Addressing Exchange Rate Risk in Infrastructure Projects in EMDEs

G20/GIF/IMF Report for the G20 Infrastructure Working Group under the Brazilian Presidency

OCTOBER 2024

Global Infrastructure Facility
A G20 INITIATIVE

G20 BRASIL 2024

INTERNATIONAL MONETARY FUND

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ADB	Asian Development Bank
AFC	Africa Finance Corporation
AfDB	African Development Bank
AIIB	Asian Infrastructure Investment Bank
ARS	Argentine peso (currency code)
BOAD	West African Development Bank (Banque Ouest Africaine de Développement)
BRL	Brazilian real
CAF	Development Bank of Latin America and the Caribbean (formerly Corporación Andina de Fomento)
CAF-AM	Development Bank of Latin America and the Caribbean - Asset Management
COP	Colombian peso
DFI	Development finance institution
DHP	Dynamic Hedging Program (Malaysia)
DRM	Domestic resource mobilization
EBRD	European Bank for Reconstruction and Development
EM	Emerging markets
EMDE	Emerging markets and developing economies
EUR	Euro
FAD	IMF Fiscal Affairs Department
FDI	Foreign direct investment
FRAT	Financial Risk Assessment Tool
FX	Foreign exchange
GFC	Global financial crisis
GDP	Gross domestic product
GIF	Global Infrastructure Facility
IBRD	International Bank for Reconstruction and Development
IDB	Inter-American Development Bank
IDR	Indonesian rupiah
IEG	G20 Independent Expert Group
IFC	International Finance Corporation
IPF	Integrated Policy Framework
IWG	Infrastructure Working Group
KGS	Kyrgyzstani som

LC	Local currency
LCBM	Local currency bond markets
LEG	Liquidity extension guarantees
LIC	Low-income country
MDB	Multilateral development bank
MICT	Ministry of Infrastructure, Communications and Transportation (Mexico)
MIGA	Multilateral Investment Guarantee Agency
MRG	Minimum revenue guarantee
MRT	Mass rapid transit
MTN	Medium term note
NDB	National development bank
NDF	non-deliverable forward
NGN	Nigerian naira
NRQC	Non-resident qualified corporate
PCG	Partial credit guarantee
PFRAM	Public Private Partnership Fiscal Risk Assessment Model
PIDG	Private Infrastructure Development Group
PIM	Public investment management
PIMA	Public investment management assessment
PPA	Power purchase agreement
PPI	Private participation in infrastructure
PPP	Public-private partnership
PSBS	Public sector balance sheet
SDG	Sustainable Development Goals
SME	Small and medium-sized enterprise
SOE	State-owned enterprise
TCX	The Currency Exchange Fund
THB	Thai baht
US$	United States dollar
UVR	Real value unit
XOF	West African CFA franc
XAF	Central African CFA franc

Executive Summary

In an increasingly interconnected global economy, infrastructure investment plays a critical role in fostering economic growth, enhancing competitiveness, and improving sustainable development. Infrastructure is central to meeting the Sustainable Development Goals (SDGs) including mitigation and adaptation needs in line with the Paris Agreement.

The global infrastructure investment gap remains substantial and is mostly concentrated in emerging markets and developing economies (EMDEs). Protracted fiscal constraints in many EMDEs limit governments' spending capacity. To complement official development assistance and private capital inflows, domestic resource mobilization needs to play an important role in closing the investment gap. Local sources of private capital that could provide long-term local currency financing for infrastructure fall short in most EMDEs, which have witnessed a decline in private investments in the past few years.

Access to international private capital is also critical for infrastructure investment and development in EMDEs, but attracting foreign investors has been a challenge. Infrastructure projects are complex, often characterized by substantial investment needs and long payback periods. They are exposed to multiple risks, including but not limited to macroeconomic, regulatory, market and financial risks.

This report focuses on one dimension of currency risks: foreign exchange (FX) risk, which is often a key barrier to attracting investors. FX risk arises when projects serving local markets generate revenues in local currency, while a portion of their costs (capital and operating expenses) are denominated in hard currency.

Addressing FX risk requires macrofinancial as well as project-level solutions. EMDEs are more vulnerable to external shocks and are often exposed to higher currency volatility, making their infrastructure projects more susceptible to FX risk. FX risk can also significantly affect projects' financing costs and returns to investors, posing a threat to their viability and eventually to broader economic stability if government obligations linked to infrastructure projects impact a country's fiscal sustainability.

An Overview of Foreign Exchange Risk in Infrastructure Financing

EMDEs require long-term strategies to increase access to infrastructure finance while managing FX risk by (i) reducing FX risk exposure and (ii) mitigating the portion of FX risk that cannot be eliminated. Risks can be reduced by aligning the currency of revenue inflows with that of financing outflows. Remaining FX risk can be mitigated through financial and non-financial mechanisms.

Sound macroeconomic policies are critical prerequisites for avoiding currency volatility and creating a conducive environment for infrastructure investment. These includes sound and credible fiscal policies, external sector sustainability, effective monetary policies, and financial sector policies that promote financial stability.

The development of local currency sovereign bond markets (LCBM) is a pivotal strategy for domestic resource mobilization. LCBM shields projects from FX volatility and creates an enabling environment that attracts both local and foreign private capital. The experience of countries that have successfully developed their local currency bond markets—offering diversified financial instruments and fostering a stable investment climate—underscores the potential of this approach to mobilize sustainable long-term financing for infrastructure projects.

The proper use of existing risk reduction and mitigation mechanisms to address FX risk at the project level is also essential. As risk reduction mechanisms (e.g., local currency finance from local investors or reliance on local supply chains) are not always available, mitigation mechanisms including financial instruments (e.g., futures, swaps, and options) or non-financial mechanisms (e.g., payment indexation to hard currency) are required. Each mechanism presents advantages and limitations, and each comes at a cost. This report aims to serve as a practical guide for policymakers by categorizing available mechanisms to reduce and mitigate FX risk, including the advantages and limitations of each.

Solutions that scale up portfolio mechanisms should be prioritized. Such mechanisms involve pooling dedicated infrastructure resources and leveraging credit enhancement instruments (e.g., guarantees) across various projects and sectors. Pooled approaches spread and diversify risk, enhance the attractiveness of investments to domestic and international investors and ultimately increase the availability of long-term local currency financing. FX risk diversification, government-backed funds, and concessional financing (when available and avoiding market distortion), contribute to deepening FX markets in EMDEs.

Specific Considerations for Different Types of Emerging Markets and Developing Economies

There is no "one size fits all" solution: options for managing FX risk differ markedly across countries, depending on their unique economic, political, and financial sector characteristics. Country contexts can significantly influence EMDEs' exposure to FX risk and limit their policy and project-level options to manage FX risk. As a result, solutions should be carefully targeted based on country characteristics, a project's specific risk profile, and expected development impact to be effective (Figure 1).

Smaller EMDEs will require substantial FX risk mitigation due to limited local capital and underdeveloped local financial markets. These economies require innovative structures to reduce FX risk for priority projects while scaling up portfolio-level risk mitigation mechanisms, such as government-backed funds and concessional resources, including blended finance infrastructure funds with concessional first loss tranches. Governments must carefully manage fiscal risks derived from infrastructure projects (including contingent liabilities) based on their limited fiscal space and prioritize projects that maximize development impact.

Mid-sized EMs benefit from a combination of FX risk reduction and mitigation, depending on available options within the specific country context. Mid-size EMs should progressively strengthen their local capital markets and expand local currency finance products, benefiting from credit enhancement. Governments should improve domestic market conditions to mobilize local capital and expand FX risk mitigation mechanisms by improving access to hedging instruments, while continuing to carefully manage fiscal risks.

Larger EMs have more developed local capital and FX markets and therefore have access to more comprehensive reduction and mitigation options to manage FX risk. These economies can mobilize both local and international financing sources in local currency or through swapped transactions. Larger EMs should also scale up portfolio solutions for FX risk reduction and progressively deepen local capital markets, while using commercial hedging instruments to mitigate residual risks. Governments should prioritize developing standardized programs of transactions rather than standalone projects.

The Way Forward

Governments need to create an enabling environment for local and international private investments in infrastructure. Implementing sound macroeconomic policies that provide stability and developing a robust pipeline of bankable projects are necessary preconditions to attracting private investors. Governments can also develop mechanisms and incentives to facilitate local investment in infrastructure, and offer guarantees and risk-sharing arrangements to make projects more attractive to international investors, while paying close attention to fiscal risks.

Multilateral development banks (MDBs) and development finance institutions also contribute to scaling up infrastructure finance in EMDEs. The G20 Working Group on the International Financial Architecture (IFA) calls for addressing exchange rate risks by scaling up local currency and expanding exchange rate risk mitigation instrument in EMDEs. The IFA roadmap calls on MDB's management to scale up private capital mobilization by supporting the development of local capital markets, unlocking domestic sources of capital while expanding the availability of FX risk mitigation instruments that enable international financing.

Stakeholders—including governments, international financial institutions, project developers, investors, and regulators—must work together to build effective FX risk management capacity. Local market participants and their regulators need the technical skills to implement sophisticated mitigation strategies such as hedging, as well as an understanding of the regulatory and institutional frameworks that support effective risk management. Training programs, knowledge-sharing platforms, and technical assistance play a critical role in strengthening these capacities by drawing on international best practices and adapting them to local contexts.

Figure 1: Summary assessment of relevance of each mechanism in different country contexts

MECHANISMS				RELEVANCE		
				Larger EMs	Mid size EMs	Smaller EMs & DEs
REDUCTION	PROJECT	FINANCIAL	LC financing	●●●	●●○	●○○
		NON-FINANCIAL	Supply chain localization	●●○	●●○	●○○
			Natural generation of hard-currency denominated revenues	*n.a*	*n.a*	*n.a*
	PORTFOLIO	FINANCIAL	Guarantees / Credit enhancement programs	●○○	●●●	●○○
			Resource mobilization by international financiers or NDBs with proceeds on-lent in local currency to infrastructure projects	●●○	●●●	●○○
			Portfolio diversification and treasury management approaches*	●●●	●●●	●●●
			Asset recycling or monetization	●●●	●●○	●○○
		NON-FINANCIAL	Promotion of domestic infrastructure investment initiatives or vehicles	●●●	●●○	●○○
			Regulatory enablers and incentives for local currency financing of infrastructure projects	●●●	●●●	●●●
MITIGATION	PROJECT	FINANCIAL	Financial hedging instruments	●●●	●●○	●○○
			Project reserve accounts and FX liquidity reserves	●●●	●●●	●●●
			FX risk guarantees provided by governments	●●●	●●●	●●○
			Proxy currency financing	●○○	●○○	●●○
		NON-FINANCIAL	Payment indexation to hard currency or inflation	●●○	●●○	●○○
			Other contractual arrangements	●●○	●●○	●●○
			Currency management mechanisms, such as cash sweeps	●●○	●●○	●●○
	PORTFOLIO	FINANCIAL	FX market creation and strengthening initiatives	●●○	●●●	●●○
			Government-backed funds / liquidity facilities	●●●	●●○	●●○
			Blended finance facilities	●●○	●●●	●●○
			Portfolio diversification and treasury management approaches*	●●●	●●●	●●●
		NON-FINANCIAL	Infrastructure project preparation facilities	●●○	●●○	●●●

** Supports both reduction and mitigation of exchange rate risk*

Key: ●○○ Low relevance ●●○ Medium relevance ●●● High relevance *n.a* not applicable

Introduction

Infrastructure is central to meeting the Sustainable Development Goals (SDGs); it serves as the backbone of modern societies, facilitating economic activities, enhancing connectivity, and improving living standards. Infrastructure development contributes directly to four Sustainable Development Goals and indirectly to additional SDGs. Infrastructure also plays an important role in achieving the global climate goals of the Paris Agreement, as existing infrastructure accounts for 80% of global greenhouse gas (GHG) emissions and 90% of adaptation costs (Thacker et al. 2021).

Despite pressing and increasing global infrastructure needs, the global infrastructure investment gap remains substantial and is estimated to reach US$18.5 trillion by 2040. EMDEs account for 70% of this shortfall in infrastructure spending (GIF 2021). This global infrastructure gap also includes the investments needed to meet the US$290–500 billion predicted annual cost of climate adaptation (Arame Tall et al. 2021), 90% of which is related to infrastructure (Thacker et al. 2021). The estimated annual infrastructure investment needs of low and middle-income economies by 2040 are nearly double those of high-income economies, approaching 5 percent of GDP (GIH 2024a). In Africa, the estimated investment need is roughly 30% higher than actual investments; this gap will exceed 40% by 2040 (GIH 2024a). Similarly, the infrastructure investment gap in Latin America and the Caribbean region is estimated at around 30% of current investment levels, and will approach 50% by 2040 (GIH 2024a). The sheer size of the investment required, combined with global fiscal constraints, means that the gap cannot be closed through government spending alone.

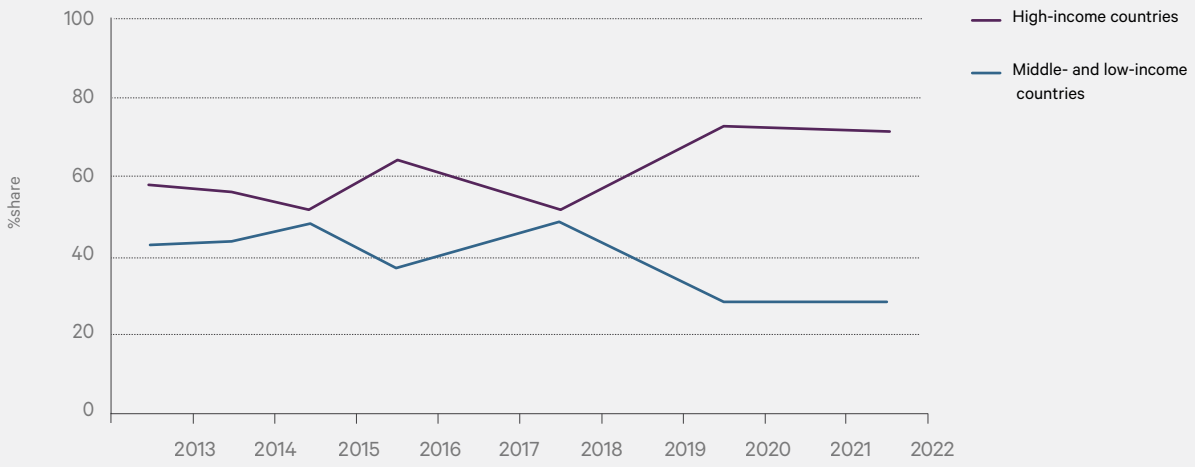
Fiscal space is limited in many EMDEs, and public finances have become increasingly stretched as public debt has risen from 38% of GDP in 2010 to 58% of GDP in 2022 (Aligishiev et al. 2023). Mobilizing private capital for EMDEs is therefore critical to supporting infrastructure development and ensuring efficient resource allocation. However, private infrastructure investment data from the Global Infrastructure Hub show that most private infrastructure funds continue to invest in advanced economies, while private investment in EMDEs has been declining in real terms over the past few years.

Local sources of private capital that could provide infrastructure investment in local currency (LC) fall short in many EMDEs. Just 10% of global financial assets are in EMDEs, despite these countries being home to over 86% of the world's population (IEA 2021; IMF 2024g). This challenge is especially acute for smaller EMs and developing economies, where major infrastructure investments often have capital requirements that exceed the total local capital supply. The median EMDE has domestic capital savings of just US$4 billion (World Bank 2022), compared to an estimated average annual financing gap of US$5.8 billion per country until 2030 (GIF 2021).

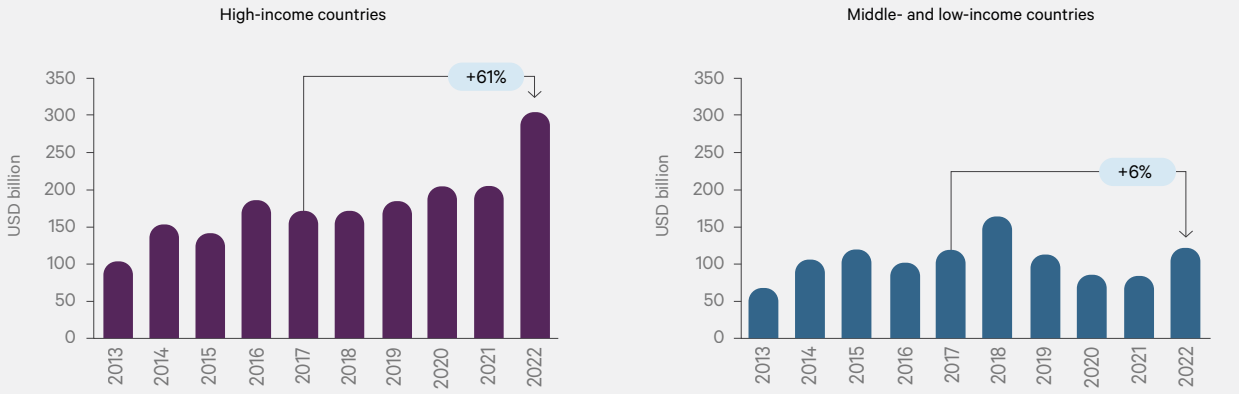
Access to international private capital is therefore critical for infrastructure development in EMDEs, but attracting foreign investors to local markets has been a challenge. Unfavorable risk-return profiles and a limited bankable project pipeline deter international investment, while high barriers to entry and unfamiliarity with the wide range of operational, financial, and political risks in EMDEs further dampen investor appetite. Private participation in infrastructure (PPI) investments in EMDEs is volatile from year to year and has decreased from US$158 billion across 630 projects in 2012 to just US$86 billion across 287 projects in 2023 (World Bank and PPIAF 2024). As a result, while PPI amounted to over US$400 billion globally in 2022, only around 30% was allocated to projects in low- and middle-income countries (Figure 2, panel 1) (GIH 2023). Private investment in low- and middle-income countries also grew significantly less even in nominal terms compared to high-income economies (Figure 2, panel 2).

Figure 2: Trends in private investment in infrastructure projects

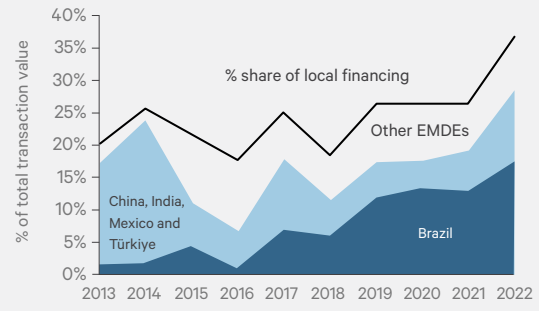
1. Private investment in infrastructure projects by income group (% share of total value)



2. Private investment in infrastructure projects by income group (USD billion and % growth compared to five-year average)

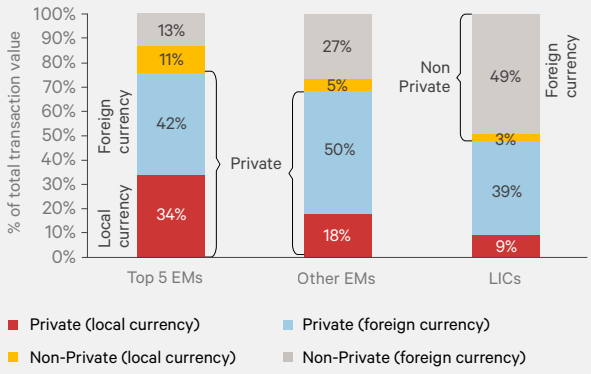


3. Local currency financing of private investment in infrastructure projects in EMDEs (% share of total transaction value, 2013-2022)



Source: Global Infrastructure Hub based on Realfin data.

4. Financing source by market segment and by income group (% of total transaction value, 2018-2022)



Foreign investment flows into EMDEs have also been sluggish on aggregate. Attracting local currency–denominated investments from foreign investors typically carry a higher risk premium due to barriers for investments resulting from weak macroeconomic fundamentals and exchange rate volatility in addition to global investor-side constraints such as risk limits in the home country—for instance, in the case of foreign institutional investors. Eichengreen and Hausmann (1999) argued that EMDEs are beset by the "original sin": the incompleteness of financial markets that prevents these economies from using their domestic currencies to borrow abroad. Just a few large EMs attract the majority of local currency private investment in infrastructure projects (Figure 2, panel 3 and 4). Many other EMDEs have not benefitted from the post-Global Financial Crisis (GFC) era of excess global liquidity and rising asset prices. During this period, returns on local currency assets in both frontier and emerging markets have lagged significantly behind those in advanced economies, likely dampening investment appetite (Figure 3, panel1). Foreign direct investment (FDI) has remained relatively modest, while portfolio flows into local debt and equity markets have been flat for a decade (Figure 3, panels 2,3, and 4). In fact, geopolitical and trade fragmentation could further exacerbate FX risk and the overall risk profile of import-dependent infrastructure projects.

Many EMDEs have, therefore, turned to foreign-currency-denominated liabilities to finance their infrastructure projects, giving rise to foreign exchange (FX) risk and other currency risks[1]. While investments denominated in foreign currencies may lower the cost of financing for local projects thanks to the lower interest rate and expected rate of return compared to those of local currency financing, this is likely to result in project-level FX risk arising from a currency mismatch between cash inflows and outflows. Beyond FX risk, foreign-currency-denominated financing can also result in transferability and convertibility risks. Although these risks are common to foreign currency investments in general, unique aspects of infrastructure investments in EMDEs could amplify the concerns of stakeholders. Financial markets in EMDEs—particularly in developing economies—lack the depth and the capacity to provide financing over longer maturities needed for infrastructure investments. Moreover, due to the long-term nature of infrastructure contracts, the risk premium increases as the potential for FX risk grows, making access to finance costly. The large quantity of imported materials associated with infrastructure project development and the large size of infrastructure projects also heighten FX risks.

At the individual country level, FX risk can be reduced through prerequisites such as appropriate macroeconomic and financial sector policies to promote deep FX markets, exchange rate stability, and local capital market development. Effective monetary policies and sound fiscal and external sector policies can create a stable investment climate, reducing FX volatility and enhancing investor confidence. Developing local capital markets is crucial for increasing local currency financing, improving currency hedging capacity, and diversifying funding sources. Effective policy measures will enhance financial stability, increase debt sustainability, and reduce the impact of sudden currency devaluations on government balance sheets.

At the project level, stakeholders can deploy mechanisms to reduce or mitigate FX risks. These mechanisms include seeking local currency financing and employing natural hedging strategies to reduce currency mismatches, minimizing exposure to FX risks, or mitigating exposure through reallocating or managing risk using guarantees, contractual agreements, and payment indexation. In addition, the application of rigorous public investment management practices to identify, assess, and mitigate fiscal risks associated with infrastructure contracts is vital for all countries, irrespective of their level of development.

Recognizing the impact of FX risk on the availability and cost of infrastructure financing in EMDEs, the G20 Infrastructure Working Group (IWG) under Brazil's 2024 G20 Presidency has made addressing FX risk in infrastructure finance one of its priorities. Under the Brazilian Presidency, the IWG builds on the previous work on "infrastructure as an asset class" under Argentina's 2019 G20 presidency to explore existing options to address exchange rate risk (G20 Brazil 2023). Against this backdrop, this report aims to provide a comprehensive view of existing and emerging options to address FX risk in infrastructure projects in EMDEs at the macro level as well as at the project level across different economies. The report is divided into four sections:

Section I provides an overview of the importance of addressing exchange rate risk in infrastructure investments in EMDEs;

Section II discusses country-level disparities that increase risk premia, thus hindering long-term investments, and outlines how local currency bond market development and fiscal sector tools can help;

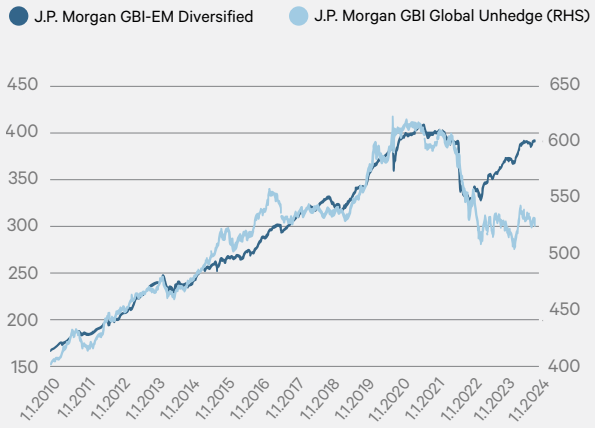
Section III outlines the available set of mechanisms to reduce or mitigate exchange rate risk at the project and the portfolio level; and

Section IV provides key considerations for the way forward.

1. Currency risk comprises of FX risk, convertibility risk, and transferability risk. This report focuses only on FX risk.

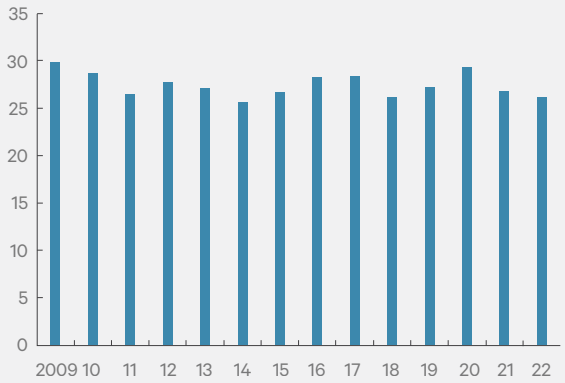
Figure 3: Returns on local currency assets and foreign investment flows into EMDEs

1. JP Morgan Government Bond Index.



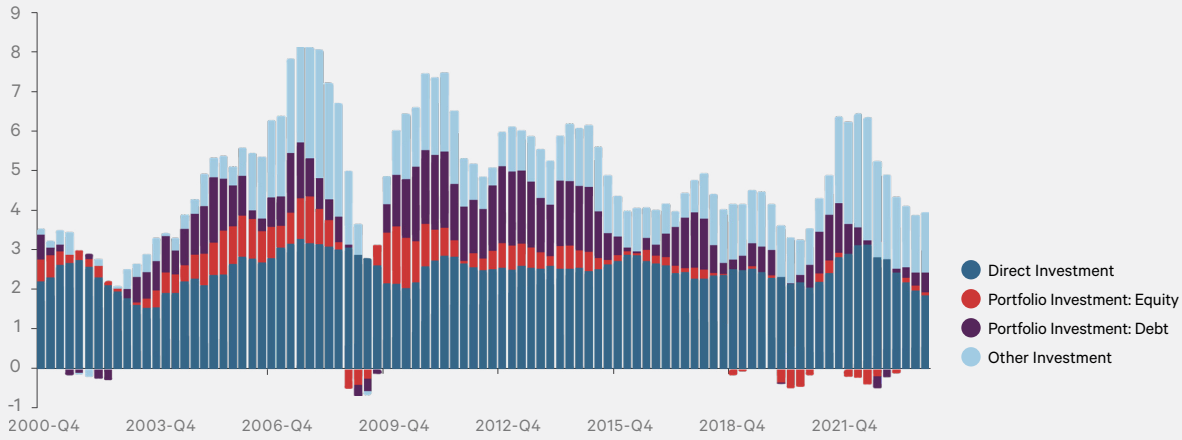
Sources: IMF staff; Bloomberg LP.

2. EMDE Stock of FDI in percent of GDP.



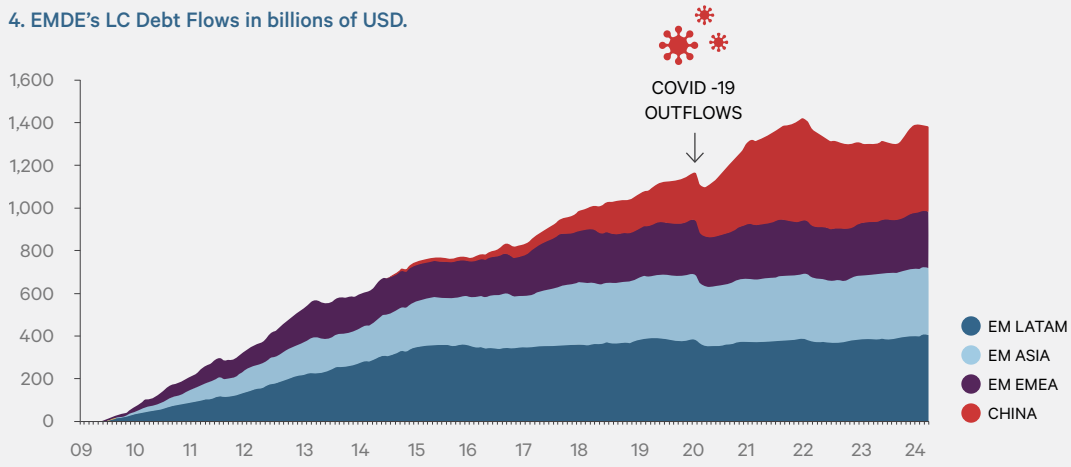
Sources: IMF Coordinated Direct Investment Survey and IMF World Economic Outlook.

3. Large EM's Investment Flows in percent of GDP.



Note: excludes China.
Sources: IMF databases; Haver Analytics.

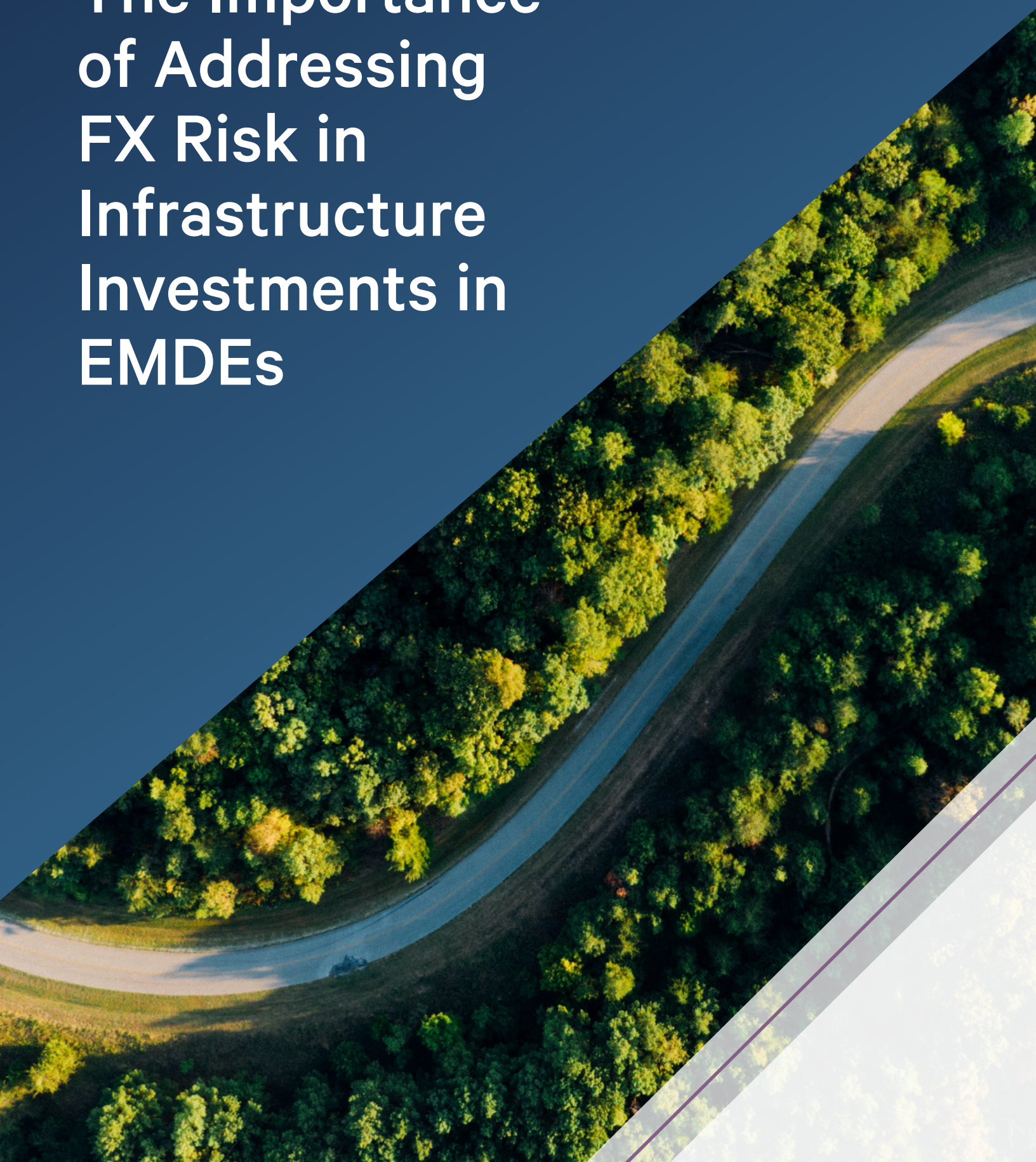
4. EMDE's LC Debt Flows in billions of USD.



Sources: IMF databases; Haver Analytics.

SECTION I

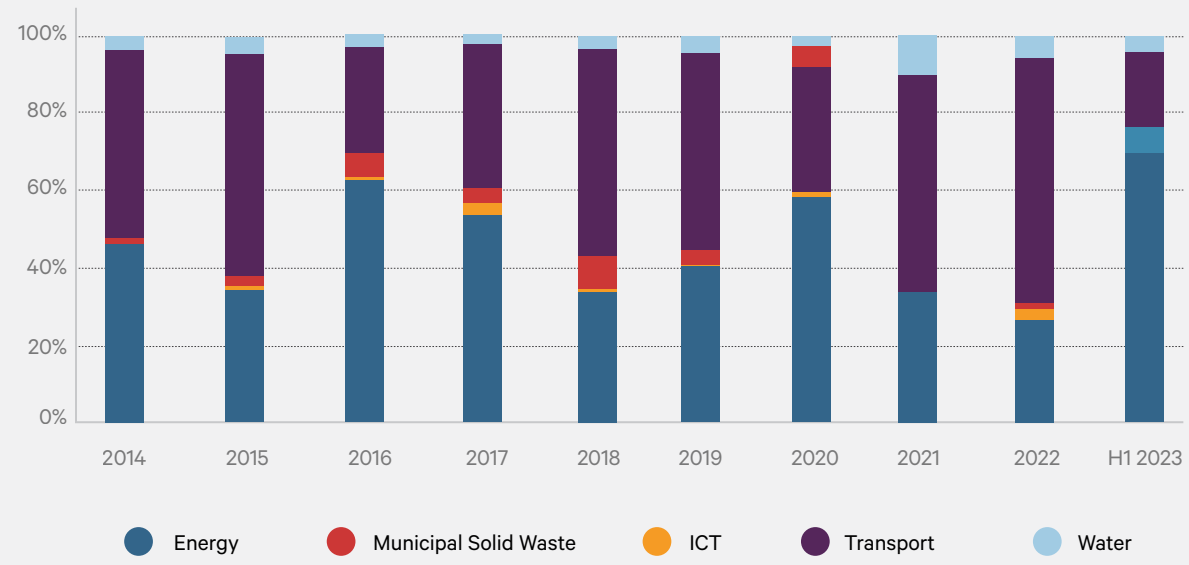
The Importance of Addressing FX Risk in Infrastructure Investments in EMDEs



FX risk is a pervasive challenge for infrastructure projects in EMDEs due to three factors that lead to currency mismatches: (1) limited access to and uptake of sufficient, affordable, long-term local currency financing means that financing is typically denominated in hard currency; (2) infrastructure projects typically generate revenues primarily in local currency and therefore lack natural hedges, apart from projects in export-oriented sectors; and (3) a portion of total project costs (capital and operating expenses) are typically denominated in hard currency due to the need for imported equipment, materials, and expertise.

Most infrastructure project revenues are typically generated in local currency, creating a currency mismatch between revenue inflows and financing and operating outflows – and an additional risk that international investors prefer to avoid. Investors note that they prioritize or even exclusively invest in export-oriented sectors and projects with substantial hard currency revenues (GIF 2024)[2]. Only 26% of private investment in infrastructure in developing markets is made in local currency (GIH 2024b), and sectors with revenues typically generated in local currency[3] accounted for only 11% of projects with private participation in low- and middle-income countries (Figure 4) (World Bank 2023).

Figure 4: Share of sectoral investment commitments in infrastructure projects with private participation in low and middle-income economies, by sector



Sources: World Bank 2023 Private Participation in Infrastructure (PPI) Half Year (H1) Update

A significant share of infrastructure project construction and operation costs are typically denominated in hard currency, further exacerbating FX risk. This risk is more acute for complex projects with high reliance on imported inputs, such as specialized equipment (e.g., for renewable energy projects, desalination plants, etc.) or materials that are not available locally and have prices indexed to international markets. Smaller EMDEs are particularly susceptible to currency mismatch between operating inflows and investment outflows due to limited domestic production of project inputs.

FX risk in infrastructure projects in EMDEs is further exacerbated by other currency risks, namely convertibility and transferability risk (Figure 5). Beyond FX risk, which commonly refers to the risk related to exchange rate volatility, infrastructure projects and stakeholders are also exposed to convertibility and transferability risks, which relate to the risk of not being able to convert local currency to foreign currency (in a timely fashion, or at all), and of not being able to transfer hard currency abroad. Transferability and convertibility restrictions can require funds to be kept onshore and/or in local currency accounts for prolonged periods. Under these conditions, project revenues are further exposed to exchange rate fluctuations, and large or persistent currency depreciation can reduce the likelihood of transferability and convertibility restrictions being lifted. Beyond policies that promote exchange rate stability, international investors rely on political risk insurance products, offered mostly by MDBs (e.g., MIGA), to obtain coverage against transferability and convertibility risks. This report will focus primarily on mechanisms available to reduce or mitigate the impact of FX risk.

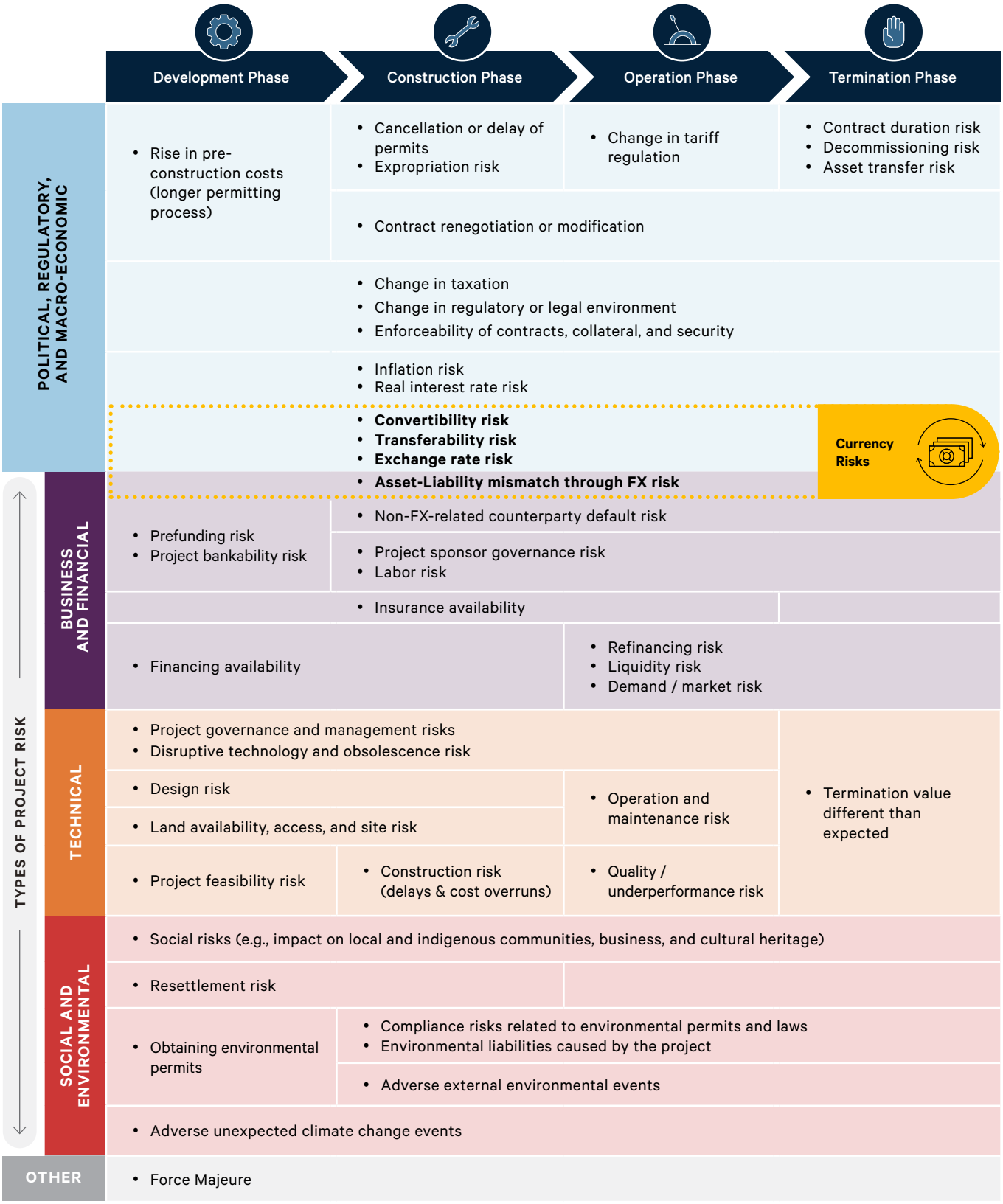
2. For example, ports, airports, and oil and mining.
3. Such as social housing, water, and local bus transport

Exposure to exchange rate risk can affect various project stakeholders in different ways, impacting a project's attractiveness and overall bankability. Exposure to FX risk may discourage international investors from providing financing. In most cases, EMDE governments assume the FX risk, which results in contingent liabilities that may heighten sovereign default risk,[4] thereby tying the project's bankability to the country's sovereign credit rating and debt sustainability. Materialization of these contingent liabilities may affect the government's capacity to scale up infrastructure investments and pursue other essential expenditures given limited fiscal space[5]. Exposure to contingent liabilities can be mitigated through ceilings and limits on government guarantees, risk premia, and risk transfer instruments. Governments may also transfer FX risk to users through tariff indexation; however, end-users are usually the stakeholders least equipped to manage this risk. Well-prepared, bankable projects will allocate risks to the party best positioned to manage them.[6]

Although it is critical, however, FX risk is not the only bottleneck holding back international investors; macroeconomic stability and a strong pipeline of well-structured, bankable projects with a balanced risk allocation are critical pre-conditions to mobilizing long-term international capital. International infrastructure investors and project developers interviewed for this report cited macroeconomic stability, robust legal and regulatory frameworks, and a strong and attractive pipeline of infrastructure projects as the main conditions necessary for making infrastructure investments in new markets. A balanced risk allocation among project stakeholders is crucial to achieving well-structured, bankable projects that can attract long-term, international investors. Indeed, infrastructure projects carry a broad range of risks—including political, regulatory, business, financial, technical, environmental, and social risks—that need to be appropriately allocated across and managed by project stakeholders (Figure 5).

4. Sovereign default risk refers to the risk that a government might default on its debt obligations or otherwise fail to meet its financial commitments.
5. Fiscal risks are defined as the exposure of public finances to unexpected developments which may lead to fiscal outcomes deviating from expectation (e.g., budgets or forecasts)
6. Exchange rate risks can be borne by government (who is in charge of macroeconomic variables), private sector (who can diversify their exchange rate risks); or consumers (who ultimately pay for services)

Figure 5: Infrastructure project risk framework



Source: GIF analysis, based on OECD and World Bank, 2015; GIH 2019

SECTION II

The Country-Level Landscape and Tools

The Landscape

Domestic capital markets in many EMDEs lack the depth and capacity to provide financing under the long maturities needed for infrastructure investments. The high cost of capital driven by regulatory impediments as well as weaker macroeconomic and financial conditions dampen investor appetite for infrastructure investments. Therefore, attracting investors in EMDEs at better yield conditions remains difficult without improving macrofinancial conditions and developing local capital markets. The risk premium also increases as the long-term nature of the infrastructure projects heightens the potential for FX risks to materialize.

Against this backdrop, a combination of macroeconomic and financial sector policies could help reduce FX risks. These policies could help as prerequisites by improving the investment climate for infrastructure projects, developing an enabling environment for innovative financial strategies focusing particularly on infrastructure investment needs, as well as to effectively develop and manage viable infrastructure projects. A stable macroeconomic environment through effective monetary policies, and sound fiscal policies can help reduce FX volatility associated with infrastructure projects. These policies will improve investor confidence and stabilize expectations, thus reducing capital flow volatility, improving market functioning and financial stability, enhancing debt sustainability and public finance management, as well as reducing the impact of sudden devaluations on governments' balance sheets. Domestic capital market development also plays a fundamental role by improving local currency financing related to these projects, the capacity to hedge FX risk through financial derivatives, and the ability to diversify funding and currency composition. However, the cost of FX hedging remains high particularly in developing economies, while hedging instruments with longer tenors continue to be scarce in EMDEs. Eichengreen, Hausmann, and Panizza (2007) argue factors that contribute to what the authors called "Original Sin" also include problems with the structure of global financial markets and policy failures—pointing to forces that concentrate international portfolios and markets in a few major currencies.

The lack of data to properly assess mismatches between FX debt and FX assets and the unique characteristics of public-private partnerships (PPPs) could further heighten this category of fiscal risks during large FX devaluation episodes. Net foreign exchange exposure reveals significant mismatches showing many countries have large foreign exchange debt obligations that are not offset by FX assets. Therefore, foreign exchange flows should be taken into account when assessing FX risks[7]. Moreover, PPPs have proven to be a type of fiscal risk that is challenging for governments to handle. This stems from the long time horizon and technical nature of PPPs and the lack of systems, skills, and experience in the public sector to appropriately manage the PPP procurement and operation steps. In general terms, exchange rate risk may negatively impact PPP contracts in two ways: large depreciation of the local currency might render it difficult to service foreign-currency-denominated debt; and the depreciation of the local currency might render more onerous the acquisition of crucial foreign-currency-denominated inputs from abroad (e.g., raw materials, fuel). If the Private Partner is not able to pass on the cost increases (as denominated in the local currency) to the Public Partner or to end-users, the PPP contract might generate losses, resulting in PPP contract default and possible government bailout. This in turn may impact the fiscal obligations that the government will have to carry – especially when the uninterrupted operation of the asset is in the public interest. It is therefore necessary for the Government to understand what risks may materialize from the PPP portfolio and to mitigate these risks.

The level of risk premia and market development across Emerging Markets and Developing Economies vary significantly. This section of the report first explores these characteristics among three groups: smaller EMs and developing economies, mid-sized EMs, and larger EMs[8]. It then outlines how local currency bond market development and fiscal sector tools can help attract long-term investments.

SMALLER EMERGING MARKETS AND DEVELOPING ECONOMIES

Infrastructure investments in small Emerging Markets and Developing Economies face headwinds due to fundamental challenges that include low sovereign ratings and high project risk. Low non-investment grade (around B minus on average) or missing sovereign credit ratings makes the pricing of risks in infrastructure projects challenging, as private debt typically prices at a premium to the sovereign[9]. (figure 6, panel 2). The typically long duration of infrastructure investment combined with the lack of a local currency yield curve in many economies in this group exacerbates these limitations. For projects that have been funded, their historical average 10-year default rates are nearly twice as large as those in mid-sized EMs. Cumulative S&P-rated project finance default rate is around 29% compared to 14% in mid-sized EMs for 10-year maturity. Hence, in these countries, both current sovereign ratings and historical losses are creating high floors for infrastructure funding costs that may render many projects unviable.

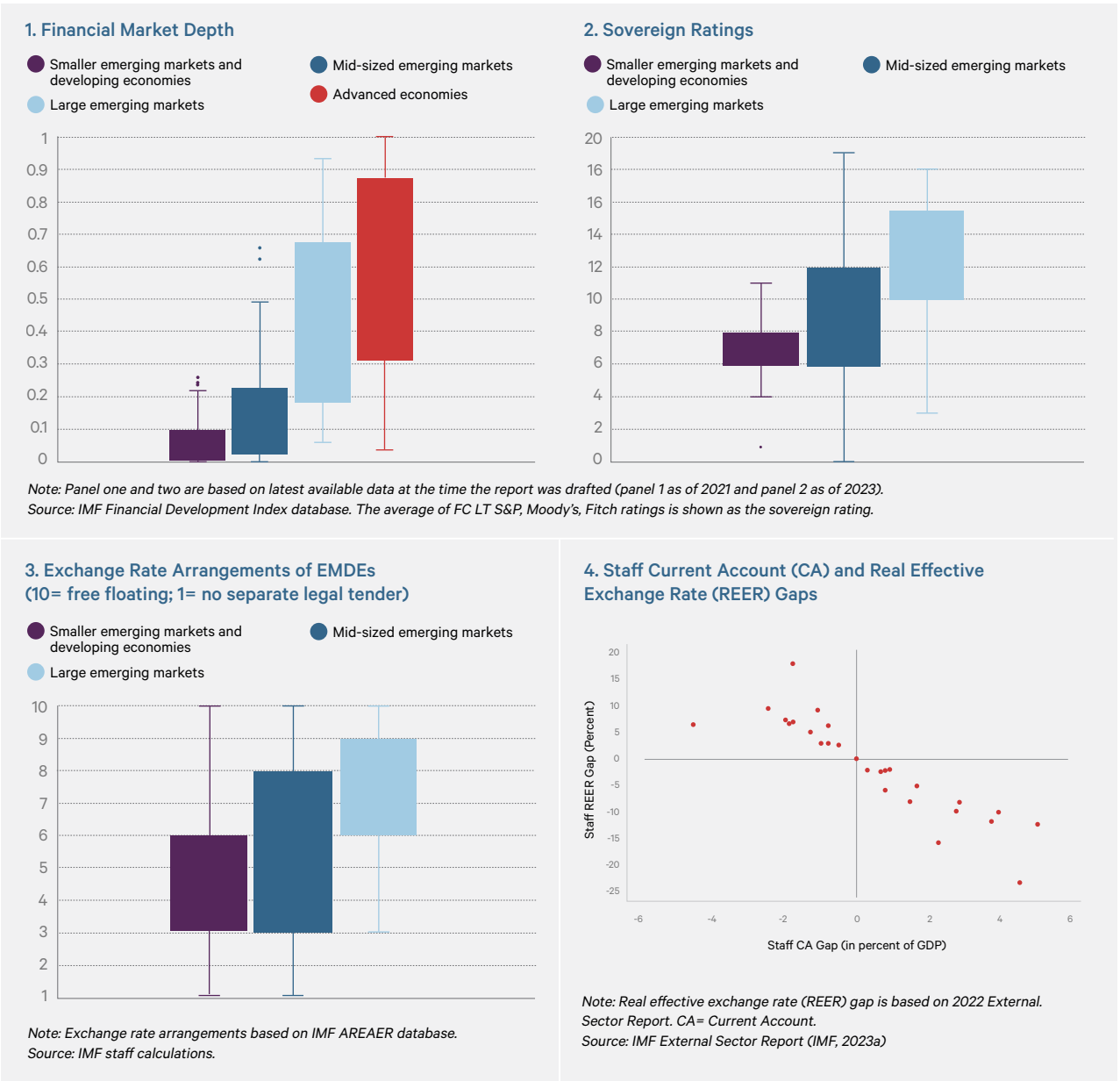
These economies also have significantly lower financial market depth compared to other EMs, making it challenging to source funds for large projects. The IMF's Financial Market Depth Index measures the depth of capital markets in terms of stock market capitalization, trading volume, outstanding international government debt securities, and total corporate debt securities as a share of GDP[10]. By this metric, Smaller EMs and Developing Economies have extremely shallow public markets. Even many top-quartile countries are below the median level achieved in Mid-sized EMs, and far from what is seen in large EM and advanced economies. (figure 6, panel 1)

7. Foreign exchange rate risk management of the external funding and debt servicing of infrastructure projects that are in the budget is typically dealt within the country's integrated exchange rate risk management framework.
8. We use the EM and LIC categorizations of the IMF World Economic Outlook, and further refine the EMs into large EMs and mid-sized EMs based on their level of income.
9. Over 40% of the countries in this group are unrated.
10. This definition can be found at https://data.imf.org/?sk=f8032e80-b36c-43b1-ac26-493c5b1cd33b&sid=1480712464593

A sound macroeconomic environment is crucial for the development of local currency bond, foreign exchange, and hedging markets in these economies. In particular, money markets are a crucial building block for local markets, and resilient and well-functioning money markets typically require an effective monetary policy framework and a low and stable inflation environment (EBRD 2016). In addition, as highlighted in the IMF's Integrated Policy Framework (IPF)-- Principles for the Use of Foreign Exchange Intervention, frequent FX interventions may hinder the development of FX and hedging markets as they may reduce private entry into the market and, therefore, reduce liquidity in the spot market[11] (IMF, 2023b) Such interventions may happen more frequently under the less flexible exchange rate arrangements that are seen on average in smaller Emerging Markets (figure 6, panel 3). The literature also finds that following periods of intense FX interventions, the share of FX debt tends to increase (Kim, Mano, and Mrkaic 2023), while countries with more flexible exchange rate regimes tend to see reductions in FX debt (Csonto and Gudmundsson 2020).

While some commercial hedging options exist in larger EMDEs, they tend to be expensive or nonexistent in these smaller EMs and developing economies. Contracts tend to be expensive and short-dated given they are based on local currency yield curves, reflecting macroeconomic fundamentals and market conditions. Options to improve hedging capacity in these economies will be discussed later in this report.

Figure 6: Comparison of macro-financial landscapes across EMDEs



Note: Panel one and two are based on latest available data at the time the report was drafted (panel 1 as of 2021 and panel 2 as of 2023).
Source: IMF Financial Development Index database. The average of FC LT S&P, Moody's, Fitch ratings is shown as the sovereign rating.

Note: Exchange rate arrangements based on IMF AREAER database.
Source: IMF staff calculations.

Note: Real effective exchange rate (REER) gap is based on 2022 External. Sector Report. CA= Current Account.
Source: IMF External Sector Report (IMF, 2023a)

11. IPF also defines cases where FX interventions are appropriate. Where interventions are warranted in line with principles highlighted in IMF (2023b), interventions should be coordinated with other economic policies, including monetary and fiscal policies, to achieve overall macroeconomic stability.

MID-SIZED EMERGING MARKETS

While mid-sized emerging markets fare better than their lower-rated counterparts, infrastructure financing remains challenging for similar reasons. The average long-term default risk of mid-sized emerging market economies remains high compared to large emerging markets (cumulative S&P-rated 10-year project finance default rate around 14% versus 3% in large EMs on average). The average sovereign rating remains below investment grade around B+ (Figure 6, panel 2), thus heightening the cost of funding in this group of countries[12]. While they have greater financial market depth compared to developing economies, their financial markets remain significantly lower on average compared to larger EMs.

The range of financial depth among the economies in this group is quite large. As shown in figure 6, panel 1, top quartile countries here are well within the levels of financial depth seen in larger emerging markets, while markets are nearly non-existent amongst the bottom quartile. Further deepening local capital markets is critical for this group of economies as this will enable financial solutions to reduce exchange rate risks. Local market development is vital to foster the ability to diversify counterparties and instruments, develop onshore access, as well as to improve the maturity transformation needed for infrastructure projects. Well-functioning bond markets and money markets, a diversified investor base, and sound regulatory infrastructure can help improve the credibility and reliability of issuers, maintain transparency of stakeholders, and enhance secondary market liquidity. Steady progress in this area will help improve local currency financing, the capacity to hedge through financial derivatives, and the ability to diversify funding and currency composition.

Exchange rate regimes in this group are broadly similar to those in smaller EMs and developing economies (figure 6, panel 3). Increasing exchange rate flexibility and strengthening monetary policy frameworks will help improve money market functioning and develop FX and hedging markets.

The financial infrastructure in many of these economies has limited capacity to utilize standard hedging instruments. Hedging instruments such as forwards, futures, options, or swaps can help hedge exchange rates for future transactions by effectively insulating a project's cash flow and profitability from adverse currency movements. However, foreign exchange derivative instruments trade in size only in the most developed emerging markets. Limited availability of longer tenors and reliance on Non-Deliverable Forwards (NDFs) are well-identified challenge[13]. The interest rate differential between the local and foreign interest rates often heightens hedging costs.

Case Study: Montenegro Highway

Montenegro's Highway PPP illustrates how unhedged exchange rate risk in infrastructure projects can pose a significant fiscal risk to a country - a sharp exchange rate depreciation impacted the government's project obligations and increased fiscal risks. Montenegro's Bar Boljare Highway is a complex physical terrain project of 170 km connecting the port of Bar to the Serbian road network to improve connectivity of the undeveloped northern region to the Trans European Transport Network (TEN-T). At EUR 19.7 million average cost per kilometer, this is one of the most expensive highways in the world. The road was financed through a loan equivalent to 20% of Montenegro's GDP in 2014, when debt stood at 63% of GDP. In addition to tax exemptions, the authorities assumed a substantial exchange rate risk by agreeing to secure financing for the project in US dollars, a risk that subsequently materialized and substantially contributed to a worsening of Montenegro's Debt-to-GDP. Although several appraisals deemed the project unviable, the government pursued the project and did not take adequate measures to mitigate against the exchange rate risk. By 2020, Montenegro's debt-to-GDP ratio reached 105%, one of the highest in the region. In 2021, the country reached a hedging arrangement to convert its almost one billion-dollar loan for the highway into euros, to gain protection from the exchange rate risk.

12. About 25% of countries in this group are unrated.
13. NDFs are foreign exchange forward contracts that do not require physical delivery of the underlying currencies. Transactions are cash-settled, typically in US dollar, through net payments that are equivalent to the difference between the spot rate at the maturity date and the previously agreed forward rate. For investors, banks, and corporates, NDF markets are often an attractive alternative to onshore markets due to the absence of regulation, longer trading hours, reduced documentation requirements, often good liquidity, no convertibility risk, and reduced credit risk because of net settlement. However, NDF markets' large size, volatility, and pricing differentials relative to onshore markets have raised concerns over spillovers from the offshore to the onshore market.

LARGER EMERGING MARKETS

Larger EMs typically benefit from relatively deep domestic capital markets and access to international investors. They have much lower average long-term default rates and are investment-grade rated in many cases, with an average sovereign credit rating in this group close to BBB minus (figure 6, panel 2). Their financial depth has also increased over time and is now largely comparable to that seen in advanced economies (figure 6, panel 1). However, despite local financial market deepening, international investors still play a key role in capital provision. In many large EMs foreign investors now hold a significant share of LC sovereign debt. Carstens and Shin (2019) argue that larger EMs with the capacity to issue LC debt however are now beset by "Original Sin Redux"—Original Sin merely shifted from borrowers to lenders[14].

The exchange rate regimes of larger EMs tend to be more flexible than those in the other EM groups (figure 6, panel 3). The IMF External Sector Assessment (ESA) report also finds that the exchange rates are largely in line with macroeconomic fundamentals (figure 6, panel 4) (IMF, 2023a).. Volatility associated with these currencies is found to be much smaller. Structural improvements made in large EMs over the last decade bore fruit during the 2020 Covid-19 stress event, as FX markets and currencies fared much better than they did during the 2013 taper tantrum[15].

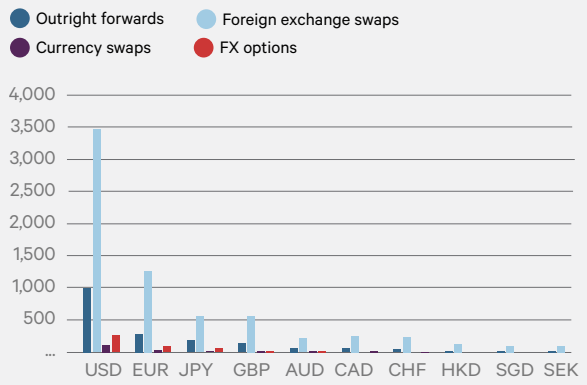
Economies in this group have started using long-term currency hedging instruments, but the scale of use is significantly lower than in advanced economies (figure 7, panels 1 and 2). Limited market liquidity hampers the effectiveness of these hedges, pointing to the need to develop a large domestic institutional investor base. The BIS (2022a) notes that while larger Asian EMs' FX hedging markets lag those in regional financial centers, their central banks are playing an active role in deepening onshore FX hedging markets. For instance, Bank Indonesia introduced a domestic NDF instrument settled in local currency in 2018. Bank Negara Malaysia introduced the Dynamic Hedging Program in 2016 to allow institutional investors to manage their portfolio FX exposure. Bank of Thailand enrolled non-resident corporates into the Non-Resident Qualified Corporate program in 2021, to give them greater flexibility in hedging their FX exposure in the onshore market. During the period from 2020 – 2024, the Reserve Bank of India rolled out measures such as longer trading hours, merging facilities for residents and non-residents, free cancellation and rollover of contracts, relaxation of underlying asset requirements for non-residents, permitting Indian banks which operate International Financial Services Centre (IFSC) Banking Units (IBUs) to offer non-deliverable derivative contracts (NDDCs) to non-resident and resident users, etc., to facilitate FX transactions, reduce the segmentation between domestic and offshore markets for the INR and develop the Domestic Non-Deliverable Forward (DNDF) markets (Reserve Bank of India, 2024).

Case Study: Mexican Transportation

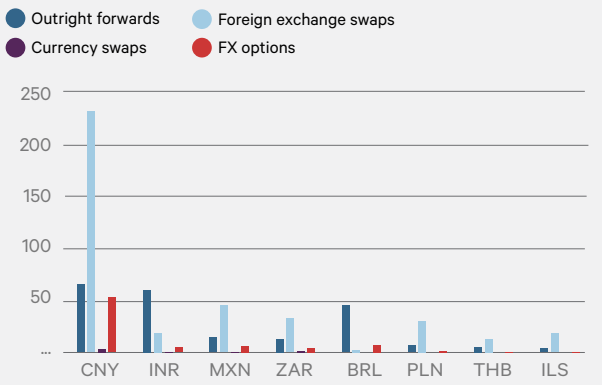
Mexico's experience with PPPs illustrates the importance of having strong public investment management frameworks to limit fiscal risks. Mexico's PPPs were concentrated in the transportation sector (road, railways, and ports) which falls under the Ministry of Infrastructure, Communications and Transportation (MICT). At the PPP program's outset in the 1980s and 1990s, PPP proposals were subject to in-depth technical scrutiny by MICT, but financial scrutiny of the PPP contract was lax. The Ministry of Finance's role was limited to determining government subsidies. The government's contingent liabilities were neither assessed nor considered in formulating budget estimates or fiscal risk assessments. The currency crisis of late 1994 crystallized significant fiscal risks. Foreign debt increased, concessionaires were unable to meet their debt burdens and the government had to provide bailouts to the private parties as mandated by the PPP law at the time. As a result, toll road usage and fees decreased, and additional financing was not available to bridge the revenue gap. Subsequently, the PPP legal framework was strengthened, and risk evaluation is now comprehensive. A stronger appraisal and selection process has been implemented to ensure the economic and financial robustness of PPP and concession contracts.

14. Given that foreign institutional investors have risk limits denominated in their home currency, a fall in the LC sovereign bond value and the associated currency depreciation could trigger selloffs by foreign institutional investors due to currency mismatches these investors incur. This in turn could put further downward pressure on the borrower's local currency.
15. The "2013 Taper Tantrum" refers to the sharp increase in U.S. Treasury yields and global financial market volatility following Federal Reserve indications of reduced quantitative easing in May 2013.

Figure 7: FX hedging volumes of advanced economies vs. EMDEs



Source: BIS Triennial Survey.



Source: BIS Triennial Survey.

Developing Local Currency Bond Markets as a Tool to Attract Long-term Investments for Infrastructure Projects

Sovereign local currency market development is complementary to effective macroeconomic policies. Sound capital markets support mobilizing domestic savings and attracting private financing for investment projects, including foreign capital. Local currency bond market (LCBM) development is an important aspect of broader capital market development. Sound and stable macroeconomic conditions, financing needs of the government, the structure of the economy including the size of the economy and domestic savings base, sound fiscal and debt positions, stable inflation, interest rates, and exchange rates, financial sector soundness, and effective debt management capacities and operating procedures are important enabling conditions for domestic government debt market development. Foreign investors and broader Foreign Direct Investment (FDI) flows are attracted to the market when countries reach a more advanced stage of LCBM development (IMF and World Bank 2021). Transactions on the domestic market and the related foreign exchange operations provide evidence of the efficiency and ease of these operations, removing any doubt investors might have about the reality of free convertibility and the absence of controls on capital.

Local currency bond market development will foster:

- **Money Market Development.** Developing the short end of the yield curve provides a crucial pricing anchor for economic agents. This facilitates intermediation and maturity transformation in the banking sector providing long-term finance to the real economy.

- **Price Reference.** A benchmark yield curve, particularly at longer maturities, provides a critical price reference to price long-term infrastructure projects.

- **Positive Spillovers.** Broader LCBM development and deepening the investor base are critical to support private sector capital mobilization and serve as a cornerstone of capital market development[16].

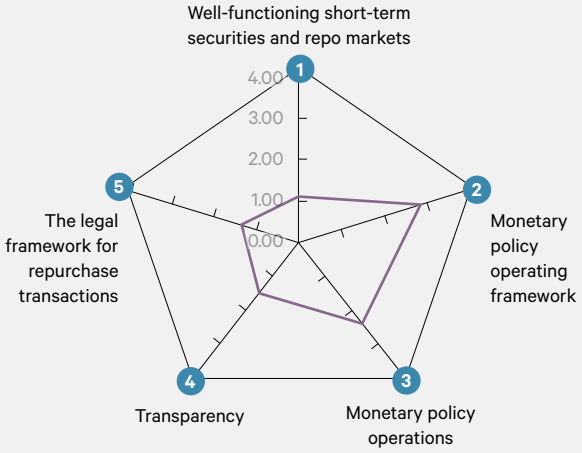
Developing an active money market and a short-end government securities yield curve is critical to attracting long-term investments. A deep and liquid inter–bank money market supports commercial banks in their financial intermediation function, facilitates maturity transformation between savings and investments in an economy, and provides pricing references for loan agreements. In markets with underdeveloped money markets, banks often prefer to minimize interest rate risks by limiting long-term loans or only extending variable rate loans that pass interest rate risk to the borrower; this can particularly affect investment activity in long-term projects, for which it is important to know the funding costs over the life of the transactions. Issues related to money markets such as contract enforceability, which impedes repo market development, and the lack of a benchmark reference are the most significant impediments to LCBM development (figure 8, panel 1). As a result, banks manage liquidity inefficiently, and monetary policy transmission is typically weak. Enhancements are proposed through improved liquidity management tools, better forecasting by governments and central banks, and the development of repo markets alongside refined monetary policy frameworks. The tenor mismatch between long-term infrastructure assets and short-term local-currency financing also impedes larger capital flows from institutional investors to infrastructure sectors.

16. The G20 report on financial platforms (IMF, 2024g) highlights findings in literature and central bank projects to strengthen cross-border capital flows with digital payments.

A domestic money market yield curve is also critical for developing FX hedging instruments that are needed to mitigate FX risks in infrastructure projects. Cross-currency forwards and swaps are priced on the interest rate parity condition; the forward or discount priced by market makers will reflect the interest rate differential between local and foreign currency. The absence of such a price indicator, or a less reliable one, may lead to a wide variation in interbank prices. A more efficient pricing mechanism provided by liquid money and government securities markets can boost availability of hedging instruments. A benchmark yield curve extending to longer maturities provides an important price reference for infrastructure projects. Many countries face challenges with large bond issuance and at longer maturities mainly due to a lack of depth in their investor base (figure 8, panel 2). Often, the lack of pension savings and institutional investors severely limits long-term finance provision to the economy. Diversification of the investor base is a priority for many countries. However, ineffective tax, accounting, and regulatory frameworks are often key impediments.

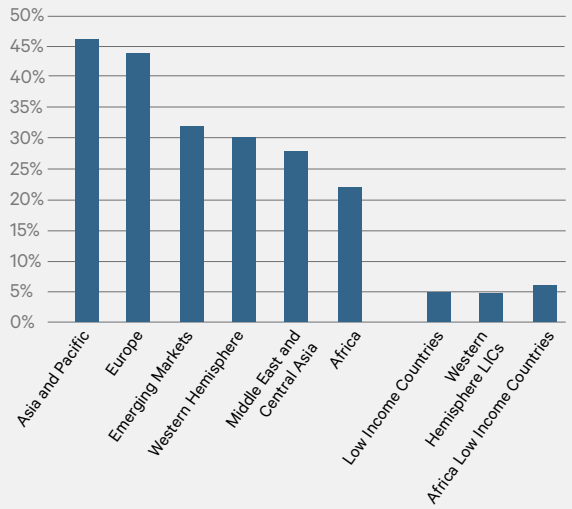
Figure 8: Impediments to LCBM development

1. Money market building block in local currency bond markets assessments.



Note: Assessment based on 13 LCBM assessments conducted to date.
Source: IMF staff.

2. EMDEs yield curves are often underdeveloped and not adequate price references.

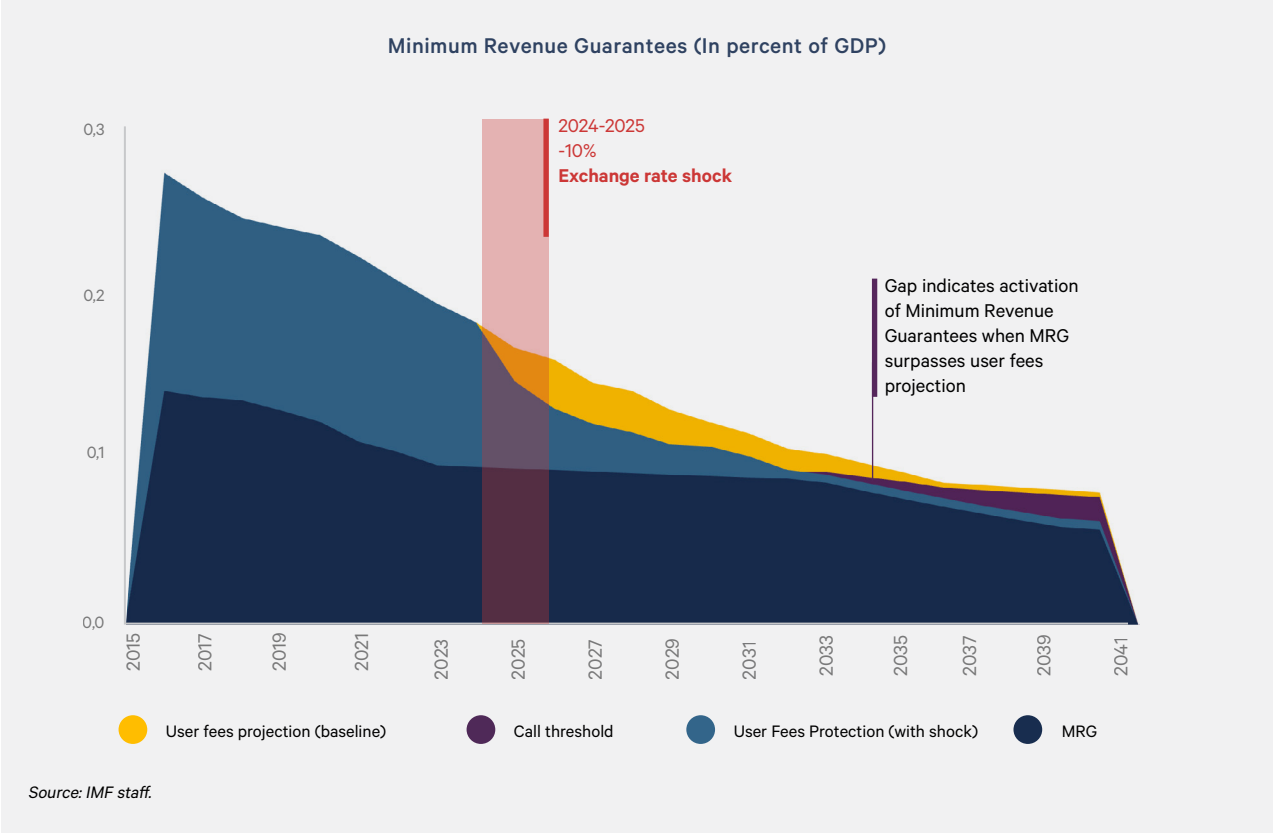


Note: chart illustrates the share of domestic bond universe with an outstanding size above USD 1 bn equivalent.
Source: IMF staff.

Fiscal Risk Toolkit to Assess FX Risks

To support countries in their fiscal risk management, the IMF has developed a fiscal risk toolkit aimed at identifying, quantifying, and mitigating various risks, including FX risks from PPPs. The Public Private Partnership Fiscal Risk Assessment Model (PFRAM) toolkit provides a framework to measure various risks, including FX risks. In the stylized example below (figure 9), the impact of an exchange rate shock on a PPP toll road contract is modelled. According to the contract, the private concessionaire is compensated through user tolling, but the government also provides a minimum revenue guarantee (MRG). As can be seen in the model, after the project is completed and operational in 2015, the user tolls are adequate to cover the guaranteed revenue stream and there is no need for government funding. However, once the exchange rate shock is introduced, user fees decline, and gradually fall below the MRG, which requires additional government funding. The tool consequently helps governments prepare for the materialization of an exchange rate shock and focus on developing sufficient fiscal buffers to absorb such shocks.

Figure 9: PFRAM modelling of currency risk materialization[17]



Source: IMF staff.

The fiscal risk toolkit consists of nine blocks to cover not only PPPs but other fiscal sector aspects. These include, beyond the PFRAM, a fiscal risk assessment tool (FRAT) to identify priority risks among 14 categories, a State-Owned Enterprise (SOE) health Check Tool, an SOE stress test tool and a Public Sector Balance Sheet Assessment (PSBS). The PSBS analysis provides a comprehensive picture of general government assets, debt, non-debt liabilities—referred to as net financial worth or net worth. By measuring net worth, governments can manage important risks, which are not captured in the statement of operations such as the fluctuation of exchange rates. FRAT and PFRAM are also targeted at identifying exchange rate risks arising from long-term contracts (e.g., PPPs).

The fiscal risk toolkit helps governments to:

- Better understand their exposure to large fiscal risks[18] including macroeconomic shocks, specific fiscal risks (, e.g., from SOEs, PPPs, guarantees), financial sector risks, or policy implementation risks due to governance failures.
- Quantify the impact of potential future shocks and estimate the likelihood of materialization.
- Mitigate the impact by avoiding risky policy decisions, limiting exposure, regulating risky activities, and using risk transfer and sharing instruments to reduce costs (e.g. hedging, insurance and partial guarantees).
- Accommodate residual fiscal risks as part of fiscal policy formulation
- Report transparently in fiscal risk statements about the nature, potential fiscal cost, and what mitigation strategies are in place.
- Ensure more sustainable and robust public finances by putting in place a framework for continuous fiscal risk analysis integrated into the budget process.

17. The PFRAM Model uses the potential impact of exchange rate shocks on the national macro fiscal framework to identify the knock-on impact on the Government's fiscal position from contractual revenue guarantees issued for PPPs.
18. Even in advanced economies, fiscal risks can heighten debt; for instance, Portugal's fiscal risks increased their debt from 76% (December 2009) to 130% (2014) of GDP. About half of that increase was due to fiscal deficits and normal debt dynamics. The remaining increase stemmed partly from SOEs and PPPs (15.3 percent of GDP) that were reclassified into the general government to address the liabilities and partly from needed bank recapitalizations (12.9 percent of GDP).

SECTION III

The Landscape of Project-Level Mechanisms

A Framework for Managing Exchange Rate Risk at the Project Level

The systemic and sustainable solution to addressing exchange rate risk in infrastructure projects is to eliminate currency mismatches through the development of local currency financing and local capital markets, which require robust macroeconomic and fiscal policies. As outlined in Section II, the specific choice of policy will vary by country archetype and depend on the country's economic profile, sovereign credit rating, and the depth of local capital and FX markets. Irrespective of the archetype, however, implementing these policies requires long-term policy commitments from governments, central banks and regulators within their legal mandate and following the principle of risk neutrality, as well as support from the international financing community. These policy commitments are critical to addressing FX risk over the long term, but take time to mature and implement.

In the meantime, infrastructure finance practitioners in emerging markets can leverage multiple mechanisms to address FX risk in infrastructure projects that require international private capital. In EMDEs, access to international private capital is needed for infrastructure projects when local capital markets lack sufficient breadth and depth to provide financing with the terms required, or when projects have financing needs in hard currency.

This section offers a framework for categorizing the existing mechanisms to address FX risk[19] in infrastructure finance. The framework sets out a strategic approach to addressing FX risk at the project and portfolio levels and serves as a practical guide for policymakers as they evaluate the feasibility of different mechanisms. These mechanisms are readily available at the project level in the short-term and can be deployed in parallel to longer-term efforts on the recommended macroeconomic and fiscal policies that will underpin sustainable solutions and based on their availability in each country context. The section builds upon existing G20 work, a literature review, and more than 40 high-level interviews with key infrastructure stakeholders[20]: governments, MDBs, DFIs, private investors, developers, commercial banks, and infrastructure funds. Selected case studies illustrate the successful real-world deployment of key mechanisms, focusing on those that have been successfully implemented in projects that have reached financial close.

Available mechanisms for addressing FX risk can be categorized by considering three dimensions:

- **Impact:** From an impact perspective, available mechanisms either reduce or mitigate the exposure to exchange rate risk:
  - **Reduction** (or elimination) of exchange rate risk involves asset-liability matching through partially or fully aligning the currencies of cash inflows and outflows, thereby minimizing the net amount exposed to exchange rate changes.
  - **Mitigation** of exchange rate risk involves limiting the impact of exchange rate movements on net future cash flows, often by reallocating the risk.

- **Scope:** Scope refers to the coverage level of the mechanism:
  - **Project-level mechanisms** are typically deployed for a specific infrastructure project.
  - **Portfolio-level mechanisms** include systematic solutions that can be applied cross multiple projects through a portfolio approach or by enabling mechanisms that cover a set of projects.

- **Nature:** Available mechanisms are either financial or non-financial in nature.
  - **Financial mechanisms** include the use of financial instruments such as loans, bonds, derivatives, and blended or commercial finance solutions.
  - **Non-financial mechanisms** typically cover contractual arrangements or initiatives to enhance market efficiency, including through technical assistance grants.

Figure 10 below provides an overview of the currently available mechanisms based on the above classification framework.

19. As mentioned in the Introduction, FX risk refers to the risk of large and sudden fluctuations in the exchange rate. Transfer and convertibility risk, which are also currency risks, can be managed only through specific transfer and convertibility guarantees offered to investors by most MDBs (e.g., MIGA, EDFI's EU-funded Transferability and Convertibility Facility for projects in the energy sector). Among the numerous mechanisms for managing transfer and convertibility risk, this section focuses on those that help reduce or mitigate the risk of FX volatility.

20. Interviews per category of institution included: PPP Units (2); NDBs (3); Export Credit Providers (3); MDBs (7); DFIs and Bilateral Donors (7); Commercial Banks (3); Dedicated FX solutions providers (2); Infrastructure Funds (6); Project Developers and Advisory Firms (8).

Figure 10: Framework of existing types of project- and portfolio-level mechanisms to address exchange rate risk

		Financial Mechanisms	Non Financial Mechanisms
REDUCTION	PROJECT	• **Local currency financing,** including through equity, loans, and bond issuance on domestic or international markets	• **Natural generation of hard currency-denominated revenues** • **Supply chain localization**
	PORTFOLIO	• **Guarantee programs and other credit enhancement mechanisms** aiming to unlock local currency financing • **Resource mobilization by international financiers or NDBs with proceeds on-lent in local currency to infrastructure projects** • **Portfolio diversification and treasury management approaches*** • **Asset recycling** / asset monetization	• **Promotion of domestic infrastructure investment initiatives or vehicles** that enable local investors to finance infrastructure projects • **Regulatory enablers and incentives for local currency financing of infrastructure projects**
MITIGATION	PROJECT	• **Financial hedging instruments** • **Project reserve accounts and FX liquidity facilities** • **FX risk guarantees** provided by governments • **Proxy currency financing**	• **Payment indexation to hard currency or inflation** • **Other contractual arrangements** • **Currency management mechanisms,** such as cash sweeps
	PORTFOLIO	• **FX market creation and strengthening** initiatives • **Governmental guarantee funds or liquidity facilities** for multiple projects • **Blended finance facilities** • **Portfolio diversification and treasury management approaches***	• Dedicated support from **infrastructure project preparation facilities** to optimize FX risk allocation mechanisms during project structuring

**Supports both reduction and mitigation of exchange rate risk*

Because there is no one-size-fits all solution for addressing FX risk, infrastructure projects often adopt a combination of mechanisms. Each mechanism presents advantages and limitations. Reduction mechanisms can fully eradicate exposure to FX risk, but their availability or applicability to projects is often limited. Mitigation mechanisms can enhance project bankability for the project's sponsor or lenders, but partially or fully shift the exchange rate risk onto a different stakeholder who may not be in the best position to bear it. Determining the specific strategy depends on country, sector, and project-specific factors that impact the availability and cost of mechanisms. Mechanisms also differ in terms of their fiscal implications for EMDE sovereigns. Section IV provides details on the availability and feasibility of different mechanisms according to country contexts.

The recommended overall strategy for addressing FX risk at the project level is to first reduce exposure to FX risk to the extent possible, and second, aim to mitigate the impact of the residual exchange rate risk as required.

Mechanisms to Reduce Exchange Rate Risk at the Project Level

FX risk reduction mechanisms seek to align the currencies of project cash inflows and outflows, respectively, to limit the exposure of net cash flows to adverse exchange rate movements. When cash inflows and outflows (or revenues and costs) are not denominated in the same currency, a change in the exchange rate may adversely affect the value of net cash flows.

At the project level—and from a financial perspective—reduction is mostly achieved by maximizing the use of local currency financing. Exchange rate risk can be significantly reduced, or even eliminated, in those cases where the infrastructure project secures financing in the same currency as the currency in which its revenues are denominated. Most infrastructure projects serve the domestic market; hence, their revenues are denominated in the country's currency. In this case, loans from local or international institutions and bond issuances in local or international markets should be denominated in local currency. A fully proportional cash inflow and outflow in the same currency would completely eliminate currency mismatches and the adverse impact of exchange rate fluctuations on cash flows.

Local currency financing for a project can be secured either by the project sponsor or by the lenders themselves, either in-country or on international markets. Projects can secure local-currency-denominated financing from domestic sources by mobilizing local savings from local investors (e.g., local sponsors, developers, commercial banks, pension funds, and national development banks) or international sources through foreign financiers (e.g., international infrastructure funds, MDBs, and DFIs), either through direct financing (e.g., loans) or by issuing project-specific bonds. International financiers can also lend in local currency to the project either by securing local-currency-denominated resources or by transforming hard-currency-denominated funds into local currency through financial derivatives.

In countries where the available pool of local currency financing is insufficient to cover the full capital expenditure required for a project's bankability, project sponsors can seek local currency financing through alternative channels. As a new infrastructure project is considered riskier in the construction and early operations phase, project sponsors can seek hard currency debt for these phases, and refinance it through local-currency-denominated debt once the project has entered a stable revenue-generation phase. In cases where there is no local-currency-denominated lending available for maturities in line with the project's time horizon, sponsors may consider the use of "mini-perms"—shorter-maturity local-currency-denominated debt that is subsequently refinanced. These alternatives are preconditioned on the existence of sufficient supply of local-currency-denominated financing and a relatively stable exchange rate, as they carry a refinancing risk. However, local governments can mitigate this risk, so that subsequent refinancing terms and conditions can be reasonably predicted and factored in during the project structuring phase. Although limited to these specific conditions, this mechanism can contribute to the maturation of local currency financing.

Non-financial FX risk reduction mechanisms aim to align the currencies of project cash inflows and outflows through underlying project characteristics. Some projects can partially or fully sell their output to international customers or customers who themselves generate their revenues in hard currency. These projects can, therefore, generate part or all of their revenues in hard currency and should be able to secure a similar proportion of their financing in hard currency to maintain currency alignment through natural hedging. This is common in infrastructure sectors such as airports and ports, which generate hard currency leasing fees and services, and export-oriented infrastructure operations (such as power exports), which generate revenues in hard currency. Projects in these export-oriented sectors can attract hard currency financing from international investors more easily without exposing themselves to exchange rate risk. Alternatively, projects can benefit from supply chain localization, whereby a part of their capital expenditure or operating costs can be denominated in local currency, as they procure goods or services from local suppliers. This approach, however, may not be cost-efficient, since local production may be more expensive than international alternatives; its feasibility may also be limited, as some critical project inputs cannot always be locally sourced (e.g., high-technology inputs, specialized equipment) or may be globally traded commodities with prices set in hard currency even if locally sourced.

Case Study: Colombia, Rumichaca-Pasto Highway Toll Road Concession (2022)

The Rumichaca-Pasto toll road has been developed as part of the Government of Colombia's Fourth Generation Roads Concession Program (4G), a large-scale plan to create a nationwide toll road network with private sector participation. The project comprises 83 kilometers of highway in the south of the country, connecting the border crossing with Ecuador and Ciudad de Pasto. The project called for the project sponsor to improve the conditions of the existing road (including its rehabilitation, improvement of specifications, and construction of a second carriageway) and operate and maintain it for the duration of the concession, between 25 and 29 years.

To finance the work, the project company first secured an eight-year mini-perm loan[21] of US$575 million from a syndicate of nine banks in 2019. Cross-currency swaps were used to mitigate the FX risk stemming from the fact that a relevant portion of project revenues was denominated in Colombian pesos (COP) while financing was fully US$-denominated.

Near the completion of the construction phase, in February 2022, the project raised US$799 million to refinance the mini-perm, cover operational costs, and fund an escrow account. This funding was raised through a combination of three loan tranches (one in COP and two in US$ with longer tenors) and one social bond issuance. This refinancing was structured to align with concession cash flows. Since a large portion of the toll road's revenues are in COP, 65% of the refinancing was made in COP, and 35% in US$.

With IDB Invest's support and as part of this refinancing, the concessionaire (Sacyr Concesiones) issued a local-currency-denominated social bond under US jurisdiction, indexed to the real value unit (UVR),[22] reflecting the variation of the Colombian consumer price index. The bond issuance covered the equivalent of US$262 million and had a 19-year tenor.

IDB Invest acted as the anchor investor for the social bond by acquiring 52% of the total issuance. The project obtained social bond certification thanks to its positive impact on local communities—social and environmental programs implemented around the highway area benefited more than 17,500 people. At the time of its issuance, it was the largest social bond tied to an infrastructure project in Latin America.

This social bond issuance allowed the project to raise local currency debt at a longer tenor than what could initially be sourced on the local market. Another key benefit was the indexation to the UVR (a proxy for inflation), which allowed investors to enjoy inflation protection and provided the borrower with a natural hedge with its revenues (as the revenues of the project are adjusted by inflation). This project provides a good example of how different mechanisms can be deployed at different stages of a project's lifecycle to successfully reduce and mitigate FX risks, and crowd in private international capital into emerging market infrastructure projects.

The project builds upon enabling groundwork carried out by the Government of Colombia to increase the attractiveness of infrastructure projects for international investors, which included developing a legal and regulatory framework around PPPs, establishing an infrastructure agency and a financial development institution and structuring pilot projects that paved the way for the 4G program.

Sources: Pagliuca et al. 2022; IDB Invest 2024; Sacyr 2024

21. Mini-perm loans are relatively short-term financing solutions that typically are used to bridge the initial phase of construction to the project's operational phase. They expose the borrowers to refinancing risk (the possibility that the borrower will not be able to refinance the short-term loan with a new loan, and/or that the interest rates might increase at the time of refinancing).
22. The real value unit (UVR) is a unit of account that reflects the purchasing power of the Colombian peso (COP) based on the variation of the consumer price index (CPI). The UVR is certified by the Bank of the Republic and is used to calculate the cost of housing loans that allow financial institutions to maintain the purchasing power of the money lent. Indexing bonds to UVR is a way of indexing to inflation, and therefore of capitalizing the inflationary component of the interest rate in a UVR-linked loan.

Mechanisms to Reduce Exchange Rate Risk at the Portfolio Level

FX risk reduction mechanisms at the portfolio level enable project-level mechanisms to align the currencies of project cash inflows and outflows at scale, unlocking resources in the relevant local currencies that would otherwise be unavailable. Financial portfolio mechanisms involve guarantee programs and other credit enhancement mechanisms that unlock local currency financing with terms and conditions more suitable to projects' needs, resource mobilization and on-lending in local currency to infrastructure projects, asset recycling, and infrastructure investors' approaches to portfolio diversification and local treasury management.

Guarantee programs aim to incentivize local currency financing for infrastructure projects by providing credit risk protection to beneficiary lenders, thereby improving the projects' risk-return profile. Partial or full credit guarantees provided by local governments, international financial institutions, or specialized institutions can incentivize domestic financial institutions or international investors to provide more and longer-term local currency infrastructure financing. In infrastructure, guarantees are mostly provided at the project level in response to project-specific risks. However, they can be designed in a standardized and programmatic manner as a mechanism to be replicated across multiple projects. Guarantee programs also facilitate local financial market development by covering risks that local banks and investors are unwilling to take on their own while building the capacity of local financial institutions at the same time. In addition, guarantees reduce the cost of local currency finance by lowering the amount of risk that beneficiary investors keep on their balance sheet. Guarantees can also be applied to infrastructure bonds issued on the local capital market.

Case Study: Guarantees in Cameroon and Togo (2018, 2019)

Cameroon – Guarantee for the Nachtigal Hydro Power Project (2018)

The Nachtigal Hydro Power Project is a 420 megawatt hydropower plant in Cameroon, expected to increase the country's power generation capacity by 30%. Project construction commenced in 2019 and commercial commissioning is scheduled for the end of 2024. The project is estimated to cost about EUR 1.2 billion and was financed with more than EUR 900 million of debt, including a 21-year- tenor local currency facility in Central African francs equivalent to EUR 171 million.

As the structuring bank, the International Finance Corporation (IFC) led the technical, financial, and environmental and social due diligence while coordinating different development finance and commercial banks. The World Bank's guarantee products played a critical role in unlocking local currency financing from local and regional commercial banks: the World Bank provided a US$200 million International Bank for Reconstruction and Development (IBRD) loan guarantee to facilitate the participation of local banks in offering Central African franc debt and a US$100 million payment guarantee to backstop payments under the power purchase agreement. In addition, the World Bank's Multilateral Investment Guarantee Agency (MIGA) provided political risk insurance for private equity investors and the IFC provided EUR debt and equity investment.

These guarantees, combined with a financing structure and government commitment that gave local and regional banks the choice to sell the loan back to the government at the end of years 7 and 14, enabled local banks to extend the local currency facility loan tenor to 21 years, beyond the regulatory restrictions imposed by the Bank of Central African States.
The use of these mechanisms made it possible for roughly 20% of the project financing to be in local currency, and for 20% of the power purchase agreement (PPA) to not be indexed to hard currencies. This effectively reduced FX risks for the project company, as well as the country and end-users.

Sources: Meng and Caporossi 2019; World Bank 2024

(continues on next page)

Togo – GuarantCo Guarantee for Kékéli Efficient Power (2019)

GuarantCo, which is part of the Private Infrastructure Development Group (PIDG), specializes in providing local currency guarantees to infrastructure projects in EMDEs. GuarantCo can provide guarantees to cover either loans or bonds and a range of products such as full or partial credit guarantees (PCGs) and liquidity extension guarantees (LEGs). By offering credit enhancement to lenders and institutional investors such as pension funds and insurance companies, GuarantCo helps lower the perceived risks associated with investing in such markets. This facilitates the mobilization of local and international investment, unlocking local currency financing, which is crucial for sustainable development in these regions.

The Kékéli Efficient Power project in Togo, built to provide electricity to nearly 20% of Togo's population, is a good example of how GuarantCo has helped unlock access to local currency financing. For this project, GuarantCo provided an XOF 15.4 billion (US$26.2 million) liquidity extension guarantee (LEG) to enable local commercial banks in Togo to extend the maturity of the loan from a 7-year tenor to 14 years. Local financing partners for this project included Orabank, NSIA Bank, Banque Atlantique, and BIA Togo; other financing partners involved were Banque Ouest Africaine de Développement (BOAD) and Africa Finance Corporation (AFC).

This project is the first infrastructure transaction in Togo to be financed mainly in local currency, which, in combination with the extended tenor enabled by the LEG, helps to provide a competitive electricity tariff for the local population.

Sources: GuarantCo 2019

Additional credit enhancement mechanisms can boost local currency financing, such as underwriting commitments for local currency loans or bonds. Underwriting commitments, provided by MDBs, DFIs, national development banks, or other international investors, refer to these actors' commitment to partially or entirely buy some or all of the junior and senior tranches of project loans or bonds, in case domestic investors do not show interest. This mechanism typically has a strong signaling effect in the local market and has proven to boost local investors' confidence in the project's credit worthiness.

While guarantee or other credit enhancement programs can facilitate financing, they can also carry costs and fiscal risks. To be effective, they require the availability of sufficient domestic capital for long-term infrastructure finance. Also, if provided by governments, guarantees can lead to significant contingent liabilities and, if triggered, result in actual fiscal liabilities. If credit enhancement mechanisms are provided by national development banks or other public sector-owned financial institutions, they can lead to similar contingent and potentially actual liabilities for the government.

Case Study: Côte d'Ivoire – Electricity for All Program (PEPT) (2023)

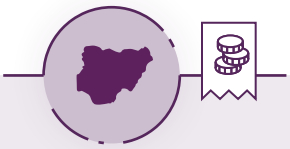
In October 2023, IFC committed XOF 30 billion (approximately US$50 million) as part of a XOF 60 billion (approximately US$100 million) bond to support the Electricity for All Program (PEPT) in Côte d'Ivoire. IFC, with support from the IDA Private Sector Window (PSW), participated as an anchor investor purchasing 50% of the issuance while the remaining long-term financing came from multiple investors, such as, Emerging Africa Infrastructure Fund (EAIF). This government initiative aims to achieve universal access to electricity by 2030. The bond, issued by a securitization vehicle, is backed by electricity receivables from low-income households to cover the pre-financed cost of grid connections.

The transaction was developed over three years and included three tranches with maturities of 7, 10, and 15 years. The 15-year tranche was fully subscribed to by IFC and supported by a first loss guarantee from the IDA PSW Blended Finance Facility (BFF) to mitigate the risk of credit losses. In addition to the BFF guarantee, the project benefited from IDA-PSW Local Currency Facility (LCF) support which was used to hedge IFC's portion of the investment.

This project was the first securitization of low-income electricity receivables, first social bond issuance in the energy sector and the longest tenor in a securitization transaction with the 15-year tranche in the West African Economic and Monetary Union (WAEMU) zone. The project was arranged by Africa Link Capital Structuration (ALC) and will support the connection of up to 800,000 additional low-income households to the national grid over the next four years, increasing the electricity access rate by more than 13% nationwide. It underscores the critical role of capital markets and local currency financing in supporting socio-economic development goals and improving living conditions for underserved populations.

Sources: IFC 2024

Resource mobilization by international financiers or NDBs—with proceeds on-lent in local currency to a portfolio of infrastructure projects—enables local currency financing and can also foster local capital market development. Several MDBs and DFIs regularly issue local-currency-denominated bonds in domestic or international markets (LSE 2018), and NDBs can also issue bonds in the domestic market to on-lend to infrastructure projects. Domestic bond issuances create virtuous cycles for local capital market development, as they can help deepen the local capital markets, extend tenors, build the local capital market's yield curve, and grow market liquidity—potentially enabling larger or longer-tenor bond issuances in the future (ADB 2022; EBRD 2023, 202; IFC 2024). Furthermore, they enable MDBs and DFIs to provide local currency financing while limiting their balance sheet exposure to exchange rate risk. For some currencies, mostly those of larger emerging markets (e.g., Indonesian rupiah, Chinese renminbi, Uzbekistan sum), local currency financing can also be raised on international (offshore) markets. By issuing local currency-linked bonds on these markets, issuers can tap into a larger liquidity pool.



Case Study: Nigeria – NGN Medium Term Note Program (2014)

In 2014, the African Development Bank received approval from Nigeria's SEC to establish a NGN 160 billion (approximately US$1 billion) Medium Term Note (MTN) Program. The African Development Bank's (AfDB) inaugural NGN bond issuance was a 7-year, fixed-rate coupon bond structured with a 3-year grace period preceding a 4-year amortizing profile on principal.

Through this bond issuance, the AfDB successfully raised NGN 12.95 billion (approximately US$80 million), issuing at a discount of about 75 bps below the comparable reference point on the government yield curve (Federal Government of Nigeria 27 Jan 2022) to price at 11.25%.

The AfDB's MTN Program was the first to be established by a supranational issuer in the Nigerian capital market. The amount raised also represented the largest-ever issuance and longest maturity instrument in its asset class to be introduced to the Nigerian capital market. The bond issuance was well received, with subscriptions from local pension funds, asset managers, banks, and insurance companies.

The proceeds of this first AfDB NGN bond issuance were lent to a client who used the funds to finance local small and medium-sized enterprises (SMEs) and some infrastructure projects. This local bond issuance supported the development of the local capital market and enabled AfDB to on-lend local currency financing to its clients, reducing exchange rate risks as a result.

Sources: AfDB 2019; LSE 2018

International finance providers' portfolio diversification and treasury management approaches can also increase the availability of local currency financing for infrastructure projects by reducing the FX risk on their own balance sheet, allowing them to lend more in local currencies while fostering local market development. Global financial institutions can reduce individual FX risk exposure through portfolio and treasury management approaches that seek a global diversification in currency exposure (by keeping exposure in uncorrelated or negatively correlated currencies). Exposure can be secured through direct lending, investments in local-currency-denominated government bonds, or through derivatives (e.g., cross-currency swaps or forwards). These approaches can help these institutions provide more financing in local currency without needing to hedge each currency exposure individually. These mechanisms require, however, a certain balance sheet size to be able to provide multiple loans, a sufficiently diversified portfolio to benefit from the currency diversification effect, and a long-term strategy in local markets.

Governments owning infrastructure assets can improve access to local currency financing for their infrastructure pipeline through asset recycling or asset monetization. Monetizing the economic value of existing infrastructure assets (e.g., by receiving an upfront payment for future concession fees or through partial or full asset disposals) enables governments or other public sector asset owners to generate significant proceeds and reinvest those in new infrastructure projects. Successful implementation requires a stock of quality infrastructure assets, a robust regulatory framework, and sufficient private sector interest.

In terms of non-financial mechanisms, EMDEs governments can also help unlock local currency financing for infrastructure at scale through targeted incentives and policies that stimulate resource allocation in infrastructure sectors and projects deemed to be strategic. These mechanisms have the potential to improve the risk-reward profile of infrastructure investments for investors and to decrease the cost of funding for project sponsors. Targeted policies and regulations can help create infrastructure-specific financial instruments that help channel institutional investment flows into infrastructure projects, establish dedicated national infrastructure banks or funds to stimulate and de-risk local-currency-denominated financing, and incentivize local institutional investors to allocate more funding to infrastructure investments. Incentives are typically provided based on predefined eligibility criteria, including sectors or sub-sectors, and are subject to pre-approval by government administrative bodies. In some specific cases, these incentives can also carry fiscal benefits. But fiscal incentives also carry an opportunity cost. Governments need to carefully consider the costs and benefits of policies and incentive schemes to ensure that public sector resources are used efficiently, are prioritizing strategic sectors and projects, and are not causing market distortions that impact local market development over the long term. It is also critical for governments to ensure that new investment activities created via these targeted policies are subject to adequate regulation and disclosure requirements.

Case Study: Brazil – Debentures (2011, 2024)

In 2011, Brazil approved the Law 12,431 that created incentivized debentures (debêntures incentivadas), a type of financial instrument (debt securities), specifically designed to crowd in more private sector investment to high-priority infrastructure projects. Between 2012 and 2022, infrastructure debentures have mobilized BRL 190 billion (US$ 34.6 billion) for infrastructure projects in local currency, consolidating itself as one of the main instruments to finance infrastructure in the country.

These debentures are issued by special purpose companies or concessionaires in infrastructure projects deemed strategic priorities by relevant federal authorities; proceeds are exclusively earmarked for infrastructure project implementation. One advantage associated with debentures is the income tax exemption or reduction on the interest derived from such securities.

Alongside the incentivized debenture, Brazil approved a new Law 14,801 in 2024 to create the infrastructure debentures (debêntures de infraestrutura) aimed to provide more options to finance strategic infrastructure assets in the country. The new type of financial instrument will offer tax benefits to issuers and is designed to mobilize institutional investors, such as pension and investment funds, as well as foreign investors. Issuers will be able to issue these securities internationally and adopt a specific exchange rate variation clause, subject to approval by the federal authority. The new law will also allow withholding-tax exemption in the remittance of interest payments. Consequently, the same treatment given to incentivized debentures issued locally will be granted to the ones issued in other jurisdictions.

Source: Montes, et al. 2024

MDBs and other development institutions can also support governments' efforts to unlock local currency financing at scale by providing technical assistance or other implementation support. Support provided typically includes technical advisory programs to help domestic institutional investors appraise infrastructure investment opportunities; regulatory assistance to create a conducive and enabling domestic environment for infrastructure investments, including recognizing infrastructure as a separate asset class; identification and appraisal of an initial pipeline of investment opportunities; and efforts to attract international co-investors. These support mechanisms have the potential to significantly structure and scale up the supply of domestic local currency institutional capital, as well as decrease the cost of financing. These measures are most effective in countries that have adequate domestic savings to mobilize and a strong ecosystem of institutional investors, especially pension funds.

Case study: Latin America and Uruguay – Asset Management and Local Currency Financing through Infrastructure Debt Funds

Investing directly in infrastructure projects can be challenging for individual and institutional investors due to the size of the projects and the resources and capabilities required to assess and structure the transactions. Infrastructure funds that pool financing from a larger set of investors can help mobilize institutional investors' funding toward infrastructure.

In 2014, the Development Bank of Latin America and the Caribbean (CAF) established the fund management entity CAF - Asset Management (CAF-AM) to manage third-party capital for financing infrastructure projects in CAF shareholder countries. CAF-AM brings together robust governance, extensive technical expertise, and deep knowledge of the region, and leverages CAF's strong track record in infrastructure financing and robust project pipeline.

CAF-AM has successfully pioneered this type of pooling solution for bringing institutional capital into infrastructure investments. With assets under management of more than US$1.8 billion in Colombia and Uruguay, originating mainly from domestic pension funds, CAF-AM's financial intermediation has enabled the local currency financing and progress of projects such as the 4G roads in Colombia and more than 200 educational institutions, road projects, and the central railway in Uruguay. As of 2024, CAF-AM has also begun capital raising activities to launch its operations in Costa Rica.

CAF-AM's experience demonstrates that infrastructure debt funds can effectively channel institutional investor funds toward local infrastructure projects if certain critical pre-conditions are met. First, there must be sufficiently mature local institutional investors (pension funds, insurance companies) that are ready to invest in infrastructure debt funds. In addition, the legal and regulatory environment should permit these institutional investors to invest in infrastructure debt funds; ideally, infrastructure debt funds should also be classified as fixed-income investments rather than alternative investments (e.g., private equity funds) with a different risk-return profile. Finally, there needs to be a strong pipeline of potential infrastructure projects in the country that the fund can expect to invest in.

Sources: CAF 2024b; 2024a; 2023

Mechanisms to Mitigate Exchange Rate Risk at the Project Level

When a currency mismatch between cash inflows and outflows cannot be avoided, FX risk mitigation mechanisms can be deployed to help improve a project's overall bankability. Mitigation of exchange rate risk consists of limiting the impact of exchange rate movements on the value of the net future cash flows, often by reallocating risk to different stakeholders outside the project or among project stakeholders.

At a project level and from a financial perspective, mitigation is most commonly achieved through financial hedging instruments. Financial hedges in FX risk management are financial instruments (e.g., cross-currency swaps, forwards, or options) used to offset or limit potential losses arising from unfavorable exchange rate movements at specific dates in the future. Financial hedges can be used by any project stakeholder exposed to foreign exchange rate risk, although they are mostly taken out by (i) a project special purpose vehicle (SPV) to hedge hard currency debt service repayment when generating revenue in local currency, or (ii) an international lender to hedge local-currency-denominated debt repayments to hard currency. In both cases, the parties create a synthetic local currency loan by transforming a hard currency loan repayment into a local currency loan repayment (or vice versa). The cost of the hedge is typically passed on to the project in the form of higher interest rates, which are then often passed on to granting authorities, off-takers, or end-users in the form of higher tariffs. While hedging instruments are versatile and can help improve the attractiveness of projects to international lenders, their availability depends on the depth and maturity of local FX markets, which impact the cost and tenor of available FX hedges. EMDE institutions often face challenges in accessing and implementing these tools, especially in smaller emerging markets and developing economies. FX hedging and trading activities often require access to external funding currency markets, which can be difficult for many EMDE institutions to navigate.

Case Study: Thailand – Bangkok Mass Rapid Transit (MRT) Project, Pink and Yellow Lines (2020)

In March 2016, the Thai government approved the implementation of the PPP Net Cost scheme for the monorail system of the MRT Pink Line and Yellow Line projects in Bangkok. The two projects are designed to diversify the city's transport modalities, mitigate traffic congestion and associated environmental issues, provide a convenient and cost-effective public transportation system, and reduce the government's fiscal burden.

In 2020, the Asian Development Bank (ADB) provided a total funding of THB 9.9 billion, with two tranches each for the Pink and Yellow Lines with 10- and 18-year tenors. To provide the requested disbursement in local currency, ADB used cross-currency swaps with start dates and varying notional amounts that closely follow the disbursement and repayment schedules of the loans (forward start, accreting and amortizing swaps).

This case study shows how cross-currency swaps can be used to provide local currency financing in EMDEs. The successful execution of these highly customized, large-sized, and long-dated swaps also demonstrated the transparency, liquidity, and competitiveness of the Thai Bhat derivatives market. These market conditions take extensive time to develop and are critical for the replication of similar mechanisms.

Source: ADB 2024

When local currency financing is not available or suitable, project sponsors can achieve FX risk mitigation by securing financing in a currency that acts as a proxy for the local currency. A proxy currency is a currency whose exchange rate tends to move in the same direction as the local currency, i.e., they are closely correlated. For projects whose revenue streams are in local currency, securing financing in a proxy currency mitigates FX risk by leveraging the positive correlation between the proxy currency and the currency of the project's revenue stream. Financing projects in a proxy currency partially mitigates the adverse impact of exchange rate volatility, enhancing bankability and investor appeal by providing greater predictability-—though some FX risk typically remains due to imperfect correlation. Proxy currency financing is especially attractive when the financial market in the proxy currency offers longer loan tenors and lower interest rates than the market in the local currency.

Projects can also mitigate FX risk by using reserve accounts or FX liquidity facilities to cover short-term liquidity shortfalls or longer-term losses in case of unfavorable exchange rate fluctuations. These facilities may be internally managed within a project, such as an escrow account set up by the project sponsor or concessionaire and topped up from revenues generated, or externally provided in the form of a stand-by facility by local banks, DFIs, or dedicated mechanisms. In practice, these mechanisms typically serve to cover liquidity shortfalls due to various circumstances (e.g., delays in customer payments, lender requirements to earmark the equivalent of multiple months' of debt service) but they can be tailored to specifically cover FX risk (Levy 2017). While these facilities act as a financial safety net for investors, they tie up capital that could otherwise be used for project development or expansion and decrease the project's overall return on equity.

Specific currency management mechanisms for project cash flows can also mitigate foreign exchange risk. Mechanisms aiming to convert local currency to hard currency as soon as possible limit the duration of the project revenues' exposure to FX risk. For example, many projects that service their debt in hard currency but earn revenues in local currency use cash sweeps, which consist of converting local currency to hard currency as soon as possible and transferring the converted amount to offshore escrow accounts dedicated to debt service. Project sponsors or concessionaires can also allow or even incentivize their customers to settle payments directly in hard currency. However, local regulations may limit the applicability of these mechanisms.

FX risk guarantees provided by governments can also help mitigate FX risk and enhance project bankability by ensuring debt repayment to the lender in the event of a borrower's credit deterioration related to adverse exchange rate fluctuations. Exchange rate guarantees, typically provided by governments to project lenders, allocate exchange rate risk to the government, thereby enhancing the project's creditworthiness. These government-backed guarantees may be combined with a pre-funded facility or reserve account to demonstrate proof of a source of contingent financing.

Non-financial FX risk mitigation mechanisms improve bankability through contractual agreements that reallocate the FX risk of net future cash flows, so that the lender no longer bears the FX risk. The most common contractual agreement is payment indexation, which entails defining the price of the service (e.g., tariff, availability payment) based on a pre-agreed-upon formula that includes the exchange rate between the local and the hard currency and/or a standard measure for the local inflation rate. Besides the formula, the agreement typically also contains the frequency of calculation (e.g., monthly, quarterly) and any conditions under which the parties would revisit the formula itself. Indexation reduces the sensitivity of the project's net cash flows to exchange rate movements by ensuring that these are partially or fully reflected into the project's revenues. As this mechanism partially or fully reallocates FX risk to the project's off-takers or end-users, it may also decrease the affordability of the project's output (e.g., electricity, using a toll road) in the case of significant price increases. In such cases, the government may need to step in to subsidize the price or cap it and make up the lost revenue to the project. Other contractual arrangements are also commonly used by financing providers, project sponsors, and contracting authorities to objectively allocate exchange rate risk among parties, commonly through reimbursement clauses (a set of parameters and rules based on which project stakeholders make payments to each other as compensation for their respective losses due to exchange rate fluctuations) and termination options—most frequently put (sale-back) options, which are contractual clauses allowing the concessionaire or project sponsor to terminate the contract to limit losses due to exchange rate fluctuations, and specifying the portion of outstanding debt for which the contracting authority and concessionaire will be liable, whether in local or foreign currency.

These mechanisms carry fiscal risk for governments due to the contingent liability they create. Governments incur a contingent liability whenever they commit to payment indexation, reimbursement clauses, or providing termination options; the extent of the potential fiscal implications for governments should be carefully evaluated during the project preparation phase.

Case Study: Indonesia – SATRIA Satellite PPP Project for High-Speed Internet (2021)

The SATRIA PPP was initiated by the Ministry of Communication and Information Technology of Indonesia to provide broadband internet service to more than 150,000 unserved schools, hospitals and local government locations in some of the most remote locations in the country, through the construction, launch, and operation of a satellite.

To date, many PPPs in Indonesia have generally been financed in Indonesian rupiah (IDR) by domestic banks and have had IDR-denominated payment structures, thus avoiding FX risk. However, the innovative aspect of this project and its overall size led project sponsors to seek financing from international lenders. Santander, HSBC, the Asian Infrastructure Investment Bank (AIIB), the Korean Development Bank, and BPI France provided financing in US dollars—thus creating a potential currency mismatch between assets and liabilities.

To mitigate the FX risk, the PPP availability payments are settled in Indonesian rupiah but denominated in both rupiah (to cover local costs) and US dollars (to cover US dollar costs and debt service). However, the indexation of availability payments to US dollars is partially capped: if the US$ / IDR exchange rate exceeds the ceiling cap of IDR 18,000/ US$1, only 50% of the amount will be converted at the prevailing US$ / IDR rate, with the remaining 50% converted at the ceiling cap of IDR 18,000/ US$1. This implies that if IDR depreciation goes beyond the IDR 18,000 ceiling cap, the project company absorbs a share of the FX-related losses. Finally, a dedicated FX reserve account was also set up by the project SPV to ensure an additional layer of protection for financiers in case of significant US dollar / Indonesian rupiah depreciation.

This indexation mechanism reduces the impact of exchange rate fluctuations on project financial viability while also enabling FX risk-sharing among project stakeholders.

Source: PFI 2021

Mechanisms to Mitigate Exchange Rate Risk at the Portfolio Level

FX risk mitigation mechanisms at the portfolio level enhance the availability and affordability of project-level mitigation mechanisms. Financial mechanisms at this level include efforts to deepen FX markets in emerging economies, government-backed funds and liquidity facilities, and blended finance facilities. Non-financial mechanisms include dedicated support from infrastructure project preparation facilities, which can help developing countries optimize FX risk allocation during project structuring and mitigate the FX risk borne by specific or all project stakeholders.

Creating or strengthening local FX markets can help unlock more suitable and affordable FX hedges for multiple infrastructure projects. Local and international commercial FX hedge providers are not present everywhere; other players can offer hedging solutions in countries in which no commercial FX hedge providers operate. Thanks to their global exposure and strong capital base, these hedging providers can manage their FX risk exposure on their balance sheet through diversification. Such initiatives help increase the availability and affordability of financing hedging instruments across EMDEs but are not necessarily focused on infrastructure financing. While these initiatives do not create fiscal risk, they may limit the development of local FX markets, especially if they offer lower rates than local hedge providers.

Case Study: Global – EMDE FX Market Creation

The Currency Exchange Fund (TCX) was established in 2007 by a group of DFIs, with risk capital provided by the governments of Germany and the Netherlands, to address the challenge of exchange rate risk in EMDEs. TCX acts as a market-maker, providing hedging solutions for markets and at tenors that commercial banks do not cover. To manage its FX risk, TCX relies on its own balance sheet, managing risk through diversification across a broad set of currencies, and by offsetting some of its exposure in the capital markets by hedging local currency bonds issued by its investors.

TCX has supported some infrastructure projects in EMDEs, such as:

- Hedging a US$50 million 9-year-tenor loan from IFC with a US$ / ARS floating rate cross-currency swap to enable long-term local currency funding to the City of Buenos Aires in Argentina to finance the bus transport system
- Hedging €10 million 5-year-tenor financing from EBRD and Optima Bank with a US$ / KGS floating rate cross-currency swap to enable medium-term local currency financing for promoting energy and resource efficiency investments in the Kyrgyz Republic.

Sources: TCX 2024b; 2024a; 2022

Government-backed funds or liquidity facilities can provide credit enhancement to multiple infrastructure projects. These types of facilities provide additional assurance that commitments made by grantors to a project stakeholder—such as guarantees, payments indexed to hard currency, or termination payments—are honored in case of counterparty failure. They can also use public sector funds more efficiently by diversifying the risk across multiple infrastructure projects. Governments can set up dedicated national infrastructure entities to provide credit enhancement to the country's infrastructure projects. While effective in increasing bankability, government guarantee funds, liquidity facilities, and national infrastructure entities are subject to fiscal risks, as they are typically structured at a country level and have limited options to diversify away their FX risk.

Blended finance facilities for infrastructure investments can also help mitigate FX risk at the portfolio level. This type of mechanism typically creates first-loss protection for infrastructure funds, with two results: first, international investors are more inclined to invest in the funds, as they can offload part of their risk onto the first-loss protection, helping them achieve their required risk-return parameters; second, the funds themselves can increase their level of risk tolerance and provide more local-currency-denominated finance to infrastructure projects. The availability

of such funds for local currency investments is typically limited to countries with relatively long-term economic stability, as the first-loss protection is not large enough to absorb significant FX volatility. Blended finance can also be used to reduce costs of FX risk mitigation instruments (e.g., cross-currency swaps, forwards, or options), while respecting key blended finance principles, such as minimum concessionality and avoiding market distortions.

Infrastructure project preparation facilities such as the Global Infrastructure Facility (GIF) and transaction advisory teams within MDBs and DFIs play an important role in supporting the development of a sustainable pipeline of infrastructure projects in EMDEs. As part of their mandate, they support the development of well-structured, bankable projects that take into consideration the existing FX risks within different countries' contexts and create bankable transactions in EMDEs through best practice risk allocation. Moreover, project preparation contributes to building the capacity of governments and the private sector within EMDEs by introducing best global practices while also fostering the development of the local market by attracting international investors.

Lastly, local currency treasury risk management initiatives in local markets support EMDE FX market creation and deepening, especially in small EMDEs, and play a critical role at the systemic level, while providing financing to infrastructure development at the local level. International financial institutions operating in local markets experience first-hand the main barriers, ranging from regulatory to operational, to local market development while providing the required financing for the development of critical infrastructure at the project level.

Case Study: Global – EBRD Local Currency Treasury Risk Management Approach

To offer affordable local currency loans in countries with shallow capital markets, the European Bank for Reconstruction and Development (EBRD) has developed a two-pillar treasury approach combining i) developing and managing local liquidity pools where it can with ii) policy work to help develop domestic financial markets. Developing liquidity pools allows EBRD to offer loan products better matching borrowers' needs in local currency, as it allows them to depart from back-to-back funding, by raising local currency financing via cross-currency swaps and bond issuances at the best possible rates independently of the timing of loan disbursements. Doing so implies having to manage liquidity mismatches and market risks with domestic market counterparties, which in turn helps develop domestic markets.

Through this approach, the EBRD has signed 1,250 debt facilities denominated in 27 local currencies, with a total value of EUR 18.4 billion as of December 2023. About 18% of the local currency loans the EBRD has made between initiating the practice in 1994 and the end 2023 have been for the infrastructure sector.

Recent local currency infrastructure investments by the EBRD include:

- A 13-year loan of up to KZT 130 billion (equivalent to EUR 252 million) for a comprehensive modernization of the existing Combined Heat and Power Plant, with full replacement of coal by natural gas as a primary fuel in order to reduce CO2 emissions and improve air quality in Almaty, Kazakhstan
- A loan of PLN 258.5 million (the equivalent of EUR 54 million) for the construction of phase four of the high-speed tramway network in Krakow, Poland, complemented by cofinancing from EIB and a Polish commercial bank.
- An investment of KZT 50 billion (equivalent of up to US$100 million) in a Kazakhstan Railways local bond issue to improve the financial resilience of the national rail operator

This approach has been crucial in supporting the continuous development of local currency markets. Since the EBRD manages its local liquidity pools by engaging directly with domestic market stakeholders, its portfolio managers have been building both knowledge of domestic markets and trust with local market participants (both the central bank and the local counterparties), which has proven to be very effective in supporting the development of domestic markets in EBRD's member countries.

Sources: EBRD 2024b; 2024a

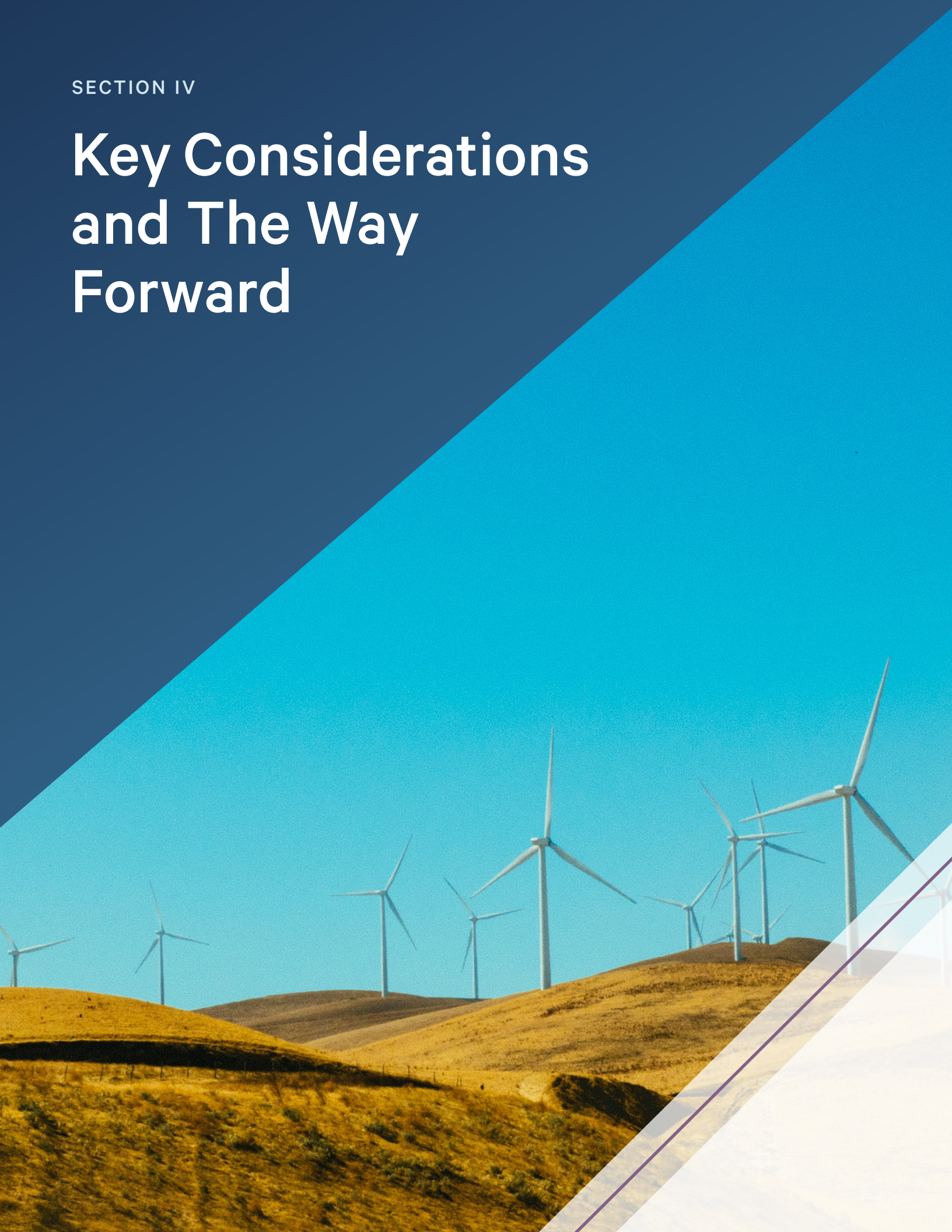
Portfolio-level FX mitigation mechanisms typically use scarce international concessional finance or national public funds, calling for a careful assessment from EMDE governments on how best to leverage them to unlock infrastructure finance. MDBs and bilateral donors have actively promoted portfolio-level mechanisms to crowd in private sector capital to infrastructure projects, including through project preparation facilities, blended finance solutions, and technical assistance to promote enabling regulatory environments, create national infrastructure banks or investor consortia, or strengthen the capacity of public sector stakeholders. Concessional funding sources are, however, scarce, and each EMDE government needs to create effective mechanisms to strategically allocate them to initiatives that are expected to have the highest impact and sustainability within the specific country context.

FX risk reduction and mitigation mechanisms also facilitate access to private finance for energy transition investments. For example, renewable energy generation projects in EMDEs can reduce FX risk through guarantees for local currency finance from domestic investors and mitigate FX risk for international investors through contractual pass-through of FX movements in the tariff mechanism or through FX liquidity facilities. Blended finance solutions can also help address FX risk in green infrastructure at project or portfolio level.

In summary, a multiplicity of mechanisms exist that can be used to either reduce or mitigate exchange rate risk; national governments and international financial institutions such as MDBs and DFIs have critical roles to play in this context. Governments have a pivotal role to play in mitigating and reducing FX risk. They can offer guarantees (and other related credit enhancement mechanisms) or offer payment indexation to hard currency for critical, strategic infrastructure projects to mitigate FX risk and attract more international investors. They can also institute supportive laws, policies, regulations and incentives and create dedicated investment instruments to enable local investors, such as pension funds and insurance companies, to participate more actively in infrastructure financing. This requires simultaneous careful consideration of which infrastructure projects and sectors to prioritize through government action, while avoiding potential market distortions and managing fiscal risks. MDBs and DFIs can leverage their available resources, robust credit ratings, and strong technical expertise to increase the availability and accessibility of key FX risk mitigation mechanisms, such as financial hedging instruments, blended finance facilities, and project preparation facilities. MDBs and DFIs can also help increase access to local currency financing for infrastructure projects in EMDEs. They can support the development of local capital markets and help crowd in private capital by providing EMDE banks with access to hard currency money market instruments at market rates, through the issuance of local currency bonds, by offering guarantees and insurance, and by developing diversified portfolios and treasury management approaches that enable them to offer more local currency financing – including by potentially offering long-term hedging facilities tailored to the specific needs of individual EMDE markets where feasible.

SECTION IV

Key Considerations and The Way Forward



Macro-Level Policy Considerations

A stable macroeconomic environment is a prerequisite to scaling up private investment. It contributes to reducing FX volatility by instilling investor confidence, enabling sustainable economic practices, and fostering an atmosphere of financial predictability. Sound fiscal and monetary policies, robust economic growth, and external accounts in line with countries' fundamentals are cornerstones for exchange rate stability.

Effective monetary policy is crucial to foster the local market functioning that is needed to improve financial intermediation and to develop maturity transformations needed for infrastructure investments. Using monetary policy to keep inflation close to its target helps money market development, as the central bank acts as the market maker in setting the price of short term liquidity and provides guidance on the evolution of this path in the future based on macroeconomic fundamentals (EBRD 2016). Clear and timely communication is an important cornerstone of effective monetary policymaking in anchoring market expectations and supporting market confidence. Where relevant, a flexible exchange rate together with central bank credibility also help improve the domestic investment environment that is essential for scaling up private investments for infrastructure projects. Program-based lending by multilateral institutions could, in fact, help foster a conducive macroeconomic environment to attract investors.

Even contracts denominated in larger EM currencies carry contingent liability risks due to the potential of high FX volatility, particularly during periods of global stress. Expected exchange rate adjustments may be large in order to absorb global shocks; such anticipated moves could deter foreign investors by triggering their risk limits (Carstens and Shin 2019).

Policymakers in EMDEs should also implement structural reforms and policies aimed at fostering domestic resource mobilization to boost infrastructure investments. The 2023 G20 Independent Expert Group (IEG) report estimates that an additional US$3 trillion investments annually by 2030 are required to achieve Sustainable Development Goals, including climate investments for EMDEs excluding China. To complement official development assistance and private capital inflows, around US$2 trillion would need to come from domestic resource mobilization (DRM)—through taxation, improved spending efficiency, and the development of local capital markets. Enhancing tax capacity could finance a significant share of DRM needs. There is also substantial potential to improve the utilization and efficiency of public spending, including through reforms in public investment and subsidies. Countries should also have an appropriate public investment management (PIM) system in place with sufficient capacity to appraise PPP contracts, identify fiscal risk exposure, and improve the investment climate to attract infrastructure investments.

FX-related fiscal risks can be mitigated by strengthening infrastructure project development, appraisal, design, and procurement in line with good public investment management practices (IMF 2024e). At the same time, managing and mitigating exchange rate exposure from infrastructure projects, improving the transparency of fiscal risks by publishing a fiscal risk statement, and using fiscal risk toolkits are key (IMF 2024c).

Establishing an LCBM helps with domestic resource mobilization and creates an environment that attracts foreign investors to the country's capital market, encouraging long-term capital provision for infrastructure projects. Therefore, policies to promote the development of the domestic debt market should be an important aspect of EMDE governments' policy mix—particularly where markets remain shallow. In large EMs where significant progress has been made on developing LCBMs, fostering a large domestic institutional investor base could help insulate against volatile capital flows. Capacity development, discussed in detail in the subsequent section, also remains an important priority.

Project-Level Considerations

At the project level, the objective is to align the currency of inflows and outflows as much as possible to reduce or eliminate FX risk. As explained in Section II, the sustainable approach to eliminating FX risk is to source local currency financing in domestic financial markets if they are sufficiently developed in breadth and depth. However, given the diverse state of macroeconomic fundamentals and capital market development in EMDEs, local currency finance is not readily available at the required volume, tenor and cost for infrastructure projects in all EMDEs. As a result, FX risk in infrastructure projects in EMDEs needs to be managed through reduction and mitigation mechanisms at the project and portfolio level.

Country-specific conditions determine the availability, feasibility, and affordability of specific FX risk reduction and mitigation mechanisms in EMDEs. Determining factors include the degree of exchange rate volatility, the breadth and depth of local capital markets as well as FX markets, and the overall country and project risks, all of which vary according to the specific country and sector context as outlined in Section II. As EMDE governments evaluate feasible options for reducing and mitigating FX risk at the project and portfolio level, with the objective of increasing access to local and international infrastructure finance, they need to take these country-specific factors into account. As a pre-condition, supportive regulatory frameworks in the respective infrastructure sectors (including cost recovery tariffs and financially sustainable off-takers) should be in place.

EMDE governments play an important role in both FX risk reduction and mitigation. As outlined in Section I, infrastructure project finance involves the sustainable allocation of risks, including FX risk, among project stakeholders, which typically include the project sponsor, the contracting authority, the government, the lenders/investors, and the users. As a key project stakeholder, EMDE authorities can contribute to the reduction of FX risk at the project level in several ways. As issuers in local bond markets, they play an important role in the development and deepening of local capital markets. As the financial sector regulator, they can incentivize local banks and investors to provide local currency finance to infrastructure projects within their legal mandate as well as in line with the principle of risk neutrality. Facilitating FX risk mitigation, EMDE governments can provide FX guarantee solutions at the project and portfolio level, while accounting for their fiscal impact. As infrastructure sector regulators, EMDE governments can provide non-financial contractual FX risk mitigation mechanisms.

EMDE governments should also consider their development plans, priority policies, and sector master plans in the selection of projects benefiting from FX risk mitigation mechanisms. This is relevant for all country groups, but especially critical for smaller EMDEs, since only a few projects will be able to benefit from mitigation mechanisms before fiscal constraints may arise. As a result, in addition to the country-specific contexts that determine the availability of mechanisms, countries should also develop project selection criteria to identify priority projects that will benefit from FX risk mitigation mechanisms to mobilize international funding. Project prioritization criteria should incorporate a country's priority policies, sector master plans, and the project's expected fiscal cost and development impact.

SMALLER EMERGING MARKETS AND DEVELOPING ECONOMIES

FX risk reduction mechanisms are not readily available in smaller EMDEs. In smaller EMDEs, the financing needs for large infrastructure projects may exceed available capital supply. In addition, local commercial banks may also lack the necessary balance sheet capacity or technical capabilities to issue the large and long-tenor loans typically required by infrastructure projects. Legal and regulatory frameworks and shallow liquidity pools can limit the ability of local institutional investors (e.g., pension funds, insurance companies) to finance domestic infrastructure projects. The limited tenor of onshore local currency financing is a key challenge for local currency finance for infrastructure in smaller EMDEs given the long-term nature of infrastructure projects. For local commercial banks mostly relying on short-term deposits, providing long-term financing puts stress on liquidity and is only allowed within regulatory boundaries. In addition, in countries with less developed capital markets and sovereign debt issuance strategies focusing on short- and medium-term lending, the government bond yield curves may not provide reference rates for long maturities, hindering the issuance of long-tenor bonds. Non-financial FX risk reduction mechanisms are also less likely to be available in smaller EMDEs, given that smaller countries are less well positioned to localize infrastructure supply chains and not all smaller EMDEs have access to hard currency revenues through export markets—for instance, through cross-border infrastructure or access to a regional power pool that trades in hard currency (or FX-linked tariffs).

Therefore, smaller EMDEs usually need to rely on financial mitigation options to address FX risk in infrastructure finance, and benefit from a concessional element to address risks, reduce costs, and enable affordability. With financial hedging instruments either unavailable or too costly, feasible FX risk mitigation mechanisms include funded liquidity facilities to backstop the negative cashflow impact of FX volatility, as well as FX risk guarantees. Providing these mechanisms through pooled portfolio solutions (such as guarantee funds or liquidity facilities) can help smaller EMDEs, especially LICs and frontier markets, address FX risk across a range of infrastructure projects and sectors. In these markets, commercial financial mitigation mechanisms are either not available or too expensive when fully pricing in country risk. Similarly, non-financial mitigation mechanisms for FX risk are either unlikely to be feasible (such as tariff indexation to hard currency in countries with high FX volatility, which could significantly increase the cost for the end-user) or rather costly (such as cash sweeps).

Financial mitigation portfolio mechanisms such as guarantee funds, liquidity facilities, and blended finance solutions, including a concessional de-risking element, should be scaled up to address FX risk in infrastructure in smaller EMDEs (Figure 11). In case local governments backstop FX risk guarantees, their fiscal implications need to be monitored and managed.

MID-SIZED EMERGING MARKETS

Mid-sized EMs have some but incomplete access to reduction mechanisms for FX risk in infrastructure. While capital markets exist, their breadth and depth vary significantly among these countries. On average, local financial markets provide shorter-term financing, have a limited number of local investors, and cannot provide local currency finance with the maturity and risk-return profiles required for infrastructure. Moreover, the capacity of local lenders and investors to assess and bear infrastructure risk is still limited. Portfolio-level FX risk reduction solutions such as local currency guarantees can help extend tenors in line with infrastructure project needs and catalyze first-time infrastructure investments on the part of local investors, who can also benefit from capacity building support. In addition, long-term local currency bond issuance from international financial institutions or national development banks in these markets helps develop capital markets and provides proceeds for on-lending to infrastructure projects. Furthermore, mid-sized EMs may benefit from some degree of supply chain localization (such as the assembly of solar panels), providing a natural hedge against FX-denominated infrastructure equipment costs.

Addressing FX risks in infrastructure finance in mid-sized EMs requires a combination of risk reduction and risk mitigation mechanisms. While hedging markets may exist, local derivatives markets are typically shallow, incomplete, and costly. Therefore, access to mitigation mechanisms such as liquidity facilities or FX risk guarantees remains an important tool in these countries. Furthermore, access to hedging instruments requires access to both local and foreign currency markets. Access to long-term hard currency lines for mid-size EMs at market-rate from foreign banks or IFIs is also crucial . Pooled infrastructure investment funds can help diversify risk, possibly including a concessional de-risking element to enhance risk-return profiles in line with investors' risk appetite. Project preparation facilities like the Global Infrastructure Facility can provide project structuring support to further enhance risk mitigation by allocating the FX risk to the project stakeholder best equipped to manage it. In this context, any FX risk allocated to the government requires adequate fiscal management.

Mid-sized EMs will benefit from ongoing development of local capital markets through local bond issuance. Governments will be able to use the proceeds of local bond issuance to pay for infrastructure projects, issue infrastructure project bonds, expand local currency guarantee products, and expand hedging instruments and capacity (Figure 11).

LARGER EMERGING MARKETS

Large EMs benefit from the most comprehensive financial options to reduce and mitigate FX risk. In large EMs, which are typically middle-income countries, local capital and FX markets tend to be more developed, which improves the availability of local currency financing options (as discussed in Section II). Thanks to their developed local financial markets—with a large pool of local savings, strong investor base, and financial depth—FX risk in infrastructure projects in large EMs can be reduced by accessing local currency finance at scale. Some credit enhancement may still be required for infrastructure projects in new sectors and technologies or untested markets, or with first-time financing structures. In addition, some financial market actors, such as local pension funds, may still benefit from capacity building in analyzing infrastructure risks. Local currency finance can also be raised through asset monetization and recycling of proceeds into new infrastructure investments. Larger EMs typically benefit from more developed commercial hedging markets, while long-term financial hedging instruments may still be unavailable or costly. Infrastructure projects in larger EMs typically have access to investments from infrastructure funds both from local and international investors, providing them with the ability to optimize currencies between project inflows and outflows. As a result of these options, the need for de-risking infrastructure finance in larger EMs through concessional finance is limited, e.g., to new markets or technologies.

In addition, stronger macroeconomic fundamentals provide larger EMs with additional non-financial mechanisms to reduce and mitigate FX risk in infrastructure. Larger domestic markets with some manufacturing capacity can lower hard-currency-denominated project costs. Capital markets regulation can incentivize investments in infrastructure from local institutional investors. Passing on FX exposure through infrastructure tariff indexation is a more feasible mitigation option in larger EMs with lower FX volatility, as the expected impact on the end-user is limited.

Consequently, large EMs are best positioned to address FX risk comprehensively through a combination of reduction and mitigation mechanisms, including at scale. Deeper capital markets provide large EMs with the possibility of maximizing FX risk reduction mechanisms by tapping into a relatively larger base of domestic savings and local investors. On the mitigation side, more developed hedging markets provide better risk coverage and financing terms. Solid budgetary positions create additional fiscal space to provide FX risk mitigation mechanisms (such as government guarantees) and/or to capitalize national development banks so that they can do so. Larger EMs can therefore develop comprehensive solution programs, combining FX risk reduction and mitigation elements. As an example, Brazil's Eco-Invest Program plans to combine blended finance, a long-term FX liquidity facility, FX derivatives, and project structuring approaches. In addition, larger EMs can issue local currency bonds in offshore markets, tapping into international investor appetite for exposure to diversified currencies. Proceeds can then be used for on-lending to infrastructure projects.

Scaling up portfolio solutions for FX risk reduction mechanisms and targeted mitigation mechanisms should be the focus in large EMs in the short-to-medium term. In the long term, these countries have the potential to move toward eliminating FX risk for infrastructure based on ongoing progress in their local capital market development, including through local currency bond issuance by international and local financial institutions, infrastructure companies, and infrastructure projects (Figure 11).

Figure 11: Summary assessment of relevance of each mechanism in different country contexts

MECHANISMS				RELEVANCE		
				Larger EMs	Mid size EMs	Smaller EMs & DEs
REDUCTION	PROJECT	FINANCIAL	LC financing	●●●	●●○	●○○
		NON-FINANCIAL	Supply chain localization	●●○	●●○	●○○
			Natural generation of hard-currency denominated revenues	*n.a*	*n.a*	*n.a*
	PORTFOLIO	FINANCIAL	Guarantees / Credit enhancement programs	●○○	●●●	●○○
			Resource mobilization by international financiers or NDBs with proceeds on-lent in local currency to infrastructure projects	●●○	●●●	●○○
			Portfolio diversification and treasury management approaches*	●●●	●●●	●●●
			Asset recycling or monetization	●●●	●●○	●○○
		NON-FINANCIAL	Promotion of domestic infrastructure investment initiatives or vehicles	●●●	●●○	●○○
			Regulatory enablers and incentives for local currency financing of infrastructure projects	●●●	●●●	●●●
MITIGATION	PROJECT	FINANCIAL	Financial hedging instruments	●●●	●●○	●○○
			Project reserve accounts and FX liquidity reserves	●●●	●●●	●●●
			FX risk guarantees provided by governments	●●●	●●●	●●○
			Proxy currency financing	●○○	●○○	●●○
		NON-FINANCIAL	Payment indexation to hard currency or inflation	●●○	●●○	●○○
			Other contractual arrangements	●●○	●●○	●●○
			Currency management mechanisms, such as cash sweeps	●●○	●●○	●●○
	PORTFOLIO	FINANCIAL	FX market creation and strengthening initiatives	●●○	●●●	●●○
			Government-backed funds / liquidity facilities	●●●	●●○	●●○
			Blended finance facilities	●●○	●●●	●●○
			Portfolio diversification and treasury management approaches*	●●●	●●●	●●●
		NON-FINANCIAL	Infrastructure project preparation facilities	●●○	●●○	●●●

** Supports both reduction and mitigation of exchange rate risk*

Key: ●○○ Low relevance ●●○ Medium relevance ●●● High relevance *n.a* not applicable

Capacity Development

In order to meet the challenges that FX risks from infrastructure projects represent to a country's fiscal robustness, efforts to strengthen capacity development should be put in place covering key institutions and tools. A country's central budget authority, usually found in its ministry of finance, should be formally mandated to critically scrutinize infrastructure contracts for fiscal risks, including FX risk. This will in turn require the use of good practices laid out in Public Investment Management Assessment frameworks and the application of the Fiscal Risk Toolkit (IMF 2022; 2024c).[23] In addition, the key infrastructure delivery units—whether line ministries, executive agencies, public corporations, or extra-budgetary funds—will require targeted support to ensure that they have the needed systems and knowledge to develop, assess, negotiate, manage, and evaluate the infrastructure services and organizations involved in the relevant long-term FX arrangements. A recently published G20 report details the efforts to stepping up domestic resource mobilization through a joint initiative by the IMF and the World Bank (IMF and World Bank 2024).

23. The PIMA framework assesses 15 topics in PIM and includes a climate module. Further details are available at IMF Infrastructure Governance web page (https://infrastructuregovern.imf.org/).

Capacity development is also an integral component of local capital market development. Greater institutional capacity is essential for developing LCBMs and, at a later stage, identifying hedging instruments. Sufficient institutional capacity and adequate human resources are also needed to undertake hedging activities, as well as to identify and manage counterparty, legal, liquidity, and operational risks that arise when hedging activities pick up pace (Jonasson et al. 2024). The ability to manage such risks will be particularly important given that infrastructure investments will require longer-term hedging instruments. Capacity constrains may be specially challenging in smaller EMDEs, which may not have the pool of experts who can assist with adequate risk management. In these cases, a pool of risk management experts for small developing countries (with similar cultural and legal environments) could be developed.

The LCBM framework provides EMDEs with guidance and a roadmap to support the development of their local currency bond markets. The framework starts with a systematic assessment of the preconditions for success and the stages of market development along the six major building blocks of LCBM development: money market, primary market, investor base, secondary market, financial market infrastructure, and the legal and regulatory framework. Applying a series of indicators, the LCBM framework allows for (1) the identification of gaps in a country's LCBM, (2) the assessment of a country's stage of market development, and (3) the identification of possible peers that may provide replicable lessons.

Several multilateral institutions collaborate closely on supporting countries in developing their local currency bond market and building capacity in public debt management. The framework has been applied in 13 countries at different stages of market development and across different regions; the detailed diagnostics and reform plans support countries in implementing necessary reforms. Findings to date reveal that LCBM development is an intricate process with countries facing various challenges, such as limited money market development, lack of a benchmark yield curve, and bank-centric investor bases.

Infrastructure project preparation facilities such as the Global Infrastructure Facility and transaction advisory teams within MDBs and DFIs play an important role in supporting the development of sustainable pipeline of infrastructure projects in EMDEs. As part of their mission, they support the development of well-structured, bankable projects that take into consideration the existing FX risks within different country contexts to create attractive transactions in developing economies. Moreover, project preparation contributes to building the capacity of governments and key private sector actors within EMDEs by introducing best global practices—while at the same time fostering the development of the local market by attracting international investors.

The Way Forward

- Effective macroeconomic and financial sector policies are prerequisites to scale up infrastructure investments by instilling investor confidence and ensuring best practices in line with macroeconomic fundamentals. Policymakers in EMDEs should also implement structural reforms and policies aimed at fostering domestic resource mobilization in order to boost infrastructure investments.

- Policymakers should ensure appropriate public investment management capacity to identify, assess and mitigate fiscal risks from new projects and the ongoing portfolio of projects using appropriate tools and frameworks anchored in the Central Budget Authority. These measures can help governments manage potential relevant fiscal risks from various financing options and they can also give investors greater certainty that their funds are spent effectively and facilitate new investment through improved transparency and governance.

- Capital market development, including local currency sovereign bond markets, helps with domestic resource mobilization and creates an enabling environment attractive to private and foreign capital. LCBM development will foster money market development and provides a critical price reference to price long-term infrastructure projects. Broadening LCBM development and deepening the investor base are critical to supporting private sector capital mobilization and serve as a cornerstone of capital market development. Countries should focus on improving their institutional capacities and developing human capital as a prerequisite to developing local capital markets.

- Local capital market development remains the preferred sustainable long-term solution for eliminating FX risk in infrastructure projects, as it allows to align local currency revenue inflows with local currency financing outflows. Policymakers should therefore prioritize efforts to develop and deepen their local financial markets to extend tenors, create liquidity, reduce financing costs, and build the capacity of local banks and investors to lend to infrastructure projects. International and local financial institutions can facilitate local currency bond issuance to further contribute to the deepening of local currency markets.

- In parallel, policymakers in countries with less developed local financial markets can improve the availability of FX risk reduction mechanisms – such as guarantees / credit enhancement and regulatory incentives – to catalyze the increased availability of local currency finance for infrastructure. By providing

concessional guarantees for local currency finance, donors and public financial institutions can help accelerate its availability for infrastructure projects by reducing costs and attracting first-time local investors to infrastructure finance.

- In the short-to-medium term, scaling up portfolio solutions for FX risk mitigation—such as hedging facilities or blended finance infrastructure funds—can increase the availability of infrastructure finance from international investors, especially in frontier markets and developing economies. In this context, concessionality needs to be well targeted to ensure additionality and avoid market distortions.

- At the country level, policymakers can adopt comprehensive approaches of combining FX risk reduction and mitigation mechanisms to increase access to infrastructure finance by minimizing FX risk. Facilitating local currency bond issuance by international and local financial institutions and providing guarantees to local currency providers increases the pool of local currency infrastructure finance, while also benefiting capital market development. In parallel, FX risk mitigation mechanisms, such as liquidity facilities, can increase access to international infrastructure finance. The relative availability of local verssus international infrastructure finance varies across country archetypes.

- At the global level, policymakers, international financial institutions, and international investors can collaborate to enable large-scale FX risk reduction and mitigation solutions. Solutions can include scaling up existing risk mitigation facilities for improved risk diversification and lower cost, creating shared local currency pools at the country level with shared and standardized access modalities for international lenders, and regulatory incentives for local bond issuance and infrastructure investments on the part of local investors.

- MDBs and DFIs can support government efforts to address FX risk in infrastructure by leveraging their available resources, robust credit ratings, and strong technical expertise to increase the availability and accessibility of key FX risk mitigation mechanisms, such as financial hedging instruments, blended finance facilities, and project preparation facilities. MDBs and DFIs can also help increase access to local currency financing for infrastructure projects in EMDEs.[24] They can support the development of local capital markets and help crowd in private capital by providing EMDE banks with access to hard currency money market instruments at market rates, through the issuance of local currency bonds, by offering guarantees and insurance, and by developing diversified portfolios and treasury management approaches that enable them to offer more local currency financing – including by potentially offering long-term hedging facilities to the specific needs of individual EMDE markets as feasible.

- Effective macroeconomic and financial policies, structural reforms, domestic resource mobilization and local capital markets development, FX risk reduction and mitigation solutions at project and portfolio levels are crucial to foster the green transition, given infrastructure investment plays an important role in achieving the global climate goals of the Paris Agreement. Existing infrastructure accounts for a substantial amount of global greenhouse gas emissions and adaptation costs, while the asset-liability mismatch and characteristics such as the long-term nature of large-scale climate-related infrastructure projects (e.g., renewable energy projects) exacerbates FX risk. Beyond the above macro-level and project-level considerations, collaboration at global level is crucial to design appropriate solutions to manage FX risk in climate-related infrastructure projects.

- Ongoing capacity building at all levels will make meaningful contributions to reducing FX risk and increasing infrastructure finance from local and international sources by:

  - » Increasing the capacity of governments to implement sound macroeconomic and financial policies that reduce FX volatility and to manage contingent liabilities from government guarantees;
  - » Enabling policymakers to facilitate local capital market development;
  - » Strengthening the ability of all project stakeholders to structure projects well and allocate remaining FX risk to the party best positioned to manage it;
  - » Increasing the capacity of investors to assess infrastructure investment risks; and
  - » Improving the risk management abilities of infrastructure lenders and investors to leverage all available financial structuring options.

24. Data based on the Global EM Risk (GEMs) database suggests that projects with MDBs tend to have lower default rates (GEM 2023).

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ACKNOWLEDGEMENTS

This report was prepared by the Global Infrastructure Facility (GIF) and staff of the International Monetary Fund[25] (IMF) for the G20 Infrastructure Working Group (IWG) under the G20 Presidency of Brazil. The GIF team, under the leadership of Astrid Manroth included Sara Ahmed and João Reye Sabino. The IMF team, under the leadership of Charles Cohen included Dulani Seneviratne, Lesley Fisher and Ian Hawkesworth with contributions from Thordur Jonasson and Bryan Gurhy. The report has been produced with support from Dalberg Advisors, in partnership with Egis Conseil. The Dalberg team was led by Daphnée Benayoun and Anna Selejan, and included team members Julia Lawson-Johns, Sophie de Chazal, Hadrien Duhem, and Alessandro Prügel. The Egis team included Iacopo Levenheck and Jean-Hugues Chérif. Editorial support was provided by Jesse Lichtenstein and design by Adriana Crespo.

The report builds on, and complements, previous work by the G20 Infrastructure Working Group (IWG), in coordination with key international organizations (IOs) and has benefited from discussions held at the G20 IWG under the G20 Presidency of Brazil in 2024. The team would like to thank the G20 IWG co-chairs and members for their valuable contributions during the IWG sessions and interview participants for their market views and case studies on this critical topic.

The report benefited from high-level interviews with more than 40 infrastructure stakeholders to gather insights and expert opinions on addressing exchange rate risk in infrastructure projects in EMDEs. The stakeholder interviews focused on the challenges that exchange rate risk poses for infrastructure project financing, on typical exchange rate risk allocation practices, on understanding the different project- and portfolio-level mechanisms that stakeholders offer and use to reduce or mitigate exchange rate risk. Stakeholders interviewed included: PPP Units (2); NDBs (3); Export Credit Providers (3); MDBs (7); DFIs and Bilateral Donors (7); Commercial Banks (3); Dedicated FX solutions providers (2); Infrastructure Funds (6); Project Developers and Advisory Firms (8).

25. Views expressed in this report do not necessarily represent the views of the IMF Executive Board or the IMF Management.