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REMITTANCES, EXCHANGE RATES, AND THE ROLE OF FINANCIAL DEVELOPMENT

John Beirne, Pradeep Panthi, and Guna Raj Bhatta

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ABSTRACT

This paper examines the role of financial development as a buffer for the appreciating effects of remittances on exchange rates using annual data from 1996 to 2021 for 146 economies, with a focus on 43 high remittance-receiving economies. A panel regression framework is employed in the baseline analysis, which remains robust to an instrumental variables approach. The findings reveal that remittances have appreciating effects on real effective exchange rates (REER), especially in high remittance-receiving economies, consistent with the “Dutch disease” mechanism. Examining subcomponents of financial development, we find that stronger domestic financial markets and market-based financial deepening are critical channels for absorbing the REER appreciation effects of remittances.

Keywords: remittances, exchange rates, financial development

JEL codes: F24, F31, G21, O16

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I. INTRODUCTION

Although remittance inflows bring multiple socioeconomic benefits to recipient economies, they can also create challenges for macroeconomic stability. As remittance levels surge, concerns can arise regarding the potential disruption of economic equilibria and the impact on macroeconomic factors. Meanwhile, remittances are becoming a critical source of foreign exchange reserves, exceeding traditional sources in many developing economies (Adams and Page 2005, Singer 2010). An abundant literature exists on the potential adverse macroeconomic repercussions of elevated levels of remittances within these economies (Acosta, Lartey, and Mandelman 2009; Ratha 2003). One of the key concerns arises when remittances are closely linked to macroeconomic and financial stability through exchange rate appreciation (Amuedo-Dorantes and Pozo 2004). This is also related to the so-called Dutch disease effect,¹ and the exchange rate appreciation effects of remittances are widely discussed in the literature (Bourdet and Falck 2007; Acosta, Lartey, and Mandelman 2009; Lartey, Mandelman, and Acosta 2012; Hassan and Holmes 2013; Makhoul and Mughal 2013; Rabbi, Chowdhury, and Hasan 2013; Gapen et al. 2018).

Remittance flows to low- and middle-income economies have surged significantly over the past 3 decades. For instance, personal remittances received at the global level increased around 16-fold over the period 1992 to 2022, according to World Bank data. Notably, lower middle-income economies led in remittance receipts among the four income groups. Despite the lowest flow of remittances to low-income economies, their role remains critical to socioeconomic transformation, rising nearly 20-fold from 1992 to 2022. The substantial growth of remittance income in developing economies also plays a pivotal role in poverty alleviation and enhancing financial inclusion (Adams and Page 2005, Acosta et al. 2008, Akobeng 2016). Remittances contribute to output stabilization, drive domestic demand, and facilitate the transfer of human capital (Acosta, Lartey, and Mandelman 2009; Azizi 2018). However, the consumption-driven nature of remittances introduces multiple challenges, such as those encompassing trade imbalances and Dutch disease in many developing economies (Amuedo-Dorantes and Pozo 2004; Chami, Fullenkamp, and Jahjah 2005; Barajas et al. 2009).

In this paper, we assess the role of financial development in the exchange rate effects of remittances in developing economies. Our underlying intuition is that a higher level of financial development can facilitate more productive allocation of remittances across the economy, with a smoother effect on the exchange rate, whereby a more developed domestic financial system absorbs remittance income owing to its depth, access, efficiency, and stability. The paper provides two main contributions to related literature. First, it examines the issue across a global sample of 146 developing economies, which, to the authors' knowledge, represents higher coverage than other existing studies. This also facilitates a comparative regional analysis and alternative economy groupings, notably for 43 high remittance-receiving economies. Second, this paper offers insights

¹ Dutch disease affects the performance of the manufacturing and industrial sectors via appreciation in the real exchange rate (Corden 1984). The term has also been used more broadly to reflect any development that leads to a sharp inflow of foreign currency financial flows (Ebrahim-Zadeh 2003).

into financial development as a potential buffer for the exchange rate shocks of remittances, thereby contributing to the growing literature on understanding the role of domestic financial markets in macro-financial stability in developing economies. Related to this, we also consider the implications of remittances for alternative exchange rate distributions as a mechanism for robustness and to understand the role of remittances in extreme real effective exchange rate fluctuations.

The rest of the paper is structured as follows. Section II reviews related literature; Section III outlines the data and variables; Section IV explains the econometric approaches and empirical models employed; Section V discusses the findings; Section VI deals with endogeneity issues and robustness; and Section VII provides conclusions and policy implications.

II. RELATED LITERATURE

Remittances can have a significant positive impact on economic prosperity in developing economies, alleviating poverty and inequality and promoting financial inclusion (Adams and Page 2005; Acosta et al. 2008; Giuliano and Ruiz-Arranz 2009; Anyanwu and Erhijakpor 2010; Anzoategui, Demirgüç-Kunt, and Martínez Pería 2014; Akobeng 2016). Related to this, they can help stabilize aggregate output by increasing domestic consumption, promoting human capital through investment in health and education, and fostering entrepreneurship through the transfer of skills, knowledge, technology, and seed capital (Acosta, Lartey, and Mandelman 2009; Chami et al. 2010; Azizi 2018; Kakhkharov 2019). Remittances can also help macroeconomic stability and growth through capital creation (Fayissa and Nsiah 2010, Lartey 2013). However, remittances may also have negative impacts, such as worsening terms of trade, brain drain leading to a decline in innovation, and shortage of labor resulting in increased wage and production costs (Beine, Docquier, and Rapoport 2001; Amuedo-Dorantes and Pozo 2004; Özden and Schiff 2006; Docquier, Lohest, and Marfouk 2007).

The major macroeconomic drawbacks well discussed in the literature are the effects of remittances on real effective exchange rates (REER). A large related literature examines “Dutch disease,” whereby a large inflow of remittances leads to an appreciation of the domestic currency, making imports cheaper and exports expensive (Amuedo-Dorantes and Pozo 2004; Rabbi, Chowdhury, and Hasan 2013; Roy and Dixon 2016; Ito 2019; Hien et al. 2020; Ratha and Moghaddam 2020). An increase in remittance flows leads to a decrease in labor supply, an increase in non-tradable consumption demand, and a Dutch disease phenomenon with a shift of labor from the tradable to the non-tradable sector, thereby offsetting the positive impacts of remittances (Fajnzylber and López 2008; Acosta, Lartey, and Mandelman 2009). This can lead to a deterioration of the external sector’s competitiveness, thereby affecting the sustainability of economic growth. Indicating remittance as a “paradox of gifts,” Amuedo-Dorantes and Pozo (2004) reveal that workers’ remittance potentially may impose economic costs on the export sector, diminishing international competitiveness and paralleling concerns raised by the Dutch disease or “resource boom” models, which involve real exchange rate appreciation and a shift of resources from traded to non-traded sectors in Latin American and Caribbean countries.

Barajas et al. (2018) state that remittances, while benefiting households, bring macroeconomic challenges like Dutch disease effects and institutional quality reduction. They also create monetary policy challenges, as higher remittance levels weaken the transmission channel between central bank policy rates and banks' marginal cost of funds. Bourdet and Falck (2007) found that migrants' remittances in Cape Verde, while rapidly increasing, induced a mild Dutch disease effect on the tradable sector's competitiveness. However, a shift in aid orientation and a more export-focused domestic policy help mitigate this impact.

Other work, by Hassan and Holmes (2013), investigates the long-run relationship between remittances and the real exchange rate in high-remittance, less-developed economies, revealing a small, yet significant, Dutch disease effect. Focusing on developing and transition economies, Lartey, Mandelman, and Acosta (2012) find that higher remittances trigger real exchange rate appreciation and resource movement effects that favor the non-tradable sector. It is also found that resource movement effects are more pronounced under fixed nominal exchange rate regimes. Focusing on Bangladesh, Rabbi, Chowdhury, and Hasan (2013) find that remittances lead to real exchange rate appreciation and diminished external trade competitiveness. The paper recommends gradually easing trade barriers, promoting external trade diversification, and redirecting remittances from non-tradable sectors to priority investment areas for long-term economic improvement (see also Roy and Dixon 2016, who focused on selected South Asian economies). Some other work has found deprecating effects of remittances are channeled to investment rather than consumption, notably where remittances are beyond the level of 1% of gross domestic product (GDP) (e.g., Ito 2019, Hien et al. 2020).

The existing literature also highlights significant policy challenges related to higher remittances. For example, higher remittances can shift developing and transition economies into non-tradable sectors through "resource movement effects" and are more pronounced when the exchange rate is fixed, causing the real exchange rate to appreciate (Lartey, Mandelman, and Acosta 2012). Other research suggests remittances could positively affect the recipient economy's economic growth without appreciating the exchange rate (Ito 2019). Lartey, Mandelman, and Acosta (2012) emphasize the role of a well-functioning financial sector, stating that a robust financial system can facilitate the efficient allocation of remittances toward productive investments, thereby mitigating the adverse effect of exchange rate appreciation. An effective financial system can transfer remittances from consumption to investment channels, leading to economic diversification while mediating the impact of remittances on the exchange rate (Acosta, Lartey, and Mandelman 2009).

A further strand of the literature examines the contribution of remittances to the financial sector development of recipient economies. For example, Adekunle et al. (2022) show remittances support financial development in the short and long run across 53 African economies. Likewise, Donou-Adonsou, Pradhan, and Basnet (2020) show that remittances and financial development have bidirectional causality in the long run in top remittance-receiving Sub-Saharan Africa, supporting financial development. Aggarwal,

Demirgüç-Kunt, and Pería (2011), Azizi (2020), and Basnet et al. (2021) provide similar evidence that remittances promote financial development. Sobiech (2019) suggests remittances alleviate poverty but support financial development in the long run. Our paper builds on this strand of the literature by examining the role of financial development in affecting the exchange rate impacts of remittances.

III. DATA AND VARIABLES

This paper uses annual time series data from 1996 to 2021. Data other than financial development indicators and real effective exchange rates (REER) are obtained from the World Bank's World Development Indicators database (WDIs). This includes data on personal remittances received (% of GDP); trade volume, comprising the sum of imports and exports of goods and services; and total capital flows, representing the sum of net direct investment and net portfolio investment (debt and equity). We obtained the broad-based financial development index and its subcomponents of financial institutions and financial markets from the International Monetary Fund (IMF) financial development database developed by Svirydzienka (2016). We obtained the REER from the database of Darvas (2021). By drawing common economies from these three sources, we develop a comprehensive dataset encompassing a diverse set of 146 economies across various income levels.² The selection of these economies largely depends upon the availability of the data, especially the remittance-to-GDP ratio, the financial development index, and the REER.

A. Remittances

Remittances (REM) are the explanatory variable in this study, which measures inward personal remittances in terms of level and percentage of GDP to recipient economies. It consists of individual transfers of employees' income and compensation, who are working abroad, to their families living in their hometown.

B. Real Effective Exchange Rate

The REER is the weighted average of an economy's currency for an index or basket of other major currencies. The weights are determined by comparing the relative trade balance of an economy's currency against that of each economy in the index. The dataset of Darvas (2021) is used for this purpose.

C. Financial Development

Financial development is critical in promoting the private sector, driving economic growth, and alleviating poverty by optimizing resource allocation. It encompasses financial institutions, markets, and instruments. Our measure of financial development covers the financial depth, access, and efficiency of both financial institutions and financial markets, as per the definitions of Svirydzienka (2016). Therefore, to understand how financial development acts as a buffer against currency appreciation related to inflows of

² See Table A6 in the Appendix for the full set of 146 economies.

remittances, we first examine the intermediation effects of the overall financial development index (FD). Then, we explore the same relationship, examining the financial institution index (FI) and the financial market index (FM) separately in the nexus between remittances and REER. These can potentially have different effects on exchange rates, with the former enabling capital inflows, including remittances, which supports credit intermediation and the real economy (banking-based financial deepening); whereas the latter can facilitate greater capital mobility and a two-way flow of capital, mainly through the equity and bond market (market-based financial deepening). This may imply that FI will tend to be associated with a REER appreciation, while FM will have mixed effects on the REER depending on the direction of the net flow of capital.

D. Other Control Variables

The study incorporates a few standard control variables to capture essential factors influencing the REER. Trade volume, also indicating trade openness, measured by the sum of imports and exports of goods and services, represents the magnitude of the real sector and its influence on the REER through relative price levels. We assume that an increase in trade volume may lead to relative demand and supply changes, affecting domestic and foreign price levels, which can influence the REER. Therefore, we use the trade volume percentage of GDP as a control variable. The size and magnitude of capital flows other than remittances also influence the REER. Therefore, the total capital flows (TCF) percentage of GDP, representing the sum of net direct investment and net portfolio investment of debt and equity, is used as another control variable. We assume that the mobility of international capital flows depends on the difference in interest rates between the two economies. When there is a disparity in interest rates between economies, capital flows are expected to move to an economy with higher interest rates. In the context of total capital flows affecting the REER, if the economy experiences an influx of capital owing to higher relative interest rates, it could appreciate the domestic currency. Besides, economies with higher capital mobility will experience more significant capital flows, potentially leading to changes in the exchange rate. When total capital flows increase, it can affect the supply of and demand for the domestic currency in the foreign exchange market, subsequently influencing the REER. The descriptive statistics of selected variables and their correlation matrix for 146 economies are reported in Table A1 of the Appendix. The scatter plots to show the relationship between the periodic mean of remittances percentage of GDP (REM) and the periodic mean of the natural logarithm of the real effective exchange rate (lnREER) are reported in Table A2 of the Appendix.

IV. ECONOMETRIC METHODS AND EMPIRICAL MODELS

Our analysis employs unbalanced panel data to identify the relationship between remittances; financial development, or subcomponents; and REER. The methodology used is a fixed effects panel regression model. In this setup, we first construct panel settings of 146 cross-sections (N) and 26 yearly time observations (T)—that is, $(N \times T) = (146 \times 26)$. The analysis also classifies the panel settings of 146 cross-sections of economies with high inflows by comparing the group means of 146 economies with the

periodic mean of each economy. Guided by the underlying theoretical framework, we formulate three main equations representing the core dynamics of critical variables:

$$\ln\text{REER}_{i,t} = \alpha_{i,t} + \beta_1 \text{REM}_{i,t} + \gamma_{i,t} + \delta_{i,t} + e_{i,t} \quad (1)$$

$$\ln\text{REER}_{i,t} = \alpha_{i,t} + \beta_1 \text{REM}_{i,t} + \beta_2 \text{FD}_{i,t} + \gamma_{i,t} + \delta_{i,t} + e_{i,t} \quad (2)$$

$$\ln\text{REER}_{i,t} = \alpha_{i,t} + \beta_1 \text{REM}_{i,t} + \beta_2 \text{FD}_{i,t} + \beta_3 (\text{REM}_{i,t} \times \text{FD}_{i,t}) + \gamma_{i,t} + \delta_{i,t} + e_{i,t} \quad (3)$$

where, $\ln\text{REER}$ is the natural logarithm of the real effective exchange rate for economy i in year t ; REM is remittances relative to GDP; and FD is the financial development metric for economy i in year t .³ $\gamma_{i,t}$ represents the vector of control variables. They are trade (TRD) and total capital flows (TCF). Both control variables are represented as a percentage of GDP. $\varepsilon_{i,t}$ captures the error term. $\delta_{i,t}$ symbolizes fixed effect (economy). $\beta_1, \beta_2, \beta_3$ are the coefficients to be estimated. Equation (1) explains the primary relationship between the remittance-GDP ratio and control variables with the natural log of the REER. Equation (2) incorporates the financial development index and its subcomponents used separately, reflecting various models. Equation (3) includes the interaction of the remittance and financial development indexes. We estimated the model with two different sample sets: one with a full sample of 146 economies and the other only with economies with a larger share of remittances relative to the size of GDP. First, we estimate the relationship between remittances and the REER, considering financial development in a global panel of 146 economies.

After that, we restrict the sample to 43 economies, high remittance receivers, or economies receiving a higher-than-average remittance-GDP ratio across the full sample of 146 economies. Further examinations are also carried out on subpanels based on different regions. We enrich the empirical work further by implementing a quantile regression approach to explore the effects of remittances at different distributions of the exchange rate. We also conduct a robustness test of the estimated results to examine the validity of our findings. These include two-stage least squares (2SLS) models using cumulative net migration (% of total active population, ages 16–64) and 1-year lagged value of remittances (% of GDP) as instrumental variables (IVs).

V. EMPIRICAL RESULTS AND DISCUSSIONS

A. Estimation Results for Global Panel

Table 1 presents the estimation results obtained through the Ordinary Least Squares-Fixed Effects (OLS-FE) method for the full panel of 146 economies. The estimation results indicate that remittances (REM) positively and statistically significantly impact the real effective exchange rate (REER). In other words, it suggests that the exchange rate tends to appreciate when remittances increase, thereby dampening external competitiveness, consistent with the Dutch disease mechanism. This effect is not always significant across

³ We use the IMF index of financial development, which examines depth, access, and efficiency of both financial institutions (FI) and financial markets (FM). These subindices of financial development (FD) (i.e., FI and FM) are examined separately in the empirical estimations.

specifications, however. Financial development (FD) also leads to a REER appreciation overall, consistent with the role played by capital inflows from abroad on the exchange rate, which are channeled more to economies where the financial sector is more developed. A similar effect is found for financial institutions (FI), reflecting bank-based financial deepening, while the effect of financial markets (FM), which reflects market-based financial deepening, is also positive and significant, but lower in magnitude.

Table 1: Estimation Results for the Full Panel of 146 Economies

Dependent Variable	Log of Real Effective Exchange Rate (lnREER)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
REEM (% of GDP)	0.002* (0.001)	0.001 (0.001)	-0.000 (0.001)	0.002* (0.001)	0.000 (0.002)	-0.002 (0.002)	0.003*** (0.001)
FD		0.557*** (0.050)			0.553*** (0.055)		
FI			0.577*** (0.037)			0.546*** (0.043)	
FM				0.043 (0.041)			0.096** (0.043)
REM×FD					0.001 (0.007)		
REM×FI						0.008 (0.005)	
REM×FM							-0.023*** (0.006)
Trade (% of GDP)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
TCF (% of GDP)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Constant	4.714*** (0.014)	4.552*** (0.020)	4.505*** (0.019)	4.707*** (0.016)	4.554*** (0.021)	4.516*** (0.021)	4.696*** (0.017)
Observations	3,327	3,223	3,223	3,223	3,223	3,223	3,223
R-squared	0.018	0.057	0.092	0.019	0.057	0.093	0.023
Number of cross-sections	146	146	146	146	146	146	146
Fixed effect (economy)	Yes	Yes	Yes	Yes	Yes	Yes	Yes

FD = financial development, FI = financial institutions, FM = financial markets, GDP = gross domestic product, REER = real effective exchange rate, REM = remittances, TCF = total capital flows.

Note: Standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Source: Authors' calculations.

Turning to the interactions, we find that the interaction of remittances with the broad measure of financial development (REM×FD) is positive but insignificant, although this may also reflect the lack of significance in the direct effect of remittances. Likewise, the interaction term between remittances and financial institutions (REM×FI) is positive and also not significant. However, the interaction term between remittances and financial market (REM×FM) is negative and highly significant, suggesting stronger domestic financial markets mitigate the exchange rate effects of remittances. With more developed financial markets, remittances can be channeled to savings, investment, or foreign asset purchases rather than consumption. This can lead to a more dampened REER appreciation or even depreciating pressure on the REER.

In a subsequent analysis, we focus on those economies that receive a high level of remittances relative to GDP. For this, we first compare each economy's periodic mean of remittances with the group mean of 146 economies from 1996 to 2021. We find that 43 economies have a higher periodic mean of remittances percentage of GDP than the group mean of 146 economies.⁴

B. Estimation Results for 43 High Remittance Receiving Economies

Table 2 presents the estimation results for the subpanel of 43 economies that have high levels of remittances relative to GDP, according to our calculations. For these economies, remittances (REM) have a positive and statistically significant impact on the REER across the majority of specifications. Notably, the effects of remittances on the REER are larger and also more statistically significant than the results for the full sample of 146 economies. Financial development (FD) and financial institutions (FI) also exhibit an appreciating impact on the exchange rate, as in the case of the full sample. However, financial markets (FM) has a negative and significant coefficient. With more developed financial markets and strength of market-based financing, this facilitates greater capital mobility for both residents and foreign investors. For the sample of high remittance-receiving economies, this implies strengthening domestic financial markets can dampen appreciating pressure on the REER.

Table 2: Estimation Results for 43 High Remittance-Receiving Economies

Dependent Variable	Log of Real Effective Exchange Rate (lnREER)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Regressors							
REM (% of GDP)	0.003*** (0.001)	0.002** (0.001)	0.001 (0.001)	0.003*** (0.001)	0.005*** (0.002)	0.003* (0.002)	0.003*** (0.001)
FD		0.560*** (0.095)			0.772*** (0.140)		
FI			0.569*** (0.060)			0.655*** (0.098)	
FM				-0.230** (0.092)			-0.062 (0.123)
REM×FD					-0.018** (0.009)		
REM×FI						-0.007 (0.007)	
REM×FM							-0.015** (0.007)
Trade (% of GDP)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)
TCF (% of GDP)	0.002 (0.001)	0.002 (0.001)	0.002* (0.001)	0.002* (0.001)	0.002 (0.001)	0.002* (0.001)	0.002 (0.001)
Constant	4.754*** (0.025)	4.668*** (0.028)	4.611*** (0.028)	4.758*** (0.025)	4.635*** (0.032)	4.591*** (0.033)	4.745*** (0.026)

Continued on the next page

⁴ The periodic mean of remittances percentage of GDP of 43 economies out of 146 economies for the period of 1996 to 2021 is reported in Table A5 of the Appendix.

Dependent Variable	Log of Real Effective Exchange Rate (lnREER)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Regressors							
Observations	974	944	944	944	944	944	944
R-squared	0.051	0.085	0.135	0.056	0.089	0.136	0.061
Number of cross-sections	43	43	43	43	43	43	43
Fixed effect (economy)	Yes	Yes	Yes	Yes	Yes	Yes	Yes

FD = financial development, FI = financial institutions, FM = financial markets, GDP = gross domestic product, REER = real effective exchange rate, REM = remittances, TCF = total capital flows.

Note: Standard errors are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Source: Authors' calculations.

The interaction terms of remittances and financial development (REM×FD) are negative and statistically significant, indicating that a well-developed financial sector overall in terms of depth, access, and liquidity mitigates the REER appreciation effects of remittances in high remittance-receiving economies. Similarly, the interaction term of remittances with the financial markets index (REM×FM) is negative and highly significant, reinforcing that better financial markets help insulate against the appreciating impacts of remittances on the REER. The interaction term of remittances with financial institutions (REM×FI) is also negative, but statistically insignificant.

We also control for the exchange rate regime, drawing on the Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER) database of the IMF. According to the database, economies practice exchange rate regimes of the conventional peg, stabilized arrangement, crawling peg, crawl-like arrangement, pegged exchange rate within horizontal bands, other managed arrangements, floating, and free-floating, especially since 2008. We assume that the exchange rate regime with floating and free-floating will significantly impact REER concerning the impacts of external capital flows such as remittances. Therefore, we provide a score of 1 for those economies that follow these two regimes; the rest of the exchange rate regimes are quoted as 0. While focusing on high remittance-receiving economies, we noted that none of these economies had adopted a free-floating exchange rate during the study period. The estimation results, considering the exchange rate regime, are reported in Table 3. Our estimation results are consistent with the baseline estimations reported in Table 2 for high remittance-receiving economies. These results indicate that REER for floating exchange regime economies appreciate more compared to those with fixed exchange rate regimes.

Table 3: Alternative Estimation Results for 43 High Remittance-Receiving Economies

(consideration of exchange rate regime)

Dependent Variable	Log of Real Effective Exchange Rate (lnREER)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Regressors							
REM (% of GDP)	0.002*** (0.001)	0.002** (0.001)	0.001 (0.001)	0.003*** (0.001)	0.005*** (0.002)	0.003* (0.002)	0.003*** (0.001)
FD		0.458*** (0.099)			0.693*** (0.141)		
FI			0.526*** (0.065)			0.617*** (0.100)	
FM				-0.224** (0.090)			-0.024 (0.121)
REM×FD					-0.021** (0.009)		
REM×FI						-0.008 (0.007)	
REM×FM							-0.018** (0.007)
Trade (% of GDP)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)
TCF (% of GDP)	0.002 (0.001)	0.002 (0.001)	0.002* (0.001)	0.002* (0.001)	0.002 (0.001)	0.002* (0.001)	0.002 (0.001)
Exchange rate regime	0.075*** (0.015)	0.056*** (0.016)	0.028* (0.016)	0.078*** (0.015)	0.059*** (0.016)	0.028* (0.016)	0.081*** (0.015)
Constant	4.739*** (0.025)	4.671*** (0.028)	4.616*** (0.028)	4.742*** (0.025)	4.634*** (0.032)	4.595*** (0.033)	4.726*** (0.026)
Observations	974	944	944	944	944	944	944
R-squared	0.075	0.097	0.138	0.082	0.103	0.139	0.088
Number of cross-sections	43	43	43	43	43	43	43
Fixed effect (economy)	Yes	Yes	Yes	Yes	Yes	Yes	Yes

FD = financial development, FI = financial institutions, FM = financial markets, GDP = gross domestic product, REER = real effective exchange rate, REM = remittances, TCF = total capital flows.

Note: Standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Source: Authors' calculations.

To enrich the findings, we also split these 43 high remittance-receiving economies into six regional subpanels. The results are reported in Table A3 in the Appendix. Results indicate that the impact of remittances on exchange rates is not uniform across regions. It is positive for most specifications in the cases of South Asia, Sub-Saharan Africa, and Latin America, while mostly insignificant for other regions. Based on these results, we can infer that South Asia, Sub-Saharan Africa, and Latin America are the regions most sensitive to the Dutch disease problem of remittances. The impact of the interaction terms between remittances and financial development indexes (FD, FI, and FM) helps mitigate the appreciation effects of remittances in these regions to varying degrees.

We further investigate the relationship using a panel quantile regression approach. Employing panel quintile regression, we explore the relationship across 0.25, 0.5, and 0.75 quantiles of the REER. The estimation results are reported in Table A4 of the Appendix. Focusing on the high remittance group, we find the results are consistent with the baseline panel of this group for the lower (0.25) and central (0.50) quantiles. The lack of significant effects evident at the higher quantile range suggests remittances do not

drive extreme REER fluctuations at the upper tail end of the distribution but are instead linked to deterioration in terms of trade.

VI. ENDOGENEITY AND ROBUSTNESS

While our main findings highlight the important role of financial development in mitigating the exchange rate appreciation effects of remittances in high remittance-receiving economies, empirical studies of this nature require careful consideration of potential endogeneity. To address this, we use cumulative net migration (CNMP) as a percentage of the total active population (ages 16–64) and the 1-year lag of remittances (% of GDP) separately as instrumental variables (IVs) under a 2SLS estimation framework.

In our dataset of 43 high remittance-receiving economies, CNMP has a 38% correlation with remittances (% of GDP) but only a 5% correlation with the REER, supporting its relevance as a suitable instrument. We also use interaction terms of CNMP with financial development indicators (FD, FI, and FM separately) as IVs for the corresponding interaction terms. The results are reported in Table 4.

Our 2SLS results in Table 4 are mostly consistent with the baseline estimations in Table 2 and Table 3 regarding the intermediation effects of financial development indicators. Remittances continue to show a significant positive association with the REER in most specifications, reinforcing their role in currency appreciation and potential Dutch disease. Notably, financial markets (FM) retain a negative and significant association with the REER, and this effect is larger in magnitude in the 2SLS models, indicating an even stronger mitigating role. In contrast, FD and FI, which are positive and highly significant in the baseline results of Table 2 and Table 3, suggesting they contribute to REER appreciation, become statistically insignificant in the 2SLS estimations, with some coefficients changing sign. This could imply that their baseline effects may have been partly affected by remittance-related endogeneity.

Regarding interaction terms, the baseline results show significant negative effects for $REM \times FD$ and $REM \times FM$, while $REM \times FI$ is insignificant. In the 2SLS results, $REM \times FM$ remains negative and statistically significant, with a larger magnitude than in the baseline, reinforcing the role of well-developed financial markets in dampening remittance-driven appreciation pressures. This suggests economies that have a stronger financial market index measure (FM) can channel remittance-driven resources toward long-term financing, including savings, investment, and foreign purchases of bonds and stocks, rather than immediate consumption. Where financial markets are underdeveloped, remittances are more likely to fuel imports and short-term consumption, thereby amplifying possible Dutch disease effects.

Table 4: 2SLS Estimations Results for 43 High Remittance-Receiving Economies
(cumulative net migration % of active population ages 16–64 as instrumental variable)

Dependent Variable Variable	Log of Real Effective Exchange Rate (lnREER)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
REM=CNMP	0.037*** (0.008)	0.052*** (0.017)	0.042** (0.017)	0.044*** (0.009)	0.987 (7.002)	-0.443 (3.079)	0.055*** (0.014)
FD		-0.492 (0.391)			10.501 (78.005)		
FI			-0.073 (0.282)			-4.083 (26.779)	
FM				-0.412** (0.174)			0.224 (0.354)
REM×FD=CNMP×FD					-2.015 (14.775)		
REM×FI=CNMP×FI						0.727 (4.700)	
REM×FM= CNMP×FM							-0.062** (0.030)
Trade (% of GDP)	-0.004*** (0.001)	-0.004*** (0.001)	-0.004*** (0.001)	-0.004*** (0.001)	-0.031 (0.205)	0.012 (0.099)	-0.004*** (0.001)
TCF (% of GDP)	-0.001 (0.002)	-0.002 (0.003)	-0.001 (0.003)	-0.001 (0.002)	-0.051 (0.375)	0.022 (0.146)	-0.002 (0.003)
Exchange rate regime	0.032 (0.028)	0.042 (0.035)	0.036 (0.031)	0.027 (0.031)	0.130 (0.752)	-0.106 (0.921)	0.024 (0.037)
Constant	4.501*** (0.066)	4.498*** (0.085)	4.503*** (0.071)	4.497*** (0.073)	-1.310 (43.081)	7.239 (17.525)	4.386*** (0.112)
Observations	974	944	944	944	944	944	944
Number of cross-sections	43	43	43	43	43	43	43
Fixed effect (economy)	Yes	Yes	Yes	Yes	Yes	Yes	Yes

2SLS = two-stage least squares, CNMP = cumulative net migration, FD = financial development, FI = financial institutions, FM = financial markets, GDP = gross domestic product, REER = real effective exchange rate, REM = remittances, TCF = total capital flows.

Note: Standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Source: Authors' calculations.

Second, given that our baseline estimations do not provide results for the lag of the regressors, this 2SLS approach considers a 1-year lag of the key explanatory variable—that is, remittances (% of GDP)—as an instrumental variable of the current-year value of the remittances. We use the interaction term of 1-year lagged remittances (% of GDP) with financial development indicators (FD, FI, and FM separately) for the IV or respective interaction terms. We follow Bøler, Moxnes, and Ulltveit-Moe (2015) and Doraszelski, Lewis, and Pakes (2018) while employing 1-year lags of the key regressors as IVs under 2SLS estimations. Estimation results are reported in Table 5.

Table 5: 2SLS Estimation Results for 43 High Remittance-Receiving Economies
(one period-lag of remittances as instrumental variable)

Dependent Variable Regressor	Log of Real Effective Exchange Rate (lnREER)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
REM=REM (-1)	0.004*** (0.001)	0.004*** (0.001)	0.003*** (0.001)	0.004*** (0.001)	0.007*** (0.002)	0.006*** (0.002)	0.005*** (0.001)
FD		0.402*** (0.102)			0.660*** (0.152)		
FI			0.491*** (0.068)			0.620*** (0.109)	
FM				-0.246*** (0.091)			-0.084 (0.126)
REM×FD=REM(-1)×FD					-0.022** (0.010)		
REM×FI=REM(-1)×FI						-0.011 (0.007)	
REM×FM= REM(-1)×FM							-0.015* (0.008)
Trade (% of GDP)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)
TCF (% of GDP)	0.002 (0.001)	0.002 (0.001)	0.002 (0.001)	0.002 (0.001)	0.002 (0.001)	0.002 (0.001)	0.002 (0.001)
Exchange rate regime	0.067*** (0.015)	0.052*** (0.016)	0.025 (0.016)	0.070*** (0.015)	0.054*** (0.016)	0.026 (0.016)	0.072*** (0.015)
Constant	4.746*** (0.026)	4.686*** (0.029)	4.631*** (0.029)	4.751*** (0.026)	4.645*** (0.034)	4.600*** (0.035)	4.738*** (0.027)
Observations	937	907	907	907	907	907	907
Number of cross-sections	43	43	43	43	43	43	43
Fixed effect (economy)	Yes	Yes	Yes	Yes	Yes	Yes	Yes

2SLS = two-stage least squares, CNMP = cumulative net migration, FD = financial development, FI = financial institutions, FM = financial markets, GDP = gross domestic product, REER = real effective exchange rate, REM = remittances, TCF = total capital flows.

Note: Standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Source: Authors' calculations.

The findings are mostly consistent with our baseline estimation results, reported in Tables 2 and 3, and partially similar to the alternative results under 2SLS of Table 4. For example, the coefficients of remittances are positive and statistically significant at the 1% level across all models. This suggests higher remittances are consistently associated with an increase in the real effective exchange rate (lnREER), indicating a robust relationship across both estimation techniques. The coefficients for interaction terms of remittances and financial development (REM×FD) are negative and statistically significant at the 5% level, which are similar with the baseline results of Table 2 and Table 3, indicating that financial development moderates the positive effect of remittances on the REER. The interaction terms for remittances and financial institutions (REM×FI) are not statistically significant, showing that financial institutions do not significantly influence the impact of remittances on the REER. The coefficients for the interaction term of remittances with financial markets (REM×FM) are negative and statistically significant, which are also similar to the baseline results of Table 2 and Table 3.

VII. CONCLUSION AND POLICY IMPLICATIONS

The increased flow of remittances toward developing economies challenges macroeconomic and financial stability, mainly because of exchange rate appreciation. Despite the significant social and economic benefits of remittances, so-called “Dutch disease” in recipient economies can lead to a deterioration of external sector competitiveness. Our empirical analysis reveals a fundamental relationship between remittances, financial development, and exchange rates across 146 global economies and 43 high remittance-receiving economies from 1996 to 2021. We confirm a consistent and significant positive association between remittances and REER, especially in high remittance-receiving economies. Financial development, particularly the dynamics of financial markets and market-based financial deepening, plays a pivotal role in dampening the effect of higher remittances on exchange rates. The negative interaction between remittances and financial markets suggests their potential as a buffer against exchange rate appreciation driven by remittance inflows. Regional panel settings for high remittance-receiving economies indicate that South Asia, Sub-Saharan Africa, and Latin America appear more sensitive to the effects of remittances on exchange rates, with varying moderating impacts of financial development measures. In addition, quantile regression results indicate that real exchange rate appreciation is more prominent at lower and central exchange rate distribution quantiles, with the REER’s extremely high tail driven mainly by trade fundamentals.

Our paper offers several policy implications. First, the results imply that developing economies need to strengthen further the efficiency of domestic financial markets so they can better absorb remittance-driven exchange rate appreciations. This could include enhancing financial regulation and reforms for prudent capital account liberalization, as well as measures to bolster the intermediation efficiency of the banking sector. This can also help improve investor confidence in domestic financial markets, triggering flows of foreign investment, improved access to finance, and deeper and more liquid asset markets. Second, our results suggest high remittance-receiving economies should shift from import-maximizing consumption patterns. Remittance income should be channeled to the most productive sectors through strategies for increasing domestic production and expanding export-led industries in the long run. Finally, enhanced regional and international cooperation for knowledge transfer and sharing of best practices are important avenues for the further sustainable development of high remittance-receiving economies.

APPENDIX

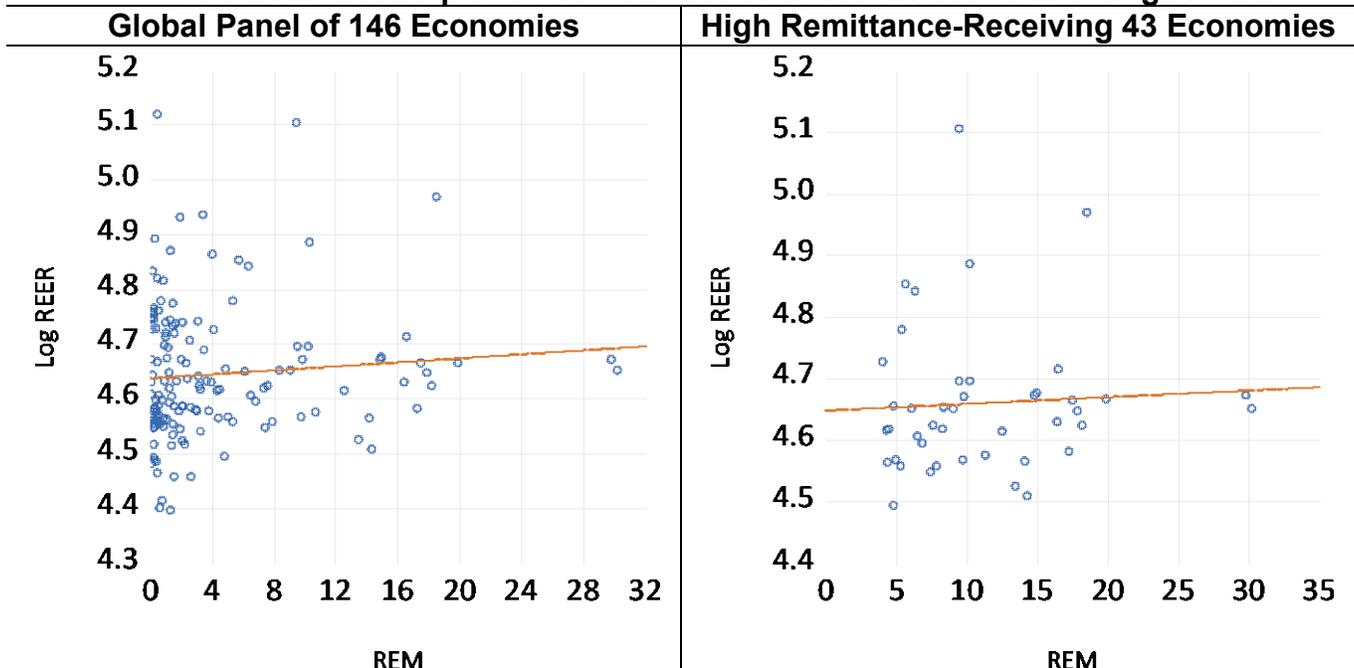
Table A1: Descriptive Statistics and Correlation Matrix
(Global panel: 146 economies)

Descriptive Statistics						
Variable	Observations	Mean	Std. Dev.	Min	Max	
InREER (natural log of REER)	3,793	4.63	0.20	3.50	6.47	
REM (% of GDP)	3,606	4.02	6.17	0.00	48.20	
FD	3,650	0.31	0.23	0.00	1.00	
FI	3,650	0.39	0.23	0.00	1.00	
FM	3,650	0.22	0.26	0.00	1.00	
TRD (% of GDP)	3,632	83.55	50.80	0.76	442.62	
TCF (% of GDP)	3,514	3.68	19.25	-137.32	716.12	

Correlation Matrix							
Variable	InREER	REM	FD	FI	FM	TRD	TCF
InREER (natural log of REER)	1.00						
REM (% of GDP)	0.04	1.00					
FD	-0.07	-0.32	1.00				
FI	-0.04	-0.24	0.93	1.00			
FM	-0.09	-0.35	0.95	0.77	1.00		
TRD (% of GDP)	-0.04	-0.01	0.17	0.25	0.09	1.00	
TCF (% of GDP)	-0.01	0.03	0.00	0.03	-0.02	0.20	1.00

FD = financial development, FI = financial institutions, FM = financial markets, GDP = gross domestic product, REER = real effective exchange rate, REM = remittances, TCF = total capital flows, TRD = trade.
Source: Authors' calculations.

Table A2: Scatterplot of Remittances and Real Effective Exchange Rates



REER = real effective exchange rate, REM = remittances.
Source: Authors' calculations.

Table A3: Regional Classification of 46 Economies

A3.1: East Asia and Pacific (5 economies)

Regressor	(1)	(2)	(3)	(4)	(5)	(6)	(7)
REM (% of GDP)	0.002 (0.003)	-0.003 (0.003)	-0.009*** (0.003)	0.001 (0.004)	0.001 (0.009)	-0.007 (0.007)	0.004 (0.004)
FD		1.926*** (0.370)			2.097*** (0.503)		
FI			1.857*** (0.198)			1.937*** (0.272)	
FM				-0.303 (0.305)			0.370 (0.339)
REM×FD					-0.019 (0.039)		
REM×FI						-0.007 (0.016)	
REM×FM							-0.151*** (0.040)
Trade (% of GDP)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
TCF (% of GDP)	-0.002 (0.003)	-0.004 (0.003)	-0.003 (0.002)	-0.002 (0.003)	-0.005 (0.003)	-0.004 (0.002)	-0.001 (0.003)
Constant	4.611*** (0.100)	4.176*** (0.123)	4.123*** (0.091)	4.657*** (0.119)	4.125*** (0.160)	4.089*** (0.120)	4.613*** (0.112)
Observations	110	106	106	106	106	106	106
R-squared	0.013	0.227	0.482	0.021	0.230	0.483	0.146
Number of cross-sections	5	5	5	5	5	5	5

FD = financial development, FI = financial institutions, FM = financial markets, GDP = gross domestic product, REER = real effective exchange rate, REM = remittances, TCF = total capital flows.

Note: Standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Source: Authors' calculations.

A3.2: Europe and Central Asia (11 economies)

Regressor	(1)	(2)	(3)	(4)	(5)	(6)	(7)
REM (% of GDP)	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)	0.001 (0.001)	0.002 (0.003)	0.002 (0.003)	0.002 (0.002)
FD		0.720*** (0.164)			0.837*** (0.290)		
FI			0.470*** (0.094)			0.573*** (0.170)	
FM				0.176 (0.407)			0.888 (0.593)
REM×FD					-0.011 (0.022)		
REM×FI						-0.009 (0.012)	
REM×FM							-0.123 (0.075)
Trade (% of GDP)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.000 (0.001)	-0.001 (0.001)	-0.001* (0.001)	-0.000 (0.001)
TCF (% of GDP)	0.004 (0.003)	0.005* (0.003)	0.006** (0.003)	0.005 (0.003)	0.005* (0.003)	0.006** (0.003)	0.004 (0.003)
Constant	4.586*** (0.051)	4.465*** (0.055)	4.451*** (0.054)	4.566*** (0.053)	4.453*** (0.061)	4.432*** (0.060)	4.541*** (0.055)
Observations	254	244	244	244	244	244	244
R-squared	0.010	0.088	0.109	0.013	0.089	0.112	0.025
Number of cross-sections	11	11	11	11	11	11	11

FD = financial development, FI = financial institutions, FM = financial markets, GDP = gross domestic product, REER = real effective exchange rate, REM = remittances, TCF = total capital flows.

Note: Standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Source: Authors' calculations.

A3.3: Latin America and the Caribbean (10 economies)

Regressor	(1)	(2)	(3)	(4)	(5)	(6)	(7)
REM (% of GDP)	0.009*** (0.002)	0.003 (0.002)	0.003 (0.002)	0.008*** (0.002)	0.018*** (0.005)	0.014** (0.006)	0.010*** (0.002)
FD		1.115*** (0.256)			2.727*** (0.551)		
FI			0.721*** (0.153)			1.271*** (0.310)	
FM				0.034 (0.425)			2.061 (1.633)
REM×FD					-0.106*** (0.032)		
REM×FI						-0.041** (0.020)	
REM×FM							-0.108 (0.084)
Trade (% of GDP)	-0.003*** (0.001)						
TCF (% of GDP)	0.009*** (0.003)	0.006** (0.003)	0.006** (0.003)	0.008*** (0.003)	0.006** (0.003)	0.006** (0.003)	0.008*** (0.003)
Constant	4.774*** (0.053)	4.632*** (0.061)	4.607*** (0.062)	4.773*** (0.054)	4.434*** (0.085)	4.475*** (0.089)	4.757*** (0.056)
Observations	229	221	221	221	221	221	221
R-squared	0.195	0.252	0.263	0.184	0.289	0.277	0.190
Number of cross-sections	10	10	10	10	10	10	10

FD = financial development, FI = financial institutions, FM = financial markets, GDP = gross domestic product, REER = real effective exchange rate, REM = remittances, TCF = total capital flows.

Note: Standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Source: Authors' calculations.

A3.4: Middle East and North Africa (6 economies)

Regressor	(1)	(2)	(3)	(4)	(5)	(6)	(7)
REM (% of GDP)	0.002 (0.004)	0.002 (0.004)	0.001 (0.004)	0.002 (0.004)	-0.010 (0.011)	-0.018 (0.020)	-0.004 (0.007)
FD		-0.175 (0.309)			-0.517 (0.416)		
FI			-0.327 (0.298)			-0.535 (0.373)	
FM				-0.032 (0.176)			-0.249 (0.280)
REM×FD					0.031 (0.026)		
REM×FI						0.048 (0.051)	
REM×FM							0.016 (0.016)
Trade (% of GDP)	-0.007*** (0.001)						
TCF (% of GDP)	0.002 (0.003)	0.002 (0.003)	0.002 (0.003)	0.002 (0.003)	0.002 (0.003)	0.001 (0.003)	0.002 (0.003)
Constant	5.246*** (0.065)	5.275*** (0.074)	5.349*** (0.107)	5.255*** (0.069)	5.396*** (0.123)	5.456*** (0.157)	5.307*** (0.086)
Observations	129	126	126	126	126	126	126
R-squared	0.376	0.377	0.381	0.375	0.385	0.386	0.380
Number of cross-sections	6	6	6	6	6	6	6

FD = financial development, FI = financial institutions, FM = financial markets, GDP = gross domestic product, REER = real effective exchange rate, REM = remittances, TCF = total capital flows.

Note: Standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Source: Authors' calculations.

A3.5: South Asia (4 economies)

Regressor	(1)	(2)	(3)	(4)	(5)	(6)	(7)
REM (% of GDP)	0.007*** (0.002)	0.006*** (0.002)	-0.001 (0.002)	0.007*** (0.002)	-0.016** (0.007)	-0.013* (0.007)	0.007*** (0.002)
FD		0.784*** (0.265)			0.042 (0.341)		
FI			1.482*** (0.279)			0.918** (0.427)	
FM				0.114 (0.152)			0.151 (0.182)
REM×FD					0.133*** (0.041)		
REM×FI						0.046* (0.027)	
REM×FM							-0.015 (0.040)
Trade (% of GDP)	-0.005*** (0.001)	-0.004*** (0.001)	-0.002* (0.001)	-0.005*** (0.001)	-0.005*** (0.001)	-0.003** (0.001)	-0.005*** (0.001)
TCF (% of GDP)	0.008 (0.011)	-0.002 (0.011)	-0.001 (0.010)	0.007 (0.011)	-0.001 (0.010)	0.001 (0.010)	0.007 (0.011)
Constant	4.850*** (0.065)	4.646*** (0.088)	4.404*** (0.098)	4.812*** (0.070)	4.789*** (0.095)	4.562*** (0.133)	4.812*** (0.071)
Observations	97	94	94	94	94	94	94
R-squared	0.261	0.333	0.447	0.270	0.405	0.465	0.271
Number of cross-sections	4	4	4	4	4	4	4

FD = financial development, FI = financial institutions, FM = financial markets, GDP = gross domestic product, REER = real effective exchange rate, REM = remittances, TCF = total capital flows.

Note: Standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Source: Authors' calculations.

A3.6: Sub-Saharan Africa (7 economies)

Regressor	(1)	(2)	(3)	(4)	(5)	(6)	(7)
REM (% of GDP)	0.002* (0.001)	0.002 (0.001)	0.002 (0.001)	0.002 (0.002)	0.009** (0.003)	0.010*** (0.004)	0.001 (0.002)
FD		0.099 (0.169)			0.661** (0.317)		
FI			0.072 (0.097)			0.428** (0.172)	
FM				-0.383 (0.395)			-3.732*** (1.250)
REM×FD					-0.072** (0.035)		
REM×FI						-0.045** (0.018)	
REM×FM							0.472*** (0.167)
Trade (% of GDP)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.001)	-0.000 (0.000)	-0.000 (0.000)	-0.001 (0.001)
TCF (% of GDP)	-0.002 (0.001)						
Constant	4.578*** (0.030)	4.570*** (0.034)	4.570*** (0.033)	4.597*** (0.035)	4.524*** (0.040)	4.517*** (0.038)	4.624*** (0.036)
Observations	155	153	153	153	153	153	153
R-squared	0.027	0.026	0.027	0.030	0.055	0.068	0.082
Number of cross-sections	7	7	7	7	7	7	7

FD = financial development, FI = financial institutions, FM = financial markets, GDP = gross domestic product, REER = real effective exchange rate, REM = remittances, TCF = total capital flows.

Note: Standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Source: Authors' calculations.

Table A4: Quantile Regression Results for Log of Real Effective Exchange Rate (lnREER)

0.25 Quantiles:	Full Panel of 146 Economies							High Remittance-Receiving 43 Economies						
Regressor	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
REM (% of GDP)	0.004*** (0.001)	0.003** (0.001)	0.002* (0.001)	0.003*** (0.001)	0.005** (0.002)	0.007*** (0.002)	0.004*** (0.001)	0.003** (0.001)	0.003*** (0.001)	0.004*** (0.001)	0.003*** (0.001)	0.007*** (0.002)	0.007*** (0.003)	0.004*** (0.001)
FD		0.491*** (0.063)			0.548*** (0.069)				0.435*** (0.132)			0.724*** (0.188)		
FI			0.558*** (0.045)			0.621*** (0.052)				0.404*** (0.082)			0.563*** (0.134)	
FM				0.038 (0.049)			0.068 (0.052)				-0.057 (0.119)			0.134 (0.155)
REM×FD					-0.012 (0.009)							-0.026** (0.012)		
REM×FI						-0.015** (0.006)							-0.014 (0.009)	
REM×FM							-0.016** (0.008)							-0.026*** (0.009)
Trade (% of GDP)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001** (0.000)	-0.002** (0.000)	-0.002*** (0.000)	-0.001*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.001*** (0.000)
TCF (% of GDP)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	0.001 (0.002)	0.002 (0.002)	0.001 (0.002)	0.001 (0.002)	0.002 (0.002)	0.002 (0.002)	0.002 (0.002)
Constant	4.485*** (0.040)	4.427*** (0.041)	4.326*** (0.040)	4.496*** (0.039)	4.422*** (0.042)	4.307*** (0.040)	4.478*** (0.039)	4.519*** (0.050)	4.463*** (0.048)	4.421*** (0.048)	4.519*** (0.044)	4.427*** (0.051)	4.382*** (0.055)	4.496*** (0.043)
Observations	3,327	3,223	3,223	3,223	3,223	3,223	3,223	974	944	944	944	944	944	944

0.50 Quantiles:	Full Panel of 146 Economies							High Remittance-Receiving 43 Economies						
Regressor	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
REM (% of GDP)	0.002* (0.001)	0.002 (0.001)	0.001 (0.001)	0.002 (0.001)	0.003* (0.002)	0.004 (0.002)	0.003** (0.001)	0.002** (0.001)	0.002** (0.001)	0.002*** (0.001)	0.002*** (0.001)	0.006*** (0.001)	0.004*** (0.002)	0.003*** (0.001)
FD		0.494*** (0.066)			0.544*** (0.072)				0.400*** (0.089)			0.704*** (0.130)		
FI			0.469*** (0.048)			0.516*** (0.056)				0.380*** (0.054)			0.454*** (0.085)	
FM				0.088 (0.056)			0.132** (0.059)				-0.185** (0.083)			0.030 (0.113)
REM×FD					-0.013 (0.010)							-0.026*** (0.008)		
REM×FI						-0.009 (0.007)							-0.007 (0.006)	
REM×FM							-0.023*** (0.009)							-0.017** (0.007)
Trade (% of GDP)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)
TCF (% of GDP)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
Constant	4.596*** (0.035)	4.508*** (0.043)	4.453*** (0.043)	4.589*** (0.045)	4.499*** (0.044)	4.439*** (0.043)	4.582*** (0.045)	4.613*** (0.035)	4.557*** (0.032)	4.518*** (0.032)	4.603*** (0.031)	4.515*** (0.035)	4.488*** (0.035)	4.590*** (0.031)
Observations	3,327	3,223	3,223	3,223	3,223	3,223	3,223	974	944	944	944	944	944	944

Continued on the next page

0.75 Quantiles: Regressor	Full Panel of 146 Economies							High Remittance-Receiving 43 Economies						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
REM (% of GDP)	-0.000 (0.001)	0.000 (0.001)	-0.000 (0.001)	-0.000 (0.001)	0.002 (0.002)	0.001 (0.002)	0.000 (0.001)	0.000 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.005*** (0.002)	0.004* (0.002)	0.001 (0.001)
FD		0.380*** (0.058)			0.402*** (0.064)				0.428*** (0.098)			0.657*** (0.148)		
FI			0.393*** (0.042)			0.415*** (0.049)				0.367*** (0.065)			0.466*** (0.109)	
FM				0.024 (0.048)			0.081 (0.050)				-0.188* (0.101)			-0.037 (0.132)
REM×FD					-0.010 (0.008)							-0.025*** (0.009)		
REM×FI						-0.005 (0.006)							-0.009 (0.007)	
REM×FM							-0.018** (0.007)							-0.010 (0.008)
Trade (% of GDP)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.001*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)
TCF (% of GDP)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.001 (0.002)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)
Constant	4.700*** (0.035)	4.640*** (0.038)	4.595*** (0.037)	4.703*** (0.038)	4.634*** (0.039)	4.583*** (0.038)	4.690*** (0.038)	4.729*** (0.040)	4.662*** (0.036)	4.636*** (0.038)	4.704*** (0.037)	4.630*** (0.040)	4.589*** (0.045)	4.707*** (0.037)
Observations	3,327	3,223	3,223	3,223	3,223	3,223	3,223	974	944	944	944	944	944	944

FD = financial development, FI = financial institutions, FM = financial markets, GDP = gross domestic product, REER = real effective exchange rate, REM = remittances, TCF = total capital flows.

Note: Standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Source: Authors' calculations.

Table A5: List of High-Remittance Receiving Economies

Economy	Geographical Region	Remittances (% of GDP) Periodic Mean
Fiji	East Asia and the Pacific	4.98
Philippines	East Asia and the Pacific	9.81
Samoa	East Asia and the Pacific	17.50
Tonga	East Asia and the Pacific	29.76
Viet Nam	East Asia and the Pacific	5.34
Albania	Europe and Central Asia	13.42
Armenia	Europe and Central Asia	14.30
Bosnia and Herzegovina	Europe and Central Asia	17.21
Croatia	Europe and Central Asia	4.40
Georgia	Europe and Central Asia	9.73
Kyrgyz Republic	Europe and Central Asia	17.82
Moldova	Europe and Central Asia	19.85
Serbia	Europe and Central Asia	8.27
Tajikistan	Europe and Central Asia	30.19
Ukraine	Europe and Central Asia	4.79
Uzbekistan	Europe and Central Asia	9.45
Dominica	Latin America and the Caribbean	6.08
Dominican Republic	Latin America and the Caribbean	7.87
Ecuador	Latin America and the Caribbean	4.03
El Salvador	Latin America and the Caribbean	18.20
Guatemala	Latin America and the Caribbean	9.48
Guyana	Latin America and the Caribbean	8.33
Haiti	Latin America and the Caribbean	14.12
Honduras	Latin America and the Caribbean	14.92
Jamaica	Latin America and the Caribbean	14.82
Nicaragua	Latin America and the Caribbean	9.00
Egypt, Arab Rep.	Middle East and North Africa	5.67
Jordan	Middle East and North Africa	16.51
Lebanon	Middle East and North Africa	18.51
Morocco	Middle East and North Africa	6.45
Tunisia	Middle East and North Africa	4.32
Yemen, Rep.	Middle East and North Africa	10.25
Bangladesh	South Asia	6.33
Nepal	South Asia	16.38
Pakistan	South Asia	4.81
Sri Lanka	South Asia	7.56
Cabo Verde	Sub-Saharan Africa	12.52
Comoros	Sub-Saharan Africa	11.34
The Gambia	Sub-Saharan Africa	10.17
Guinea-Bissau	Sub-Saharan Africa	5.28
Mali	Sub-Saharan Africa	4.48
Senegal	Sub-Saharan Africa	7.40
Togo	Sub-Saharan Africa	6.80

GDP = gross domestic product.

Source: Authors' calculations.

Table A6: List of Economies for Full Panel

Low-Income	Lower Middle-Income	Upper Middle-Income	High-Income
Benin	Algeria	Albania	Antigua and Barbuda
Burkina Faso	Angola	Argentina	Australia
Burundi	Bangladesh	Armenia	Austria
Comoros	Bhutan	Azerbaijan	Barbados
Congo, Dem. Rep.	Bolivia	Belarus	Belgium
Ethiopia	Cabo Verde	Belize	Canada
The Gambia	Cambodia	Bosnia and Herzegovina	Chile
Guinea	Cameroon	Botswana	Croatia
Guinea-Bissau	Congo, Rep.	Brazil	Cyprus
Haiti	Djibouti	Bulgaria	Denmark
Madagascar	Egypt, Arab Rep.	People's Republic of China	Estonia
Mali	El Salvador	Colombia	Finland
Mozambique	Eswatini	Costa Rica	France
Niger	Georgia	Dominica	Germany
Rwanda	Ghana	Dominican Republic	Greece
Sierra Leone	Honduras	Ecuador	Hong Kong, China
Sudan	India	Fiji	Hungary
Syrian Arab Republic	Indonesia	Gabon	Iceland
Tanzania	Kenya	Guatemala	Ireland
Togo	Kyrgyz Republic	Guyana	Israel
Uganda	Lao PDR	Iran, Islamic Rep.	Italy
Yemen, Rep.	Moldova	Jamaica	Japan
	Morocco	Jordan	Latvia
	Nepal	Kazakhstan	Luxembourg
	Nicaragua	Lebanon	Malta
	Nigeria	Malaysia	Netherlands
	Pakistan	Maldives	New Zealand
	Papua New Guinea	Mauritius	Norway
	Philippines	Mexico	Oman
	Senegal	Mongolia	Panama
	Solomon Islands	Namibia	Poland
	Sri Lanka	North Macedonia	Portugal
	Tajikistan	Paraguay	Qatar
	Tunisia	Peru	Saudi Arabia
	Ukraine	Romania	Seychelles
	Uzbekistan	Russian Federation	Slovak Republic
	Viet Nam	Samoa	Slovenia
	Zambia	Serbia	Spain
		South Africa	Sweden
		Suriname	Switzerland
		Thailand	United Kingdom
		Tonga	United States
		Türkiye	Uruguay

Lao PDR = Lao People's Democratic Republic.

Note: Classifications based on World Bank income groupings (July 2021).

Source: Authors.

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Remittances, Exchange Rates, and the Role of Financial Development

This paper examines how financial development can mitigate the exchange rate appreciation effects of remittances, based on a global sample of 146 economies over the period 1996 to 2021. The findings indicate that appreciation effects are most pronounced in high remittance-receiving economies, consistent with the “Dutch disease” mechanism. Stronger domestic financial markets and market-based financial deepening emerge as key channels for buffering against these effects.

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