid communication and help build credibility.

SUMMARY OF WHAT WE HAVE LEARNED

54. The goal of the analytical work conducted under the IPF umbrella is to enrich our understanding of complex interactions among shocks, policies and country characteristics.

The IPF uses a unified framework to consider the appropriateness of policies in various circumstances, thus enhancing the Fund's analytical toolbox. At the same time, the findings are subject to a number of caveats, and operationalizing them requires careful consideration. Inevitably, the models are stylized representations of reality, and they do not cover all possible scenarios. Measuring the effectiveness of policy tools empirically over various horizons remains challenging as it is not obvious what the policymakers' objectives were; there are difficulties in resolving endogeneity of shocks and policies; and more work is needed to accurately measure CFMs and MPMs. Even though some of the intertemporal tradeoffs—between short-term and long-term benefits and costs of deploying various tools—are captured in modeling work, further analysis is needed. Moreover, policymakers face practical challenges—such as the difficulty of identifying the nature of shocks (e.g., transient or permanent) in real time. As often occurs in wide-ranging workstreams, in some cases the results are mixed. It is also desirable to incorporate fiscal policy and

related MPMs on domestic banks are associated with lower FX debt liabilities for banks but higher FX borrowing by the corporate sector. See also Keller (2018) for evidence for Peru using micro data.

³⁰ As discussed in Box 3, many countries that faced excessive increases in interest premia after the Taper Tantrum, a risk-off shock, used FXI to reduce the premia, in line with the model framework prescriptions.

³¹ Unsal et al. (2020) develop a toolkit to provide a comprehensive assessment of monetary policy frameworks across countries. The resulting data is granular and can be used flexibly to look at parts of the framework such as policy strategy or communication.

multilateral aspects more fully into the analysis. Subject to these caveats, the analysis supports the following conclusions.

55. An important finding of the IPF conceptual framework is that optimal policy combinations depend on shocks, country characteristics and initial conditions, and that there is no preset hierarchy of policies. While this statement may appear trivial, it is a reminder that policy advice cannot always be conditioned on a single dimension and needs to pay due regard to the complexity of the overall context. Models, empirical work and case studies all highlight the complex interactions among different policy levers and the role country characteristics play in shaping the impact of shocks and policy responses on the economy.

56. Models incorporating the types of frictions that are common in EMDEs suggest a role for FXI, MPMs and CFMs in some circumstances.³² Notably, these tools (including precautionary CFMs) can lower risks of sudden stops or help limit the impact should they occur. They can also enhance monetary policy autonomy in the face of external financial shocks, allowing monetary policy to focus on domestic stabilization objectives and improving the tradeoff between output and inflation. Precautionary reserve accumulation during normal times creates buffers for bad times. The effectiveness and appropriateness of these tools varies with circumstances. Relatively shallow FX markets and unhedged FX liabilities—and vulnerability to sudden stops that they give rise to—would generally make the use of these instruments more appealing. However, whether or not they should be used (and which ones) depends not only on vulnerabilities but also on the nature of the shock. By and large, they should not be used in response to shocks originating in the real economy that do not exacerbate financial conditions. Neither should they be used to maintain undervalued or overvalued exchange rates. This could potentially hurt the country pursuing such policies, as well as generate adverse spillovers to trading partners.

57. In countries with deep foreign exchange markets and continuous market access, the models do not provide a rationale for FXI or CFMs. In such countries a fully flexible exchange rate and monetary policy aimed at domestic objectives provide the best response.³³ As FXI and CFMs cannot always help monetary policy fully offset the impact of shocks in the presence of vulnerabilities, reducing those vulnerabilities over time should be an important goal. The IPF tools are not a substitute for deep markets and healthy balance sheets. Structural policies play a major role in reducing vulnerabilities.

58. Empirical evidence complements the model-based analysis of optimal policy by pointing to the effectiveness of multi-faceted responses. FXI affects the exchange rate, at least in the short run. Macroprudential policy and pre-existing CFMs can reduce the domestic buildup of financial vulnerabilities stemming from easy global financial conditions—and bolster resilience to

³² While the usefulness of IPF tools under some circumstances has been recognized in the literature, this paper—and its underlying background studies—provide firm conceptual micro-foundations and extensive empirical analysis to support these conclusions.

³³ This statement does not pertain to countries that have a fixed exchange rate regime and thus have endogenous FXI and no independent monetary policy. This paper does not explore the issue of exchange rate regime choice.

shocks. Empirical evidence on the impact of CFMs on capital flows is mixed, but generally points to CFMs being able to change the composition of flows to less risky instruments. This is consistent with studies pointing to beneficial effects of precautionary inflow CFMs, although it should be noted that historical evidence suggests that CFMs are sticky and do not vary much over time. Importantly, in line with model predictions, appropriate use of FXI, MPMs, and CFMs may afford greater room for monetary policy to focus on domestic output and stability objectives. Evidence also suggests that policy combinations can be more effective than using a single instrument.

59. At the same time, empirical work suggests potential costs that are not incorporated in the models. They include the risk that policies that aim to stabilize the exchange rate may encourage a buildup of FX debt and thus heighten vulnerabilities. In addition, empirical analysis and case studies underscore the importance of communicating clearly the objectives and the actions—as well as challenges of doing that in a multi-tool framework. They also find multilateral spillovers (both positive and negative) from EMDE and AE policies.

60. Additional considerations complicate the choice of the right path. Imposing outflow CFMs may incur reputational costs.³⁴ Persistent FXI is generally believed to slow market development, although econometric challenges have precluded providing a definitive proof. Building central bank reputation and credibility—a critical asset that improves future tradeoffs—might be easier when following a relatively simple and transparent approach. On the other hand, if that approach leads to excessive volatility, it may not be conducive market development and financial resilience. In terms of practical implementation, it is not easy to assess in real time whether a shock is permanent or transient, and the precise extent to which shocks are real or financial in nature. The same applies to divining the future distribution of shocks to calibrate precautionary CFMs.

61. The tradeoffs between short-term effects, spillovers, and long-term consequences need to be carefully considered in each case before employing these tools. The IPF does not yield exact prescriptions for every set of circumstances. It delivers broad principles and helps understand the tradeoffs (and quantify some of them), but judgment will be essential in applying the framework. Achieving greater clarity about the intertemporal tradeoffs associated with these policies is a particularly difficult challenge. At the current stage, these tradeoffs are not captured fully in the models and the empirical analysis.

62. Developing safeguards to minimize the risk that IPF policies are used inappropriately will be key in translating the framework's findings into implementable policy advice. In the model frameworks, IPF tools are aimed at well-defined macroeconomic and financial stability objectives. In practice, however, those tools are at risk of being misused to support misaligned exchange rates, substitute for warranted macroeconomic adjustment, or impede competition and price discovery. This risk is exacerbated by the fact that sufficient and timely information about

³⁴ One should also be mindful of administrative costs of maintaining CFMs.

shocks and vulnerabilities is not always available. Differentiating between appropriate and inappropriate deployment of IPF tools will require developing suitable metrics.

63. Taken together, both the models and empirical analysis suggests that precautionary CFMs may enhance financial stability under certain conditions. They may help reduce the buildup of vulnerabilities, particularly where MPMs cannot curtail the accumulation of risky liabilities. The model weighs these benefits against the cost of distorting capital flows, but costs that are not modeled also need to be taken into account. Moreover, while the model results indicate that these measures should be adjusted in response to evolving financial risks, calibrating and communicating these adjustments could present significant challenges in practice.

64. IPF results help clarify circumstances when FXI is useful. Simple recipes such as limiting FXI only to cases of disorderly market conditions may be too restrictive. At the same time, the analysis does not suggest that FXI is the right approach for all countries in all circumstances—fully flexible exchange rate adjustment is appropriate in many situations. This is generally the case for countries with floating currencies that have deep FX markets and uninterrupted access to foreign capital. But even for other countries, FXI may be costly and ineffective, for example, when a shock necessitates a permanent adjustment in the real exchange rate and there are no financial stability benefits from smoothing it.

65. More broadly, the IPF can advance Fund surveillance and help the Fund’s members in a variety of ways. It further enhances the Fund’s ability to execute its mandate to assess members’ exchange rate and other economic and financial policies in an integrated manner. It provides a realistic model incorporating relevant frictions for EDMs. Its rich analytical framework—which can be expanded further to incorporate additional frictions—can be applied to a wide range of countries, allowing a systematic approach across income groups. This facilitates consistent surveillance across AEs and EDMs. Moreover, by articulating a consistent framework for using multiple tools, the IPF can help central banks improve communication and build credibility. The Fund can also provide technical assistance to help countries implement richer quantitative models.

66. The issues covered under the IPF umbrella are complex and evolving. While this paper summarizes and concludes the first phase of the IPF workstream, analytical work will continue given the centrality of capital flows to the Fund’s mandate. Moreover, like the GFC, the COVID-19 crisis may lead to permanent changes to the global landscape, and lessons from this crisis will need to be drawn and incorporated into the framework. Future advances will most likely include further refining and enriching the conceptual model; expanding various versions of the quantitative model and calibrating them to individual countries; considering how IPF findings might be operationalized through development of appropriate metrics—and, where applicable, transparent and implementable policy rules; continued review of accumulated country experience using IPF tools; conducting additional empirical work, including on effectiveness of jointly implementing IPF policies and the tradeoffs between short and long term; engaging with the authorities, academia, and other experts and stakeholders on IPF issues, sharing views, analysis and experiences; and helping countries develop their frameworks through technical assistance and training. Two areas that need to be further investigated are fiscal policy and multilateral aspects.

67. The analytical findings from this paper are not intended to be a new Fund policy, but rather to help inform the upcoming review of the Fund’s Institutional View. The Institutional View on the Liberalization and Management of Capital Flows (IMF, 2012b) was adopted in response to the IMFC’s call for “further work on a comprehensive, flexible, and balanced approach for the management of capital flows.”³⁵ The IV guides Fund advice to members and, where relevant, Fund assessments in the context of surveillance. Similar to other Fund frameworks, the IV is subject to periodic reviews, the last of which took place in 2016 (IMF, 2016). Staff remains guided by the IV. Changes to that policy framework could be considered during the forthcoming review of the IV, tentatively scheduled for 2021. The work on the IPF will be a key input for this review, along with a report by the IEO on the *IMF Advice on Capital Flows*.

ISSUES FOR DISCUSSION

Do Directors agree that the IPF offers valuable analytical insights into how country characteristics, initial conditions, and the nature of shocks affect whether the use of multiple policy tools is warranted?

Do Directors agree that the analysis highlights how monetary autonomy and financial stability can be enhanced under certain conditions by the use of multiple tools?

Do Directors agree that the paper highlights the main tradeoffs in the use of multiple tools? Do they see other considerations that could be relevant?

Do Directors agree that there is a need for safeguards and judgment in the application of multiple tools?

³⁵ See [Communiqué](#) of the 24th Meeting of the IMFC, 9/24/2011.

Annex I. Responding to External Shocks with Multiple Instruments: Select Experiences

1. This Annex describes the experience of seven economies in responding to external shocks by activating different policy instruments. At Management's initiative, discussions on policy frameworks in Brazil, Indonesia, Korea, Mexico, Peru, Thailand (all with inflation targeting (IT) regimes) and Malaysia took place in 2018 and 2019. The aim was to better understand the multiple policy objectives targeted by policymakers, identify the instruments deployed to meet those objectives, assess the consistency of the policies adopted with the IT regimes, and evaluate any unintended consequences. The meetings included a presentation by the country team of the policy framework and its application in past episodes of capital inflows and outflows; an intervention by a discussant (typically a former country official); and a tour de table.

2. Some countries deployed multiple instruments simultaneously while others substituted one instrument for another based on their perceived effectiveness. For example, in Brazil and Peru, FXI, CFMs and MPMs were mostly used in combination, allowing monetary policy some independence to focus on price stability. Where deployed, the CFMs were in some cases calibrated symmetrically over the cycle while MPMs were mostly used in inflow episodes. Monetary policy decisions were seldom based on cyclical conditions alone, but also reflected (i) external considerations such as maintaining attractiveness to capital inflows in Indonesia and Mexico; and (ii) financial stability concerns—e.g., in Thailand, where policy rates were often higher than appeared warranted by inflation developments but high levels of household and corporate indebtedness militated against easing.

3. FX intervention was a prominent part of the policy response for many of the cases discussed. Some intervened in the FX market at times to influence the pace of exchange rate appreciation (Korea, Thailand), which could have impacted competitiveness; most intervened opportunistically to accumulate reserves, most notably following the GFC. These buffers were later deployed by several countries to prevent disorderly depreciation (Malaysia, Mexico) and the associated financial risks from FX exposures (Brazil, Indonesia, and to a lesser extent Peru).

4. These countries' strategies for managing external shocks also reflected their history and legacies, such as the Asian crisis in Indonesia, Korea, and Thailand, the Tequila crisis in Mexico, and hyperinflation in Peru. In the past, they were also a function of some long-standing concerns such as a more negative perception of the central bank in Brazil when the currency depreciates, and notwithstanding the overall responsiveness of monetary policy to cyclical conditions, the legacy of indexation and its influence on central bank decisions at times prevailed. More recently, Brazil kept rates on hold when external conditions worsened in 2018, with inflation and output gap both negative. Strategies adopted also reflect structural characteristics such as high dollarization (Peru) and fragile private balance sheets (Malaysia, Thailand).

5. These diverse approaches have generally coincided with benign macroeconomic outcomes in the face of difficult challenges but were not always guided by a clear framework and entailed some costs. Some countries' growth outcomes were impressive, and more intensive use of FXI does not seem to have led to worse inflation outcomes when compared to countries seen

as pure inflation targeters. However, it was suggested in the discussions that these policies may be linked to lower levels of financial development (Indonesia, Peru), potential weakening of central bank policy credibility (Thailand), and central bank accountability in terms of the possible tradeoffs with inflation stabilization and communication challenges (Brazil, Indonesia).

Annex II. Empirical Results on IPF Policy Tools

Instrument	Macroprudential Measures	Foreign Exchange Intervention	Capital Flow Management Measures
<i>Primary uses</i>	<ul style="list-style-type: none"> Control domestic credit 	<ul style="list-style-type: none"> Build precautionary FX reserves Mute volatility in shallow FX markets Mitigate currency mismatch risks Control inflation Curb exchange rate misalignments 	<ul style="list-style-type: none"> Manage capital in/outflows or flows in specific asset classes Alter composition of flows
<i>Effectiveness</i>	<ul style="list-style-type: none"> Reduce domestic buildup of vulnerabilities from easy global financial conditions Cost to output seem small 	<ul style="list-style-type: none"> Affects exchange rate in short run May help manage capital flows Adequate reserves reduce vulnerabilities 	<ul style="list-style-type: none"> Can change composition of flows May impact overall size of flows, but this is less clear Precautionary CFMs can help contain financial stability risks from surges Less evidence for reactive use
<i>Unintended consequences and spillovers</i>	<ul style="list-style-type: none"> Can “leak” via credit provision by nonbanks and from abroad May enhance resilience of other countries 	<ul style="list-style-type: none"> May induce higher FX borrowing Might impact central bank credibility, but evidence is weak 	<ul style="list-style-type: none"> Tend to be “sticky” Limited evidence on growth impact Can deflect capital flows to other countries
<i>Policy interactions</i>	May help increase monetary policy autonomy.		
	<ul style="list-style-type: none"> Help limit exchange rate appreciation associated with fast credit growth 	<ul style="list-style-type: none"> Combinations of monetary policy and FXI can help smooth the impact of external financing shocks 	<ul style="list-style-type: none"> Can enhance FXI effectiveness Can reduce leakage from MPMs and dampen feedback effects

References

- Adler, G., C. Casas, L. M. Cubeddu, G. Gopinath, N. Li, S. Meleshchuk, C. Osorio Buitron, D. Puy, Y. Timmer, 2020, "Dominant Currencies and External Adjustment," IMF Staff Discussion Note No. 20/05 (Washington: International Monetary Fund).
- Adler, G., K. S. Chang, and Z. Wang, 2020, "Patterns of Foreign Exchange Intervention under Inflation Targeting," IMF Working Paper No. 20/69 (Washington: International Monetary Fund).
- Adler, G., K. S. Chang, R. C. Mano and Y. Shao, forthcoming, "Foreign Exchange Intervention: A Dataset of Public Data and Proxies," IMF Working Paper (Washington: International Monetary Fund).
- Adler, G., N. Lisack, and R. C. Mano, 2019, "Unveiling the Effects of Foreign Exchange Intervention: A Panel Approach," *Emerging Markets Review*, Vol. 40 (September).
- Adler, G. and C. E. Tovar, 2014, "Foreign Exchange Interventions and their Impact on Exchange Rate Levels," *Monetaria, Centro de Estudios Monetarios Latinoamericanos*, CEMLA, Vol. 0(1) (January), pp. 1–48.
- Adrian, T., J. C. Erceg, J. Lindé, P. Zabczyk, and J. Zhou, 2020, "A Quantitative Model for the Integrated Policy Framework," IMF Working Paper No. 20/122 (Washington: International Monetary Fund).
- Ahnert, T., K. Forbes, C. Friedrich, and D. Reinhardt, 2018, "Macroprudential FX Regulations: Shifting the Snowbanks of FX Vulnerability?" NBER Working Paper No. 25083 (Cambridge, MA: National Bureau of Economic Research).
- Aikman, D., A. G. Haldane and B. D. Nelson, 2015, "Curbing the Credit Cycle," *Economic Journal*, Vol. 125(585), pp. 1072–109.
- Aizenman, J., M. D. Chinn, and H. Ito, 2015, "Monetary Policy Spillovers and the Trilemma in the New Normal: Periphery Country Sensitivity to Core Country Conditions," NBER Working Paper No. 21128 (Cambridge, MA: National Bureau of Economic Research).
- Aizenman, J. and R. Glick, 2009, "Sterilization, Monetary Policy, and Global Financial Integration," *Review of International Economics*, Vol. 17, pp. 777–801.
- Alam, Z., A. Alter, J. Eiseman, G. Gelos, H. Kang, M. Narita, E. Nier, and N. Wang, 2019, "Digging Deeper—Evidence on the Effects of Macroprudential Policies from a New Database," IMF Working Paper No. 19/66 (Washington: International Monetary Fund).
- Alfaro, L., A. Chari, and F. Kanczuk, 2017, "The Real Effects of Capital Controls: Firm-level Evidence from a Policy Experiment," *Journal of International Economics*, Vol. 108, pp. 191–210.

- Alter, A., and S. Elekdag, 2016, "Emerging Market Corporate Leverage and Global Financial Conditions," IMF Working Paper No. 16/243 (Washington: International Monetary Fund).
- Araujo, J., M. Patnam, A. Popescu, F. Valencia, and W. Yao, 2020, "Effects of Macroprudential Policy: Evidence from Over 6,000 Estimates," IMF Working Paper No. 20/67 (Washington: International Monetary Fund).
- Badescu, B., 2016, "Foreign Exchange Interventions as an Unconventional Monetary Policy Instrument — An Empirical Review," *Journal of Economics, Business and Management*, Vol. 4(1).
- Basu, S., E. Boz, G. Gopinath, F. Roch, and F. Unsal, 2020, "A Conceptual Model for the Integrated Policy Framework," IMF Working Paper No. 20/121 (Washington: International Monetary Fund).
- Bayoumi, T., G. Dell'Ariccia, K. Habermeier, T. Mancini Griffoli, and F. Valencia, 2014, "Monetary Policy in the New Normal," IMF Staff Discussion Note No. 14/3 (Washington: International Monetary Fund).
- Bergant, K., F. Grigoli, N. Hansen, and D. Sandri, 2020, "Dampening Global Financial Shocks in Emerging Markets: Can Macroprudential Regulation Help?" World Economic Outlook Spring 2020 (Washington: International Monetary Fund).
- Benigno, G., H. Chen, C. Otrok, A. Rebucci, and E. Young, 2012, "Optimal Policy for Macro-Financial Stability," CEPR Working Paper No. 9223.
- Bhargava, A., R. Bouis, A. Kokenyne, M. Perez Archila, U. Rawat, and R. Sahay, forthcoming, "Anatomy of Capital Controls: A New Dataset," IMF Working Paper (Washington: International Monetary Fund).
- _____, forthcoming, "Preventing Surges: Do Inflow Controls Work?" IMF Working Paper (Washington: International Monetary Fund).
- Bianchi, J., 2011, "Overborrowing and Systemic Externalities in the Business Cycle," *American Economic Review*, Vol. 101(7), pp. 3400–3426.
- Bianchi, J. and E. Mendoza, 2010, "Overborrowing, Financial Crises and 'Macroprudential' Taxes," NBER Working Paper No. 16091 (Cambridge, MA: National Bureau of Economic Research).
- Binici, M., M. Hutchison, and M. Schindler, 2010, "Controlling Capital? Legal restrictions and the Asset Composition of International Financial Flows," *Journal of International Money and Finance*, Vol. 29, pp. 666–684.

- Blanchard, O., G. Adler, and I. de Carvalho Filho, 2015, "Can Foreign Exchange Intervention Stem Exchange Rate Pressures from Global Capital Flow Shocks?" IMF Working Paper No. 15/159 (Washington: International Monetary Fund).
- Blanchard, O., J. D. Ostry, A.R. Ghosh, and M. Chamon, 2016, "Capital Inflows: Expansionary or Contractionary?" *American Economic Review*, Vol. 106(5), pp. 565–569.
- _____, 2017, "Are Capital Inflows Expansionary or Contractionary? Theory, Policy Implications, and Some Evidence," *IMF Economic Review*, Vol. 65, pp. 563–585, (Washington: International Monetary Fund).
- Bouis, R., A. Kokenyne, M. Perez Archila, U. Rawat, and R. Sahay, forthcoming, "Capital Controls in Times of Crisis—Use and Effects," IMF Working Paper (Washington: International Monetary Fund).
- Brandao-Marques, L., G. Gelos, M. Narita, and E. Nier, 2020, "Leaning Against the Wind: An Empirical Cost-Benefit Analysis," IMF Working Paper No. 20/123 (Washington: International Monetary Fund).
- Bruno, V. G. and H. S. Shin, 2018, "Currency Depreciation and Emerging Market Corporate Distress," CEPR Discussion Papers No. 13298 (London: Center for Economic Policy Research).
- Buch, C. M., and L. S. Goldberg, 2017, "Cross-Border Prudential Policy Spillovers: How Much? How Important? Evidence from the International Banking Research Network," *International Journal of Central Banking*, March, pp. 505–508.
- Carney, M., 2019, "Pull, Push, Pipes: Sustainable Capital Flows for a New World Order," Speech at the 2019 Institute of International Finance Spring Membership Meeting, June (Tokyo).
- Carstens, A., 2019, "Exchange Rates and Monetary Policy Frameworks in Emerging Market Economies," Lecture at the London School of Economics, May (London).
- Caselli, F., 2017, "Did the Exchange Rate Floor Prevent Deflation in the Czech Republic?" IMF Working Paper No. 17/206 (Washington: International Monetary Fund).
- Cecchetti, S. G., T. Mancini-Griffoli, M. Narita, and R. Sahay, 2020, "U.S. or Domestic Monetary Policy: Which Matters More for Financial Stability?" *IMF Economic Review*, Vol. 68(1) (March), pp 35–65, (Washington: International Monetary Fund).
- Cecchetti, S. G., M. Narita, U. Rawat, and R. Sahay, forthcoming, "International Spillovers of "Lower for Longer" U.S. Interest Rates: Can They be Mitigated?" (Washington: International Monetary Fund).
- Chamon, M., D. Hofman, S. Lanau, U. Rawat, and M. Vari, 2019, "Effectiveness of Intervention," ed. by M. Chamon, D. Hofman, N. E. Magud, and A. Werner, *Foreign Exchange Interventions in Inflation Targeters in Latin America* (Washington: International Monetary Fund).

- Chari, A. and P. Blair Henry, 2008, "Firm-Specific Information and the Efficiency of Investment." *Journal of Financial Economics*, Vol. 87(3) (March), pp. 636–655 (Elsevier).
- Chen, J., T. Mancini-Griffoli, and R. Sahay, 2014, "Spillovers from U.S. Monetary Policy on Emerging Markets: Different this Time?" IMF Working Paper No. 14/240 (Washington: International Monetary Fund).
- Chinn, M. and H. Ito, 2008, "A New Measure of Financial Openness," *Journal of Comparative Policy Analysis*, Vol. 10(3), pp. 309–322.
- Cizel, J., J. Frost, A. Houben, and P. Wierds, 2016, "Effective Macroprudential Policy: Cross-Sector Substitution from Price and Quantity Measures," IMF Working Paper No. 16/94 (Washington: International Monetary Fund).
- Collard, F., H. Dellas, B. Diba, and O. Loisel, 2017, "Optimal Monetary and Prudential Policies," *American Economic Journal: Macroeconomics*, Vol. 9(1), pp. 40–87.
- Cordella, T., P. Federico, C. Vegh, and G. Vuletin, 2014, *Reserve Requirements in the Brave New Macroprudential World* (Washington: The World Bank).
- Corsello, F. and V. Nispi Landi, 2018, "Labor Market and Financial Shocks: A Time Varying Analysis," Temi di discussione (Economic Working Papers) 1179, Bank of Italy, Economic Research and International Relations Area.
- Csonto, B., and T. Gudmundsson, 2020, "Destabilizing Stability? Exchange Rate Arrangements and Foreign Currency Debt," IMF Working Paper No. 20/173 (Washington: International Monetary Fund).
- Cubeddu, L., S. Hannan, and P. Rabanal, forthcoming, "External Financing Risks: How Important is the Composition of the International Investment Position?" IMF Working Paper (Washington: International Monetary Fund).
- Culiuc, A., 2020, "Real Exchange Rate Overshooting in Large Depreciations: Determinants and Consequences," IMF Working Paper 20/60 (Washington: International Monetary Fund).
- Dabla-Norris, E., J. Honda, A. Lahreche, and G. Verdier, 2010, "FDI Flows to Low-Income Countries: Global Drivers and Growth Implications," IMF Working Paper (Washington: International Monetary Fund).
- Das, M., G. Gopinath, and S. Kalemli-Ozcan, forthcoming, "Pre-Emptive Policies and Risk-Off Shocks," IMF Working Paper (Washington: International Monetary Fund).

- Daude, C., E. L. Yeyati, and A. Nagengast, 2016, "On the Effectiveness of Exchange Rate Interventions in Emerging Markets," *Journal of International Money and Finance*, Vol. 64, Issue C, pp. 239–261.
- Desai, M. A., C. F. Foley, and J. Hines, 2006, "Capital Controls, Liberalizations, and Foreign Direct Investment," *Review of Financial Studies*, Vol. 19, Issue 4, pp. 1433–1464.
- Di Giovanni, J., S. Kalemli-Özcan, M. F. Ulu, and Y. S. Baskaya, 2017, "International Spillovers and Local Credit Cycles," NBER Working Paper No. 23149 (Cambridge, MA: National Bureau of Economic Research).
- Dincer, N. and B. Eichengreen, 2014, "Central Bank Transparency and Independence: Updates and New Measures," *International Journal of Central Banking*, (March), pp. 189–253.
- Domanski, D., E. Kohlscheen, and R. Moreno, 2016, "Foreign Exchange Market Intervention in EMEs: What Has Changed?" *BIS Quarterly Review, Bank for International Settlements*, (September).
- Dornbusch, R., 1976, "Expectations and Exchange Rate Dynamics," *Journal of Political Economy*, Vol. 84(6), pp. 1161–1176.
- Edwards, S., 2007, "Capital Controls, Capital Flow Contractions, and Macroeconomic Vulnerability," *Journal of International Money and Finance*, Vol. 26(5) (September), pp. 814–840 (Elsevier).
- Eichengreen, B. and A. Rose, 2014, "Capital Controls in the 21st Century," *Journal of International Money and Finance*, Vol. 48, issue PA, pp. 1–16.
- Erten, B., A. Korinek, and J. A. Ocampo, 2019, "Capital Controls: Theory and Evidence," NBER Working Paper No. 26447 (Cambridge, MA: National Bureau of Economic Research).
- Farhi, E., and I. Werning, 2016, "A Theory of Macroprudential Policies in the Presence of Nominal Rigidities," *Econometrica*, Vol. 84(5), pp. 1645–1704.
- Fayad, G., and H. Poirson, forthcoming, "Caught in the Crosswinds: The Experiences of Small Open Economies Responding to External Volatility with Multiple Policy Levers," IMF Working Paper (Washington: International Monetary Fund).
- Fendoğlu, S., 2017, "Credit Cycles and Capital Flows: Effectiveness of the Macroprudential Policy Framework in Emerging Market Economies," *Journal of Banking & Finance*, Vol. 79, pp. 110–128.
- Fernández, A., M. W. Klein, A. Rebucci, M. Schindler, and M. Uribe, 2016, "Capital Control Measures: A New Dataset," *IMF Economic Review*, Vol. 64(3), (Washington: International Monetary Fund).
- Filardo A. and J. Yetman, 2012, "The Expansion of Central Bank Balance Sheets in Emerging Asia: What are the Risks?" *BIS Quarterly Review, Bank for International Settlements*, (June), pp. 47–63.

- Filardo, A., G. Gelos, and T. McGregor, forthcoming, "FX Intervention Effectiveness in the Medium- and Long Term," IMF Working Paper (Washington: International Monetary Fund).
- Finger, H., and P. Lopez Murphy, 2019, "Facing the Tides: Managing Capital Flows in Asia," Asia and Pacific Department Paper 19 (Washington: International Monetary Fund).
- Fleming, J. M., 1962, "Domestic Financial Policies Under Fixed and Floating Exchange Rates." IMF Staff Papers, Vol. 9, pp. 369–379.
- Forbes, K., 2019, "Macroprudential Policy: What We've Learned, Don't Know, and Need to Do," *American Economic Review Papers and Proceedings*, Vol. 109 (May), pp. 470–75.
- _____, 2005, "Capital Controls: Mud in the Wheels of Market Efficiency," *Cato Journal*, Vol. 25(1), pp. 153–166.
- _____, 2007a, "The Microeconomic Evidence on Capital Controls: No Free Lunch," ed. by S. Edwards, *Capital Controls and Capital Flows in Emerging Economies: Policies, Practices, and Consequences*, pp. 171–202 (University of Chicago Press).
- _____, 2007b, "One Cost of the Chilean Capital Controls: Increased Financial Constraints for Smaller Traded Firms," *Journal of International Economics*, Vol. 71(2) (April), pp. 294–323.
- Forbes, K. J., M. Fratzscher, and R. Straub, 2015, "Capital Controls and Macroprudential Measures: What Are They Good For?" NBER Working Paper No. 20860 (Cambridge, MA: National Bureau of Economic Research).
- Forbes, K. J., M. Fratzscher, T. Kostka, and R. Straub, 2016, "Bubble Thy Neighbour: Portfolio Effects and Externalities from Capital Controls," *Journal of International Economics*, Vol. 99 (March), pp. 85–104.
- Forbes, K. J. and F. E. Warnock, 2012, "Capital Flow Waves: Surges, Stops, Flight, and Retrenchment," *Journal of International Economics*, Vol. 88(2), pp. 235–251.
- Frankel, J., and G. Saravelos, 2012, "Can Leading Indicators Assess Country Vulnerability? Evidence from the 2008–09 Global Financial Crisis," *Journal of International Economics*, Vol. 87(2), pp. 216–231.
- Fratzscher, M., O. Gloede, L. Menkhoff, L. Sarno, and T. Stöhr, 2019, "When Is Foreign Exchange Intervention Effective? Evidence from 33 Countries," *American Economic Journal: Macroeconomics*, Vol. 11(1), pp. 132–56.
- Frost, J., H. Ito, and R. van Stralen, 2020, "The Effectiveness of Macroprudential Policies and Capital Controls Against Volatile Capital Inflows," BIS Working Papers No 867, (June), (Basel: Bank for International Settlements).

- Gabaix, X., and M. Maggiori, 2015, "International Liquidity and Exchange Rate Dynamics," *The Quarterly Journal of Economics*, Vol. 130, pp. 1369–1420.
- Gadanecz, B. and A. Mehrotra, 2013. "The Exchange Rate, Real Economy and Financial Markets." BIS Working Papers No 73, pp 1–10 (Basel: Bank for International Settlements).
- Gagnon, J. E., T. Bayoumi, J. M. Londono, C. Saborowski, and H. Sapriza, 2017, "Direct and Spillover Effects of Unconventional Monetary and Exchange Rate Policies," *Open Economies Review*, Vol. 28, pp. 191–232.
- Gelos, G., L. Gornicka, R. Koepke, R. Sahay, and S. Sgherri, 2019, "Capital Flows at Risk: Taming the Ebbs and Flows," IMF Working Paper No. 19/279 (Washington: International Monetary Fund).
- Georgiadis, G. and F. Zhu, 2019, "Monetary Policy Spillovers, Capital Controls and Exchange Rate Flexibility, and the Financial Channel of Exchange Rates," BIS Working Papers No 797 (Basel: Bank for International Settlements).
- Ghosh, A. R., J. D. Ostry, and M. S. Qureshi, 2015, "Exchange Rate Management and Crisis Susceptibility: A Reassessment," *IMF Economic Review*, Vol. 63(1), pp. 238–276, (Washington: International Monetary Fund).
- Ghosh, A. R., J. D. Ostry, and M. Chamon, 2016, "Two Targets, Two Instruments: Monetary and Exchange Rate Policies in Emerging Market Economies," *Journal of International Money and Finance*, Vol. 60, pp. 172–196.
- Ghosh, A. R., J. D. Ostry, and M.S. Qureshi, 2017, "Managing the Tide: How Do Emerging Markets Respond to Capital Flows?" IMF Working Paper No. 17/69 (Washington: International Monetary Fund).
- _____, 2018, *Taming the Tide of Capital Flows: A Policy Guide* (Cambridge, MA: MIT Press).
- Giordani, P., M. Ruta, H. Weisfeld, and L. Zhu, 2014, "Capital Flow Deflection," IMF Working Paper No. 14/145 (Washington: International Monetary Fund).
- Gopinath, G., E. Boz, C. Casas, F. J. Díez, P-O. Gourinchas, and M. Plagborg-Møller, 2020, "Dominant Currency Paradigm," *American Economic Review*, Vol. 110(3), pp. 677–719.
- Gopinath, G., 2015, "The International Price System," Jackson Hole Symposium, Vol. 27, Federal Reserve Bank of Kansas City.
- Gupta, P. and O. Masetti, 2018, "Capital Flow Measures: Structural or Cyclical Policy Tools?" World Bank Group Policy Research Working Paper, No. WPS 8418 (Washington: World Bank).
- Gupta, P., D. Mishra, and R. Sahay, 2007. "Behavior of Output During Currency Crises," *Journal of International Economics*, Vol. 72(2) (July), pp. 428–450.

- Habermeier, K., A. Kokenyne, and C. Baba, 2011, "The Effectiveness of Capital Controls and Prudential Policies in Managing Large Inflows," IMF Staff Discussion Note No. 11/14 (Washington: International Monetary Fund).
- Henry, P. B., 2007, "Capital Account Liberalization: Theory, Evidence, and Speculation," *Journal of Economic Literature*, Vol. 45(4), pp. 887–935.
- Hofman, D., M. Chamon, P. Deb, T. Harjes, U. Rawat, and I. Yamamoto, 2020, "Intervention Under Inflation Targeting—When Could it Make Sense?" IMF Working Paper No. 20/09 (Washington: International Monetary Fund).
- International Monetary Fund, 2012a, *Modernizing the Legal Framework for Surveillance—An Integrated Surveillance Decision* (Washington).
- _____, 2012b, *The Liberalization and Management of Capital Flows: An Institutional View* (Washington).
- _____, 2015a, *Guidance Note for Surveillance under Article IV Consultation* (Washington).
- _____, 2015b, *Evolving Monetary Policy Frameworks in Low-Income and Other Developing Countries* (Washington).
- _____, 2016, *Capital Flows - Review of Experience with the Institutional View* (Washington).
- _____, 2017, "Global Financial Stability Report," October 2017 (Washington).
- _____, 2020a, "World Economic Outlook," April 2020 (Washington).
- _____, 2020b, "External Sector Report," August 2020 (Washington).
- Jeanne, O. and A. Korinek, 2010, "Excessive Volatility in Capital Flows: A Pigouvian Taxation Approach," *American Economic Review Papers and Proceedings*, Vol. 100(2), pp. 403–407.
- Jeanne, O., A. Subramanian, and J. Williamson, 2012, "Who Needs to Open the Capital Account?" Petersen Institute for International Economics (April).
- Kacperczyk, M., S. Sundaresan, and T. Wang, 2018, "Do Foreign Investors Improve Market Efficiency?" NBER Working Paper No. 24765 (Cambridge, MA: National Bureau of Economic Research).
- Kalemli-Ozcan, S., 2019, "US Monetary Policy and International Risk Spillovers," *Jackson Hole Symposium Proceedings*.
- Kearns, J., and N. Patel, 2016, "Does the Financial Channel of Exchange Rates Offset the Trade Channel?" *BIS Quarterly Review*, Bank for International Settlements, (December).

- Keller, L., 2019, "Capital Controls and Risk Misallocation: Evidence from a Natural Experiment," mimeo (University of Pennsylvania).
- Kim, M., R. C. Mano, and M. Mrkaic, 2020, "Do FX Interventions Lead to Higher FX Debt? Evidence from Firm-Level Data," IMF Working Paper No. 20/197 (Washington: International Monetary Fund).
- Klein, M. W., 2012, "Capital Controls: Gates versus Walls," *Brookings Papers on Economic Activity* (1), pp. 317–367.
- Korinek, A., 2016, "Currency Wars or Efficient Spillovers? A General Theory of International Policy Cooperation," NBER Working Paper No. 23004 (Cambridge, MA: National Bureau of Economic Research).
- Korinek, A., 2020, "Managing Capital Flows: Theoretical Advances and IMF Policy Frameworks," IMF Independent Evaluation Office Background Paper 20-02/01 (Washington: International Monetary Fund).
- Kose, M. A., E. S. Prasad, and M. E. Terrones, 2008, "Does Openness to International Financial Flows Raise Productivity Growth?" IMF Working Paper (Washington: International Monetary Fund).
- Lama, R. and J. P. Medina, 2020, "Shocks Matter: Managing Capital Flows with Multiple Instruments in Emerging Economies," IMF Working Paper No. 20/97 (Washington: International Monetary Fund).
- Levi-Yeyati, E., 2008, "The Cost of Reserves," *Economics Letters*, Vol. 100(1), pp. 39–42.
- Lízal, L. and J. Schwarz, 2013, "Foreign Exchange Interventions as an (Un)conventional Monetary Policy Tool," BIS Working Papers No. 73, pp. 127–143 (Basel: Bank for International Settlements).
- Magud, N. E., C. M. Reinhart, and K. S. Rogoff, 2018, "Capital Controls: Myth and Reality-A Portfolio Balance Approach," *Annals of Economics and Finance, Society for AEF*, Vol. 19(1), pp. 1–47.
- Mano, R. C., and S. Sgherri, 2020, "One Shock, Many Policy Responses," IMF Working Paper 20/10 (Washington, DC: International Monetary Fund).
- Menkhoff, L., 2013, "Foreign Exchange Intervention in Emerging Markets: A Survey of Empirical Studies," *The World Economy*, Vol. 36, pp. 1187–1208.
- McCallum, B. T., 2000, "Theoretical Analysis Regarding a Zero Lower Bound on Nominal Interest Rates," *Journal of Money, Credit and Banking*, Vol. 32(4), pp. 870–904.
- McCann, F. and C. O'Toole, 2019, "Cross-Border Macroprudential Policy Spillovers and Bank Risk-Taking," *International Journal of Central Banking*, (October).

- Mohanty, M., 2013, "Market Volatility and Foreign Exchange Intervention in EMEs: What Has Changed?" BIS Working Papers No 73, pp. 1–10, (Basel: Bank for International Settlements).
- Mundell, R., 1963, "Capital Mobility and Stabilization Policy Under Fixed and Flexible Exchange Rates," *Canadian Journal of Economics and Political Science*, Vol. 29, pp. 475–85.
- Nier, E., T. T. Olafsson, and Y. G. Rollinson, 2020, "Exchange Rates, Domestic Credit and Macroprudential Policy," IMF Working Paper No. 20/187 (Washington: International Monetary Fund).
- Nispi Landi, V., and A. Schiavone, 2018, "The Effectiveness of Capital Controls," Working Paper No. 1200, Bank of Italy.
- North, D. C., 1990, "Institutions, Institutional Change and Economic Performance," (New York: Cambridge University Press).
- _____, 1991, "Institutions," *Journal of Economic Perspectives*, Vol. 5 (Winter), pp. 97–112.
- Obstfeld, M., 2015, "Trilemmas and Tradeoffs: Living with Financial Globalization," Central Banking, Analysis, and Economic Policies Book Series, ed. by C. Raddatz, D. Saravia, and J. Ventura, *Global Liquidity, Spillovers to Emerging Markets and Policy Responses*, Ed. 1, Vol. 20, Ch. 2, pp. 013–078, Central Bank of Chile.
- Obstfeld, M., J.D. Ostry, and M.S. Qureshi, 2018, "Global Financial Cycles and the Exchange Rate Regime," *American Economic Review*, Vol. 108(2), pp. 499–504.
- _____, 2019, "A Tie that Binds: Revisiting the Trilemma in Emerging Market Economies," *The Review of Economics and Statistics*, Vol. 101(2), pp. 279–293.
- Ostry, J. D., 2019, "Managing Capital Inflows: Toward a Policy Maker's *Vade Mecum*," ed. by J. H. Cochrane and J. B. Taylor, *Currencies, Capital and Central Bank Balances* (Hoover Institution Press).
- Ostry, J. D., A.R. Ghosh, K. Habermeier, M. Chamon, M. Qureshi, and D. Reinhardt, 2010, "Capital Inflows: The Role of Controls," IMF Staff Position Note No. 10/4 (Washington: International Monetary Fund).
- Ostry, J. D., A. R. Ghosh, K. Habermeier, L. Laeven, M. Chamon, M. S. Qureshi, and A. Kokenyne, 2011, "Managing Capital Inflows: What Tools to Use?" IMF Staff Discussion Note No. 11/06 (Washington: International Monetary Fund).
- Ostry, J. D., A. R. Ghosh, and M. Chamon, 2012, "Two Targets, Two Instruments: Monetary and Exchange Rate Policies in Emerging Market Economies," IMF Staff Discussion Note 12/01 (Washington: International Monetary Fund).

- Ostry, J. D., A. R. Ghosh, M. Chamon, and M. S. Qureshi, 2012, "Tools for Managing Financial-Stability Risks from Capital Inflows," *Journal of International Economics*, Vol 88(2), pp. 407–21.
- Ostry, J. D., A. R. Ghosh, and A. Korinek, 2012, "Multilateral Aspects of Managing the Capital Account," IMF Staff Discussion Note No. 12/10 (Washington: International Monetary Fund).
- Pasricha, G. K., 2020, "Estimated Policy Rules for Capital Controls," IMF Working Paper No. 20/80 (Washington: International Monetary Fund).
- Pasricha, G. K., M. Falagiarda, M. Bijsterbosch, and J. Aizenman, 2018, "Domestic and Multilateral Effects of Capital Controls in Emerging Markets," *Journal of International Economics*, Vol. 115, pp. 48–58.
- Poirson, H., N. Porter, I. Agur, R. Bi, J. Chen, J. Eugster, G. Fayad, S. Laseen, J. Menkulasi, K. Moriyama, C. Rochon, K. Svirydzenka, C. Tovar, Z. Zhang, and A. Zdzienicka, forthcoming, "Managing External Volatility: Policy Frameworks in Non-Reserve Issuing Economies," IMF Working Paper (Washington: International Monetary Fund).
- Quinn, D., M. Schindler, and A. Maria Toyoda, 2011, "Assessing Measures of Financial Openness and Integration," IMF Economic Review, Vol. 59(3), pp. 488–522, (Washington: International Monetary Fund).
- Rajan, R. G. and L. Zingales, 2003, "The Great Reversals: The Politics of Financial Development in the 20th Century," *Journal of Financial Economics*, Vol. 69(1) (July), pp. 5–50.
- Rebucci, A. and C. Ma, 2019, "Capital Controls: A Survey of the New Literature," NBER Working Paper No. 26558 (Cambridge, MA: National Bureau of Economic Research).
- Rey, Hélène, 2015, "Dilemma not Trilemma: The Global Financial Cycle and Monetary Policy Independence," NBER Working Paper No. 21162 (Cambridge, MA: National Bureau of Economic Research).
- Richter, B., M. Schularick, and I. Shim, 2018, "The Costs of Macroprudential Policy," NBER Working Paper No. 24989 (Cambridge, MA: National Bureau of Economic Research).
- Rodrik, D., A. Subramanian, and F. Trebbi, 2002, "Institutions Rule: The Primacy of Institutions Over Geography and Integration in Economic Development," IMF Working Paper 02/189 (Washington: International Monetary Fund).
- Rodrik, E., 2006, "The Social Cost of Foreign Exchange Reserves," *International Economic Journal*, Vol. 20(3), pp. 253–266.

- Sahay, R., V. Arora, T. Arvanitis, H. Faruquee, T. Mancini-Griffoli, P. N'Diaye, and an IMF Team, 2014, "Emerging Market Volatility: Lessons from the Taper Tantrum," IMF Staff Discussion Note 14/09 (Washington: International Monetary Fund).
- Sarno, L. and M. P. Taylor, 2001, "Official Intervention in the Foreign Exchange Market: Is It Effective and, If So, How Does It Work?" *Journal of Economic Literature*, Vol. 39(3), pp. 839-868.
- Sgherri, S. and Y. Shao, forthcoming, "Broadening the Toolkit: The Role of Fiscal Policy through the Lenses of Emerging Markets' Pandemic Response," IMF Working Paper (Washington: International Monetary Fund).
- Svensson, L. E. O., 2000, "The Zero Lower Bound in an Open Economy: A Foolproof Way of Escaping from a Liquidity Trap", NBER Working Paper 7957 (Cambridge, MA: National Bureau of Economic Research).
- _____, 2003, "Escaping from a Liquidity Trap and Deflation: The Foolproof Way and Others," *Journal of Economic Perspectives*, Vol. 17, pp. 145-166.
- _____, 2017, "Cost-Benefit Analysis of Leaning Against the Wind." *Journal of Monetary Economics*, Vol. 90, pp. 193-213.
- Tong, H., and S. J. Wei, 2019, "Endogenous Corporate Leverage Response to a Safer Macro Environment: The Case of Foreign Exchange Reserve Accumulation," NBER Working Paper No. 26545 (Cambridge, MA: National Bureau of Economic Research).
- Unsal, D. F., C. Papageorgiou, and H. Garbers, forthcoming. "Monetary Policy Frameworks: An Index and New Evidence," IMF Working Paper (Washington: International Monetary Fund).
- Vegh, C. A., L. Morano, D. Friedheim, and D. Rojas, 2017, "Between a Rock and a Hard Place: The Monetary Policy Dilemma in Latin America and the Caribbean," LAC Semiannual Report, (October), (Washington: The World Bank).
- Ye, M., E. Hutson, and C. Muckley, 2014, "Exchange Rate Regimes and Foreign Exchange Exposure: The Case of Emerging Market Firms," *Emerging Markets Review*, Vol. 21, pp. 156-182.