Examining the Implications of the IMF Remittance Reporting Framework and Guidelines for Central Bank Digital Currencies: A Case Study of the eNaira Implementation in Nigeria

By

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Author's Declaration

I, the undersigned Ali Asad Rashid, candidate for the Masters in Arts in Economic Policy in Global Markets at the Central European University Department of Economics, declare herewith that the present thesis is exclusively my work, based on my research and only such external information as properly credited in notes and bibliography. I declare that the views presented in this thesis are mine alone and do not represent the views of any institution. I declare that no unidentified and illegitimate use was made of the work of others, and no part of the thesis infringes on any person's or institution's copyright. I also declare that no part of the thesis has been submitted in this form to any other institution of higher education for an academic degree.

Ali Asad Rashid

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Abstract

Many scholars have studied the links between remittances and development, economic growth, and poverty alleviation. In parallel, there should be more research on improving the remittance data, which makes the building blocks for most economic research on remittances. Remittance data is reported by central banks' balance of payments compilers based on the IMF BMP6 and RCG remittance framework, which were released in 2009. Since then, significant innovations in financial technology have improved the remittance value chain. Central Bank Digital Currency (CBDC) is one of the latest innovations many countries are experimenting with as they can potentially change the payments and remittances sector. Nigeria is the first country in Africa to introduce the eNaira CBDC, a digital Naira that Nigerians can use as a means of payment similar to cash. In theory, eNaira and CBDCs can significantly reduce cross-border remittance costs, and transaction times, promoting the formalization of remittances and improving remittance data. This thesis aims to present then the intersection of CBDCs and remittance data through a case study of the eNaira implementation in Nigeria within the current IMF BPM6 and RCG remittance reporting framework to understand the shortcomings of the current definitions, concepts, and data reporting methods for remittances. The thesis suggests modifying the concepts, definitions, and data sources in the IMF framework for remittance reporting. These changes aim to enhance the quality of remittance data, particularly in relation to the adoption of eNaira and CBDCs by countries globally, as the current framework provided by the IMF BPM6 and RCG impose limitations on countries' ability to report remittance data effectively.

Keywords: Remittance, Central Bank Digital Currency, Central Bank of Nigeria eNaira, Nigeria, International Monetary Fund, Balance of Payments, International Transactions in Remittances: A Guide for Compilers.

Contents

List of Figures

List of Tables

List of Abbreviations

Abbreviation	Meaning
AE	Advanced Economies
AML	Anti Money Laundering
BIS	Bank for International Settlements
BOP	Balance of Payments
BPM	Balance of Payments International Investment Position Manual
BPM5	Balance of Payments International Investment Position Manual: 5th Edition (1993)
BPM6	Balance of Payments International Investment Position Manual: 6th Edition (2008)
CBDC	Central Bank Digital Currency
CBN	Central Bank of Nigeria
CFT	Combating the Financing of Terrorism
CPMI	Committee on Payments and Market Infrastructure
DLT	Distributed Ledger Technology
ECB	European Central Bank
EMDE	Emerging Markets and Developing Economies
EU	European Union
FATF	The Financial Action Task Force
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
IDP	Internally displaced persons
IMF	International Monetary Fund
IMTO	International money transfer operators
IOM	International Organization for Migration
ITRS	International Transaction Reporting System
KNOMAD	Global Knowledge Partnership on Migration and Development
KYC	Know your customer
NPISH	Nonprofit institutions serving households
ODA	Official Development Assistance
RCG	International Transaction in Remittances: Guide for Compilers (2009)
RPW	Remittance Prices Worldwide
SSA	Sub-Saharan Africa
SWIFT	Society for Worldwide Interbank Financial Telecommunication
TPS	Transaction per second
UN	The United Nations
UN SDGs	United Nations Sustainable Development Goals
USSD	Unstructured Supplementary Service Data

Chapter 1

Introduction

Over the last few decades, the world has undergone significant changes. Two major recessions in the last 10 years have affected economies and rocked the foundations of financial institutions worldwide, requiring monetary and fiscal interventions for economies to stay afloat. The world has likewise observed significant national and international migration during this period. Countries with aging populations require increased human capital, while the boom in the technology sector has led to new businesses opening up, drawing human capital from developing countries.

International migration is an essential aspect of a highly globalized economy, and remittances are a standard byproduct of international migration. Remittance is money transferred from migrants from destination countries (host countries) to migrant origin countries and has remained steadfast throughout the recent global pandemic shock (Gammadigbe, 2021; Kpodar, Mlachila, Quayyum, & Gammadigbe, 2023). In parallel, with more conservative governments taking charge in the world, the official development assistance and foreign direct investment to developing countries have been shrinking, and remittances have become the leader of forex inflows to developing countries (World Bank, 2022b). Moreover, scholarly research has shown the significance of remittance in improving migrant families and remittance-receiving households and becoming an accelerator for economic growth, development, and reducing poverty in migrant-origin countries (Ratha, 2013). These reasons alone mandate the accurate and timely monitoring of remittances to aid remittance data compilers, researchers, financial institutions, tax authorities, and government ministries to fully understand remittances' microeconomic and

macroeconomic effects and use them effectively for decision-making. Unfortunately, the current reporting systems have significant drawbacks regarding accuracy, reliability, openness, and timeliness.

Over time, technology has played an essential part in facilitating and improving the remittance value chain with respect to digital solutions, new remittance corridors, and reducing remittance transaction pricing, but remittance data is still riddled with problems. One of the recent technological innovations for central banks is the Central Bank Digital Currency (CBDC) which can enhance the central banks' current operations. CBDCs are a digital representation of a country's fiat money, issued, managed, and distributed by central banks (Auer, Cornelli, & Frost, 2020; Ozili, 2022b), which can improve remittance operations, data collection, and reporting. Countries worldwide are showing interest in CBDCs, and it is only a matter of time before CBDCs are scaled up by developed and developing countries. As more countries implement CBDCs on accepted global standards, they can offer more granularity, reliability, accuracy, and timely data on cross-border payments, especially on remittances enabling central banks to have access to detailed data on remittance transactions while identifying links between migrant and migrant households.

Compilers for remittance data comprise of central banks' remittance data teams, the balance of payments statistics teams, and other departments specifically working on remittances. IMF provides the 'International Transactions in Remittances: Guide for Compilers (RCG)' (IMF, 2009b) and the 'Balance of Payments Manual (BPM)' (IMF, 2009a), for central banks and remittance data compilers, which have not been updated since 2009 and need immediate attention in lieu of CBDCs. This research aims to bridge the remittance data reporting guidelines by the IMF for CBDC implementation through the lens of a case study of the eNaira implementation in Nigeria - a CBDC implemented by the Central Bank of Nigeria (CBN). As eNaira is still in its early stages, quantitative data from Nigeria on eNaira transactions is also limited; therefore, this research does not claim to be exhaustive rather, it attempts to shed light on the possible implications of the eNaira on remittance data and reporting.

The first part of this thesis explores the remittance sector, its growth, importance, and impact on microeconomic and macroeconomic factors while focusing on the limitations of exist-

ing remittance data. The following section will cover the IMF remittance reporting framework for remittance data compilers and its benefits and drawbacks. The third section will introduce CBDCs, their technology, and policy motivations, simultaneously showcasing how CBDCs impact remittance reporting. After introducing the concepts and technology for CBDCs, the thesis will attempt to present the implications of CBDCs on the IMF remittance reporting framework through a case study analysis on the eNaira - a CBDC implemented by the Central Bank of Nigeria. Lastly, this thesis will present suggestions for updates required in the IMF remittance reporting framework to support developing countries in light of how CBDCs can streamline remittance data collection and reporting, which can result in possible improvement in future remittance studies.

Chapter 2

Remittances in a Global Economy

This section of the thesis aims to showcase the importance of remittances in a globalized economy and why it is a topic of discussion on the global agenda. The research will then dive into the existing literature on the impact of remittances and next cover the significance of remittances as international flows for a country and the issues with remittance data estimations.

2.1 Remittances: Current State of Affairs

"[D]ollars rapped with care." (Ratha, 2019, para. 1)

In the last few decades, increased mobility for individuals has subsequently increased migration from developing to developed countries. With increased migration, remittances sent by migrants from and to countries have also significantly increased, providing support for households even during the COVID-19 pandemic where remittances were countercyclical to the global economic shock caused by the pandemic. Currently, there are approximately 281 million international migrants (as of 2020) globally, i.e., 3.6% of the world's population (Division, 2021) (International Migrant Stock | United Nations Population Division, 2021). This stock of international migrants is a 3.5% rise in the stock of international migrants since 2019, with international migrants remitting USD 781 billion in 2021 (Ratha et al., 2022) alone. In their brief, Ratha et al. (2022) also estimated this number to increase to USD 794 billion by the end of 2022 and forecast international remittances to reach USD 815 billion in 2023. These remit-

tance flow figures have overshadowed 'Official Development Assistance' (ODA) and 'Foreign Direct Investment' (FDI) to low and middle-income countries. Remittance flows, especially to developing countries, act as incoming capital, and in some countries, the remittances to GDP ratio exceed more than 20%. For example, Tonga (46.2%), Tajikistan (33.4%), and Kyrgyz Republic (32.7%) (Bank, 2021).

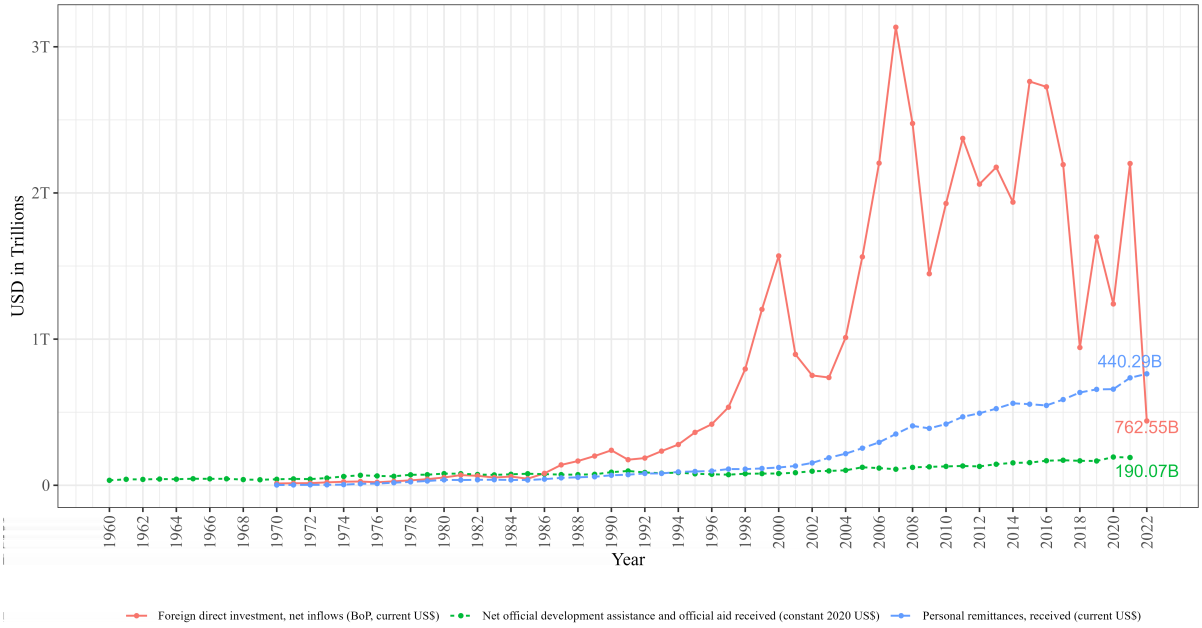

Figure 1: FDI, ODA, & Remittances (including China), data from World Bank (2022b)

The Group of Twenty (G20) devised its plan to assist remittance flows (GPFI, 2014, para. 1), enabling growth, development, financial inclusion[1], reducing transaction costs, and reducing inequalities. International organizations recognize the pivotal role remittances can play for migrant and migrant families and have devised specific working groups to work on remittances, given that remittances are part of the 2030 Agenda for Sustainable Development Goals (SDGs)[2]. Being a stand-alone indicator in the UN Sustainable Development Goals 2030, remittances also feed in other Sustainable Development Goals; SDG 1 (No Poverty), SDG 2 (Zero Hunger), SDG 4 (Quality Education), SDG 5 (Gender Equality), SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation, and Infrastructure), and SDG 10 (Reduced Inequalities) (UNCDF, n.d., para. 1).

[1]The term 'financial inclusion' refers to providing access to useful and affordable financial services to all members and sections of society - sustainably. (The World Bank, 2022)

[2]United Nations Sustainable Development Goal Indicator 2030 10.c.1 - lower remittance cost to 3%

One of the main goals for global leaders and international organizations is to bring down remittance costs to 3%[3] as remittance costs vary from corridor to corridor. To initiate steps toward the UN Sustainable Development goal, the World Bank has established Remittance Prices Worldwide (RPW) with a database of remittance prices per corridor to monitor the progress on the UN SDG 10.c.1. Even with this data available from the World Bank, the collection methodology is not clear and variables have likewise changed over time. In order to distinguish the cost of digital versus cash-based remittance channels, it is difficult to collapse the data as there are gaps which the World Bank also admits and is actively working with partners across the globe to improve the integrity of that data. However, as of yet, this is the best source of information on remittance prices worldwide.

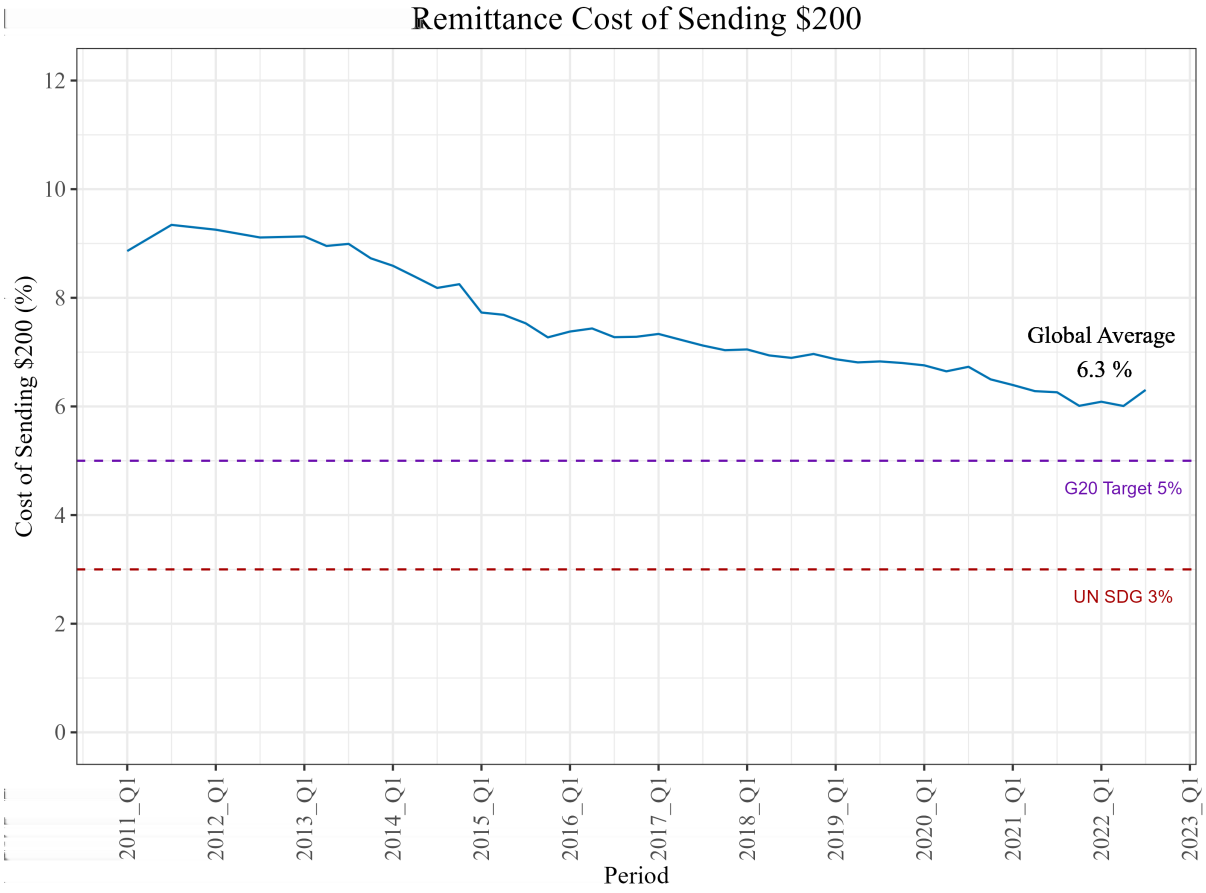

Figure 2: Global Remittance Cost of Sending $200 World Wide, data from World Bank (2022)

From the most recent report published by the world bank, we see a declining trend for remittance prices. However, the global average remittance cost is far from the UN Sustainable De-

[3]United Nations Sustainable Development Indicator 10.c.1

velopment 10.c.1 target. While collecting remittance prices, specific remittance corridors stand out with issues with digital access and less competition between international money transfer operators (IMTOs), specifically inter-regional corridors between Nigeria and Mali, Togo, and Benin, among others (World Bank, 2022). When comparing the world's regions for remittance pricing, the average cost of sending remittances to Sub-Saharan Africa is 8.46%[4], the highest of all the regions. Furthermore, the foreign exchange costs and transaction fees associated with cash-based remittances are also the highest in Sub-Saharan Africa, where Nigeria dwarfs other Sub-Saharan African countries for absolute amounts of remittances received in dollars.

'[C]utting prices by at least 5 percentage points can save up to $16 billion a year.' (World Bank, 2022)

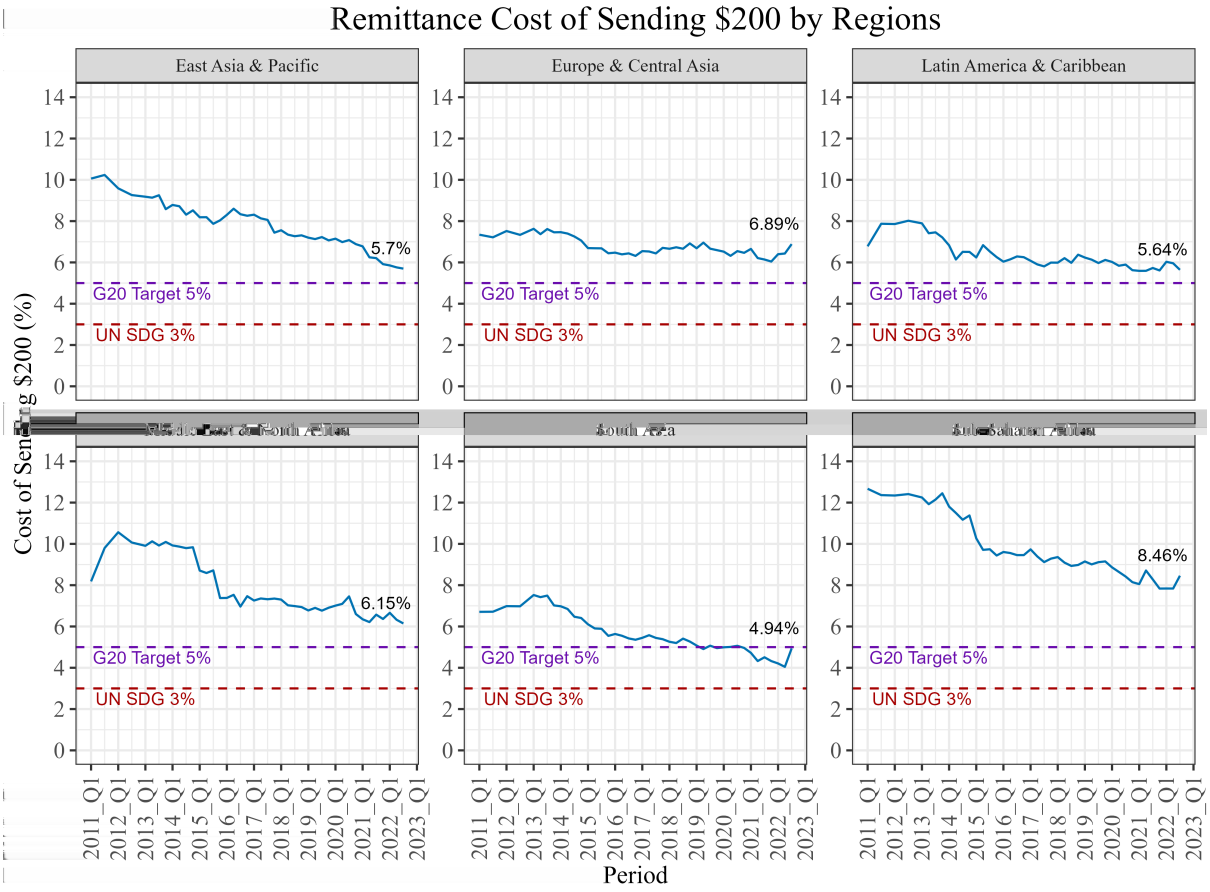

Figure 3: Remittance Cost of Sending $200 by Region, data from World Bank (2022)

With the compounded impacts of the global recession and, more recently, the COVID-19 pandemic on the global financial system, there has been a significant tightening of regula-

[4]Remittance prices worldwide quarterly - Issue 43 September 2022 - available at http://remittanceprices.worldbank.org

tions impacting relationships of intermediaries, financial institutions, and correspondent banks, which facilitate cross-border payments (Erbenova et al., 2016, p. 5; Rice, von Peter, & Boar, 2020, pp. 37-38). Curbing money laundering, intensifying know-your-customer requirements (KYC), and reducing terrorist financial activities are vital in developing countries to improve their financial regulatory frameworks while strengthening financial institution relationships.[5] The Financial Action Task Force (FATF) is responsible for monitoring the AML/CFT standards and providing implementation recommendations for these said standards. Countries not on par with the FATF standards, go on the FATF grey list, indicating a high prevalence of illicit financial activities, impacting their relationships with global correspondent banks and intermediaries, and increasing transaction times and transaction costs to last-mile customers, which significantly impacts households and individuals dependent on remittances as their livelihoods. More recently, in February 2023, Nigeria and South Africa - countries amongst the most influential economies in Africa and other jurisdictions- have been put on the FATF grey list due to the high prevalence of illicit financial activities impacting billions of individuals (*FATF grey listing*, 2023). The degradation of these relationships can lead to further deterioration in financial services, trade activities,[6] and international money transfer services[7] resulting in a slowdown of remittances through official channels and worsening macroeconomic conditions and financial stability of a country.

2.2 Impact of Remittances

The impact of remittances on remittance-dependent countries has gained substantial interest from both academia and policymakers (Acosta, Fajnzylber, & Lopez, 2007; Ratha, 2013; Williams, 2016). The existing research heavily relies on the accuracy of remittance data as any underlying issues in the remittance data input in economic studies will seep into the results, questioning the validity of the studies. Therefore, improving remittance data, in turn, can improve remittance scholarship. Many organizations are doing excellent data-gathering around remittance flows

[5] These are known as Anti-Money Laundering and Combating Financial Activities (AML/CFT) regulations monitored by the Financial Action Task Force (FATF).

[6] Trade and finance activities rely on cross-border payments.

[7] International money transfer services primarily serve the underbanked through cash-based transactions.

and migration in low and middle-income countries (Ratha et al., 2022, p .2). Unfortunately, gaps do remain, hindering product innovation and policymaking. Even global institutions such as the World Bank and IMF apply estimation techniques on the remittance data received through the balance of payments of reporting countries, knowing that official data sources tend to under-report the actual remittance flows. Furthermore, remittances channeled through official channels are one part of remittances, while remittances sent through informal channels are the second part, which is undocumented by central banks. Hence, the reliability and validity of remittance data should be questioned, and alternative solutions should be explored, especially in the case of Sub-Saharan Africa, where there is a significant parallel informal economy allowing remittances to be transferred through informal channels (Medina, Jonelis, & Cangul, 2017; Ratha, Plaza, & Navarrete, 2011). Furthermore, there is a disparity between migration flows and remittance flows in Sub-Saharan Africa due to informal channels, high cash-based transactions, and the Sub-Saharan Africa region having the highest percentage of remittance cost (World Bank, 2022).

In addition to the reporting gaps, there is a need to improve the granularity of the remittance data if countries want to address the UN Sustainable Development Goals, as recent evidence shows a gender divide within remittances. Research shows that women generally lag on the digital front and, in some instances, absorb higher transaction fees (Rashid, Cao, & Gravesteijn, 2022; Women, 2020, para. 2). For inclusive policy-making in developing countries, the improvement in the granularity of data can ensure a reduction of the gender divide.

Remittances are treated as exogenous flows in macroeconomic research using the general equilibrium framework with the remittance data input coming from countries' official national account statistics 'Balance of Payments (BOP).' The only available sources to BOPs compilers for the reporting of remittance data are the 'Balance of Payments and Investment Manual (BPM)' and the 'International Transactions in Remittances: Guide for Compilers (RCG)' created by IMF. Although these manuals warrant merit as the primary and most significant building blocks of remittance reporting, the definitions and data sources provided within the manuals have not been updated since 2009. This, evidently, can cause additional reporting problems.

As per the BPM5, there were three main components of statistics: "workers' remittances",

"employee compensation", and "migrant transfers". Chami et al. (2008) argue that workers' remittances, employee compensation, and migrant transfers correlate differently with other macroeconomic variables and are not a proponent of combining them to calculate the value of remittances as per the BPM5 guidelines. Furthermore, they maintain that conclusions based on the improper measurement of remittances based on inaccurate data can lead to wrong policy decisions by central banks trying to devise monetary policies to target economic development and growth.

Measuring the aggregate value of remittances using the official BOP data will also significantly underestimate their actual levels as the RCG and BPM require updating with new emerging technologies. One of the main problems central banks face is data compilation from various sources, as the central bank has to collect information from multiple licensed remittances facilitating institutions in the economy to compile and report remittance data (IMF, 2009b, p. 57). It is easier for central banks to collect and report data from banks, but given the prevalence of multiple remittances facilitating institutions (licensed and unlicensed), the collection and reporting can become quite complex. Especially in Sub-Saharan Africa, central banks have faced numerous challenges in collecting and reporting remittance data and are working with international organizations to improve their remittance data quality (ILO, n.d.; UNCDF, 2022), with certain politically unstable countries such as Chad, and the Republic of Congo not reporting any remittance data (World Bank, 2022b).

Moreover, older remittance research has pointed out the importance of remittance flows as a significant addition to foreign currency reserves (Taylor et al., 1996), while others uncover that remittances can also impact destination countries' inflation and foreign exchange (Haderi, Papapanagos, Sanfey, & Talka, 1999). In recent studies, Barkat, Alsamara, and Mimouni (2023) in their study of 109 developing countries, illustrate that remittances, if channeled efficiently, can improve energy poverty[8]. The reality is that neither the public nor private sector adequately understands the size and growth of the remittance markets. Freund and Spatafora (2005, para. 1) in their study of estimating informal flows, uncovered that the informal remittances market could be between 35% to 250% of formal flows. Therefore, reliable data on remittances is vital

[8]European Commission defines energy poverty as the circumstances in which households face difficulties in accessing fundamental energy services and products.

for current and future research to examine remittances' microeconomic and macroeconomic impacts on an economy, resulting in better policymaking based on proper data.

2.3 Remittances as International Flows

In scholarship, there is a general consensus that liquidity flows (inflows and outflows) are essential for a given country's economy and play a role in a country's economic growth and improve investment levels (Bosworth, Collins, & Reinhart, 1999, p. 143; Ahmed & Zlate, 2014, p. 1; J.-Y. Lee & Wilson, 1997). Contrary to the benefits of these capital flows, these capital flows can have a negative impact on the receiving country's inflation and exchange rate and pressurize the domestic to appreciate requiring active monetary policy intervention by central banks (Ahmed & Zlate, 2014; Okpanachi, 2012, p. 3; Qayyum & Khan, 2003, p. 977; J.-Y. Lee & Wilson, 1997). Despite the above, the type of capital inflows, monetary policy interventions by central banks to capital flows, and the specific banking and non-banking sector behavior and preferences determine the transmission channels of the impact of capital flows on the receiving country.

As per the currently available remittance channels, they usually enter the receiving economy through formal (financial institutions and remittance service providers) or informal channels (usually in cash or in-kind). Remittances routed through formal channels are generally traceable through the formal financial system balances and recorded the national balances and forex accounts, increasing the official reserves. The monetary authority has these reserves at its disposal to facilitate economic activities such as investment, debt management, and import/export management, among other activities. Financial institutions typically apply the official exchange rate the central banks give when the public withdraws remittances in the local currency for consumption and investment. It has been noted numerous times in literature that the official balance of payments severely underestimates the actual magnitude of remittances (Freund & Spatafora, 2005) due to unreliable accounting and usage of informal channels (Puri & Ritzema, 1999, p .7).

For the majority of remittance inflows (formal & informal), either the whole amount or part of the remittance is exchanged and converted into local currency from the official or parallel

market exchange rate and, as noted above, used for consumption and investment (Maimbo & Ratha, 2005, p. 5; Rice et al., 2020, p. 9). While a part of remittance is put towards savings in financial institutions or saved informally in the household in foreign currency. Ultimately the savings from remittances also get converted into local currency, affecting household demand for local currency. In other words, remittances increase households' spending capacity (Maimbo & Ratha, 2005); therefore, the demand for local currency also increases. In economies with a degree of dollarization, remittance inflows can be substituted for local currency, as in such economies, foreign currency can be used in parallel with the local currency for payments and transactions. In this scenario, remittance inflows do not raise local currency demand, on the contrary, remittance can reduce the demand for local currency (Ratha, n.d., p. 9).

Remittances routed through informal channels exchanged on the black parallel market can be used for legal/illegal cash payments for imports and household needs. When residents cannot acquire foreign currency from licensed financial intuitions at the official rate or when the parallel market offers a better exchange rate due to central bank interventions in official markets, residents end up in parallel markets. For example, in countries like Nigeria with a high degree of informal economy (Table-2.1 below) (Economics, 2023), the Central Bank of Nigeria has tight controls on providing forex due to the Naira volatility. Therefore, people rely on the parallel exchange market to access dollars (Mohammed, 2022) for imports, capital movement, and international migration, which are Nigeria's primary sources of forex outflows.

Country	**Percentage of Informal Economy**
Afghanistan	72.0%
Zimbabwe	64.1%
Nigeria	57.7%
Haiti	55.1%
Bolivia	54.8%

Table 2.1: Top Five Countries with Percentage of Informal Economy, World Economics 2023 available at https://www.worldeconomics.com/Informal-Economy/default.aspx

Similarly, countries with porous borders also have significant issues capturing cross-border remittances in cash, like the Western African borders, Nigeria, Ghana, Nepal-India corridor, and Pakistan-Afghanistan corridor. In the case of many Sub-Saharan African countries, in-

cluding Nigeria, most transactions are still cash-based as the informal sector has a substantial share of the economy. In their recent article, Fernandes, Aneja, and Sultanov (2022) state that customers choose informal channels due to high remittance costs, substandard financial market infrastructure (both sending and receiving sides), and migrant characteristics. Besides, and as noted above, the existence of the parallel foreign exchange market and parallel exchange rates, a high informal economy, and better foreign exchange rates on the black market can be named as one of the key factors that drive customers away from formal channels. Introducing digitized remittance channels built on innovative technologies such as the CBDC can improve the remittance sector and address these issues, specifically improving the uptake and usage of formal channels over informal channels. Therefore, CBDCs demand attention and further research with regard to remittances to possibly alleviate said issues. Simultaneously CBDCs can also address the remittance reporting issues that BOP compilers face in data granularity, collection, aggregation, analysis, and reporting. This will be further explored in Section-4.5 and Section-5.3.4.

Chapter 3

IMF Framework for Remittance Reporting

Given the information above on remittances, this section will cover the resident definition provided by the IMF in the Balance of Payments Manual - 6h Edition (BPM6) and the International Transactions Remittances: Guide for Compilers (RCG). These definitions require understanding and dissection, as they form the foundation of the conceptual and theoretical remittance framework in the BPM6 and RCG and, therefore, global understandings of the remittance sector. After covering the theoretical and conceptual framework, this section will discuss the remittance data reporting and data sources, their advantages and disadvantages, and their compilation. This knowledge is crucial to understanding remittances under the framework and how they are reported enabling this research to hone in on the importance of CBDCs and remittance data.

3.1 Resident Definitions under Balance of Payments (6th Edition) & International Transactions in Remittances: Guide for Compilers

It is imperative to define how the IMF defines residents and nonresidents in an economy, as that definition determines how the remittance transactions are marked and recorded in the country's

accounts, which is a critical concept to clear before moving onto remittance reporting. The IMF, in BMP6, defines "household residence" as "the predominant center of economic interest of the household and its members." (IMF, 2009b, p. 18). In the predominant area of interest, the individual has to spend a minimum of a year or more to qualify as a resident. IMF makes further distinctions between residents and students, stating that students are only considered residents of their origin country and shift their status as residents of the host economy at the end of their course of study, regardless of the years spent (IMF, 2009a, p. 71) which leaves all student remittances unreported. The treatment of students and their financial transactions from the host country to their home country in the BPM6 and RCG framework poses challenges for remittance reporting. Education times differ for students depending on the nature of studies; for example, medical studies in the West can be as long as eight years, while other disciplines can be completed within one to five years. Countries with high outward migration of students who also send remittances back home for the duration of their studies, if not reported correctly, can significantly underestimate the remittance values for the home country. Therefore, for high inward remittance countries, it is equally essential to have strong capabilities in maintaining accurate migration registers and numbers with migration purposes to incorporate their transactions in the BOP statistics to capture the remittance data more precisely.

3.2 Remittance Reporting Components

Having established the importance of accurate remittance data reporting in Section-2.3, and as above in Section-3.1, IMF member states must follow the conceptual and theoretical framework in the BPM6 and RCG for remittance data reporting in their BOPs (Vasile, Bunduchi, Stefan, & Comes, 2023). BOP is a quantitative report encapsulating the financial transactions of a country and between its residents and nonresidents within a specific time frame (IMF, 2009a, p .9). From the literature, we observe that only the BPM6 and the RCG are available for researchers and practitioners working on remittances. Furthermore, the BOPs also provide a good baseline for the IMF, academics, and researchers to conduct cross-country comparisons on macroeconomic indicators to track growth and development.

In the RCG and BPM6, IMF states the first part of remittances reporting is personal remittances and comprises of three main parts; personal transfers, remuneration of employees, and household capital transfers, which falls under 'secondary income account' reporting (IMF, 2009b, pp. 19-22). The 'personal transfers' item was introduced to update the previously mentioned 'workers remittances' recording item in the BPM5 (1993). IMF defines 'personal transfers' as "resident households receiving current transfers in cash or in-kind made to or from nonresident households" (IMF, 2009b, p. 20). 'Employee remuneration' is the earnings of seasonal, temporary, and borderland employees not working in their resident economy and employees employed by international firms. Lastly, 'household capital transfers' are household capital/assets that migrants when they move, affecting the balance sheets of origin and destination countries. These are mandatory items to be reported by all IMF member states in their BOPs. The second building block for remittance reporting is 'social benefits', which is also recorded in the secondary income account but is considered a supplementary item - essentially, good to have but not mandatory. The RCG describes social benefits as assistance and security transfers granted to migrant households to address exigencies arising from specific incidents or conditions. Lastly, the third building block for remittance reporting is current, and capital transfers to nonprofit institutions directed toward households (NPISHs) and is also considered a supplementary item in reporting.

With the baseline items described above, the 'Total Remittances' is the summation of personal remittances and social benefits for reporting total remittances, moreover 'Total Remittances and Transfers to NPISHs' are built by adding total remittances with current and capital transfers to nonprofit institutions directed toward households (NPISHs). Like the previously stated supplementary items, both compositions of total remittances are supplementary items that IMF member states are not obliged to report but are advised to report in their BOPs (IMF, 2009a, p. 274; IMF, 2009b, p. 20).

All of the above mentioned in the BPM6 and RCG for remittance reporting hinges on the definitions of residents. An underlying issue with the definition of residents and non-residents will carry forward to calculating individual components of remittances and immensely underestimate the remittance data for a country. With the proliferation of multiple international money

transfer operators (IMTOs) having different reporting standards in the remittance market facilitating remittance transactions, the BOP statistics compilers have to digest data manually from various sources if automated reporting channels are not in place, which can result in remittance data and reporting degradation. Introducing automated reporting mechanisms built on global remittance transaction reporting details can streamline reporting for remittance data compilers and avoid the pitfalls discussed. Especially digital forms of central bank money, also known as CBDCs' require little to no human intervention for reporting, which can dramatically change the remittance data sector. Moving on, the current data sources provided in RCG and BPM6 for BOPs remittance data compilers will be explored in the section below.

3.3 Data Sources for Remittance Reporting

3.3.1 International Transactions Reporting System (ITRS)

An International Transaction Reporting System's (ITRS) core goal is not remittance reporting but to ensure support for a broader reporting of all incoming and outgoing transactions for a given country's economy.[1] Its history lies as a foreign exchange record system, and over time has evolved to collect data and inputs for the accumulation of the BOP statistics. An 'International Transaction Reporting System' collects data from financial institutions operating in a country's economy. ITRS records aggregated transactions below the ITRS transaction amount threshold limit and all transactions above the ITRS threshold limit are reported at the individual transaction level (IMF, 2009b, p. 25), as per the country's legislative framework and accounting standards. It encompasses information on cash transactions executed through domestic banks and with nonresidents, cash transactions executed by enterprise accounts through foreign banks, non-cash transactions, and stocks[2] (Lubis, 2017). The ITRS has a standardized reporting structure that attempts to capture a vast amount of information for a given transaction, ranging from reporting bank codes, identification numbers, beneficiary customer information, ordering customers, and more. ITRSs are usually of three types; Closed, Open, and Partial. The key difference between the three types is that in the closed ITRS, reporters record and reconcile

[1] RCG does not support implementing an ITRS system specifically for remittance reporting.

[2] This refers to balance sheet positions.

transactions with the accounts mentioned in the BOP.[3] In contrast, open and partial ITRS do not account for transactions and reconciliation of all accounts. Therefore in open and partial ITRS, the data should be supported with supplementary data for reporting and reconciliation. Usually, payment systems facilitate remittance transactions through formal channels such as the banking system. Therefore they are recorded in the ITRS and can be reliable providers of remittance data information. BOP compilers should engage more rigorously with the intermediary banks facilitating transactions on behalf of money transfer operators or other institutions carrying out remittance transactions to aid remittance reporting, given that there is a well-functioning ITRS.

There are definitive advantages of having an ITRS for transaction reporting covering remittances. It is more cost-effective than having the central banks' statistical units and compilers of BOP manually receive data from financial institutions and reconcile them. Secondly, it gives BOP compilers access to timely regular data updates making a timely compilation of reports for policymakers to take adequate action if necessary and to support monetary policy. Lastly, as mentioned above, within a closed ITRS system, transactions are captured with the global data standards, ensuring reliability and confidence in the reported data. Compilers can further contact financial institutions to request additional remittance data for in-depth data confirmation and checking if required (IMF, 2009b, p. 29).

As with any reporting system, the ITRS is not error-free and requires close management, training, human intervention, and a level of collaboration to provide a clear view of remittance data. ITRS cannot capture remittance transaction data for compilers in countries with many international money transfer operators, high informality, and high cash-based transactions. Depending on the level of informality, these omissions can lead to bad reporting and non-optimal policy decisions. Secondly, it has been stated from many sources that BOP suffers from misclassification errors in transactions (IMF, 2009b, p .29; Lubis, 2017, pp.4-5), as the remittance service provides records and reports remittance data differently. High remittance countries like Nigeria, without an ITRS in place, should not opt for this method for just remittance reporting. ITRS is essentially a reporting mechanism for the whole financial sector, with remittances being a component of that reporting. Therefore it would be prudent for countries to explore al-

[3] Reporters are financial institutions.

ternative options to capture remittance data adequately. One such alternative that leaps over the ITRS is again CBDCs. As the name suggests, it is a digital currency encapsulating a complete digital end-to-end trail for a remittance transaction for central banks and BOP compilers to utilize in devising the mandatory and supplementary items quickly and efficiently for remittance reporting.

3.3.2 Direct Reporting

Besides ITRS data, the balance of payments and remittance data compilers can collect data directly from any institution, including international money transfer operators, rather than intermediary or settlement banks. This method can enable compilers to access a wide array of data enabling more detailed reporting on remittances. Similarly to the ITRS system, international money transfer operators report netted remittance amounts rather than gross and transactional remittance data; having the gross and transactional remittance data can be instrumental in calculating bilateral remittance flows between countries as other key remittance players and IMTOs have information on sending sides and receiving sides. One can quickly review the available research and find that countries have no data on bilateral remittance flows but only have data on incoming and outgoing remittances. KNOMAD is the only available source for bilateral remittance flows, and the bilateral remittance flows are estimates based on migrations statistics and incoming and outgoing remittance data reported in BOP statistics which under reports the official formal flows. In countries where international money transfer operators (IMTOs) have a significant share of remittance transactions, direct reporting can cover most of the transactions, given that informal channels have an extremely low prevalence (IMF, 2009b, p .36). Given the granular data recording requirements of remittance payment facilitators, this can also be an effective method for analyzing transaction costs associated with the sender and receiver side with additional indicators such as province, district, unit, gender, occupation of senders and receivers, transaction purpose to help map the remittance domain of a country. BOPs can request a granular view of the remittance data for detailed analysis of the population segments and devise policy objectives based on multiple dimensions not fulfilled by aggregated data reporting.

When using this method, a few considerations are that the central bank and regulators should

have the legal power to acquire such data directly from all economic players and remittance-facilitating institutions in the market. Secondly, institutions and international money transfer operators (IMTOs) collect, store, and report data internally on payments in different formats. The data might differ between institutions, and how the data is stored and shared would also differ, requiring more work on remittance data compilers to streamline. To circumvent these issues, regulators must implement a standardized reporting mechanism and have digital reporting mechanisms rather than sharing flat files, which can diminish the data quality and burden compilers with the additional workload. Thirdly, given the business setup of remittance-facilitating institutions, i.e., to facilitate cross-border payments for individuals and households, remittances through unlicensed entities will be excluded from this method (IMF, 2009b, p .37). Therefore this method can support the ITRS as it cannot provide information on the three parts of remittance and can only cover personal remittances (IMF, 2009b, p .36). Like other data sources, direct reporting is also plagued with classification errors, mainly with transaction reasons and the residents vs. nonresidents concept as defined in the BPM. Lastly, regulators must determine the frequency of data collection from this method to ensure the timely production of bi-annual and annual reports without any time lags for final compilations of the balance of payments (BOP) remittance statistics and further reporting to the IMF for verification and publication. European countries with robust legal and regulatory frameworks have already moved to direct reporting systems to central banks to reduce reporting issues and inefficiencies (Lubis, 2017, p .5). However, the data is still far from the on-ground reality due to the reporting standards, which differ from country to country; as most European countries are migrant destination countries, they primarily focus on outgoing flows rather than incoming flows.

3.3.3 Household Surveys

Household surveys can be a substantial source of remittance information. Carefully designed surveys can capture information lacking in the international transaction reporting systems and direct reporting methods. Similarly to direct methods, household surveys can estimate personal remittances but can also be used to estimate total remittances (IMF, 2009b, p .37). Statistical offices of countries conduct extensive household surveys for a magnitude of reasons, such as

population statistics and economic statistics, among others, to track the progress of a country. Surveys are often challenging to conduct and implement depending on the size and population of a country. Moreover, it requires hiring and training a large sample of enumerators to ensure the collected data is reliable. Statistical offices can include questions regarding remittances and migration in existing surveys, such as demographic and labor surveys, to circumvent the need for running specific remittance surveys. BOPs remittance compilers can also utilize international organizations' surveys, such as the Global Findex survey conducted by the World Bank, which tries to capture indicators of financial usage, penetration, and remittances. However, their frequency is far from what the central banks require.

Surveys can shed light on estimating remittances from formal and informal channels, which often go under the radar through the previous methods. Direct engagement with households can provide insight into the preferred remittance channels, the household members residing in foreign countries, the sender's gender, occupation, and household usage of remittances while including otherwise excluded populations not captured by formal channels. Compilers, academics, and researchers can utilize such detailed information to conduct microeconomic studies to understand the impact and link between remittances, poverty, education, energy poverty, and growth. Therefore surveys will not become outdated even with the introduction of novel technologies such as CBDCs, as surveys provide far more information than transactional data, which will be explored in greater detail in Section-5.3.3. Nonetheless, only the channels through which the surveys are conducted may change over time. Given the benefits of collecting survey data, they also have inherent challenges. One major challenge with this method is sampling error (IMF, 2009b, p. 43). Identifying receiver households to include in the existing survey can be difficult if the country does not have good remittance data and reporting mechanisms. Secondly, there is a tendency for households to underreport data for fear of taxation or due to migration-related issues. Lastly, compilers must align the data with the guidelines and definitions set in the BPM and RCG, given that households would categorize residents and non-residents differently from the official guidelines (IMF, 2009b, p. 45).

3.3.4 Indirect Sources

The IMF suggests indirect sources to estimate remittance as a method that should be used when all other sources are not reliable, do not sufficiently capture the remittance market, and in an economy with a high degree of informality (IMF, 2009b, pp. 46-47). Remittance compilers can utilize secondary and primary data from the sources mentioned above to build remittance estimation models. Remittance estimation modeling can be econometric, residual, and demographic models based on population or census data. Devising models is not easy, to say the least, and remittance compilers would require significant expertise in model-making and technical support for developing remittance estimation models that can be used to facilitate remittance data reporting for central banks. Although this approach can reveal a magnitude of variables that may or may not affect remittances; for instance, remittance determinants, cyclicality, and noncyclicality of remittances. However, remittance estimation model building takes time, and it requires extensive testing and robustness checks if the regulators and compilers would use them as official remittance data reporting and to devise policy actions; therefore, it is a complex and formidable challenge to undertake. Hence, this approach is usually left to academics and researchers in the remittances sector than central banks taking this approach themselves.

It is important to note here that there is not much information and research published on what data sources are currently used by central banks across the globe when they report their remittance data. The remittance data reporting mechanisms lack transparency and are like a black box. In a recent survey of 20 central banks, all European central banks surveyed only collected aggregated data with no information provided on data sources, and the main reason the top two reasons for remittance data collection were BOP statistics and evidence-based policies (UNCDF, 2023). However, aggregated data will not be able to achieve central banks' goals for reasons covered previously. Greater transparency in reporting and data sources coupled with CBDCs and global central bank cooperation can shift the tides in remittance data. Although this review on remittances and remittances data does not claim to be exhaustive, the important concepts that have been outlined are necessary to understand before conceptualizing CBDCs and, moreover, to understand how CBDCs, mainly eNaira can potentially fit or not fit into the existing BPM6 and RCG.

Chapter 4

Central Bank Digital Currency (CBDC)

This section presents an understanding of CBDCs as defined within academic scholarship, along with an understanding of the growing interest in CBDCs, including the motivations of different countries for CBDCs, the basic setup of CBDCs and moving on to critical areas in which CBDCs can play a pivotal role, for instance, in cross border payments, specifically international remittances which will be the focus of this research.

4.1 CBDC Definitions

To understand the possible potential of CBDCs, we first must take a step back and define what a CBDC is. A working definition will also help differentiate it from the existing private digital currencies in the market. The Federal Reserve System (FED) generally defines CBDC as a "digital liability of a central bank that is widely available to the general public" (Board, 2023). Yves Mersch (member of the Executive Board of the ECB), stated in a speech in 2017 that CDBC has two underlying properties, firstly CBDCs act like standard banknotes - meaning that holders of the CDBC "have a claim on the bank" and secondly, CBDCs - as the name suggests - are digital money (European Central Bank, 2017). Building on this, CBDC has also been defined as a digital fiat currency (meaning that physical commodities do not back it up) that is issued by the central bank. Ozili (2022b) and M. J. Kiff et al. (2020, p. 5) defined it as "a digital representation of sovereign currency" which has to be issued by the central bank, similar to other types of currency. We can simplify the above definitions even further by envisioning

CBDC as a legal tender in the economy that can be used as a mode of payment in exchange for goods and services, which can be placed alongside the existing legal tenders issued by the central bank, i.e., banknotes, coins and consumer bank deposits (Auer et al., 2022, p. 700) and can act as cash (M0)[1]. For this thesis, we will be using the latter definition.

4.2 Exisiting Literature on CBDCs

As mentioned at the end of the previous section, the research on the intersection of CBDCs and remittance data requires more work. This is partly since CBDCs are still relatively new and have yet to be widely adopted. A few Caribbean countries have implemented CBDCs, but their scale is low, and those countries are less dependent on remittances. Scoping through the literature on CBDCs, we also see a general theme emerging, where researchers focus on the underlying technology, motivations, impact on monetary policy, and macroeconomic and financial stability. Boar, Holden, and Wadsworth (2020, p. 9) emphasize that central banks need to work together to understand the full impact of the underlying technologies and their interoperability with other central banks launching CBDCs around the world. Löber and Houben (2018, p. 7) also states that CBDC-based transactions can be safer and reduce costs while providing resilience to a country's payment infrastructure. Davoodalhosseini (2018), in their Canadian case study, examine the welfare effects of CBDCs. They show that consumption can increase by 0.16%, and welfare gain will occur if CBDC has an interest-bearing feature. They also state that having both cash and CBDC in circulation can lead to lower welfare as agents in the economy will end up selecting cash as it offers more privacy in transactions. Rogoff (2017) in his book presents multiple arguments for removing cash from circulation. Firstly, it can result in lower informal hiring and payments made in cash (the informal economy) compared to other alternatives. Secondly, it can result in higher tax revenues, and thirdly, it can be a sophisticated approach for achieving negative interest rates. He also states that privacy issues and law enforcement need to be carefully managed with stated benefits. Yao (2018, p. 7), in his research on CBDCs in China, found that CBDCs can reduce lag on monetary policy and provide

[1] M0, M1, M2, & M3 are measures of the money supply. M0 is the currency in circulation (banknotes and coins) (Money Supply | Richmond Fed, n.d.)

better macroeconomic control. Kumhof and Noone (2018, p .9) argue that if central banks' reserves and CBDCs merged, it could modify the transmission channels through which monetary policy is implemented. Furthermore, they also state that CBDCs can lead to 'dollarization' in countries with elevated inflationary pressure and fluctuating exchange rate through currency substitution. Boar and Wehrli (2021), in their third round of surveys conducted by the BIS with central banks on CBDCs, showed that 86% of advanced economies and emerging markets and developing economies[2] were exploring the issuing of CBDCs. In a follow-up report in May 2022, 90% of the surveyed central banks were engaged in CBDC work, and 25 of the respondents were from advanced economies, while 56 were from emerging and developing economies (Kosse & Mattei, 2022); as shown in Figure-4 below.

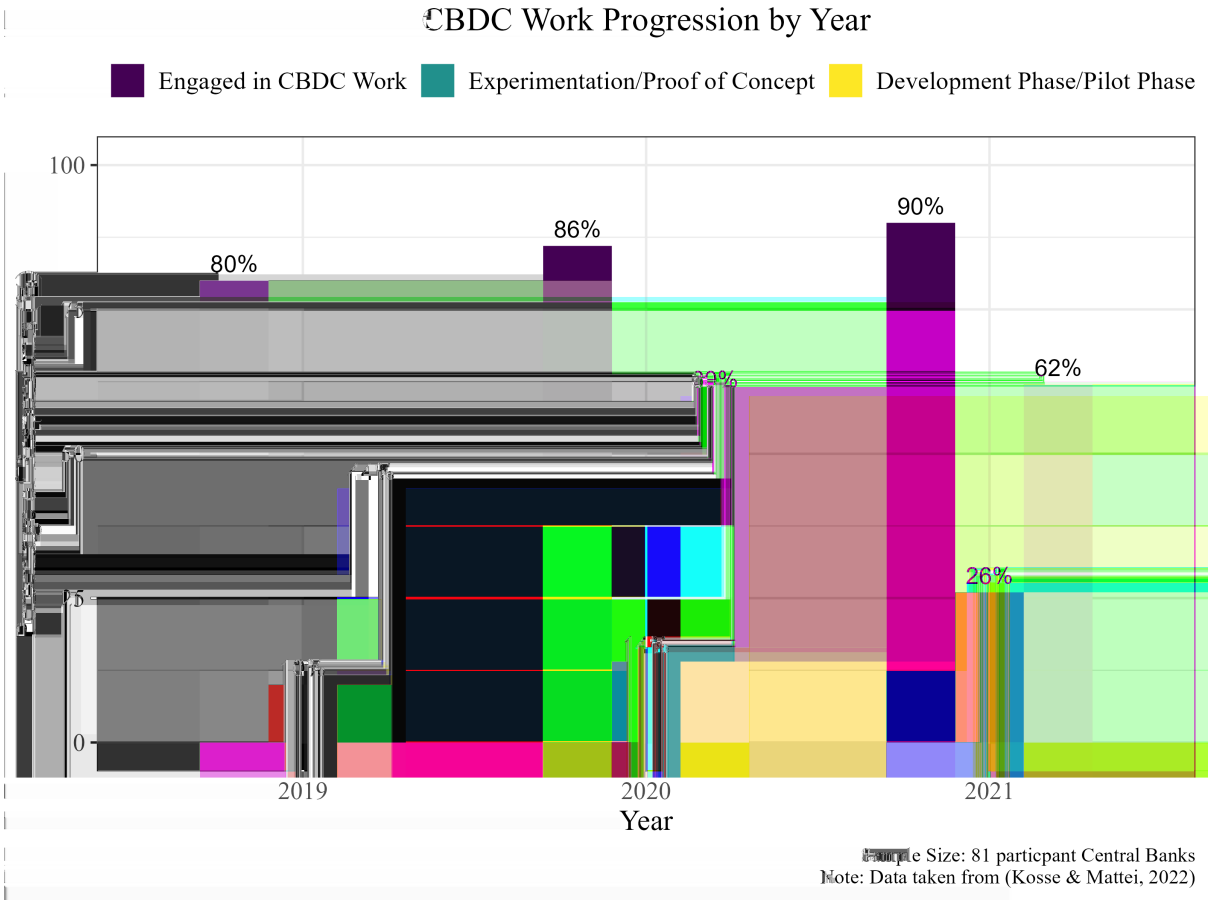

Figure 4: Responses from CPMI Survey 2021, data taken from Kosse and Mattei (2022)

G20 in 2020 provided a roadmap for improving cross-border payment, including remit-

[2]The definition and classification of countries in 'advanced economies, emerging market and developing economies' are provided by International Monetary Fund (IMF): World Economic Outlook - October 2021, available at https://www.imf.org/external/pubs/ft/weo/2021/02/weodata/groups.htm

tances, and prioritized it on the global agenda (*G20 Roadmap for Enhancing Cross-border Payments: Consolidated progress report for 2022*, 2022; World Bank, 2021), further signaling its importance. This roadmap emphasized collaboration and keeping an international aspect in the CBDC designs. Project Stella, an initiative of the European Central Bank and Bank of Japan on CBDC, completed its phase, examining improving the safety of cross-border payments using DLT. The People's Bank of China has been leading the charge for CBDC with their 'Digital Currency Electronic Payment' (DCEP) project, which is expected to replace SWIFT[3]. Bank of Korea, in November 2022, also concluded its 10-month testing for cross-border remittances with the Digital South Korean won among 10 commercial banks (Pessarlay, 2022).

In 2021, the Central Bank of Nigeria (CBN) launched its CBDCs known as the eNaira. Nigeria is the biggest economy in Sub-Saharan Africa (SSA), making it the first country in Africa to implement a CBDC. Given it is the only developing country heavily dependent on remittance that has adopted a CBDC, this research will focus on the eNaira and try to bridge the literature gap on remittance data and reporting with CBDCs.

4.3 CBDC Policy Motivations

Global headwinds have nudged central banks to delve deeper into technologies that can complement traditional finance, forcing central banks to be bold and adapt to emerging technologies. However, each country has different motivators for the CBDC research, development, testing, and implementation. Many IMF countries, amongst others, have either started conducting discussions or research on the viability and scope of CBDCs. In contrast, others have already begun designing, implementing, and piloting CBDCs (Auer et al., 2020; Council, 2023); J. Kiff, 2021, pp. 5-7.

[3] Society for worldwide interbank financial Telecommunication - currently used messaging network for financial institutions.

Figure 5: CBDC Global Tracker Source: Council (2023)

Soderberg et al. (2022, p .2) research provides the preliminary considerations and choices for central banks to issue CBDC, as shown below.

Figure 6: CBDC Planning, taken from Soderberg et al. (2022, p .2)

(Auer et al., 2022, p. 703; M. J. Kiff et al., 2020, p .11; Kosse & Mattei, 2022, pp. 6-7 Women, 2020, para. 2; Soderberg et al., 2022, pp. 4-8) have all gathered evidence through surveys and engagements with central banks behind the policy motivations for CBDC. Their research and Ozili (2023) and Ozili (2022b) demonstrates that different countries have different motives; (1) financial inclusion, (2) financial stability, (3) payment efficiency, especially cross-border and domestic payments, (4) monetary sovereignty, (5) Payments resilience/robustness, and (6) reducing illicit use of money, formalization of payments, and competition.

For developed economies, the primary policy drivers are improving the payments' robustness, efficiency, and financial stability. For emerging and developing economies, financial inclusion, payment efficiency (domestic and international), and payment formalization are the leading policy concerns. Since remittances outpace official development assistance and foreign direct investment, cross-border remittances for developing economies are high on the agenda. Remittance dependant countries' policy motivations for CBDCs research and implementation are to improve cross-border transactions. Therefore, as seen from the figure above provided by the IMF, the policy consideration will lead to the decision on the CBDCs design and architecture to ensure that the policy considerations are met and the CBDCs being implemented is more than just a general CBDC.

4.4 CBDC Type Distinctions

As mentioned above, policy considerations will lead to the design choices for a CBDC. For individuals and households, the CBDC should act like banknotes and as cash does currently in the economy (Ozili, 2022b), while for central banks, they serve multiple facets. Drawing on the survey done by BIS to discuss the policy considerations of central banks around the globe, CBDCs can be broken down into two types, (1) General Purpose/Retail CBDC and (2) Wholesale CBDC ABCD (Didenko & Buckley, 2021; Ozili, 2022b).

Especially for remittances and remittance data, this research focuses on the eNaira implementation by the Central Bank of Nigeria; therefore, it will only cover the General/Retail CBDC and leave the Wholesale CBDC for future research as the eNaira is General/Retail CBDC imple-

mentation. As discussed above in definitions of CBDCs, the general purpose or retail CBDC would be a digital currency issued and backed up by the central bank, which financial institutions issue against their reserves with the bank. The General Purpose/Retail CBDC is to improve payments and reporting for all economic actors. The central bank does not limit it to financial institutions as that would fall short of achieving financial inclusion, financial stability, and improving cross-border payments. In today's financial setup, international financial institutions must use intermediary and correspondent financial institutions to send finances across borders. This setup can be inefficient depending on the availability and arrangement of intermediary/correspondent financial institutions, which can be expensive, time intensive, have multiple hops if there is more than one intermediary/correspondent bank, and have other risks associated with it as international financial institutions cannot have direct accounts with the central banks of other countries (Forum, 2020). Especially for remittances, General/Retail CBDC is favored, as it is issued to all economic actors and can act as Cross-Border CBDCs, improving the remittance value chain over traditional remittance channels.

As previously mentioned, eNaira is a General/Retail CBDC, and multiple options are available for the eNaira design. The two design options for ledger technology for the Central Bank of Nigeria are whether the CBDC will be developed on conventional or distributed ledger technology (DLT). The widely known distributed ledger technology is the blockchain, based on decentralized ledgers compared to centralized ledgers authorized by a single authority. Contrary to distributed ledger technology, transaction validation occurs in the conventional method through a single authority - a central bank. The distributed ledger technology must mature to meet current standards to handle high transactions per second (TPS) in advanced economies and certain emerging and developing economies (Auer et al., 2020, p .22). However, smaller jurisdictions with lower transaction requirements per second (TPS) can benefit from distributed ledger technology. Central bankers have a choice between the two technologies, and it would depend on whether the central bank or a centralized transaction verification authority can verify and settle payments on their own or delegate the verification and settlement to a decentralized network of financial institutions (Forum, 2020, p .10). Both have advantages and disadvantages; proponents of transparency, lower costs, time limitations, faster deployment, inter-connectivity,

and privacy in transaction verification lean towards a DLT-based CBCD. On the other hand, DLT-based CBDC can cause slower transaction verifications, security concerns associated with distributed networks with multiple verification authorities, and slower scalability in the financial system (Forum, 2020; D. K. C. Lee, Yan, & Wang, 2021). In the case of the eNaira design, the choice made by the Central Bank of Nigeria was a hybrid ledger variant - a unique blend between conventional and distributed ledger technology (of Nigeria, 2021, p .11). The reason for this variant is that it overcomes the limitations of the distributed ledger technology while allowing the Central Bank of Nigeria to use identity management systems put in place by the government to ensure identity verification of transacting actors; therefore, the Central Bank of Nigeria does not require to take on the additional burden and can utilize existing systems in place. In particular, this design choice enables end-to-end identification for remittance senders and receivers, which was previously impossible through standard remittance reporting channels as international money transfer operators do not share detailed level information with the central banks.

4.5 Account-based and Token-based CBDC

For a successful funds transfer, the transaction initiator must verify the receiver as the account-based CBDC typology links it with an identity management system held by the central bank. Account-based CBDC would require the central banks to provide accounts to the public, perform 'know your customer' (KYC) operations, and become customer-facing. However, in the current scenario, financial institutions are conducting these operations rather than central banks, as most central banks do not have the capacity to become customer-facing, and currently, it is not in their mandate to become customer-facing. Logically, for central banks to become customer-facing, the legal and regulatory framework would require rework to change the mandates of central banks. In contrast to account-based CBDC, where the identity management system is with the central bank (Auer et al., 2020; Ozili, 2022b), token-based CBDC is not located with the central bank. Instead, it is located in digital financial products, such as digital or mobile wallets, representing a 'token' that functions as a digital signature (Auer & Böhme, 2020, p .94).

Token-based CBDCs do not require central intermediaries and offer privacy because they are not tied to identity management systems. The eNaira is an account-based CBDC design. The Central Bank of Nigeria wants to innovate the payments sector and maintain a robust regulatory framework of identity management for transactions, especially in the case of remittances. Given the high level of informality in the Nigerian economy, the Central Bank of Nigeria desires to reduce illicit flows to and out of the country and improve the remittance value chain, especially the formalization and digitization of remittances and remittance data reporting for migrants and migrant households.

Chapter 5

eNaira & Remittances Data: A Case Study on Nigeria

This section will cover the thesis motivation for selecting Nigeria as the basis of the case study through the lens of remittances, provide stylized facts on the Nigerian migration and remittance sector, then move toward the implementation of the eNiara by the Central Bank of Nigeria (CBN), providing a critical analysis of the impact of the eNaira on the IMF Balance of Payments Manual (6th Edition) (BPM6) and International Transactions in Remittance: Guide for Compilers (RCG) remittance reporting framework and data sources for remittance as provided by the IMF, while proposing changes in the framework, data sources.

5.1 Remittances in Nigeria

Nigeria is the seventh most populated country globally with a population of 213 million and the biggest economy in the SSA region, also making it the largest remittance-receiving country in absolute amounts in SSA. The official number of Nigerians residing outside the country is expected to be higher than recorded as a result of high migration through informal channels (Afolayan, Ikwuyatum, & Abejide, 2010). In parallel, Nigeria, with its porous borders and an intermediary stop for refugees fleeing war-stricken areas, has additional inward migration from adjoining countries in Sub-Saharan Africa. Furthermore, Nigeria has a poverty rate of 40% (World Bank, 2022a), and outward migration is taken to escape poverty and improve the

household situations of the family members left behind. Some undertake complex, challenging, and dangerous routes for a better future (Nwosu et al., 2022).

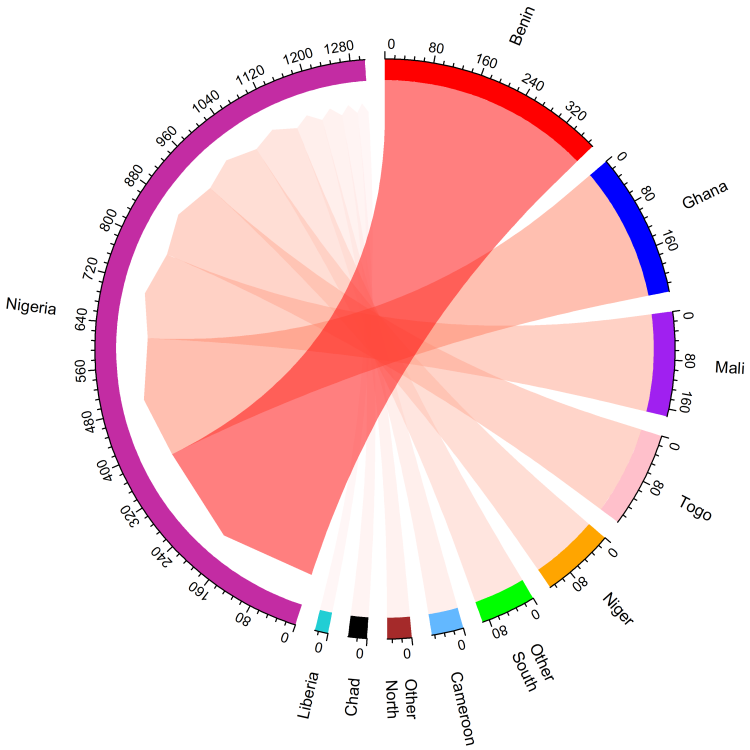

Figure 7: Inward Migration Nigeria (in thousands) - Top 10 Countries, data from KNOMAD/World Bank Bilateral Remittance Matrix 2021, December 2022.

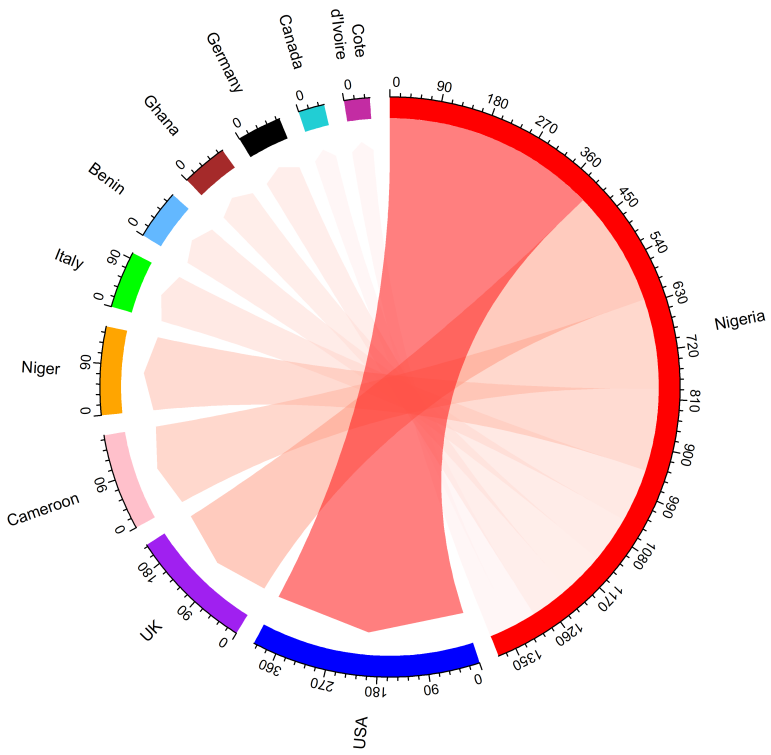

Figure 8: Outward Migration Nigeria (in thousands) - Top 10 Countries, data from KNOMAD/World Bank Bilateral Remittance Matrix 2021, December 2022.

From Figure-7 and Figure-8 above, the major inward migration corridors to Nigeria are Benin, Ghana, Mali, Niger, and Togo. These countries are neighboring countries except Ghana, and limited border controls make unregulated crossings easy. Observing outward migration, the popular destinations for the Nigerian population are the USA, UK, Cameroon, Niger, Italy, Benin, and Ghana.

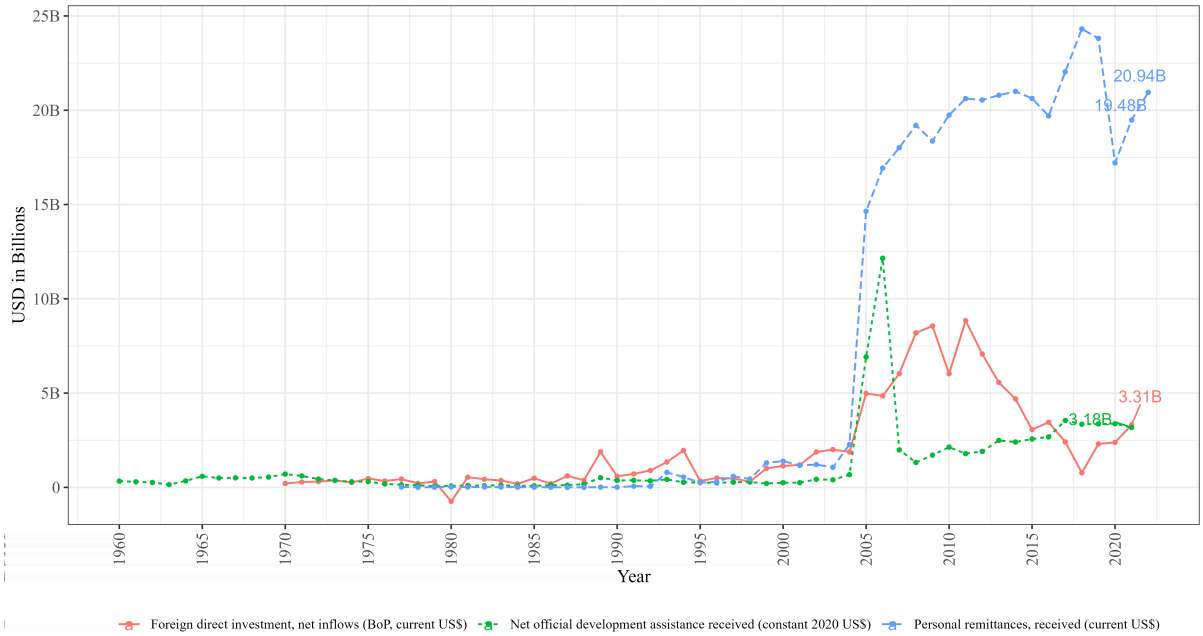

Figure 9: FDI, ODA, and Remittance inflow to Nigeria, data from World Bank (2022b).

The Nigerian migrants outside Nigeria contribute extensively to their households and the country through remittances. Over the years, the remittances to Nigeria have grown significantly with increased outward migration. Second, to Nigerian oil exports, remittances are the country's leading source of foreign exchange (forex). The most notable point in the above Figure-9 is that the remittances have outpaced both official development assistance and foreign direct investment considerably in Nigeria. By the year-end 2021, official development assistance stood at $3.18 billion and foreign direct investment at $3.31 billion, compared to $19.48 billion incoming remittances. The difference between combined official development assistance and foreign direct investment to remittances was $12.99 billion, and to reiterate, these are only the official recorded remittances. The dollar value of remittances to Nigeria in 2022 hit $20.94 billion, making Nigerian immigrants one of the biggest lifelines to Nigerian households and the Nigerian economy.

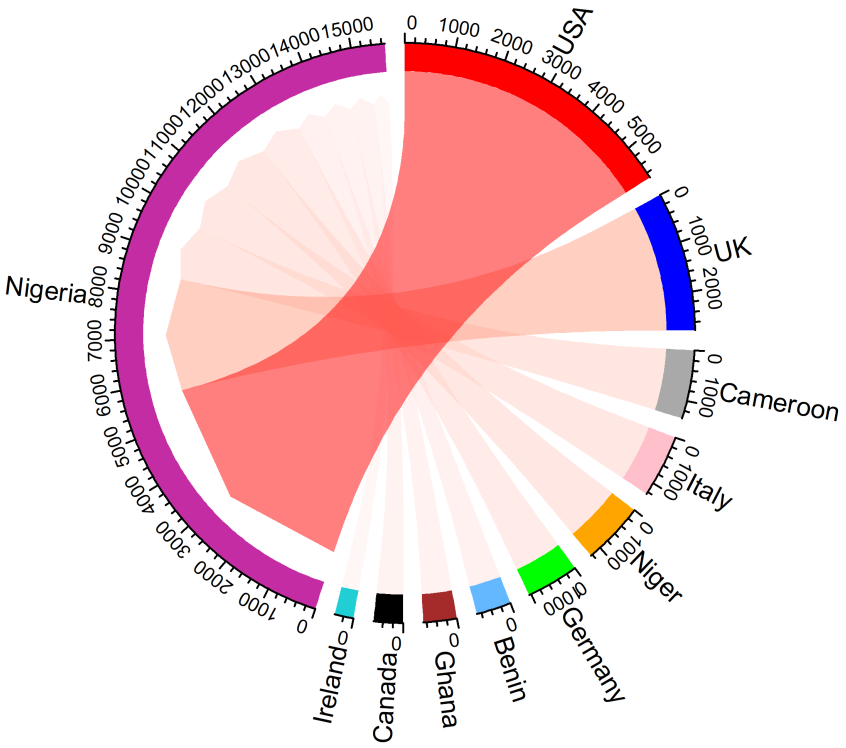

Figure 10: Inward Remittance Nigeria (in USD millions) - Top 10 Countries, data from KNOMAD/World Bank Bilateral Remittance Matrix 2021, December 2022.

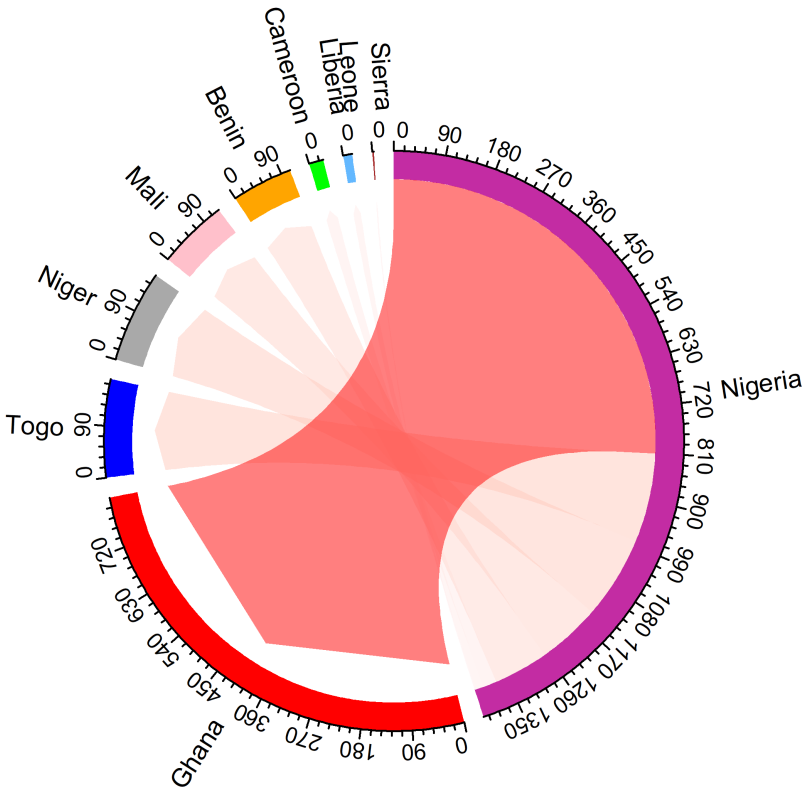

Figure 11: Outword Remittance Nigeria (in USD millions) - Top 10 Countries, data from KNOMAD/World Bank Bilateral Remittance Matrix 2021, December 2022.

Unpacking the inward remittances to Nigeria, they follow the same patterns as outward migration. The top inward remittance corridors to Nigeria are the USA, UK, Cameroon, Italy, Niger, and Benin - contributing to more than 50% of the inward remittances. In parallel, the outward remittances from Nigeria are to adjoining countries, mainly Ghana, Togo, Niger, and Mali. The above-presented bilateral remittance data is from KNOMAD/The World Bank, which is based on the BOP statistics data reported by the Central Bank of Nigeria coupled with migration estimations, also making this data unreliable. However, as mentioned in Section-3.3, central banks lack a complete view of the remittance data making the currently available data an underestimate of the remittance sector.

The problem in the Nigerian economy is a vast parallel informal economy of approximately 57.7% (Economics, 2023). The reported remittance data provide only part of the picture, providing an underestimated value of the overall remittance flowing in the economy. The official

sources state that the informal sector is between 57% to 65% (Administration, 2021; Economics, 2023) among the top three globally. This makes it harder to track cash-based transactions coming into the country and exchanging on the parallel exchange market, putting pressure on the local currency in circulation. At the same time, Nigeria has exhibited a growing interest in cryptocurrencies (Ozili, 2023), even though there are regulations from the central bank to restrict their holding and usage. The Central Bank of Nigeria restricted the Nigerian population from engaging its cryptocurrencies, primarily to introduce eNaira as a viable solution to growing interest in cryptocurrencies and to improve the formalization and digitization of payments.

This backdrop for the Nigerian remittance sector is critical to understand the role remittances play for Nigerian households, the economy, the Central Bank of Nigeria, and policymakers. With known issues in remittance data reporting according to the IMF BPM6 and RCG remittance reporting framework pointed out in Section-3.3, eNaira poses exciting opportunities for scholars to explore its real-world implications within the BPM6 and RCG remittance reporting framework and for the Central Bank of Nigeria to access more reliable remittance data which can genuinely enable decision-makers to channel remittances more effectively and utilize the data for evidence-based policymaking.

5.2 The eNaira & its Policy Considerations

This thesis focuses on the implications of the eNaira on remittance data rather than how the eNaira was implemented. Therefore this research will not cover how but will focus on the possible impact of the eNaira design and technology on the IMF BPM and RCG framework for remittance data.

The Central Bank of Nigeria started its consultations on CBDCs early in 2017, before the COVID-19 pandemic. The rise of cryptocurrencies for remittance transactions due to low costs raised concerns for the Central Bank of Nigeria, and alternate solutions were being explored (Kedem, 2021, paras. 7-8). By the end of 2021, the Central Bank of Nigeria had conducted its CBDC design assessment and feasibility and launched the eNaira - the Central Bank of Nigeria digital currency, making it the first African country to do so. IMF CBDCs support document

suggests that policy considerations drive the design and implementation of the CBDC. In Nigeria, implementing the eNaira can be attributed to a confluence of policy objectives presented by the Central Bank of Nigeria. Among the policy objectives stated by the Central Bank of Nigeria, the top three were; (1) financial inclusion, (2) welfare distribution, and (3) improving remittances (Salami, 2021, para. 6) and in parallel curbing remittances through cryptocurrencies, with the ultimate goal of the Central Bank of Nigeria to move towards a cashless society. From the policy objectives, the eNaira technology and design choices make it clear that it cannot be a wholesale CBDC but a general/retail CBDC. The Central Bank of Nigeria manages and provides the eNaira to licensed financial institutions in the market for distribution which is a non-interest-bearing general/retail CBDC with a two-tiered architecture and on one-to-one parity with the Naira. The underlying technology is an account-based model with a distributed ledger technology (DLT) - a hyperledger fabric variant (of Nigeria, 2021, p. 11) which overcomes the limitations of a DLT mentioned in Section-4.4 and Section-4.5. This implementation allows the Central Bank of Nigeria to utilize existing identity systems in their economy, such as financial institutions systems and the Nigeria e-ID issued by the National Identity Management Commission. Furthermore, access and usage of eNaira is not limited to modern digital wallets through mobile applications but is also made available to anybody in Nigeria having access to a cell phone through Unstructured Supplementary Service Data (USSD), giving access and usage of the eNaire to the previously unbanked. Furthermore, Nigerians outside the country also have access to the eNaira wallet, and they can transfer their foreign currency in their wallets and remit it directly to beneficiaries' of eNaira wallets back home. With its tiered wallet system, any individual can have an eNaira wallet as there is no restriction on having an account with a financial institution - meaning it can reach the previously unbanked customers and remittance receivers in the formal system boosting financial inclusion and by eliminating the costs associated with expanding traditional financial institutions, IMTOs and agent networks.

As presented in Figure-6, IMF staff, in its fintech notes, states that policy considerations lead to CBDC design considerations which are the first step that drives the country and their monetary authorities to explore CBDCs in their jurisdictions. While it adequately captures the building blocks central banks need to follow to guide their CBDC work, there is one vital step,

'State of current financial infrastructure,' which needs to be stated explicitly as that is linked to the policy goals which should be added, as shown in Figure-12 below.

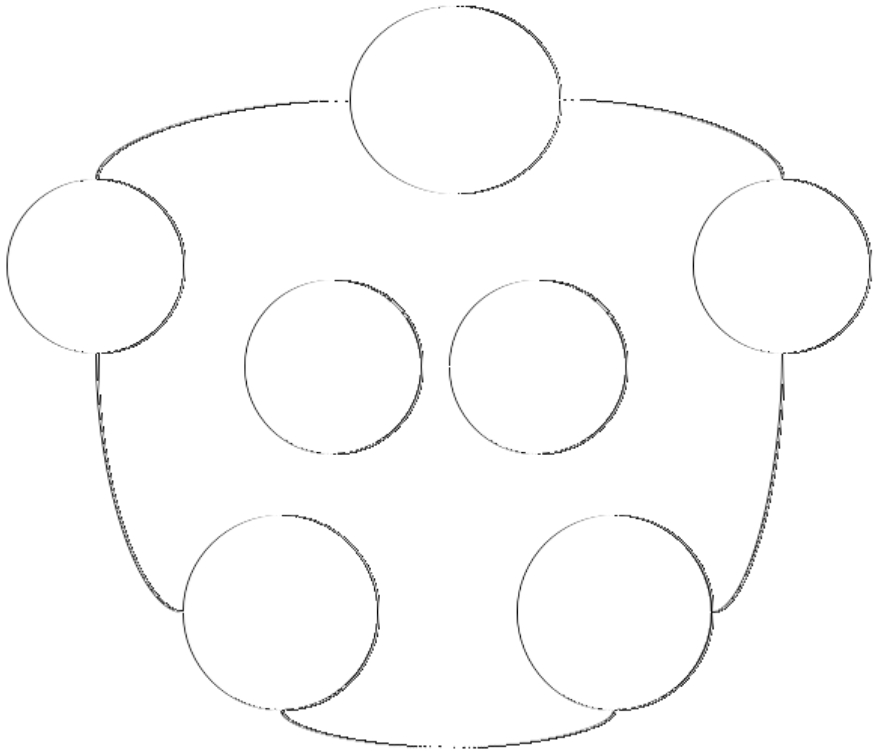

Figure 12: Updated IMF CBDC Cycle, figure adapted from Soderberg et al. (2022).

One of the first propositions of this research is a rework of the IMF CBDC Choices and Considerations provided by (Soderberg et al., 2022, p .2), enabling a more robust framework of considerations for CBDCs and rather than starting from policy goals alone, as the current financial infrastructure and penetration will drive the policy goals, which vary by country. Consequently, countries will possess varying policy objectives and incentives to engage in work on CBDC. Going through the available material, no reports are available from the Central Bank of Nigeria on background assessment of the current financial infrastructure. The Global Findex report was made available by late 2022 but by then, the Central Bank of Nigeria had already launched the digital currency. Assessing digital financial penetration is vital if Nigeria wants to move towards a cashless society. The Findex report showcased a significant gender divide in digital penetration and a low digital financial and mobile money take-up. These issues would

trickle over even with the implementation of the eNaira. To ensure that policy motivations of the eNaira are materialized, a transparent baseline assessment is necessary to propel the implementation and strategy for the benefit of the people and the country. Moreover, the baseline assessment is necessary to uncover the theory of change towards the policy ambitions for the eNaira. According to the Central Bank of Nigeria, digital payments have risen since 2017. However, cash still reigns as 'King' in the Nigerian economy, with a parallel informal economy increasing the currency in circulation at a compound annual growth rate of 7% in the last 11 years i.e. 1.5 Trillion Nigerian Naira in 2010 to 2.9 Trillion Nigerian Naira by 2021 (of Nigeria, 2021), hampering the ambitions of Central Bank of Nigeria to move towards a cashless society. The Central Bank of Nigeria's objectives were to directly engage at the customer level for the government to disburse social welfare benefits, support remittances from overseas Nigerians, financial inclusion, reduce informality and reduce the cost and time for cross-border transactions of Nigeria, 2021, p. 8; Department, 2021, para. 4). These ambitions must be assessed in detail with the current state of affairs with an in-depth roadmap by the Central Bank of Nigeria which can shed light on how the eNaira can intersect and push the Nigerian economy towards the said goals.

5.3 eNaira Implications for Remittance Data under BPM6 and RCG

The implications of the eNaira on remittance data and sources rests upon two main assumptions;

1. eNaira wallet-to-wallet remittances will increase, capturing the major share of remittance transactions - given that they have no transactions compared to traditional remittances channels to Nigeria where the remittance cost can be as high 8.6% of the remittance amount (Section-2.1, Figure-3).

2. eNaira's technology design has interoperability at its core, meaning the technology is future-ready to work with other CBDCs being deployed by central banks around the globe, which will further strengthen the cross-border remittances value chain with more

countries introducing CBDCs.

The rationale behind assumption one is that sending remittances through eNaira wallets eliminates the interactions and settlements through intermediaries and settlement banks. Reducing the interactions of intermediaries reduces transaction times and costs associated with the multiple players in the remittance transaction chain. Having multiple players in the remittance transaction chain also causes remittance data degradation because of different integration between transaction facilitators. Depending on the legal agreements and technology integration of remittance transaction facilitators, not all transaction information is shared between all actors. The current implementation of the eNaira wallet transactions globally has no transaction cost associated with the transfer (Jack Ree IMF African Department, 2021, para. 3). The rationale behind the second assumption is that the design of the eNaira is devised to ensure that it works with other CBDCs being introduced around the globe. The Central Bank of Nigeria can work closely with central banks and financial institutions of significant migration and remittance corridors to Nigeria, improving the interoperability of the eNaira as a payment method with other CBDCs being introduced by central banks in countries like China, South Korea, and the USA, further reducing the cost of remittances for Nigerians living abroad and overall for cross-border transactions. Promoting interoperability of the eNaira between central banks CBDCs based on global standards would improve cross-border remittance reporting on institutional and central bank levels also in turn reducing the dollarization issue mentioned in Section-2.3. The breakdown of the BPM6 and RCG will be based on the above-mentioned assumptions.

The framework and guidelines available for monetary authorities to compile remittance data have been discussed in detail in Section-3.3.4 The compilers for remittance data follow the BPM and RCG, as all IMF member countries must report remittance data as per BOPs standards. The BPM5 manual was introduced in 1993, and the BPM6 was released in 2009, and migrating from the old BPM5 to the new BPM6 is already challenging for developing countries. It requires technical expertise on the part of the central bank to understand the changes and the nuances presented before conducting an internal analysis of the effort required to update regulations and implement the changes. Nigeria started its transition to the new BPM6 in 2014, and by 2020 it was still running both the BMP5 and BMP6 in parallel as the whole

transition still needed to be completed (Gaiya, 2020, p. 13). Running dual reporting standards poses conceptual challenges in remittance reporting treatment, reducing the reliability and accuracy of estimates. The main reason for remittance reporting issues under dual standards is because previously, in the BPM5, the components that referred to reporting remittances were compensation of employees, workers' remittances, and migrant transfers (Reinke, 2007, p. 2). At the time, no definition was provided for a migrant. Instead, a definition of residents and non-residents, as stated in Section-3.1, was provided, which is still the same in the current iteration (BPM6 and RCG (2009)). In RCG, the components were updated to employee remunerations, personal remittances, and household capital transfers, with workers' remittances now being a supplementary item as total remittances in BPM6, which still falls short of accurately capturing remittance data because of the outdated remittance data concepts in the BPM6 and RCG. This is pivotal to the analysis as eNaira reduces the need for human intervention in remittance data reporting. This automation of remittance data reporting for the Central Bank of Nigeria will only work with the proposed changes of the concepts in the BPM6 and RCG for remittance data sources, as presented below.

The first limitation of the BPM6 and RCG for remittance data is the concept of residents and non-residents for remittance data reporting. The limitations of the concept of residents and non-residents for remittance data reporting is that it does not account for individuals immigrating from their host countries, such as students, medical patients undergoing treatment, embassy staff, diplomatic staff, and military staff from being reported in remittance data as they are considered residents of their home country throughout their stay in the foreign country under the BPM6 and RCG. As a use case, if an individual from Nigeria migrates to the USA or the UK for their education[1], as per the host country's regulations, they are legally allowed to work a certain number of hours. Moreover, during semester breaks, students may take on internships and short-term work to earn additional income and support their household back home through remittances. Similarly, Nigerian medical patients who migrate for medical treatment to foreign countries often reside there for more than one year, are also excluded from remittance reporting as they are considered residents of their home country even though they will be supporting their

[1]Undergraduate 4 years, Diplomas 1 year, Graduate studies 1-2 years, Doctoral Studies 3-6 years, and Tehnical education 1 to 2 years.

treatment through capital movement from origin to destination countries and outbound remittances from the origin country. Likewise, Government officials and diplomats working outside their countries also are not regulated under the narrow lens of resident definition in BPM6 and RCG as they are still considered residents of their home country. Granted, officials and diplomats are paid by their governments from their home countries, and most often than not, they send remittances back home to their families. This mistreatment of the individuals mentioned above who move countries and send remittances back to Nigerian households hampers remittances reporting by misclassifying them as non-residents of the host country under BPM6 and RCG, resulting in their remittance transactions not being captured and leading to an overall under reported value of remittances in the BOP statistics for Nigeria and other IMF member countries.

Considering the aforementioned concept outlined in Section-3.3.1 and its limitation elaborated upon in the preceding discussion, this research posits the recommendation for the IMF to incorporate the concept of migrants within the BPM6 and RCG framework. Simultaneously, it suggests eliminating the notion of residents, thereby broadening the scope of remittance data and alleviating the current constraints and issues explicated earlier. Moving to the concept of migrants in the remittance reporting framework will enable a more holistic view of the remittance movement and reporting in the BOP statistics enabling the Central Bank of Nigeria to understand and facilitate remittances better than before. Unfortunately, there is no global consensus on the definition of migrants or a formal definition available for migrants. The UN and IOM both define migrants somewhat differently, but there are baseline similarities in their definitions. Migrants can be internal, within the bounds of the same country, or external, a journey undertaken to a different country known as international migrants. The UN definition for migrants is the closest available to help discover remittance data. The UN categorizes an international migrant as someone who relocates to a different country from their origin, regardless of the reason (*Definitions*, 2016, para. 2). Using the concept of a migrant coupled with the design principles of the eNaira, the Central Bank of Nigeria can theoretically mitigate the issues when identifying, classifying, collecting, and reporting remittance data. The identity of eNaira users in and outside Nigeria must be validated before they can access and use it for transactions and

remittances, enabling a more rigorous KYC implementation for all players transacting in the economy, enabling the identification and links between remittance senders and receivers that currently remain out of the purview of the Central Bank of Nigeria, based on the framework presented in the BPM6 and RCG (2009). Lastly, the suggested updates of concepts in BPM6 and RCG will result in improving the concept of personal transfers, which currently records the bulk of remittance transactions as per the framework. This is because the current remittance data is recorded under 'personal transfers' and rests on the concepts of transfers between residents and non-residents, updating it to transfers between migrants and migrant households (non-migrants) using the eNaira identification method will enable the Central Bank of Nigeria to bring in the previously unreported data under the current framework, significantly improving remittance data. The following section will now unpack the remittance data sources with respect to eNaira presented in the BPM6 and RCG framework.

5.3.1 International Transaction Reporting System (ITRS)

Currently, Nigeria does not have an ITRS. ITRS design and implementation require high financial and technological investment and human resource management. Usually, it is difficult to devise an ITRS internally as that requires collaboration with financial technology firms that might not be available domestically. The development of an ITRS also requires close involvement from IMF because the ITRS has to be built on the IMF ITRS standard of reporting. Developing an ITRS and customizing it for the needs of the Central Bank of Nigeria and the Nigerian economy can be time-consuming and cumbersome, and quite costly. Technological advancements such as the eNaira pose a dual choice for the Central Bank of Nigeria. Either invest in legacy systems to improve remittance data collecting and reporting as guided in the BMP6 and RCG framework or skip over the legacy system and use the eNaira technology. Based on the assumptions, using the eNaira, the Central Bank of Nigeria can circumvent designing and deploying an ITRS and use the eNaira hyperleger technology to record granular and aggregated remittance amount data accurately.

eNaira can overcome the weakness of ITRS remittance reporting mechanisms, specifically the one associated with misclassification and thresholds. In general, certain thresholds are put

in place for reporting to reduce the cost and load of an ITRS. Transactions under the threshold are reported as aggregates, and all transactions above a threshold are reported individually. International remittances have a high number of transactions that are under the threshold amounts of ITRSs'. Migrants tend to send small but frequent remittances to their households depending on the migrant host country, which gets aggregated in ITRS and BOP statistics. eNaira reporting mechanisms ensure that all transactions, regardless of any threshold, are accounted for in the eNaira hyperledger and not just netted amounts. This minor improvement has a major impact on remittance data for the Central Bank of Nigeria. The Central Bank of Nigeria, with eNaira remittances, could for the first time, start devising bilateral remittance data for Nigerian migration corridors, which has not been done by any country. In conjunction with migration data, the bilateral remittance data through eNaira can enable policymakers to support Nigerian migrants and remittance-receiving households by further product innovation in the eNaira wallet using insights from transaction patterns ensuring the users remain within the formal channel for all their financial needs. The other issue of misclassification can also be circumvented with eNaira wallet-to-wallet remittances being recorded with global standards for CBDCs, ensuring detailed transactional information on the sender, receiver, sender country, receiver, country, gender, costs, and transaction times. The differences in reporting standards between money transfer operators will reduce with eNaira as reporting will be automated through unified hyperledger entries for eNaira remittances, thereby reducing the need for direct reporting. Moreover, given the eNaira design and architecture, eNaira enables complete end-to-end identity management for remittance senders and receivers. The Central Bank of Nigeria has adopted stronger 'Know your customer (KYC)' and 'Anti Money Laundering (AML)' controls with financial institutions to ensure compliance which previously was difficult to implement with cash-based transactions. The Central Bank of Nigeria and BOP compilers would have a complete view of the household-to-household remittances providing more reliable, timely, and accurate data on remittances than before. In theory, there is no need for the Central Bank of Nigeria to invest in an ITRS system with eNaira for the reasons stated above; instead, they should work with institutions to improve the regulatory and legal framework. Improving the legal and regulatory framework around eNaira can enhance the Central Bank of Nigeria's ability to improve the

country's financial sector's efficacy and gain public support for a shift towards eNaira adoption. Furthermore, if utilized properly, eNaira remittances can eliminate the burden of building all the components of remittances in the BPM6 and RCG mentioned in Section-3.3.2 due to its automated reporting nature and the end-to-end remittance trail. In parallel, the stated advantages of the eNaira for remittances can lead to a more considerable shift towards this transaction channel, eliminating the need for ITRS-based reporting as the Central Bank of Nigeria has a better automated reporting purview.

5.3.2 Direct Reporting

Before eNaira implementation, BOP and remittance data compilers can contact financial institutions and international money transfer operators to receive direct remittance data. They can request access to aggregated and granular data depending on their needs. In the ITRS, financial institutions and international money transfer operators report netted amounts of settlement accounts, restricting the view of available remittance data. It is evident from the review of the Nigerian economy that for international remittances, individual preference leans towards international money transfer operators providing more favorable exchange rates and lower remittance transaction costs. This is because IMTOs have better relationships with operators in foreign countries to facilitate payments than the existing Nigerian banks, providing access to more remittance corridors for Nigerians living outside the country to send remittances back home. Direct reporting to BOP compilers would have benefits and challenges for remittance data in Nigeria. In Nigeria, the legal and regulatory framework does support the Central Bank of Nigeria and BOP compilers for direct reporting on remittance when required. One of the main challenges the Central Bank of Nigeria faces is that direct reporting is not automated and works manually, raising concerns for remittance data reliability. It can be argued that it is a form of a survey. This is because the Central Bank of Nigeria would send out a standard form for remittance data to all international money transfer operators and other players facilitating remittance transactions in the economy to reply with the remittance data as per the direct reporting form. Even before reaching out to remittance-facilitating actors in the economy, the Central Bank of Nigeria and BOP remittance compilers face the ordeal of identifying the complete range of in-

stitutions, international money transfer operators, and agents supporting remittance transactions for remittance data compilation. This actor identification exercise would have to be conducted manually every time for BOP remittance statistics as new remittance institutions enter the economy and increase their reach through branches and agent networks while some older players might be exiting the market. This actor identification can also add more burden for the Central Bank of Nigeria, resulting in time delays for remittance reporting. The second challenge for remittance data collection through direct reporting is that the frequency of data collection can vary, given that even though it is called direct reporting, one might assume it is automated in nature but in reality, it is a manual process. Therefore, depending on the capacity of the Central Bank of Nigeria and BOP remittance compilers, this would be once or twice per year. Similarly to the ITRS, even direct reporting is plagued with misclassification errors and errors in the purpose of remittance transactions.

As mentioned above and to reiterate, the eNaira wallet remittances are purely digital in nature, with detailed ledger entries that can provide the Central Bank of Nigeria with the most timely, reliable, end-to-end remittance transaction information. Given the eNaira, remittance transaction reporting will standardize the remittance transaction details. This will, in turn, reduce misclassifications due to multiple remittance-receiving operators having different internal reporting standards and mechanisms and, at times, depending on the legal arrangement between remittance operators, the sending side institutions not being transparent with the receiving side institutions on the cost, commission structure, and the forex conversations. The eNaira-based remittances would make the whole remittance transaction chain transparent for the Central Bank of Nigeria and BOP remittance data compilers, allowing them to explore previously unavailable data ensuring a complete compilation of the mandatory and supplementary items for remittance data reporting in the BPM6 and RCG framework.

5.3.3 Household Surveys

The RCG suggests household surveys to be additional sources of remittance data after the ITRS and direct reporting. Compilers of remittance data can utilize existing surveys and request the country's statistics office to add additional questions about remittances in their standard surveys.

The Central Bank of Nigeria can also conduct specific surveys to collect data on remittance reasons, channels, and costs. Specialized surveys for remittance in Nigeria would be challenging to conduct and would be costly given the size of the population and population residing in far-reaching areas of the country. Even with the introduction of the eNaira, household surveys are a vital source of direct information and will keep adding value to understand the on-ground picture of the remittance market directly from the population. The challenges regarding sampling for remittance receiver households (IMF, 2009b, p. 42), to a degree, can be mitigated with eNaira for the Central Bank of Nigeria and remittance data compilers by having a digital database of remittance recipients using eNaira wallets. Although eNaira can help in sampling and identifying remittance-receiving households, an issue of a proper representation of the population in the sample can get exaggerated, causing a sample bias. The reason for this would be that eNaira wallet users for remittances might have different socioeconomic backgrounds and education from the general population. Therefore it would be prudent to closely monitor the adoption rate from both sending and receiving sides before building samples based on eNaira users. The introduction of the eNaira would not impact household surveys as they provide access to more information uncovering both formal and informal methods than transactional remittance data. Therefore, this data source for remittances would be the least impacted.

5.3.4 Modeling Remittances

As described in Section-3.3.4, remittance data compilers for BOP statistics can utilize indirect data sources for building approaches to estimate the remittance sector. Furthermore, in scholarship, researchers have utilized econometric models used for estimating the size of the shadow economies to estimate the remittance sector (both formal and informal). Unfortunately, remittance data compilers for BOP statistics stay clear of this approach as it requires extensive technical expertise and IMF also has strict checks and quality assurance measures before remittance data is reported in the BOP statistics from indirect sources. Diving into the research, we see that the remittance estimation models are built on available macroeconomic indicators coupled with secondary data to gauge the remittance sector. Therefore it is critical to point out that the majority, if not all, of the macroeconomic indicators for Nigeria come from BOP statis-

tics of Nigeria, such as GDP calculations, remittance calculations, and forex calculations. This research has already pointed out numerous times that current remittance data in BOP statistics underreport the remittance data due to inherent problems listed, and if the same primary data is used in modeling remittance data, the issues will trickle down, raising reliability and validity issues. Therefore, the eNaira implementation can provide access to better-starting data as inputs for modeling remittances, but this method should be used as a last resort.

In conclusion, to the case study analysis, let's break down the assumptions in Section-5.3. The first assumption rests on eNaira-based remittances having no transactions that will translate into Nigerian adopting this channel over other channels. From the research shown in Section-2.3, migrants tend to choose the remittance channel with the lowest costs and favorable exchange rates; therefore, they choose digital and informal channels, as informal channels are usually based on trust systems. Therefore, the implication of low adoption of the eNaira remittances, based on the reasons above, still holds. Low digital and financial literacy will have the most significant impact on our first assumption breaking down, causing low uptake of the eNaira and usage of eNaira-based remittances. The Global Findex Survey 2021, for Nigeria has illustrated the low digital uptake of mobile money services and digital platforms for financial services, including remittance (Demirgüç-Kunt, Klapper, Singer, & Ansar, 2022). Furthermore, it also unveiled the digital divide between men and women in Nigeria for financial services. What is commendable in the eNaira and eNaira wallet implementation is that is not solely based on mobile applications on smartphones but is available to the whole Nigerian country through USSD as well on feature phones, a technology that most Nigerians are accustomed to, thereby making it accessible to all and ensuring the uptake increases gradually over time. Given the rising popularity of CBDCs around the globe (see Section-4.2), it is a matter of time before countries start deploying their own CBDCs. Countries are already concluding their testing and pilot phases for CBDCs, and the eNaira, having interoperability as a core design for cross-border payments, can fare well for the remittance value chain. Hence, the second assumption should also hold and not break down over time.

Chapter 6

Discussion & Policy Considerations

With the innovation of new technologies such as the eNaira and other digital currencies coming into mainstream finance, the IMF should take a greater onus to improve its BPM6 and RCG remittance data framework. Firstly to support developing countries dependent on remittances rather than pointing out inaccuracies of current remittance data which are primarily due to BPM6 and RCG remittance frameworks having poorly constructed concepts, definitions, and data sources. Secondly, by defining and updating the underlying remittance transactions and their calculations to capture the on-ground realities of the remittance sector. Therefore regardless of the technological leaps that countries take, such as Nigeria with the eNaira, they will be restricted to report remittance data based on the BPM6 and RCG and not fully utilizing the potential of the eNaira for remittances. Bearing in mind that eNaira is a fairly new implementation and is yet to be adopted at scale. As pointed out in this research, it can potentially improve remittances by applying global standards and identity management, reducing remittance costs and informality by providing people with cost-free transacting channels and favorable exchange rates. This would only be a reality with a shift in people's preferences for the eNaira channel, which require time and trust. In contrast, the eNaira can cause further problems for remittances and the payments industry, as some might consider privacy a concern given the design of the eNaira as there will no longer be anonymity in transactions as cash provides. People would not want the government and the central bank to have a full picture of individual transactions as the eNaira implementation is not the decentralized application of CBDC. Hence, the Central Bank

of Nigeria and Nigerian policymakers need to work together in improving the legal and regulatory frameworks around the eNaira to foster trust and shift the tide from cash to digital in the Nigerian economy, which is plagued by informality. In parallel, policymakers and monetary authorities around the globe need to keep a close eye on the eNaira, to monitor how the eNaira remittances have fared over time and draw from the lessons learned from the eNaira, in order to keep improving and innovating the underlying technology facilitating cross-border payments and remittances. Ozili (2022a) and the research above on the eNaira sheds light on opportunities it holds, especially with remittances and remittance data, this will only be feasible if the IMF becomes more proactive and engage on a more active basis with countries implementing CBDCs while acknowledging the inadequacies of its BPM6 and RCG remittance framework and reworking them in the upcoming iterations of the BPM and RCG.

Chapter 7

Conclusion

The thesis has tried to integrate the eNaira - a Central Bank of Nigeria digital currency within the existing concepts, definitions, and specifically in the IMF BMP6 and RCG remittance framework, exposing underlying issues that can be addressed by the new emerging technologies such as the CBDCs. Firstly, In order to fully exploit the CBDC technology, IMF would benefit from revisiting the concepts of residents and updating them with migrants, as remittances and migrants are intertwined compared to concepts of residents with remittances. Secondly, with CBDCs, central banks have a way forward to apply global standards and move towards more digitized and automated reporting for all economic actors and remittance-facilitating institutions. The remittance frameworks should be updated to reflect new emerging technologies rather than promoting data sources that were prominent a decade ago.

Remittance and remittance costs are high on the global agenda with the backing of the G20; however, there has been little work done since 2009 to improve the concepts defining remittances and remittance data in the IMF BPM6 and RCG for remittance compilers. International organizations have been working tirelessly in the remittance sector to improve remittance data, but given the vast number of remittance corridors, IMF must play a more pivotal role. Over the years, remittance-dependent countries have taken numerous measures to improve their financial and regulatory frameworks around remittances and cross-border payments, but they are unable to translate those improvements for reliable remittance data as they are bound by the IMF to report remittance data as per the outdated BPM6 and RCG remittance frameworks.

The suggestions presented in the thesis are not without limitations. The improvements in remittance and remittance data overall would come about with increasing uptake of new remittance methods such as the eNaira. Research has shown that remittance senders actively seek out low-cost remittance channels with favorable foreign-exchange rates to send money back home. eNaira wallet remittances have zero costs - the first of its kind, having the potential to bring about a shift in individual behavior. Nonetheless, a vast amount of research also showcases that behavioral change takes time which will definitely have an impact on the uptake of eNaira. Additionally, there are concerns about infringement on privacy with the eNaira as it gives the Central Bank of Nigeria a complete end-to-end transaction view which can also significantly impact eNaira becoming the main channel for remittances and payments in the economy. Additionally, the eNaira remittance can also be affected if there is no improvement in digital and financial literacy across Nigeria, as that can hamper the uptake of the eNaira. Lastly, due to the current lack of quantitative data available on the eNaira remittances, there are no empirical studies done as of now; therefore, future research should utilize the data that will be published by the Central Bank of Nigeria for the year 2022 to uncover the impact of eNaira on remittances.

Even with the stated limitations, it would be prudent to keep a close eye on Nigeria for countries moving into the CBDC research, pilot, and implementation stages, as greater collaboration between the IMF and central banks around the globe can result in CBDCs changing the cross-border payments sector. To conclude, IMF must keep up with new emerging technologies and should take a more inclusive approach rather than a top-down approach to address the actual conditions of the remittance sector and reflect the same in their remittances framework, to ultimately improve the remittance sector as a whole.

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