Estimating the Impact of Digital Money on Cross-Border Flows

Scenario Analysis Covering the Intensive Margin

Eugenio Cerutti, Melih Firat, and Hector Perez-Saiz

NOTE/2025/002

FINTECH NOTE

Estimating the Impact of Digital Money on Cross-Border Flows

Scenario Analysis Covering the Intensive Margin

Prepared by Eugenio Cerutti, Melih Firat, and Hector Perez-Saiz

February 2025

Estimating the Impact of Digital Money on Cross-Border Flows: Scenario Analysis Covering the Intensive Margin

Note 2025/002

Prepared by Eugenio Cerutti, Melih Firat, and Hector Perez-Saiz*

Cataloging-in-Publication Data
IMF Library

Names: Cerutti, Eugenio, author. | Firat, Melih, author. | Perez-Saiz, Hector, author. | International Monetary Fund, publisher.
Title: Estimating the impact of digital money on cross-border flows: scenario analysis covering the intensive margin / Eugenio Cerutti, Melih Firat, and Hector Perez-Saiz.
Other titles: Scenario analysis covering the intensive margin. | Fintech notes (International Monetary Fund).
Description: Washington, DC : International Monetary Fund, 2025. | Feb. 2025. | Includes bibliographical references.
Identifiers: ISBN:
9798229000611 (paper)
9798229000703 (ePub)
9798229000758 (WebPDF)
Subjects: LCSH: Digital currency. | Banks and banking—International.
Classification: LCC HG1710.C4 2025

RECOMMENDED CITATION: Cerutti, Eugenio, Melih Firat, and Hector Perez-Saiz. 2025. "Estimating the Impact of Digital Money on Cross-Border Flows: Scenario Analysis Covering the Intensive Margin." IMF Fintech Note 2025/002, International Monetary Fund, Washington, DC.

Publication orders may be placed online or through the mail:
International Monetary Fund, Publication Services
P.O. Box 92780, Washington, DC 20090, U.S.A.
T. +(1) 202.623.7430
publications@IMF.org
IMFbookstore.org
elibrary.IMF.org

*This note has benefited from discussions at the G20 IFA (Brazil) meeting, IMF Fintech Brownbag Seminar, the Bank of England, and internal IMF seminars. The authors would like to thank Marianne Bechara, Pelin Berkmen, Gabriela Conde, Adrian Dorel, Julia Faltermeier, Andres Fernandez, Russell Green, Tommaso Mancini Griffoli, Dong He, Kenneth Kang, Joe Kogan, Yaroslav Hul, Nghi Luu, Marcello Miccoli, Maria Olivia, Sole Martinez-Peria, Svitlana Maslova, Junghwan Mok, Kieran Murphy, Nasir Rao, Andre. Reslow, Marco Reuter, Nadine Schwarz, Indulekha Thomas, Anita Tuladhar, Tomohiro Tsuruga, Dmitry Vasilyev, Torsten Wezel, Rui Xu, and the participants in seminars at the Bank of England, G20 IFA working Group Meeting, and the IMF.

Contents

Boxes

Figures

Tables

Summary

Digital money and digital payments innovations have the potential for improving cross-border payments by reducing costs, enhancing speed, and improving transparency. This note performs an empirical analysis of the potential impact of digital money on the volume and transaction costs of cross-border payments, with a focus on the short-term intensive margin. The market of cross-border payments is very large, with retail transactions having a low share of the total but the highest transaction costs, particularly for remittances. Our illustrative scenarios assume an estimated 60 percent reduction in transaction costs and short-term elasticities to changes in costs estimated from remittances data. The results show two outcomes. First, the cross-border volume increases could be sizable for countries that are large remittance recipients and face expensive transaction costs. Second, even with a large drop in transaction costs, the short-term rise in global cross-border transaction volumes could be limited as a result of the low transaction costs of the wholesale segment. Moving outside the short-term intensive margin, the impact could potentially be much larger as digital currencies and other digital payments innovations—together with tokenization of assets on programmable platforms—could move the financial system into a transformative new era by fostering financial development and promoting further inclusion across borders.

Introduction

Cross-border payments constitute a substantial part of the global economy. It encompasses both wholesale and retail cross-border payment segments, each characterized by distinct transaction types, costs, and challenges. The wholesale segment, which accounts for about $145 trillion, involves high-value transactions primarily between businesses, driven by large financial institutions and corporations. However, the retail segment, valued at approximately $45 trillion, includes lower-value transactions. Although remittances make up only a small portion of this segment, they are particularly important in many low-income and emerging markets.

Despite its importance, some segments of the cross-border payment market still face high costs and lengthy processes. Although mostly affecting retail transactions, these issues are largely caused by the complexity of the existing clearing and settlement systems for cross-border payments, notably the correspondent banking model. This traditional model, while foundational to global financial transactions, has recently seen a decline in active correspondent banks, further reducing competition and complicating efforts to lower cross-border transaction costs (Rice, von Peter, and Boar 2020; Borchert and others 2024). The G20 Roadmap for Enhancing Cross-Border Payments (FSB 2023b) aims to reduce average retail payments costs below 1 percent and remittance costs below 3 percent by 2027 and 2030, respectively.

Recent technological digital money advancements, particularly the implementation of central bank digital currencies (CBDCs), present a promising avenue to address these challenges. CBDCs, if properly designed and integrated with existing payment systems, could significantly enhance the efficiency of cross-border payments by reducing the number of financial intermediaries, lowering settlement risks, and providing more transparent and faster transactions (BIS 2021a; Soderberg and others 2023). Such design features must be compatible with existing laws and regulations and be accompanied by necessary legal and regulatory changes when appropriate to do so. CBDCs can also complement and support the development of private mobile money and fast payment systems (IMF 2024b). Other digital payments innovations, such as interlinking fast payment systems across countries and multilateral cross-border platforms, could also in principle deliver similar improvements, including a significant reduction in cross-border transaction costs. The focus of our scenario analysis would be on CBDCs, but our findings can be broadly extrapolated to other digital payments innovations if their implementation results in a similar assumed reduction in cross-border transaction costs.

This note undertakes an empirical effort to estimate the potential impact of digital money and CBDCs on cross-border payments, focusing on the intensive margin and across different types of payments.[1] Our

[1]. The term “intensive margin” as used in this note refers to the short-term changes in the volume of flows between two countries that occur within the framework of their existing relationships/current consumers. As a consequence, we do not take into account how the introduction of new technologies could significantly alter the markets of cross-border flows and its participants. In addition, we are excluding longer-term general equilibrium effects, which may include permanent shifts in exchange rates or

analysis suggests that the introduction of CBDCs could lead to a substantial reduction in cross-border transaction costs, particularly in high-cost payment corridors. Using the available good remittance cross-border data and the analysis of Beck, Janfils, and Kpodar (2022), we speculate that the emergence of CBDCs could potentially reduce transaction costs by 60 percent. This reduction is primarily driven by increased competition through the entry of new intermediaries, enhanced market competition, and potentially, to a lower degree, better compliance with anti–money laundering/combating the financing of terrorism (AML/CFT) requirements.[2] Although this estimate slightly exceeds the G20's Roadmap target of a 50 percent reduction in cross-border transaction costs, it is also in line with other projections, such as the 50 percent cost reduction anticipated for the multicurrency CBDC (mCBDC) Bridge project (or in short mBridge project) and the 80 percent reduction suggested in the Oliver Wyman report for multicurrency CBDCs (see also Ekberg and others 2021).[3]

Although the cost-savings resulting from extrapolating a 60 percent cost reduction in cross-border payments are modest at a global level, they are relatively more important for remittances. Our estimates suggest a total reduction in costs of about $510 billion, equivalent to 0.3 percent of total cross-border flows or 0.5 percent of global GDP. Although these savings are modest in the global aggregate, the impact varies significantly across different payment types. In the wholesale segment, the impact of the cost reduction would be small because of the already low transaction costs. By contrast, in the retail segment, where costs are proportionally higher, CBDCs could trigger a more substantial relative reduction. Notably, the most significant relative savings would materialize for remittances, especially those related to several low-income countries and emerging markets, where transaction costs are disproportionately high. A 60 percent reduction in costs for these remittance flows could result in savings of approximately $17 billion, or about 3.7 percent of the total remittance flows.

Our illustrative scenario on the impact of the estimated cost reductions on cross-border flows highlights the role of elasticities, which are estimated to vary nonlinearly across different cost levels. Following Kpodar and Imam (2024), we estimate the elasticities of remittances with respect to transaction costs across different costs and find a relatively nonlinear elasticity curve. Our estimated cost reduction of approximately 60 percent, when combined with different proxied elasticities for wholesale and retail cross-

fundamental changes in macroeconomic policies across countries because of the adoption of digital money and central bank digital currencies.

[2] Note that our hypothesis is based on assumptions that (1) CBDCs could potentially reduce the number of intermediaries involved in cross-border payments, which may help to lower associated risks and potentially compliance checks through shorter transaction chains, and (2) countries will ensure the effective application of anti–money laundering/combating the financing of terrorism (AML/CFT) controls and sound supervisory and oversight frameworks to mitigate risks. Of course, the implementation of CBDCs at a cross-border level is still in its infancy and there are many open questions about the legal requirements of participating jurisdictions, data protection, and roles and responsibilities of operating and oversight bodies, which would be a function of design choices. See the upcoming Fintech Note, *The Financial Integrity Implications of CBDCs*, for a discussion on how the money laundering/terrorism financing risks and the required AML/CFT measures in a CBDC arrangement would depend on the design features of the arrangement. Other digital payments innovations could also in principle deliver similar cost improvements, but our analysis focuses on CBDCs.

[3] Phase 3 of the multicurrency CBDC (mCBDC) Bridge project (or in short mBridge project) is a joint initiative of the Hong Kong Monetary Authority, The Bank for International Settlements Innovation Hub of the Bank of Thailand, the Digital Currency Institute of the People's Bank of China, and the Central Bank of the United Arab Emirates. In October 2024, the Bank for International Settlement announced the handover of the project to the participant central banks (See BIS 2024).

border payments, also indicates differential impacts on transaction volumes, at least in the short-term intensive margin. Even with a large fall in transaction costs, the rise in global cross-border transaction volumes could be limited as a result of large importance and low costs of wholesale transactions. Instead, the most pronounced effects are likely to be observed in the case of remittances. These results of our illustrative scenario should be taken as a broad approximation because of the opaqueness and lack of cross-border transactional data, especially in terms of cross-border cost data for the wholesale segment, which increases the uncertainty about our used elasticities.

Using a novel corridor-by-corridor analysis reveals that the potential impact of CBDCs would be significant in countries facing both high remittance costs and a strong reliance on remittance inflows. Unlike most other cross-border transactions, the availability of disaggregate remittances data allows us to construct a country-by-country analysis that considers the elasticities as a function of each corridor's current cost structure. This analysis shows that countries facing very expensive corridors would especially benefit, with several countries experiencing increases in flows up to 5 percent of GDP. This would be particularly the case for countries with less diversified but highly dependent remittance structures, such as Lesotho, where the impact of CBDCs could be transformative. By reducing the reliance on a single expensive corridor and promoting competition among service providers, CBDCs could lower costs, increase transaction volumes, and ultimately contribute to economic stability and growth.

Our analysis underscores the importance of considering the unique circumstances of each country when assessing the potential short-term benefits of CBDCs and other digital payments innovations. Although the overall global impact of CBDCs on cross-border payments is promising, the most significant short-term gains will be realized in those countries where high costs and dependency on remittances are most acute. By tailoring CBDC implementation strategies to address these specific challenges, policymakers can maximize the positive impact on financial inclusion and economic development. In addition, moving outside the intensive short-term margin, the impact could potentially be much larger as CBDCs and other digital payments innovations—for example, in partnership with the digitalization of assets on a programmable platform or *tokenization*—could move the financial system into a transformative new era by fostering financial development and promoting further inclusion across borders. Further work based on actual data from ongoing CBDC initiatives or other digital payments innovations are needed to reach more precise conclusions for the nature of the effects.

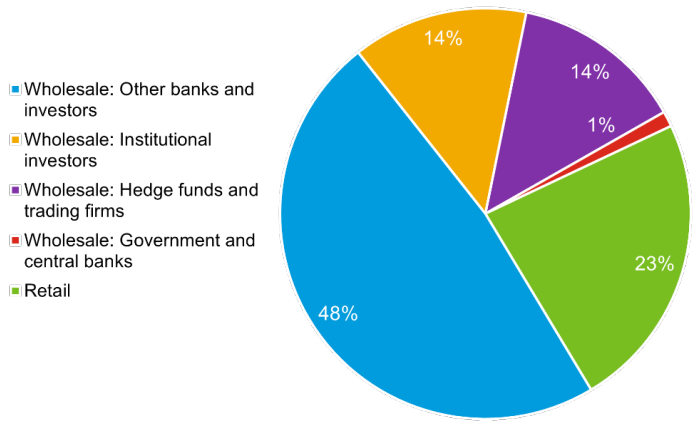
The Global Market for Cross-Border Payments

Cross-Border Payment Market

The market for cross-border payments reached $190 trillion in 2023. This figure, which represents approximately 190 percent of global GDP, includes both wholesale (which is particularly difficult to estimate due to its opacity) and retail cross-border payments.[4] The wholesale market segment, includes high-value payments between businesses, while the retail segment involves lower-value cross-border payments (Figure 1). This market comprises a complex amalgam of financial transactions of varying natures, such as the trade in goods or services, short- and long-term financial investments, and international transfers.

The wholesale cross-border market segment has a size of about $146 trillion—77 percent of the total market—and is driven by large financial institutions and corporations. Within the wholesale segment, about 80 percent of the large business-to-business (B2B) payments are conducted by banks and investors and 18 percent by hedge funds and trading firms, with the remaining portion handled by governments and central banks.[5]

Figure 1. Cross-Border Payments: Wholesale and Retail Markets



Source: FXC Intelligence (2023) data.

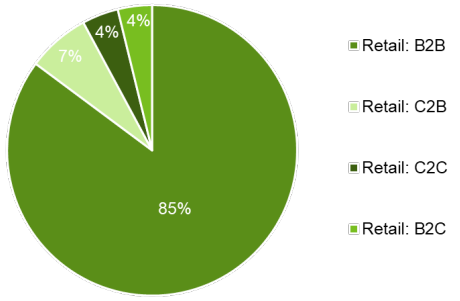
The retail segment of the cross-border payments market has a size of about $45 trillion, with consumers playing a relatively minor role. This segment is often divided into four categories based on the

[4] The estimated size of global cross-border payments is from FXC Intelligence. They provide estimates of the total addressable market (TAM) for cross-border payments, while pointing the challenge to fully assess the size due to the highly opaque wholesale payment market. See https://www.fxcintel.com/research/reports/how-big-is-the-b2b-cross-border-payments-market.

[5] There is not a clear and well-established cut-off limit in volumes to classify payments as wholesale or retail, but the industry typically uses a limit of approximately $500,000.

entities behind the cross-border transactions. As shown in Figure 2, nearly 85 percent of retail payments are B2B payments, often capturing small trade or financial flows. This is followed by consumer-to-business (C2B) transactions, accounting for about 7 percent, and business-to-consumer (B2C) transactions, which make up 4 percent of the total. Examples of C2B and B2C transactions include those conducted through card networks (for example, VISA). Finally, consumer-to-consumer (C2C) payments, which include "gig economy" payments (for example, eBay) and remittances, represent 4 percent of total retail payments. Notably, remittances constitute nearly half of all C2C cross-border payments.

Figure 2. Cross-Border Payments: Retail Markets



Source: FXC Intelligence (2023) data.
Note: B2B = business-to-business; B2C = business-to-consumer; C2B = consumer-to-business; C2C = consumer-to-consumer.

Most of these cross-border payments are being settled through a network of correspondent banks, which can sometimes be quite complex and opaque, although other models also exist (BIS 2018). Correspondent banking is an arrangement under which one bank (correspondent) holds deposits owned by other banks (respondents) and provides them with payment and other services. Payments between distant corridors, including those involving countries not well integrated into the international financial system, may settle through a relatively large and complex network of correspondent banks. This complexity typically results in high transaction costs and lengthy processing times. The ongoing decline in the number of active correspondent banks worldwide—down approximately 4 percent in 2020 and about 25 percent between 2011 and 2020—has further reduced competition (Rice, von Peter, and Boar 2020), making it even more challenging to lower costs in cross-border payments.[6]

Other well-known alternatives to the correspondent banking model are the interlinking and closed-loop models (BIS 2018). The interlinking model involves connecting the national payment infrastructures of two different countries, which can be achieved through the private or public sectors by linking the automated clearing houses or real-time gross settlement systems. In the closed-loop model, a large payment provider with a cross-border presence (for example, VISA) or a large multinational bank can use its financial infrastructure and operations to channel payments between end users across different jurisdictions (Figure 3).

[6] See also https://www.retailbankerinternational.com/comment/correspondent-banking-risk-greater-than-financial-risk-steven-marshall/?cf-view. This reduction is partly attributed to increased compliance costs associated with enhanced regulatory scrutiny.

Figure 3. Illustration of the Cross-Border Payments Markets

Retail markets	C2C	C2B	B2B
Closed-loop model			
Corresponding banking model			
Examples	*Remittances, personal transfers*	*E-commerce purchases abroad*	*Trade payments*

Source: BIS (2018) and IMF staff illustrations.
Note: B2B = business-to-business; C2B = consumer-to-business; C2C = consumer-to-consumer; PSP = payment service providers.

Cross-Border Transaction Costs

Information on transaction costs for cross-border payments, measured as a percentage of the amount sent, is quite limited, particularly for the wholesale segment, but evidence suggests significant variation across different segments and corridors. Because of the high opacity and complexity of this market—a complex amalgam of financial transactions of very different characteristics—we need to use multiple sources to provide a general view of transaction costs across types of cross-border payments (Table 1). Operational costs for wholesale transactions are particularly hard to estimate as in many cases these services are bundled with other financial services, so they are not individually priced (FSB 2021). McKinsey (2018) provides approximate estimates, indicating that wholesale (B2B) payments have the lowest transaction costs, about 0.1 percent. The most recent and detailed cost estimates are for retail payments, provided under the G20 Roadmap for Enhancing Cross-Border Payments (FSB 2023a). These transaction costs are substantially higher than those for wholesale transactions, ranging between 1.5 percent and 6 percent. For remittances, which are a subcategory of retail payments, we rely on the highly detailed database from the World Bank.[7]

Table 1. Transaction Costs across Different Markets

Type of Cross-Border Flow	Total Flows 2023 ($ trillion)	Average Total Cost (%)
Wholesale (B2B)	145.6	0.1
Retail (B2B)	37.9	1.5
Retail (C2B)	3.1	2.0
Retail (B2C)	1.7	1.7
Retail (C2C)	1.8	2.5
Of which remittances	0.5	6.2
TOTAL	190.1	

Source: The G20 Roadmap progress report (using FXC Intelligence data) for retail transaction costs; McKinsey (2018) for wholesale transaction costs; World Bank for remittances in a sample of about 100 countries (low-income countries and emerging markets); and IMF staff estimations.
Note: B2B = business-to-business; B2C = business-to-consumer; C2B = consumer-to-business; C2C = consumer-to-consumer.

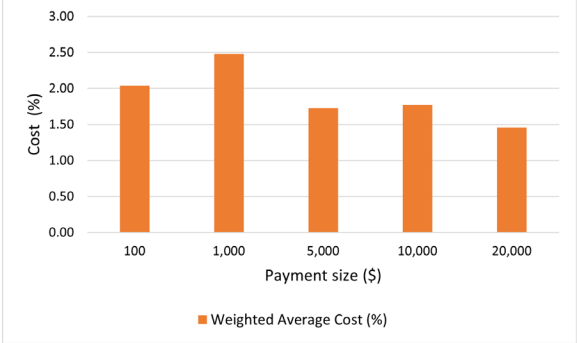
There is also significant heterogeneity in retail payments costs across regions and payment sizes. Transaction costs for cross-border payments decrease with the volume of the flows and remittances are the most expensive. Recent data shows that retail cross-border payment transaction costs tend to decline with the size of the payment (Figure 4, panel 1). Using data from different payment corridors, we observe that transaction costs tend to be larger in Sub-Saharan Africa, the Middle East and North Africa, and Latin American regions. Furthermore, there is a negative correlation between the transaction costs and the

[7] See https://remittanceprices.worldbank.org/

number of corridors, indicating that regions with more corridors tend to have lower transaction costs (Figure 4, panel 2).

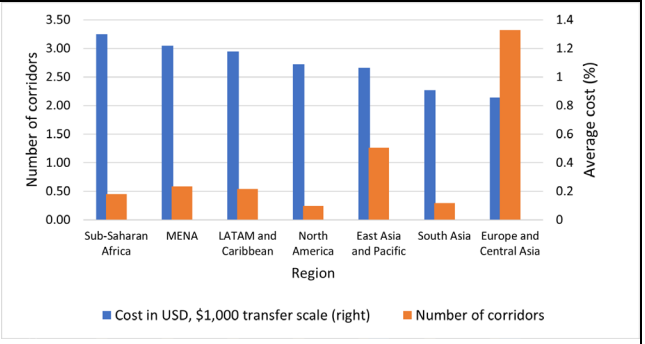
Figure 4. Payment Costs by Size and C2C Payment Costs and Corridors

1. Payment Costs by Size



Source: Financial Stability Board (2023a).
Note: Payments in the chart are shown for different payment volumes, which correspond to different payment segments. These are consumer-to-business ($100), consumer-to-consumer ($1,000 and $10,000), business-to-consumer ($5,000), and business-to-business ($20,000).

2. C2C Payment Costs and Corridors



Source: Financial Stability Board (2023a).
Note: The number of corridors is calculated as average across countries within the regions. We use the most granular regional breakdown available from the Financial Stability Board database. LATAM =Latin America; MENA = Middle East and North Africa.

Remittances are the most expensive segment, particularly in low-income countries and emerging markets. Data from the World Bank on remittances costs across approximately 100 countries (mostly low-income countries and EMs) show relatively large transaction costs, averaging 6.2 percent of the amount sent.[8] This figure is closely monitored as part of the global effort to reduce the costs of remittances, a key policy objective tied to the United Nations' 2030 Agenda for Sustainable Development. One of the Sustainable Development Goals, adopted in September 2015, aims to lower the cost of migrant remittances to less than 3 percent by 2030. Remittance prices are high for many reasons, including underdeveloped financial infrastructure in some countries, limited competition, regulatory obstacles, lack of access to the banking sector by remittance senders and receivers, and difficulties for migrants to obtain the necessary identification documentation to enter the financial mainstream (Ardic and others 2022).

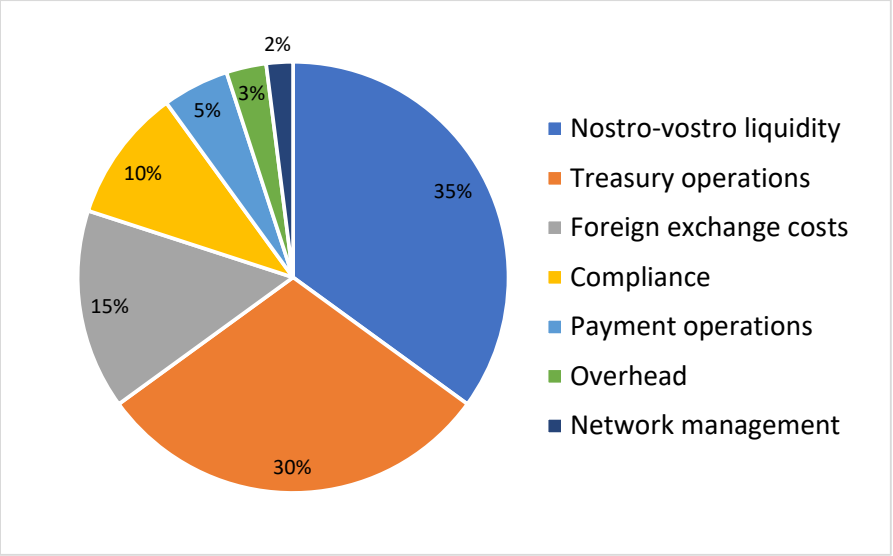
The typical distribution of operational costs of correspondent banks associated with cross-border payments is influenced by a wide range of factors. Using data from McKinsey and participant banks in the IL2 project,[9] PricewaterhouseCoopers (PwC) estimates that the majority of costs in correspondent banks come from vostro-nostro liquidity management and treasury operations followed by foreign exchange costs and compliance expenses (BIS 2021b and Figure 5). This operational cost structure, including any other additional margins or markups, is inevitably passed onto the final costs paid by both senders and

[8] See https://remittanceprices.worldbank.org/about-remittance-prices-worldwide.

[9] See https://www.bis.org/publ/othp40.htm. The Project Inthanon-LionRock Phase 2 prototype (also referred to as the IL2 prototype—a predecessor of Project mBridge) is a common platform for multiple CBDC settlements based on a single multicurrency system. The prototype encompasses Thailand, Hong Kong, and two additional jurisdictions.

receivers of cross-border payments. However, this cost breakdown is approximate, as individual factors can vary significantly depending on the bank and region, especially in regions where the exchange rates are highly volatile. For retail payments, estimates from the G20 progress report suggest that foreign exchange–related costs can be substantial, often comprising more than half of the total costs paid by end users.

Figure 5. Distribution of Costs in Cross-Border Payments



Source: BIS (2021b) (based on PricewaterhouseCoopers (PwC) estimates).

Because of the high costs and slow processing times of cross-border payments, policymakers have recently developed initiatives to reduce these transaction costs. A recent report from the Financial Stability Board (FSB 2021) sets quantitative targets for the G20 Roadmap for Enhancing Cross-Border Payments, aiming to address challenges related to cost, speed, transparency, and access (Table 2). Tracking progress toward these targets over time will help determine whether the Roadmap actions are sufficient or if additional actions may be needed. These targets have been developed based on clear and well-defined principles.[10]

[10] The targets are proposed to be directly related to the challenges, provide a clear indication of the extent of progress, be appropriately ambitious, be able to be readily communicated, and be meaningful to a wide range of stakeholders.

Table 2. The G20 Roadmap: Targets

	Wholesale	Retail	Remittances
Cost	No target set.	Global average cost of payment to be no more than 1 percent by end-2027.	Global average cost of sending $200 remittance to be no more than 3 percent by 2030.
Speed	Seventy-five percent of cross-border wholesale payments to be credited within one hour of payment initiation or within one hour of the pre-agreed settlement date and time for forward-dated transactions and for the remainder of the market to be within one business day of payment initiation, by end-2027.	Seventy-five percent of cross-border retail payments to provide availability of funds for the recipient within one hour from the time the payment is initiated and for the remainder of the market to be within one business day of payment initiation, by end-2027.	Seventy-five percent of cross-border remittance payments in every corridor to provide availability of funds for the recipient within one hour of payment initiation and for the remainder of the market to be within one business day, by end-2027.
Access	All financial institutions operating in all payment corridors to have at least one option and, where appropriate, multiple options for sending and receiving cross-border wholesale payments by end-2027.	All end users or banks to have at least one option for sending or receiving cross-border electronic payments by end-2027.	More than 90 percent of individuals who wish to send or receive a remittance payment should have access to a means of cross-border electronic remittance payment by end-2027.
Transparency	All payment service providers to provide at a minimum the following list of information concerning cross-border payments to payers and payees by end-2027: total transaction costs; the expected time to deliver funds; tracking of payment status; and terms of service.		

Source: This table is taken from the report by the Financial Stability Board (2021).
Note: G20 = Group of Twenty.

Estimating the Effect of Central Bank Digital Currencies on Transaction Costs and Volumes at the Intensive Margin

Potential Advantages of CBDCs on Cross-Border Payments

If properly designed, regulated, and integrated with existing payment systems, digital money could substantially enhance the efficiency of cross-border payments. A CBDC is a safe and liquid asset that could potentially reduce the number of financial intermediaries and settlement risks. CBDCs also offer an opportunity to build cross-border payment functionality from the outset, thereby improving the overall efficiency of cross-border payments (Reslow, Soderberg, and Tsuda 2024). Many central banks consider improved cross-border payments as a potential benefit of CBDCs, which can help overcome some of the friction in cross-border transactions (BIS 2021a, 2022; World Bank 2021; IMF 2023). CBDCs can also potentially coexist with current payment systems. Kosse and Mattei (2023) provide a survey of 86 central banks and show that more than 80 percent of central banks believe there may be value in having both a fast payment system and a CBDC.[11]

There are several channels through which CBDCs might lower transaction costs. These channels can be divided into three categories:

1. Reduction of entry barriers and stronger competition: CBDCs could potentially stimulate competition and innovation within payment systems by reducing entry barriers for financial technology companies and banks. This increased competition could help lowering payment costs and increase payment system efficiency (IMF 2023).
2. Increased efficiency/cost reduction in correspondent bank networks or payment platforms: For instance, building a coordinated cross-border payment platform (for example, mBridge) could help in improving the liquidity management across all platform participants by using a liquidity saving mechanism. In addition, such platforms could reduce inefficiencies by directly linking banks, thereby lowering treasury operation costs.
3. Potential improvements in AML/CFT compliance: Technological innovations may present opportunities for more effective and efficient application of AML/CFT controls.[12] Furthermore, the introduction of CBDCs could reduce the number of intermediaries involved in cross-border payments, which could, in turn, lower some compliance risks and challenges associated with the current system that often involves long transaction chains spanning multiple countries (Reslow,

[11] Note that a decisive impulse in the development and linkage of cross-border payment platforms by central banks could potentially also lead to substantial cost reductions and savings.

[12] See, for instance, The Financial Action Task Force (FATF), Opportunities and Challenges of New Technologies for AML/CFT (2021), Bank for International Settlement, Project Aurora: the power of data, technology and collaboration to combat money laundering across institutions and borders (2024), and Project Aurum 2.0 from the BIS Innovation Hub for privacy-enhancing technologies (Reslow, Soderberg, and Tsuda 2024).

Soderberg, and Tsuda 2024). Nonetheless, any potential improvements in AML/CFT compliance would be a function of the CBDC design choices that would need to balance different policy goals, such as data privacy.

Information asymmetries and limited competition have been core factors explaining persistently high costs in cross-border payments. The recent entry of new players, such as financial technology companies, has the potential to increase the competition in the payments industry, while digitalization could also help in reducing information asymmetries. CBDCs could facilitate the creation of new cross-border payment platforms that reduce entry barriers to financial technology companies and encourage stronger competition.[13] Soderberg and others (2023) state that CBDCs could be designed as platforms for private sector payment service providers to stimulate innovation and competition, thereby lowering payment costs and improving payment system efficiency. Auer, Haene, and Holden (2021) note that a CBDC compatible with others and benefiting from a diverse and competitive market for services would be a real public good, and to achieve this, central banks will need to collaborate. Ekberg and others (2021, Oliver Wyman report) state that, in the absence of multiple correspondent banks along the payment cycle, multi-CBDC solutions have the potential to reduce cross-border transaction revenue by 80 percent annually, from approximately $120 billion to $20 billion (excluding foreign exchange revenues).[14] Carare and others (2022) find that financial and digital development in remittance-receiving countries—such as debit/credit card ownership or bank branch penetration—are associated with lower remittance fees, especially in Central America, Panama, and the Dominican Republic. Drakopoulos and others (2024) also state that leveraging digital currencies and blockchain technology can help Latin America and the Caribbean countries reduce transaction costs and times, thus enhancing economic efficiency and fostering deeper regional and global trade relationships.

Building coordinated cross-border payment platforms with joint public and private sector efforts would help address challenges and friction in cross-border payments (FSB 2023b; IMF 2024a). New multilateral cross-border payment platforms could address problems inherent in legacy technologies and processes by complementing or substituting traditional correspondent banking links or by bilaterally interlinking the payment infrastructures of different countries (CPMI 2020). BIS (2023) provides an update on the Project mBridge experiments with a multiple-central bank digital currency (multi-CBDC) common platform for wholesale cross-border payments, aiming to solve key inefficiencies such as high costs, low speed and transparency, and operational complexities. It is estimated that the mBridge platform could reduce the cost of cross-border payments in nostro-vostro liquidity, treasury operations, compliance, and foreign

[13] Our note does not take a stand on wholesale or retail CBDCs as they are likely to co-exist and expected to directly or indirectly improve competition and efficiency in cross-border payments (for more details, see IMF 2024a.).

[14] This assumes that, at most, one correspondent bank will continue to be used to facilitate cross-border payments. It is expected that actual savings will be larger in the Association of Southeast Asian Nations (Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam) region, given the number of correspondent banks typically required.

exchange (previously discussed) by up to 50 percent (BIS 2021b).[15] The platform developed for the project mBridge is underpinned by custom-built distributed ledger technology, a set of comprehensive legal rulebook documents, and a fit-for-purpose governance structure. Standardizing communication between corresponding platforms by employing ISO 20022 may facilitate opportunities to interlink domestic payment infrastructures from different jurisdictions. Increased adoption of ISO 20022 could support linkages between national and regional fast payment platforms, thus facilitating cross-border transactions between different jurisdictions.[16,17]

Effective application of AML/CFT controls and sound AML/CFT risk-based supervisory frameworks could help smooth implementation of CBDCs and the mitigation of risks. One of the building blocks of enhanced cross-border payments stated by CPMI (2020) highlights the importance of applying AML/CFT rules consistently and comprehensively to ensure a more effective and robust implementation of AML/CFT frameworks, while continuing to pursue a risk-based approach. Beck, Janfils, and Kpodar (2022) find a positive and significant relationship between the median remittance price and the AML index in both sending and receiving countries. BIS (2021a) states that a coordinated CBDC framework provides greater transparency and potential benefits of using smart contracts, as well as the synchronization of payment records storage and updates. Furthermore, this would help in automating some pre-trade compliance and post-trade monitoring processes for banks and regulators. Therefore, integrating CBDCs into cross-border payment systems, along with sound AML/CFT frameworks, could help reduce transaction costs although actual cost reduction will depend on specific CBDC design options chosen.[18]

Illustrative Scenario: Potential Reduction in Cross-Border Transaction Costs

Using retail cross-border data, we estimate that the emergence of CBDCs could potentially reduce transaction costs by 60 percent. Our estimated cost reduction is attributed to increased competition through the entry of new intermediaries and potentially improved and automated compliance with AML/CFT requirements. Our illustrative calibration exercise draws from the relatively large remittances literature and highly detailed related databases that have emerged in recent years. Beck, Janfils, and Kpodar (2022) show that remittance transaction costs tend to decrease with the growing presence of

[15] To reduce nostro-vostro liquidity costs, the mBridge pilot manages liquidity across all participants algorithmically with liquidity-saving mechanisms. To reduce treasury operation costs, the pilot provides direct payment versus payment settlement for banks. To reduce foreign exchange costs, the prototype targets two cost sources, namely foreign exchange risk and exchange fees. Finally, to reduce compliance costs, the pilot provides greater transparency and potential benefits of using smart contracts.

[16] There are other ongoing pilot platforms based on CBDCs that are experimenting with various technologies to enhance the efficiency of cross-border payments. For instance, it is estimated that the CBDC bridge for the eCNY (Digital Renminbi) between China and Singapore could drive estimated savings of 3% to 5% of Singapore's GDP, see https://www.oliverwyman.com/our-expertise/insights/2021/jun/the-digital-currency-battleground.html#:~:text=For%20example%2C%20use%20of%20eCNY,lower%20fees%20or%20more%20liquidity.

[17] ISO 20022 is a single standardization approach (methodology, process, repository) to be used by all financial standards initiatives and describes a common platform for the development of messages.

[18] In-depth analysis on the AML/CFT considerations for CBDCs will be captured in an upcoming Fintech Note, *The Financial Integrity Implications of CBDCs*.

nonbanks and the number of providers in remittance corridors. They also show that remittance transaction costs tend to increase with the perceived AML risk of the receiving country. Based on these empirical results, we assume that the introduction of CBDC could lead to a two standard deviation increase in the importance of nonbanks and the number of providers in remittances corridors, as well as a possible decrease in the ML/TF risks of the receiving country, with the effective application of appropriate AML/CFT measures.[19] These assumptions would imply that remittances costs could decrease by about 60 percent. Although this result is slightly more ambitious than the 50 percent objective established by the G20, it aligns with cost reduction estimates for mBridge (50 percent reduction) and the Oliver Wyman report for multicurrency CBDC (80 percent reduction).

Using the estimated reduction from remittances corridors, we extrapolate this 60 percent reduction to other types of cross-border payments. As a result of the lack of detailed data for other payment segments, we produce estimates by extrapolating the results obtained for remittances to other types of cross-border payments (Table 3). The total reduction in transaction costs would be about $510 billion, which represents about 0.3 percent of total cross-border flows (estimated at about $190 trillion) or about 0.5 percent of global GDP. Whereas the estimated savings are not very large on aggregate, there are substantial differences across payment types. For wholesale payments, despite their high volume, savings in costs would not be the largest in absolute terms, as the transaction costs are already very small.

Table 3. Scenario Analysis: 60 Percent Reduction in Transaction Costs

	Reduction in Transaction Costs		
	In Billion USD	**As % of Flows**	**As % of World GDP**
Wholesale (B2B)	87.36	0.06	0.09
Retail			
B2B	341.1	0.9	0.36
C2B	37.2	1.2	0.04
B2C	17.3	1.02	0.02
C2C	27	1.5	0.03
Of which remittances	16.7	3.72	0.02
Total	510	0.27	0.54

Source: IMF staff estimations based on 60 percent cost reduction scenario analysis and leveraging data from the G20 Roadmap progress report for retail transaction costs; McKinsey (2018) for wholesale transaction costs; and World Bank for remittances in a sample of about 100 countries (low-income countries and emerging markets).
Note: B2B = business-to-business; B2C = business-to-consumer; C2B = consumer-to-business; C2C = consumer-to-consumer.

Our estimates show that the largest reduction in transaction costs, in absolute and relative terms, would occur in the retail segment, where transaction costs are proportionally much larger compared to the

[19] Two standard deviations approximately correspond to a change between 25th percentile and 75th percentile for each of these three variables used in the cost reduction estimation.

wholesale sector. In nominal amounts, retail B2B payments would see the most significant reduction, with estimated savings of about $340 billion, or 0.9 percent of flows. In relative terms, the largest savings would be for retail C2C flows—$27 billion or about 1.5 percent of flows. Within C2C flows, the largest savings among retail payments would be for the expensive remittances observed in many low-income countries and emerging markets. A 60 percent reduction in transaction costs for these flows would generate about $17 billion in savings, or about 3.7 percent of the flows.

Illustrative Scenario: Estimating the Increase in Volumes Using Price Elasticities

Considering the scarcity of data and inherent complexities, assessing the prospective impact of CBDC on cross-border transaction volumes poses several challenges. The economic literature suggests that a reduction in the cost of sending money across borders should lead to an increase in transaction volumes, as it becomes less expensive to transfer money to households and corporations. Nevertheless, as a result of the significant uncertainties associated with the nascent stages of CBDC adoption and design, coupled with the scarcity of comprehensive data, our approach is confined to drawing upon available proxies and conducting scenario analysis, focusing on short-term intensive margins.

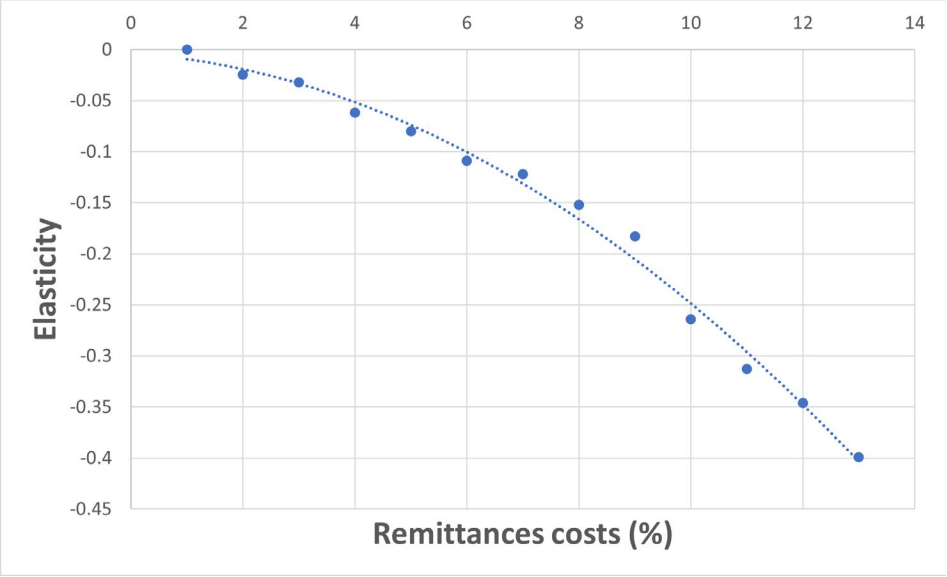
Detailed corridor-by-corridor cross-border data on remittances offer the possibility to estimate price elasticities.[20] The study by Kpodar and Iman (2024) is the most complete one on hand and considers elasticity estimations using a dynamic setting. They find an average short-term (one-quarter ahead) elasticity of −0.087. There are additional studies estimating remittances, usually focused on specific country cases. Gibson, McKenzie, and Rohorua (2006) use a survey of Tongan immigrants in New Zealand and estimate an average price elasticity of −0.22 for the New Zealand-Tonga corridor. Ahmed and Martinez-Zarzoso (2016) estimate the relationship between remittance prices and amounts sent for remittances to Pakistan from 23 sending countries and find a relatively high elasticity (−1.6). Yang (2005) examines the potential effects of exchange rate fluctuations on the amount of remittances sent to the Philippines, taking advantage of a natural experiment created by the 1997 Asian Financial Crisis, and estimates an implied elasticity of −0.6.

We further exploit the available remittances data and show that the estimated elasticities vary nonlinearly across different transaction costs. Following Kpodar and Imam (2024), we estimate the elasticities of remittances with respect to transaction costs across different fees. To test whether the elasticity of remittances to transaction costs changes with the level of transaction costs, we incorporate additional indicator variables in their econometric specification to capture the variation in elasticities with fees (see Annex 2 section “Elasticity Estimations” and Figure 6). Figure 6 shows a relatively nonlinear curve, which remains flat at low transaction cost levels but increases rapidly as fees rise. This suggests that the increase in remittances against a unit decline in remittance transaction costs becomes more

[20] A payment corridor in cross-border transactions refers to the specific routes or networks through which financial transactions are facilitated between two and more countries.

pronounced as remittance transaction costs increase. On the flat side of the curve, the average elasticity is small, approximately −0.025, implying that a 1 percent increase in transaction costs would reduce remittance volumes by 0.025 percent. In contrast, for high-cost corridors, the elasticity approaches −0.4, indicating a much stronger response in remittances against a decline in transaction costs.

Figure 6. Heterogeneous Price Elasticities



Source: IMF staff estimations based on Kpodar and Imam (2024). See estimation details in Annex 2, section "Elasticity Estimations."

The analysis conducted shows that elasticities can greatly differ across different transaction costs. This variation is an important factor that would not only determine the potential impact of CBDC on remittances, but also help us to speculate about other cross-border flows. For instance, given that transaction costs for B2B wholesale payments are very small, it is reasonable to expect that elasticity for wholesale payments should be correspondingly small. On the contrary, in the case of expensive retail payments, where transaction costs are substantially higher, we would expect that elasticity would be much higher.

Baseline Estimations

Using our elasticity estimations from remittance data, we provide a scenario analysis to estimate volume increases for different segments of the cross-border market. For retail segment, we assume an elasticity of −0.087, which corresponds to the remittance cost at the mean of cross-corridor cost distribution.[21] This figure implies that a 1 percent decline in the transaction costs leads to a 0.087 percent increase in the volume. For the wholesale segment, we assume a much lower elasticity of −0.039, which is approximately the average of the estimated elasticities in the lowest three percentiles from Figure 6.

[21] Note that the elasticity of −0.087 is from Kpodar and Imam (2024).

Our results show that the increases in transaction volumes are approximately equally split between the retail and wholesale segments. The total increase in cross-border flows is estimated to be around $5.8 trillion, representing a 3 percent increase, which equals to about 6.1 percent of world GDP (see Table 4). Approximately half of this total increase would correspond to wholesale flows, while the other half would be attributed to retail flows. Within the retail segment, the large majority of the increase would correspond to retail B2B flows, which represent about 85 percent of all retail flows.

Table 4. Scenario Analysis: Increase in Transaction Volumes

		Increase in Volumes		
	Elasticity	**Volume Increase (%)**	**Volume Increase ($ trillion)**	**Volume Increase (% of World GDP)**
Wholesale (B2B)	-0.039	2.4	3.5	3.6
Retail				
B2B	-0.087	5.2	2	2.1
C2B	-0.087	5.2	0.2	0.2
B2C	-0.087	5.2	0.1	0.1
C2C	-0.087	5.2	0.1	0.1
Of which remittances	-0.087	5.2	0.0	0.0
Total		3.0	5.8	6.1

Source: IMF staff estimations based on Beck, Janfils, and Kpodar (2022).
Note: B2B = business-to-business; B2C = business-to-consumer; C2B = consumer-to-business; C2C = consumer-to-consumer.

Robustness and Alternative Considerations

The scenario analysis is particularly sensitive to the elasticity assumptions and our focus on the intensive margin/short-term elasticities.[22] Although there is no direct literature available on non-retail cross-border flows to ground our elasticity assumptions, a review of the literature (see Box 1) would suggest that our elasticity proxies could be probably conservative, if we also consider longer-term effects that could produce structural changes in the industry, for example, new services, financial deepening, and tokenization (Aldasoro and others 2023; Agur and others 2024). This would translate into a potential much larger effect than in our baseline; however, while plausive it would be incorporating “extensive margin” considerations that are beyond our short-term focus on our baseline illustrative scenario.

[22] The results are robust to using a 50 percent reduction in cross-border transaction costs as targeted by the G20 Roadmap initiative. (See Annex Table 3.1.)

Box 1. Financial Literature and Elasticities

The estimation of the price elasticity, a prominent concept in economics, has remained at the forefront of empirical research for decades. Researchers have often developed sophisticated econometric models, sometimes using highly granular data to estimate price elasticities in a wide variety of industries, with applications to cost–benefit analysis, antitrust, or policy evaluation, just to name a few. Its significance has also extended to the sphere of international economics to evaluate the effect of various cross-border trade and financial policies.

Nonetheless, the task of estimating the elasticity for cross-border payments presents numerous challenges, especially in terms of data availability. Cross-border payments represent a complex amalgam of financial transactions associated with transactions of very different nature such as the trade in goods or services, short- or long-term financial investments, or international transfers. Thus, the related literature that estimates price elasticities in cross-border economic transactions is typically divided in several strands, which include the areas of international trade, international transfers to low-income countries and emerging markets (remittances) and the market microstructure literature in finance. A main constraint in the estimation of elasticities is obtaining sufficiently granular data, especially for cross-border flows. To our knowledge, remittances data is the only publicly available and sufficiently granular source related to this question.

In the financial literature, some studies have estimated the elasticity of various types of transaction costs, although analysis of international transactions is very limited. In the context of an increasing interest in the taxation of financial transactions as a way to curve financial market excesses after the global financial crisis, Matheson (2011) surveyed the literature, mostly focusing on elasticities of stock market and futures trading with respect to transaction costs and bid-ask spreads. Elasticities for various types of financial instruments vary substantially; for example, futures trading elasticities with respect to bid-ask spreads range between −0.1 (wheat futures) and −2.6 (gold futures). In addition, Baltagi and others (2006) found that the elasticity of stock market trading volume with respect to trading costs varies between −0.5 and −1 in China. Discussing the role of currency transaction tax on foreign exchange trading, Schmidt (2007) estimated the elasticity of trading volumes with respect to bid-ask spreads and found an elasticity equal to −0.41. Additional discussion on tax levies on financial transactions, both domestic and international, and estimates on effects and revenues collected can be found in Committee of Experts to the Taskforce on International Financial Transactions and Development (2010). In the retail payments literature, Bolt, Humphrey, and Uittenbogaard (2005) found relatively small price elasticities (below −0.5) for various means of payment (debit cards versus cash).

Corridor-by-Corridor Calculation for Remittances

Our analysis of the elasticities for remittances shows that it is important to consider a sufficiently granular, corridor-by-corridor approach when estimating the potential impact of CBDCs. The World Bank remittance database, which covers a group of about 100 countries with large remittance transaction costs—mostly low-income and emerging markets—show that there is considerable heterogeneity across countries. Table 5 displays the countries that are most dependent on remittances inflows, measured as a percentage of GDP. At the top of the list, Tonga stands with remittances accounting for 42.9 percent of GDP, followed by Samoa (29.8 percent), Lebanon (29.4 percent), Tajikistan (27.8 percent), and Gambia (25.3 percent). The remittances reaching these countries arrive from a different set of corridors (for example, eight different corridors in the case of Lebanon), with very different cost structures (for example, the most expensive corridor is being faced by Eswatini with a cost of above 21 percent).

Some countries have strong dependence on few corridors that tend to be also very expensive. For instance, Lesotho and Eswatini have some very large expensive corridors with transaction costs close to 20 percent, since they are each dependent on only one corridor originating in South Africa. Others such as Lebanon and South Sudan have a strong dependence on remittances, but have a much more diversified corridor structure, with less pronounced differences across corridors.

Table 5. Importance of Cost of Remittances across Countries

				Corridor by Corridor Information			
				Most Expensive Corridor		Second Most Expensive Corridor	
Country	Remittances Inflows (% of GDP)	Remittances Costs (avg, %)	Number of Corridors	Cost Most Expensive Corridor	Sender Corridor	Cost Second Most Expensive Corridor	Sender Corridor
Tonga	42.87	9.17	2	9.58	New Zealand	8.44	Australia
Samoa	29.83	7.94	2	8.03	New Zealand	7.80	Australia
Lebanon	29.36	9.01	8	11.22	United States	10.81	Australia
Tajikistan	27.84	7.91	1	7.91	Germany		
Gambia	25.31	13.45	1	13.45	United Kingdom		
Kyrgyzstan	23.92	2.35	2	8.84	Germany	1.12	Russia
El Salvador	23.05	3.98	1	3.98	United States		
Honduras	22.85	4.58	2	7.49	Spain	4.26	United States
Jamaica	21.80	6.80	3	7.03	United Kingdom	6.89	United States
Haiti	20.44	6.08	4	9.48	France	8.25	Dominican Republic
Lesotho	20.27	19.90	1	19.90	South Africa		
Nepal	20.09	3.58	8	4.31	United States	4.16	Saudi Arabia
Comoros	19.67	7.03	1	7.03	France		
Somalia	16.65	6.40	5	9.11	Sweden	7.83	Australia
Vanuatu	15.75	9.96	2	9.96	Australia	9.08	New Zealand
South Sudan	14.48	9.26	5	11.96	Kenya	9.28	United Kingdom
Nicaragua	13.73	5.73	2	6.91	Costa Rica	4.54	United States
Cape Verde	13.52	7.91	2	9.08	United States	7.07	Portugal
Fiji	9.71	7.24	2	7.83	New Zealand	6.79	Australia
Zimbabwe	6.29	11.05	4	13.29	South Africa	8.64	Canada

Source: World Bank remittances database and IMF staff estimations based on Kpodar and Imam (2024).
Note: This table shows 20 countries with the highest importance of remittances inflows (as percent of GDP), sorted from highest to lowest. Remittance flows and costs data are for 2022, except for Kyrgyzstan where we use cost data for 2021 for the corridor with Russia. Eswatini is not shown in the table as it is not among the 20 countries that have largest remittance flows (measured as percent of their GDP).

We can incorporate those aspects into a disaggregated country scenario analysis of the impact of CBDCs by aggregating corridor-by-corridor effects for each receiving country. Assuming a uniform 60 percent reduction in transaction costs across all corridors, we can apply different elasticities based on the transaction cost levels of each specific corridor, as derived from our previous estimates. We can then estimate the total volume increase for each country by aggregating the effects across all relevant corridors. Given the presence of large fees in certain corridors, our illustrative scenario—assuming a 60 percent fee reduction—would likely result in a significant increase in volumes, as the assumed elasticities are higher for more expensive corridors, reflecting the nonlinear nature of the effect. The final estimated impact for each country is derived by aggregating the corridor effects, weighted by the importance of each corridor to the country.

Our corridor-by-corridor estimations indicate that the potentially most benefited countries by CBDC are not only a function of the importance of remittances in their economy, but also the cost structures that they are facing. Table 6 and Figure 7 show that some small emerging markets and low-income countries such as Lesotho, Tonga, and Lebanon—which receive large remittance inflows through relatively expensive corridors—can experience very high increase in volumes (as percent of GDP) resulting from the assumed 60 percent decline in cross-border transaction costs. The table shows strong nonlinear effects in some countries, the increase in remittance flows can be up to 23 percent for Lesotho, representing about 5 percent of its GDP. Most countries in the table have a strong dependence on remittances, constituting more than 10 percent of their GDP, and typically face high average remittance costs, exceeding 9 percent.[23]

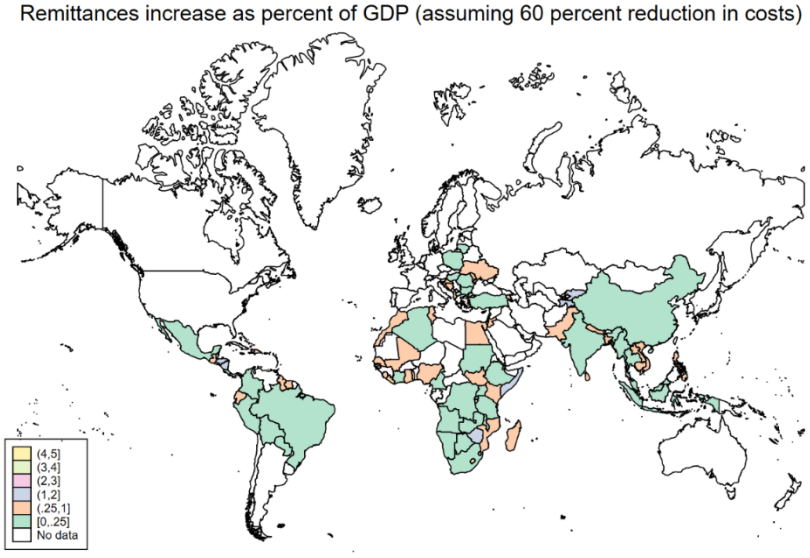
[23] Although the expenses for maintaining the infrastructure, advertising, and educating the public to increase adoption rates could be significant for low-income countries, a cost-benefit analysis is beyond the scope of this note.

Table 6. Effects of CBDC: Heterogeneous Effects for Remittances

Country	Remittances Inflows (% of GDP)	Remittances Costs (avg, %)	Cost Most Expensive Corridor	Increase in Flows (in %)	Increase in Flows (% of GDP)
Lesotho	20.27	19.90	19.90	23.10	4.68
Lebanon	29.36	9.01	11.22	16.32	4.79
Zimbabwe	6.29	11.05	13.29	16.24	1.02
Comoros	19.67	7.03	7.03	15.06	2.96
Samoa	29.83	7.94	8.03	13.71	4.09
Vanuatu	15.75	9.96	9.96	13.65	2.15
Tonga	42.87	9.17	9.58	13.45	5.77
Cape Verde	13.52	7.91	9.08	11.81	1.60
Jamaica	21.80	6.80	7.03	11.27	2.46
Haiti	20.44	6.08	9.48	10.47	2.14
Fiji	9.71	7.24	7.83	10.17	0.99
Nicaragua	13.73	5.73	6.91	8.25	1.13
Somalia	16.65	6.40	9.11	7.27	1.21
South Sudan	14.48	9.26	11.96	6.66	0.96
Gambia	25.31	13.45	13.45	6.60	1.67
Tajikistan	27.84	7.91	7.91	6.11	1.70
Honduras	22.85	4.58	7.49	5.83	1.33
Kyrgyzstan	23.92	2.35	8.84	4.71	1.13
El Salvador	23.05	3.98	3.98	4.84	1.12
Nepal	20.09	3.58	4.31	4.63	0.93

Source: World Bank remittances database and IMF staff estimations based on Kpodar and Imam (2024).
Note: This table shows 20 countries with the highest increase in flows (in %), sorted from highest to lowest. Remittance flows and costs data are for 2022 except for Kyrgyzstan, where we use cost data for 2021 for the corridor with Russia. CBDC = central bank digital currency.

Figure 7. Effects of CBDC: Cross-Country Variation for Remittances



Source: World Bank remittances database and IMF staff estimations based on Kpodar and Imam (2024).
Note: CBDC = central bank digital currency. The boundaries, colors, denominations, and any other information shown on the maps do not imply, on the part of the International Monetary Fund, any judgment on the legal status of any territory or any endorsement or acceptance of such boundaries.

Conclusion

The potential of digital money and CBDCs to revolutionize cross-border payments is increasingly evident, particularly in addressing the long-standing challenges of high costs, inefficiencies, and slow transaction speeds. Our analysis highlights that the introduction of CBDCs could significantly lower transaction costs, especially in high-cost remittance corridors, leading to a substantial increase in cross-border payment volumes. By reducing the number of intermediaries, enhancing competition, and potentially improving compliance with AML/CFT regulations, CBDCs offer a promising solution to the inefficiencies that have plagued cross-border payments for decades. Other digital payments innovations, such as interlinking fast payment systems across countries and multilateral cross-border platforms, could also in principle deliver a similar increase in cross-border payment volumes if their implementation result in a similar assumed reduction in cross-border transaction costs.

However, the impact of digital money and CBDCs will vary considerably across different countries and corridors. Small emerging markets and low-income countries, which are heavily dependent on remittances and face high transaction costs, stand to benefit the most. Our findings suggest that the increase in remittance volumes against a unit decline in remittance costs becomes more pronounced as fee levels increase, because of nonlinear nature of remittance elasticities. This variation is an important factor that would determine the potential impact of CBDC on remittances. Our corridor-by-corridor analysis shows that in countries such as Lesotho, Tonga, and Lebanon, where remittance costs are particularly high, the introduction of CBDCs could lead to dramatic increases in remittance volumes, contributing significantly to GDP growth. These findings suggest that the deployment of CBDCs could be a powerful tool for promoting financial inclusion and economic development in regions where traditional financial systems have failed to deliver affordable and efficient services.

Although the overall global benefits of digital money and CBDCs are clear, realizing their full potential will require careful consideration of country-specific factors. Policymakers should tailor their CBDC strategies to address the unique challenges and opportunities within each country's remittance corridors including legal and regulatory challenges. By doing so, they can ensure that the benefits of CBDCs are maximized, leading to more equitable and inclusive financial systems worldwide. As long-term benefits of CBDCs continue to be explored and developed—also in partnership with tokenization technologies—they hold the promise of transforming cross-border payments and contributing to a more efficient and accessible global financial system.

Annex 1. Data Sources

- Cross-border volumes by type: FXC Intelligence
  - ❑ https://www.fxcintel.com/cross-border-payments-market-sizing-data
  - ❑ Classification: Wholesale and retail, business-to-business, business-to-consumer, and so on
- Remittances Costs: World Bank (based on FXC intelligence)
  - ❑ https://remittanceprices.worldbank.org/
  - ❑ Limited coverage: about 90 receiving countries and about 40 sending countries; the number of corridors is also quite limited (some receiving countries have only a few observations)
- Remittance flows/volumes: Knomad
  - ❑ https://www.knomad.org/data/remittances
  - ❑ This data is provided by Knomad, but essentially uses balance-of-payment data (so the source comes from authorities/International Monetary Fund)
  - ❑ Available for most countries in the world and also includes bilateral flows (although many bilateral corridors are missing because of lack of data, or perhaps because flows are negligible)
- Costs for wholesale cross-border transactions: McKinsey paper
  - ❑ A vision for the future of cross-border payments (McKinsey, 2018)

Annex 2. Econometric Specifications

Reduction in Transaction Costs

To estimate the potential transaction cost reduction effects of central bank digital currency on remittance costs, we use the econometric specification following Beck, Janfils, and Kpodar (2022):

$$\text{Cost}_{ijt} = \beta_1 \text{bankshare}_{it} + \beta_2 \text{respondent}_{it} + \beta_3 \text{AML}_{it} + \beta_4 \text{gdp}_{it} + \beta_5 \text{gdp}_{jt} + \beta_6 \text{pop}_{it}^{\text{rural}} + \beta_7 \text{pop}_{jt}^{\text{rural}} + \beta_8 \text{trade}_{ijt} + \beta_9 \text{distance}_{ijt} + \text{ò}_{ijt}$$

where the dependent variable Cost_{ijt} denotes the remittance transaction cost between country *i* and *j* and the main determinant variables of interests bankshare_{it}, respondent_{it}, and AML_{it} denote share of banks, the number of respondents, and AML index in country *i* at time *t*, respectively. The parameters gdp_{it} and gdp_{jt} denote log GDP per capita in country *i* and *j*, respectively; $\text{pop}_{it}^{\text{rural}}$ and $\text{pop}_{jt}^{\text{rural}}$ denote rural population share in country *i* and *j*, respectively; trade_{ijt} and distance_{ijt} denote log bilateral trade and distance between country *i* and *j*. Our analysis exploits the corridor-time variation across 365 corridors from 2011 and 2020, as shown in Annex Table 2.1.

Annex Table 2.1. Cost Determinants

Variables	(1) Pooled	(2) Pooled	(3) Clustering
Share of banks	7.428***	6.383***	6.383***
	(0.379)	(0.508)	(1.059)
Number of respondents	-0.110***	-0.0590**	-0.0590*
	(0.0186)	(0.0240)	(0.0307)
AML index	0.656***	0.542***	0.542***
	(0.0752)	(0.104)	(0.094)
Ln(source GDP per capita)		-0.157*	-0.157*
		(0.0910)	(0.057)
Ln(destination GDP per capita)		-0.0997	-0.0997
		(0.0881)	(0.0725)
Source rural population share		0.0643***	0.0643***
		(0.00892)	(0.006641)
Destination rural population share		-0.0214***	-0.0214***
		(0.00562)	(0.00492)
Ln(bilateral trade)		-0.0794	-0.0794
		(0.0813)	(0.0697)
Ln(distance)		0.520***	0.520***
		(0.153)	(0.1087)
Constant	2.786***	7.000**	7.000**
	(0.513)	(2.872)	(1.992)
Observations	2413	1807	1807
R-squared	0.188	0.212	0.212
Corridor fixed effects	NO	NO	NO
Year fixed effects	NO	NO	NO

Source: IMF staff estimations based on Beck, Janfils, and Kpodar (2022).
Note: Heteroskedasticity and Autocorrelation Consistent standard errors are in parentheses in columns 1 and 2. Standard errors are clustered on year. AML = anti–money laundering.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Elasticity Estimations

To understand the elasticity of remittances to the transaction costs, we follow Kpodar and Imam (2024) and estimate a nonlinear version of their specification:

$$\text{rem}_{ijt} = \beta_1 \text{cost}_{ijt-1} \times I_{\text{costbin}} + \beta_2 \text{cost}_{ijt-1} + \beta_3 I_{\text{costbin}} + \Gamma X + \alpha_{ij} + \alpha_t + \text{ò}_{ijt}$$

where rem_{ijt} is the log of remittance values and cost_{ijt} denotes the log of transaction cost of remittances between corridor *i* and *j*. The parameters α_{ij} and α_t denote corridor and time fixed effects, respectively. Note that, to examine the heterogeneity in remittance elasticity, we interact cost variable with a dummy variable I_{costbin} which takes up values between 1 and 12 depending on the value of corridor transaction cost within the cost distribution of the sample. Specifically, we generate the dummy variable based on the cost level as follows: (1) below 1st percentile, (2) between 1st and 20th percentile, (3) between 20th and 25th percentile, (4) between 25th and 40th percentile, (5) between 40th and 50th percentile, (6) between 50th and 60th percentile, (7) between 60th and 75th percentile, (8) between 75th and 90th percentile, (9) between 90th and 95th percentile, (10) between 95th and 99th percentile, (11) between 99th and 99.5th percentile, and (12) above 99.5th percentile.

Annex Table 2.2 presents the elasticity estimations for Groups 1–12. Note that both remittance and cost variables are defined in log terms (for example, rem = log(Rem)); thus, the partial derivate of remittances with respect to costs in the estimations represents the elasticities as follows: $\frac{\partial \text{Rem}}{\partial \text{Cost}} \frac{\text{Cost}}{\text{Rem}} = \frac{\partial \log \text{Rem}}{\partial \log \text{Cost}} = \frac{\partial \text{rem}}{\partial \text{cost}}$. Elasticity increases substantially with the remittance costs with elasticity being −0.024 for the lowest cost group and −0.399 for the highest cost group.

Annex Table 2.2. Elasticity Estimations

Variables	(1) Baseline	(2) Robustness 1	(3) Robustness 2
Group 1	-0.0246	-0.0175	-0.0688
	(0.187)	(0.148)	(0.174)
Group 2	-0.0322	-0.0694**	-0.0376
	(0.0374)	(0.0274)	(0.0427)
Group 3	-0.0617*	-0.0824***	-0.0411
	(0.0363)	(0.0258)	(0.0309)
Group 4	-0.0800**	-0.0781**	-0.0468**
	(0.0385)	(0.0288)	(0.0220)
Group 5	-0.109**	-0.0970***	-0.0619**
	(0.0428)	(0.0317)	(0.0234)
Group 6	-0.122**	-0.0828**	-0.0683**
	(0.0471)	(0.0361)	(0.0278)
Group 7	-0.152***	-0.0778*	-0.0773**
	(0.0529)	(0.0403)	(0.0352)
Group 8	-0.183**	-0.0815	-0.0747*

	(0.0681)	(0.0495)	(0.0409)
Group 9	-0.264***	-0.144**	-0.0978*
	(0.0624)	(0.0527)	(0.0558)
Group 10	-0.313***	-0.177***	-0.144**
	(0.0773)	(0.0556)	(0.0688)
Group 11	-0.346***	-0.212**	-0.163*
	(0.0913)	(0.0806)	(0.0820)
Group 12	-0.399***	-0.263***	-0.211***
	(0.0731)	(0.0638)	(0.0724)
$I_{costbin}$	0.0381*	0.0129	0.0216
	(0.0216)	(0.0174)	(0.0225)
$cost_{ijt-2}$			0.0260
			(0.0268)
$cost_{ijt-3}$			-0.0289
			(0.0237)
$cost_{ijt-4}$			0.0299
			(0.0297)
rem_{ijt-1}			0.420***
			(0.0559)
rem_{ijt-2}			-0.0551
			(0.0484)
rem_{ijt-3}			0.0586*
			(0.0341)
rem_{ijt-4}			0.326***
			(0.0506)
$cost_{ijt+1}$			-0.0273
			(0.0256)
$cost_{ijt+2}$			0.0970*
			(0.0483)
$cost_{ijt+3}$			-0.0629**
			(0.0244)
$cost_{ijt+4}$			0.0617*
			(0.0334)
Ln(GDP per capita source)		0.565***	0.0280
		(0.0612)	(0.0762)
Ln(GDP per capita destination)		0.442**	0.449***
		(0.183)	(0.0752)
Ln(USD exchange rate)		0.280***	0.0929
		(0.0466)	(0.0605)
Ln(migrants population)		0.304**	0.197**
		(0.119)	(0.0862)
Constant	6.088***	0	0

	(0.0951)	(0)	(0)
Corridor fixed effects	YES	YES	YES
Time fixed effects	YES	YES	YES
Number of observations	1902	1855	1423
Number of corridors	70	69	69

Source: IMF staff estimations based on Kpodar and Imam (2024).
Note: Heteroskedasticity and Autocorrelation Consistent standard errors are in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Annex 3. Robustness

Annex Table 3.1 Scenario Analysis (Robustness): 50 Percent Reduction in Transaction Costs

	Reduction in Transaction Costs		
	In Billion USD	***As % of Flows***	***As % of World GDP***
Wholesale (B2B)	72.8	0.05	0.08
Retail			
B2B	284.3	0.75	0.30
C2B	31.0	1.00	0.03
B2C	14.5	0.85	0.02
C2C	22.5	1.25	0.02
Of which remittances	14.0	3.10	0.01
Total	425.0	0.22	0.45

Note: IMF staff estimations based on 50 percent cost reduction scenario analysis and leveraging data from the G20 Roadmap progress report for retail transaction costs; McKinsey (2018) for wholesale transaction costs; and World Bank for remittances in a sample of about 100 countries (low-income countries and emerging markets). B2B = business-to-business; B2C = business-to-consumer; C2B = consumer-to-business; C2C = consumer-to-consumer.

References

Agur, Itai, Germán Villegas-Bauer, Tommaso Mancini-Griffoli, Maria Soledad Martinez Peria, and Brandon Tan. 2025. “Tokenization and Financial Market Inefficiencies.” IMF Fintech Note 2025/001, International Monetary Fund, Washington, DC.

Ahmed, Junaid, and Inmaculada Martinez-Zarzoso. 2016. “Do Transfer Costs Matter for Foreign Remittances? A Gravity Model Approach.” *Economics, The Open-Access, Open-Assessment E-Journal* 10 (2016-4): 1–36.

Aldasoro, Iñaki, Sebastian Doerr, Leonardo Gambacorta, Rodney Garratt, and Priscilla Koo Wilkens. 2023. “The Tokenisation Continuum.” Bulletin No 72. Bank for International Settlements, Basel, Switzerland.

Ardic, Oya Pınar, Hemant Baijal, Patrizia Baudino, Nana Yaa Boakye-Adjei, Jonathan Fishman, and Richard Audu Maikai. 2022. “The Journey So Far: Making Cross-border Remittances Work for Financial Inclusion.” Bank for International Settlements, Basel, Switzerland.

Auer, Raphael, Philipp Haene, and Henry Holden. 2021. “Multi-CBDC Arrangements and the Future of Cross-border Payments.” Bank for International Settlements, Basel, Switzerland.

Baltagi, Badi H., Dong Li, and Qi Li. "Transaction tax and stock market behavior: evidence from an emerging market." *Empirical Economics* 31 (2006): 393-408.

Bank for International Settlements. 2018. “Cross-border Retail Payments.” Bank for International Settlements, Basel Switzerland.

Bank for International Settlements (BIS). 2021a. “Central Bank Digital Currencies for Cross-Border Payments.” Joint report to the G20 by the Committee on Payments and Market Infrastructures, the BIS Innovation Hub, the International Monetary Fund and the World Bank, BIS, Basel, Switzerland.

Bank for International Settlements (BIS). 2021b. “Inthanon-LionRock to mBridge. Building a Multi CBDC Platform for International Payments.” BIS Innovation Hub, Bank for International Settlements, Basel, Switzerland.

Bank for International Settlements (BIS). 2022. “Project Tourbillon Explores Cyber Resiliency, Scalability, and Privacy in a Prototype CBDC.” BIS Innovation Hub, Bank for International Settlements, Basel, Switzerland.

Bank for International Settlements. 2023. “Experimenting with a Multi-CBDC Platform for Cross-Border Payments.” Bank for International Settlements, Basel, Switzerland.

Bank for International Settlements. 2024. “The Future of Finance.” Remarks by Mr. Agustín Carstens at the Santander International Banking Conference 2024, October 2024. https://www.bis.org/speeches/sp241031.htm

Beck, Thorsten, Mathilde Janfils, and Kangni Kpodar. 2022. “What Explains Remittance Fees? Panel Evidence.” IMF Working Paper 2022/063, International Monetary Fund, Washington, DC.

Bolt, Wilko, David B. Humphrey, and Roland Uittenbogaard. 2005. “The Effect of Transaction Pricing on the Adoption of Electronic Payments: A Cross-Country Comparison.” Federal Reserve Bank of Philadelphia.

Borchert, Lea, Ralph De Haas, Karolin Kirschenmann, and Alison Schultz. 2024. “Broken Relationships: De-risking by Correspondent Banks and International Trade.” CEPR Discussion Paper DP19373, Center for Economic and Policy Research, Washington, DC.

Carare, Alina, Lavinia Franco, Metodij Hadzi-Vaskov, Justin Lesniak, Dmitry Vasilyev, and Yorbol Yakhshilikov. 2022. “Digital Money and Remittances Costs in Central America, Panama, and the Dominican Republic.” IMF Working Paper 2022/238, International Monetary Fund, Washington, DC.

Committee of Experts to the Taskforce on International Financial Transactions and Development (CETIFTD). 2010. “Globalizing Solidarity: The Case for Financial Levies.” CETIFTD, Paris.

Committee on Payments and Market Infrastructures (CPMI). 2020. “Enhancing Cross-border Payments: Building Blocks of a Global Roadmap.” Stage 2 Report to the G20, Bank for International Settlements, Basel, Switzerland.

Drakopoulos, Dimitris, Yibin Mu, Dmitry Vasilyev, and Mauricio Villafuerte. 2024. “Cross-Border Payments Integration in Latin America and the Caribbean.” IMF Working Paper 2024/119, International Monetary Fund.

Ekberg, Jason, Michael Ho, Tek Yew Chia, Laura Liu, Naveen Mallela, Harshika Patel, and Sukrit Khatri. 2021. “Unlocking $120 Billion Value in Cross-Border Payments: How Banks Can Leverage Central Bank Digital Currencies for Corporates.” Oliver Wyman, New York.

Financial Stability Board. 2021. “Targets for Addressing the Four Challenges of Cross-Border Payments: Final Report”. Financial Stability Board, Basel, Switzerland.

Financial Stability Board. 2023a. “Annual Progress Report on Meeting the Targets for Cross-Border Payments: 2023 Report on Key Performance Indicators.” Financial Stability Board, Basel, Switzerland.

Financial Stability Board. 2023b. “G20 Roadmap for Enhancing Cross-Border Payments: Consolidated Progress Report for 2023”. Financial Stability Board, Basel, Switzerland.

Gibson, John, David McKenzie, and Halahingano Tu’akolo Siufanga Rohorua. 2006. “How Cost Elastic Are Remittances? Estimates from Tongan Migrants in New Zealand.” Working Paper 2/06, Department of Economics, University of Waikato, Hamilton, New Zealand.

International Monetary Fund (IMF). 2023. “IMF Approach to Central Bank Digital Currency Capacity Development.” IMF Policy Paper 2023/016, International Monetary Fund, Washington, DC.

International Monetary Fund (IMF). 2024a. “G-20 Note on Financial Platforms: What are They and What are Their Macro-Financial Implications?” G20 Note, International Monetary Fund, Washington, DC.

International Monetary Fund (IMF). 2024b. “CBDC, Digital Payments, and Crypto Assets: Opportunities and Policy Challenges in Sub-Saharan Africa.” IMF Fintech Note 2024/001, International Monetary Fund, Washington, DC.

Kosse, Anneke, and Ilaria Mattei. 2023. “Making Headway—Results of the 2022 BIS Survey on Central Bank Digital Currencies and Crypto.” BIS Papers No. 136, Bank for International Settlements, Basel, Switzerland.

Kpodar, Kangni, and Patrick Amir Imam. 2024. “How Do Transaction Costs Influence Remittances?.” *World Development* 177: 106537.

Matheson, M. T. 2011. "Taxing Financial Transactions: Issues and Evidence." IMF Working Paper 2011/054, International Monetary Fund, Washington, DC.

McKinsey. 2018. “A Vision for the Future of Cross-Border Payments.” McKinsey & Company, New York.

Reslow, Andre, Gabriel Soderberg, and Natsuki Tsuda. 2024. “Cross-Border Payments with Retail Central Bank Digital Currencies: Design and Policy Considerations.” IMF Fintech Note 2024/002, International Monetary Fund, Washington, DC.

Rice, Tara, Goetz von Peter, and Codruta Boar. 2020. “On the Global Retreat of Correspondent Banks.” *BIS Quarterly Review*, March.

Schmidt, Rodney. 2007. *The Currency Transaction Tax: Rate and Revenue Estimates*. Ottawa: North-South Institute.

Söderberg, Gabriel, John Kiff, Hervé Tourpe, Stephanie Forte, Kathleen Kao, Ashley Lannquist, Tao Sun, and Akihiro Yoshinaga. 2023. "How Should Central Banks Explore Central Bank Digital Currency? IMF FinTech Note 2023/008, International Monetary Fund, Washington, DC.

World Bank. 2021. “Central Bank Digital Currencies for Cross-Border Payments. A Review of Current Experiments and Ideas.” World Bank, Washington, DC.

Yang, Dean. 2005. “International Migration, Human Capital, and Entrepreneurship: Evidence from Philippine Migrants’ Exchange Rate Shocks.” World Bank Policy Research Working Papers, Vol. 3578, World Bank, Washington, DC.

PUBLICATIONS

Estimating the Impact of CBDCs on Cross-Border Flows: Scenario Analysis Covering the Intensive Margin

NOTE/2025/002