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# Navigating External Shocks in Southeast Asia's Emerging Markets

Key Lessons and Challenges in Applying the IMF's Integrated Policy Framework

Prepared by Corinne Deléchat, Umang Rawat, and Ara Stepanyan

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DEPARTMENTAL PAPER

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# Executive Summary

As relatively small open economies, southeast Asian emerging markets (Indonesia, Malaysia, Philippines, Thailand [Association of Southeast Asian Nations (ASEAN)-4]) are highly susceptible to external shocks—both financial and real—that could induce large capital flows and exchange rate volatility that could lead to foreign exchange (FX) market dysfunction. With the exception of Bank Negara Malaysia, ASEAN-4 central banks mostly have flexible inflation targeting frameworks for monetary policy implementation. Their main policy objectives include medium-term price stability, sustainable economic growth, and financial stability.<sup>1</sup>

Central banks in ASEAN-4 economies have been early pilots in the operationalization of the Integrated Policy Framework (IPF) in 2022-23 given their experience in using multiple policy tools besides the monetary policy rate, including macroprudential measures, foreign exchange interventions (FXIs), and capital flow management measures, to achieve their multiple objectives. They have welcomed the IPF as a systematic, frictions-based approach to analyze the use of these multiple tools to manage trade-offs across policy objectives.

The IPF provides a frictions-based approach to the use of multiple policy tools. IPF models link FXIs—and macroprudential measures and capital flow management measures—to underlying frictions and vulnerabilities and examine how they fit into the overall policy framework (IMF 2020). Insights from IPF work also fed into the changes introduced to the IMF's Institutional View on the liberalization and management of capital flows (IMF 2022a). A recent note on IPF principles for FXI provides further guidance on IMF advice on the use of FXIs as part of the IPF in IMF surveillance (IMF 2023a). Although exchange rate adjustment remains the first line of defense for inflation-targeting countries facing external nonfundamental shocks, FXIs might be warranted if the shocks are large and occur in the presence of well-identified frictions as part of the overall policy mix.

This paper takes stock of the experience from these pilots, both from the perspective of country authorities and of IMF country teams. It aims at distilling key lessons, which could be used to inform broader IPF operationalization.<sup>2</sup>

Although there is significant cross-country heterogeneity, ASEAN-4 countries all experience at least one of three IPF frictions—namely, lack of FX market depth, unhedged FX debt, and risk of inflation expectations de-anchoring—that might justify the use of FXIs under certain shocks. ASEAN-4 FX markets can become shallow during market stress episodes, though they may appear deep by most metrics during normal times. In all ASEAN-4 countries, there is limited evidence of frictions related to unhedged FX balance sheet exposures, although large exchange rate depreciations could also have a nonlinear impact on private sector balance sheets. Inflation expectations are mostly well-anchored, but the exchange rate pass-through to inflation can be also subject to nonlinearities and tends to be larger during periods of high inflation and elevated uncertainty. This could de-anchor inflation expectations.

As part of IPF operationalization in surveillance, IMF teams for ASEAN-4 countries used the Quantitative Model for the Integrated Policy Framework (QIPF) model to assess policy trade-offs under a risk-off shock. The QIPF applications highlighted that under some scenarios a coordinated use of monetary, FXI, and fiscal policies improve trade-offs between price and output stability. The use of FXIs in response to a large nonfundamental risk-off shock is found to mitigate the impact of inefficiently tight financial conditions and

---

<sup>1</sup> In the case of Indonesia, this also includes exchange rate stability.

<sup>2</sup> See the IMF Article IV Staff Reports for Thailand (IMF 2022b), Philippines (IMF 2023b), Indonesia (IMF 2023c), and Malaysia (IMF 2023d).

abrupt spikes in uncovered interest parity premiums, and hence lower the burden on monetary policy by limiting the extent of depreciation and pass-through to inflation. In countries with a negative output gap, complementary use of FXIs could also alleviate output-inflation trade-offs.

The authorities and country teams view the QIPF model as helpful and reiterated that policy advice also requires judgment and taking into account considerations beyond the models. ASEAN-4 authorities appreciated the QIPF as it provides a fully consistent micro-founded framework to assess IPF policies. However, there is agreement that internalizing the costs associated with the use of FXIs and capital flow management measures would be important for accurately identifying policy trade-offs. Use of FXIs may have nonnegligible long-term costs such as impeding financial market development and encouraging excessive buildup of foreign currency debt. Given remaining gaps, judgment would still be needed, and policy decisions should also take specific country circumstances into account.

The pilots pointed to several remaining challenges in moving toward an integrated policy approach.

*First, country teams at times lacked sufficient information to assess the extent of frictions.* Accurately measuring FX market depth in the absence of official FXI data was difficult. Granular data about unhedged FX balance sheet exposures would allow to better assess the presence of FX mismatches that could amplify risk-off shocks.

*Second, country teams noted that it is important to ex ante identify key country-specific structural as well as idiosyncratic factors that may play a role in amplifying/mitigating the impact of shocks to appropriately calibrate policies.* Assessing the nature and magnitude of shocks in real time was also challenging. The authorities further noted the issue is compounded by the need to decide on FXIs very quickly, mostly within a day.

*Third, the authorities and teams agreed that more work is needed to assess potential nonlinearities.* The time-varying nature of IPF frictions and the nonlinear effects of shocks make it difficult to assess situations when benefits of a complementary use of FXIs would outweigh the costs.

*Fourth, the authorities noted remaining operational challenges in IPF implementation.*

- *Integrating policies working with different implementation lags on different parts of the economic cycle was still challenging.* Macroprudential policy operates at longer horizon on the financial cycle, monetary policy works with shorter lags of a few months, and FXI has an immediate effect on the exchange rate.
- *Internal operational frameworks were not fully integrated,* as different departments within central banks were in charge of different policy tools (for example, FXIs led by central bank operations departments versus macroprudential and monetary policy). In this regard, monetary policy committees could play a more active coordination role.

The experience from the ASEAN-4 pilots confirmed that FXIs feature prominently in the authorities' policy toolkit. ASEAN-4 central banks indicated that FXIs are deployed to smooth excessive volatility, in particular when exchange rate movement is deemed inconsistent with historical patterns of normal market functioning and could risk drying liquidity in the FX market or give rise to disorderly market conditions. Even though preemptive FXI is not recommended under IMF guiding IPF principles for FXIs, the authorities noted that they may intervene preemptively if they assess that herd behavior leading to a large volume of FX transactions may dry up liquidity and/or result in excessive volatility. In such cases, where risks of market dysfunction are elevated, central banks find it prudent to act promptly rather than waiting for the risk to materialize. If there is clear evidence of an elevated risk of market dysfunction, indicated by sharply increased uncovered interest

parity/covered interest parity premiums or bid-ask spreads, there may be a case for FXI under the IPF. These premiums are the first step of the transmission of the shock into macroeconomic variables, so addressing them today is a proactive and forward-looking way of preventing macroeconomic destabilization later on.

IMF country teams noted that the lack of official FXI data hampered a proper assessment of the appropriateness and impact of FXI in ASEAN-4, for example, as part of the response to the combined large supply and risk-off shocks experienced during 2022.

Overall, the ASEAN-4 model-based IPF pilots proved useful in illustrating policy trade-offs in a downside scenario and assisting in the operationalization of the IPF. As regular users of multiple policy tools to attain their (also multiple) policy objectives, ASEAN-4 authorities appreciate the evolution of IMF's thinking on navigating external shocks and volatile capital flows embodied in the IPF. The authorities' familiarity with the models, in particular the QIPF supported by IMF capacity development, greatly facilitated structured policy discussions in the context of Article IV surveillance, both at the technical and senior policymaker level. All ASEAN-4 central banks are currently using semi-structural models to integrate various macro-financial channels and policy instruments, but they recognize that using a fully-fledged dynamic stochastic general equilibrium model would be superior in terms of being more theoretically sound and used in normative analysis of policy scenarios. In this regard, the pilots have fostered a dynamic, ongoing engagement with the ASEAN-4 authorities on the IPF, supported by ongoing capacity development to help the central banks model enhancements based on the authorities' feedback and continued capacity development.



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# Acronyms and Abbreviations

ASEAN-4	Association of Southeast Asian Nations (Indonesia, Malaysia, Philippines, Thailand)
CFM	capital flow management measure
FX	foreign exchange
FXI	foreign exchange intervention
IPF	Integrated Policy Framework
MPM	macroprudential measures
QIPF	Quantitative Integrated Policy Framework
QPM	quarterly projection model
UIP	uncovered interest parity

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# 1. Introduction

As relatively small open economies, southeast Asian emerging markets (Indonesia, Malaysia, Philippines, Thailand, or Association of Southeast Asian Nations [ASEAN]-4) are highly susceptible to external shocks—both financial and real—that could induce large capital flows and exchange rate volatility that could lead to foreign exchange (FX) market dysfunction. Strong policy buffers and sound financial systems have helped them manage their significant exposure to external shocks. With the exception of Bank Negara Malaysia, ASEAN-4 central banks mostly have flexible inflation targeting frameworks for monetary policy implementation. Their main policy objectives include medium-term price stability, sustainable economic growth, and financial stability. To achieve their multiple objectives, ASEAN-4 central banks use a variety of policy tools besides the monetary policy rate, including macroprudential measures (MPMs), foreign exchange interventions (FXIs), and capital flow management measures (CFMs).

ASEAN-4 economies have been early pilots in the operationalization of the IMF's Integrated Policy Framework (IPF) given their experience in using multiple policy tools to achieve their multiple objectives. They have welcomed the IPF as a structured approach for analyzing the use of these multiple tools to manage trade-offs across policy objectives. The 2022 Article IV consultations for Thailand (IMF 2022b) and the Philippines (IMF 2023b) and the 2023 Article IV consultations for Indonesia (IMF 2023c) and Malaysia (IMF 2023d) used the IPF approaches and quantitative models to analyze policy trade-offs under alternative scenarios.<sup>1</sup>

This paper takes stock of the experience from these pilots, also presenting the perspective of country authorities. It aims at distilling key lessons and implementation challenges. The paper draws on a rich set of inputs and contributions, both from ASEAN-4 central banks and IMF country teams. In particular, we use the material prepared for the Article IV consultations, subsequent discussions with and contributions from ASEAN-4 country teams, as well as a survey of and additional meetings with country authorities. The discussion is also informed by the proceedings of a high-level policy dialogue on the policy mix jointly organized by Bank Indonesia and Bank of Thailand on the margins of the meeting of ASEAN finance ministers and central bank governors in Jakarta (ASEAN Finance Ministers and Central Bank Governors) on August 22, 2023 (Annex 1), and a technical peer learning event on the use of models in macro-financial analysis organized at the Singapore Training Institute in Singapore on July 17, 2023 (Annex 2).

Whereas the IPF is a multipronged framework which encompasses various models and approaches (for example, conceptual model, diagrams, operational principles to guide the use of FXI), the IPF operationalization in ASEAN-4 is supported by the quantitative IPF model developed by the IMF's Monetary and Capital Markets Department (Quantitative Model for the Integrated Policy Framework [QIPF]) (Adrian and others 2021) and its empirical implementation (Chen and others 2023).

The rest of the paper is structured as follows. The second section presents ASEAN-4 initial conditions, policy frameworks, and various policy tools. The third section provides a brief overview of IPF principles and guidance on IPF policy tools. It then turns to framing the use of the IPF quantitative model in the ASEAN-4 pilot cases for IPF operationalization. Drawing on the IPF's empirical and theoretical work, the fourth section assesses the relevance of key IPF frictions in ASEAN-4 as well as operational considerations and challenges in appropriately measuring them. It then provides preliminary lessons from the use of quantitative models in IPF applications in surveillance in ASEAN-4, both in the case of adverse scenario simulations and of an

---

<sup>1</sup> The 2023 Article IV Consultation for the Philippines used a version of the Quantitative Model for the Integrated Policy Framework (QIPF) model with significant modifications/extensions compared to the version used in the other ASEAN-4 countries (Annex 4). For consistency across country cases, this paper uses the IPF application to a downside scenario presented in the 2022 Article IV Consultation Philippines Staff Report (IMF 2023b).

ex-post review of the policy response to multiple shocks in 2022. Given that FXIs were found to feature prominently in ASEAN-4 policy toolkits, the section also investigates further the region's central banks' rationales for intervening in the FX market. The fifth section concludes.

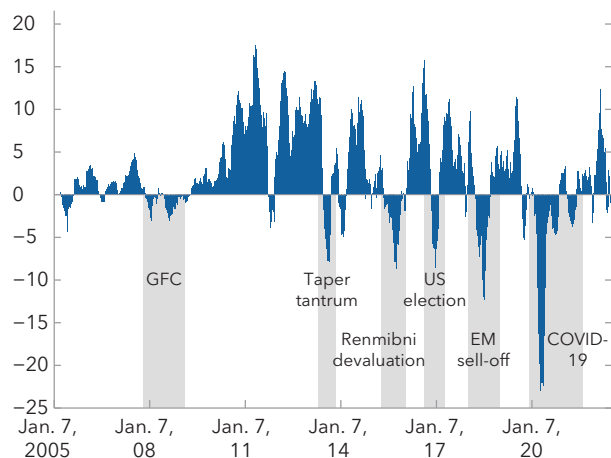
## 2. Background

ASEAN-4 economies are susceptible to external shocks—both financial and real—that could induce large capital flows and exchange rate volatility. Given that they are relatively small open economies, financial shocks are mostly related to sudden shifts in global risk sentiment and advanced economies' monetary policy. Further, ASEAN-4 economies are sensitive to external demand and supply shocks, particularly from China. Since Indonesia and Malaysia are commodity exporters, they are also vulnerable to changes in global commodity prices. Therefore, ASEAN-4 countries have faced highly volatile capital flows and experienced significant capital outflows during recent crisis episodes including the 2013 taper tantrum, renminbi devaluation in 2015, US election in 2016, emerging market sell-off in 2018, and COVID-19 pandemic in 2020 (Baek and others 2023) (Figure 1). This has heightened exchange rate volatility in ASEAN-4 countries (Figures 2 and 3). In terms of the IPF, the external demand and supply shocks, the commodity price shocks, and the US monetary policy shocks would be fundamental, while the risk-off episodes may have a nonfundamental component (see section titled "Key Integrated Policy Framework Principles and Guidance").

ASEAN-4 countries' strong policy buffers and sound financial systems have helped them manage their significant exposure to external shocks. ASEAN-4 countries accumulated FX reserves for precautionary reasons between the Asian financial crisis and the global financial crisis and in response to large capital inflows after the global financial crisis. Public debt is around 60 percent of GDP or lower, which provides sufficient policy space to address downside risks.<sup>2</sup> In addition, closing or already positive output gaps with declining inflation allow ASEAN-4 countries to normalize monetary and fiscal policies. Financial stability risks are also well-contained: the ASEAN-4 banking systems are well-capitalized and have ample liquidity.

**Figure 1. Nonresident Portfolio Flows to ASEAN-4 Countries**

(Billions of US dollars, three-month rolling sum)

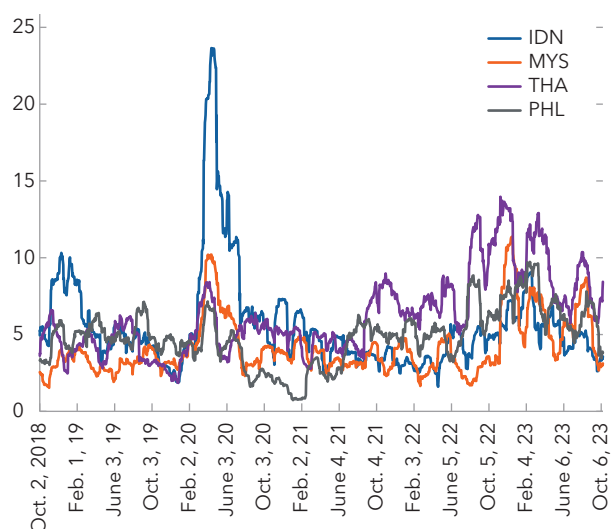


Sources: Institute of International Finance; and IMF staff calculations.

Note: ASEAN-4 = Association of Southeast Asian Nations (Indonesia, Malaysia, Philippines, Thailand).

**Figure 2. ASEAN-4: Exchange Rate Volatility**

(30-day realized volatility, percent)

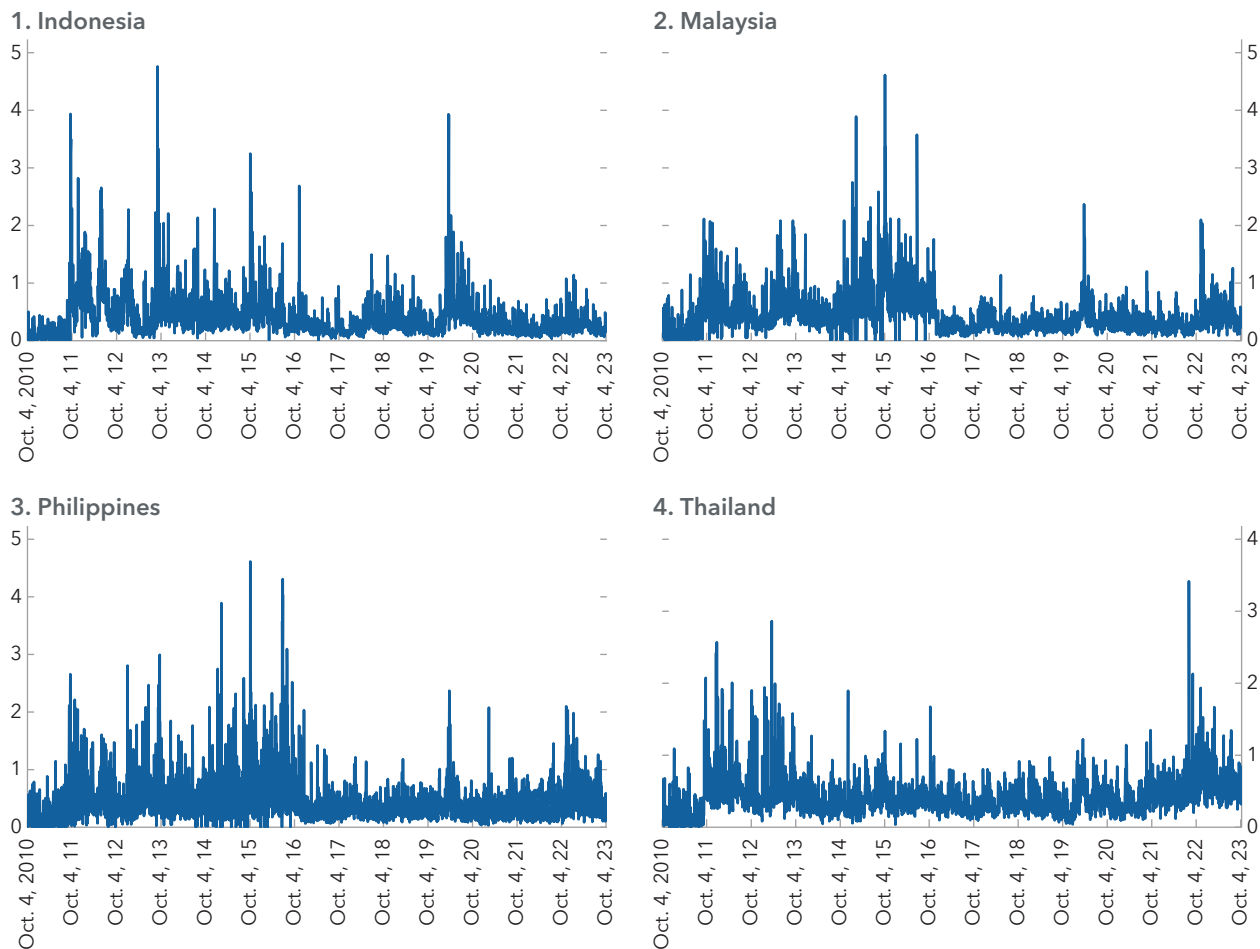


Source: Bloomberg L.P.

Note: Data labels in the figure use International Organization for Standardization (ISO) country codes. ASEAN-4 = Association of Southeast Asian Nations (Indonesia, Malaysia, Philippines, Thailand).

<sup>2</sup> Public debt to external creditors is around 20 percent of GDP or lower in ASEAN-4 countries.

**Figure 3. ASEAN-4: Intraday Exchange Rate Volatility (Percent)**



Sources: Bloomberg L.P.; and IMF staff calculations.

Note: Volatility is the difference between intraday maximum and minimum as a percentage of closing exchange rate. ASEAN-4 = Association of Southeast Asian Nations (Indonesia, Malaysia, Philippines, Thailand).

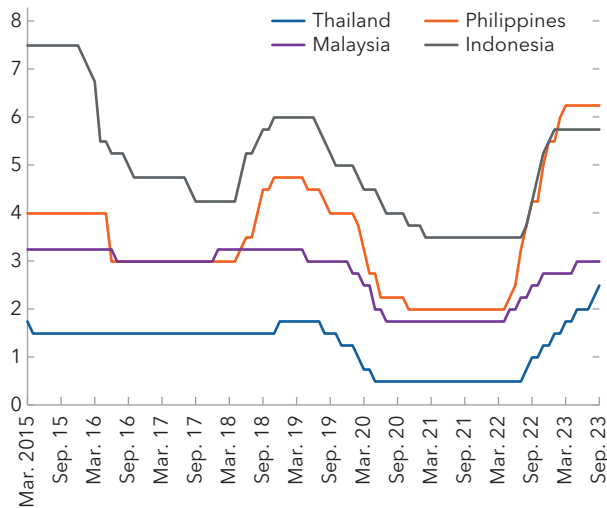
ASEAN-4 central banks mostly have flexible inflation targeting frameworks for monetary policy implementation.<sup>3</sup> The main policy objectives include medium-term price stability, sustainable economic growth, and financial stability. Some central banks also aim to ensure exchange rate stability or convertibility of the national currency. To achieve their multiple objectives, ASEAN-4 central banks use a variety of policy tools.

1. The primary tool used to achieve price stability is the policy rate. While the monetary policy transmission channels in ASEAN-4 countries are not very strong, the monetary policy stance has historically been responsive to inflation movements (Corbacho and Peiris 2018; Figure 4). Nevertheless, due to significant trade-offs between various objectives caused by multiple simultaneous shocks, ASEAN-4 central banks' interest rate policies are often burdened with balancing price versus financial stability or growth objectives. Purchases of government bonds, mostly from the secondary market, are also used to manage aggregate demand and support fiscal policy implementation.<sup>4</sup>

<sup>3</sup> The Bank Negara Malaysia does not have an inflation (or flexible inflation) targeting framework. Its principal objective is to promote monetary and financial stability conducive to sustainable growth.

<sup>4</sup> Bank Indonesia also purchased government bonds from the primary market to mitigate destabilizing volatility in interest rates and to support the needed fiscal expansion during the COVID-19 pandemic.

**Figure 4. ASEAN-4: Policy Interest Rate (Percent)**



Source: Haver Analytics.

Note: ASEAN-4 = Association of Southeast Asian Nations (Indonesia, Malaysia, Philippines, Thailand).

2. MPMs are deployed to ensure financial stability.<sup>5</sup> Since the aftermath of the 2007–09 global financial crisis, MPMs have been increasingly employed by the ASEAN-4 countries to preserve and promote financial stability. The ASEAN-4 countries have a wide array of MPMs geared toward responding to financial stability challenges, such as loan-to-value limits, caps on open FX exposures, and capital requirements. To limit risks emerging from banking sector FX exposure, most central banks in ASEAN-4 have limits on net open FX position (in terms of the capital, see Box 1).

3. FXI is used to complement policy rate and MPM tools. While ASEAN-4 central banks use exchange rate flexibility as the first line of defense against external shocks, FXIs—usually sterilized and conducted in the spot market—were also used. Historically, ASEAN-4 central banks' use of FXI appears to have been concentrated during periods of severe FX market stress. While ASEAN-4 central

banks do not publish FXI data, as is the case for many emerging market central banks, based on the intervention database compiled by Adler and others (2021), FXI is generally negatively correlated with the uncovered interest parity (UIP) premiums.<sup>6</sup> ASEAN-4 central banks seem to have conducted monthly FX sales (“large FXI”) during the taper tantrum (2013), the emerging market stress episode (2018), and most recently during the risk-off shock in 2022 triggered by the Federal Reserve’s interest rate hikes (Figure 5). These interventions coincided with periods of higher UIP premiums. However, there are also some episodes of FXI during periods of low UIP deviation, reflecting potential inconsistencies with the use of FXI under the IPF.

4. CFMs are used very sparingly and are intended as a last resort to address excessive volatility in capital flows that can destabilize economic and financial stability. While there has not been much use of CFMs in the recent past, there are some long-standing measures still in place in ASEAN-4.

<sup>5</sup> In the case of Bank Indonesia, alongside growth and inclusion objectives.

<sup>6</sup> For those countries that do not publish FXI data (122 out of 162 sample countries), including ASEAN-4, the paper constructs FXI proxies, which are defined as any active transaction altering a central bank’s foreign currency position. The definition excludes passive changes and operations by non-central bank entities.

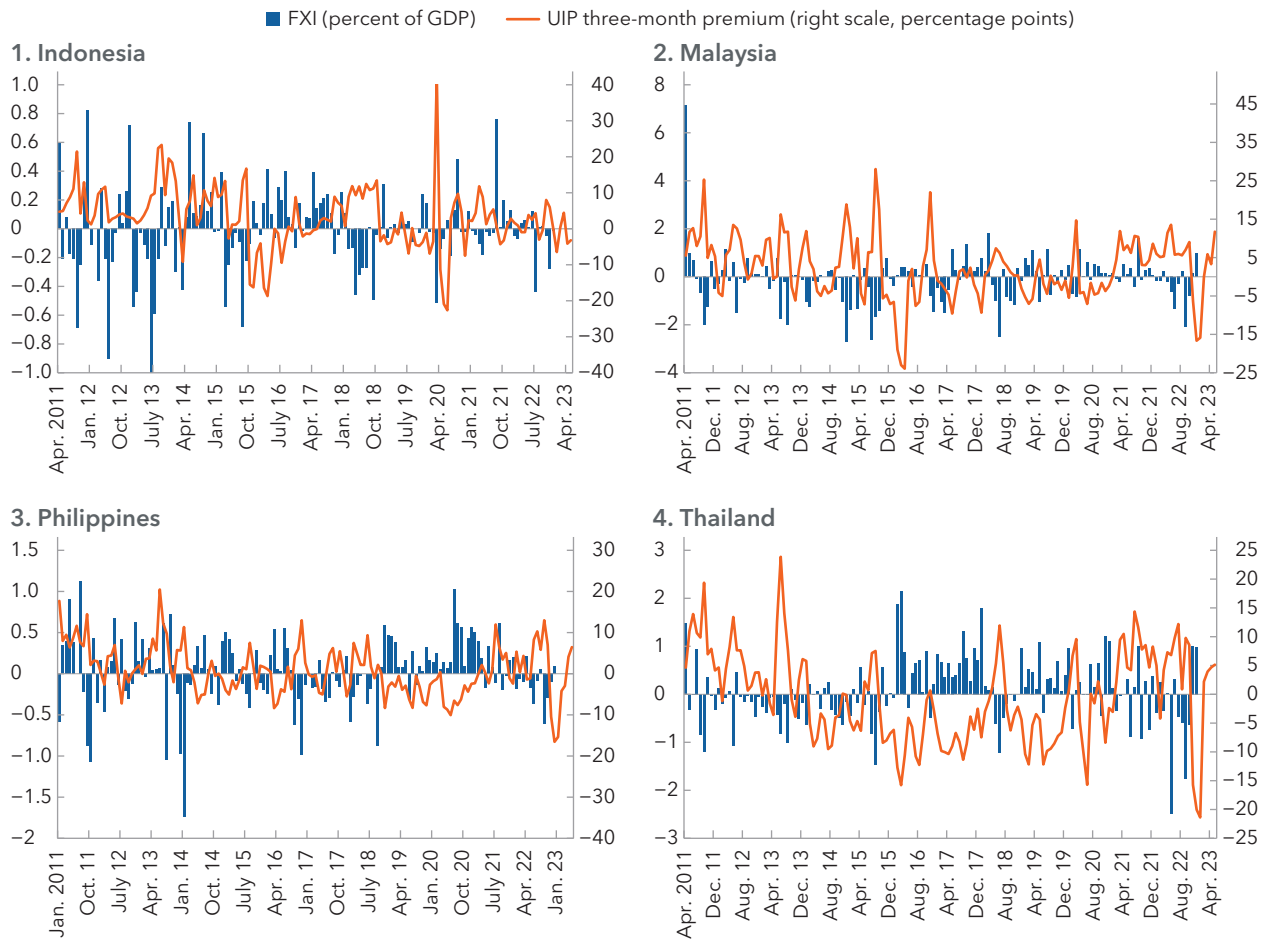


**Box 1. Foreign Exchange-Related Macroprudential Measures in ASEAN-4**

Indonesia	<p>According to Regulation 16/21/PBI/2014, nonbank corporations with external debt were initially required to meet a minimum hedging ratio of 20 percent of the negative difference between maturing foreign currency assets and foreign currency liabilities in the next three months and in the next three to six months. This ratio has been increased to 25 percent since 2016. Bank Indonesia's monitoring indicates a high degree of compliance by nonbank corporates with the requirements. Furthermore, nonbank corporations with external debt must also meet the minimum FX liquidity ratio, by holding liquid foreign currency assets to meet foreign currency liabilities with maturities less than three months. The ratio is set at a minimum of 70 percent. The hedging and liquidity requirements on nonbank corporates have been assessed as both capital flow management measures as well as macroprudential policy measures under the IMF's Institutional View. The authorities have advised that, as per their definitions, the measure does not constitute either a macroprudential policy measure or a capital flow management measure.</p> <p>There are also prudential regulations that limit banks' net open foreign exchange positions.</p>
Malaysia	<p>Part of Malaysia's foreign currency external debt is subject to Bank Negara Malaysia's prudential and hedging requirements.</p>
Philippines	<p>Prudential regulations limiting banks' net open foreign exchange positions (overall net open position limit [end of day] of 20 percent or \$50 million).</p> <p>Higher risk weights for purposes of compliance with the risk-based capital requirement (15 percent capital charge from 10 percent capital charge) on non-deliverable forward transactions.</p> <p>Limits on a bank's gross exposures to peso non-deliverable forward transactions (20 percent and 100 percent of unimpaired capital for domestic banks and foreign bank branches, respectively).</p>
Thailand	<p>Commercial banks must maintain a net open position in each currency at the end of each day in a proportion to its capital not exceeding 15 percent or \$5 million, whichever is greater, and an aggregate position at the end of each day in a proportion to its capital not exceeding 20 percent or \$10 million, whichever is greater.</p> <p>Retail banks must maintain an aggregate position at the end of each day in a proportion to its capital not exceeding 20 percent or \$2 million, whichever is greater.</p> <p>Finance companies must maintain, at the end of each day, an aggregate position of net short in a proportion to its Tier 1 capital not exceeding 20 percent or an aggregate position of net long in a proportion to its Tier 1 capital not exceeding 25 percent.</p>

Note: ASEAN-4 = Association of Southeast Asian Nations (Indonesia, Malaysia, Philippines, Thailand).

**Figure 5. ASEAN-4: Uncovered Interest Parity Premium and Foreign Exchange Interventions**



Sources: UIP data from Bloomberg L.P.; and FXI estimates based on Adler and others (2021).  
 Note: ASEAN-4 = Association of Southeast Asian Nations (Indonesia, Malaysia, Philippines, Thailand); FXI = foreign exchange intervention; UIP = uncovered interest parity.

### 3. A Recap on the IMF's Integrated Policy Framework

#### A. Key Integrated Policy Framework Principles and Guidance

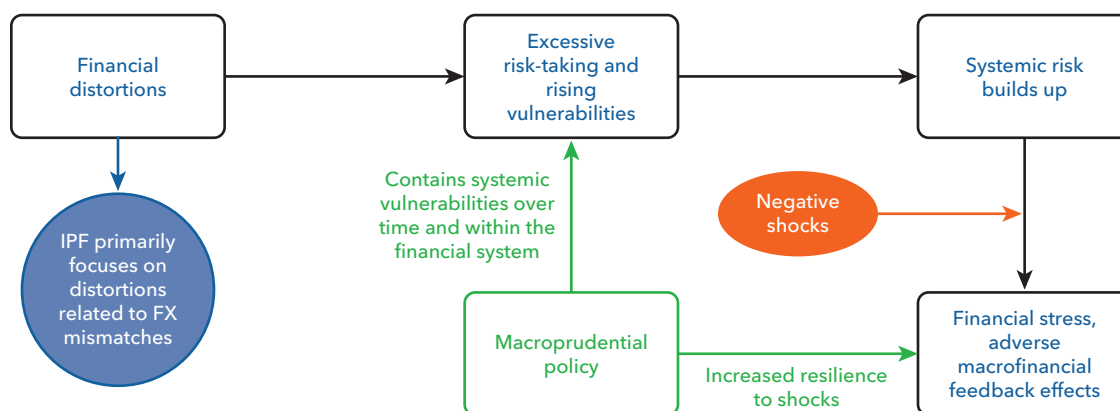
IPF insights provide the foundations for a structured, frictions-based approach to the use of policy tools. While several countries (particularly ASEAN-4 economies) have used multiple policy tools for decades, responses to shocks have been heterogenous across countries and over time. The IPF modernizes the IMF's thinking about policy responses to shocks. IPF links FXI, MPMs, and CFMs to underlying frictions and vulnerabilities and examine how they fit into the overall policy framework (IMF 2020, 2023a; Basu and others 2020; Adrian and others 2020). Insights from IPF work also fed into the changes introduced to the IMF's Institutional View on the liberalization and management of capital flows (IMF 2022a).

While there has been a clear operational guidance on the use of MPMs and CFMs since 2012-13, the operational guidance on FXI use has been formulated only recently.

Detailed operational guidance on the IMF's macroprudential policy framework exists in the form of guidance notes on macroprudential policy and its application in IMF surveillance (IMF 2013, 2014a, 2017, 2021). Overall, the design of macroprudential policies is linked to financial distortions that can result in a buildup of vulnerabilities over time and/or structural vulnerabilities within the financial system (IMF, 2014b). These vulnerabilities can amplify shocks and increase financial stability risks and have severe negative impact on the real economy through feedback loops (Figure 6).

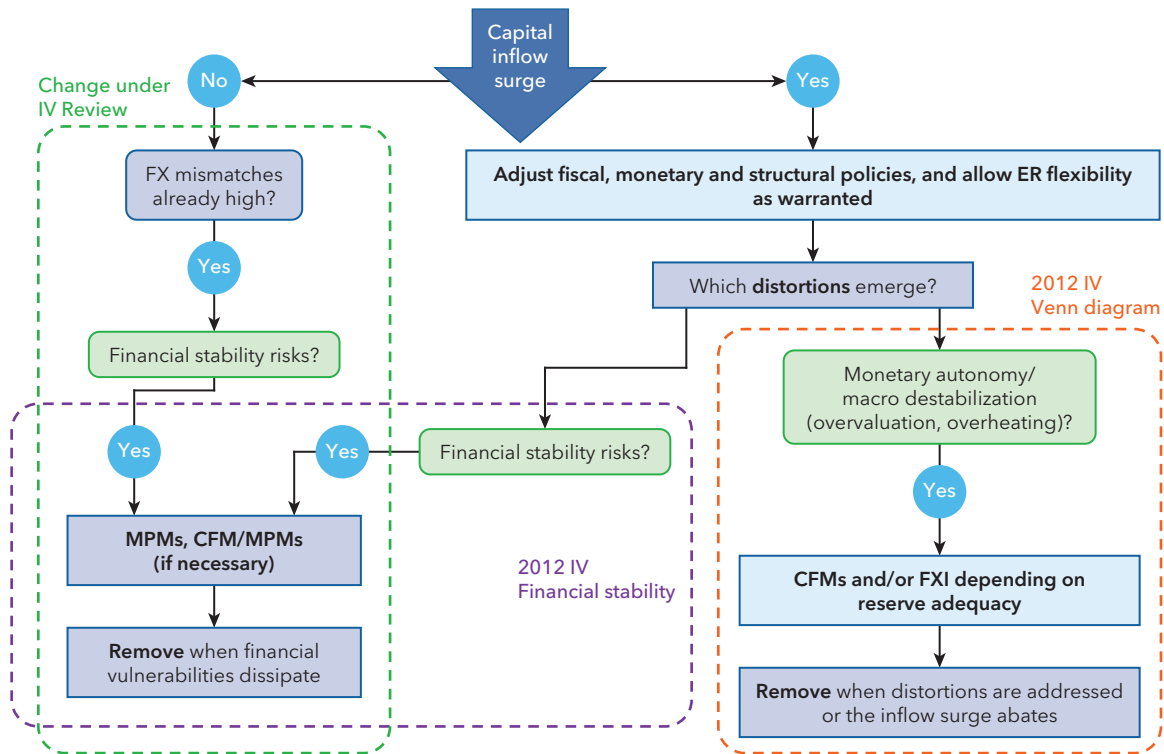
The operational guidance on CFMs is based on the IMF's Institutional View on liberalization and management of capital flows, which was revised in 2022 to reflect IPF findings (IMF 2012a, 2022a). The Institutional View, adopted in 2012, deemed CFMs an appropriate part of the policy mix only under some scenarios in an inflow surge or in an imminent crisis situation (IMF 2012a). However, IPF findings showed that preemptive CFMs/MPMs may be desirable, particularly in countries with elevated stock vulnerabilities. These findings were reflected in the revised Institutional View (IMF 2022a; Figure 7).

**Figure 6. Systemic Risk Analysis and Macroprudential Policy Framework**



Source: IMF (2021).

Note: FX = foreign exchange; IPF = Integrated Policy Framework.

**Figure 7. Revised Institutional View on Capital Flows**

Source: IMF (2022a).

Note: CFM = capital flow measure; ER = exchange rate; FX = foreign exchange; FXI = foreign exchange intervention; IV = Institutional View; MPM = macroprudential measure.

The initial guidance on FXI was laid out in the Integrated Surveillance Decision (IMF 2012b). It states that members “should intervene in the exchange market if necessary to counter disorderly market conditions,” while taking into account the interests of other members in their intervention policies. Importantly, the Integrated Surveillance Decision does not describe when FXI could be used more generally, nor does it preclude the use of FXI in situations other than disorderly market conditions.

The recent policy paper on IPF principles for the use of FXI aims at guiding the advice on the use of FXI as part of the IPF in IMF surveillance (IMF 2023a). While clarifying that the IPF-based advice on FXI complements rather than replaces the one based on disorderly market conditions, the advice based on the IPF is expected to improve specificity and consistency of the policy advice.

Despite the pilots being conducted prior to the finalization of the policy paper on IPF principles for the use of FXI, the analysis in this paper adopted the main principles from the final published version of the paper. In particular, the paper identifies three use cases for FXI (use cases A, B, and C) once a shock has materialized, closely tied to the frictions in the IPF models and the nature of shocks:

- FXI in the presence of premiums in shallow FX markets (use case A). FXI may be appropriate to smooth large changes in hedging and financing premia (UIP, covered interest parity, and FX financing) that generate risks to macroeconomic and financial stability due to shallowness of FX markets and that arise even though domestic policy settings are appropriate. Even when the FX market is shallow, FXI is not warranted after fundamental shocks unless there is a clear ex post evidence of nonfundamental shocks.

- FXI to counter financial stability risks from FX mismatches (use case B). If a large depreciation increases financial stability risks from FX mismatches (for example, private sector defaults), FXI can be used to help prevent adverse financial amplification, provided that reserves are sufficient.
- FXI to counter risks to price stability, when sharp changes in exchange rates risk de-anchoring inflation expectations (use case C). FXI can support monetary policy when there is a risk that a large exchange rate depreciation may de-anchor inflation expectations, provided the costs of using monetary policy alone are high, reserves are sufficient for FXI to be effective, the costs of including FXI are low, and that FXI does not substitute for the warranted monetary adjustment. There can be a role for FXI also to lean against sustained appreciation.

The paper further clarifies that, in addition to the presence of these frictions, FXI should be used only if shocks are large and pose significant risks to central bank price and financial stability objectives. FXI should not substitute for a warranted adjustment of macroeconomic policies and should be integrated within the overall policy response to the frictions. Strong central bank governance and communication are necessary to ensure the success of FXI under the IPF.

Complementary to the ex-post use of FXI discussed earlier, the paper also advocates for other ex-ante policies to limit the severity of these frictions.

- For use case A, in countries where inefficient premiums may arise due to shallow markets, structural reforms to deepen the FX market and local currency debt market should build resilience ex ante to risk-off shocks. Further, consideration may also be given to preemptive CFMs/MPMs to contain stock vulnerabilities, as per the review of the Institutional View (IMF 2022a).
- For use case B, ex ante policies such as MPMs and MPMs/CFMs (as per the revised Institutional View) should be used to limit financial vulnerabilities from elevated FX debt stocks.
- For use case C, building central bank credibility would limit policy trade-offs by better anchoring inflation expectations and reducing exchange rate passthrough.

## B. Integrated Policy Framework Models to Support Operationalization in ASEAN-4

The conceptual IPF model (Basu and others 2020) and the subsequent IPF diagrams (Basu and Gopinath, 2024) provide a broad conceptual framework for policy analysis under the IPF. These works feature nominal and real rigidities in a short horizon setup. This note uses the quantitative IPF model (QIPF) developed by the IMF's Monetary and Capital Markets Department (Adrian and others 2021) and its empirical implementation (Chen and others 2023) in the IPF operationalization pilots in ASEAN-4. The QIPF is an infinite horizon New Keynesian model, which can be used to quantify some of the policy trade-offs using integrated policy tools that are highlighted by the IPF approach. It includes financial frictions that are akin to those incorporated in the conceptual IPF model, which lead to UIP premiums and occasional sudden stops, and create room for a possible deployment of FXIs and CFMs to complement monetary policy in reaching its stabilization objectives. The empirical implementation used the linearized version of the QIPF, which can be estimated using Bayesian methods and standard macroeconomic time series, and then used to generate baseline projections and alternative scenarios.<sup>7</sup> However, as any "living" model, QIPF has been further developed to include the supply side, commodities, and fiscal policy, and work is ongoing to add macroprudential policy.

<sup>7</sup> These models were used in versions that are very close to the published ones for the 2022 Article IV Consultations with the Philippines (IMF 2023b) and Thailand 2022 (IMF 2022b) and the 2023 Article IV Consultation with Indonesia (IMF 2023c).

ASEAN-4 central banks have benefited from extensive modeling technical assistance from the IMF in recent years, which facilitated policy discussion in the context of IPF pilots. Several ASEAN-4 economies (Indonesia, Malaysia, Thailand) have received technical assistance in using micro-founded QIPF for formulating macro-financial policy advice. In contrast, the Philippines had received extensive technical assistance on a semi-structural quarterly projection model (QPM; Annex 3). The authorities' familiarity with the QIPF model greatly facilitated policy discussions in the context of Article IV surveillance, both at the technical and senior policymaker level. The bilateral engagement has been supported by peer learning events at the regional level during both the technical and high-level seminars in Singapore and Jakarta, respectively (see Annexes 1 and 2).

## 4. Implementing the Integrated Policy Framework with Multiple Shocks and Policy Trade-Offs in ASEAN-4: Main Findings and Early Lessons

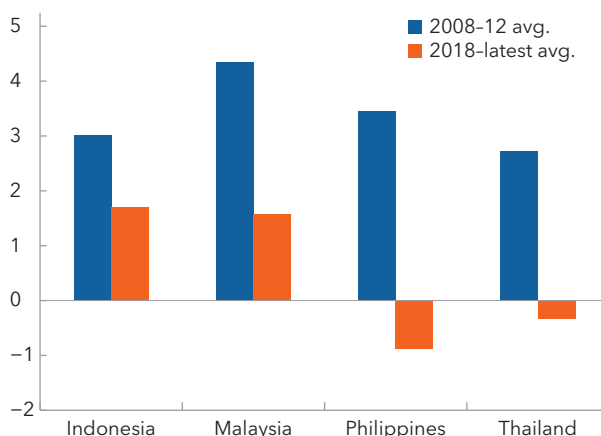
The IPF has highlighted the importance of frictions in calibrating the appropriate policy mix in response to external shocks. Drawing on the IPF's empirical and theoretical work, this section assesses the relevance of key IPF frictions in ASEAN-4 as well as operational considerations and challenges in appropriately measuring them.

### A. Identifying and Measuring Integrated Policy Framework Frictions and Shocks

*FX markets depth.* While there is a significant cross-country heterogeneity, ASEAN-4 FX markets can become shallow—especially during stress times—despite recent progress in market deepening. ASEAN-4 FX markets, including for FX derivatives, have seen significant deepening in the past decade, reflecting a series of financial market reforms (see ASEAN 2019; BIS 2022).<sup>8</sup> Various measures of FX market depth, including the FX trading volume and average bid-ask spreads, reflect relatively deep markets during normal times. Further, the average UIP premium has also declined significantly over the past decade (Figure 8). Nonetheless, FX markets can turn shallow occasionally with liquidity drying up, particularly during episodes of drastic global moves and thin market hours. The evidence of time-varying market depth was found in several ASEAN-4 countries (Indonesia, Malaysia, Thailand) using the quantitative IPF model (Table 1).

However, accurately measuring FX market depth in the absence of official FXI data is difficult. FX market depth is largely measured using market

**Figure 8. ASEAN-4: Uncovered Interest Parity Premiums**  
(Percentage points)



Sources: Bloomberg L.P.; and IMF staff calculations.  
Note: ASEAN-4 = Association of Southeast Asian Nations (Indonesia, Malaysia, Philippines, Thailand).

<sup>8</sup> Given the importance of onshore FX and FX derivatives markets in supporting stable exchange rates, the ASEAN-4 economies have implemented measures to promote the use of onshore markets and develop local FX hedging markets. Bank Indonesia introduced a domestic non-deliverable forward (DNDF) instrument settled in local currency in November 2018 that helps to smoothen FX demand and ease pressure on the spot market. The Central Bank of Malaysia introduced the Dynamic Hedging Program in 2016 that allows institutional investors to manage their portfolio FX exposure by entering and unwinding forward contracts without the need to submit documentation. In January 2021, the Bank of Thailand enrolled nonresident corporates into the Non-Resident Qualified Corporate program, which allows them greater flexibility in hedging their FX exposure in the onshore market, thus improving the ease of doing business and reshoring FX activities to increase market liquidity. In the Philippines, a regulation in July 2020 limits bank's total gross exposure to all forms of peso non-deliverable forward transactions to a fixed percentage of the bank's capital base, and the Bangko Sentral ng Pilipinas has established the Currency Rates Risk Protection Program, a non-deliverable forward contract between the Bangko Sentral ng Pilipinas and commercial banks to help bank clients hedge their eligible foreign currency exposures and to help commercial banks manage their hedging needs for foreign currency exposures.

**Table 1. Evidence of Time-Varying Market Depth**

Parameter	Prior Distribution					Indonesia		Malaysia		Philippines		Thailand	
	R <sub>1</sub> : Deep			R <sub>2</sub> : Shallow		Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow
	Type	Mean	Std	Mean	Std								
$\Gamma$ - FX market depth	Beta	0.01	0.005	0.075	0.01	0.005	0.076	0.001	0.072	0.001	0.072	0.001	0.072
Trans. probabilities. (R1 to R2 and R2 to R1)	Beta	0.5	0.2	0.5	0.2	0.04	0.36	0.01	0.63	0.00	0.68	0.01	0.63
Probability of deep FX markets						0.89		0.99		0.99		0.99	
Change in log marginal likelihood						3.2		14.7		-14.8		4.0	

Source: IMF staff calculations.

Note:  $\Gamma$  is the parameter in the model reflecting depth of the foreign exchange (FX) market, with a low value of  $\Gamma$  corresponding to deeper FX markets. The table shows prior and posterior distributions of the FX depth parameter based on Bayesian estimation from the Quantitative Model for the Integrated Policy Framework model. The last row (change in log marginal likelihood) shows the difference in log-likelihood between the models without and with time-varying FX market depth. An increase in the log-likelihood suggests that the model with time-varying FX market fits the data better. The FX intervention proxy, based on the Adler and others (2021) database, is included as an observable in the estimation of the FX market depth.



indicators (such as bid-ask spreads, FX turnover, UIP premium), which are endogenous to the use of FX interventions (Chen and others 2023). Hence, if FXI is effective and/or conducted preemptively, FX markets may appear to be deeper than they actually are. The lack of official FXI data makes assessment of the FX market depth particularly challenging. For example, in the case of Thailand, staff's model-based estimates indicate that Thailand's FX market is the deepest among sampled countries, which goes against the authorities' own assessment. The problem is even more severe in the presence of time-varying market depth, which seems to be the case in ASEAN-4 countries.

*Unhedged FX debt.* The available data suggest that ASEAN-4 economies do not appear to face significant frictions related to unhedged FX balance sheet exposures, although nonlinearities and amplifying factors could generate frictions even at relatively low levels of exposure. While granular data on private sector currency mismatches and hedging positions are not publicly available for most economies, FX mismatches at the sectoral level are generally limited. The low level of external corporate debt and strong prudential and hedging requirements limit broader financial stability risks. Nonetheless, in the Philippines, while banks have buffers to withstand large FX shocks, the opacity of some conglomerate structures prevents the formation of a perfect overview of the resilience of borrowers' balance sheets.

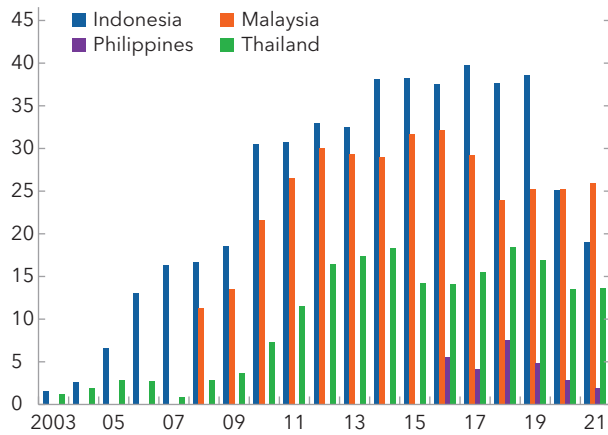
The underdeveloped FX hedging market in ASEAN-4, however, complicates corporates' abilities to manage their exposures. For example, a large exchange rate depreciation could have a nonlinear impact on private sector balance sheets reflecting the partial hedging of FX exposures. The impact ultimately will depend on the size of unhedged exposures, persistence of the exchange rate depreciation since hedging requirements only apply to near-term exposures, and whether these exposures are systemic. This emphasizes the need for more granular data about the magnitude of unhedged FX balance sheet exposures to better assess the presence of FX mismatches that could amplify the impact of risk-off shocks.

The interaction of FX exposure with other factors could also affect the extent to which exchange rate movements amplify shocks. Even moderate levels of FX debt may result in destabilizing impact in the presence of other frictions such as shallow FX markets. For example, there may be nonlinear effects (due to large exchange rate impact) when foreign investor share of local currency debt markets is large, the co-movement between exchange rate depreciation and private credit risk premiums is high, or the resilience of private sector balance sheets to large depreciation shocks is low. While foreign holdings of local currency government bonds declined during the pandemic, they remain considerable, particularly in Malaysia (Figure 9). In addition, exchange rate volatility and credit default swaps are strongly correlated in ASEAN-4 countries (Figure 10). These factors could amplify the impact of nonfundamental shocks.

*Risk of inflation expectations de-anchoring.* Inflation expectations are broadly well anchored. ASEAN-4 central banks have developed significant monetary policy credibility on the back of sound policies over the years. This has helped in anchoring inflation expectations, which have been largely stable since the adoption of inflation targeting in Indonesia, Philippines, and Thailand (Figure 11). While Malaysia does not follow an inflation targeting framework, inflation expectations have been stable and anchored around Bank Negara Malaysia's forecast lower limit. Exchange rate pass-through is generally low, in part reflecting fuel subsidies/administered prices that are common in the region, and has been found to be asymmetric in ASEAN-5 (ASEAN-4 plus Singapore), with the impact of depreciations on inflation larger than that of appreciations (Pham and others 2023).

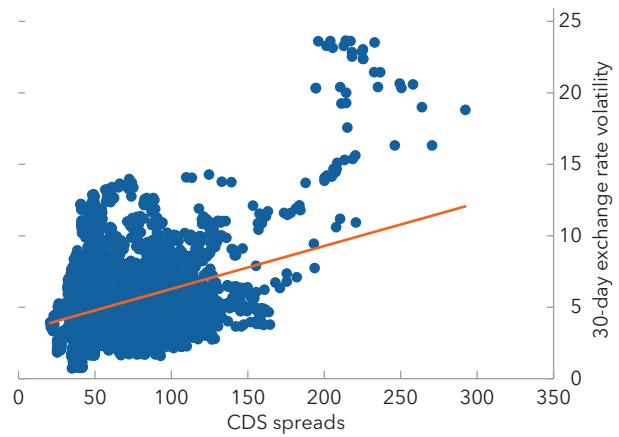
However, the exchange rate pass-through can be subject to nonlinearities, which could risk de-anchoring inflation expectations during large shock episodes. In addition, the threshold for the size of the shock that could de-anchor inflation expectations could be state dependent. Drawing on the experience of a large sample of advanced and emerging market economies, Carrière-Swallow and others (2023) find that exchange rate pass-through tends to be significantly larger during periods of high inflation and elevated uncertainty (Figure 12). They also find that the rate of pass-through triples when an exchange rate depreciation has

**Figure 9. Foreign Holdings in Local Currency Government Bonds (Percent)**



Source: Asian Development Bank, Asian Bonds Online.

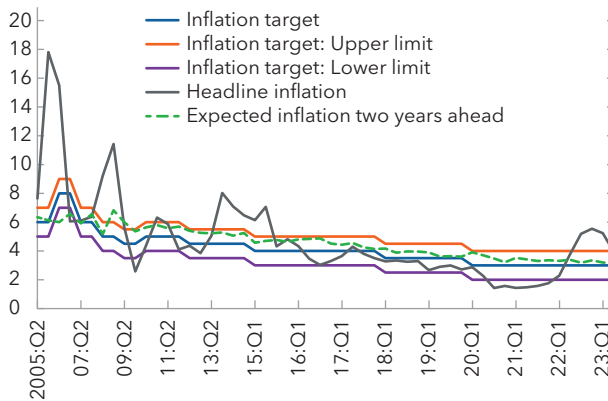
**Figure 10. Exchange Rate Volatility and CDS Spreads (CDS spreads, basis points; volatility, percent; since 2019)**



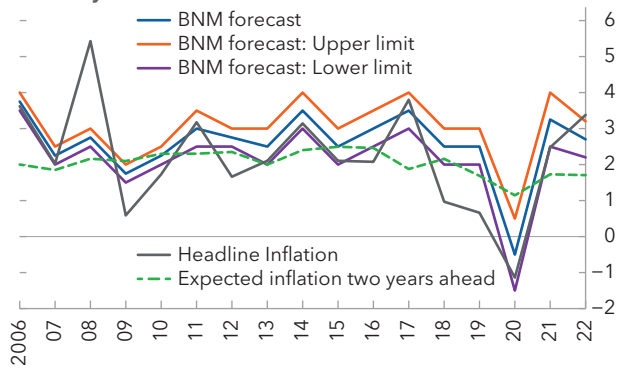
Source: Bloomberg L.P.  
Note: CDS spreads are for nonfinancial corporates. CDS = credit default swap.

**Figure 11. ASEAN-4: Two-Year-Ahead Inflation Expectations (Percent)**

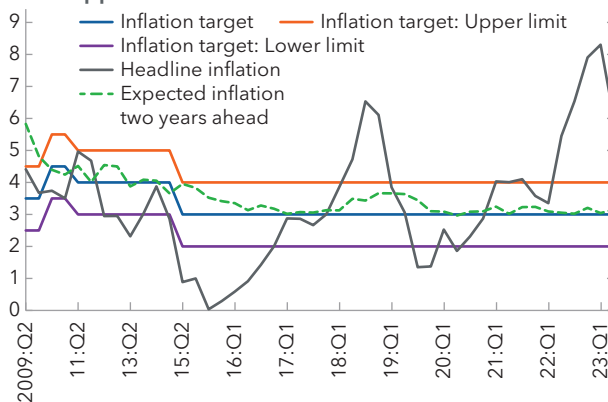
**1. Indonesia**



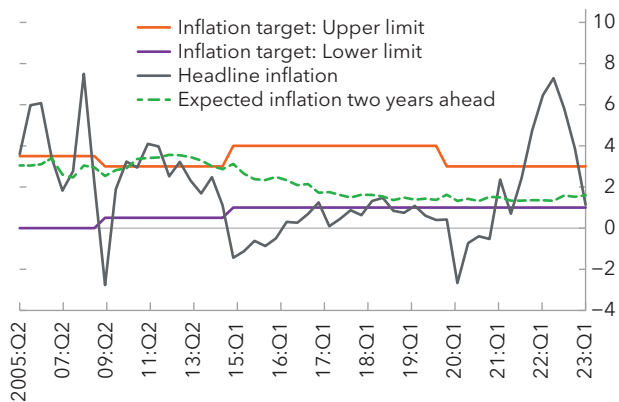
**2. Malaysia**



**3. Philippines**

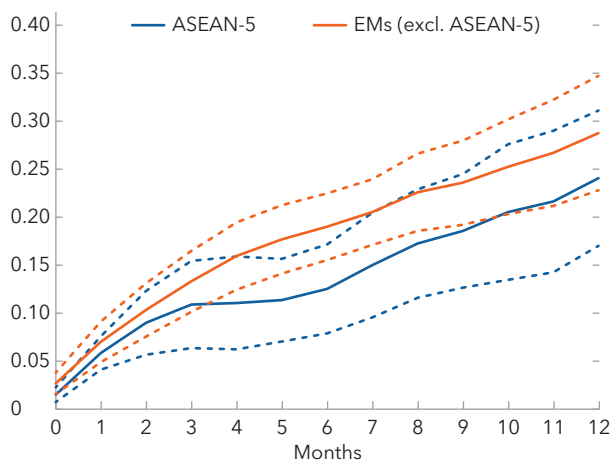


**4. Thailand**



Sources: Consensus Economics; and IMF staff estimates.  
Note: ASEAN-4 = Association of Southeast Asian Nations (Indonesia, Malaysia, Philippines, Thailand).

**Figure 12. Pass-Through Heterogeneity with Inflation**  
(Percent quartiles, dotted lines indicate confidence bands)



Sources: Haver Analytics; and IMF staff calculations.

Note: Standard errors are clustered at country level, and confidence intervals are at 68 percent. ASEAN-5 = Association of Southeast Asian Nations (Indonesia, Malaysia, Philippines, Singapore, Thailand); EMs = emerging markets.

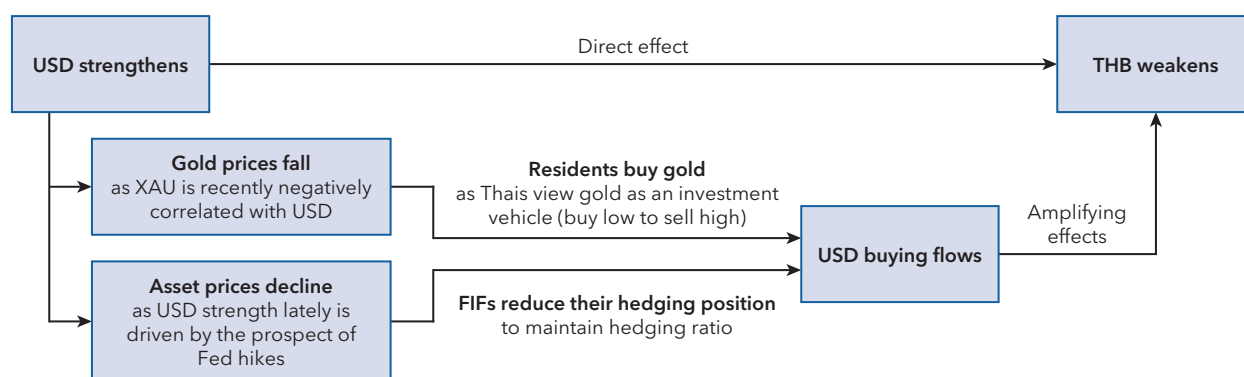
been driven by US monetary policy tightening. Although the pass-through appears lower for ASEAN-4 than other emerging markets, there is still strong evidence of higher pass-through when inflation is higher in these countries.

While it is difficult to pinpoint the inflection point at which the risk of de-anchoring increases substantially, existing studies do find significant threshold effects associated with exchange rate shocks. In particular, Caselli and Roitman (2019) find that the rate of exchange rate pass-through becomes nonlinear when the exchange rate depreciates by more than 24 percent in a sample of emerging markets. Indonesia had episodes of similarly large exchange rate depreciations since 2000: 2000-01, 2008-09, and 2013-14. During all three episodes, inflation increased markedly, and the exchange rate depreciated by about 27 to 64 percent, and during two out of the three episodes (2000-01 and 2008-09), there were indications of higher risk of inflation expectations getting de-anchored. In particular, the

dispersion of market inflation forecasts increased significantly in 2000-01. There was a smaller dispersion of market forecasts in 2008-09, but long-term inflation expectations (two-year-ahead consensus forecasts) deviated from Bank Indonesia's inflation target band. The experience during these historical episodes suggests that price stability risks may indeed be pertinent under large but plausible exchange rate shocks.

ASEAN-4 countries also exhibit a *high degree of dollarization in trade*. A large share of trade invoicing is done in US dollars (ranging from around 75 percent in Thailand to about 90 percent in Indonesia), implying significant dominant currency pricing. While dominant currency pricing on its own does not justify the use of FXIs, it can weaken the macroeconomic stabilization role of exchange rate flexibility. For instance, if external shocks put depreciation pressures on the local currency, exporters might not be inclined to sell FX, while the demand for FX from importers rises, which could further amplify the shock. In this pricing paradigm, in response to fundamental shocks, exchange rate flexibility may have to be greater to achieve the same macroeconomic stabilization.

Finally, the authorities noted that *idiosyncratic factors could amplify the impact of external shocks*. In Thailand, a large share of nonresidents in the FX market may expose the country to reversal of capital flows, particularly portfolio flows during risk-off shocks. Nonresidents may also be price-setters in the FX market if their market shares and trade executions are much larger than residents. Further, as in Thailand, certain resident activities such as prevalence of gold trading and increased investment in foreign investment funds may also contribute to higher exchange rate volatility (Figure 13). These structural characteristics would be difficult to capture in standard IPF models.

**Figure 13. Thailand: Illustration of Resident Activities Amplifying Exchange Rate Volatility**

Source: Bank of Thailand.

Note: FIF = foreign investment fund; THB = Thai baht; USD = US dollar; XAU = spot gold price.

## B. Findings from Model Simulations of Adverse External Shocks and ASEAN-4 Policy Mix in 2022

As part of IPF operationalization in surveillance, ASEAN-4 country teams used the QIPF to quantify policy trade-offs under a risk-off shock. These pilot exercises were undertaken over 2022-23. The pilots focused on assessing the appropriate policy mix under an adverse scenario. While the exact scenario varied depending on the conjuncture at the time of the respective Article IV consultations, they all had combination of fundamental and nonfundamental shocks with the following elements: a large supply shock (predominantly from Russia's war in Ukraine and rising commodity prices), an abrupt contractionary monetary policy in advanced economies resulting in capital outflows, and an associated risk-off shock (see Table 2 for the scenario description).

Overall, the application of IPF framework to ASEAN-4 highlighted that monetary policy should be the first line of defense against persistent inflationary pressures, and the exchange rate should remain flexible and act as a shock absorber following fundamental shocks. However, in response to large and nonfundamental shocks that results in abrupt spikes in UIP premiums resulting in inefficiently tight financial conditions that could hurt growth or risk de-anchoring inflation expectations (that is use case C), a coordinated use of monetary, FXI, and fiscal policies improves trade-offs between price, financial, and output stability. The use of FXIs in response to nonfundamental risk-off shock improves the functioning of the FX market, alleviating financial stability risks, and limits inflationary pressures due to the depreciation helping monetary policy to keep inflation expectations anchored. Consequently, monetary policy gains additional space to maintain a looser stance compared with the scenario without FXIs, which improves output-inflation trade-offs (Figure 14). The less tight monetary policy also prevents a further rise in debt at risk in the corporate sector, mitigating financial stability risks. Nonetheless, if the depreciation is relatively small and short-lived, the gains from the use of FXI may be limited and the cost of FXI may exceed its benefits.

From IMF country teams' perspective, in addition to the challenges in identifying and measuring IPF frictions (see section titled "Key Integrated Policy Framework Principles and Guidance"), it was difficult to ascertain the impact of FXIs in ASEAN-4 economies due to the lack of official FXIs data. The model's estimate of FXI effectiveness is aligned with that of Blanchard and others (2015) for a sample of emerging markets, which shows that a 1 percent of GDP FXI leads to about 1 percent movement in the exchange rate on average. It should also be noted that large uncertainties surround those estimates, making it difficult to draw firm conclusions, given the unavailability of historical FXI data. In addition, the authorities (for example, Bank

**Table 2. ASEAN-4 IPF Operationalization (Adverse Scenarios, Frictions, and Key Takeaways)**

Country	Scenario	Assessment of Frictions	Key Takeaways
Indonesia (2023)	Global supply shocks lead to higher inflation than in the baseline and prompt central banks in major advanced economies to hike policy rates further, triggering a tightening of global financial conditions and an abrupt repricing of risky assets. In addition, a non-fundamental "risk-off" shock leads to sizable capital outflows from emerging markets. This is modeled as roughly one standard deviation shock to Indonesia's UIP premium, which has an amplifying effect on the exchange rate, due to Indonesia's shallow FX markets.	Indonesia does not appear to face significant frictions related to unhedged FX balance sheet exposures and has well-anchored inflation expectations. However, Indonesia's FX market remains shallow, despite recent progress in market deepening. In addition, large changes in exchange rate, which may arise due to very large shocks, could have nonlinear effect on inflation risking to de-anchor inflation expectations.	The use of FXI as part of a policy package in response to the nonfundamental risk-off shock limits the excessive exchange rate depreciation (in the context of shallow FX markets) and associated pass through to inflation, and allows monetary policy to achieve a better trade-off between price stability and output. The smaller increase in interest rates help limit the rise in debt at risk in the corporate sector, which also mitigates financial stability risks. The use of well-targeted and temporary fiscal measures, if fiscal space allows, helps to further reduce the output gap and protect vulnerable households.
Malaysia (2023)	There is a severe and protracted slowdown in China. Growth in the foreign economy, represented by the United States in the model, declines by about 2 percent relative to the steady state, as a sharp decline in imports from a major trading partner causes shortages in industry supplies and consumer goods. This also causes a decline in external demand and a slowdown in Malaysia. Additionally, a shift in market sentiment raises the risk premiums and triggers a risk-off shock, which causes the ringgit to depreciate.	Notwithstanding the steps taken by Bank Negara Malaysia to deepen the FX market, staff estimates suggest that historically Malaysia has exhibited shallowness in its FX market. Inflation expectations remain broadly anchored and exchange rate pass-through is low.	FXI limits the depreciation resulting from a risk-off shock, particularly when the shock is large and results in abrupt spikes in UIP premiums. This reduces the inflationary as well as potential financial stability impact of the shock. Consequently, monetary policy gains additional space to lower the policy rates further and reduce the impact on output. Nonetheless, in this scenario, since depreciation is relatively short-lived, the gains from the use of FXI may be limited and the cost of FXI may exceed its benefits.
Philippines (2022)	Global supply disruptions and elevated commodity prices trigger more persistent price pressures and wage compensation demands that become embedded in inflation expectations (cost-push shocks). This leads to higher inflation and stronger monetary policy tightening by major foreign central banks, contraction in the foreign economy, and capital outflows from emerging markets. In the context of stressed and illiquid financial market conditions, the Philippines is subject to a risk-off shock to the UIP premium and domestic risk premium, which results in a weaker exchange rate and an increase in the long-term rate.	Philippines' banking system has only limited levels of currency mismatch, but further analysis is needed on exposures in nonfinancial corporates. Foreign exchange market is subject to periods of illiquidity reflecting signs of shallowness. While inflation expectations are broadly anchored, exchange rate pass-through can be large and nonlinear.	Monetary policy should be the first line of defense against persistent inflationary pressures, and the exchange rate should remain flexible and act as a shock absorber following fundamental shocks. However, in the context of Philippines' relatively shallow FX market, and under a scenario with sharp and volatile exchange rate depreciation where shocks relate to risk-off or disorderly financial conditions, the use of FXI may alleviate financial stability risks, limit inflation, and reduce some of the pressure on monetary policy—particularly if exchange rate pass-through to inflation is stronger than expected.

**Table 2. (continued)**

Country	Scenario	Assessment of Frictions	Key Takeaways
Thailand (2022)	The prolonged war in Ukraine weighs on global growth and triggers a broad-based risk-off shock. Moreover, a prolonged crisis with elevated commodity prices for long increases inflationary pressures both for Thailand and globally. A tightening of global financial conditions amid a worsened global outlook results in a large increase in global risk aversion generating sizable spillovers (asset market sell offs and a spike in risk premiums resulting in further exchange rate depreciation and possibly disorderly market conditions, adding to already high inflationary pressures).	Thailand has a relatively liquid FX market, with no strong evidence of FX mismatches that poses systemic risk to the broader financial system. However, there is an evidence of time-varying FX market depth with occasional periods of drying up of FX liquidity. Inflation expectations are broadly anchored, and exchange rate pass-through is low. However, pass-through is found to be asymmetric and could respond nonlinearly to large depreciation.	A large nonfundamental risk-off shock causing a sharp depreciation of the exchange rate leads to inefficiently tight financial conditions or disorderly market conditions and further pushes inflation up with risks to de-anchor inflation expectations. Interest rate hikes to bring inflation closer to target would worsen the already large output gap and increase interest rate exposure of vulnerable borrowers. While monetary policy (interest rate hikes) should be the first line of defense, a complementary use of FXI is found to be effective in mitigating the effect of destabilizing premiums on financial stability and in helping moderate inflationary pressures, thus alleviating risks of de-anchoring of inflation expectations. Further, by relieving some of the pressure from monetary policy, the use of FXI also results in a lower output cost.

Source: IMF Article IV Staff Reports for Thailand (IMF 2022b), Philippines (IMF 2023b), Indonesia (IMF 2023c), and Malaysia (IMF 2023d).

Note: ASEAN-4 = Association of Southeast Asian Nations (Indonesia, Malaysia, Philippines, Thailand); FX = foreign exchange; FXI = foreign exchange intervention; UIP = uncovered interest parity.

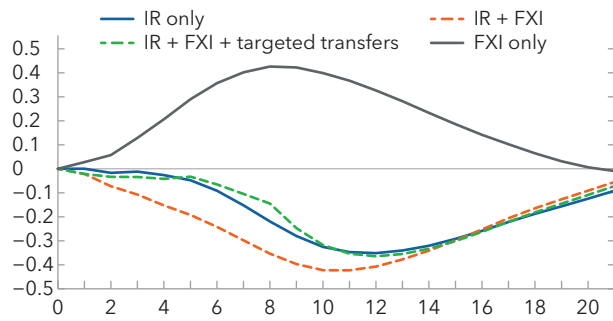
Indonesia) cautioned against using low-frequency data to assess the timing and effectiveness of FXI. In their view, the impact of FXI on the exchange rate tends to be very brief, even instantaneous at the time of FXI within the day.

In addition, the cost of FXI needs to be properly assessed and incorporated in the decision-making framework for identifying policy trade-offs. Use of FXI may have nonnegligible longer-term costs such as impeding financial market development and encouraging excessive buildup of foreign currency debt. Also, using FX sales to support the exchange rate in a risk-off episode may risk large and potentially destabilizing losses of reserves if the risk-off sentiment in the currency market proves more persistent than first anticipated or a large loss of reserves triggers a further repricing of risk premium. Not accounting for these costs may erroneously make FXI appear more effective in minimizing output/inflation trade-offs.

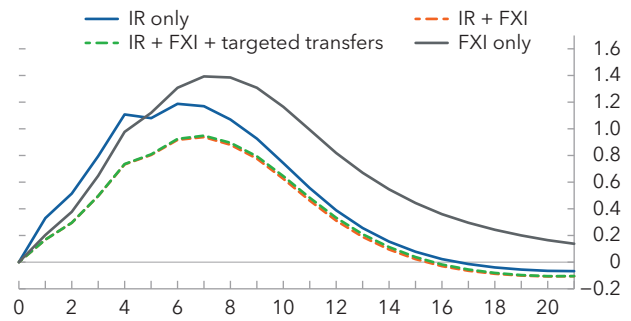
Moreover, ASEAN-4 authorities and IMF country teams agreed that the nature and magnitude of shocks is difficult to assess in real time. The 2022 shocks were multiple and a combination of fundamental and nonfundamental shocks. In these situations, it is not always easy to decompose them and to assess in real time whether they are “large enough” to pose significant risks to central bank objectives. This issue is further compounded by the need to decide on intervention relatively quickly, often within a day, with the actual size of the intervention depending on the severity of the stress episode and market conditions. This could pose

**Figure 14. ASEAN-4: Downside Risk and Policy Scenarios (Percent)**

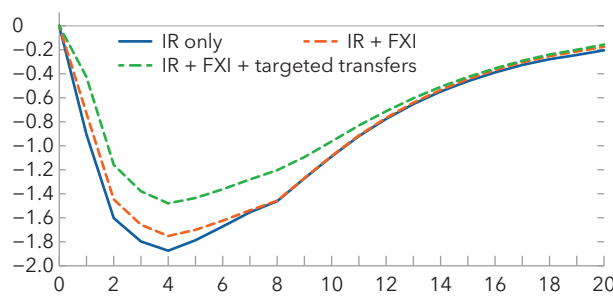
**1. Indonesia: Output Gap**



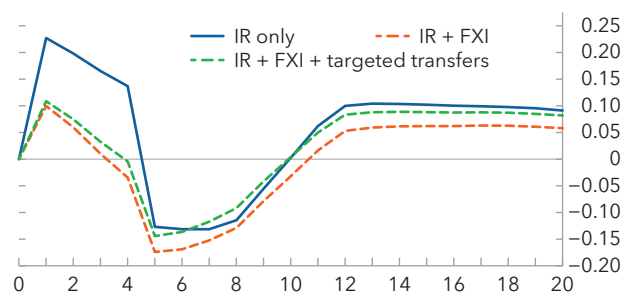
**2. Indonesia: Core Inflation**



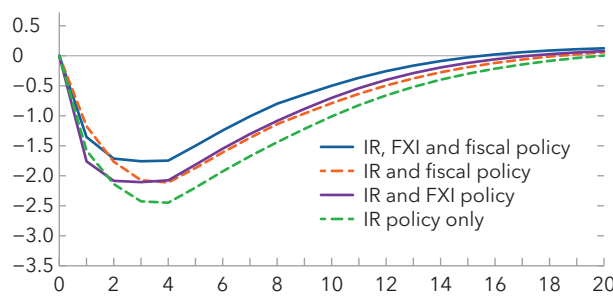
**3. Malaysia: Output Gap**



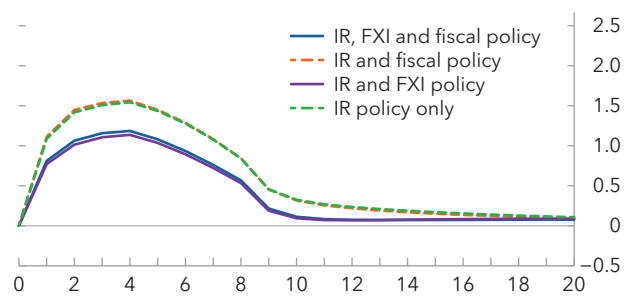
**4. Malaysia: Core Inflation**



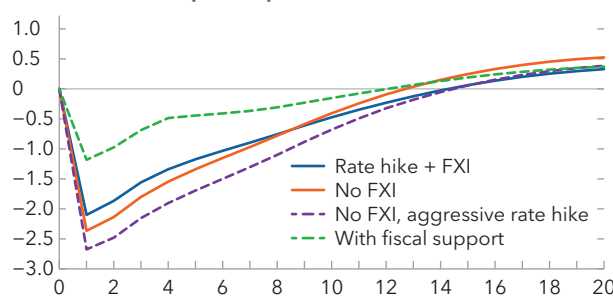
**5. Philippines: Output Gap**



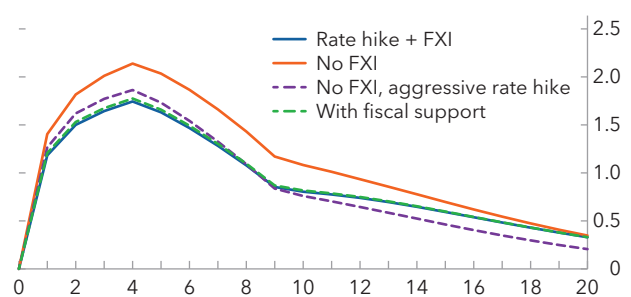
**6. Philippines: Core Inflation**



**7. Thailand: Output Gap**



**8. Thailand: Core Inflation**



Source: IMF staff estimates.

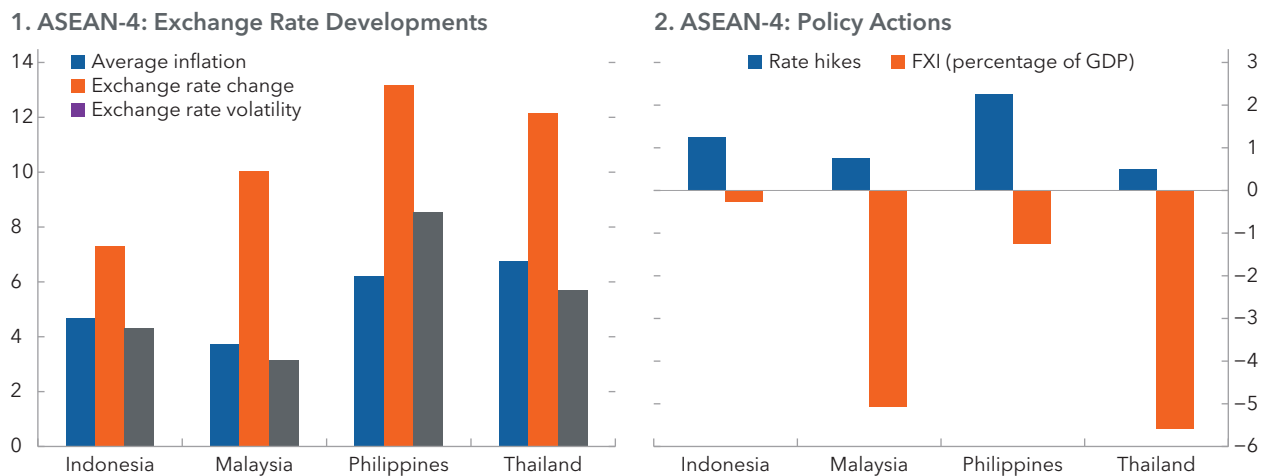
Note: FXI = foreign exchange intervention; IR = interest rate.

a practical challenge for IPF operationalization since identifying the nature of shocks typically takes time. For example, while the war in Ukraine was primarily a supply shock (on top of the prolonged COVID-19 shock), it resulted in higher uncertainty—including about advanced economies’ monetary policy path—and in a risk-off shock for emerging markets.

ASEAN-4 central banks highlighted the operational challenges of integrating multiple policy tools. They pointed to the fact that decisions on the use of each tool (MPMs, monetary policy, FXIs) were made by different central bank departments that do not necessarily coordinate well with each other. The use of multiple policy tools also poses communication challenges for inflation-targeting central banks.

Some of the shocks discussed during the IPF pilots have materialized during 2022. Advanced economies' monetary policy tightening and ensuing uncertainty in response to the commodity price shock in early 2022 resulted in a prolonged period of exchange rate depreciation and high exchange rate volatility in the ASEAN-4 region. The large supply shock also resulted in inflation breaching the central bank targets. Interest rate hikes were used as the first line of defense to bring inflation durably back to central bank targets/forecast. In addition, traditional monetary policy was complemented with FXI to limit the adverse impact of excessive volatility on financial and economic stability as well as preventing de-anchoring of inflation expectations due to sharp movements in exchange rate (Figure 15).

**Figure 15. ASEAN-4: Coordinated Policy Use During April–October 2022**  
(Percent)



Sources: Adler and others (2021); Bloomberg L.P.; and Haver Analytics.

Note: ASEAN-4 = Association of Southeast Asian Nations (Indonesia, Malaysia, Philippines, Thailand); FXI = foreign exchange intervention.

However, data on specific FXIs would be needed to assess how actual FXI aligned with periods of market dysfunction in 2022 as risk premiums were not elevated for all four countries throughout the entire period. In line with the pilot recommendations, FXI would likely be justified in such periods of nonfundamental risk-off shocks when FX markets are or turn shallow, and market sentiment is vulnerable—marked by high exchange rate volatility including periods of significantly high bid-ask spreads and heightened risk of market dysfunction as captured by elevated measures of risk premiums.<sup>9</sup> Indeed, FX markets are found to be shallow (or occasionally shallow with time-varying depth) in ASEAN-4 economies. Further, as noted earlier, large shocks can have the potential of destabilizing otherwise relatively well-anchored inflation expectations in the region.

ASEAN-4 central banks highlight that while relying on FXI to limit propagation of risks due to occasionally shallow FX markets or to address disorderly market conditions, they don't have a volatility threshold above which interventions are undertaken. Instead, FXIs are deployed when exchange rate movements are deemed inconsistent with historical patterns of regular market functioning and could risk drying liquidity in the FX market, lead to herd behavior in the market, or give rise to disorderly market conditions. Key metrics that ASEAN-4 central banks use to determine whether to intervene in the FX market include FX market

<sup>9</sup> IMF's disorderly market conditions monitor showed signs of disorderly market conditions in FX markets of ASEAN-4 countries during April to October 2022.



volatility, bid-ask spreads, as well as FX market turnover to gauge liquidity in the FX market. FX volatility is measured using varying concepts (one-month at-the-money implied volatility, exponentially weighted moving average daily volatility, and excessive volatility against a model-determined equilibrium exchange rate).

The authorities noted that the decision to intervene can be taken both *ex post*, after observing signs of market dislocations, and also preemptively to avoid disorderly market conditions. In case of heightened risk of herd behavior of participants such as a rush to hedge, as measured by exporters' and importers' forward transactions, the authorities may use FXIs preemptively to prevent self-fulfilling panic executions that could exacerbate market volatility and give rise to disorderly market conditions. In such cases, where risks of market dysfunction are deemed to be elevated (including based on market participant's behavior), they noted that central banks find it prudent to act promptly rather than waiting for the risk to materialize.

In this regard, the IPF provides the following guidance:

- If there is clear evidence of an elevated risk of market dysfunction, indicated by sharply increased UIP/covered interest parity premiums or bid-ask spreads, there may be a case for FXI under the IPF. These premiums are the first step of the transmission of the shock into macroeconomic variables, so addressing them today is a proactive and forward-looking way of preventing macroeconomic destabilization later on.
- If, however, there is an exchange rate depreciation today without clear evidence of market dysfunction, which may or may not be correlated with higher premiums later on, there would not be a case for FXI under the IPF until the evidence of destabilized premiums emerges.

## 5. Conclusions

As regular users of multiple policy tools to attain their (also multiple) policy objectives, ASEAN-4 authorities appreciate the evolution of IMF's thinking on navigating external shocks and volatile capital flows embodied in the IPF. The ASEAN-4 model-based IPF pilots proved useful in illustrating policy trade-offs in a downside scenario and assisting in the operationalization of the IPF. The authorities' familiarity with the models, in particular the QIPF supported by IMF capacity development, greatly facilitated structured policy discussions in the context of Article IV surveillance, both at the technical and senior policymaker level. The pilots have also been the start of a dynamic engagement with the ASEAN-4 authorities, supported by model enhancements based on the authorities' feedback and continued capacity development. For example, the 2023 Article IV consultation to the Philippines used an expanded QIPF model featuring a more realistic baseline forecast, with a somewhat differentiated transmission of external shocks to the domestic economy compared with the nonaugmented QIPF model (Annex 4).

The application of the IPF framework to ASEAN-4 reaffirmed the importance of using monetary policy to address persistent inflationary pressures stemming from fundamental shocks and allowing the exchange rate flexibility to act as a shock absorber. However, a complementary use of FXI could improve trade-offs between price, financial, and output stability when economies are faced with large and nonfundamental shocks that results in abrupt spikes in UIP premiums resulting in inefficiently tight financial conditions that could hurt growth or risk to de-anchor inflation expectations.

Nevertheless, the IPF pilots also highlighted some challenges faced by country teams when operationalizing IPF principles, notably regarding the assessment of frictions and shocks that might justify the use of FXI.

Country teams at times lacked sufficient information to adequately assess the extent of frictions. The lack of official FXI data makes assessment of the FX market depth particularly challenging given the impact of the FXI on market indicators used to measure FX market depth. Additionally, in the absence of granular data about the magnitude of unhedged FX balance sheet exposures, it is difficult to accurately assess the presence of FX mismatches that could amplify the impact of risk-off shocks. Moreover, the time-varying nature of IPF frictions and the nonlinear effects of shocks make it difficult to assess situations when benefits of a complementary use of FXI would outweigh its costs.

Therefore, an important lesson from IPF pilots is that more work is needed to assess potential nonlinearities in the data and their effects. While during normal times, FX markets could be deep and inflation expectations well anchored in ASEAN-4, an elevated exchange rate volatility or a very large exchange rate depreciation could turn FX markets shallow and/or de-anchor inflation expectations. While assessing these thresholds is notoriously difficult, the absence of high-frequency data on FXI makes it even harder. Future work would also help to identify the circumstances in which FXI is not desirable because the nonlinearities are not salient.

The IPF pilots also illustrated that further customizing quantitative models to reflect specific country's features can improve the assessment of policy trade-offs. However, broader IPF principles beyond quantitative model results should guide staff's assessment of a suitable policy mix.

# Annex 1. Key Takeaways from the Bank Indonesia-Bank of Thailand High-Level Policy Dialogue on Frameworks for Integrated Policy: Experiences and the Way Forward

(Jakarta, Indonesia, August 22, 2023)

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This high-level policy dialogue offered an avenue to take stock, discuss, and exchange experiences among practitioners and researchers in order to identify useful lessons and remaining gaps in policy frameworks guiding the use of multiple tools to deal with multiple shocks. The event also served to facilitate the ongoing dialogue between ASEAN policymakers and the IMF and the Bank for International Settlements, providing insights and inputs that could usefully shape ongoing analytical work that will help guide policymakers on how to best operationalize policy frameworks and adapt them to the rapidly changing economic context and nature of risks going forward. Governors Perry (Bank Indonesia) and Suthiwartnarueput (Bank of Thailand) and Deputy Governor Francis Dakila (Bangko Sentral ng Pilipinas) participated in the first panel on “Frameworks for Integrated Policy: Experiences and Expectations.” IMF Economic Counselor Pierre-Olivier Gourinchas, Assistant Governor Piti Disyatat (Bank of Thailand), Claudio Borio (Bank for International Settlements), and Executive Director Firmin Mokhtar (Bank Indonesia) participated in the second panel, “Operationalization of Frameworks for Integrated Policy.”

While in normal times inflation-targeting central banks do not need multiple policy tools, the governors emphasized that the IPF was particularly suited for Asian emerging markets as small open economies particularly vulnerable to sudden and large swings in capital flows with high exchange rate volatility that could lead to market dysfunction. Having an integrated framework for thinking about the trade-offs involved in using different tools to achieve different objectives was seen as useful in relieving the burden on monetary policy. They emphasized time-varying market depth, nonlinear exchange rate pass-through with risks of de-anchoring inflation expectations as reasons for using FXI to smooth excessive exchange rate volatility, while noting that interventions were two-sided and that the exchange rate path was still allowed to reflect fundamentals. They saw the ability of having an open and constructive dialogue about when it could be appropriate to use other instruments than monetary policy as a positive development. Key operationalization challenges in their views were as follows:

- There are communication challenges in explaining the consistency of using multiple policy tools with the inflation-targeting regime. Having an explicit integrated policy framework might help alleviate those challenges.
- There are still gaps in the models, and judgment will still be needed: there is no “cookbook approach”—country-specific circumstances still need to be factored in and the framework needs to be applied in a flexible manner.
- More guidance on FXI would be helpful: there are well-established policy tools (Taylor rules, etc.) for monetary policy, but not for FXIs.

The second panel focused on practical considerations for operationalizing integrated policy framework, often echoing the points made by governors in the first panel (for example, on implementation lags and communication and coordination challenges).

- The IMF's interventions laid out the evolution in the institutional thinking about how to systematically integrate nontraditional policy tools in an upgrade from the traditional Mundell-Fleming model considering three financial frictions (shallow FX markets, currency mismatches, high exchange rate pass-through that might threaten to de-anchor inflation expectations). It also noted that if frictions were small, or if there would be large effects of the policy interventions (for example, depletion of foreign reserves), the use of tools other than standard monetary or fiscal policy would remain suboptimal. They emphasized the challenges in assessing the nature, size, and duration of shocks in real time and of measuring frictions. Some frictions suggest some instruments are better than others depending on the shock. FXIs in IPF pilots have been shown to be better for risk-off shocks. One also needs to take into account interactions of policy tools: FXIs can help avoid de-anchor inflation expectations if they are used judiciously alongside monetary policy. If frictions are not large, then the traditional policy mix would be optimal.
- The IMF intervention also described the IMF's forward-looking agenda in terms of operationalizing the IPF, including work on the use of the macroprudential policy toolkit in the IPF context, adding specific considerations for low-income countries to the IPF framework, continuing to refine the IPF quantitative model, conducting analytical work on robust policies and diagnosing shocks, and continuing support of IPF applications in the coming year, with targeted capacity development and its integration in surveillance.
- The Bank for International Settlements representative noted that, in an environment where it is difficult to assess the size and nature of shocks in real time, preventive policies were important. These include prudent macroeconomic policies allowing for adequate buffers and strong frameworks to maintain macro-financial stability, including adequate deployment of macroprudential policies.
- Bank Indonesia and Bank of Thailand representatives reemphasized the importance of using judgment and knowledge of country-specific circumstances. They noted that the Monetary Policy Committee played an important role in integrating the views and advice from different central bank departments (macroprudential, FX markets, etc.), but that operationalizing an integrated policy framework remained challenging in practice.

## Annex 2. Key Takeaways from Singapore Training Institute Technical Workshop on Quantitative Models for Macrofinancial Policy Analysis: The Experience of ASEAN-4

The IMF (Singapore Training Institute) hosted a regional technical workshop on the use of quantitative models for macro-financial policy analysis for ASEAN-4 countries, jointly organized by the Asia and Pacific Department, the Institute for Capacity Development, and the Monetary and Capital Markets Department. The workshop provided a forum for the IMF to discuss its ongoing pilots on operationalization of the IPF, to hear from the ASEAN-4 central bankers on their own policy frameworks, and to exchange views on the use of quantitative models for policymaking. Key takeaways from the workshop are the following:

- ASEAN-4 central banks are frequent users of multiple instruments to achieve their multiple objectives; however, gaps remain in their quantitative frameworks to guide an integrated policy mix. They currently rely on one or more semi-structural core models with multiple satellite models to integrate various macro-financial channels and policy instruments. The workshop provided an opportunity for peer learning, wherein central bank participants exchanged views on empirical and modeling framework for key policy instruments—most notably monetary policy, MPMs, and FXIs. IMF staff noted that a micro-founded structural general equilibrium model is best suited to look at the interactions between various frictions, policies, and transmission channels in a consistent way. The central bank participants recognized that their frameworks were not always fully internally consistent, especially among the short-term interventions (for example, FXIs) led by central bank operations departments and semi-structural macro frameworks of the policy departments. In that regard, they appreciated the IMF's work on IPF pilots and related capacity development efforts.
- The ASEAN-4 central bank participants welcomed IMF's work on designing IPF principles for the use of FXI. While IMF principles for the use of MPMs and CFMs are well documented, operational guidance on use of FXIs (outside of disorderly market conditions) was still missing. The central bank participants noted that FXI decisions, which are often made at a higher frequency (for example, daily), come under the purview of FX operations teams and not the team supporting macrofinancial policy advice using quarterly models to senior management. Hence, having guiding principles for the use of FXIs would help ensure consistency between high-frequency FXI decision making and lower-frequency macrofinancial modeling in quarterly quantitative frameworks in the ASEAN-4 central banks.
- Further engagement at the surveillance, policy, and capacity development level is expected to facilitate operationalization of the IPF in the ASEAN countries and at the IMF. The initial pilots in the ASEAN-4 pilots focused on using the QIPF model in downside scenarios covered in the Article IV consultations. However, there was a consensus on the need to use models capable of assessing the use of IPF tools in realistic scenarios in the context of Article IV discussions and capacity development provision as the central bank modeling teams need to provide guidance to senior management on the policy trade-offs involved in the current uncertain economic outlook. Thus, they welcomed the latest version of the QIPF model and evaluation of different policy combinations in response to current forecasts as a way forward. The transition to using QIPF-type dynamic stochastic general equilibrium models was seen as a gradual process with IMF

capacity development playing an important role (Indonesia, Malaysia, Thailand). They saw IPF-consistent semi-structural models like the QPM presented by the Institute for Capacity Development as a possible complementary approach (the Philippines).

## Annex 3. Experience from Capacity Development on the Use of the Extended Multipolicy Quarterly Projection Model in the Philippines<sup>10</sup>

The Philippine authorities have continued to improve the application of macroeconomic models in policy analysis. As part of its forecasting and policy analysis system, the Bangko Sentral ng Pilipinas originally employed a multi-equation econometric model as its core medium-term forecasting model. This supported the remarkable disinflation process in the Philippines in the 2000s. However, some of the model's underlying assumptions, including that of a constant future interest rate, made it unsuitable as a guide for incorporating changes in the stance of monetary policy, as was necessary during the volatile post-global financial crisis period. At the request of the Bangko Sentral ng Pilipinas, the Institute for Capacity Development began a technical assistance project in April 2022 to modernize the Bangko Sentral ng Pilipinas' forecasting and policy analysis system with a semi-structural QPM at its core. The Bangko Sentral ng Pilipinas' new QPM is designed to provide forward-looking baseline and risk scenario projections with endogenous monetary policy (Dakila and others 2024). The QPM has also been extended to incorporate fiscal policy and macro-financial linkages, as well as additional policy tools such as FXIs and CFMs.

Developing and fully operationalizing the QPM was a major milestone for the Bangko Sentral ng Pilipinas. By incorporating a wider range of channels and mechanisms, the QPM has enhanced policymakers' ability to evaluate, in real time and on an ongoing basis, the potential impact of policy decisions across different policy domains. Senior Bangko Sentral ng Pilipinas managers and policymakers, concerned about the impact of shocks on the growth and inflation outlook, have found the model extensions useful as they navigate a complex macro-financial landscape which requires integrated thinking about trade-offs between different policy tools. Extensions that have explicitly incorporated macroprudential policy should support enhanced coordination among monetary, financial supervision, and macroprudential policymakers.

The Bangko Sentral ng Pilipinas' new QPM and the extended QIPF provide complementary inputs into the central bank's monetary policy decisions. The rich theoretical structure of the QIPF model helps the Bangko Sentral ng Pilipinas to step back from the quarter-to-quarter fray to consider the merits of different policy regimes. It has also helped incorporate in the QPM the key lessons and mechanisms of the IMF's IPF. Meanwhile, the relatively simple semistructural QPM, calibrated to the Filipino economy by drawing on the data and the experience of Bangko Sentral ng Pilipinas staff, lends itself to the development of baseline projections and alternative scenarios for regular policymaking rounds. The Bangko Sentral ng Pilipinas staff have found it useful, and reassuring, to be able to check the consistency of the two models, notably with respect to the FXI and monetary policy shocks that feature in the IPF.

The Asia and Pacific Department country team is using a model along the lines of the Bangko Sentral ng Pilipinas' QPM for its policy discussions with the authorities, also with the support of ICD (IMF 2023e). This analytical foundation has facilitated a common understanding about how the interplay of economic assumptions, shocks, and policies drives the forecasts. This, in turn, has greatly enriched the discussion of baseline projections and risks.

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<sup>10</sup> Prepared by Philippe Karam (Institute for Capacity Development).

## Annex 4. Extending the QIPF Model: The Case of the Philippines<sup>11</sup>

The IPF model (gap model) first discussed with Philippine authorities during the 2022 Article IV consultation was an estimated linearized variant of Adrian and others (2021). As discussed at length in the companion Selected Issues paper (IMF 2022c), the model featured financial intermediation frictions à la Gabaix and Maggiori (2015), a balance sheet channel to capture capital flow and exchange rate pressures, along with an indexation mechanism to proxy for imperfect monetary policy credibility.

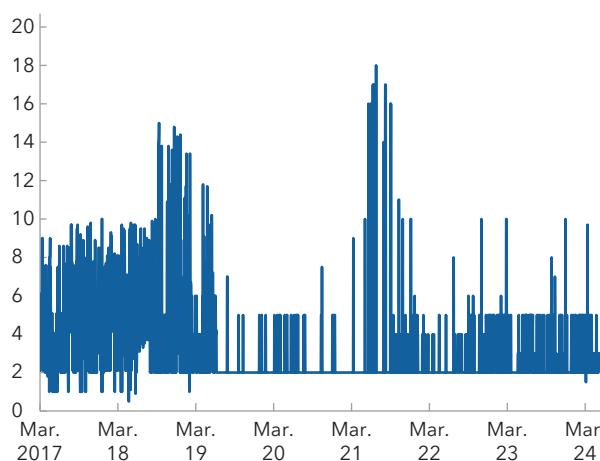
The model was further expanded to include a supply side (with an estimated wage block). The extension was important because it meant that the model could endogenously account for growth and that it could be used to generate baseline forecasts for the Philippine economy. This updated QIPF model was used during the 2023 staff visit to analyze the potential implications of changes in minimum wage regulations debated by Congress at the time. The results of the simulations were discussed with the authorities and compared to those from a calibrated QPM-style model. The ensuing discussion focused on the negative response of domestic demand to the persistent positive wage markup shock underlying the scenario, which appeared counterintuitive. The decline in domestic demand was linked to the absence of liquidity-constrained households with a high marginal propensity to consume, with the latter arguably relevant in the Philippines given the thick left tails of the income distribution.

These considerations on how to enhance the realism of the baseline forecast led to further model development. An extended version of the model now allows for, and estimates, the share of liquidity constrained consumers, adding commodity prices and a richer fiscal side, and allowing FX market depth to follow a Markov process, consistent with the empirical evidence in Annex Figure 4.1. The analysis of the Markov switching model highlighted the benefits of estimation and the importance of allowing the coefficients of the central bank's intervention rule to be state-dependent, with more aggressive interventions associated with periods of lower liquidity in FX markets.

The fruitful dialogue with the authorities highlights many potential dimensions along which the new estimated QIPF model could be applied. It, however, also calls for further exploring the question of the impact of the model changes on the transmission of key IPF disturbances, such as the risk appetite shock depicted in Annex Figure 4.1.

Annex Figure 4.2 shows that the risk-appetite shock transmits similarly in the model extended with a supply side, but that transmission differs more notably in the variant with liquidity-constrained households. These differences should be taken into account and judgment applied in formulating policy recommendations.

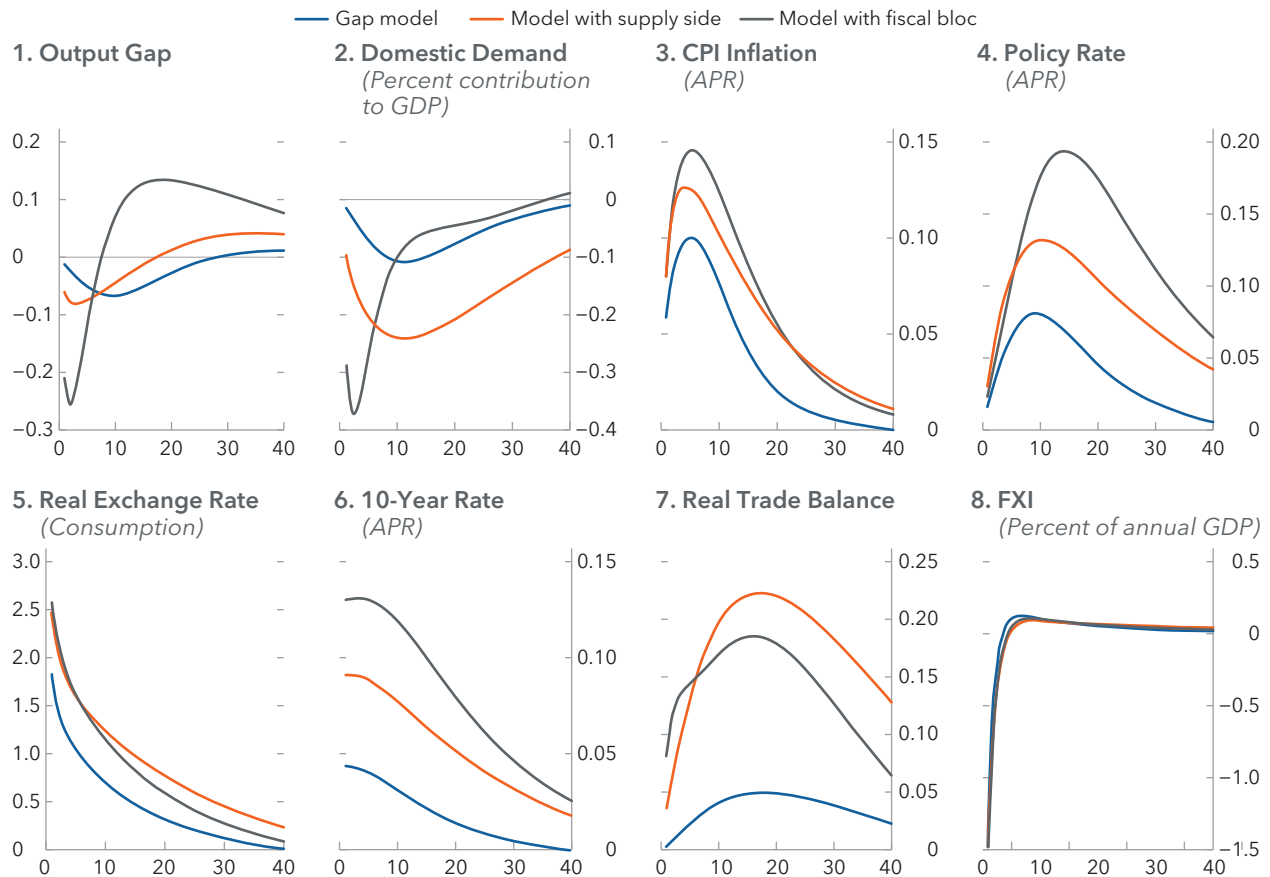
**Annex Figure 4.1. Philippines: Bid-Ask Spread, Spot Rates**  
(Basis points, calculated as ask minus bid)



Sources: Bloomberg L.P.; Refinitiv; and IMF staff estimates.

<sup>11</sup> Prepared by Pawel Zabczyk (Monetary and Capital Markets Department).



**Annex Figure 4.2. Impact of a Risk-Appetite Shock in Different Vintages of the Philippines QIPF Model**

Source: IMF staff estimates.

Note: APR = annual percentage rate; CPI = consumer price index; FXI = foreign exchange intervention.

It is worth noting that the policy rules currently built into the QIPF model are meant to be descriptively realistic, that is, capture how policymakers have typically responded in the past. Since many of the corresponding interventions predated the development of the IPF, these rules may not always exactly align with current IPF recommendations. Exploring how various policy tools should be used in an integrated fashion—which is one of the IPF's stated goals—requires additional analysis and judgment, which could, in principle, be based on the assessment of shocks and frictions implied by the estimated model.

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