



Policy Position Paper (PPP/23–01)

Expanding Local Currency Transactions in ASEAN+3 Cross-Border Payments

December 2023



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Expanding Local Currency Transactions in ASEAN+3 Cross-Border Payments

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December 2023

Executive Summary

Use of local currencies in cross-border transactions among the ASEAN+3 strengthens financial resilience, promotes trade and investment, and reduces the region's reliance on foreign currencies. Hence, authorities in the region are keen to expand cross-border wholesale and retail payment and settlement in local currencies. Encouragingly, the use of ASEAN+3 local currencies in diverse cross-border transactions has been steadily increasing, benefiting nonfinancial firms by reducing the costs of dual-leg currency conversions and need to enter into expensive exchange rate hedges.

However, significant challenges need to be overcome in expanding local currency transactions. The US dollar remains the dominant invoicing and vehicle currency in international trade and finance. The advantages of using the US dollar include its stable value, the perceived strength and size of the US economy and its global geopolitical influence, and the ready convertibility of US treasuries into cash. These factors represent strong barriers to moving away from the US dollar-centric international trade and financial system. Other frictions in cross-border transactions relate to cost, convenience, speed, access, and transparency.

Bank Indonesia has invited AMRO staff to study how the region could strengthen and enhance cooperation on payment connectivity to facilitate the expansion of local currency use in international transactions. The project comprises two components, specifically, it: (1) assesses the ecosystem facilitating local currency transactions in the ASEAN+3 region, including the current state of cross border payment and settlement initiatives; and (2) examines how the Local Currency Settlement Framework (LCSF) could be made more efficient and the transaction costs lowered.

Significant gaps exist in the ecosystem for local currency transactions. A lack of direct currency exchange markets and limited capacity in local markets for hedging foreign-exchange holdings contribute to dependence on the US dollar. Meanwhile, LCSF implementation continues to be hampered by the heavy reliance by regional economies on the US dollar for trade invoicing, among other considerations. Elsewhere, regional bond markets are beset by thin liquidity, sparse and costly hedging tools, and a lack of standardization in market practices and harmonization of regulations, amid differing priorities among counterparts that can reduce the effectiveness of bilateral swap arrangements. Lastly, regional payment systems are limited in their cross-border interoperability as is accessibility for cross-border settlement systems.

A common refrain from market participants is that local currency transactions face a “chicken-and-egg” problem. Local currency markets are underdeveloped compared to the

US dollar market due to thin liquidity, lack of hedging instruments and access by foreign entities to domestic assets, and limited use of the LCSF. Weak demand for local currencies then deters investment in resources for local currency trading and settlement. In turn, inadequate infrastructure and insufficient economies of scale discourage local currency transactions. These factors hinder direct price discovery between local currencies, which then hampers direct local currency transactions.

It is unlikely that ASEAN+3 currencies can challenge the preeminence of the US dollar in the foreseeable future but certain strategies can promote the use of local currencies in cross-border transactions. In this regard, a multi-pronged approach would be beneficial, specifically:

- Appointed Cross Currency Dealers (ACCDs) could help stimulate demand for local currencies by supporting cross-border quick-response (QR) retail payments, in alignment with ongoing cross-border payment initiatives or developing products that increase the use of local currency facilities.
- A holistic approach to payment systems—encompassing technological, operational, and pricing structures requiring a unified approach at the regional level—would need to be adopted. The introduction of cross-border QR linkages between ASEAN+3 members and improvements to real-time gross settlement systems offer significant potential for leveraging the existing cross-border payment infrastructure to facilitate local currency transactions.
- Multilateral cooperation in addressing operational and regulatory differences could incentivize interest among intermediary banks to increase their participation and market makers to facilitate price discovery.
- Central banks could provide access to local currencies to offshore entities for liquidity management and backstopping when necessary.
- Applications of lessons learned from cross-border central bank digital currency (CBDC) projects as to how technology could lower costs and improve efficiencies could also be contemplated.

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Abbreviations

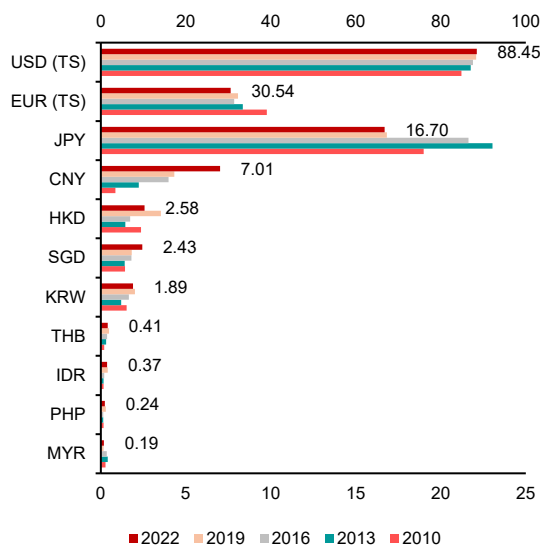
ABF	Asian Bond Fund
ABMI	Asian Bond Market Initiative
ACCD	Appointed Cross Currency Dealers
ACC BIS	Asian Consultative Council of the Bank for International Settlements
ADB	Asian Development Bank
AML/CFT	anti-money laundering/combating the financing of terrorism
AMM	automated market-makers
ASEAN	Association of South-East Asian Nations (Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam)
ASEAN+3	ASEAN plus China (including Hong Kong, China, hereafter “Hong Kong”), Japan, Korea
ASEAN-5	Indonesia, Malaysia, Philippines, Singapore, Thailand
BI	Bank Indonesia
BIS	Bank for International Settlements
BISIH	Bank for International Settlements Innovation Hub
BNM	Bank Negara Malaysia
BoT	Bank of Thailand
BSA	bilateral swap arrangement
CBDC	central bank digital currency
CPMI	Committee on Payments and Market Infrastructures
FX	foreign exchange
KYC	know-your-customer
IMF	International Monetary Fund
JMoF	Japan Ministry of Finance
LCFSF	Local Currency Settlement Framework
MAS	Monetary Authority of Singapore
MoU	memorandum of understanding
NYIC	Federal Reserve Bank of New York’s New York Innovation Center
PBoC	People’s Bank of China
PvP	payment-versus-payment
QR	quick-response
SDRs	Special Drawing Rights
SME	small- and medium-sized enterprise
SWIFT	Society for Worldwide Interbank Financial Telecommunications

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I. Introduction

- 1. The benefits associated with local currency usage in cross-border transactions between ASEAN+3 economies are widely acknowledged.** Advantages from transacting in local currency include strengthening financial resilience and reducing the region's reliance on the US dollar; promoting intraregional trade and investment; and bolstering regional value chains ([ASEAN 2023](#)). Hence, authorities in the region are keen to promote cross-border direct local currency transactions and settlements in both the retail and wholesale space. [ASEAN+3 Research Study Group \(2010\)](#) argues that bilateral and regional cooperation initiatives—including the establishment of trade payment/settlement systems, monetary coordination, and liberalization of policies and restrictions governing foreign exchange (FX) transactions—have been effective in fostering cross-border use of local currencies.
- 2. The utilization of ASEAN+3 local currencies in diverse cross-border transactions has been steadily increasing.** Over the past decade, it has shifted from the Japanese yen to other regional units, as evidenced by the turnover and share of cross-border payments (Figures 1 and 2). This trend, if it were to continue, would increasingly benefit nonfinancial firms involved in regional transactions by reducing their reliance on a third, usually major, currency (such as the US dollar) and consequently reduce the costs of dual-leg currency conversions or the need to enter expensive hedged positions.
- 3. However, cross-border transactions face frictions related to cost, convenience, speed, access, and transparency.** The overall effectiveness of local currency settlement frameworks in expanding local currency transactions remains to be seen. As it is, even though the region commonly uses the US dollar as the main invoicing currency, cross-border transactions typically go through multiple layers of correspondent banks, resulting in high costs and slow transaction times with little transparency.
- 4. Moreover, the continuing importance of the US dollar in cross-border payments crowds out much-needed market interest in the development of local currency infrastructure.** The US dollar is preferred in cross-border transactions, even when exchanging between two local currencies, because it carries low costs and risks while the direct local currency exchange infrastructure remains underdeveloped ([Sussangkarn 2019](#)). This predisposition toward the US dollar then reinforces the dollar's liquidity and weakens the market demand needed to develop local currency markets. Inefficiencies in price discovery attributable to illiquid local-cross currency markets—which lead to currency and liquidity risks for counterparts—represent the biggest challenge. And without appropriate and adequate government intervention, the persistent dominance of the US dollar over local currencies will continue.
- 5. The objective of this project is to consider how the region could strengthen and enhance cooperation on payment connectivity to facilitate the expansion of local currency use in international trade and financial transactions.** The project comprises two components, specifically, it: (1) assesses the ecosystem facilitating local currency transactions in the ASEAN+3 region, including the current state of cross border payment and settlement initiatives; and (2) examines how the Local Currency Settlement Framework (LCSF) could be made more efficient and transaction costs could be lowered (in terms of infrastructure, regulation, and leveraging financial digitalization progress in the region).

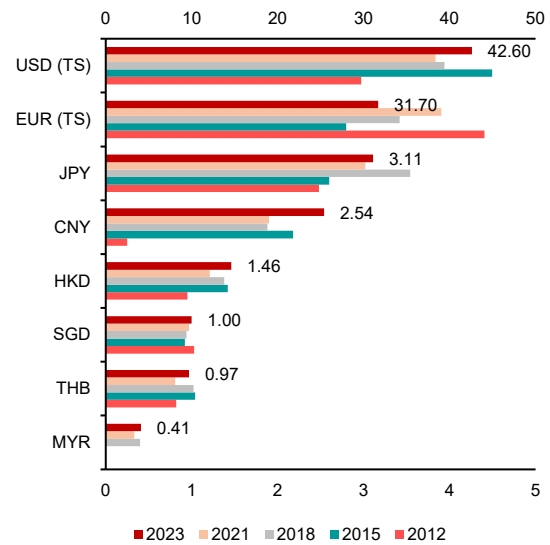
Figure 1. ASEAN+3: Over-the-Counter Foreign Exchange Market Turnover by Currency
(Percent of global turnover)



Source: Bank for International Settlements.

Note: Turnover is defined as the gross value of all new deals entered into during a given period and is measured by the nominal or notional amount of the contracts. Because two currencies are involved in each transaction, the sum of the percentage shares of individual currencies totals 200 percent instead of 100 percent. The figure uses the daily average of reported turnover in April, adjusted for local and cross-border inter-dealer double-counting ("net-net" basis). TS = top side.

Figure 2. Selected ASEAN+3: Currency Shares in Cross-border Payments
(Percent of global total)



Source: Society for Worldwide Interbank Financial Telecommunications (SWIFT) RMB Tracker.

Note: Data for Malaysian ringgit (MYR) are not available for 2012 and 2015. TS = top side

6. **Clearly, the US dollar will remain the dominant international currency for the foreseeable future but ASEAN+3 authorities can adopt strategies to expand local currency transactions.**¹ Recent advancements in cross-border payment infrastructure may have opened new avenues for progress. The introduction of cross-border quick-response (QR) linkages between members of the ASEAN+3 and improvements to real-time gross settlement systems offers significant potential for leveraging the existing cross-border payment infrastructure to facilitate local currency transactions ([CPMI 2022b](#)). Multilateral collaboration in addressing operational and regulatory differences could incentivize interest among intermediary banks to increase their participation and market makers to facilitate price discovery. Concurrently, central banks could provide offshore entities with access to local currencies when necessary for liquidity management and backstopping purposes. Applications from cross-border central bank digital currency (CBDC) projects as to how technology could lower costs and improve efficiencies could also be contemplated.

7. **The rest of the paper is structured as follows:** Section II reviews concepts relating to safe assets, and invoice and vehicle currencies for trade and investment. Section III discusses the existing ecosystem facilitating local currency transactions, followed in Section IV by analysis of the price discovery problem permeating local currency transaction

¹ In researching the issues, AMRO staff also engaged with numerous external parties, comprising ACCD and non-ACCD market participants, such as [Malayan Banking Berhad](#) and [Hong Kong and Shanghai Banking Corporation](#); infrastructure/platform providers, such as [Payments Network Malaysia Sdn. Bhd.](#) and [Revolut](#); international organizations; and several member central banks. Several interlocutors requested anonymity.

initiatives. Section V offers suggestions for incentivizing local currency usage. Section VI proposes issues for members' consideration.

II. Transaction and Reserve Currencies

8. **The acceptance of a currency for international transactions is typically reflected in its share of cross-border payments.** Currency internationalization refers to the process through which a currency gains recognition and acceptance by economic agents outside the country that issues it, primarily attributable to key functions of being a unit of account, a store of value, and a medium of exchange ([Prasad 2019](#); Eren and Malamud 2022). The currency's key uses for international transactions would include: (1) safe asset determination, which focuses on its role as a store of value; (2) trade invoicing, which emphasizes its function as a unit of account; and (3) as a vehicle currency—the currency of a third-party country in bilateral trade—which underscores its crucial function as a medium of exchange (Gopinath and Stein 2021; Eren and Malamud 2022).

9. **In this regard, the US dollar continues to retain its importance in international trade and financial transactions among ASEAN+3 economies, despite the sharply reduced role of the US in global trade.** Eichengreen (2009) argues that the growing economic influence of emerging markets should have weakened the rationale for a US dollar-based international monetary and financial system. However, [Maronoti \(2022\)](#) attributes the sustained dominance of the US dollar to three importance factors:

- Use of the US dollar as vehicle currency in FX transactions, wherein non-US dollar currency pairs are exchanged via the US dollar (which reportedly drives around 40 percent of FX market turnover) and not directly.
- Role of the US dollar in offshore funding markets where debt or loans in foreign currency are sourced (representing about half of all international debt securities and cross-border loans issued).
- Popularity of the US dollar in international trade and global payments (amounting to around half of global trade invoiced relative to the US accounting for just over 10 percent of global trade).

A. Safe Asset

10. **The US dollar is preeminent as a reserve asset, notwithstanding its gradually diminishing global share over the past two decades.** Even other major currencies, much less the non-traditional reserve currencies, cannot compete with the popularity of US dollar—the euro is a distant second, followed by the yen (Figure 3)—for the following reasons:

- The euro area does not have a sufficiently deep market in high-grade euro-denominated securities that can be held as reserves by central banks outside the region, with a high proportion either held by banks within the EU or by the European Central Bank.
- Japan's economic stagnation, aging population, and ultra-low interest rate policy have made holding reserves in yen unattractive (Eichengreen 2009). Although the Japanese government bond market is one of the largest in the world, worth about

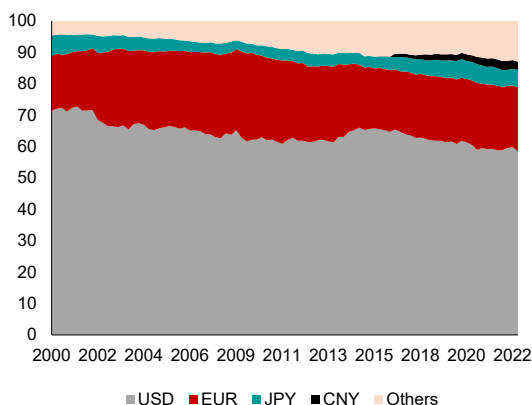
USD 8.3 trillion as of September 2023, its liquidity has been declining since the Bank of Japan introduced its yield-curve control policy in 2016, wherein the central bank has had to purchase vast quantities to defend the upper limit of the band and now holds more than half the market.

- The Chinese renminbi is still subject to capital controls that restrict its free movement despite its rapid internationalization and huge role in international trade, with any liberalization expected to only be gradual (HSBC 2021).

Among other mooted contenders, the IMF's Special Drawing Rights (SDRs) are not used in international trade or finance and cannot be used by central banks to provide liquidity. Nor is there a lender-of-last-resort in SDRs during periods of market stress—unlike the US Federal Reserve (the Fed) with the US dollar.

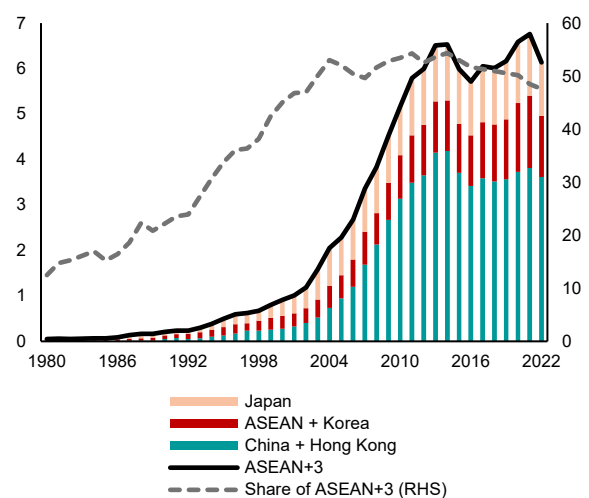
11. **It is unsurprising that central banks still choose to hold their foreign reserves in the same currency in which their countries' foreign debt is denominated and foreign trade is conducted.** Central banks want their reserves to be readily convertible into cash at a moment's notice if they are to be quickly and easily deployed in market operations to smooth capital and trade flows. Consequently, US Treasury bonds—traded in the largest, most liquid government bond market in the world (about USD 33.5 trillion as of October 5, 2023), with their high turnover and narrow bid-ask spreads—hold significant appeal. Eichengreen (2009) notes the self-reinforcing feature of this market—investors transact and concentrate their holdings in US government bonds because of their liquidity. Such activity, in turn, further increases liquidity and strengthens the incumbent advantage of the US dollar. With ASEAN+3 central banks accounting for about 50 percent of the world's foreign reserves, many obviously have significant US dollar holdings themselves (Figure 4). The recent conversion of the Fed's Foreign and International Monetary Authorities facility to a standing facility could further incentivize central banks to hold US treasuries as a proxy for US dollar liquidity.

Figure 3. Major Currencies: Share of World Foreign Reserves (Percent)



Source: International Monetary Fund via Haver Analytics.

Figure 4. ASEAN+3: Foreign Reserves (Trillions of US dollars; percent)



Source: International Monetary Fund via Haver Analytics.

12. **That said, the growing popularity of digital assets has generated discussion about alternative “challengers” to the US dollar.** Iancu and others (2022) observes that rapid developments in digital currencies and new payment ecosystems could accelerate the shift. [Carney \(2019\)](#) proposes the creation of a “synthetic hegemonic currency” that could be provided through a network of CBDCs to serve as an invoicing and payment currency, and whose widespread use could strengthen the credibility of currencies in the basket as reliable reserve assets. Indeed, some 90 percent of central banks are reportedly engaging in work relating to CBDCs ([Kosse and Mattei 2022](#)).

B. Invoice Currency

13. **Exporting firms play an important role in determining the international role of a currency.** They have the option of invoicing in their own currencies, the currency of the destination country, or a separate “vehicle currency.” This invoicing decision influences the degree to which exchange rate fluctuations might affect relative prices in international trade and, in turn, affects the shock transmissions between countries. In the ASEAN+3 region, the US dollar is the dominant currency for invoicing and settlement in intraregional transactions ([Shimizu 2019](#)).

14. **The widespread use of the US dollar in international trade is directly linked to demand for safe assets denominated in the currency.** When entities engage in international transactions, particularly for invoicing, there is a predilection to use the US dollar based on its widespread acceptance and the perceived strength and reliability of the US economy. Other features contributing to the currency’s desirability include its stable value, the sheer size of the US economy and the country’s geopolitical influence ([Siripurapu and Berman 2023](#)), and network externalities. Third countries’ foreign exchange policies such as currency pegs and baskets are pertinent too ([Koerner and Winkler 2017](#)). For these reasons, many ASEAN+3 local currencies continue to struggle to gain traction as preferred media of exchange across borders, even within the region itself.

Exchange Rate Volatility and Pass-Through

15. **The decision by a firm to invoice in a particular currency is usually influenced by monetary volatility.** Where domestic monetary policy is credible, stable, and predictable, exporters and importers may prefer invoicing in their own domestic currencies. This preference would minimize uncertainty and transaction costs, and benefit both parties involved in those trade transactions. Devereux, Engel, and Storgaard (2004) notes that exchange rate volatility can influence a firm's pricing decisions, and countries with more stable money growth tend to attract invoicing in their own currencies.

16. **Correspondingly, there is a link between the choice of invoicing currency and the extent of exchange rate pass-through.** Engel (2006) finds that under sticky price adjustments, firms' preference for the degree of exchange rate pass-through influences their decision as to which currency to use for invoicing. Using major currency examples, [Boz and others \(2020\)](#) estimates that countries invoicing more in US dollars (euro) tend to experience greater US dollar (euro) exchange rate pass-through to their import prices, and that their trade volumes are also more sensitive to fluctuations in these exchange rates. Separately, Amiti, Itskhoki, and Konings (2022) shows that flexible-price determinants of exchange rate pass-through are among the key factors that influence the currency choice of firms.

Market Size

17. **There is a higher likelihood of firms invoicing in their customers' currencies in larger export markets and for large orders.** Friberg and Wilander (2008) offers several possible explanations for this trend: (1) increased competition from local firms in larger markets encourages pricing in the importers' currency, particularly when prices are set before the actual transactions take place; (2) importers in larger markets tend to possess greater bargaining power, enabling them to push for invoicing in their own currencies; (3) larger markets are often associated with lower transaction costs, reducing the need for a vehicle currency; and (4) the costs associated with setting prices and managing multiple currencies influence the choice of invoice currency. Other factors influencing invoicing decisions may include the type of trade (intra-firm, inter-firm, or through a trading company); transaction costs associated with different currencies; the intensity of competition and degree of product differentiation in export markets; and the structure of the production and distribution network (Ito and others 2012).

18. **An obvious example is the influence of the US market on invoicing decisions.** Non-US exporters are incentivized to invoice their exports in US dollars because of the large US market size, which allows them to align their prices with US competitors, resulting in "local currency pricing" for US imports. This practice stabilizes intermediate input prices for US producers, leading them to also invoice their exports in US dollars, resulting in "producer currency pricing" for US exports. Beyond trade with the US, non-US producers invoice their exports in US dollars on the back of the stability of the US dollar and its status as a widely used anchor currency. This "dominant currency pricing" aligns global export prices with those of competing non-US exporters (Mukhin 2022).

19. **Firms also consider strategic complementarities from the interdependence of pricing decisions and international input-output linkages, when determining the invoice currency.** International input-output linkages, particularly within global value chains, also impact invoice currency selection. Firms typically opt to use the same currency for imports and exports to stabilize their margins by aligning costs with revenues and to mitigate exchange rate risks. In this context, the stability of the chosen invoice currency is crucial for exporters in consolidating their marginal costs, enabling effective management of pricing strategies, and maintaining cost structures ([Georgiadis and others 2021](#); Amiti, Itskhoki, and Konings 2022).

C. Vehicle Currency

20. **A "vehicle currency" is a single national currency that has assumed the pivotal role of international money.** This currency fulfills the functions typically associated with domestic currencies but on a global scale (Krugman 1980). Devereux and Shi (2013) posits that the advantages of a vehicle currency become more significant when there are numerous countries and currencies included in the system; however, the distribution of cost savings is usually uneven, with the vehicle country benefiting disproportionately.

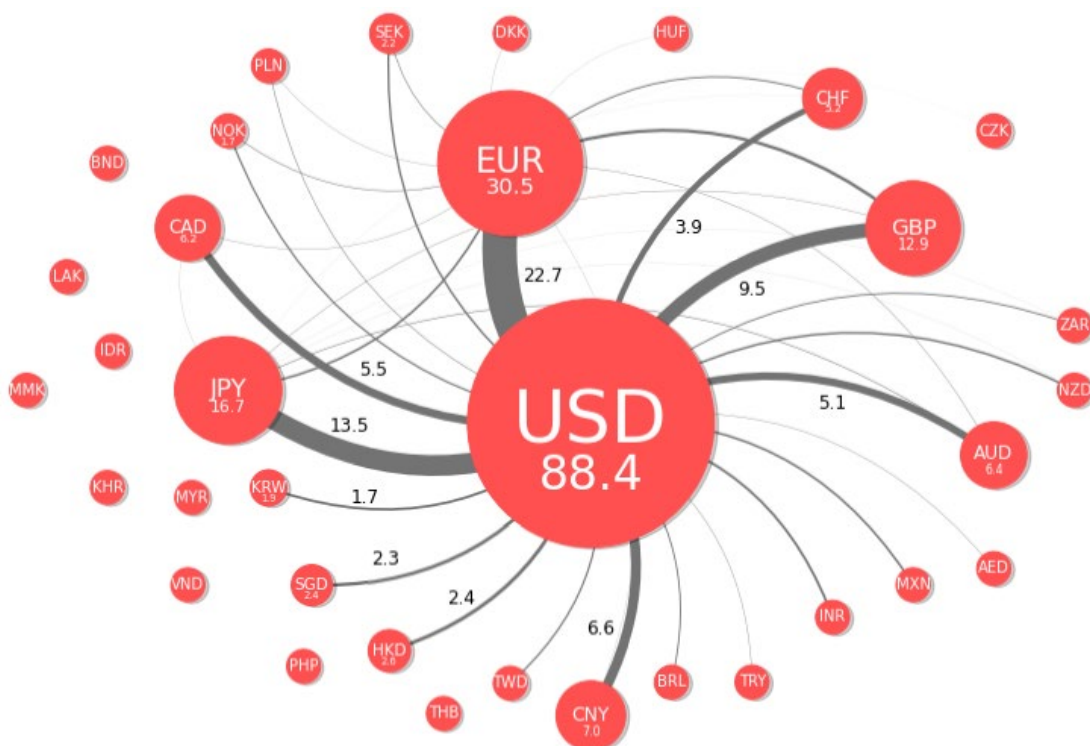
21. **Multiple interrelated factors influence the selection of a vehicle currency.** Goldberg and Tille (2008) suggests three major considerations: (1) transaction costs and liquidity in FX markets—currencies with low transaction costs and high liquidity are more likely to be chosen; (2) industry characteristics, such as homogeneity of goods and specialized markets—once a dominant currency is established in a market, there is a tendency for firms to continue invoicing in that currency to avoid higher transaction costs and

sales volatility; and (3) impact of macroeconomic volatility, particularly in terms of monetary shocks—firms prefer vehicle currencies to be from countries with moderate volatilities to minimize exchange rate fluctuations.

22. **The prevalence of the US dollar as the vehicle currency of choice for trade is underpinned by several considerations.** First, the US holds dominant positions in global markets as both consumer and producer. Second, many countries peg their currencies to (or manage their currencies against) the US dollar. Lastly, the widespread use of the US dollar as the main invoice currency in international trade is reinforced by its importance in transactions involving homogeneous goods, that is, products with high elasticity of substitution that are often priced similarly across different suppliers (Goldberg and Tille 2008).

23. **The eminence of the US dollar in international trade invoicing and global banking and finance is strongly connected and mutually reinforcing.** Significant amounts of international invoicing in US dollars generate higher demand for the currency (Figure 5), granting the US dollar an exceptional advantage from lower borrowing costs. Consequently, these favorable borrowing costs make it appealing for non-US exporters to invoice their sales in US dollars, enabling them to access inexpensive dollar funding more easily. As a result of this two-way feedback loop, the US dollar has become entrenched as the preferred global vehicle currency, even when other economies possess comparable fundamentals (Gopinath and Stein 2021).

Figure 5. Global Over-the-Counter Foreign Exchange Market Turnover Share by Currency and Currency Pair
(Percent of total)

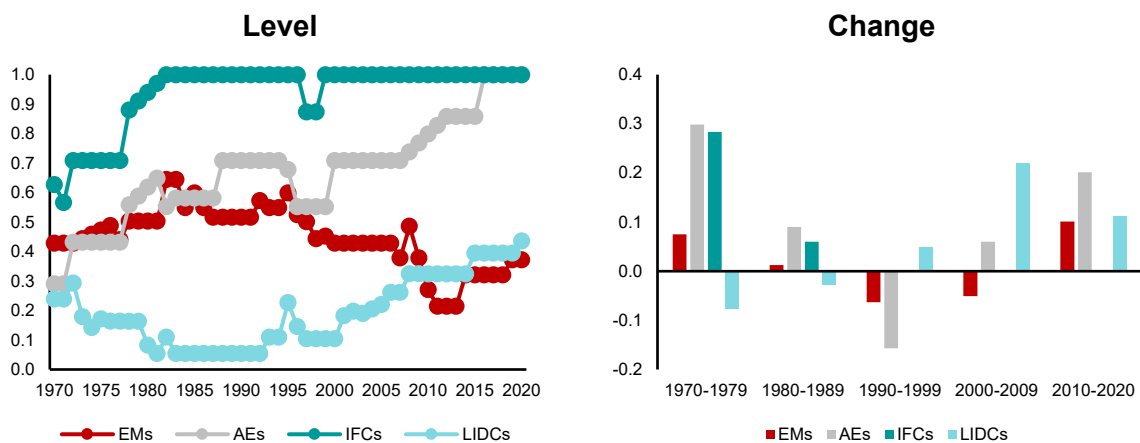


Sources: Bank for International Settlements; and AMRO staff visualizations.

Note: Vertex size is proportional to the share of single currency in total turnover; edge thickness represents the turnover share of the currency pair. Because two currencies are involved in each transaction, the sum of the turnover shares of individual currencies totals 200 percent instead of 100 percent.

24. **In Asia, the US dollar remains the primary currency for trade.** Asian countries initially relied on a *de facto* US dollar peg policy but have adopted more flexible exchange rates since the Asian financial crisis in 1997–98. Despite this shift, the US dollar continues to be the key currency used in international trade in part attributable to changing capital controls and regulations in the region that contribute to restricting the use of local currencies (Figure 6). Moreover, the US dollar offers convenience as a vehicle currency even for intra-firm trade given that the US remains the ultimate destination for many Asian exports, and notwithstanding that regional production networks and multinational firms in Asia are driving intraregional trade (Ito and others 2012; Sato 2019).

Figure 6. ASEAN+3: Evolution of Chinn-Ito Financial Openness Index by Income Group



Sources: [Chinn and Ito \(2006\)](#); and AMRO staff calculations.

Note: The index is based on a scale from 0 to 1, with higher values indicating greater financial openness. The aggregated indices are simple averages of individual country indices. The right figure shows changes in the normalized aggregated index (max = 1.0). AEs = advanced economies, comprising Japan and Korea, EMs = emerging markets, comprising China, Indonesia, Malaysia, Thailand, and Philippines, IFCs = international financial centers, comprising Hong Kong and Singapore, LIDCs = low-income developing countries, comprising Cambodia, Lao PDR, Myanmar, and Vietnam. Data for Brunei Darussalam are not available.

III. Existing Ecosystem for Local Currency Transactions

25. **Certain policy measures can effectively foster the utilization of local currencies in trade and investment in the ASEAN+3 region.** [Sussangkarn \(2019\)](#) highlights several key strategies, namely: (1) establishing efficient currency exchange markets; (2) promoting the use of local currencies through initiatives such as the LCSF; (3) developing local currency bond markets through the Asian Bond Market Initiative (ABMI) and Asian Bond Fund (ABF); and (4) establishing bilateral swap arrangements (BSAs). Other aspects of the ecosystem include enhancing the role of Appointed Cross Currency Dealers (ACCDs) and improving the infrastructure for payment, clearing, and settlement.

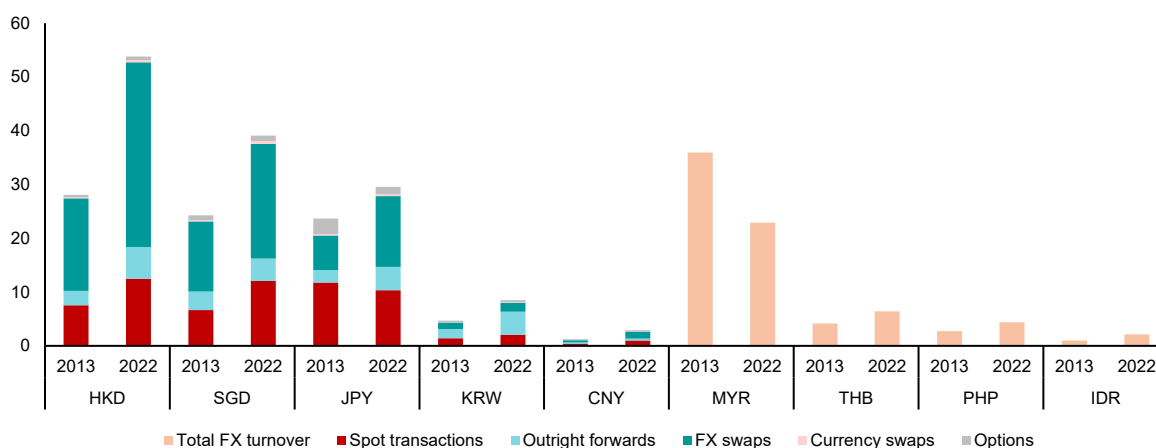
A. Currency Exchange Markets

26. **The lack of a direct currency exchange market in ASEAN+3 contributes significantly to the dependence on trading through the US dollar.** For example, FX buy and sell rates for bank transfers from major banks in Thailand, Indonesia, and Malaysia show that spreads relative to the US dollar are generally smallest compared to other currencies ([Sussangkarn 2019](#)), although individual bank data show that in several instances, prices for direct quotations in local currency are better, notably within ASEAN. One reason for the wide spreads seen in many non-major currencies vis-à-vis local currencies is that there is no direct currency exchange market between the former and the

latter, hence the need to trade through the US dollar. The lack of direct currency markets also makes hedging costs through forward contracts much more expensive for local currencies compared to the US dollar.

27. **Exposures to ASEAN+3 emerging market FX are vulnerable to the limited hedging capacity of local markets.** FX swaps, and outright forwards to a smaller extent, are the most common FX hedging instruments in the region. However, FX derivative activity in most member economies, particularly in ASEAN-4 markets, remains relatively small (Figure 7). During periods of financial stress, any increase in demand for FX hedging can cause the costs of these derivatives to spike. To facilitate FX hedging in these emerging market economies, [ACC BIS \(2022\)](#) recommends streamlining procedures, lowering transaction costs, and offering incentives to firms to improve their FX risk management practices.

Figure 7. Over-the-Counter Foreign Exchange Turnover by Currency and Instrument, 2022
(Percent of GDP)



Source: Bank for International Settlements.

Note: Turnover is defined as the gross value of all new deals entered into during a given period and is measured by the nominal or notional amount of the contracts. The figure uses daily average of reported turnover in April 2022, adjusted for local inter-dealer double-counting ("net-gross" basis).

28. **Although swap and forward markets constitute the largest portion of FX turnover by instrument, their liquidity and accessibility to nonresidents for onshore FX hedging vary significantly throughout the region.** The FX markets in Hong Kong and Singapore demonstrate superior market liquidity to other economies in the region, with narrower bid-ask spreads (Appendix I). They also offer greatest accessibility for nonresidents engaging in onshore FX hedging. While some regional members permit offshore hedging activities, usually under pre-defined thresholds and at larger bid-ask spreads, others (for example, Malaysia) do not recognize offshore trading of their currencies ([ACC BIS 2022](#)).

B. The Local Currency Settlement Framework

29. **The LCSF is gaining recognition as an effective policy coordination tool to foster the adoption of ASEAN+3 local currencies.** The LCSF refers to the process of settling bilateral transactions between customers in partner countries using local currencies

through ACCDs.² LCSFs between ASEAN+3 economies are designed to directly boost the use of local currencies in trade and investment settlements ([Watanabe and Wang 2019](#)).³ Through the LCSF, selected financial institutions are designated as ACCDs, allowing them to offer a range of financial services to local businesses, such as direct FX quotes and financing/deposit accounts in the counterpart's currency (Appendix II). This direct access to financial services in local currencies reduces reliance on major currencies (such as the US dollar) and effectively lowers FX costs for businesses, creating an incentive to utilize local currencies in bilateral transactions among participating jurisdictions ([BNM 2019](#); [BI 2020](#)). The expansion of local currency settlement is also considered crucial in enhancing FX stability and offering a natural hedge against currency risks ([Haryono 2022](#)).

30. The LCSF has had some initial success in increasing the use of local currencies in cross-border trade and investment. [Sussangkarn \(2019\)](#) notes a rise in the share of exports denominated in local currencies from Thailand to Malaysia after the two countries agreed to an LCSF in 2016. [Shofa \(2023\)](#) observes that Indonesia's bilateral trade under LCSFs with China, Japan, Malaysia, and Thailand also grew substantially in 2022. The country's trade and investment transactions under various LCSFs reached USD 2.1 billion in the first four months of 2023, surpassing half the total for the whole of 2022.

31. However, the overall effectiveness of LCSFs in promoting cross-border transactions in local currencies is still to be determined. Various challenges, as highlighted by Sato (2019) include: (1) idiosyncratic economic characteristics of regional economies that may be at odds with the goal of promoting local currency usage (e.g., heavy reliance on the US dollar for trade invoicing); (2) the exclusive granting of flexible FX risk management options to ACCDs, leaving other dealers, who might have been open to undertaking more local currency transactions, exposed to FX volatility and so potentially favoring the US dollar; and (3) growing regional production and value chains with the US as the primary final destination market.

32. ACCDs are authorized by respective authorities to support local currency settlement transactions through the establishment of accounts in the partner country's currency, but further improvements to the facility are necessary. AMRO staff's discussions with ACCDs highlight several major impediments to expansion:

- *Nature of local currency transactions.* Currently, transactions are dominated by payments for trade in goods and services; primary income transactions, such as receipt of and payment for labor compensation and investment income; and secondary income transactions, such as remittances that include receipts of and payments to the government sector or other sectors (excluding grants, prizes, donations, and/or the like). A large part of ACCD activity is centered on opening accounts and managing account balances and payment facilities. ACCDs also

² For example, customers in Indonesia and Japan can pay or receive payments/transfers in local currencies such as the Indonesian rupiah or Japanese yen without conversion via a third currency such as the US dollar.

³ Examples include the LCSFs between Malaysia and Thailand, and Malaysia and Indonesia that came into effect in 2016 and 2018, respectively, and more recently, the LCSF signed between Indonesia and Korea in May 2023, both directly seeking to boost local currency usage in trade and investment settlements among the participating economies. Among ASEAN members, commitment to promoting this objective is also evidenced in schemes such as the Strategic Action Plan for Financial Integration (2016–2025), the ASEAN Regional Payment Connectivity Initiatives, and ASEAN Guideline on Local Currency Settlement Cooperation Framework.

promote awareness of local currency transactions and provide incentives to use their payment services, such as discounts on transfer or commission fees. Although these incentives have not been sufficient to boost the volume of local currency transactions, the latter could rise significantly as transactions expand to include activities such as financing and portfolio and direct investments.

- *Price discovery.* ACCDs are required to provide direct FX quotations in local currency, which means that efficient pricing mechanisms are necessary to increase the attractiveness of transacting in local currencies. However, demand for local currencies is crucial in determining the direct quotations, and with ACCDs continuing to face illiquid local currency markets—money markets are still dominated by the US dollar—price discovery is difficult and ACCDs need to mitigate potential liquidity and foreign exchange risks.
- *Infrastructure.* ACCDs require ready infrastructure and skills to support efficient local currency transaction processes—to ensure fast, secure, affordable, and transparent transactions, and execute various mandatory reporting requirements effectively. Current bilateral arrangements with different sets of regulations in each country make the process costly and discourages expansion. As it is, setting up local currency transactions requires that ACCDs work with clients to change their invoicing to local currency and adapt certain accounting practices to satisfy local requirements. ACCDs also need to coordinate with their clients' trading partners to facilitate the shift and agree on whose local currency is to be used, while providing incentives to the parties assuming the exchange rate risks. These procedures are typically carried out case-by-case, resulting in sizable overhead costs for implementing the LCSF. Moreover, FX trading businesses (at both ACCDs and non-ACCDs) find that it is not cost-efficient to dedicate resources to trading direct local currency pairs given the lack of volume. Consequently, they continue to use the US dollar as the “hub” currency.

33. **For ACCDs and their clients, any shift to LCSFs has yet to present clear incentives.** According to market participants, whereas small and medium-sized enterprises (SMEs) whose businesses are limited to a few (two to three) jurisdictions have moved toward LCSF, multinational firms still prefer to use a vehicle currency—typically not an ASEAN+3 currency—for transactions and reporting. Firms prepared to make the transition may need to incur some operational overheads and adjust to internal policies on payment arrangements (that typically define settlement currencies) to switch from the vehicle currency. Although this operational burden is eased with assistance of the ACCDs, it remains a barrier to a quick transition to the LCSF. ACCD interlocutors note that although volumes have risen, they have not increased sufficiently to provide economies of scale and justify investing resources to facilitate client onboarding.

C. Local Currency Bond Markets

34. **ASEAN+3 local currency bond markets are crucial for diversifying financial intermediation channels and raising demand for local currencies.** Their development and growth are particularly significant in that they encourage greater foreign investment in local currencies (Box 1), reducing currency and maturity mismatches resulting from the “original sin” that led to the Asian financial crisis ([Eichengreen and Hausmann 1999](#);

Eichengreen, Haussman, and Panizza 2003).⁴ Initiatives such as the ABMI and ABF aim to stimulate both demand for and supply of local currency bonds and attract more regional savings for intraregional investments ([Sussangkarn 2019](#)).

35. ASEAN+3 local currency bond markets have grown steadily over time, largely underpinned by a few economies, but liquidity remains thin. These markets are largely dominated by treasury and other government bonds, which accounted for 71 percent of the region's total bond stock in 2022. The share of foreign holdings in some markets has declined in recent years but increased in Japan and Korea (Figure 8). In terms of the broader characteristics:

- *Market size has increased over time but plateaued over the past couple of years.* Outstanding bonds reached USD 33.4 trillion at the end of 2022, equivalent to 123.2 percent of the region's GDP (Figure 9). However, the amount is mostly attributable to China and Japan. ASEAN local currency bonds outstanding totaled USD 2.1 trillion in 2022, representing 6.2 percent of the entire ASEAN+3 local currency bond market, or the equivalent of 60.9 percent of ASEAN GDP. Correspondingly, bond trading volumes rose from 2017 but flattened in 2021 and 2022 after central banks tightened monetary policy (Figure 9).
- *Market liquidity has declined from levels prior to the COVID-19 pandemic.* In 2022, bond turnover ratios—defined as trading activity relative to market size, with higher ratios indicating greater market liquidity—were lower than observed in 2019 in many ASEAN+3 economies, especially for government bonds (Figure 10).

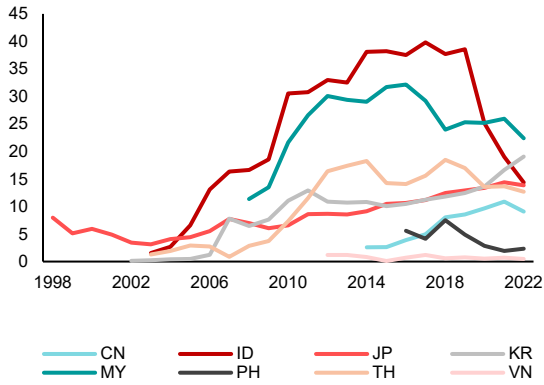
36. The development of local currency bond markets in emerging Asian economies is confronted with several existing and new challenges. The 26th ASEAN+3 Finance Ministers and Central Bank Governors' Meeting in May 2023 highlighted a couple of crucial issues ([JMoF 2023](#)):

- The need to tackle the shortage and high cost of hedging tools—the root cause can be traced back to inefficiencies and inactivity in the short-term money market and secondary bond market.
- A lack of standardization of market practices and harmonization of regulations, which continues to hamper cross-border bond transactions—the public and private sectors are conducting discussions on legal and regulatory issues to promote standardization regionally through the ASEAN+3 Bond Market Forum.

Moreover, technological advancements, such as distributed ledger technology, artificial intelligence, and big data analytics are rapidly reshaping the financial landscape and posing new questions for regulators, who will need to be more nimble and require different skillsets.

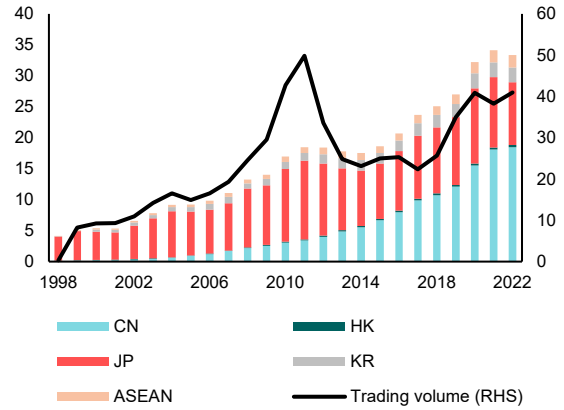
⁴ “Original sin” in this case refers to the situation where domestic borrowers are unable to borrow in local currency abroad or over the long term, even domestically.

Figure 8. Selected ASEAN+3: Share of Foreign Holdings of Local Currency Government Bonds (Percent)



Source: AsianBondsOnline.

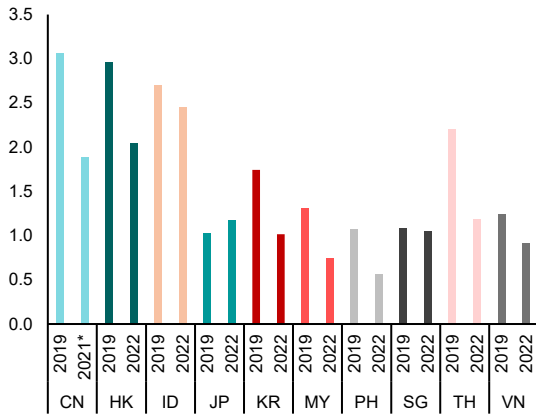
Figure 9. ASEAN+3: Local Currency Bonds Outstanding and Trading Volume (Trillions of US dollars)



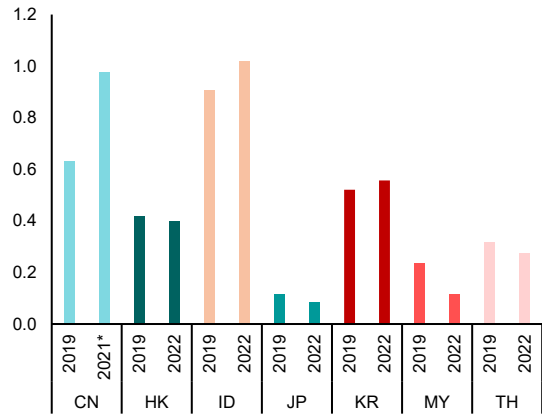
Source: AsianBondsOnline.

Figure 10. Selected ASEAN+3: Local Currency Bond Turnover Ratios

Government Bonds



Corporate Bonds



Source: AsianBondsOnline.

Note: The bond turnover ratio serves as an indicator of bond market liquidity; it measures the level of trading activity that occurs in the secondary market in relation to the average amount of bonds outstanding, which is determined by taking the average value of the bonds outstanding at the beginning and end of the year. Data on corporate bonds for Singapore, Philippines, Vietnam and data for Brunei Darussalam and Myanmar are not available. CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; LA = Lao PDR; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam.

* Data for 2022 are not yet available.

Box 1. Developing ASEAN+3 Bond Markets to Support Cross-Border Transactions in Local Currencies

ASEAN+3 economies made substantial efforts to develop their local currency bond markets in the wake of the Asian financial crisis. The crisis highlighted the problem of currency and maturity mismatches among those with larger shares of external debt denominated in foreign currencies (Eichengreen, Hausmann and Panizza 2003; [Fried 2017](#)). Consequently, governments sought to expand their local currency bond markets through the Asian Bond Market Initiative and Asian Bond Fund, with support from the Asian Development Bank. Over time, issuance of local currency sovereign bonds by the Bank's member economies has risen notably ([ADB 2023](#)).

The development of local currency bond markets is crucial for improving market liquidity and encouraging the use of local currencies in cross-border transactions. [Eichengreen \(2013\)](#) defines a liquid market as one where both private and public investors can buy and sell assets denominated in a particular currency without causing substantial price impact or facing excessive transaction costs. Such liquidity would require a certain market depth, such as sizable outstanding bonds, and making related financial instruments available for investors to manage the associated risks. Efficient clearing, settlement, and trading platforms—through over-the-counter (OTC) mechanisms or real-time gross-settlement delivery-versus-payment systems—can facilitate investor access and encourage participation. The willingness of the central bank to act as the lender of last resort during periods of limited credit availability is also vital in maintaining stability and liquidity.

Several factors contribute to the development of local currency government bond markets. [Claessens, Klingebiel, and Schmukler \(2003\)](#) finds positive correlation between the size of an economy, low inflation, and capital account openness with a higher proportion of local currency sovereign debt. [Hoschka \(2005\)](#) highlights the potential of regional political initiatives—such as those by the Asian Development Bank or the Inter-American Development Bank—to drive growth in local currency sovereign borrowing. Meanwhile, [Spiegel \(2009\)](#) underscores the importance of market size, financial liberalization, and regulatory standards in fostering the development of local currency bond markets. Burger, Warnock, and Warnock (2012) associates stable inflation and robust legal safeguards for creditors with increased reliance on local currency sovereign borrowing, while [Fried \(2017\)](#) suggests that the credibility of monetary policy plays a pivotal role in shaping the government's decision regarding the optimal currency denomination of its debt. Finally, [Burger and Warnock \(2006\)](#) shows that the tendency to run fiscal deficits is associated with larger government bond markets, which are used to finance those deficits.

For the issuing government, debt denominated in local currency offers different benefits and challenges compared to foreign currency debt. Local and foreign currency sovereign bonds differ in their risk profiles. Foreign currency debt exposes governments to exchange rate risk. In contrast, local currency sovereign debt offers built-in protection against currency fluctuations and inflation; however, governments at risk of a sovereign debt crisis may be tempted to dilute the value of their debt denominated in local currency through inflation or excessive depreciation of the real exchange rate, further eroding economic stability and the credibility of their monetary policies ([Fried 2017](#); Dulaney 2022). Put another way, local currency debt shifts currency mismatch risks to foreign investors—as the local currency depreciates, the impact for foreign investors is amplified, which can lead to capital flight and exert further downward pressure on the currency ([Carstens and Shin 2019](#)).

D. Bilateral Swap Arrangements

37. **BSAs involve an exchange of assets between central banks through predefined tenders, with the aim of providing liquidity in the currency of the counterpart.** They focus primarily on fulfilling the foreign currency funding requirements of domestic banks ([CPMI 2022a](#)).⁵ Put another way, bilateral swap lines may be likened to traditional lending facilities provided by central banks, but in this case involve one central bank assessing the eligibility of the borrowing entities (that is, its own domestic banks and firms) and bearing the credit risks on behalf of the source central bank ([Bahaj and Reis 2018](#)).

38. **BSAs have emerged as a means of enhancing liquidity in local currencies.** They provide another mechanism for central banks to supply liquidity in their own currencies to foreign banks. [Arslanalp, Eichengreen, and Simpson-Bell \(2022\)](#) observes that the expanding global network of BSAs has improved the ability of central banks to access currencies other than the traditional reserve currencies. [Bahaj and Reis \(2018\)](#) suggests that BSAs can incentivize recipient-country banks to invest their funds in assets denominated in the source-country's currency—BSAs provide recipient-country banks with a reliable and direct channel to access the source-country's currency, consequently diminishing their funding risks. [Perez-Saiz and Zhang \(2023\)](#) argues that beyond the direct utilization of such agreements, their presence can be positive for overall perception and trust in the currencies of source countries, indirectly encouraging broader usage and acceptance in various transactions.

39. **That said, BSAs can have diverse objectives across jurisdictions, which complicates their role in promoting local currency transactions.** For instance, swaps between the Bank of Japan and its counterparts are typically intended to ease pressure on currency funding markets, while swaps among the ASEAN-5 countries tend to focus on facilitating local currency settlements in trade and investment and stabilizing financial markets ([Han and Lulu 2022](#)). Elsewhere, China has used BSAs to expand the cross-border reach of the renminbi (Box 2). More generally, intraregional BSAs are primarily concentrated among China, Japan, Korea, and the ASEAN-5. BSAs among ASEAN+3 amounted to USD 401 billion as of July 2023.

40. **Hence, there are limitations to the application of BSAs in supporting cross-border usage of local currencies.** [Han and Lulu \(2022\)](#) points to certain drawbacks that are directly related to the very features of BSAs themselves:

- The diverse aims of BSAs could limit the focus on promoting cross-border local currency transactions—they may prioritize other needs over currency internationalization.
- The modalities of BSAs—including duration and counterparty risks—may be less predictable, given their bilateral nature. This lack of consistency may hinder the

⁵ At the commencement of a swap, a central bank sells a specific amount of its currency to the source central bank in exchange for the latter's currency at the prevailing market exchange rate and agrees to buy back its currency at the same exchange rate on a specified future rate. The central bank that requested activation then uses the currency obtained through the swap to on-lend to its local banks or firms. On the specified future date, the swap unwinds and the funds are returned to the source central bank, and the requesting central bank pays interest to the source central bank.

development of a stable and consistent environment for catalyzing cross-border transactions using local currency, as participants may face uncertainty about availability and terms of the arrangements.

- The establishment of BSAs between participating countries is based on mutual interests and specific needs, which could contribute to a lack of transparency and data availability in promoting cross-border usage of local currencies.

Box 2. Efforts to Promote Use of the Renminbi in International Transactions

BSAs have been used extensively by the People's Bank of China (PBoC) to promote the internationalization of the renminbi. As of 2022, China had 40 outstanding swap lines totaling about CNY 4 trillion, covering neighboring Asian countries and other emerging market economies, as well as advanced economies and their institutions, such as Canada, the euro area, and the United Kingdom ([PBoC 2023](#)). Although some have questioned the effectiveness of BSAs in promoting trade settlement in local currency, given that they have been employed infrequently (for example, McDowell 2019), other evidence suggests that China's signing of BSAs has increased the number, value, and proportion of settlements priced in the renminbi in cross-border trade (for example, Song and Xia 2020).

To enhance local currency liquidity, the Renminbi Liquidity Arrangement was established in 2022. The Arrangement was developed by the Bank for International Settlements (BIS) in collaboration with the PBoC. The Renminbi Liquidity Arrangement aims to provide liquidity support to participating central banks in the Asia-Pacific region through a reserve pooling scheme, whereby they can draw from their contributions and access additional funding through a collateralized liquidity window operated by the BIS during periods of market volatility. The participating central banks include Bank Indonesia, Bank Negara Malaysia, the Hong Kong Monetary Authority, the Monetary Authority of Singapore, and the Central Bank of Chile ([BIS 2022b](#)).

From a regional perspective, an amendment to the Chiang Mai Initiative Multilateralization (CMIM) Agreement, implemented on March 31, 2021, has institutionalized the utilization of local currencies among ASEAN+3 economies. This change allows member countries to use their respective local currencies, in addition to the US dollar, for CMIM financing. As a result, member countries can now access liquidity support from the CMIM's total financing capacity of USD 240 billion, based on voluntary and demand-driven requirements ([AMRO 2021](#)). This development aims to enhance liquidity in and highlight the usage of local currencies in the region.

E. Payment and Settlement Infrastructure

41. The FX market supports activities such as risk hedging and international trade and investment, but settlement risks are associated with those transactions.

Specifically, settlement risks arise when currencies are converted and payments are made in different currencies during wholesale FX transactions ([Glowka and Nilsson 2022](#)). These encompass both credit risk (potential loss of the transaction's principal value) and liquidity risk (shortfall in the purchased currency) ([NYIC and MAS 2023](#)). Additionally, cross-border cross-currency payments are typically exposed to time lags with longer settlement processes and delays due to limited operating hours and differences in time zones.

42. Payment-versus-payment (PvP) mechanisms may be used to mitigate FX settlement risks but not all FX transactions can access them, resulting in increased friction. PvP ensures that final settlement in one currency occurs only if final settlement in the other currency happens.⁶ Where PvP is not available, transactions can be settled

⁶ The Global Foreign Exchange Committee (GFXC), consisting of central banks and market participants, has enhanced its guidance on settlement risk, which emphasizes the use of PvP or risk reduction strategies like netting (GFXC 2021) and has been endorsed by the Basel Committee on Banking Supervision.

through correspondent banks in various ways, each with its own limitations: (1) controlled settlement, which reduces counterparty exposure for only one party; (2) manual synchronization of transactions, which is often operationally expensive; or (3) “on-us” settlement, where both legs of an FX trade is settled by a single institution but there is still no guarantee both payment legs will be settled simultaneously or in coordination.

43. Relatedly, availability of investment opportunities, such as bonds and other asset management products, and their efficient settlement are crucial for promoting wider use of local currencies. An example of progress is the Renminbi Trade Settlement Scheme, which covers trade transactions between five Chinese cities and selected partners (Hong Kong, Macao SAR, and ASEAN) and enables offshore parties to easily convert the renminbi to other currencies. It has resulted in increased demand for renminbi deposits in Hong Kong and subsequent growth in nontrade financial activities, including renminbi-denominated bond issuance and asset management ([Rhee and Sumulong 2014](#)). On the Hong Kong side, efficient payment and securities settlement systems, with infrastructure for PvP and Delivery-versus-Payment for renminbi-denominated securities already in place, has played a crucial role in supporting this development.

44. From the payments perspective, existing systems often lack interlinking arrangements. Domestic infrastructures are often limited to specific institutions without direct or even indirect connections for cross-border payments. Rather, cross-border payments typically rely on specific domestic or regional infrastructures that are often unique to given jurisdictions and accessible only to certain institutions. The challenge also lies in overcoming technological differences between systems, given that these initiatives were often designed for domestic use and may not be interoperable to facilitate cross-border transactions. Furthermore, although multicurrency settlement systems facilitate the settlement of cross-border transactions, they might not have sufficient liquidity to cover all currencies. As a result, intermediary banks are still relied upon to access domestic systems in both originator and beneficiary jurisdictions, leading to longer transaction chains, reduced transparency, increased costs, and higher counterparty risks ([NYIC and MAS 2023](#)).

45. Fragmentation of regional payment systems remains a key barrier to promoting cross-border local currency usage. AMRO staff’s discussions with private sector users and providers of cross-border payment infrastructure suggest that differences in practices, technology preferences, and business models are key challenges for payment connectivity initiatives in the region. Cohesiveness in these areas is needed to achieve customized, country-specific technological or regulatory solutions for connecting participants. However, given the significant time and costs required to harmonize systems, local currency arrangements are only feasible on a bilateral basis at this stage. But, bilateral arrangements are not scalable—and hence unlikely to contribute to any significant growth in local currency usage—and the resources required to expand such initiatives could increase exponentially with the number of linkages.

IV. Price Discovery

46. Price discovery is defined as the act of determining a common price for an asset.⁷ The process occurs every time a seller and a buyer interact and arrive at a

⁷ Per Chicago Mercantile Exchange Group (<https://www.cmegroup.com/education/courses/introduction-to-futures/price-discovery.html>), accessed on 14 June 2023.

transaction price for a given quantity of the asset. Price discovery encompasses all relevant information from the interactions between buyers and sellers on a regulated exchange (Lien and Hung 2023). In financial markets, the success of the process depends on various factors, which broadly include supply of and demand for the asset, the risk appetite of market participants, volatility of the asset price, information asymmetries, and the reliability of market mechanisms that seek to establish a market price.⁸

47. Price determination, though related to price discovery, is a different market concept. Price determination is the evaluation of an equilibrium price given the supply and demand of a particular asset. It can be visualized as the point of intersection between the supply and demand curves. On the other hand, price discovery is the mechanism through which buyers and sellers arrive at the price for a particular transaction in the absence of perfect and symmetrical information. Hence, price determination represents a macro-level perspective on the equilibrium price, whereas price discovery represents a micro-level perspective on the variability of prices around the equilibrium ([Anderson, McKenzie, and Mitchell 2021](#)).

48. Price discovery depends on many different factors but liquidity is arguably the most important. The efficiency of price discovery is determined by the speed and accuracy with which prices adjust from the old to the new equilibrium with the arrival of new information ([Yan and Zivot 2007](#)). The factors (not mutually exclusive nor exhaustive) that determine the efficiency of price discovery include trader habits and behaviors, connectivity of interrelated assets, the measurement interval (precision of time intervals on orders), liquidity factors, short-selling activities, market mechanism changes, and micro- or macro-events (Lien and Hung 2023). However, the literature suggests that liquidity—which could be measured in the number of market participants (Frijns, Indriawan, and Tourani-Rad 2018), trading volume, effective spread (Peña, Romo, and Mayordomo 2010)—leads to more efficient price discovery (Janzen and Adjemian 2017; [Díaz de León 2020](#)).

49. Price discovery has evolved significantly in FX markets over time. Trading has become more electronic while the diversity of participants and trading venues has increased, both having enabled higher trading speeds, more choices, and greater variety in trading strategies. Traditionally, FX markets could be divided into inter-dealer and dealer-customer segments, but the emergence of non-dealer financial institutions and multiple electronic trading platforms has produced a highly fragmented market. Participants can trade FX at more than 75 execution venues,⁹ while banks' internalization of customer flows has decreased inter-dealer trading. This fragmentation has reduced transparency in broader markets ([Schrimpf and Sushko 2019](#)). Meanwhile, the emergence of high-frequency trading has accelerated the process of price discovery (Scholtus, van Dijk, and Frijns 2014; Chordia, Green, and Kottimukkalur 2018; [Chaboud, Hjalmarsson, and Zikes 2020](#)).

50. Trader location plays an important role in price discovery despite concurrent worldwide access to real-time newsfeeds. Traders who are based in the country whose currency is being traded and those based in major international FX centers typically play a

⁸ Per IG (<https://www.ig.com/sg/trading-strategies/what-is-price-discovery-and-how-does-it-work--190605>), accessed on 14 June 2023.

⁹ An execution venue is an entity that provides a marketplace, and thereby liquidity, to participants wishing to trade in securities. Execution venues include regulated markets, multilateral trading facilities, and market makers.

larger role in price discovery, given that they may have superior information about the fundamental or long-term value of the exchange rate. Price discovery is also influenced by the business hours at a particular location given that trading outside of business hours could be less related to fundamentals and more related to temporary demands for liquidity ([D'Souza 2007](#)).

51. The dependence on global FX markets is significant, and it also determines the trading in currency crosses (trades in which the US dollar is not present in any of the legs). However, even for currency crosses a substantial part of the price discovery occurs through the US dollar. A US dollar leg is present in 88 percent of all FX trades done ([BIS 2022a](#)) which, by definition, makes the US dollar the dominant currency in FX markets. The US dollar implied rate typically “discovers” the equilibrium price faster than the currency cross, attributable to better liquidity in the former than the latter ([Yan and Zivot 2007](#)).

52. The availability of a wide range of financial instruments enhances price discovery in markets. FX markets offer several derivatives such as futures, options, and swaps, which are either exchange-traded or over-the-counter (OTC). Exchange-traded derivative markets facilitate price discovery and immediacy functions for smaller trades. For example, there is evidence that derivatives (especially futures and non-deliverable forwards) play a major role in price discovery and help to guide spot prices toward equilibrium ([Sharma and Chotia 2019](#); [Schmittmann and Teng 2020](#)). In certain emerging market economies, derivative markets could be more liquid than the underlying cash market and hence perform the price discovery function ([IMF 2002](#)).

53. Feedback from market makers trading ASEAN currencies suggest that the lack of demand for intraregional currency settlement is the biggest hindrance to direct price discovery of cross currency pairs. Price discovery continues through the US dollar leg because the demand for transactions in local-currency crosses is low and does not provide economies of scale for market makers to develop a direct market between the latter currencies. Direct price discovery of non-US dollar currency pairs would need dedicated resources and low volumes do not justify such investment. On the other hand, high trading volumes for US dollar-based FX mean that market makers (almost) never have to worry about the liquidity of the US dollar leg. US dollar round tripping also means that two trades are executed in each transaction, which allows intermediary banks to increase profit margins by passing the conversion costs to their clients through the bid-ask spreads. Together, the lack of volume and economies of scale associated with the current set-up do not provide sufficient incentive for direct price discovery among non-US dollar currency pairs.

54. The corporate sector could be a key source of demand for local currencies but their needs differ. Large multinational corporations that operate in multiple jurisdictions typically maintain their balance sheets in US dollars so that the overheads of dealing with multiple currencies are reduced. On the other hand, SMEs operating in two or three economies in the region are more likely to switch their transactions away from the US dollar, but they may not be able to generate the necessary volumes to justify dedicated resources and infrastructure for direct settlement.

55. Hence, better liquidity in local currency pairs requires diversity in the customer base and changes in market infrastructure. Typically, demand for regional FX can be divided into the real (for example, exporters, importers, real money investors) and the speculative (for example, hedge funds, financial institutions). Although it may still be possible

to move real demand away from US dollars, a similar shift in speculative demand could be more difficult. Speculators typically use the US dollar as a vehicle currency, given that it trades around the clock and its risks can be managed more efficiently than those associated with other currencies. The restricted trading hours of regional currencies, which are not synchronized even within the region, can impede price discovery when either or both currency markets are closed.

56. Market makers do not see the availability of hedging instruments and investible assets as roadblocks to price discovery of local currency pairs. Contrary to the literature and conventional wisdom, AMRO staff's discussions with market makers in ASEAN currencies suggest that OTC FX forwards and options available in local currency onshore and non-deliverable forward markets are sufficient for risk management. Although desirable, a wider range of hedging instruments would not be the primary driver for price discovery of local currencies. Market makers believe that the hedging market would organically develop as volumes rise—banks in the region have sufficient expertise to price and structure products if their customers are sufficiently interested in using them. Access to investible assets in local currencies can help improve yields while holding local currencies, but that too is seen to be a “nice-to-have” rather than a “must-have” feature.

V. Strategies to Encourage Local Currency Transactions

57. Increased use of local currencies can enhance financial stability, making ASEAN+3 economies less susceptible to shocks emanating from the rest of the world. It would also strengthen the ability of central banks in the region to stabilize their economies during periods of stress. However, improvements would be necessary in several areas. Broadly, the LCSF is still limited in scope and needs to be enhanced, while an expansion of underlying transactions in local currency markets is also needed, as well as linking cross-border payment initiatives to resolve some of the challenges in promoting the LCSF.

58. Any significant expansion in the use of ASEAN+3 local currencies would likely be driven by the region's ascendancy along several dimensions. The growing role of Asian markets (particularly China) as final consumption destinations has kick-started the move toward using local currencies. The impetus for the adoption of local currencies is further driven by the expansion of regional production networks such as joint ownerships with local firms, increased local procurements, and rising intraregional trade and foreign direct investment. Institutional changes—including greater liberalization of FX transactions and a shift toward more flexible managed float exchange rate systems—are also contributing factors. [Ito and others \(2021\)](#) argue that the preeminence of the US dollar would gradually decline were Asian countries to continue strengthening their local production capabilities and opening up their capital markets.

59. However, the requirements to challenge the dominance of the US dollar are simply not in place at this stage nor are they likely to be established even in the medium-term. Emerging market currencies are typically not considered sufficiently safe assets because of the greater volatility of their underlying fundamentals than those of advanced economies. The demand for safe assets is then directly linked to invoicing behavior—and vehicle currencies—associated with international trade, with the preference for currencies backed by strong and stable economies. In a “chicken and egg” outcome, the consequent lack of depth, accessibility, and liquidity of emerging market currencies make vehicle currencies much more attractive. Moreover, central banks would naturally hold large portions of their foreign reserves in the same currency in which their countries' foreign debt

is denominated (largely in US dollars) so that they can be converted into cash at a moment's notice. Net-receiving economies would still have the option of converting local currency acquired into requisite hard currencies to boost their foreign reserves.

60. **Expanding the use of ASEAN+3 local currencies in cross-border transactions and improving their liquidity might be achievable through other means.** [Arslanalp, Eichengreen, and Simpson-Bell \(2022\)](#) argue that market forces and incentives matter “at least as much as” policy measures. New financial technologies make the trading of currencies of smaller economies cheaper and easier. Electronic trading platforms, automated market-making (AMM), and automated liquidity management technologies for FX transactions have reduced transaction costs and could be deployed to benefit transacting in local currencies (Box 3).

A. Price Discovery and ACCD Contributions

61. **ACCDs could enhance strategies to promote the use of local currencies for cross-border transactions.** However, with participants still in the adoption phase, limited financial market infrastructure in place, and high transaction costs for non-US dollar pairs, ACCDs face significant challenges in offering competitive bid-ask spreads for local currency transactions. Although the “chicken and egg” problem prevails, incentives in several areas could move the effort forward:

- ACCDs could support cross-border QR retail payments in alignment with ongoing cross-border payment initiatives or develop products that increase the use of their local currency facilities. The expansion of local currency transactions would improve liquidity in those accounts at ACCDs and provide liquidity buffers, which would allow ACCDs to generate more revenue streams. The resulting transactions data could be used to design new financing facilities for customers that could generate additional interest revenue.
- As local currency markets expand, central bank bilateral arrangements under the LCSF could act as a backstop against any manifestation of liquidity risks. Greater demand for local currencies should also improve the pricing discovery for direct FX quotations.
- Infrastructure to facilitate interoperable arrangements that would make local currency transactions more efficient for ACCDs could facilitate greater take-up. Technology enhancements could also be leveraged to simplify documentation, monitoring, and reporting processes.

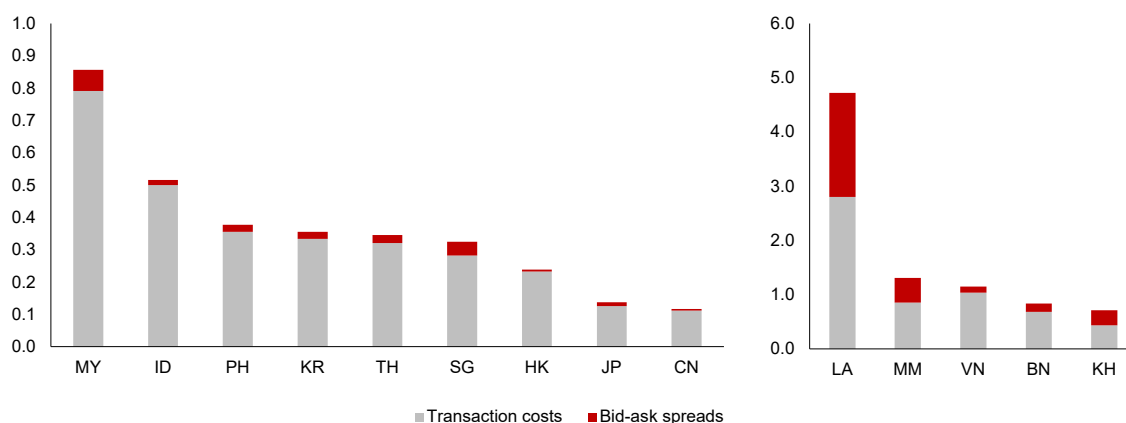
Box 3. Potential Financial Gains from Direct Local Currency Transactions

Financial gains from local currency transactions with the aid of improved technology and infrastructure could be substantial for some economies. These gains would arise from direct transaction channels that shorten intermediary steps and eliminate the vehicle currency, leading to reduced FX costs in addition to lower transaction costs. The prevailing practice of using the US dollar as the invoice currency even in intraregional trade transactions means that both parties typically pay the bid or ask price of FX. In the transaction, the importer first purchases US dollars using its local currency to pay the exporter through an intermediary. Then the exporter converts the US dollars into its local currency after receiving the US dollar payment from the importer through corresponding intermediaries. Hence, both the importer and exporter get the worse of the bid-ask spread at either stage. Furthermore, these transactions tend to involve multiple layers of transaction costs with intermediaries involved at each step of the process.

The establishment of direct local currency transaction channels would reduce the number of intermediate transactions needed and should provide better exchange rates between two local currencies. Assuming the existence of a liquid direct currency market where only one transaction leg is needed, and hence a 50 percent narrowing of the two bid-ask spreads, both the importer and exporter should benefit. Moreover, the direct arrangement would reduce the involvement of intermediaries in cross-border transactions. When combined with improved cross-border local currency transaction infrastructure, such as the networks of ACCDs, cross-border QR payment linkages, or even cross-border CBDC arrangements, the collective transaction costs could be cut by up to 80 percent ([Ekberg and others 2021](#)).

Back-of-the-envelope estimates based on goods trade alone suggest that cost savings could be significant in some cases. In particular, smaller economies with less commonly used currencies and wider bid-ask spreads to the US dollar could realize greater benefits and preserve some of their foreign reserves (Box Figure 1). The savings could be even greater, given the significant variation in actual bid-ask spreads across financial intermediaries, and when trade in services and investment flows are included in the estimates. Hence, expanded local currency transactions could directly bolster financial stability and resilience in the ASEAN+3 region by increasing the financial buffers of individual member economies. This advantage would be on top of reducing the region's reliance on the US dollar and susceptibility to shocks, in addition to promoting intraregional trade and value chains and investment.

Box Figure 1. ASEAN+3: Estimated Potential Gains from Narrower Bid-Ask Spreads and Lower Transaction Costs
(Percent of foreign reserves)



Sources: Bloomberg Finance L.P. [Ekberg and others \(2021\)](#); International Monetary Fund and national authorities, both via Haver Analytics; and AMRO staff estimates.

Note: Estimates are based on 2022 trade values between a member economy and its corresponding counterparts in the ASEAN+3, and assume that an average of about 15 percent of intraregional trade settlements are made in local currencies per information gathered from various national authorities. Foreign exchange reserves are as of end-2022. Exchange rate improvements are estimated as half of the annual average difference between daily mid-rate quotes and daily bid-ask spreads in 2022. Transaction cost improvements are assumed to be 80 percent lower than current transaction costs that are estimated at 0.5 percent of the trade value, based on [Ekberg and others \(2021\)](#). Gains from transaction costs are assumed to be shared equally between trade counterparts. BN = Brunei Darussalam, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.

62. National authorities need to play a more active role in addressing the substantial challenges to promoting extensive use of the LCSF, which necessitate making improvements to the existing framework. Official sector involvement would include: (1) addressing the risks to local currency settlement—notably, liquidity and currency risks; (2) making available central bank facilities or instruments to support local currency settlement (pricing credibility); and (3) collaboration among members in programs such as proactive and targeted campaigns and incentives/facilities. Improvements to the framework would be multi-pronged (Box 4), and entail the expansion of:

- eligible underlying/lines of business to capital account and financial account transactions, in addition to the present coverage of the current account;
- areas of regional cooperation to financial market and cross-border payment initiatives;
- participation in local currency settlements to include retail customers (using cross-border payment initiatives such as QR) and other relevant participants involved in local currency transactions, particularly those facilitating cross-border payment initiatives and portfolio investment transactions;
- currency arrangement monitoring and surveillance mechanism to include non-ACCD participants.

Box 4. ASEAN Local Currency Transactions Framework

The ASEAN Local Currency Transactions Framework (“Framework”) was announced at the 42nd ASEAN Summit held on May 10–11, 2023. It will serve as the basis for collaboration between ASEAN members to enhance accessibility and efficiency in local currency transactions and promote their wider adoption by market participants in the region. The High Level Principles (“Principles”) of the Framework, which were endorsed at the 10th ASEAN Finance Ministers’ and Central Bank Governors’ Meeting, represent key principles in establishing and implementing the Framework.

The Principles will primarily guide the development of a detailed Framework. The Framework will then be applied in the formulation of policy and regulation, as well as to develop infrastructure, to support its implementation across ASEAN members. Specifically, the Framework:

- shall serve as a guide for financial sector authorities in promoting the use of local currencies through enhancing regulations and policies to improve accessibility and efficiency, as well as promoting coordination and collaboration with domestic stakeholders and other authorities in ASEAN;
- should allow more flexible Foreign Exchange Administration/ Regulation (FEA) to facilitate market-based adoption of local currency denominated transactions with underlying economic activities, while taking into account ASEAN members’ domestic laws and regulations and the development of their financial markets;
- shall take into account the importance of an integrated, interoperable, and interconnected financial market infrastructure to promote clear, transparent, and efficient pricing;
- will synergize with ASEAN’s Cross Border Payment Initiatives to promote cheaper, faster, more secure, and more inclusive transactions;
- should be supported by an effective reporting and monitoring mechanism of local currency transaction implementation by harnessing technology.

B. Developing Payment Systems

63. **The development of national digital payment systems in each country has opened new avenues for improving cross-border retail payments and promoting local currency usage, with potential lessons for wholesale transactions.** These retail payment systems are connected internationally to form “linkages,” enabling near-instantaneous cross-border transfers between economies, facilitating direct local currency transactions in which senders use their local currencies and recipients receive the equivalent amounts in their respective local currencies (Appendix III).

64. **Cross-border payment linkages can enhance and expand retail access to cross-border transactions, boosting economic growth and local currency usage.** Direct transactions with local currencies enable retail users traveling overseas to eschew the need for and costs of converting cash to and from another currency, making transactions more efficient, convenient, and affordable.¹⁰ Utilization of digital finance in cross-border retail payments further promotes financial inclusion and economic growth by allowing SMEs to tap into overseas markets and strengthen the role of local currencies in cross-border trades ([BI and BoT 2022](#); [BI and MAS 2022](#); [MAS and BNM 2023](#)).

65. **The establishment of retail cross-border linkages also generates demand for innovation among participating institutions and could be foundational in developing corresponding infrastructure for wholesale payments.** To operate retail platforms in an automated and continuous manner, participating institutions are required to upgrade their internal infrastructure to ensure interoperability with other systems, 24/7 availability, and automation ability. In the PayNow–PromptPay example, all participating banks had to improve their treasury infrastructure and automate their internal FX determination mechanisms and fee collection from users ([Baker McKenzie, BoT, and MAS 2022](#)). Such improvements could be applied to cross-border payments for the corporate sector. Indeed, AMRO staff’s discussions with relevant institutions suggest that lessons learned from the retail experience could potentially be leveraged for wholesale transactions in the future.

66. **A key consideration in facilitating cross-border local currency usage is to establish a holistic framework encompassing technological, operational, and pricing structures.** It would require reaching a consensus among all stakeholders on a unified approach at the regional level.¹¹ Given that regional cross-border connectivity demands a much more complex solution, strong intraregional collaboration is needed to ensure such initiatives can both harmonize different members’ specific situations and ensure transparency and efficiency. Although still in its infancy, CBDCs and the attendant infrastructure are examples of how technology could lower costs and incentivize greater interest in local currency transactions (Box 5).

¹⁰ [World Bank \(2023\)](#) estimates that the cost of using cash in cross-border transactions in the Asia-Pacific region is 41 percent higher than digital methods.

¹¹ An example of this approach is the dominance of Visa and Mastercard in retail cross-border payments, in which a common, albeit private, infrastructure firm provides consistent standards and scalability in facilitating payments in various currencies.

Box 5. Leveraging on Technology to Expand Local Currency Transactions

In the wholesale market where institutional participants generate high-volume transactions, the use of local currency could be expanded with the development of large-scale technological innovations.

Albeit still in the early days of experimentation, wholesale CBDCs and cross-border CBDC arrangements could become an automated and digitally linked payment system that facilitates cross-border transactions in a much more efficient manner. In particular, the programmability of CBDCs via smart contracts could reduce the need for financial intermediaries in cross-border payments. Unlike the traditional system in which intraregional payments are required to go through a series of correspondent banks—sometimes even outside of the region—CBDC models are expected to allow direct transactions in local currencies in an automated manner. Such advantages have been confirmed from CBDC trials by the BIS Innovation Hub (BISIH) and other central banks in Project Dunbar ([BISIH, RBA, and others 2022](#)) and Project mBridge ([BISIH, HKMA, and others 2022](#)), in which participating banks can hold foreign CBDCs directly and conduct transactions in their local currencies with other participating institutions. These direct transactions are executed in a near-instant manner at lower costs.

The use of CBDCs and their digital platforms could unlock opportunities to further improve the infrastructure for cross-border local currency transactions. The programmability of CBDCs can also facilitate automation in several stages of cross-border payments; for instance, in pricing discovery mechanisms. One example of a solution is to automate the estimation of the rate of exchange between two assets through the AMM protocol, which has been widely used in decentralized finance. AMM is an innovative mechanism that automatically establishes trading rates in a digitally native environment (Appendix IV). The BISIH has been experimenting with using AMM protocols in Project Mariana, as a solution to pricing discovery between two currencies ([BISIH, Bank of France, and others 2023](#)). In this context, AMM could be developed to support transactions between local currencies in this region, for example, in a multi-CBDC arrangement between local CBDCs.

Technology can create new opportunities for market participants and regulators but innovation would crucially need to ensure interoperability with existing financial systems. AMRO staff's discussions with market participants suggest that concerns over the ability to synchronize and comply with existing internal technology systems and regulatory environments remain the biggest hurdle to adoption. For instance, the development of CBDCs would need to encompass AML/CFT and the data privacy considerations of every participant, in addition to improvements to the payment infrastructure. Results from Project Mariana show that transaction costs in an AMM-based system are dependent on the size of the liquidity pool. A larger liquidity pool lowers transaction costs and vice-versa; however, funding and maintaining such pools can be expensive for participant banks ([BISIH, Bank of France, and others 2023](#)).

C. Improving Clearing and Settlement Efficiency

67. **The expansion of local currency trade settlement schemes into a regional trade settlement system could significantly reduce the high transaction costs from using the US dollar as a vehicle currency.** For example, [Rhee and Sumulong \(2014\)](#) suggests that the effectiveness of the existing Renminbi Trade Settlement pilot scheme could be parlayed into an expanded scheme that includes other major regional economies, such as Japan and Korea.¹² The emergence of regional currencies for trade settlements will help reduce emerging Asia's reliance on the US dollar and contribute to the diversification of international settlement currencies.

68. **However, there would be trade-offs involved in using multiple currencies for trade settlement.** Availability of cross-currency trading and settlement for all possible ASEAN+3 currency pairs (91 combinations) would be ideal but the resultant complexity of requisite systems and infrastructure would be very costly. A much simpler system would be to establish a few regional vehicle currencies, as suggested by [Rhee and Sumulong \(2014\)](#).¹³

69. **Solutions to enable simultaneous settlement of FX transactions in currencies not eligible for existing PvP arrangements are also needed.** For instance, project Cedar Phase II x Ubin+ aims to develop a system to facilitate near real-time end-to-end settlement of cross-border cross-currency payments and achieve technical interoperability among payment infrastructures across countries ([NYIC and MAS 2023](#)). It is envisaged that the system's interoperability should allow seamless clearing and settlement of payments across systems without requiring direct participation in multiple systems.

70. **The establishment of offshore clearing banks could improve the efficiency of cross-border local currency transactions.** Such banks could streamline complicated KYC AML/CFT procedures for overseas financial institutions, allowing them to settle local currency transactions directly with local clearing banks. The former could also simplify the process, given that they operate in the same time zone and often use the same language and similar legal frameworks ([Perez-Saiz and Zhang 2023](#)). Clearing banks also contribute to the growth of the offshore currency market by facilitating the accumulation of local currency liquidity. For example, China has set up 31 offshore clearing banks across 29 countries and regions, encompassing all key time zones and major international financial centers around the world ([SCIO 2023](#)). Separately, China has also established the Cross-Border Interbank Payment System, which allows foreign institutions that are members of the network to get direct access to its domestic payment settlement system (Box 6).

¹² Under the pilot scheme, cross-border trade transactions (both imports and exports) between approved areas of mainland China and selected areas outside are eligible for settlement in renminbi ([HKMA 2009](#)).

¹³ One vehicle currency translates to 13 combinations; two vehicle currencies translate to 25 combinations.

Box 6. China's Cross-Border Interbank Payment System

The Cross-Border Interbank Payment System (CIPS) is China's modern wholesale payment system. It supports both domestic and cross-border payment, clearing, and settlement of the renminbi. CIPS was launched in 2015 as an important financial infrastructure for renminbi cross-border transactions, akin to the US Clearing House Interbank Payments System. Unlike offshore clearing banks, CIPS is open to all foreign financial institutions regardless of jurisdiction, allowing direct access to China's domestic payment settlement system. As of August 2023, CIPS has 97 direct participants and 1,370 indirect participants, with 452 from Asia (excluding Mainland China), 235 from Europe, 49 from Africa, 30 from North America, 23 from Oceania, and 17 from South America.^{1/} Direct CIPS members can transact with entities banked by CIPS direct participants without having to go through SWIFT. As CIPS further develops, it is expected to play a more prominent role in CNY settlement, potentially reducing the importance of offshore clearing banks and reliance on SWIFT (Greene 2022; Perez-Saiz and Zhang 2023).

However, China's strict capital controls suggests that it may take a while before trade partners readily accept the renminbi for their exports to China instead of the US dollar. Existing limits on inbound capital flows restrict foreign investors from holding greater amounts of Chinese assets, while limits on outbound investments by Chinese residents disincentivize foreign governments from holding renminbi assets as foreign exchange reserves (Gopinath and Stein 2018), and in turn, the creation of deeper markets for foreign liabilities denominated in renminbi (Weiss 2022). In this context, a much larger number of financial institutions would need to sign up to participate in CIPS to facilitate wider use of the renminbi in international transactions—current participation consists of 1,467 financial institutions from 111 countries and regions, compared to SWIFT's network of more than 11,000 participants across 200 countries. Nonetheless, CIPS is considered a possible alternative to establishing offshore clearing banks.

^{1/} CIPS Participants Announcement No. 88 (https://www.cips.com.cn/en/participants/participants_announcement/60005/index.html), accessed on September 11, 2023.

D. Harmonizing Regulatory Requirements

71. Differences in regulatory standards are considered a significant operational challenge for participants in local currency initiatives. While market participants largely consider regulatory requirements within individual economies to be reasonable, simultaneous compliance with two distinct regulatory regimes may be a significant obstacle when dealing with transactions involving two local currencies. Such difficulties increase greatly when substantial differences exist in documentation and compliance requirements between these regimes. Clear official operational guidelines would mitigate this challenge, helping firms accelerate their preparations and operational speed. Similarly, disparities in practices, such as fee collection, liability determination, and interoperability standards, can further obstruct efforts to establish linkages in local currency transactions.

72. In this regard, multilateral collaboration is needed to promote a standardized approach to addressing technological, operational, and regulatory differences. These synchronization efforts would need to cover a broad spectrum of considerations. One potential model is the hub-and-spoke linkage, in which a common intermediary provides users with the necessary connections to all other participants. A prominent contemporary example of such a system is Project Nexus (BISIH, Bank of Italy, BNM, MAS, and others 2023), which was developed to provide the technical and data interoperability necessary for participants to connect with one another.

73. However, these multilateral initiatives would then have to address considerations regarding the sovereignty and authority of participants. Specifically, certain regulatory and policy stances may come into conflict, such as the contrast between

the necessity of safeguarding data privacy versus data collection for compliance purposes. The issue is amplified when certain currencies are subject to more rigid regulatory oversight than others. As illustrated in the CBDC project, mBridge, some regulations do not allow foreign participants to hold large amounts of local currencies overnight, thus reducing the efficiency gains from such transactions. Project Cedar Phase II x Ubin+ ([NYIC and MAS 2023](#)) examines potential solutions to bridge heterogeneous networks implemented under separate governance and operating models, while maintaining the independence of the respective central bank infrastructures.

VI. Issues for Consideration

A. Questions Posed to Members

74. What can authorities do to address the challenges identified in this paper that may be within their purview? In particular, are there specific measures that could be taken to:

- incentivize greater ACCD participation in local currency transactions?
- apply experiences from cross-border retail digital payment linkages to wholesale transactions?
- expand local currency settlement schemes?
- address barriers arising from technological, operational, and regulatory differences?

75. How can lessons learned from CBDC initiatives be applied to expand local currency transactions? Can the progressive technology envisaged in regional cross-border initiatives such as Projects Dunbar, mBridge, Nexus (non-CBDC), and Cedar Phase II x Ubin+ be leveraged for this purpose?

76. What support can AMRO provide to members to help expand local currency transactions in the ASEAN+3 region?

B. Response from Members

77. **One member suggests that AMRO staff could undertake research into the Local Currency Transactions Framework.** Specifically, the study could analyze the implications and challenges stemming from implementation of this Framework. It could further assess any direct correlation between local currency transactions and the cross-border utilization of QR codes.

Appendix I. Currency Hedging Instruments

Appendix Table 1. Selected ASEAN+3: Details of Currency Hedging Instruments, 2022

Economy	Onshore FX Market		Nonresident Access to Onshore Market	Offshore FX Market	
	Average Daily Volume	Spread		Average Daily Volume	Spread
China	Forward and swap: USD 70–90 billion	6-month: 5–15 pips	Yes, under the Qualified Foreign Institutional Investor and the Renminbi Qualified Foreign Institutional Investor rules, cross-border transactions and China Interbank Bond Market's foreign exchange mechanism.	NDF: 1 billion	1-month spread: 30–50 pips
Hong Kong	Forward: USD 13–15 billion	1–3-month: 0.5–1 pip 6–12-month: 1–3 pips	Yes	N/A	N/A
Indonesia	Forward: USD 500 million Domestic NDF: USD 500–700 million	Forward: 10 pips Domestic NDF: 5 pips	Yes, with underlying documentation.	Options: USD 50 million	
Korea	Forward: <1m: USD 8 billion >1m: USD 3 billion	1-month: 10 pips	Yes, for underlying investment.	NDF: USD 3–4 billion	1-month spread: 20 pips
Malaysia	Forward: USD 1.1 billion Swap: USD 6.4 billion	1-month forward spread: 30 pips 1–12-month swap spread: 3–30 pips	Yes, for spot and forward basis with licensed onshore banks and appointed overseas basis. Forward basis for financial account-related transactions has to be on firm commitment basis only. Institutional investors are eligible for the Dynamic Hedging Programme to undertake forward hedging activities without documentation.	The central bank does not recognise offshore trading in MYR, including NDFs	
Philippines	Forward: USD 550 million	1-month: 1–2 cents 12-month: 10–20 cents	Tenor of FX forwards must match the maturity of the underlying.	NDF: USD 400–600 million	1-month spread: 2–3 cents
Singapore	Forward: USD 1.0–1.5 billion	1–6-month: 0.1–1 pip	Yes, outright FX forwards allowed. Limits on resident financial institutions' lending of SGD (including via FX swaps) to nonresident financial institutions.	N/A	N/A

Economy	Onshore FX Market		Nonresident Access to Onshore Market	Offshore FX Market	
	Average Daily Volume	Spread		Average Daily Volume	Spread
Thailand	Forward: USD 1.5 billion	Up to 3-month spread: 2–4 pips 6–12-month spreads: 4–6 pips	Yes, unlimited with underlying commitment. If no underlying, amounts are restricted.	N/A	N/A

Sources: [ACC BIS \(2022\)](#); and AMRO staff compilation.

Note: FX = foreign exchange; MYR = Malaysian ringgit; NDF = non-deliverable forward; pip = point in percentage; SGD = Singapore dollar; N/A = not available.

Appendix II. Local Currency Settlement Frameworks

Appendix Table 2. ASEAN+3: Details of Bilateral Memoranda of Understanding (MoUs) for Local Currency Settlement Frameworks

MoU	Sign Date	Parties	Motives	Appointed Cross Currency Dealers
Malaysia and Thailand	August 27, 2015	Bank Negara Malaysia and Bank of Thailand	<ul style="list-style-type: none"> • Encourage use of local currencies for settlement of trade and investment among participating countries, and so reduce reliance on major currencies. • Allow access to financial services that offer products denominated in both local currencies to better manage their foreign exchange risk, and vice versa. 	<p>Malaysia (9 entities): Bangkok Bank, CIMB, HSBC, Maybank, MUFG Bank, Public Bank, RHB Bank, Standard Chartered Bank, United Overseas Bank.</p> <p>Thailand (9 entities): Bangkok Bank, Bank of Ayudhya, CIMB, Kasikornbank, Krung Thai Bank, Siam Commercial Bank, Standard Chartered Bank, HSBC (Bangkok Branch), United Overseas Bank.</p>
Indonesia and Thailand: Indonesia and Malaysia	December 23, 2016	Bank Indonesia, Bank Negara Malaysia, and Bank of Thailand	<ul style="list-style-type: none"> • Promote wider use of local currencies in the ASEAN Economic Community and spur development of regional FX and money markets in support of wider economic and financial integration. • Reduce transaction costs, improve efficiency in trade and investment settlements, and offer businesses more options in choosing currencies for trade settlement. 	<p>Indonesia (12 entities): Bank BTPN, Bank Central Asia, Bank Danamon Indonesia, Bank Mandiri, Bank Negara Indonesia, Bank Permata, Bank Rakyat Indonesia, CIMB, HSBC Bank, Maybank, Mizuho Bank, MUFG Bank (Jakarta Branch).</p> <p>Malaysia (7 entities): CIMB Bank, Hong Leong Bank, HSBC, Maybank, MUFG Bank, Public Bank, RHB Bank.</p> <p>Thailand (11 entities): Bangkok Bank, Bank of Ayudhya, CIMB Bank, Kasikornbank, Krung Thai Bank, Mizuho Bank (Bangkok Branch), Siam Commercial Bank, Standard Chartered Bank, Sumitomo Mitsui Banking Corporation (Bangkok Branch), HSBC (Bangkok Branch), TMB Bank.</p>
Indonesia and Japan	December 5, 2019	Bank Indonesia and Japan's Ministry of Finance	<ul style="list-style-type: none"> • Strengthen the framework (effective August 5, 2021) by expanding it as follows: <ul style="list-style-type: none"> – Add cross-currency swap and domestic-NDF as a hedging instrument. – Increase the threshold of transactions that do not require underlying documents to USD 500,000 or local currency equivalent per transaction (which was previously set at USD 25,000). – Expand the eligibility criteria for hedging to also include direct investment transactions with anticipatory basis documents and extend the hedging tenor based on the anticipatory basis document to more than one year. 	<p>Indonesia (7 entities): Bank BTPN, Bank Central Asia, Bank Mandiri, Bank Negara Indonesia, Bank Rakyat Indonesia, Mizuho Bank, MUFG Bank (Jakarta branch).</p> <p>Japan (5 entities): Bank Negara Indonesia (Tokyo Branch), Mizuho Bank, MUFG Bank, Resona Bank, Sumitomo Mitsui Banking Corporation.</p>

MoU	Sign Date	Parties	Motives	Appointed Cross Currency Dealers
Indonesia and China	September 6, 2021	Bank Indonesia and the People's Bank of China	<ul style="list-style-type: none"> • Reduce transaction conversion costs. • Provide alternative export financing/direct investment opportunities in local currency. • Provide alternative hedging instruments in local currency. • Diversify currency exposure in transaction settlement. 	<p>China (8 entities): Agriculture Bank of China, Bank Mandiri (Shanghai Branch), Bank of China, Bank of Ningbo, China Construction Bank, Industrial and Commercial Bank of China, Maybank (Shanghai Branch), United Overseas Bank.</p> <p>Indonesia (12 entities): Bank Central Asia, Bank Danamon Indonesia, Bank Mandiri, Bank Negara Indonesia, Bank OCBC NISP, Bank of China, Bank Permata, Bank Rakyat Indonesia, China Construction Bank, Maybank, ICBC Bank, United Overseas Bank.</p>
Indonesia and Singapore	August 29, 2022	Bank Indonesia and the Monetary Authority of Singapore	<ul style="list-style-type: none"> • Promote the use of local currencies in bilateral transactions, such as trade and direct investments. • Reduce transaction costs and reduce exchange rate risks of conducting bilateral transactions. 	N/A
Indonesia and Korea	May 2, 2023	Bank Indonesia and Bank of Korea	<ul style="list-style-type: none"> • Promote the use of local currencies in bilateral transactions, such as current account transactions, direct investment, and any other economic and financial transactions as agreed upon by both authorities. • Reduce transaction costs and reduce exchange rate risks of conducting bilateral transactions via direct exchange rate quotation between the Korean Won and the Indonesian Rupiah in interbank trading. 	N/A
Indonesia, Malaysia, and Thailand	August 22, 2023 for Indonesia and Thailand; August 25, 2023 for Indonesia and Malaysia	Bank Indonesia, Bank Negara Malaysia, and Bank of Thailand	<ul style="list-style-type: none"> • Establish the Framework for Cooperation to Promote Bilateral Transactions in Local Currencies between the countries. • Strengthen cross-border economic activities, enhance regional financial market stability, and deepen local currency markets in the participating countries. • Supersede the MoUs on local currency settlement framework signed between the three central banks on August 27, December 20 and 23, 2016. 	No change or expansion.

Sources: Various press releases; and AMRO staff compilation.

Note: The Indonesia-Thailand MoU and the Indonesia-Malaysia MoU that were signed on December 23, 2016, together with the Malaysia-Thailand MoU signed earlier formed the LCSF among three countries, effective from January 2, 2018. The Philippines also signed an [agreement to join this LCSF](#) on the sidelines of the ASEAN finance ministers and central bank governors' meetings in Thailand on April 5, 2019; specifically, the Bangko Sentral ng Pilipinas signed letters of intent with Bank Indonesia, Bank Negara Malaysia, and Bank of Thailand to express mutual interest in the possibility of establishing a framework to facilitate financial institutions' use of local currencies in the settlement of bilateral trade and direct investments. N/A = not available.

Appendix III. Fast Payment Systems and Cross-Border Payment Linkages in the ASEAN+3 Region

Cross-border linkages are important in promoting the use of local currencies in cross-border transactions. By offering several benefits to retail users and small and medium-sized enterprises (SMEs), such as lower costs, faster speed, and greater convenience, these infrastructure projects can help foster demand that contributes to the development of local currency markets. In directly quoting the rate of exchange between the two local currencies involved in a cross-border transaction, multiple conversion legs and intermediaries—such as card payment providers or participating banks that add additional costs—could be eliminated. Some estimates suggest that direct quotes of local currency exchange rates could reduce transaction costs by 30 percent ([Chew 2023](#)). Moreover, by transacting in local currencies, users can avoid exchange rate fluctuations and uncertainties affecting the cost of their transactions or assets.

Another benefit of cross-border linkages is in boosting retail usage of local currencies through tourism and overseas spending. They increase the convenience and accessibility of cross-border transactions by enabling users to pay or receive payments in local currency across countries. For instance, tourists can use their mobile phones or quick-response (QR) codes to pay for goods and services in local currency without having to exchange cash or use cards. Concurrently, merchants can also benefit from lower fees and faster settlement. The result could be a positive feedback loop, where more tourists and merchants use local currencies for their cross-border transactions, and service providers have greater incentive from economies of scale to reduce fees further which, in turn, increases the demand and supply of local currencies in the market.

Cross-border linkages can also expand the inclusion of nonbanks and SMEs in the digital economy. They facilitate the participation of these businesses in cross-border trade and e-commerce by providing easier access to overseas markets and lowering barriers to entry. They can also increase the competitiveness and innovativeness of these businesses by allowing them to offer more diverse and customized products and services in local currency, and similarly create a virtuous cycle. As of October 2023, thirteen ASEAN+3 member economies had established bilateral connections with other networks, either between national networks or through private-led networks (Appendix Table 3).

However, a notable challenge to cross-border linkages is limited scalability. AMRO staff's discussions with industry experts underscore the bilateral nature of current linkages as a major barrier to expansion. Establishment of bilateral links between two economies requires substantial resources, encompassing infrastructure development, operational arrangements, and policy accommodations. The differences in design across systems consequently make adaptation difficult and suboptimal for broader expansion, thus hindering economies of scale.

To address this challenge, the concept of a multilateral linkage system has emerged as a potential solution. The Nexus project, which is a collaboration of the BIS Innovation Hub and several central banks, provides a working example. The project aims to devise a hub-and-spoke multilateral framework to connect all systems. As of 2023, it has demonstrated the technical feasibility of a multilateral connection design. Nonetheless, obstacles remain, notably in regulatory compliance in the context of instantaneous payments. A significant challenge is to balance between sanction screening time and user convenience, while still complying with diverse regulatory standards and reporting formats.

Appendix Table 3. ASEAN+3: Selected Cross-border Payment Linkages

Economies	Project/ Network name	Launch Date
China–Hong Kong	UnionPay QR at merchants in Hong Kong	June 2017
China–Japan	UnionPay QR at merchants in Japan	December 2017
China–Malaysia	UnionPay QR–Boost Malaysia (QR)	November 2018
China–Philippines	UnionPay QR–Asia United Bank (QR)	December 2018
Japan–Thailand	MyPromptQR at merchants in Japan	December 2018
China–Lao PDR	UnionPay QR at merchants in Lao PDR	July 2019
Cambodia–Thailand	Thai QR–KHQR	February 2020
China–Malaysia	UnionPay QR–Bank of China (QR)	July 2020
China–Australia	UnionPay QR–epay (QR)	October 2020
China–New Zealand	UnionPay QR at merchants in New Zealand	October 2020
Thailand–Vietnam	Thai QR–VietQR	March 2021
Singapore–Thailand	PayNow–PromptPay	April 2021
China–Brunei Darussalam	UnionPay QR–DSTPay	June 2021
Malaysia–Thailand	DuitNow QR–Thai QR	June 2021
Indonesia–Thailand	Thai QR–QRIS	August 2021
Singapore–Thailand	NETS (QR)–Thai QR	September 2021
China–Thailand	UnionPay QR–Bangkok Bank	September 2021
China–Vietnam	UnionPay QR–VNPay and ECPay (QR)	December 2021
Indonesia–Malaysia	QRIS–DuitNow (QR)	January 2022
China–Singapore	UnionPay QR–DBS PayLah	June 2022
China–Indonesia	UnionPay QR–Bank Negara Indonesia	November 2022
China–Korea	UnionPay QR–ZeroPay (QR)	December 2022
Japan–Vietnam	NETSTARS (QR)–MB Bank (QR)	March 2023
Malaysia–Singapore	DuitNow (QR)–NETS (QR)	March 2023
Cambodia–Lao PDR	KHQR–LAOQR	August 2023
Cambodia–China	KHQR–Alipay+	November 2023
Indonesia–Singapore	QRIS–NETS (QR)	November 2023
Malaysia–Singapore	DuitNow–PayNow	November 2023
Cambodia–Vietnam	KHQR–VietQR	December 2023
Hong Kong–Thailand	FPS QR–PromptPay QR	December 2023

Sources: National authorities; and AMRO staff compilation.

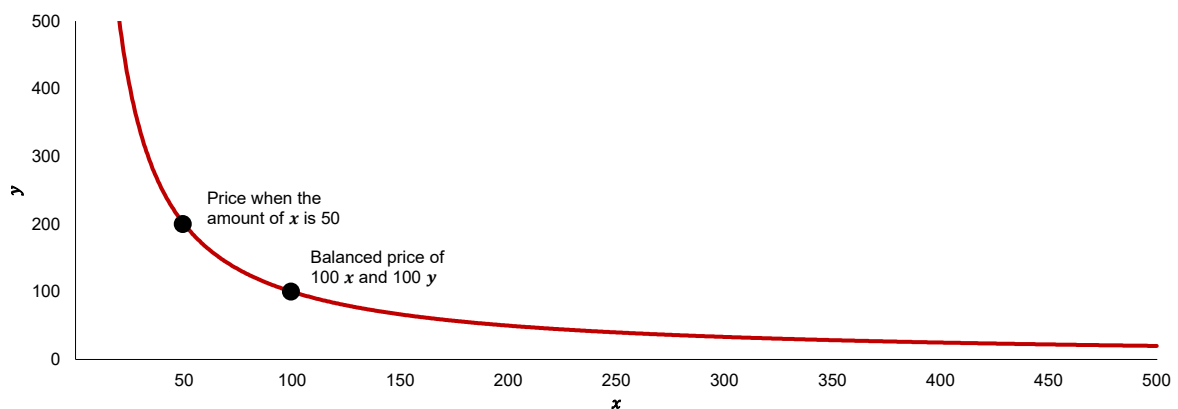
Note: Cross-border payment linkages led by central banks enable efficient and real-time fund transfers, usually in small amounts, among participating members. For each economy pair, only the main linkage to/from financial institutions and/or international payment organizations is listed; there is also a wide range of FinTech products of varying scale connecting e-wallet platforms across economies that are not listed here. For Singapore–Thailand and Malaysia–Singapore, PayNow–PromptPay and DuitNow–PayNow are remittance services, whereas NETS (QR)–Thai QR and NETS (QR)–DuitNow (QR) are QR payment linkages.

Appendix IV. Automated Market Making Protocols

Automated Market Making (AMM) protocols are used on decentralized exchanges (DEX) to determine the price to buy and sell virtual assets. Unlike traditional asset markets, where trades can be facilitated by designated market makers to provide liquidity or through a centralized order book system, DEX do not have any entity to facilitate trades of virtual asset pairs (for example, Bitcoin–Ethereum or Bitcoin–Tether). Traders using AMM on DEX do not trade with a counterparty but rather with the underlying smart contracts (that is, the underlying program that develops the AMM protocols). The smart contracts establish a system between the liquidity pool and liquidity providers. The exchange pricing is then determined through a function of the ratio between the paired assets in the liquidity pool. Specifically:

- The liquidity pool is a decentralized reserve of a certain asset pair on the DEX, which has several liquidity pools—one for each listed pair—into which anyone may deposit virtual assets and from which they may withdraw.
- Liquidity providers are users who add funds to liquidity pools, which are then reallocated according to a ratio between the designated paired assets.
- A common rule to determine such a ratio is the constant formula $x * y = k$ (Appendix Figure 1), in which x and y are the reserves of the two tokens and element k represents the total size of the liquidity pools. Accordingly, prices are determined purely based on the token amounts, removing the bid-ask spread element but at the same time subjecting prices to adjustments according to the token ratio.
- DEX trades are subject to a trading fee. The received fees are allocated between reinvesting additional liquidity in the pool and rewarding the liquidity providers. Because fees are reinvested in the pool, the element k will increase as the number of trading activities increases.
- The prices from AMM-based DEX can align with the external market by relying on an arbitrage trading process. Traders buy and sell between the external markets and the DEX to profit from any price discrepancy, until the prices between the two are aligned.

Appendix Figure 1. Illustration of AMM Price Discovery Function



Source: AMRO staff visualization.

Note: The figure illustrates the price mechanism of an AMM using a constant function $x * y = 10,000$. When the volume of x is 100, the price of x would be equal to that of y . However, when there is a surge in demand for x that reduced x volume to 50, a price of x would be 4 y .

However, AMM has limitations. One prominent drawback is transaction slippage, a phenomenon where the actual execution price deviates from the initially quoted price. This issue becomes particularly pronounced in liquidity pools that have limited available funds. As the AMM dynamically adjusts the price between tokens x and y to maintain the constant product of token balances, substantial-sized orders will disrupt the token ratio and cause the price to move significantly during the transaction. Another weakness lies in the protocol's dependence on individual liquidity providers. This reliance amplifies the risk of liquidity runs during periods of financial turmoil, as individual liquidity providers retain the prerogative to withdraw funds at any juncture, potentially exacerbating market instability.

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