



HOW TO

NOTES

How to Operationalize an Exchange Rate Peg

Kazuhiro Hiraki and Meryem Rhouzlane

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How to Operationalize an Exchange Rate Peg

Kazuhiro Hiraki and Meryem Rhouzlane
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Abstract:

A key objective of exchange rate pegs is to achieve price stability by stabilizing the value of the currency. However, the effectiveness of an exchange rate peg as a nominal anchor crucially depends on its operational design. This note provides guidance on how to effectively implement different exchange rate peg arrangements—such as bilateral exchange rate pegs, pegs to a basket of currencies, crawling pegs, and currency bands. It specifically focuses on operational considerations to ensure long-term price stability, such as choosing an appropriate anchor currency, setting the rate of crawl, and designing bands. It also discusses how to conduct monetary and foreign exchange operations consistent with the chosen exchange rate peg arrangement.

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Abbreviations

AREAER	Annual Report on Exchange Arrangements and Exchange Restrictions
CFMs	capital flow management measures
CIP	covered interest rate parity
DN	Danmarks Nationalbank
ECB	European Central Bank
ERM	European Exchange Rate Mechanism
FX	foreign exchange
FXI	foreign exchange intervention
HK\$	Hong Kong dollar
HKMA	Hong Kong Monetary Authority
MPMs	macroprudential measures
OMOs	open market operations
UIP	uncovered interest rate parity

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Introduction

This note provides guidance for the operationalization of exchange rate peg arrangements. Because the objective of an exchange rate peg is to provide a nominal anchor, its operations should be calibrated to maintain the value of the currency in nominal terms—typically against a major reserve currency, but alternatively against a basket of currencies or a commodity such as gold. Given that price stability is often a paramount objective of pegged regimes, the note specifically focuses on arrangements that are also likely to perform well in ensuring long-run price stability. It provides guidance for the operationalization of bilateral exchange rate pegs, pegs to a basket of currencies, crawling pegs, and bands, with central bank practitioners and IMF country teams as key intended audience. On the other hand, the choice of the exchange rate regime itself is outside the scope of this note, that is, the note assumes that the authorities have already assessed the optimal exchange rate regime and have concluded that the exchange rate is the optimal nominal anchor.¹

The first section discusses fixed-parity exchange rate pegs where the monetary authorities fix the value of the currency vis-à-vis a single anchor currency or a basket of currencies. For conventional single anchor currency regimes, the note discusses key considerations for selecting an appropriate anchor currency, including convertibility and a track record of low inflation. For basket peg arrangements, a variant in which the value of the domestic currency is fixed to a weighted average of multiple bilateral exchange rates, it notes that these may be beneficial for economies with diversified international linkages, though these benefits need to be weighed against the disadvantage of reduced simplicity and transparency. Finally, it addresses arrangements where the exchange rate is fixed against the price of a commodity (for example, gold or oil), concluding that commodity pegs are generally not advisable.

The second section discusses crawling pegs and provides guidance on how to operationalize these in a way that is consistent with the objective of providing a nominal anchor. Compared with fixed-parity regimes, crawling pegs allow for the gradual adjustment of the exchange rate of the domestic currency vis-à-vis another currency or a currency basket. A crawling peg may be preferred to a fixed exchange rate peg under some circumstances, for example, to facilitate the transition to lower inflation or to allow for a persistent inflation differential with the anchor currency. However, crawling pegs can jeopardize price stability and macroeconomic welfare if they are not well specified. Specifically, some countries use a crawling peg to stabilize the real exchange rate—by setting the rate of crawl to the inflation differential between the home and foreign countries. Such an approach is not well grounded conceptually and often results in poor inflation performance in practice.

The third section discusses bands, within which the exchange rate is allowed to fluctuate. Having a band around the central exchange rate target provides some limited degree of monetary policy autonomy and allows the exchange rate to play some role as a shock absorber. In addition, it can reduce the need for foreign exchange intervention (FXI) and its associated costs. However, too wide a band will weaken the role of the exchange rate as the nominal anchor, so the appropriate design of any bands is critical.

The last section discusses how to conduct monetary and foreign exchange (FX) operations consistent with the exchange rate peg arrangement. It explains that domestic interest rates should closely track the equilibrium interest rate level that is consistent with the fixed or crawling exchange rate, and how this could be achieved. It also discusses the importance of coordination between the exchange rate policy and other macroeconomic policies.

¹ See Casiraghi, Habermeier, and Harjes (2020) for a discussion of considerations on the choice of an exchange rate regime.

Fixed-Parity Exchange Rate Arrangements

Choice of Anchor Currency

Monetary and exchange rate policy frameworks should always establish a clear nominal anchor. A nominal anchor is a variable policymakers use to pin down the price level. Lack of a credible nominal anchor could lead to unchecked inflation and cause macroeconomic and financial instability. A common way to establish a nominal anchor is employing a fixed exchange rate arrangement (a “peg”). In its most basic form, this entails that the monetary authority commits to maintaining the exchange rate at a predetermined level or within a specified range (a “band”) vis-à-vis another currency—the “anchor” currency. By doing so, the monetary authority effectively surrenders its own policy autonomy to “borrow” the monetary policy credibility of the anchor currency. While a growing number of economies have transitioned to inflation-targeting frameworks in recent decades—where the inflation target serves as an anchor and the exchange rate is typically allowed to float freely—many economies employ the exchange rate as the nominal anchor.

Operationally, the exchange rate functions as a nominal anchor through several channels. First, it contributes to stabilizing tradable goods prices, which is particularly relevant to small open economies. Second, the commitment to maintaining the exchange rate parity helps anchor inflation expectations by providing a stable and predictable reference for price and wage setting. Third, maintaining the peg requires discipline in macroeconomic policies, including not only monetary (interest rate) policy but also fiscal and financial sector policies, among others.

This subsection discusses how a country that employs a single-currency exchange rate peg should choose an anchor currency. A suitable anchor currency should generally have several desirable attributes that maximize the advantages and minimize drawbacks of adopting a currency peg arrangement:

- **A strong track record on inflation:** Because the country that pegs its currency “borrows” credibility of the anchor currency to maintain price stability, the anchor currency country should possess a long track record of maintaining low and stable inflation with continued prospects to do so. Notwithstanding short-lived inflation surges after the pandemic, most major convertible currencies (for example, US dollar and euro) are suitable candidates in this respect.
- **High convertibility:** To credibly keep the currency peg, the authorities of the pegging country may need to intervene in FX markets using their international reserves. To facilitate this, the anchor currency should be a liquidly traded asset with relatively low volatility. Such conditions also contribute to the relative stability and dependability of the anchor currency. Therefore, an effective anchor currency for a fixed exchange rate arrangement must be a convertible currency that allows for free and low-cost trading in both domestic and global FX markets.
- **Major invoicing currency:** Sizable exchange rate fluctuations are not desirable from the price stability perspective, particularly for countries that highly depend on imported goods because of a significant exchange rate pass-through to domestic prices. In addition, a stable exchange rate is favorable for reducing transaction costs and enhancing the competitiveness of tradable goods sector. Since it is the invoicing currency—and not necessarily the currencies of trading partners—that is mainly relevant to exchange rate pass-through and transaction costs, such considerations tend to favor key invoicing currencies, in particular the US dollar. Recent literature notes that dominant currency pricing is widespread, with the US dollar in particular being used for trade invoicing, even in transactions between non-US countries (see, for example, Goldberg and Tille 2008; Gopinath 2015). In addition, the US

dollar typically matters the most for commodity-exporting countries because of its widespread usage in commodity trading.

- **Strong financial linkages:** When foreign currency-denominated debt and currency mismatches are substantial, currency depreciations can lead to adverse balance sheet effects which may be detrimental to the stability of exchange rate and domestic prices. Pegging to the primary currency denomination of foreign debt can mitigate this risk. The literature highlights the significant role of the US dollar, as US dollar-denominated debt is predominant in international debt markets (see He, Krishnamurthy, and Milbradt 2019; Maggiori, Neiman, and Schreger 2020). In addition, studies indicate the mutually reinforcing effects between the dominant trade currency and the dominant financial currency (see Gopinath and Stein 2021). However, as a fixed exchange rate may further incentivize the accumulation of FX liabilities, abandoning the peg (whether voluntary or forced) in the future may become very costly.
- **Synchronization of business cycles:** Because adopting a fixed exchange rate arrangement leads to the loss of the monetary autonomy and effectively imports the policy settings of the anchor economy, it is in principle desirable (though not always feasible) to choose an anchor currency whose economy faces similar shocks (see, for example, Mundell 1961; Alesina, Barro, and Tenreyro 2002). This attribute may partly overlap with the preceding two conditions since stronger trade and financial linkages may result in more synchronizations of business cycles.

Because of its high convertibility and dominant role in trade invoicing and financial transactions, the US dollar plays a dominant role as an anchor currency (Ilzetzki, Reinhart, and Rogoff 2019).² Besides the US dollar, the euro is also widely used as an anchor currency by European and African countries.³ Some countries peg their currencies to their large neighbor country with strong trade and economic linkages. For example, Kiribati, Nauru, and Tuvalu peg their currencies to the Australian dollar, and Eswatini, Lesotho, and Namibia peg their currencies to the South African Rand.

The choice of an anchor currency requires careful analysis of all relevant factors. It is often the case that no single currency satisfies all the attributes discussed earlier simultaneously. For instance, a country with imports mainly invoiced in US dollar might come closest to stabilizing import price inflation by pegging to the US dollar. However, such a choice might not perform as well in stabilizing real activity and domestic price inflation as a peg to the euro if its business cycle is more synchronized with the euro area.⁴ Thus, a careful cost-benefit analysis is necessary when choosing an anchor currency, with the consideration that the first two attributes above (that is, track record on inflation and high convertibility) are the most critical to the price stability mandate. Moreover, oftentimes, factors beyond strictly economic rationales, including historical and social ties to the anchor economy and political economy considerations, also matter.

² A more recent study on invoicing currency by Boz and others (2025) points out that the US dollar remains the dominant invoicing currency, although there is a sign of growing polarization in the choice of invoicing currency.

³ According to the IMF's latest Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER) (2024), 81 economies adopt an exchange rate anchor. Among them, 38 countries, mainly oil-exporting countries in the Middle East and small island countries in the Caribbean and the Pacific, peg to the US dollar, whereas 25 countries, mainly smaller European countries and African countries with historical ties, peg to euro.

⁴ In this situation, a highly open economy that wanted to stabilize consumer price inflation might peg to the US dollar (since imports comprise most of its consumption basket), whereas a less open economy with the same preference to stabilize consumer price inflation might peg to the euro (since its consumption bundle is largely comprised of domestically produced goods).

Basket Pegs

A small set of countries chose to peg not to a single anchor currency but to a basket of currencies.⁵ A basket peg may be attractive for economies with diversified international linkages, as it aims to stabilize the weighted average of multiple exchange rates. However, this potential benefit comes with several challenges, which would harm the nominal anchor unless carefully addressed. These aspects are briefly discussed in the following.

A basket peg can potentially strengthen exchange rate stability in small, open economies with diversified international linkages. Tying the value of the domestic currency to a weighted average of several foreign currencies can reduce the variability of the nominal effective exchange rate and the need to tether policy rate adjustment to the monetary policy of a single trading partner. To illustrate, a country pegging to the US dollar under an open capital account would have to raise interest rates in lockstep with the United States if stronger US demand caused the Federal Reserve to tighten policy, and its exchange rate would appreciate with the US dollar against other currencies such as the euro. By contrast, a country pegging to a basket and facing the same shock would allow its currency to depreciate against the US dollar while appreciating somewhat against other currencies, so that the nominal effective exchange rate would be more stable than under a pure US dollar peg. Moreover, its policy rate would rise less, which could be beneficial for macro-economic stability (unless the business cycle was tightly linked to the United States).

However, credibility and transparency are critical challenges under a basket peg. For an exchange rate peg to be an effective nominal anchor, it is crucial that the public can observe in real time the authorities' commitment to maintaining the peg. For basket pegs, even if the central bank discloses the composition and weights of the basket, it takes some effort on the part of observers to verify if it firmly keeps the basket rate to the committed level. Moreover, the public's perception and expectations will still be affected by fluctuations in bilateral exchange rates, which are easier to observe and may affect them more directly. If the composition and weights of the basket are not publicly disclosed (as is the case in some basket pegs), it even becomes impossible for the public to confirm the central bank's commitment. This loss of transparency associated with basket pegs can significantly weaken the effectiveness of the peg, especially when the credibility of the central bank is weak.

Although the bilateral exchange rates of the basket components may fluctuate, basket pegs do not offer the flexibility associated with floating exchange rates in absorbing shocks. In a basket peg regime, the central bank decides ex ante the level of the basket rate. This basket rate should be predictable and known to the markets and the public so that the basket peg provides an effective nominal anchor. This implies that basket pegs allow a very limited degree of flexibility in terms of acting as a shock absorber.

Managing a basket peg requires strong institutional and operational capacities. The basket peg regime requires the central bank to be able to collect high-quality data on trade and exchange rate markets, design an appropriate basket composition, and manage more sophisticated daily operations. Without adequate and sufficient capacity, the arrangement risks being poorly implemented, for example, through a suboptimal currency basket composition, which can undermine its effectiveness as a nominal anchor.

⁵ According to the latest AREAER, eight countries adopt a basket peg as their exchange rate anchor. In addition, there are four countries that peg their currency to a currency basket under monetary policy frameworks different from the exchange rate anchor (for example, "Other" monetary policy framework in the AREAER classifications). The baskets of these countries typically include the US dollar, euro, and the currency of large neighbor countries (for example, the Australian dollar and New Zealand dollar for countries in the Pacific). Some countries include the Special Drawing Rights, which itself is a basket of major currencies, in their currency basket.

There are no established ways to calculate the optimal weights for currencies in the basket. For example, although there is large literature on the estimation of the optimal basket weights, there is no consensus on the desirable “objective function” for this optimization exercise.⁶

There are several key considerations for the basket peg to be an effective nominal anchor by mitigating its challenges described earlier. First, each currency in the basket should satisfy the attributes for a good anchor currency listed in the previous subsection (for example, freely convertible currencies of countries with a strong track record of low inflation). This ensures the currency basket as a whole to reap the benefit of borrowing anchor countries’ credibility while mitigating the drawbacks of the loss of monetary autonomy.

Second, the composition and weights of the basket should be disclosed. Transparency is crucial to gain public confidence in the arrangement. This would also help market participants and the public to understand and forecast developments in the basket rate. On the contrary, the lack of transparency would result in the loss of confidence in the arrangement, impairing its ability to provide the nominal anchor.

Third, the number of currencies should be limited, typically not exceeding five. Empirical evidence suggests that currency baskets typically comprise no more than five currencies to balance the coverage of external transactions and operational simplicity (Frankel and Wei 1994, 2008). Keeping the number of currencies small also helps limit the complexity of the basket, thus enhancing the transparency of the basket arrangement.

Fourth, the selection of basket weights and the process for adjusting them should support a strong nominal anchor and price stability. The same considerations influencing the choice of a single anchor currency discussed may in principle also influence the choice of basket weights (including exchange rate pass-through, financial linkages, and business cycle synchronization). Even so, it is critical that both the choice and any adjustment of weights be perceived as ultimately consistent with supporting price stability rather than influenced by opportunistic factors (for example, changing weights to avoid tightening policy as much). Given the complexities associated with multiple objectives, choosing weights based on a narrower focus on price stability may be attractive in practice.

Finally, the effective functioning of a basket peg requires a careful technical design. For example, choosing an appropriate averaging method for calculating the basket rate is important. Annex 1 provides more detailed explanations.

Commodity Anchors

Historically, commodities, especially precious metals, have been frequently used as anchors. Prominent examples include the international gold standard during the nineteenth to early twentieth centuries, and the US dollar’s peg to gold under the Bretton Woods system. However, after the collapse of the Bretton Woods System in the 1970s, gold ceased to serve as the anchor of currencies. Indeed, the second amendment of

⁶ The literature on optimal currency baskets has been evolving around the stabilization of real economic activities. For example, existing studies examined optimal currency basket by targeting exports (Edison and Vardål 1987), output (Rajan 2000), output of tradable goods (Edison and Vardål 1990), current account (Lipschitz and Sundararajan 1980), and trade balance (Shioji 2006), while Yoshino, Kaji, and Suzuki (2004) examined several objective functions such as gross domestic product, exchange rate, and current account. Turnovsky (1982) and Daniels, Toumanoff, and von der Ruhr (2001) are few exceptions that include the stabilization of domestic inflation as a part of their objective functions.

the IMF's Articles of Agreement, which became effective in 1978, Article IV, Section 2(b),⁷ prohibits member countries from maintaining the value of their currency in terms of gold.

Despite its prevalent use historically, a commodity peg does not satisfy the conditions required of a good nominal anchor, and hence it is not advisable. If a commodity price were to provide an effective nominal anchor, it should satisfy the desirable properties of anchor currencies listed in the previous section, but this is mostly not the case. In particular, commodity prices typically exhibit higher volatility than hard currencies (that is, currencies that are highly liquid, stable, widely accepted for international trade, and reliable means for store of value), which is not a desirable feature for providing a stable nominal anchor of the economy. Moreover, commodity prices may fluctuate for reasons that are irrelevant to macroeconomic fundamentals, including technological innovations, discoveries of new mines, geopolitical tensions, and war. Indeed, the literature points out that technological innovations in gold extraction and discovery of new gold mines increased the supply of gold and eventually fueled inflation in the United States in early twentieth century (Friedman and Schwartz 1963). Such “nonfundamental” shocks can bring unnecessary fluctuations to the economy of a country that fixes its exchange rate against a commodity price, which could be detrimental even for countries that dominantly rely on that commodity.

Some literature has pointed to the limitations of currency pegs and suggested that commodity anchors may help mitigate the effects of terms-of-trade shocks for resource-rich countries.⁸ An important motivation is that commodity-exporting countries pegging their currencies to the US dollar or other hard currencies (for example, oil-producing countries in the Middle East) have experienced large swings in macroeconomic activity and capital flows during episodes of sharp commodity price fluctuations. Accordingly, Frankel (2002, 2003, 2005, 2017) argued that a peg to a commodity price may help smooth the business cycle by letting the nominal exchange rate automatically appreciate (depreciate) when the term of trade becomes favorable (unfavorable) because of commodity price fluctuations.⁹

However, a commodity peg could seriously undermine macroeconomic stability. Although exchange rate flexibility is desirable in responding to terms-of-trade shocks (as would occur under floating rates), allowing the exchange rate to adjust in lockstep with a commodity price could seriously undermine macroeconomic stability. In particular, stabilizing the nominal price of a commodity, such as oil, when its relative price is rising requires deflating the economy (that is, achieving the increase in the relative price of the commodity by depressing the prices of other goods and wages). This would likely entail severely compressing domestic demand through higher real interest rates and also allowing the real exchange rate to appreciate substantially. By exacerbating Dutch disease—real exchange rate appreciation during commodity price booms which harms the non-resource-manufacturing sector—such an arrangement would likely lower long-run economic growth (see the survey by Frankel 2010, and references therein). As a commodity-pegged exchange rate

⁷ Under an international monetary system of the kind prevailing on January 1, 1976, exchange arrangements may include (i) the maintenance by a member of a value for its currency in terms of the special drawing right or another denominator, other than gold, selected by the member, or (ii) cooperative arrangements by which members maintain the value of their currencies in relation to the value of the currency or currencies of other members, or (iii) other exchange arrangements of a member's choice.

⁸ The choice of exchange rate regime is a difficult problem especially for resource-rich countries (Casiraghi, Habermeier, and Harjes 2020). On the one hand, these countries are typically small open countries with underdeveloped financial markets, favoring a currency peg regime. On the other hand, they are susceptible to large terms-of-trade shocks (that is, commodity price fluctuations), favoring a floating regime.

⁹ Vogel, Hohberger, and Herz (2015) studied this point based on a general equilibrium model and reported that pegging to commodity or export prices does not necessarily yield superior performance from the macroeconomic stabilization perspective compared to a standard consumer price index inflation targeting.

would appreciate even more in real terms during commodity price booms, this arrangement can severely hamper resource-rich countries' effort to diversify their economy and reduce their dependence on the resource sector. This point is especially important for countries that rely on exhaustible natural resources.

There are better ways to address challenges of resource-rich countries. Cyclical developments in the domestic economy and capital flows in resource-rich countries should be better addressed by other macroeconomic policy tools including prudent and countercyclical fiscal policy and sovereign wealth funds. When commodity-exporting countries adopt a fixed exchange rate regime at the cost of the loss of monetary autonomy, the authorities can still employ a prudent and countercyclical fiscal policy for a countercyclical macroeconomic stabilization tool. In addition, it has become common for resource-rich countries to establish sovereign wealth funds to accumulate revenues from the natural resource sector as savings for intergenerational equality purposes, mitigating cyclicity in fiscal policy, and sterilizing financial inflows during commodity price booms (for example, IMF 2012b; Eyraud, Gbohoui, and Medas 2023).

Institutional Variants: Currency Board Arrangements

Fixed-parity regimes differ not only in the choice of anchor but also in their institutional framework. Currency boards are a rules-based form of fixed exchange rate arrangement designed to strengthen credibility by limiting policy discretion. They represent the stricter end of fixed exchange rate regimes. Under this framework, the central bank cannot freely set its policy rate and commits to exchanging domestic currency for the anchor currency at a fixed rate. Monetary issuance is governed by strict rules: base money can be created only if it is backed by foreign reserves. In other words, money supply changes are tied to reserve movements rather than discretionary policy decisions.

In practice, currency boards typically maintain full foreign reserve backing of the monetary base, often with additional buffers. Liquidity conditions adjust automatically to the balance of payment flows. For example, capital inflows increase reserves and expand liquidity, whereas outflows reduce reserves and liquidity. Active monetary policy instruments are generally absent, and lender-of-last-resort functions are limited. As a result, the banking system must be supported by strong regulation and sound balance sheets. In such systems, domestic interest rates are largely market-determined, reflecting automatic liquidity adjustments to external flows. These institutional features can strengthen credibility in the peg by reducing uncertainty about policy actions. However, they also limit flexibility. Therefore, adjustment to shocks must occur mainly through domestic prices and economic activity, rather than exchange rate movements. Sustaining such arrangement typically requires strong fiscal discipline, adequate reserve buffers, and a sound financial system. The implications of these institutional features for liquidity management and interest rate dynamics are discussed in "Foreign Exchange and Monetary Operations and Other Macroeconomic Policies" section.

Crawling Pegs

Definition and Benefits of Crawling Pegs

Under a crawling peg arrangement, the parity of the nominal exchange rate vis-à-vis its anchor currency is periodically adjusted by a predetermined amount.¹⁰ The “rate of crawl” refers to how fast the nominal exchange rate is adjusted, and it is typically set at a fixed rate or determined based on specified quantitative indicators. Crawling peg arrangements can be beneficial under certain circumstances, including to allow the home country to target a different inflation rate than the anchor country, and to facilitate the transition of high-inflation economies to a lower rate of inflation. However, their implementation requires institutional capacity and careful consideration.

Even as crawling pegs are not fixed at a single parity, they do not offer the flexibility associated with floating exchange rates in absorbing shocks. In a crawling peg regime, the central bank decides in a forward-looking manner the level of the exchange rate at any point in time. To provide an effective nominal anchor, this level of the exchange rate should be predictable and known to the markets and the public. In other words, crawling pegs bring a very limited degree of additional flexibility in terms of acting as a shock absorber. By contrast, in flexible exchange rate regimes, the market determines the exchange rate, sometimes with the central bank intervening in the FX market under certain circumstances, but without establishing a predictable path for the exchange rate.¹¹

Because the primary objective of a crawling peg is to provide a nominal anchor, it should not be misused for other objectives such as maintaining competitiveness.¹² Inappropriately operationalized crawling arrangements can jeopardize price stability and macroeconomic welfare. For example, the operational parameters of the exchange rate regime—most notably the rate of crawl—should be set so that the crawling regime fulfills its role as nominal anchor and ultimately delivers price stability.

How to Set the Rate of Crawl

Benchmark Rate of Crawl

The critically important parameter for operationalizing crawling peg arrangements is the rate of crawl.¹³ This is because an inappropriately calibrated rate of crawling may invite price instability that is welfare decreasing. Other operational parameters such as the width of any band around the central path and the review frequency of the rate of crawl will be discussed in later sections.

The rate of crawl should be consistent with the objective of price stability. Specifically, the rate of crawl should be selected to ensure that domestic inflation runs near its desired level on average in the medium term or moves to this desired level for countries transitioning from high inflation.

¹⁰ According to AREAER 2023, three countries (Botswana, Nicaragua, and Honduras) designate the exchange rate as the nominal anchor and adopt a crawling peg (or crawling band) as their de jure exchange rate arrangement. See Annex 2 for more detailed information.

¹¹ In flexible exchange rate regimes, FXI may be warranted to address disorderly market conditions or certain frictions considered in the integrated policy framework (see IMF 2023b).

¹² Although objectives of crawling pegs sometimes include addressing misalignment in the real exchange rate or maintaining an adequate international reserve level, such issues will normally be better addressed by other measures. In particular, a one-off adjustment of the exchange rate is generally preferable to address misalignment in the real exchange rate. Likewise, reserve adequacy can be addressed by appropriately setting the domestic interest rate given the rate of crawl.

¹³ An initial exchange rate adjustment may precede the calibration of the rate of crawl to correct any misalignment if needed.

One type of rationale for a crawling peg is based on steady-state considerations. A country may set a nonzero rate of crawl to help deliver low inflation in the face of a secular rise in the relative price of nontradables or to aim for a different average inflation rate than the anchor country.

- For the former case, a country may face trend appreciation in the relative price of nontraded to traded goods that would imply a higher inflation rate on average than that of the anchor currency if it simply pegged its exchange rate. This can be seen from the following equation, which is derived by assuming that home consumer price index inflation (π_t) is a weighted average of the inflation rate of nontraded and traded goods ($\pi_{N,t}$ and $\pi_{T,t}$), with s_N the share of nontraded goods, and that traded goods inflation is assumed to be equal to the nominal exchange rate depreciation vis-à-vis the anchor currency plus foreign inflation (that is, $\pi_{T,t} = \pi_t^* + \Delta e_t$):¹⁴

$$\pi_t = s_N (\pi_{N,t} - \pi_{T,t}) + \Delta e_t + \pi_t^*. \quad (1)$$

If the inflation rate of nontraded goods relative to traded goods ($\pi_{N,t} - \pi_{T,t}$) was expected to rise by 3 percent per year on average because of Balassa-Samuelson effects, and the share of nontraded goods was $s_N = 2/3$, then home inflation π_t would on average exceed the anchor country's inflation π_t^* by 2 percent per year if the exchange rate was simply fixed ($\Delta e_t = 0$). However, the home country could aim to achieve the same inflation rate as the anchor country, at least on average, by allowing its currency to appreciate by enough to offset the rise in prices of nontraded goods, that is, by 2 percent ($\Delta e_t = -2$).

- For the latter case, it is clear from equation (1) that the home country may also opt for a nonzero rate of crawl if it aims for a different average inflation rate than the anchor country. For example, if the anchor country has very low inflation, the home country may want a somewhat higher rate of inflation because of concern about downward nominal wage rigidities. In this case, it might allow the exchange rate to depreciate at a low trend rate (for example, 1-2 percent per year), because an average inflation rate in the home country will be higher than that of the anchor country by the rate of depreciation, assuming that the relative price of nontradables was constant.
- In general, the steady-state rate of crawl is described by the combination of these two elements: (1) Balassa-Samuelson effect ($s_N(\pi_{N,t} - \pi_{T,t})$) and (2) the average inflation rate the home country aims for and its difference from the inflation rate in the anchor country ($\pi_t - \pi_t^*$).

The rate of crawl based on these steady-state or secular considerations—which may be termed the “benchmark” rate of crawl—should be adjusted infrequently. Adjustments to this benchmark rate of crawl should be regarded as akin to changing the inflation target. As such, changes should be infrequent, not be linked to the business cycle, and based on a thorough framework review. As a corollary, adjusting the rate of crawl should not be regarded as an active tool that could deliver more exchange rate flexibility than a pure peg, at least for an economy in which inflation is already low and stable (and attempting to do so would raise some of the same risks as frequently adjusting the inflation target, including by potentially fanning political pressures).

A second key rationale for setting a nonzero rate of crawl is to facilitate a transition from high to low inflation. Countries facing a high and entrenched inflationary pressure have often used exchange rate-based stabilization plans to reanchor inflation expectations at much lower levels and ultimately reduce inflation. However, stabilization plans that simply fix the nominal exchange rate to the anchor currency have often

¹⁴ The law of one price for the tradable goods suggests $\pi_{T,t} = \pi_{T,t}^* + \Delta e_t$. We replace $\pi_{T,t}^*$ with π_t^* for simplicity as the difference between these two are small relative to the rate of crawl in practical considerations.

proved unsustainable: while traded goods inflation comes down relatively quickly, the high degree of inertia in wages and service prices translates into a large real appreciation that weakens the economy, generates a rising current account deficit, and ultimately undermines confidence in the peg. Allowing the exchange rate instead to depreciate by setting a positive rate of crawl is consistent with a more gradual disinflation strategy that can help mitigate real appreciation pressures and make the disinflation more likely to be sustainable (including by reducing the contraction in real activity).

For countries with high inflation, setting an initial rate of crawl well above the longer-run “benchmark” level may reduce the cost of disinflation. More specifically, the rate of crawl may be calibrated to be somewhat higher (that is, more depreciation) than the benchmark rate at the beginning and gradually converge over time to the benchmark rate of crawl—though still lower than the inflation rate differential so as to generate a real exchange rate appreciation. To this end, expected inflation should be used to measure the inflation rate differential so that the rate of crawl is set in a forward-looking manner to exert disinflationary pressure *ex ante*. As noted, this more gradual approach could be desirable insofar as it reduces the appreciation of the real exchange rate relative to a pure peg and mitigates the contraction in activity, though a key drawback is that inflation comes down more slowly.

Even so, the deviation from the benchmark rate of crawl should not be too large to ensure that inflation is put on a firm downward path and the arrangement provides a credible nominal anchor. Some theoretical studies even suggest that the rate of crawl should be significantly lower than the inflation differential. For example, in the earlier disinflationary case, even when the rate of crawl is below the inflation differential, crawling arrangements may not provide a nominal anchor and price indeterminacy may arise if the rate of crawl is not low enough to exert substantial disinflationary pressure (for example, Zanna 2009).

Setting the rate of crawl sufficiently close to the benchmark rate and away from the actual inflation differential lends credibly to the authorities’ commitment to price stability. Communication around the exchange rate regime will be more effective if its ultimate purpose (that is, providing the nominal anchor) and the rationale behind the rate setting are clearly articulated. See also the subsequent section, which elaborates more on communication.

Trade and domestic production cost structures should be analyzed and accounted for when setting the rate of crawl. The degree of inflationary or disinflationary pressure from exchange rate fluctuations is determined by these factors. For instance, being other things equal, a higher degree of openness and exchange rate pass-through makes domestic prices more responsive to exchange rate movements and thus the rate of crawl. Therefore, central banks should analyze how exchange rate movements will affect domestic production costs and domestic inflation to make sure that the rate of crawl is set sufficiently close to the benchmark rate of crawl, exerting sufficient downward pressure on inflation to revert to the desired level.

Crawling pegs should be supported by coordinated macroeconomic policy frameworks. Potential loss of competitiveness under exchange rate peg arrangements should be addressed in principle by coordinated macroeconomic policy frameworks. A prudent and countercyclical fiscal policy would be helpful to address downward pressure on output. Implementing structural policies such as strengthening institutional capacity, reforms of regulatory and legal systems, and infrastructure investment is crucial. In addition, policies aimed at enhancing productivity and competitiveness would be effective in maintaining overall economic competitiveness.

In the long run, negative effects of nominal crawling pegs on competitiveness will diminish. In a high-inflation case, the pegging country may be tempted to pursue a real exchange rate peg (see the following), rather than the nominal crawl to avoid real exchange rate appreciation, weakening competitiveness and an associated compression in domestic demand (since inflation must eventually fall below its steady-state level to restore competitiveness, which implies temporarily higher real interest rates). However, weaker activity should facilitate real exchange rate depreciation that eventually restores competitiveness and allows activity to recover.

If adjustment in the real exchange rate is deemed necessary, a one-off upfront adjustment is typically more effective than a steeper rate of crawl without one-off adjustment. This is because (1) external sector imbalances should be addressed as soon as possible, and (2) a prolonged steep crawling rate could negatively affect the credibility on the exchange rate arrangement as a nominal anchor.

Real Exchange Rate Peg: Once Popular, But Not Advisable

An alternative rule to set a rate of crawl, often called a real exchange rate peg, has been popular especially in developing countries.¹⁵ The rate of crawl under the real exchange rate peg, Δe_t^r , is set to the inflation differential (domestic minus foreign) as follows:

$$\Delta e_t^r = \pi_t - \pi_t^*, \quad (2)$$

where π_t^* and π_t are the foreign and domestic inflation rates, respectively. This rate of crawl keeps the ex-ante real exchange rate constant. To see this point, recall the definition of the real exchange rate (in a dynamic form):

$$\Delta z_t = \Delta e_t + (\pi_t^* - \pi_t), \quad (3)$$

where z_t is the real exchange rate in units of domestic currency per one unit of foreign currency (so that a positive z_t value means home real exchange rate depreciation). Substituting the real exchange rate peg rate Δe_t^r into Δe_t in equation (3), one can see that $\Delta z_t = 0$. Specifically, the real exchange rate peg rule sets a positive rate of crawl (that is, depreciation) that increases when the domestic inflation is relatively higher than the foreign counterpart, whereas it sets a negative rate of crawl (appreciation) that decreases when the domestic inflation is relatively lower than the foreign counterpart. Some authors call this rule the purchasing power parity rule because it maintains the (deviation from) purchasing power parity constant.

Despite its historical popularity, a real exchange rate peg could jeopardize price stability and lower the economic welfare as it fails to provide a nominal anchor. Casually speaking, a real exchange rate peg rule is not conducive to stabilizing inflation because it takes a more accommodative policy stance by setting the depreciation crawling rate higher when inflation goes up. Theoretical studies confirm that a real exchange rate peg does not provide a nominal anchor but results in higher volatility of prices and may give rise to a price indeterminacy problem (Dornbusch 1982; Adams and Gros 1986; Uribe 2003; Zanna 2009; Shin and Subramanian 2012). This strand of literature also shows that the price indeterminacy induced by the real exchange rate peg is welfare decreasing.

¹⁵ Calvo, Reinhart, and Vegh (1995) argue that the real exchange rate is perhaps the most popular real target in developing countries. Many studies present empirical findings of real exchange rate pegs, including Klein and Marion (1997), Frankel and Rose (1996), Kaminsky and Reinhart (1999), Jacome and Parrado (2007), Berg and others (2007), and Dooley, Folkerts-Landau, and Garber (2004).

Country cases generally confirm the theoretical results that a real exchange rate peg is not conducive to price stability. For example, Brazil had been pursuing a real exchange rate peg between the late 1960s and early 1990s, while the country experienced a prolonged period of hyperinflation. The real exchange rate peg is attributed to one of the main factors that resulted in this persistent hyperinflation (Calvo, Reinhart, and Vegh 1995; Ayres and others 2019). In addition, historical experiences show that a real exchange rate peg does not exert a sufficient disinflationary effect, and as a result, it often conflicts with monetary policy objectives (for example, Botswana's post-COVID experience).

In practice, ex post real exchange rates can fluctuate even under a real exchange rate peg, especially when inflation is elevated. This is because the rate of crawl should be set in advance. Even when the inflation differential is calculated by using expected inflation data so that the real exchange rate will be kept constant ex ante, the ex post inflation data and hence the ex-post real exchange rate can deviate from their ex-ante values. This implies that the ex-post real exchange rate may not be constant because of shocks to inflation in the home and foreign economies. This ex-post uncertainty suggests that a real exchange rate peg can destabilize the real exchange rate, given the well-known stylized fact that uncertainty in inflation becomes higher as the level of inflation becomes higher (Adams and Gros 1986).

Other Operational Parameters of Crawling Peg Arrangements

In addition to the choice of the anchor currency and the rate of crawl discussed earlier, the following parameters should be decided to operationalize crawling peg arrangements:

- **Frequency of adjustment in the reference rate:** The central bank establishes the reference rate of the exchange rate relative to a single currency or to a basket of currencies. In the crawling peg, the reference rate should be adjusted daily to facilitate a gradual and smooth adjustment of the exchange rate, thus eliminating the need for larger later adjustments and minimizing volatility associated with significant fluctuations. For most cases, linearly interpolating the designated rate of crawl defined, say, as an annual rate, would suffice, because other interpolation methods, such as a geometric interpolation, does not make significant differences for typical rates of crawl.
- **Band:** The central bank may establish a band surrounding the reference rate, allowing the exchange rate to gradually adjust around the reference rate within the defined band. See the next section for a more detailed discussion.
- **Review frequency of the rate of crawl:** The rate of crawl should be reviewed on a regular but typically infrequent basis so that structural changes in and shocks to the home and foreign economies are appropriately taken into account. If deemed appropriate as a result of reviews, the rate of crawl could be adjusted or remain unchanged for multiple review cycles. Too frequent reviews and changes will harm credibility of the crawling peg regime, endangering its nominal anchor role.
- **Choice of variables:** To operationalize crawling peg arrangements, it is necessary to define exactly what variables are used to measure home and foreign inflation, and nominal and real exchange rates especially when a quantitative formula is employed to set the rate of crawl.¹⁶
- **Contingency arrangements for exceptional circumstances:** It is desirable to place contingency arrangements that enable the monetary authorities to review the arrangement outside the regular review schedule should exceptional circumstances occur. For example, in response to an unexpected large capital inflow, it will be beneficial for the central bank to have the right to set a new rate of crawl and make the exchange rate appreciate in a controlled way.

¹⁶ While targeting the real exchange rate should be avoided, it is important to monitor developments in the real exchange rate. To this end, one should be mindful that there are multiple definitions of real exchange rates, depending on what relative price indices are employed. Typically, CPI-based price indices are used to calculate the real exchange rate, although some studies document that wage- or labor cost-based indices are more relevant to the competitiveness of the export sector (Ahn, Mano, and Zhou 2020; IMF 2023b).

Bands

The central bank may establish a band surrounding the reference rate, allowing room for the exchange rate to fluctuate within the defined range. The currency band can be combined with any type of exchange rate peg arrangement. For fixed-parity arrangements, the band surrounds the parity rate. For a crawling peg, the band gradually moves with the reference rate that is determined by the predefined rate of crawl.

An exchange rate band in principle provides a limited degree of monetary policy autonomy and allows the exchange rate to play some role as a shock absorber.¹⁷ Under this framework, the central bank is not as rigidly constrained to follow the interest rate changes of the anchor currency, and may allow the exchange rate to appreciate or depreciate within the band, which gives the central bank some latitude to cushion shocks (Svensson 1994). Even so, the central bank must be careful to ensure the credibility of the band, which may entail sharp policy rate adjustments and FXI to defend it as the exchange rate tests the edges of the band.

The band may also help reduce the need for FXI, alleviating operational costs for maintaining the exchange rate peg. Without a band, any shocks to the FX market, however small and idiosyncratic, would require some combination of interest rate adjustments and FXI, which may be operationally costly and burdensome for the authorities. Having a band that accommodates small exchange rate fluctuations because of transitory idiosyncratic shocks would significantly reduce such costs.

However, any band should be sufficiently narrow for the exchange rate to maintain its role as the nominal anchor. A wider band may allow large variations in the exchange rate, making the public perceive that the exchange rate is no longer a stable anchor. In addition, a wider band gives more leeway to the authorities for using the exchange rate to pursue objectives other than the price stability mandate, thereby weakening credibility.¹⁸ These risks of a wider band compound when it is combined with a crawling arrangement or a basket peg. This is because a wider band, combined with other features of the exchange rate adjustability, makes it increasingly difficult for the public to recognize the exchange rate anchor and understand the central bank's reaction function (see, for example, Frankel, Fajnzylber, and Schmukler 2001).

The choice of the width of the band should factor in country-specific conditions. As discussed, a narrower band is preferable for the purpose of making the exchange rate anchor stronger. At the same time, it is important to analyze how frequent and large FXI would be necessary to maintain the band with the given bandwidth parameter (assuming that interest rates are set appropriately—see the next section), and whether there are sufficient international reserves to sustainably maintain it, as narrower bands may require more interventions.

While there is no consensus about the optimal bandwidth, a low single-digit percentage is typical. Historically, the baseline arrangement of the European Exchange Rate Mechanism (ERM) allowed exchange rate fluctuations within a ± 2.25 percent band. Currently, Denmark pegs its currency to the euro with a ± 2.25

¹⁷ Nevertheless, the exchange peg should remain constrained by the commitment to maintain the credibility of the exchange rate anchor, and thus this limited intra-band flexibility should not be used in ways that could harm the credibility of the peg.

¹⁸ While it is outside the scope of this note, bands are often employed to achieve transitions from an exchange rate anchor to a floating regime. See Ötker-Robe and Vavra (2007) for more discussions about transitions to a floating regime.

percent band under the ERM II, which is the successor of the ERM.¹⁹ Other economies that officially set a band typically choose a bandwidth between ± 2 percent and ± 5 percent. On the other hand, Hong Kong SAR operates its currency board arrangement with a narrower band; the Hong Kong dollar (HK\$) is pegged to the US dollar at HK\$7.8 per the US dollar, with the band (called the Convertibility Zone) between 7.75 and 7.85 (which amounts to about a ± 0.6 percent bandwidth).

There are different modalities for how FXI is conducted, including transactions through rules-based standing facilities and discretionary FX operations. At a minimum, the central bank needs to intervene in the FX market when the exchange rate approaches the margins of the band so that the exchange rate stays within the band (with this intervention complemented by policy rate adjustment). In addition, the central bank may engage in FXI even before the exchange rate approaches the boundary of the band. Such “smoothing” FXI may be conducted based on a prespecified rule (for example, a multi-corridor band system) or at the central bank’s discretion.²⁰ These operational details should be carefully designed together with the bandwidth.

Clear commitment, a narrow band, and adequate international reserves are key to making the peg arrangement within a band credible. Under credible commitment to the peg within a band, the arrangement will have a stabilizing effect even inside the band as market participants expect that FXI will be conducted as the exchange rate approaches the boundary (the so-called “honeymoon effect” dubbed by Krugman 1991). Cukierman, Spiegel, and Leiderman (2004) argue that high credibility enables the economy to operate under a narrower band, mentioning Hong Kong SAR as a primary example of such a highly credible narrow band arrangement. Clear communication about the purpose of the peg arrangement and institutional arrangements including enshrining the peg as the *de jure* arrangement will strengthen commitment and in turn the credibility of the peg (Qureshi, Ghosh, and Tsangarides 2011).

¹⁹ Although the baseline bandwidth under the ERM II is ± 15 percent, adopting a narrower band is allowed in this mechanism, which is the case for Denmark. Note that actual fluctuations of Danish krone vis-à-vis euro are much smaller than the ± 2.25 percent band.

²⁰ Lindberg and Soderlind (1992) show that considering intra-band interventions is necessary to explain developments in Swedish krona during 1988 and 1990, during which period the country adopted an exchange band peg. Relatedly, Svensson (1992) documents that the key assumptions of Krugman’s (1991) seminal model, including the assumption that FXI occurs only at the boundary of the band, are not supported by the data.

Foreign Exchange and Monetary Operations and Other Macroeconomic Policies

This section discusses how domestic interest rates should be determined to be consistent with the exchange rate peg, and how FX and monetary operations should be conducted. It also discusses coordination with other macroeconomic policies and communication strategies.

Under a fixed exchange rate arrangement with free capital mobility, monetary autonomy is limited. This is the manifestation of the impossible trinity; monetary policy cannot be conducted independently of the exchange rate policy under an exchange rate peg regime with an open capital account. Rather, the domestic interest rate should align with the equilibrium interest rate that would balance capital flows. Otherwise, if the domestic interest rate is too low (high) relative to that of the anchor currency, it could trigger persistent capital outflows (inflows), endangering the sustainability of the exchange rate peg arrangement and the level of international reserves.

Determination of Domestic Interest Rates

The Uncovered Interest Rate Parity Condition

The uncovered interest rate parity (UIP) condition underpins the determination of the domestic interest rate under an exchange rate peg. To illustrate the main ideas, let us explain this by focusing on a fixed-parity currency peg case. Additional considerations for other arrangements are discussed later.²¹

Under a fixed-parity currency peg, the domestic interest rate should be consistent with the UIP condition:

$$i_t = i_t^* + \text{UIP}_t, \quad (4)$$

where i_t is the domestic nominal interest rate, i_t^* is the anchor currency's nominal interest rate, and UIP_t is the so-called UIP premium or the risk premium term. Given that the exchange rate is constant under the peg, the return on investing in domestic interest rate markets (i_t) should be equal to the return on investing in the anchor economy's interest rate markets (i_t^*) adjusted for the risk premium, which is represented by the UIP premium. Otherwise, there would be persistent capital flows from the economy with lower risk-adjusted returns to that with higher returns (for example, if the domestic interest rate is higher after considering the UIP premium, there will be capital inflows into the home economy).

In the case where the central bank does not set the policy rate, market forces drive domestic interest rates to the level at which capital flows are stabilized. In other words, market forces drive the domestic interest rate to the level at which equation (4) holds. In response to a rise in demand for the domestic (foreign) currency, the central bank purchases (sells) foreign currencies and supplies (withdraws) domestic currency, typically through standing facilities. These unsterilized transactions will result in increases (decreases) in domestic liquidity, driving down (up) the domestic interest rate. This would stabilize capital flows as a decrease (an increase) in the domestic interest rate discourages (encourages) demand for the domestic currency. Operationally, such systems rely on a floating interest rate corridor centered around a variable-rate, full-allotment main monetary operation to infer the market rate. Frequent open market operations (OMOs), along with reserve requirement

²¹ For the discussion in this section, we assume that the peg is credible without the risk of de-pegging or an exit from the peg arrangement.

averaging, help absorb liquidity shocks and dampen short-term interest rate volatility. The width of standing facility spreads should be set wide enough to exceed friction costs²² in order to avoid constraining the automatic liquidity adjustment through the balance of payment flows.²³ Economies under a currency board arrangement are typical examples that take this approach, reflecting the requirement that the monetary base should be fully backed by foreign reserve assets (see Annex 3 for the example of Hong Kong SAR).

Most central banks operating under fixed exchange rate regimes find it more convenient to explicitly target a short-term interest rate rather than allowing it to be determined by market forces. Because of sluggish responses of capital flows to interest rate differentials, market-determined, short-term interest rates often exhibit excessive volatility, which in turn likely results in a higher liquidity premium. Higher volatility and liquidity premium in financial markets have negative impacts on growth, price stability, and financial stability. Consequently, central banks may prefer to set the policy rate and supplement FX operations with domestic liquidity management tools. In such cases, the operational framework relies on an interest rate corridor defined by lending and deposit facilities around the policy rate. Implementation may take the form of (1) a mid-corridor system with a fixed-rate, full-allotment main operation conducted at the policy rate, or (2) a floor system in which the deposit facility rate effectively defines the policy stance. In the presence of pressures on the exchange rate, a ceiling system can be implemented in which the lending facility rate would be set at the policy rate. The width of the corridor should be sufficiently wide to preserve interbank market activity and avoid constraining the automatic liquidity adjustment through the balance of payment flows. Reserve requirement averaging can further support the intertemporal smoothing of liquidity shocks and help maintain short-term rate stability.

When the central bank sets the policy rate, it should be consistent with the UIP condition. Otherwise, persistent capital flows may endanger the sustainability of the peg. To this end, the central bank needs to pin down the two terms on the right-hand side of equation (4) by (1) determining the most appropriate foreign interest rate for i_t^* and by (2) assessing the level of the UIP premium.

Among the interest rates in the anchor country, the rate that influences capital flows most should be used as a measure of i^* . The choice of the appropriate interest rate should be based on empirical evidence regarding the impact of interest rates on capital flows. In addition, the central bank should consider how forward-looking its choice needs to be. One option is to assume immediate transmission so that the domestic rate instantaneously reflects changes in the anchor currency interest rate. An alternative option is to adjust the domestic interest rate to expected changes in the anchor rate, based, for instance, on interest rate swaps in the anchor country; interest rate swap markets are usually liquid, and thus, swap rate data are typically available.

The UIP premium is usually positive for developing countries because of relatively larger risk premium compared to their anchor currencies. A positive premium means that the home country should set its policy rate at a level higher than anchor currency's interest rate so that the relatively higher risk of investing in home bonds is compensated for.

The UIP premium is known to be time-varying, which implies that interest rate spreads need to be adjusted so that the UIP condition is satisfied. Kalemli-Ozcan and Varela (2021) has documented that the UIP premium generally exhibits large variations, especially for developing countries' currencies. Moreover, the UIP premium may endogenously respond to the macroeconomic conditions of the home country as it

²² Frictions arise, inter alia, from counterparty limits, liquidity and capital prudential regulations, and FX transaction costs.

²³ See Della Valle, King, and Veyrune (2022) for more details on reserve requirements and related monetary operations.

encompasses sovereign and currency risk premium. Even for currency pegs between advanced economies, interest rate spreads fluctuate given that they depend on a time-varying risk premium. The Danish krone, which is pegged to the euro under a conventional peg arrangement, is a prominent example. While the Danish policy rate closely follows that of the European Central Bank (ECB), interest rate spreads are not constant because the Danish central bank may unilaterally adjust the policy rate by reflecting the fluctuations in the relative risk premia between Denmark and the euro area. For example, the Danish-minus-ECB policy rate spread decreased and turned negative for most of the time since the European debt crisis. Another noteworthy example is Hong Kong SAR. The interest rate differentials between Hong Kong SAR and US short rates exhibit fluctuations, too, driven by forces in the FX and money markets.²⁴ See Annex 3 for more detailed information.

Although conceptually straightforward, empirically assessing the level of the UIP premium may be challenging. In practice, the following estimates or proxies of the UIP premium could be used by central banks:

- If professional forecasts (for example, Consensus Forecast) on the future exchange rate level $E_t[e_{t+1}]$ are available, one can directly estimate the UIP premium based on the UIP condition (see equation 5 below).
- Eurobond yield spreads or sovereign credit default swaps, if available, also proxy the UIP premium. These variables proxy sovereign risk premium of the home country.
- If there are developed FX derivative markets and currency forward prices are available, one can calculate the deviations from covered interest rate parity (CIP). Literature shows that CIP deviations arise because of constraints on financial intermediaries that prevent their arbitraging activities (for example, Du, Tepper, and Verdelhan 2018). As such, CIP deviations measure the degree of limits to arbitrage and may therefore provide useful complementary information on the shallowness of exchange rate markets and developments in the UIP premium.
- Various other variables that measure liquidity and market depth of currency markets provide information on the UIP premium. These variables include trade volumes in spot and derivatives markets, bid-ask spreads, and price impact measures such as the Amihud (2002) illiquidity measure.
- Other macroeconomic variables (for example, gross domestic product growth rate) may also be helpful to assess UIP deviations, as these variables are related to sovereign credit risk. For example, these variables could be used as explanatory variables in statistical models to assess UIP premium. Likewise, commodity prices may provide relevant information for commodity-exporting countries.

Estimating the UIP premium in real time is particularly challenging. First, real-time estimation may be subject to more severe data limitations, especially for counties with less developed financial markets and limited availability of high-frequency market data. Second, the correlation between the proxies listed earlier and the UIP premium may change depending on market conditions. For instance, these proxies can entail larger uncertainty during episodes of market stresses. These difficulties suggest that central banks may need to make real-time policy decisions (for example, on conducting FXI or on changing the policy rate) under considerable uncertainty about the UIP premium and the adequate domestic interest rate level (equation 4). In these circumstances, central banks may need to rely on the evidence of actual capital outflow or inflow pressures to gauge the UIP premium.

²⁴ Under the Linked Exchange Rate System, HK\$ interbank rates generally track the US dollar counterparts, while shorter-tenor interbank rates tend to be also influenced by the supply and demand of HK\$ funding in the local market such as seasonal factors and capital market activities.

Having a suitably parametrized interest rate reference formula is desirable, yet mechanically following such a formula is not recommended. Having an internally consistent, robust, and empirical model for a reference interest rate is important for enhancing the credibility of monetary policymaking. However, given data limitations, uncertainty, and shocks, such a model cannot be applied mechanically. Instead, expert judgment should complement the information provided by economic models.

How to Respond to Changes in the UIP Condition

When there are shifts in the anchor currency's policy rate and the UIP premium, the home central bank needs to take policy action to maintain the peg. Consider a situation where a UIP premium shock hits the home economy so that the UIP term in equation (4) increases. In this case, there would be capital outflow pressure unless the central bank responds to it. The central bank may adjust the policy rate upward by the size of the shock to the UIP premium so that the capital flow balance is restored. Otherwise, the central bank needs to conduct FX sales to address capital outflow pressures if the policy rate is kept unchanged (or the policy rate adjustment is not enough to restore the balance). This is the basic trade-off that the central bank faces between using the policy rate and FXI.²⁵

In principle, the domestic interest rate should be adjusted so that the UIP condition holds continuously. That is, the domestic interest rate should be adjusted as the foreign interest rate and the UIP premium change.²⁶ However, there may be cases where temporary deviations from the UIP condition could be justified.

Deviations from the UIP condition could be justified if shocks are transitory. Adjusting the domestic interest rate to transitory shocks may result in unwarranted short-term interest rate volatility that may be detrimental to price and financial stability. In such cases, the benefit of temporary deviations from the UIP condition to "look through" shocks may outweigh the cost of maintaining these deviations using FXI. On the other hand, if a shock is persistent, the adjustment of the policy rate is necessary. Otherwise, conducting FXI for prolonged periods would be required, endangering the sustainability of the peg.

Relying on FXI could be more effective than adjusting the interest rate when capital flows are not sensitive to interest rate differentials. When capital flows are not sensitive to interest rate differentials, large swings in the domestic interest rate may be necessary to maintain the capital flow balance. Such volatile movements in the domestic interest rate can be costly for the domestic economy. The elasticity of capital flows to interest rate differential depends on the depth of FX and domestic financial markets, the degree of integration into the global financial markets, and the nature of capital flow shocks. Deeper and more integrated markets will be more responsive to interest rate differentials, making it more challenging to keep a deviation of the policy rate from the UIP condition using FXI.

The cost and benefit of deviating from the UIP condition crucially depend on the level of international reserves. When there are not enough international reserves, keeping the interest rate lower than what the UIP condition suggests can be highly problematic, as capital outflows may quickly deplete international reserves. Keeping the interest rate higher than the UIP condition when there are already sufficient international reserves is also not recommended. This is because accumulating too many reserves can be costly as sterilization typically

²⁵ In practice, as discussed earlier, the central bank's decision making between using the policy rate option or FXI options can be complicated by the fact that the UIP premium is not directly observable.

²⁶ Scheduling regular monetary policy meetings after those of the anchor currency economy may be beneficial to incorporate changes in the anchor economy's interest rate in a timely manner, although the frequency and lag length may depend on country-specific conditions.

results in losses; the central bank earns lower returns on FX reserves—often invested in safe and liquid assets, such as US Treasury bills—while paying higher domestic interest rates to absorb liquidity. Therefore, the interest rate should return to the UIP condition level to mitigate inflow pressures before such quasi-fiscal cost becomes material. On the other hand, temporary upward (downward) deviations of the domestic interest rate may help accumulate (decumulate) reserves if they are below (above) the adequate level.²⁷

Even when deviations from the UIP condition are warranted, deviations should be temporary. As described, relying on FXI for a prolonged time may increasingly result in the divergence of international reserves from their adequate level. The cost of such a departure can be nonlinear, especially when the central bank defends the exchange rate peg from outflow pressures.

Additional Considerations for Other Arrangements

When the exchange rate can move, the UIP condition can be generalized as follows:

$$i_t = i_t^* + \left(E_t[e_{t+1}] - e_t \right) + \text{UIP}_t, \quad (5)$$

where e_t is the nominal exchange rate in the units of the home currency for one unit of the foreign currency (that is, increase in e_t means home currency depreciation).

- In a crawling peg arrangement, the domestic interest rate should also reflect the rate of crawl in addition to the foreign interest rate and the UIP premium term. The additional term, $E_t[e_{t+1}] - e_t$, denotes the expected change in the exchange rate (where a positive value means home currency depreciation), which is equal to the rate of crawl under a crawling peg. The expected home currency depreciation (appreciation) under the crawling arrangement must be compensated for by a higher (lower) domestic interest rate by an equivalent margin to maintain the interest rate parity. For instance, if the home country adopts a crawling peg arrangement and depreciates its currency, the home country should set its policy rate above the sum of the interest rate of the anchor currency and the UIP premium by the amount equal to the rate of crawl.
- In a basket peg arrangement, the foreign interest rate i_t^* should be the weighted average of the interest rates of the basket currencies. The weights of the basket should be used as the weights for calculating the average interest rate. If it is combined with a crawling arrangement, the exchange rate e_t for the calculation of the term $E_t[e_{t+1}] - e_t$ should be the basket rate.
- In a band arrangement, the interest rate should, in principle, respond proactively and symmetrically to deviations of the exchange rate from the central parity within the band. This would help the exchange rate revert to the central parity and stabilize the peg arrangement. An asymmetric reaction function can be justified, for example, if the level of international reserves is below the adequate level.

Under limited capital mobility, the policy rate could respond to domestic economic conditions. More specifically, the policy rate could be determined as a weighted average of the interest rates implied by a Taylor-rule-type monetary policy function and that implied by the UIP condition, allowing the central bank to use monetary policy to respond to domestic developments. In other words, central banks may have the ability to pursue an independent monetary policy to some extent under a peg.

Even so, the UIP component should be dominant in setting the domestic interest rate. One of the main purposes of exchange rate anchor is “borrowing” monetary credibility from the anchor currency. Consequently, large

²⁷ For the estimation of the adequate reserve level, see IMF (2016) and Allen and others (2023).

and prolonged deviations from the UIP condition, which may not be sustainable without capital controls, do not align with the choice of exchange rate as the optimal anchor and the discipline that the peg is meant to bring is effectively lost.

Foreign Exchange and Monetary Operations

FX operations under an exchange rate peg are typically conducted through standing facilities. The central bank buys and sells FX at the initiative of its counterparties—typically commercial banks—in unlimited amounts and at the official rate for authorized transactions. These transactions are executed to maintain the announced parity and reflect the automatic nature of the commitment to the peg. Intramarginal FXI at market-determined exchange rates, akin to OMOs, are generally limited to arrangements with wider exchange rate bands, where some flexibility is permitted around the central parity.

Even when the central bank does not set the policy rate, it may still conduct monetary operations to reduce volatility in short-term domestic interest rates.²⁸ While domestic liquidity operations in this case are not aimed at steering the interest rate toward a specific level, they smooth out volatility arising from autonomous liquidity factors, mainly the impact of FXI on domestic liquidity, but also changes in government deposits or currency in circulation. Such smoothing liquidity management can be especially beneficial in market-determined, short-term interest rate settings to mitigate potential excessive volatility in the domestic money markets.

When the central bank sets the policy rate, the framework of monetary operations resembles that of interest rate-targeting arrangements with other nominal anchors. The central bank would seek to steer short-term rates toward its policy rate through OMOs, either by the mid-corridor system, where it provides liquidity in line with market demands, or by a floor system, where it provides ample liquidity and lets the deposit facility rate drive market rates.

Implementation of OMOs is more complex under a fixed exchange rate regime without capital controls because of the less predictable nature of FXI. In a fixed exchange rate regime, the central bank commits to a predetermined exchange rate against an anchor currency and does not control the volume of FXI. As a result, liquidity forecasting becomes more difficult, with errors driven largely by the central bank's limited ability to anticipate the scale of upcoming FX operations.²⁹ Although medium-term capital flows and terms-of-trade shocks are difficult to predict, short-term forecasts (up to five days ahead) can be produced using the information from the $T + 2$ settlement lag and aggregate forecasts provided by FX market counterparties. However, where the settlement cycle is shortened to $T + 0$, FXI becomes more difficult to forecast and, therefore, less predictable as a driver of liquidity conditions.³⁰ Given the unpredictability of FXI beyond the very short term, calibration of OMOs must account for potential liquidity mismatches. This underscores the need for frequent OMOs, a longer maintenance period in the reserve requirement framework, and a clearly defined interest rate corridor to absorb liquidity shocks and mitigate interest rate volatility.

²⁸ See Khatat and Veyrune (2019) for more detailed discussions on liquidity management under fixed exchange rate arrangements with open capital account.

²⁹ In some commodity-exporting economies operating exchange rate pegs, however, domestic liquidity conditions may be influenced primarily by fiscal operations, particularly the timing of government conversion of FX revenues into local currency. In such cases, close coordination with fiscal authorities constitutes an important input into liquidity forecasting.

³⁰ Other autonomous domestic liquidity factors—such as currency in circulation and government deposits—can be forecast in line with standard practices under other exchange rate regimes, with forecast accuracy depending on the quality of the central bank's models and the effectiveness of government cash management.

The main instrument to cushion the volatility of autonomous factors is the averaging provision of reserve requirements. It helps smooth temporary liquidity imbalances, thereby buffering short-term interest rate fluctuations. The reserve ratio should be higher and the maintenance period should be longer compared to alternative arrangements to absorb the relatively large and unpredictable impact of capital flows on domestic liquidity. To further support market stability, high-frequency operations, such as daily OMOs to absorb excess liquidity, can help banks frequently adjust their liquidity positions, facilitating a smooth adjustment of interest rates in response to the effects of FXI on domestic liquidity.³¹

Other Macroeconomic Policies

Coordination among macroeconomic policies is the key to successfully operating fixed exchange rate arrangements. In the absence of independent monetary policy, countercyclical fiscal policy should play a central role in absorbing shocks, while strong financial sector supervision and an effective macroprudential framework are essential to safeguard financial stability. Adequate international reserves further underpin the credibility of the exchange rate peg and strengthen the authorities' capacity to respond to external pressures.

- **Fiscal policy:** Under the open capital account and fixed or crawling peg arrangements, to compensate for the loss of monetary autonomy, fiscal policy should be countercyclical and act as a shock absorber within the scope of a country's available fiscal space and without jeopardizing other fiscal objectives such as debt reduction. Moreover, credibility of a prudent countercyclical fiscal policy is closely related to credibility of the sustainability of fixed exchange rate regimes.
- **Structural policies:** For countries whose inflation is currently running higher than that of the anchor economy, fixed-parity pegs or crawling arrangements whose rate of crawl is below the inflation differential will result in real exchange rate appreciation, which could erode competitiveness. To mitigate this, structural policies such as strengthening institutional arrangements, infrastructure and human resources, and the business environment, among other policies, would help boost productivity growth and competitiveness while maintaining the exchange rate peg arrangement as a firm nominal anchor. Note that structural policies would be more relevant to the sustainability of peg arrangements than to short-term reliefs because they typically take time to be implemented and bear their fruits.
- **Financial sector policy:** Sound supervision of financial institutions and well-functioning macroprudential framework are essential for economies with exchange rate peg arrangements. Under a peg, the exchange rate has a limited role in stabilizing cyclical developments including real economic activities and global financial cycle. Therefore, monitoring and mitigating the buildup of excessive credit, excessive external debt, and currency mismatch through supervision and macroprudential measures (MPMs) are necessary to make the FX arrangement sustainable. Many economies that have been operating fixed exchange rate regimes for a long period have strong banking supervision and macroprudential frameworks (for example, Hong Kong SAR and Saudi Arabia).
- **Capital flow management measures (CFMs) and CFM/MPMs (CFMs that are also MPMs):** These measures may be useful under several circumstances for countries that use the exchange rate as the nominal anchor. The IMF's *Institutional View on Liberalization and Management of Capital Flows* (IMF 2012a, 2022) provides the basis for policy advice on capital flow managements. See Annex 4 for more detailed information.

³¹ Central banks operating under a fixed exchange rate arrangement usually experience a structural liquidity surplus because of the accumulation of FX reserves.

Communications

In all cases, the central bank must be clear about its objectives under the chosen exchange rate arrangement and monetary policy regime. Specifically, the central bank must clearly articulate that the objective of fixed or crawling exchange rate arrangement is to provide a nominal anchor with the ultimate objective of achieving price stability. If a secondary objective is assigned, the central bank should make it clear that the price stability objective is the priority. Otherwise, if stakeholders perceive that the exchange rate arrangement is operated to achieve objectives different from price stability—such as maintaining competitiveness by dampening real exchange rate movements—this could jeopardize price stability as shown in the previous sections.

Central bank communication should be forward-looking. Forward-looking communication is helpful for private sector stakeholders to be well informed about the future course of policy conducts and to form expectations that are well aligned with a stable operation of the exchange rate arrangement.

In principle, operational details of fixed and crawling peg arrangements should be publicly available to strengthen credibility. For example, the composition of the currency basket, clarity on the reference rate of a fixed peg or the rate of crawling, how the reference rate changes under a crawling arrangement, the width of a band around the reference rate, and rules and procedures for FX operations including standing facilities and discretionary FXI to keep the exchange rate within the band enhance exchange rate predictability, allowing it to anchor public expectations as expected of a nominal anchor. In that respect, the de facto and de jure arrangements should be aligned to avoid confusing the public. Specifically, enshrining the exchange rate peg arrangement in the relevant law would enhance the creditability and transparency of the peg by strengthening authorities' commitment.

To effectively operationalize monetary policy in a way that is consistent with the exchange rate arrangement, following best practices about monetary policy is also important.³² Strengthening monetary policy transmission helps to guide the policy rate toward the level consistent with the exchange rate arrangement. Enhanced credibility in monetary policy and anchoring of inflation expectations increases the resilience of the exchange rate arrangement to adverse shocks. Effective monetary policy communications will also be helpful to deepen domestic financial markets by enhancing predictability and reducing uncertainty, making it easier for the economy to move to more flexible exchange rate arrangements if deemed appropriate.

³² See Casiraghi and Perez (2022) for comprehensive and detailed overviews on best practices on central bank communication.

Annex 1. Considerations for the Technical Design of a Basket Peg

This annex provides explanations on technical considerations for the design of a basket peg.

The averaging method: When calculating the currency basket rate as a weighted average of bilateral exchange rates, a geometric average should be used to ensure that basket weights remain stable over time. An arithmetic averaging is not recommended as it can cause weights to drift as bilateral exchange rate fluctuates.

Intervention currency: The monetary authorities should designate the intervention currency, which is a currency used for interventions in the foreign exchange market, particularly when actions are required to maintain the basket rate. To fulfill its purpose, it should be highly liquid, widely traded, suitable as a reserve asset, and relevant to the currency basket (that is, carrying a significant weight in the basket). Therefore, it is natural to designate one of the constituent currencies of the basket for this purpose. In practice, countries that currently operate a basket peg regime often designate the US dollars as the intervention currency, reflecting its dominant role in international trade and finance, as well as its high liquidity and prevalence in official reserves.

Frequency of the updates in the basket rate: The basket rate should be updated frequently, at least several times a day, to reflect developments in the exchange rates of the bilateral exchange rates in the basket. The update should occur at a certain time during the day. Frequent updates avoid deviation of the basket exchange rate from the basket-weighted bilateral exchange rates and the possibility of arbitrage if capital flows are free. The more currencies included in the basket, the more cumbersome it would be to implement this adjustment and the more likely the risk of large deviations.

Frequency of the review of the basket: The frequency of the review should strike a balance between maintaining a stable basket to enhance the credibility of the basket peg as a nominal anchor and reflecting structural changes in the economy's international linkages into the basket composition. Too frequent changes in the basket composition may be harmful for the credibility of the peg, whereas too few changes could make the basket less relevant to the structure of the home economy. Practically, it is recommended to review the basket weights at a regular frequency (say every five years), but that is not tied to cyclical conditions. This will help avoid the perception that the weights are being changed for opportunistic reasons. The weights should be adjusted to reflect the latest data. Ensuring the accuracy and reliability of the data will facilitate informed decision making on the composition and management of the currency basket. Regular reviews are also beneficial for strengthening the central bank's capacity to implement its exchange rate policy framework effectively and manage the currency basket.

Approaches to calibrating currency weights: Countries adopting a basket peg have traditionally used trade weights as currency weights in a basket. However, there are arguably important shortcomings of such an approach. Notably, it may induce high variability in import price inflation if the currency composition of invoicing differs substantially from that of overall trade. This is often the case in practice, where imports tend to be heavily invoiced in US dollars, even for countries with relatively low bilateral trade ties to the United States. A forthcoming IMF working paper (Vaccaro-Grange, forthcoming) shows how a country may choose

basket weights to minimize the variability of imported price inflation in a way that takes account of heterogeneity in pass-through from basket currencies and also their co-movement (treating the choice of weights as a portfolio choice problem). Such an approach may also come close to stabilizing the variability in the overall inflation for highly open economies in which imports are a large share of the consumption bundle, and perform much better on this key dimension than the traditional approach of using trade weights.

Annex 2. Brief Overview of Currently Existing Crawling Arrangements

This annex provides the brief overview of three countries—Botswana, Honduras, and Nicaragua—which currently adopt a crawling peg arrangement.

Botswana: Since 2005, Botswana has been pegging its currency to a basket of the South African Rand and IMF's Special Drawing Rights with 50 percent weight each as of December 2025, aiming to correct and avoid overvaluation in the real exchange rate and promote economic diversification. The rate of crawl is set in a forward-looking manner as a difference between the domestic inflation objective and inflation forecast of major trading partners. The rate of crawl is set at least annually, with additional changes when deemed necessary by the Bank of Botswana. In July 2025, the Bank of Botswana increased the rate of depreciation from 1.51 percent to 2.76 percent while widening the trading band from ± 0.5 percent to ± 7.5 percent. Since the adoption, the real effective exchange rate has been stable. As such, the Botswanan crawling arrangement can be thought as a real exchange rate peg.

The real exchange rate peg arrangement coexists with a domestic price stability objective (which is currently a 3–6 percent inflation range). While the Botswanan monetary and exchange rate regimes served the country well for two decades until the pandemic, some challenges have emerged after the pandemic and the Russian invasion of Ukraine; global food and energy prices inflation has been causing conflicts between the real exchange rate peg and monetary policy. As inflation surged, the real exchange rate peg arrangement required to engineer currency depreciation, which resulted in inflationary pressure because of high exchange rate pass-through, creating tensions between price stability objectives. Facing these challenges, the IMF country team proposes several reform options including a transition to a “nominal exchange rate targeting”, which is akin to the benchmark rate of crawl approach in this note (see IMF 2023a).

Honduras: Honduras's exchange rate arrangement is a crawling band vis-à-vis the US dollar, where the rate of crawl is determined by considering the difference between the domestic and trading partners' inflation, nominal effective exchange rate, and international reserve coverage. Since February 2022, the exchange rate has stabilized within a 2 percent band against the US dollar. Accordingly, the de facto exchange arrangement was reclassified from crawling peg to stabilized, effective from February 4, 2022. In September 2024, Honduras restarted a nonzero crawling with the annualized rate of depreciation averaging about 6 percent. The current rate of crawl is set to eliminate the overvaluation in the real effective exchange rate (see IMF 2025a). As such, the current Honduran crawling arrangement gears toward managing the real exchange rate rather than price stability.

Nicaragua: Nicaragua's exchange rate arrangement is a crawling peg vis-à-vis the US dollar, and the exchange rate is used as a nominal anchor. The Nicaraguan central bank uses the exchange rate as the nominal anchor for the economy, to support price stability through a crawling peg regime (IMF 2025b). The rate of crawling has been decreasing (in absolute value) over time and has been 0 percent since the beginning of 2024. The rate of crawl is set to maintain the current exchange rate regime and price stability as the current and planned crawling peg rates remain below the inflation differential with the United States. As such, the Nicaraguan crawling arrangement can be thought as following the benchmark rate of crawl (or an arrangement which is approaching to the benchmark rate of crawl).

Annex 3. Examples of Fixed Exchange Rate Arrangements

This annex provides examples of fixed exchange rate arrangements, describing the exchange rate arrangement, monetary policy design and operations, and coordination with other macrofinancial policies.

A Currency Board Arrangement Pegged to the US Dollar in Hong Kong SAR

Since 1983, Hong Kong SAR has been pegging its currency to the US dollar.³³ Hong Kong SAR's exchange rate regime is a currency board, and the fixed peg arrangement is used as a nominal anchor. The fixed peg rate is HK\$ 7.80 per US dollar, and a band between HK\$ 7.75 and 7.85 was established in 2005. Once the exchange rate touches the band edges and upon request by banks, the Hong Kong Monetary Authority (HKMA) executes what is termed the "Convertibility Undertaking" to bring the rate back to within the band. The stability of the HK\$ exchange rate is maintained through an automatic interest rate adjustment mechanism and the firm commitment by the HKMA to honor the Convertibility Undertakings.³⁴ In addition, the HKMA may occasionally conduct market operations within the band if the monetary environment justifies doing so. Such within-zone operations should be consistent with currency board principles.

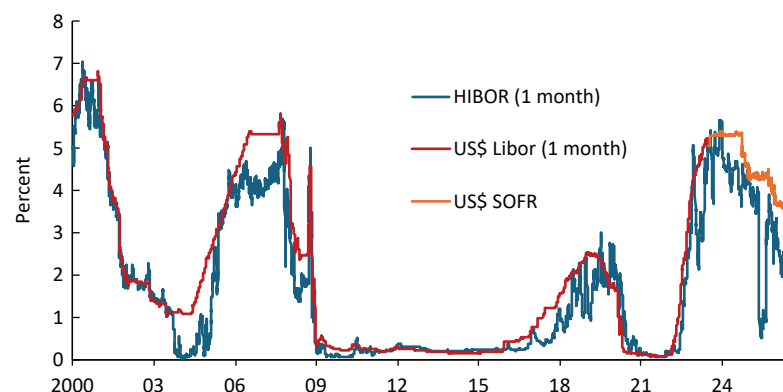
Hong Kong's currency board system has weathered various episodes of market volatility and uncertainty, including the Asian financial crisis, the SARS outbreak, the Global Financial Crisis, and the pandemic. The stability of Hong Kong SAR's currency board system is attributed to several factors: abundant international reserves (almost twice as much as the monetary base), a long history of prudent fiscal policy and accumulation of substantial fiscal reserves, strict financial regulation and supervision, and the authorities' strong will to defend the fixed peg regime.

Because of the currency board regime, Hong Kong SAR does not have monetary autonomy. More specifically, the HKMA does not steer domestic short-term rates to a specific level, and thus, domestic rates are determined by market forces, moving in tandem with short-term rates in its anchor currency economy, the United States (Figure A3.1). As a result, the interest rate differential between Hong Kong SAR and the United States has been staying in a certain range, but it is not a constant, reflecting changes in relative currency premiums and shocks to capital inflows and outflows (Figure A3.2).

Because the HKMA does not set the policy rate, changes in capital flow balance are translated to short-term interest rates in Hong Kong SAR through market forces. To provide a backstop source of HK\$ liquidity and support smooth functioning of the interbank payment system, the HKMA provides a discount window facility, which provides liquidity through repo agreements. Its discount rate, called the Base Rate, is determined based on prevailing market rates: it is currently set at either 50 basis points above the lower end of the prevailing target range for the US federal funds rate or the average of the five-day moving averages of the overnight and one-month Hong Kong Interbank Offered Rates (HIBORs), whichever is higher.

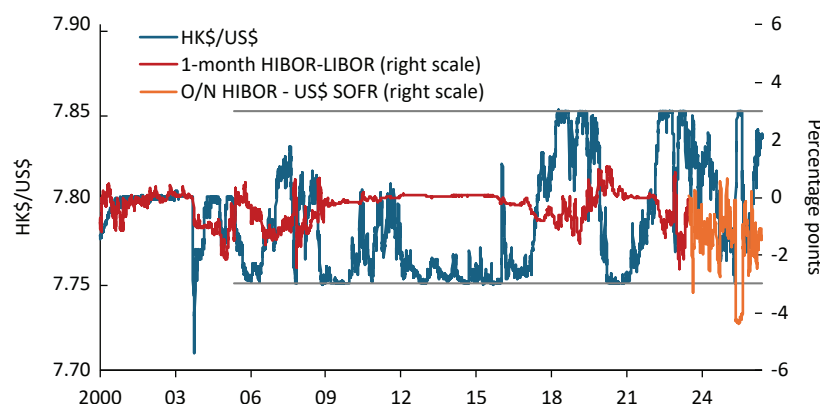
³³ For detailed descriptions of Hong Kong SAR's exchange rate arrangement, see HKMA (2013) and Banque de France (2022).

³⁴ See the HKMA's [website](#) for an explanation of the automatic interest rate adjustment mechanism.

Figure A3.1. Interbank Rates in Hong Kong SAR

Sources: Bloomberg; and IMF staff calculation.

Note: SOFR = Secured Overnight Financing Rate.

Figure A3.2. Hong Kong Dollar Dynamics and Interbank Interest Rate Differentials in Hong Kong SAR

Sources: Bloomberg; and IMF staff calculation.

Notes: The spread between the overnight HIBOR and the US dollar SOFR is calculated as a five-day moving average value. The two horizontal lines at HK\$/US\$ = 7.75 and 7.85 stand for the Convertibility Zone introduced in May 2005. HIBOR = Hong Kong Interbank Offered Rate; LIBOR = London Interbank Offered Rate; SOFR = Secured Overnight Financing Rate.

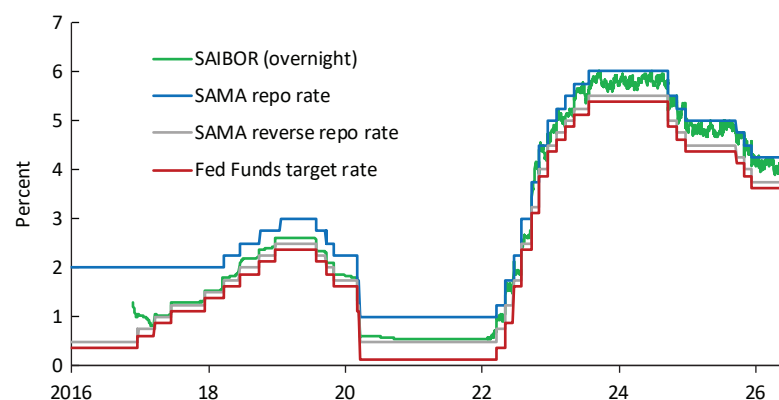
A Conventional Peg Arrangement Pegged to the US Dollar in Saudi Arabia

Since June 1986, Saudi riyal has been pegged to the US dollar at SAR 3.75. The US dollar is chosen as the anchor currency because of its dominant role in the oil industry and international financial markets. The Saudi riyal was under selling pressure in 1993 and 1998 amid falling oil prices and the Asian financial crisis, which were successfully managed by Saudi Central Bank through FXI in the forward market.

Saudi Central Bank sets the policy rate corridor comprised of the repo rate and the reverse repo rate, both of which closely track the Federal Funds target rate (Figure A3.3). Because of its structural liquidity surplus position, owing to the stable nature of oil-related flows and the fixed exchange rate, the overnight reverse repo rate is the primary policy rate that influences Saudi short-term interest rate markets.

Given this conventional fixed exchange rate regime and maintaining a liberal capital account, the monetary policy lacks autonomy as per the impossible trinity. Furthermore, Saudi Arabia conducts a countercyclical fiscal policy, running a fiscal surplus when oil exports are strong and supporting domestic economy by deficit spending when oil exports weaken.

Figure A3.3. Policy Rates and Interbank Rates in Saudi Arabia



Sources: FRED; and LSEG Workspace.

Note: The Fed funds target rate is the midpoint of the target range. SAIBOR = Saudi Arabian Interbank Offered Rate; SAMA = Saudi Central Bank.

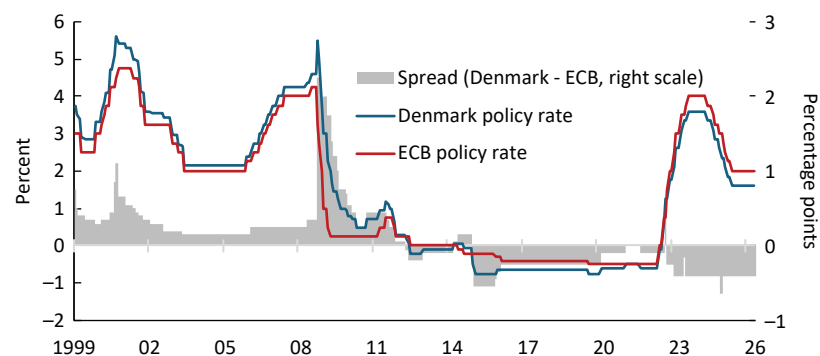
A Conventional Peg to the Euro in Denmark

Since 1982, Denmark belongs to the ERM, ERM II, and has been fixing its currency first vis-à-vis the Deutsche Mark, and then vis-à-vis the euro since 1999.³⁵ The central rate of the fixed rate is Danish krone 7.46038 per euro, but the ERM II allows the exchange rate to fluctuate by up to 2.25 percent on either side of the central rate.

Danmarks Nationalbank (DN) sets its policy rate to keep the interest rate differential between its rate and the ECB's (or before 1999, Bundesbank's) policy rate consistent with the fixed exchange rate regime. When the ECB changes its policy rates, DN makes similar changes typically on the same day (Figure A3.4). However, the interest rate spread is not constant over time. If there are persistent imbalances in the exchange rate market that FXI do not stabilize, DN unilaterally adjusts its policy rate (for example, raise its policy rate when Denmark krone is persistently weaker). For example, prior to the European debt crisis, the interest rate spread (Danish rate minus ECB rate) had been positive. However, following the persistent strengthening of krone since 2011, DN unilaterally lowered its policy rate below that of the ECB. The policy rate spread has remained negative for most of the time since then.

Under the fixed peg regime, the monetary policy is not used as a macroeconomic stabilization tool. Because of strong connection between Danish economy and the euro area economy, the ECB's monetary policy is usually aligned with developments in Danish economy, but it is not always the case. To address such situations, Danish authorities have been conducting a countercyclical fiscal policy as a stabilization tool. To enhance the policy coordination, DN provides assessments of the fiscal policy stance regularly.

³⁵ For detailed descriptions of Denmark's exchange rate arrangement, see Spange and Toftdahl (2014).

Figure A3.4. Policy Rates in the Euro Area and Denmark

Sources: Danmarks Nationalbank; ECB; and IMF staff calculation.

Note: The data show end-of-month values. The policy rate of Denmark is the certificates of deposit rate until February 2021 and the current account rate thereafter, whereas that of the ECB is the main refinancing operation rate until September 2008 and the deposit facility rate thereafter. ECB = European Central Bank.

Annex 4. Use of Capital Flow Management Measures under Exchange Rate Pegs

Countries with fixed exchange rate regimes, and basket and crawling regimes to a lesser extent, may face more macroeconomic and financial stability risks as these countries may face larger and more volatile capital flows than countries with floating exchange rate regimes. To address these risks, capital flow management measures (CFMs) and CFM/macprudential measures (MPMs) (CFMs that are also MPMs) may be useful under several circumstances. IMF's "Institutional View on Liberalization and Management of Capital Flows" (IMF 2012a, 2022; henceforth, IV) provides the basis for policy advice on capital flow managements.

The case for employing CFMs and CFM/MPMs on inflows may be stronger for countries with fixed, basket, or crawling peg arrangements (see paragraph 23 of IMF 2022). First, countries with fixed exchange rate regimes may be more sensitive to conditions in center country and global credit supply shocks (see paragraph 8 of the background note 1 of IMF 2022, and references therein), suggesting that these countries may face large capital flows more frequently. Second, these countries face tighter constraints when adjusting their macroeconomic policy to address large inflows, because of less flexible exchange rate adjustment and loss of monetary autonomy. Third, countries with shallow foreign exchange and domestic markets, which is often the case of countries with fixed or crawling arrangements, may be benefited from CFMs and foreign exchange intervention (see paragraph 10 of the background note 1 of IMF 2022, and references therein). These characteristics of fixed or crawling countries may strengthen the case for CFMs and CFM/MPMs.

However, the use of CFMs and CFM/MPMs should not substitute for warranted macroeconomic and structural adjustments. When large capital inflows occur, appropriate adjustment in macroeconomic policies should be sought first before considering the introduction of CFMs and CFM/MPMs. For example, to address large capital inflows, lowering the policy rate is preferable as long as the economy is not overheating, appreciating the exchange rate is preferable as long as it is not overvalued, and conducting sterilized foreign exchange intervention is preferable when reserve level is not adequate, rather than employing CFMs and CFM/MPMs to curb inflows. Only when there is no flexibility in these recommended policy reactions, CFMs on inflow may be considered. In addition, these measures should be temporary and lifted once other macroeconomic and structural policy actions become feasible.³⁶

Specifically, CFMs on outflows should not be introduced for the purpose of supporting unsustainable peg or crawling arrangements. The IV stipulates that CFMs on outflows are not allowed except under crisis or imminent crisis circumstances. If exchange rate peg or crawling arrangements were to be unsustainable, necessary macrofinancial adjustments and recalibration of exchange rate arrangements are warranted.

³⁶ The 2022 IV review allows *preemptive* CFM/MPMs on inflows, which should be used only when systemic financial risks are elevated because of FX mismatches.

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