1. Introduction

Remittances are an important inflow for many emerging and developing economies, especially for foreign exchange, but also as a source of supporting household incomes. Figure 1 shows the top 40 recipient countries with the highest remittance inflows as a percentage of GDP, indicating that these flows have been increasing substantially over time. Especially for a handful of LAC countries, remittances grew from less than 10 percent of GDP in 2000 to about 20 percent of GDP in 2023 (close to 30 percent of GDP for Nicaragua and Honduras), well above the world's and LAC averages (Figure 2).

Figure 1. Remittances (percent of GDP) in the Top 40 Countries Worldwide

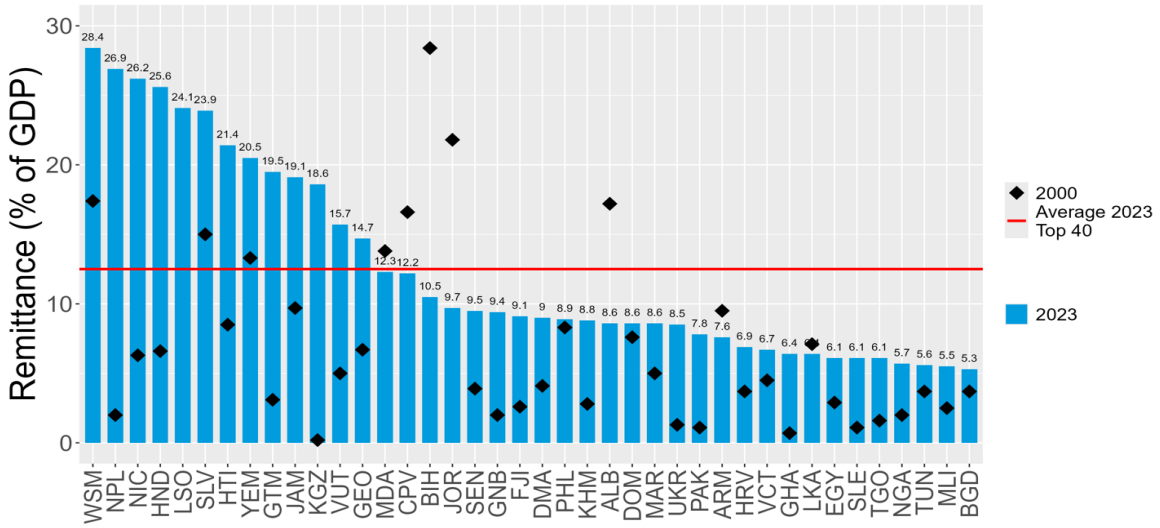
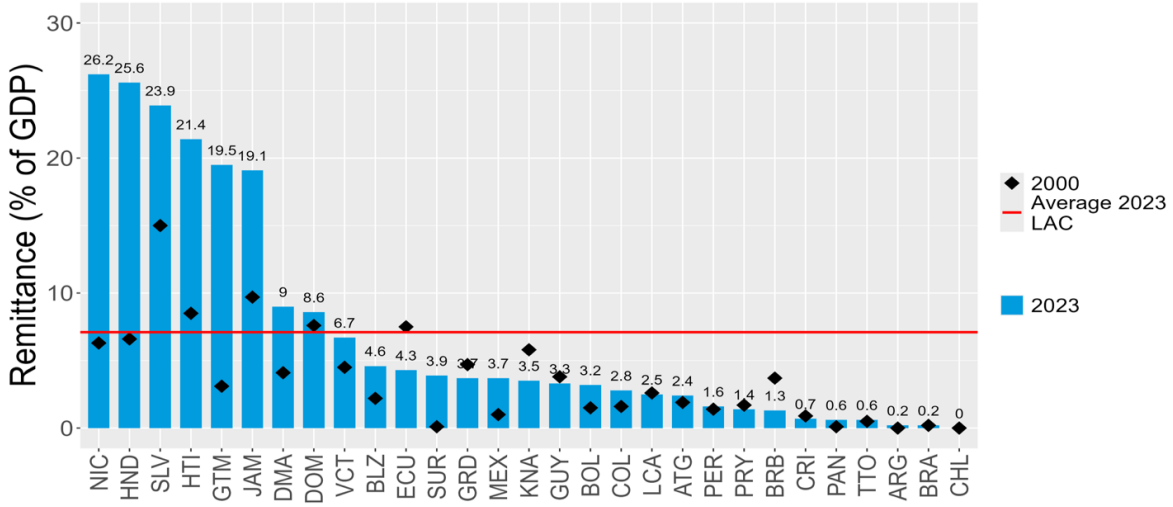


Figure 2. Remittances (percent of GDP) in Latin America & Caribbean



While remittances can help stabilize the macroeconomy, especially in economic downturns, policymakers are concerned about potential real exchange rate appreciation resulting from large increases in remittance flows. For instance, real exchange rate appreciation may reduce the competitiveness of the tradable goods sector, often regarded as an engine of economic growth (e.g., Rodrik, 2008).

The empirical literature, nevertheless, finds more nuanced results on the role of remittances in REER appreciation once a larger set of controls is used in the estimation. For instance, Lopez and others (2010) find that remittances lead to significant appreciation, in particular for large remittance flows in Latin American and Caribbean countries. However, Barajas and others (2010) found that the standard "Dutch Disease" results of appreciation due to remittances are substantially weakened or even overturned depending on: degree of openness; factor mobility between domestic sectors; the share of consumption in tradables, etc.

Moreover, the empirical studies do not explore consistently under what type of exchange rate regime and country's macroeconomic characteristics remittance inflows lead to (stronger) REER appreciation. Therefore, it is crucial to study these two key dimensions to get a better understanding about the impact of remittance inflows on the REER. First, whether exchange rate policies can mitigate the appreciation pressures on the real exchange rate caused by surges in remittance flows. Second, whether some structural characteristics of individual countries—such as the extent of import dependence—may determine how remittance flows ultimately affect the real exchange rate.

Looking to fill the gap in the literature, this paper examines empirically how REER appreciation caused by remittance inflows depends on exchange rate regimes and macroeconomic structures. Using data from a large set of countries over 2008-21, we arrive at the following set of empirical findings.

First, analyzing the statistical correlation between remittance flows and a measure of REER overvaluation, following the methodology of Rajan and Subramanian (2005) and Rodrik (2008), we find that remittance flows are not correlated with overvaluation in economies operating under fixed exchange rate regimes, but are positively correlated in economies with flexible exchange rate regimes. While this result suggests that stabilizing nominal exchange rates can help mitigate the appreciation pressure of remittance flows on REER, potential endogeneity may influence the result as well.[1]

To estimate the causal effects of remittance flows on REER under different exchange rate regimes, while controlling for potential endogeneity, we employ a dynamic panel model with the Blundell-Bond estimator, where we regress the level of the real exchange rate on remittances as a percent of GDP, and control for numerous variables that influence exchange rate behavior. The results show that the REER appreciates less and more slowly in countries with fixed exchange rate regimes than in those with flexible exchange rate regimes after one year, but not at the onset of a remittances shock, nor in the long run.

Second, by further analyzing the role of other structural macroeconomic characteristics, we find that in countries with a large share of imported goods, higher remittances do not significantly increase the demand for non-tradable goods, resulting in smaller REER appreciation. Most importantly, we find that high-remittance-receiving economies—defined as those receiving remittances as share of GDP above the global median—experience REER appreciation regardless of the exchange rate regime, and the appreciation is more pronounced in countries with flexible exchange rate regimes, consistent with our baseline estimation. As a result, countries with relatively higher remittances and relatively lower imports experience REER appreciation after a remittances shock, regardless of the exchange rate regime.

The results are robust to alternative classifications of countries by imports and remittance flows using different thresholds, sources of data (REER and foreign reserves from the IMF International Financial Statistics),

[1] Rajan and Subramanian (2005) argue that REER appreciation may reduce remittance flows by lowering the value of foreign currency.

specifications or sample size (the baseline estimation includes 79 countries, while the alternative includes 146 countries).

The rest of paper is structured as follows. Section 2 explains the dataset. Section 3 reviews the related literature. Section 4 examines the statistical relationship between the REER and remittances and how this relationship depends on exchange rate regimes. Section 5 describes our estimation strategy. Section 6 presents our main estimation results, and section 7 provides robustness analyses. Finally, Section 8 concludes.

2. Data

Our dataset comprises of macroeconomic variables from various data sources. The sample covers annual observations from 2008 to 2021 for our primary analysis.

The data on the real effective exchange rates (REER) is from Darvas (2011, 2021). Darvas (2011, 2021) collects the data on nominal exchange rates and price indices to construct REER and extends the dataset on REER constructed by the World Bank whose data on the REER has the largest coverage among publicly available datasets. We use this data in our main regressions because it covers the most countries. For robustness, we also use data on REER from the International Financial Statistics (IFS) of the IMF.

Data on remittances (as percent of GDP) is from the IMF's Balance of Payment Statistics (BOP) database. The remittances consist of personal transfers and compensation of employees as defined by the sixth edition of the IMF's Balance of Payments Manual. GDP series are retrieved from the WEO (October 2024 vintage).

The classification of exchange rate regimes is from the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER). The AREAER classifies member countries' exchange rate arrangements into *de jure* and *de facto* categories. This classification relies on the IMF staff's analysis of the actual (de facto) arrangements of members, which might not always align with the countries' officially declared (de jure) arrangements. On February 2, 2009, the methodology for this classification underwent a revision to ensure more uniform and objective categorizations across different countries and to enhance clarity. Therefore, the AREAER covers 2008 to 2021 classifications. We use both de jure and de facto categories to cover as many countries as possible.

We construct the real interest rates using data on nominal policy rates and inflation rates. The data on policy rates are sourced from the Bank for International Settlements (BIS)'s central bank policy rates dataset and, for completeness, we also use some data from the IMF's IFS database. We use averages of annualized monthly nominal interest rates for each year. The data on the inflation rate are from the World Development Indicators (WDI) of the World Bank.

Financial Openness data are obtained from Chinn and Ito (2006). This index measures the ease of cross-border financial transactions and is constructed based on the IMF's AREAER. The index is derived from the first principal component of the four binary dummy variables in the IMF's AREAER. This variable provides insights into the level and characteristics of restrictions on cross-sectional external transactions across countries and uses several strands of information. The first variable indicates the presence of multiple exchange rates. The second variable pertains to restrictions on current account transactions. The third variable signals restrictions on capital account transactions. The fourth variable denotes the obligation to surrender export proceeds.

The data on foreign reserves per GDP is from the External Wealth of Nations Database constructed by Lane and Milesi-Ferretti (2018). The dataset primarily relies on BOP and international investment position (IIP) statistics from various countries, provided by the IMF. A notable distinction in our dataset is the omission of central bank gold holdings from the list of financial assets, as these do not constitute a claim on another nation.

Additionally, the External Wealth of Nations dataset enhances the IIP statistics by broadening the temporal and geographical range to encompass almost every economy from 1970 onwards. The latest database has been updated to 2021. This enhancement is facilitated by incorporating alternative data and methodologies to address gaps, inaccuracies, or uncertainties in the available IIP data. We also use the data on foreign reserves from BOP and IIP from the IMF only.[2]

The data on GDP per capita, current account, terms of trade, imports, tradable output, and government expenditures are from WDI. All of these variables serve as controls. We identify and estimate impulse response functions of the shock of remittances after controlling for these variables, since they tend to be correlated with remittances. Remittances are excluded from the current account. We use imports and tradable output to distinguish countries into imports or tradable goods producers as we explain below.

3. Related Literature

Our paper is related to and contributes to four strands of the literature. This section reviews some findings from the literature and provides an overview of the paper's contributions.

First, our paper is related to the literature studying the effect of remittances on the REER. Rajan and Subramanian (2005) construct a measure of overvaluation and find that remittances do not have adverse effects on a country's competitiveness, as reflected in a decline in the share of labor-intensive and tradable industries in the manufacturing sector. In this vein, we reexamine the relationship between remittance and the REER overvaluation by using first the same approach as Rajan and Subramanian (2005) to understand if the relationship continues to hold, and if so, to what degree. Beaton et al. (2018) study the effect of remittances on macroeconomic variables including the REER. They use instrument variables in a panel data setting to identify the causal effects of remittances, but do not find statistically significant effect of remittances on the REER. On the other hand, Hassan and Holmes (2011) find that remittances appreciate the real exchange rate in developing countries in the long run, especially in the case of countries with high levels of remittances. Acosta et al. (2009) find a similar result, including an appreciation of the REER in the short run due to an increase in non-tradeable goods prices. They estimate a two-sector dynamic stochastic general equilibrium model in developing countries. Compared to these studies, our paper extends the analysis by exploring the role of exchange rate regime, and also the role of macroeconomic structure (levels of remittances and imports).

The second strand of the literature focuses on studying the role of exchange rate regimes and the effect of remittances on the REER. For instance, Ball et al. (2013) find that the exchange rate regime has a significant impact on the responses of inflation and the nominal money supply to changes in remittances, but not on the REER. This study uses a panel vector autoregressive (VAR) model over the 1980-2010 period. Moreover, this paper finds that currencies appreciated at quarterly frequency, and the effects are similar under both flexible and fixed regimes. Compared to Ball and others (2013) we include more control variables from other studies in

[2] Note that the data from the IMF's BOP and IIP has fewer observations than the External Wealth of Nations Database.

the literature and consider how the dynamic effect depends on macroeconomic structures of countries. Mandelman (2013) finds that under a floating exchange rate regime, the exchange rate appreciates more freely, helping to contain inflationary pressures as imported goods become relatively cheaper, when estimating a dynamic stochastic general equilibrium (DSGE) model for Philippines. The paper also finds that under a nominal peg regime the exchange rate appreciation is more limited, thereby leading to potential overheating due to remittances. Lartey, Mandelman, and Acosta (2012) found that remittances lead to real exchange rate appreciation, when estimating a generalized method of moments in a panel dataset from 109 developing and transition countries for 1990-2003. They also found that the effect is more pronounced in countries with flexible exchange rate regimes because prices are sticky in the short run. Unlike their paper, we study both the short-run and long-run effects of remittances on the REER by computing the impulse response functions and find that the REER appreciates sluggishly under fixed exchange rate regime.

Third, our paper is linked to the broad literature on exchange rate determination. In their seminar study, Meese and Rogoff (1983) find that nominal exchange rates are hard to predict by the macroeconomic variables considered in many macroeconomic frameworks. However, recent analyses find that the determination of nominal exchange rate is affected by a limit to arbitrage by financial intermediary (e.g. Gabaix and Maggioni, 2015), shocks in financial markets can explain many puzzles in exchange rates (nominal and real, see for example Itskhoki and Mukhin, 2021), and demand for premium for liquidity on government bonds as well as other macroeconomics variables can account for the dynamics of nominal exchange rates (Engel and Wu, 2023). Engel and Wu (2024) find that monetary variables, including expected inflation rates and real interest rates, along with certain macroeconomic variables such as trade balance, global risk measure, and the demand for liquid assets, can explain significant variations in the behavior of the nominal exchange rate between the US dollar and G10 currencies. We incorporate several control variables from their paper to identify the impact of remittances on the REER.

Fourth, our paper also relates to the literature on effects of government policies on exchange rates. Monacelli and Perotti (2010) estimate the impacts of government expenditures using vector autoregressions (VAR) and find that government spending depreciates the real exchange rates. Miyamoto et al. (2019) study the impact of government expenditure on the real exchange rate by exploiting variation in military spending across 125 countries. They find that an increase in government purchases appreciates the real exchange rate in developing countries, while in advanced countries, it results in a depreciation of the real exchange rate. Also, Chamon et al. (2017) uses a synthetic control approach to study the sterilized foreign exchange intervention in Brazil and find that the government intervention appreciated the Brazilian real. Also, Kuersteiner et al. (2018) apply a regression discontinuity method to the sterilized foreign exchange intervention in Colombia. They find that the rule-based policy intervention appreciates Colombian peso for a short period. Based on these findings, we control for government expenditure and foreign reserves as well as capital controls.

To summarize, we contribute to the literature on the Dutch disease by taking into account the following aspects simultaneously: (i) how the effect of remittance flows vary across exchange rate regimes; (ii) the short- and long-run effects of remittance flows on the REER; (iii) control variables explaining nominal and real exchange rates, which are found in the literature on the exchange rate determination; (iv) how macroeconomic structural characteristics influence the effect of remittance flows on the REER.

4. Remittance and Overvaluation of the Real Effective Exchange Rate

To understand the relationship between remittances and the real effective exchange rate, we construct a measure of real effective exchange rate overvaluation similar to the approaches of Rajan and Subramanian (2005) and Rodrik (2008). This measure captures the deviation of the REER from its long-term component, specifically, the GDP per capita as predicted by the Balassa-Samuelson model. The Balassa-Samuelson model predicts that richer countries, which have high productivity in the tradable goods sector, have a higher price level because of the higher price of non-tradable goods. When productivity increases in the tradable goods sector, workers in that sector will earn higher wages or income. This increase in income leads to higher prices for the non-tradable goods that these workers purchase.

To get the measure of the overvaluation, we first estimate the following model:

$$\log REER_{it} = \alpha + \beta \log GDPPC_{it} + \delta_t + \varepsilon_{it},$$

where $REER_{it}$ is the real effective exchange rate of country i in year t, $GDPPC_{it}$ is GDP per capita in country i in year t, δ_t is the time-fixed effects, and ε_{it} is the error term. Then, we construct the predicted value of the log of REER: $\log \widehat{REER}_{it} = \hat{\alpha} + \hat{\beta} \log GDPPC_{it} + \hat{\delta}_t$. The predicted value is the component of the REER determined by GDP per capita, time-fixed effects, and a constant term. We obtain the measure of the overvaluation by excluding the predicted value from the actual REER, that is, by taking the difference between $\log REER_{it}$ and $\log \widehat{REER}_{it}$. Note that the measure of the overvaluation is the residual of the model, $\hat{\varepsilon}_{it}$. After excluding the long-run component and the time-fixed effects of the REER, the residual captures all other components determining the REER unrelated to changes in GDP per capita, or the time trend.[3]

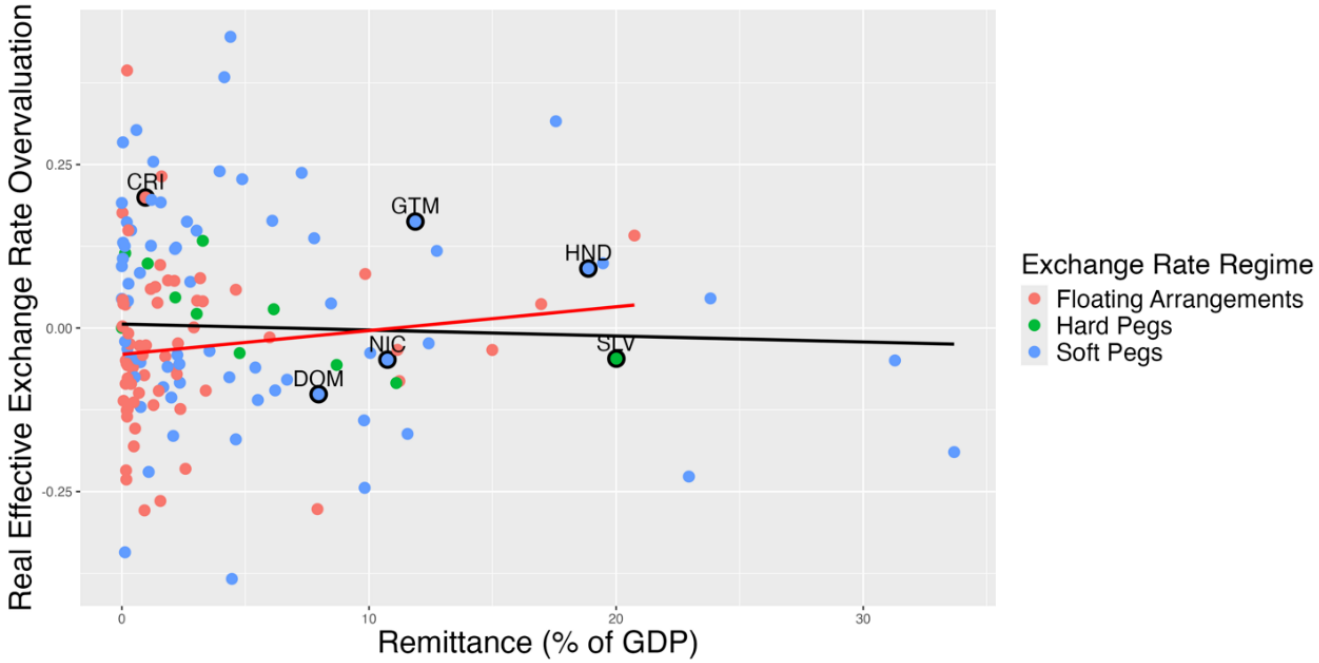
Figure 3 shows the relationship between remittances and the measure of overvaluation from 2008 to 2021. Economies are classified by their exchange rate regimes in 2021. Our results remain consistent if we classify countries by the exchange rate regimes they adopted most frequently during the sample periods. For the classification of the exchange rate regimes, we use the broad measure of the exchange rate regimes of the AREAER: (i) hard pegs, (ii) soft pegs, and (iii) floating arrangements. In the exchange rate classification, hard pegs include “Exchange arrangement with no separate legal tender” and “Currency board arrangement.” Soft pegs include “Conventional pegged arrangement,” “Stabilized arrangement,” “Crawling peg,” “Crawl-like arrangement,” and “Pegged exchange rate within horizontal bands.” Floating arrangements include “floating” and “free-floating.”

The black line is the fitted line for all countries, and the red line is the fitted line based on countries under floating arrangements. The black line does not show a strong positive correlation between remittances and the measure of overvaluation. However, we can see that remittances are positively correlated with the measure of overvaluation in countries under floating arrangements. The relationship may suggest *prima facie* that there is Dutch disease effect for countries under floating arrangements. However, to estimate properly the causal effect of remittances on the REER, it is critical to control for possible endogeneity. For example, Rajan and Subramanian (2005) argue that the overvaluation of exchange rates causes lower remittances because the

[3] The long-run REER benchmark is assumed to be time-invariant, though structural changes (e.g., trade liberalization, supply shocks) may shift equilibrium REERs over time.

overvaluation of the local currency decreases the value of one unit of remittance. This underestimates the appreciation pressure of remittances on exchange rates.

Figure 3. Remittances (percent of GDP) and the Measure of Overvaluation



5. Empirical Strategy

We estimate the effect of remittances on the REER and study how the effect depends on exchange rate regimes. Since remittances may affect the REER both in the short and the long run, according to the literature, to capture the dynamic effect of remittances, we estimate impulse response functions of a remittance shock by estimating a dynamic panel model. Moreover, as GDP per capita proxies for productivity in tradables, it could also correlate with other REER determinants—terms of trade, aid dependence, or financial openness. However, since in this specification they are not controlled for, the specification may suffer from omitted variable bias. For this reason, in addition to employing a dynamic panel setup, we are also controlling for these variables.

We separate the set into economies under fixed exchange rate regime and economies with flexible exchange rate regime and estimate the impulse response functions in each of these subgroups to study how the effect of remittances depends on the exchange rate regime. The subsample fixed exchange rate regime includes both hard pegs and soft pegs because we do not have many countries adopting hard pegs in our sample.

A. Dynamic Panel Model

We use a dynamic panel model which includes the lag of the remittance flows to estimate the dynamic effects of the remittance flows on the REER. Therefore, for each subsample (labeled floating and fixed regimes), we estimate the following dynamic panel model:

$$\log REER_{it} = \alpha + \Sigma_{s=1}^{l}\beta_s \log REER_{it-s} + \Sigma_{s=0}^{m}\gamma_s \frac{Remittance_{it-s}}{GDP_{it-s}} + \boldsymbol{X'_{it}\delta} + \nu_i + \phi_t + \varepsilon_{it},$$

where $\boldsymbol{X'_{it}}$ is a vector of control variables, ν_i is individual fixed effects of country i and ϕ_t is time fixed effects of year t. We use annual observations for our estimation because we do not have higher-frequency data for some variables for all countries, such as terms of trade, financial openness, and government expenditure. Note that we do not use the measure of overvaluation because we control for GDP per capita as we explain below, and so the change in the REER is deviation from its long-run component. Also, we control for global factors such as GDP in the US or VIX by controlling for time fixed effects. To estimate the causal effects, we use the Blundell and Bond estimator. The Blundell-Bond estimator uses the first differences of lagged dependent variables as instruments, given that the error terms in the dynamic panel model are not correlated with these instruments.

We include the following variables as controls: log of real GDP per capita, terms of trade, current account, real interest rate differential relative to the U.S., financial openness, foreign reserves (as percent of GDP), and government expenditure (as percent of GDP). Note that time-fixed effects capture global factors such as VIX. We selected these variables because GDP per capita is a key determinant of the REER in the long run, the current account and foreign reserves affects the REER,[4] and terms of trade also determines demand for non-tradable goods, which in turn affects REER. We also control for policy variables which affect real exchange rates such as central bank policy rates, financial openness, foreign reserves, and government expenditure.

We include lags of remittances (as percent of GDP) in the regression model to compute impulse response functions. The coefficients for the lagged remittance-GDP ratio captures the dynamic effect of remittances on the REER. We also include lags of the REER because of the structure of dynamic panel model, and, as Engel and Wu (2024) discuss, the lagged exchange rate can be used for error correction terms. For instance, if the REER appreciates last year, the current REER may tend to depreciate, converging to its the long-run level.

We consider the level of the REER instead of the change in the REER in line with our motivation captured in Figure 3, which looked at the statistical correlation between the level of REER and the degree of overvaluation. Moreover, given the annual frequency of the data, our impulse responses will capture the impact of remittance levels on the level of the REER at the onset of the shock, after a year, and in the long-term (we show results until 4 years ahead).

6. Baseline Estimation Results

In this section, we present the impulse response functions of the Real Effective Exchange Rate (REER) to a one-off increase in remittance flows for each group of countries. As we explain in the previous section, we estimate impulse response functions using a dynamic panel model in two subsamples – fixed exchange rate (hard pegs and soft pegs) and flexible exchange rate regime. Given that our analysis uses annual frequency data, the impulse response functions illustrate the impact of remittances on the REER in subsequent years.[5]

[4] We control for foreign reserves and the current account separately because governments hold foreign reserves primarily in U.S. dollars (about 59 percent in 2021), and U.S. dollars are considered a liquid asset, which helps explain the behavior of nominal exchange rates.

[5] The full set of results for all estimations available by request from authors (including cumulative effects for the impulse response functions).

A. Impulse Response Functions Estimated by Dynamic Panel Model

Figure 4 shows the results for the impulse response functions under fixed and flexible exchange rate regimes.[6] In the left panel of Figure 4, we observe that under a fixed exchange rate regime, the REER begins to appreciate one year after the remittance shock, reaching its peak appreciation in two years. The sluggish pace of REER appreciation under a fixed exchange rate regime is attributed solely to changes in price levels. We do not observe REER appreciation at the onset of the shock because price levels are sticky in the short run, and the subsequent appreciation is relatively muted. These findings align with Lartey et al. (2012). There are no statistically significant effects of the remittance shock over the 4-year post-shock horizon. These results are also consistent with the theoretical literature, which does not suggest a particular sign of the long-run effect of remittances. For example, Fullenkamp and others (2008) summarize how remittance flows affect long-run GDP, which in turn determines the long-run REER through many macroeconomic variables such as physical and human capital and show that the overall effect is ambiguous.

In the right panel of Figure 4, we observe that under a flexible exchange rate regime, the REER appreciates more within one year than it does under a fixed exchange rate regime. This immediate and stronger response compared to that under a fixed exchange rate regime is most likely due to the nominal exchange rate appreciation following the remittance shock.[7] Furthermore, there is a wider confidence interval for each year because the nominal exchange rate is volatile and difficult to predict, consistent with the findings in the literature on the determination of exchange rates (e.g., Meese and Rogoff, 1983; and Itskhoki, 2021). There is no statistically significant initial appreciation of the real effective exchange rate (REER) at the onset of the shock, which could be driven by price stickiness.[8] Nonetheless, the effect after one year is larger and statistically significant. In the long run, we observe no lasting change in the REER—similar to the fixed exchange rate regime—suggesting that initial deviations are fully unwound.

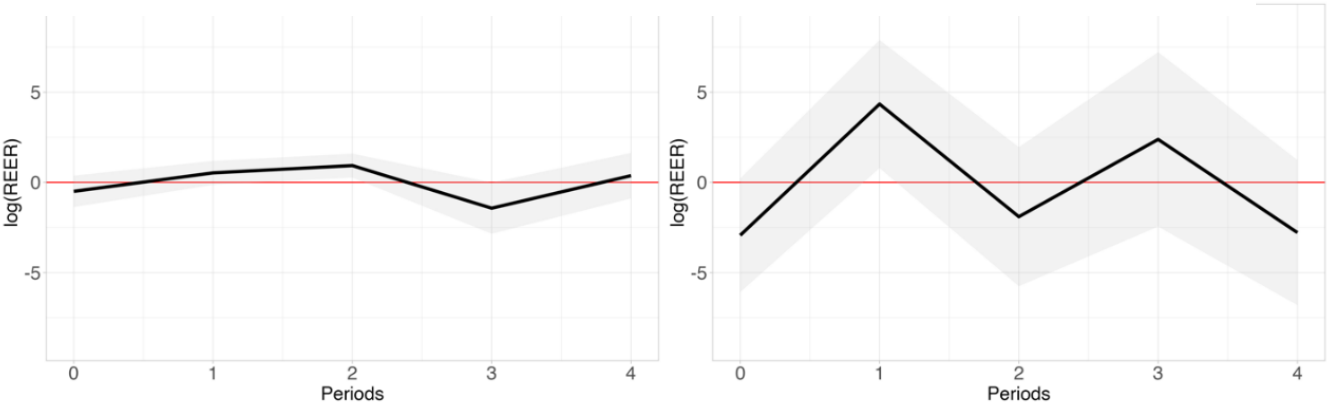
Some related papers report different results from ours. Ball et al. (2013) finds that remittances appreciate the REER under both exchange rate regimes, but the magnitude differs. One possible explanation for having different results is that we control for more macroeconomic variables.

[6] Because we estimate the impulse response functions on subsamples, we do not test whether the impulse responses are statistically different across periods. However, the estimates are considered statistically different if their confidence intervals do not overlap.

[7] The framework, like in most empirical papers does not distinguish between a REER appreciation due from the appreciation of the nominal exchange rate, a change in relative prices, or a combination of both.

[8] Bakker (2024) introduces a dual-component framework in which nominal exchange rates follow a random walk in the short run. Mean reversion—thus predictability—is possible over the medium term because of the stationarity of a cyclical component..

Figure 4. Impulse Response Functions for Countries Under Fixed Exchange Rate Regime (Left) and Flexible Exchange Rate Regime (Right) Estimated by the Dynamic Panel Model



Note: A positive (negative) value indicates an appreciation (depreciation) of the real effective exchange rate. The grey shaded regions represent the 95 percent confidence intervals of the impulse response functions.

To summarize, we find that under both regimes the REER begins to appreciate one year after the remittance shock. However, the appreciation is stronger under a flexible exchange rate regime due to fluctuations in the nominal exchange rate. Under a fixed exchange rate regime, prices are sticky in the short term, and the nominal exchange rate is stabilized by the authorities. Moreover, the volatility of the nominal exchange rate under a flexible regime makes it difficult to discern the effect of remittances at the onset of the shock. In the long run, we observe no statistically significant effect of remittances.

Even though the response to a remittances shock is a smaller and slower appreciation under fixed exchange rate regime (after one year), this does not preclude an overvaluation over time. Note that we estimate the impact of rising remittances on the level of REER, not its deviation from the equilibrium. Therefore, given the steady increase of remittances over time observed in some countries, this result could explain why countries with fixed exchange rates tend to have more overvalued exchange rates.

The extent to which remittance flows appreciate the REER also depends on macroeconomic characteristics, not just exchange rate regimes. In the next section, we classify countries by import intensity, remittance inflows, non-tradable goods production, and manufacturing exports, and examine how these factors condition the effect of remittances.

B. Importers

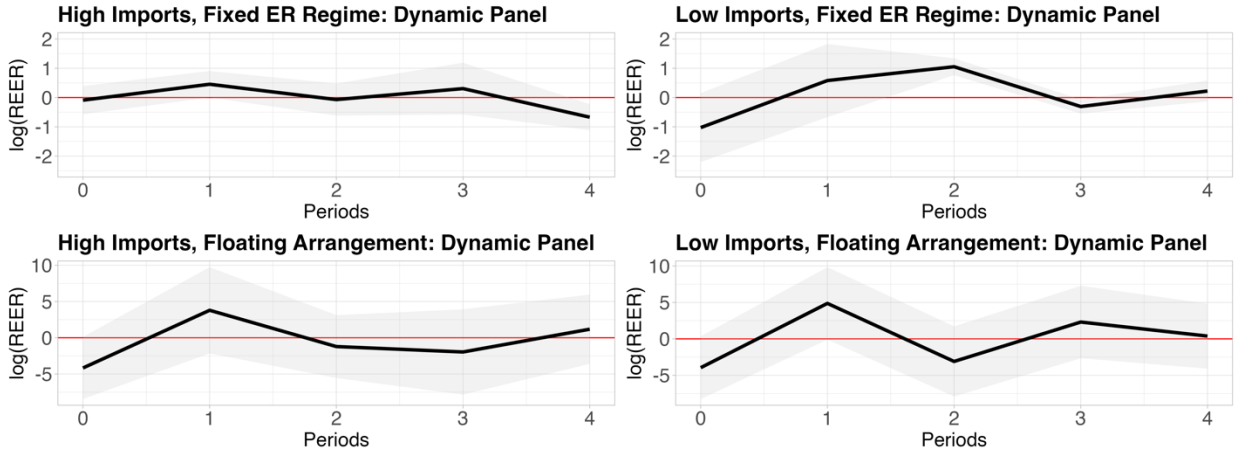
In countries that import foreign goods, households are likely to consume more imported tradable goods when remittances increase. Since the REER appreciates with an increase in demand for non-tradable goods, we anticipate that remittance flows will not strongly appreciate the REER in countries that import a larger volume of foreign goods compared to those that import less. Under a flexible exchange rate regime, a higher demand for foreign goods implies a lower demand for the local currency, leading to a depreciation of the country's nominal exchange rate.

To understand how the effect of remittance flows is influenced by imports, we calculate the impulse response functions for both “high importers” and “low importers”. We define a high (low) importer as a country whose median import-to-GDP ratio over the sample periods is above (below) the global median of the import-to-GDP ratio. We further divide these countries based on their exchange rate regimes. After categorizing the countries, we conduct regressions for each of these four subgroups and calculate their impulse response functions. Figure 5 shows the impulse response functions for four groups: (1) high importers under fixed exchange rate regime; (2) high importers under flexible exchange rate regime; (3) low importers under fixed exchange rate regime; (4) low importers under flexible exchange rate regime.

The top left and right panels show that low importers under a fixed exchange rate regime experience greater REER appreciation following a remittance shock than high importers under the same regime. This outcome aligns with the predictions of the theoretical background we explained. In countries that import a significant amount of foreign goods, remittance flows do not substantially increase the demand for non-tradable goods, resulting in only a modest appreciation of the REER.

The bottom left and right panels also confirm the theoretical prediction. We do not see any statistically significant effect for high importers, but we can see that low importers experience the REER appreciation due to the shock on remittances. Moreover, by comparing the top right and bottom right panels, we can again observe that countries under flexible exchange rate regimes experience higher and quicker appreciation of the REER. The results support our finding in the baseline specification: the REER appreciates faster and to the greater extent under flexible exchange rate regimes.

Figure 5. Impulse Response Functions by Level of Imports and Exchange Rate Regimes



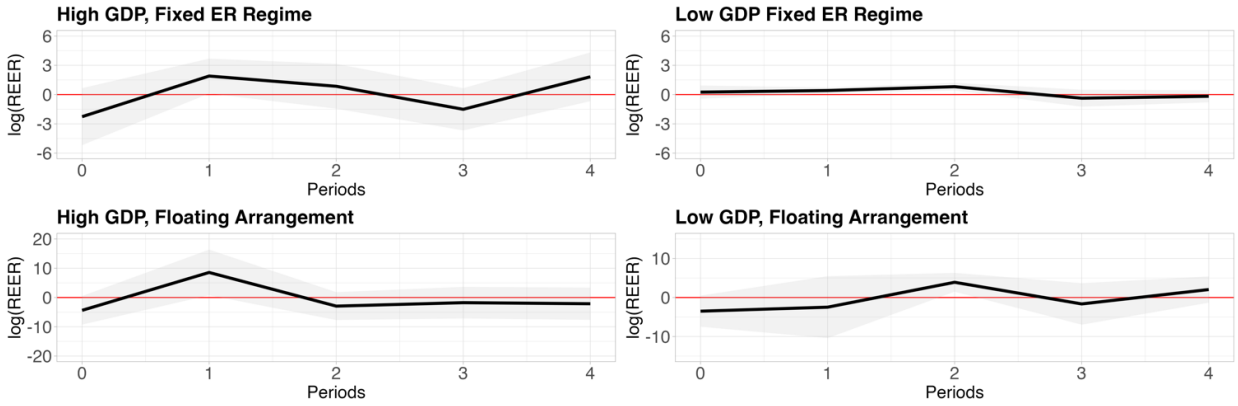
Note: A positive (negative) value indicates an appreciation (depreciation) of the real effective exchange rate. The grey shaded regions represent the 95 percent confidence intervals of the impulse response functions.

C. Size of the Economy

The above result can be explained by the fact that in smaller open economies imports represent a higher share of consumption, and therefore, an increase in remittances is more likely to have an impact on the REER in countries that tend to have lower imports (which tend to be larger economies). Indeed, Annex II shows this correlation between imports as a percent of consumption, and the size of the economy (GDP), and Figure 6

below shows the results when splitting the sample into small and large countries according to GDP (below or above the median GDP). The REER appreciates more in large countries. However, both large and small economies experience statistically significant REER appreciation, especially in floating exchange rate arrangements.

Figure 6. Impulse Response Functions by Level of GDP and Exchange Rate Regimes



Note: A positive (negative) value indicates an appreciation (depreciation) of the real effective exchange rate. The grey shaded regions represent the 95 percent confidence intervals of the impulse response functions.

D. High Remittance Receivers

Countries receiving high remittance flows are concerned about the REER appreciation because a shock increasing the remittance flows may further reduce competitiveness of the tradable goods sector. We classify countries as high (low) remittance receivers when they receive remittances above (below) the world median of remittances relative to GDP.

Figure 7 shows the impulse response function estimated by the dynamic panel model for each remittance receiver and exchange rate regime pair. Note that we consider the case where the remittance-to-GDP ratio increases by 1 percentage point as in the baseline estimations.

The top left and right panel show the impulse response functions for high remittance and low remittance receivers under fixed exchange rate regimes. We find that countries receiving more remittances experience statistically significant REER appreciation.

The top left panel and bottom left panel show the impulse response functions for high remittance receivers under fixed and flexible exchange rate regimes respectively. The estimation results show that the REER appreciates following an increase in remittance flows regardless of their exchange rate regimes. Also, as in the baseline estimations, we find that countries under flexible exchange rate regimes experience higher and quicker REER appreciation.

The right top and bottom panels show the estimation results for low remittance receivers under fixed exchange rate regimes. By comparing the two panels, we can see that the REER appreciates significantly under flexible exchange rate regimes, consistent with the baseline estimation. The bottom left and right panels do not show any huge difference in the magnitude of REER appreciation.

To summarize, we find that high remittance receivers experience the REER appreciation regardless of the exchange rate regime, and the REER appreciates more in countries under flexible exchange rate regime as we find in the baseline estimation.

Figure 7. Impulse Response Functions by High (Low) Remittance Receivers and Exchange Rate Regimes

Note: A positive (negative) value indicates an appreciation (depreciation) of the real effective exchange rate. The grey shaded regions represent the 95 percent confidence intervals of the impulse response functions.

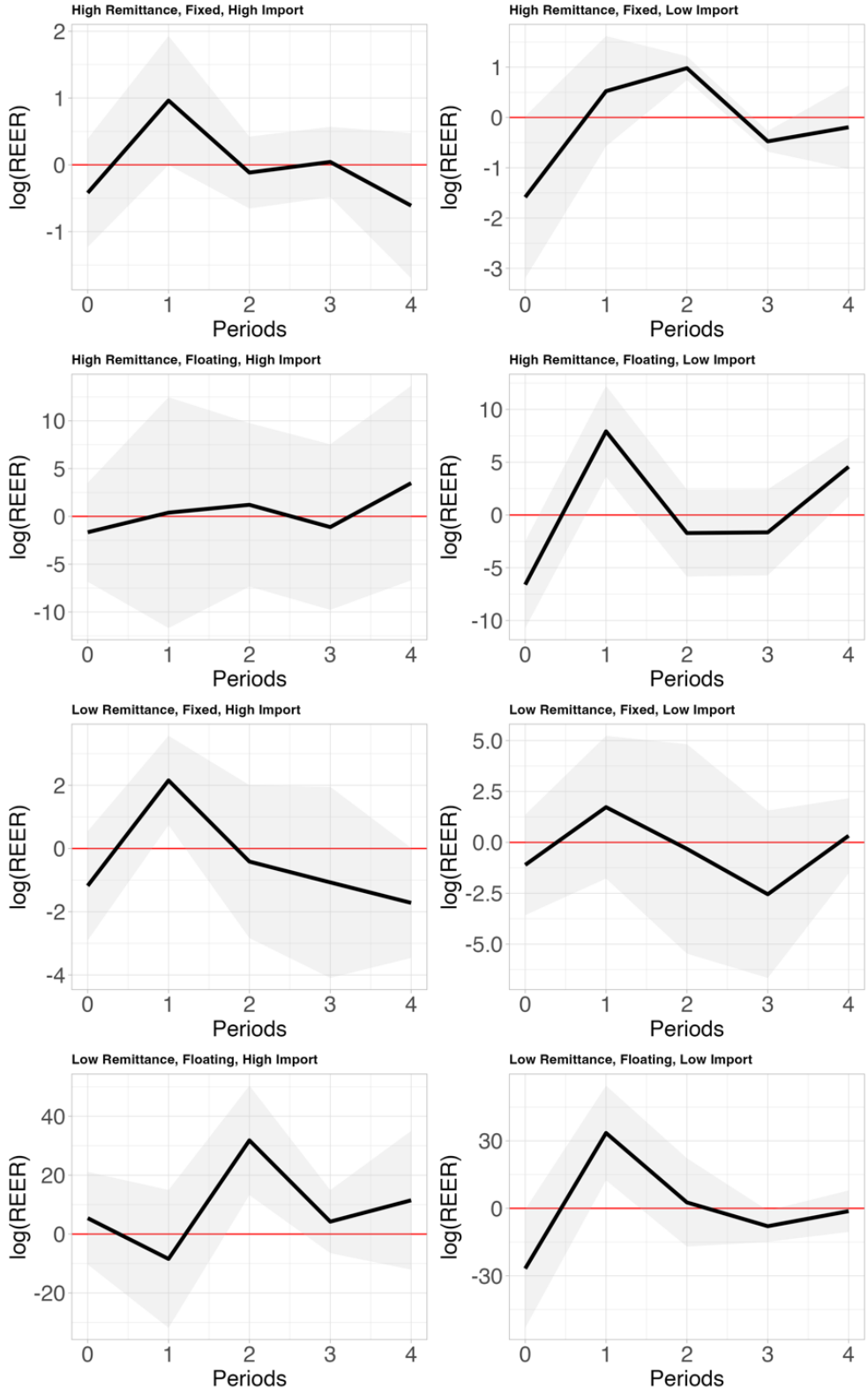
E. Remittances and Imports Jointly

Figure 8 shows impulse response functions in subgroups of countries classified by three dimensions: (i) the level of imports; (ii) level of remittances; and (iii) exchange rate regime. We find that if countries receive high remittances and import less, the REER appreciates after a remittance shock, regardless of the exchange rate regime. The results are consistent with the findings in Figures 5 and Figure 6. As we argued, countries that import fewer foreign goods tend to consume more non-tradable goods when remittances increase, resulting in higher REER appreciation. Additionally, Figure 6 shows that countries receiving remittances above the world median experience statistically significant REER appreciation following the shock in remittance flows.

We also find that countries with low remittances and high imports have the highest REER appreciation at the peak. The results could be driven by nominal exchange rates. As we can see, the IRFs show that countries under flexible exchange rate regime tend to have higher appreciation.[9] Note that the estimate is less precise because the subsample has the least observations among the subsamples. The subsample has 45 observations and 8 countries, that is, each country has about 6 observations on average.

[9] Countries with high remittance, high imports, and flexible exchange rate regime have no significant effect, but have quite wide confidence interval explained by the volatility of nominal exchange rates.

Figure 8. Impulse Response Functions by Remittances, Imports, and Exchange Rate Regimes



Note: A positive (negative) value indicates an appreciation (depreciation) of the real effective exchange rate. The grey shaded regions represent the 95 percent confidence intervals of the impulse response functions.

F. Remittances, Imports and REER Undervaluation

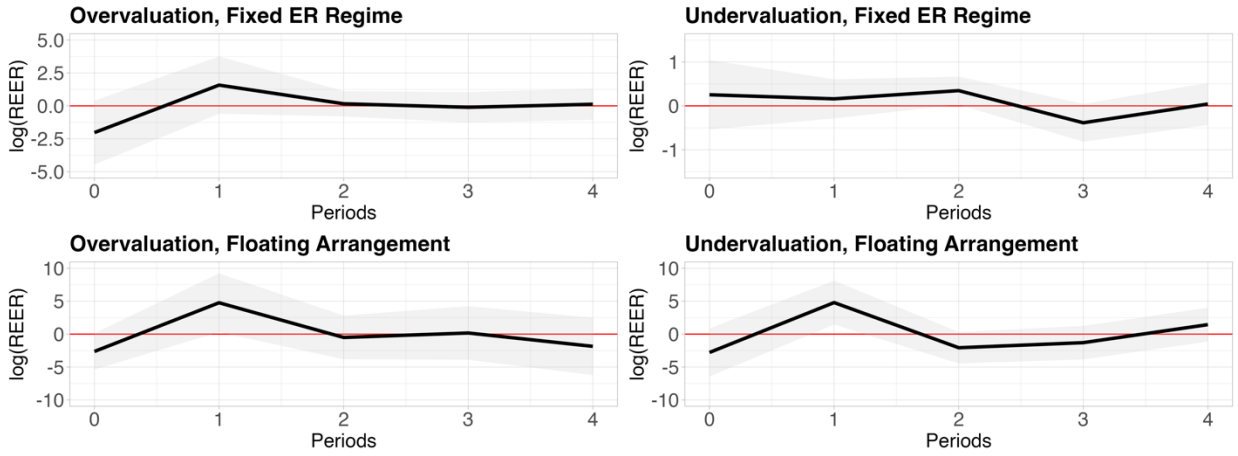
The extent to which remittances are spent on imported goods rather than domestically-produced goods or services will depend not only on the size of the economy but also on the existing level of REER undervaluation.[10] In turn, the impact of a remittances shock on the real exchange rate will be different in cases of overvalued vs cases of undervalued exchange rate.

Using the estimations in section 4, we split the sample between countries with an overvalued REER, and countries with undervalued REER. The results in Figure 9 suggest that as in all previous estimations the impact of a remittances shock has a higher impact on the REER appreciation in the case of a floating arrangement, as the nominal exchange rate adjusts to the influx of foreign exchange. The reason the appreciation of the REER may be more significant in the case of the undervaluation since there is more room for the REER to appreciate before reaching its equilibrium level (consistent also with results from Lopez and others, 2007).

Figure 9 also shows that in countries with fixed exchange rate regime the impact on the REER is not statistically significant, regardless of the departure from the equilibrium exchange rate.

Moreover, in countries with low remittances—where the exchange rate is most likely not yet overvalued—a remittance shock has a bigger impact. From Figure 10, which shows impulse response functions, depending on the degree of overvaluation (the measure explained in section 4) as well as if remittance flows are below or above the median of the sample, we can conclude that the highest impact of a remittances shock on REER appreciation is in the case of low remittances and undervaluation (since, as before, there is more room to push the exchange rate towards the equilibrium).

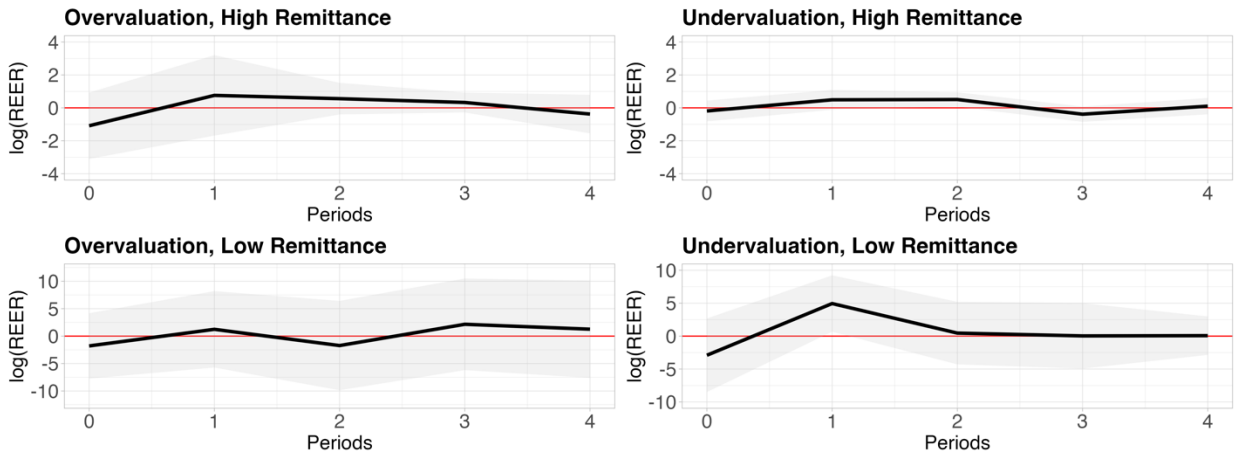
Figure 9. Impulse Response Functions by REER Undervaluation and Exchange Rate Regimes



[10] For example, Bakker (2025, forthcoming) found that countries observing surges in remittances also see increases in consumption. However, because much of this consumption consists of imported good—driven by overvalued exchange rates—these increases do not translate into significant increase in long-run GDP growth.

Note: A positive (negative) value indicates an appreciation (depreciation) of the real effective exchange rate. The grey shaded regions represent the 95 percent confidence intervals of the impulse response functions.

Figure 10. Impulse Response Functions by REER Undervaluation and Remittances



Note: A positive (negative) value indicates an appreciation (depreciation) of the real effective exchange rate. The grey shaded regions represent the 95 percent confidence intervals of the impulse response functions.

7. Robustness Analysis

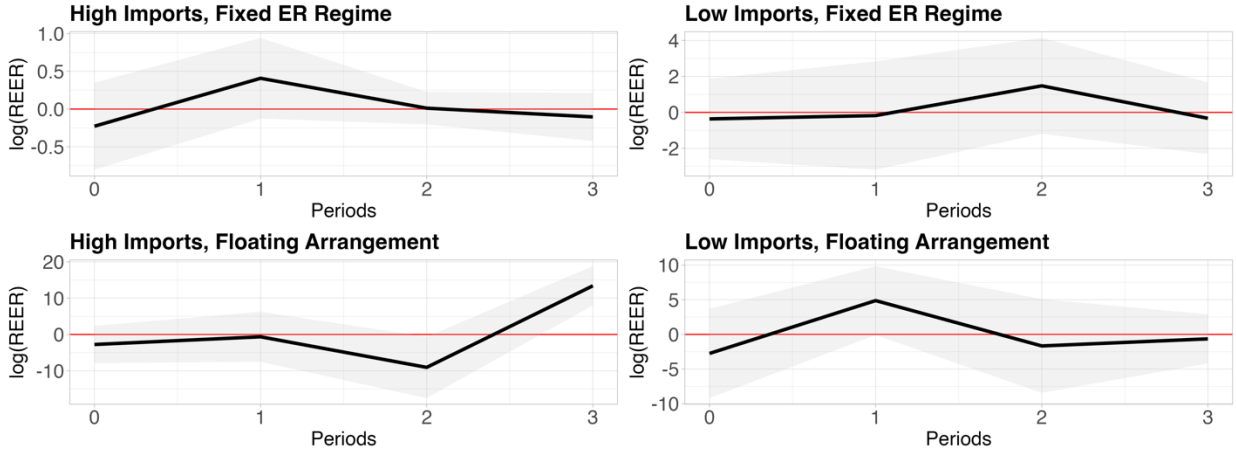
For robustness, we estimated impulse responses using various measurements of variables and different thresholds for country characteristics in our groupings. Although we have fewer observations, resulting in less precise estimates in our robustness analysis, we will demonstrate that some of the findings from our main regressions remain robust.

A. Different Thresholds for Imports

In this section, we use different thresholds to define high importers and low importers and estimate IRFs for each subgroup. High importers have imports (percent of GDP) above the 70th percentile, while low importers have imports (percent of GDP) below the 30th percentile. We choose the 70th and 30th percentiles, rather than the 80th and 20th percentiles used in the next section, to ensure we have enough observations to estimate IRFs.

Figure 11 shows the IRFs of the REER for each import and exchange rate regime pair. We find that after one year of the remittance flow shock, the REER does not appreciate significantly at the 95 percent confidence level. However, the REER appreciates significantly at the 90 percent level and p-value is 0.054 for low importers under flexible exchange rate regime. This result confirms our baseline estimation results: low importers experience more appreciation. Unlike our main estimation, we do not find statistically significant appreciation for low importers adopting fixed exchange rate regime. One possible explanation for the wide confidence interval is the limited number of observations. For our main estimation, we have 149 observations, but we only have 77 observations in this estimation, which causes wider confidence intervals.

Figure 11. Impulse Response Functions by (Non-)Importers and Exchange Rate Regime



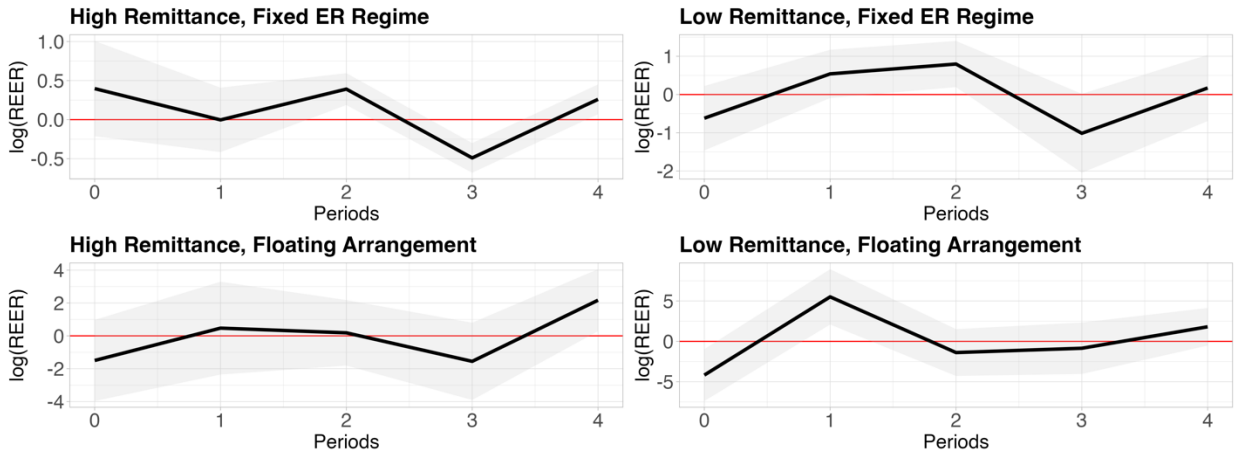
Note: A positive (negative) value indicates an appreciation (depreciation) of the real effective exchange rate. The grey shaded regions represent the 95 percent confidence intervals of the impulse response functions.

B. Different Thresholds for Remittances

In this section, we classify countries as high remittance receivers if their remittance flows are above the 80th percentile. Conversely, low remittance receivers are countries whose remittance flows are below the 20th percentile.

Figure 12 shows our estimation results. We find that countries under fixed exchange rate regime experience slower and smaller appreciation of the REER, which is consistent with our main estimation. On the other hand, we do not find statistically significant appreciation of the REER for high remittance receivers under flexible exchange rate regime. One possible explanation of having wide confidence interval for the IRF of the subgroup is that we only have 50 observations whereas we have 149 observations for the estimation for the subgroup.

Figure 12. Impulse Response Functions by High (Low) Remittance Receivers and Exchange Rate Regimes with Different Threshold



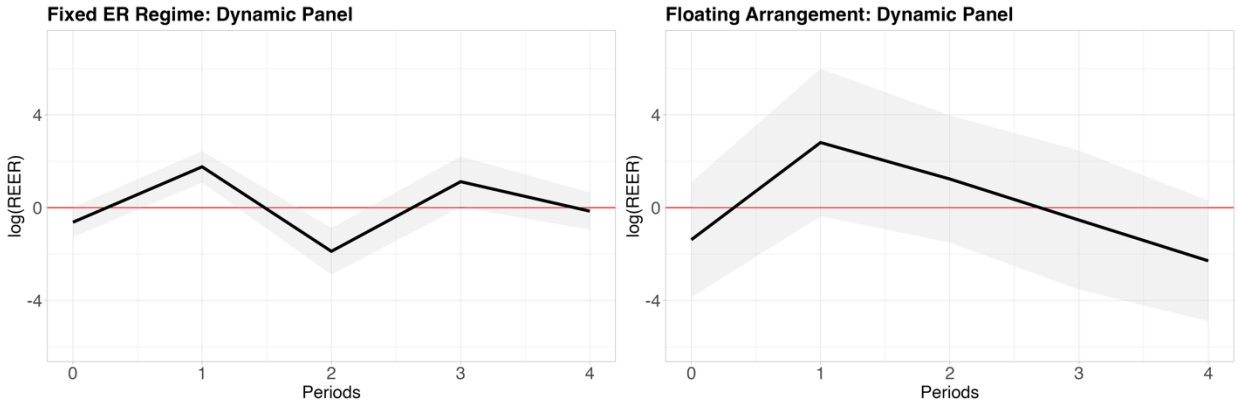
Note: A positive (negative) value indicates an appreciation (depreciation) of the real effective exchange rate. The grey shaded regions represent the 95 percent confidence intervals of the impulse response functions.

C. Real Effective Exchange Rates from IFS

For our main regressions, we use the data on the REER constructed by Darvas (2011, 2021). In this section, we instead use the data on the REER from the IFS of the IMF. Note that this data covers a smaller number of countries.

The right panel shows the IRF under the flexible exchange rate regime, indicating that the REER does not appreciate significantly at the 95 percent confidence level, but it does appreciate significantly at the 90 percent confidence level (p-value is 0.083), consistent with our baseline estimation result. The left panel shows the IRF under the fixed exchange rate regime. The effect of remittance flows on the REER is smaller under the fixed exchange rate regime, but the REER appreciates one year after the occurrence of the shock. The difference could be due to the fact that we have fewer observations here. In this analysis, the number of observations is 172 and the number of countries is 19. In contrast, our main regression for the fixed exchange rate regime includes 385 observations with 43 countries.

Figure 13. Impulse Response Functions of the REER from IFS of the IMF



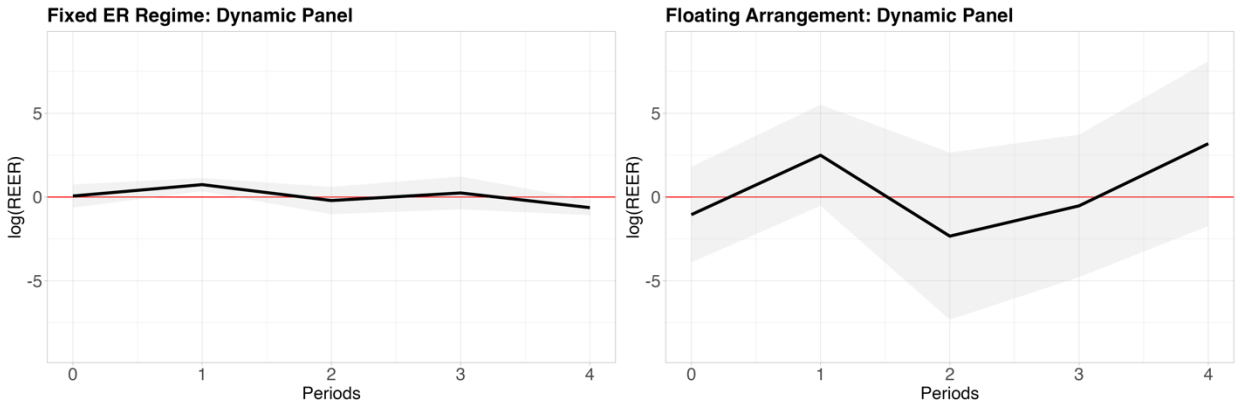
Note: A positive (negative) value indicates an appreciation (depreciation) of the real effective exchange rate. The grey shaded regions represent the 95 percent confidence intervals of the impulse response functions.

D. Foreign Reserves from IFS

In this section, we estimate the IRFs as in our main regressions, but the data on foreign reserves is from the BOP and IIP of the IMF. The data have fewer observations because Lane and Milesi-Ferretti (2018) extended the dataset from the BOP and IIP.

Figure 14 shows the impulse response of the REER to the shock on remittance flows. Unlike our baseline estimation, the right panel does not show statistically significant appreciation of the REER after the shock on remittance flows at the 95 percent confidence level, but significant at 90 percent confidence level (p-value is 0.105). The left panel shows that the REER appreciation is smaller after the shock of remittances. Again, we find that the REER appreciates more under the fixed exchange rate regime, consistent with our baseline estimation, although it appreciates following the shock on remittances.

Figure 14. Impulse Response Functions of the REER (Foreign Reserves from BOP and IIP of the IMF)



Note: A positive (negative) value indicates an appreciation (depreciation) of the real effective exchange rate. The grey shaded regions represent the 95 percent confidence intervals of the impulse response functions.

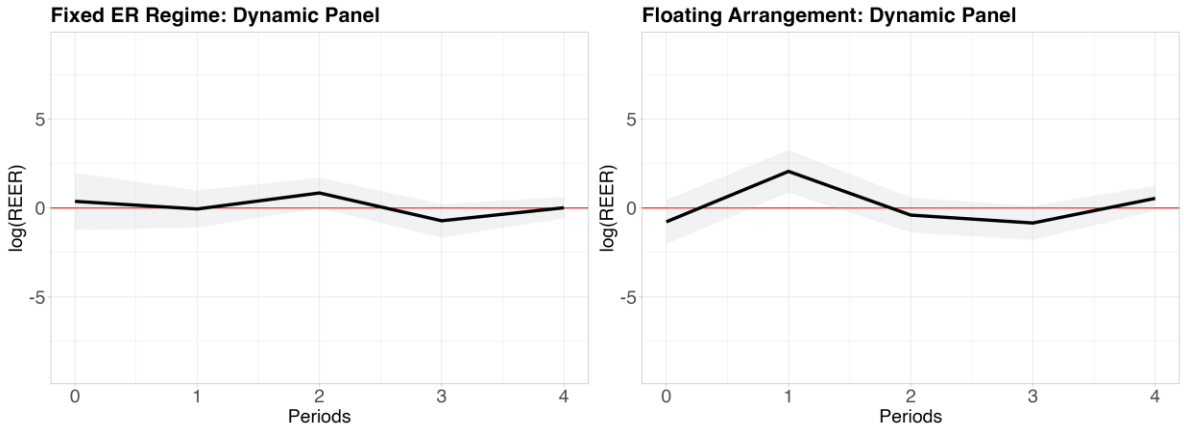
E. Larger Sample

Note that in our baseline regressions, some countries that receive high remittances and are included in Section 4—such as Haiti, Jamaica, Nicaragua, and Honduras—are not in the sample due to missing data on policy rates. Excluding policy rates, we can use a larger set of countries and estimate the impulse response functions of the REER to remittance shocks. The new sample includes 146 countries (see Annex I for details). The sample period remains the same (2008-21).

Figure 15 presents the IRFs of the REER to a remittance shock. We find that our baseline results are robust to changes in sample size. Countries with floating exchange rate regimes experience sharp appreciation in year 1, while those with fixed exchange rate regimes exhibit more gradual appreciation.

To address potential omitted variable bias, we implement an overidentification test to assess whether our instruments remain valid after excluding policy rates. The overidentification test in both regressions imply that these instruments are valid.

Figure 15. Impulse Response Functions of the REER (146 countries, no policy rate as control)



Note: A positive (negative) value indicates an appreciation (depreciation) of the real effective exchange rate. The grey shaded regions represent the 95 percent confidence intervals of the impulse response functions.

8. Conclusion

This paper studies how the effects of remittance flow shocks on the real effective exchange rate (REER) depend on exchange rate regime and the country's macroeconomic structure, such as reliance on remittance flows and imports. We fill a gap in the existing literature by simultaneously considering: (i) the role of exchange rate regimes, (ii) both short-run and long-run effects of remittance flows on the REER, (iii) control variables that determine the behavior of nominal and real exchange rates (as found in recent work on exchange rate determination), and (iv) the dependence of these effects on macroeconomic structures.

We arrive at three main findings. First, we find a positive correlation between remittance flows and the overvaluation of the REER (deviation from the REER relative to its long-run level) in countries with flexible exchange rate regimes, pointing at the possibility of a Dutch disease effect. Once we control for potential endogeneity and other variables affecting the real exchange rate, we also found that economies with fixed exchange rate regimes are found to experience sluggish and smaller REER appreciation after a shock in remittance flows, in line with the foreign exchange inflows literature. Moreover, this result is also in line with a different strand of the literature, the one explaining the possible overvaluation over time observed in countries with fixed exchange rate regimes, given their slower adjustment to a remittance shock, and the steady increase in remittances observed over time in some countries. Second, when zooming in on characteristics of the countries' macroeconomic structure, we find relatively larger REER appreciation effects for countries that have import-to-GDP ratios lower than the world median, and countries that remittances-to-GDP ratios higher than the world median. Third, for countries that receive relatively high remittances and import relatively less, the REER appreciates after a remittance shock, regardless of the exchange rate regime. The results are robust to alternative classifications, data sources empirical specifications, or sample size and different ways of splitting the sample.

The main policy implication is that countries experiencing high remittances inflows (percent of GDP) need to track the path of the REER, and implement structural reforms as needed, to ensure they do not lose competitiveness of the tradable goods sector.

Annex I. Lists of Countries

This annex lists the countries in our sample under fixed exchange rate regime (Table 1) and flexible exchange rate regime (table 2). Note that some countries adopted both exchange rate regimes during our sample periods. *Indicates countries in the extended sample only. Note that some countries adopted both exchange rate regimes during our sample periods. These countries are Algeria, Angola, Argentina, Armenia, Belarus, Cambodia, Costa Rica, Czechia, Egypt, Estonia, Georgia, Ghana, Guatemala, Guinea, Haiti, Indonesia, Jamaica, Kazakhstan, Kenya, Latvia, Lithuania, Mauritius, Mongolia, Pakistan, Paraguay, Peru, the Philippines, Sri Lanka, Tanzania, Tunisia, Ukraine, and Zambia. We use all observations to get precise estimates for each subgroup.

Table AI.1. Countries With Flexible Exchange Rate Regime

Albania*	France*	Latvia*	Seychelles
Algeria	Gambia	Lithuania*	Sierra Leone*
Angola	Georgia*	Madagascar*	Slovakia*
Argentina	Germany*	Malaysia	Slovenia*
Armenia*	Ghana*	Malta*	South Africa
Australia	Greece*	Mauritius*	South Korea
Austria*	Guatemala*	Mexico	Spain*
Belarus*	Guinea*	Moldova*	Sri Lanka
Belgium*	Haiti*	Mongolia*	Sweden
Brazil	Hungary	Mozambique	Tanzania
Cambodia*	Iceland	Netherlands*	Thailand
Canada	India	New Zealand	Tunisia*
Chile	Indonesia	Norway	Turkey
Colombia	Ireland*	Pakistan	Uganda
Costa Rica*	Israel	Paraguay	Ukraine*
Cyprus	Italy*	Peru	United Kingdom
Czechia	Jamaica*	Philippines	United States
Egypt	Japan	Poland	Uruguay
Estonia*	Kazakhstan*	Portugal*	Zambia
Finland*	Kenya*	Russia	

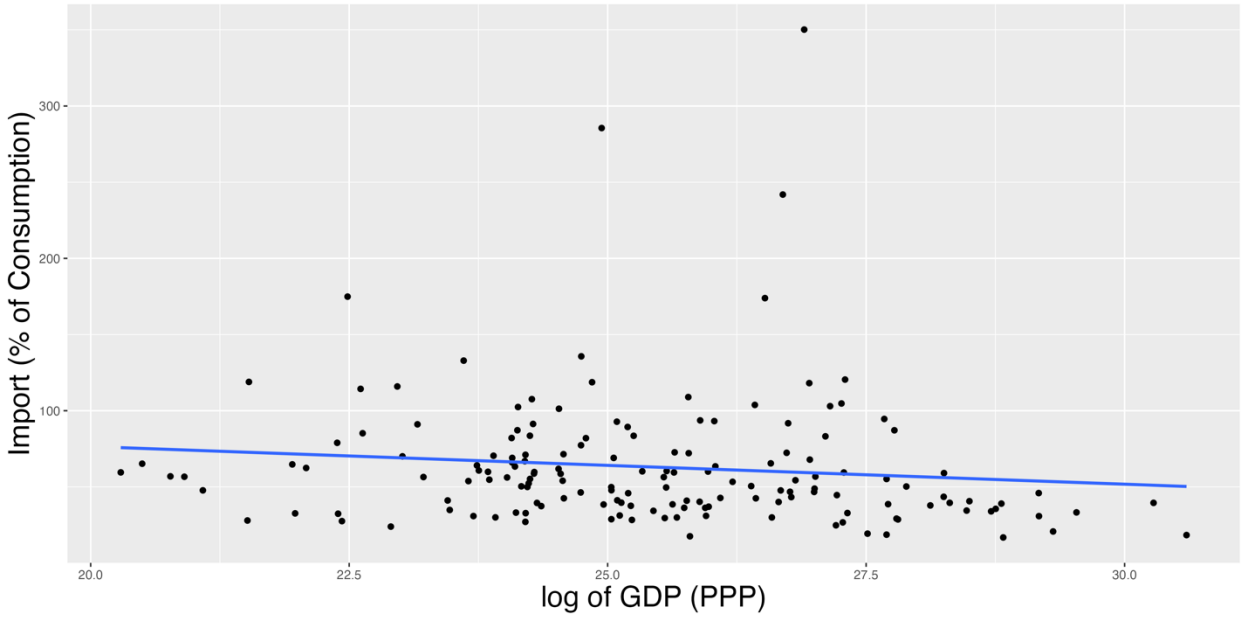
Table AI.2. Countries With Fixed Exchange Rate Regime

Algeria	Costa Rica*	Indonesia	Panama*
Angola	Croatia	Jamaica*	Paraguay
Argentina	Czechia	Jordan	Peru
Armenia*	Côte d'Ivoire*	Kazakhstan*	Philippines
Azerbaijan*	Denmark	Kenya*	Qatar*
Bahamas*	Djibouti*	Kuwait	Rwanda
Bahrain*	Dominica	Kyrgyzstan*	Samoa*
Bangladesh*	Dominican Republic*	Laos	Saudi Arabia

Barbados	Ecuador	Latvia*	Senegal*
Belarus*	Egypt	Lebanon	Singapore*
Belize*	El Salvador*	Lesotho	Solomon Islands*
Benin*	Estonia*	Lithuania*	Sri Lanka
Bhutan*	Eswatini	Mali*	Sudan*
Bolivia	Ethiopia*	Mauritania	Suriname*
Bosnia & Herzegovina*	Fiji	Mauritius*	Syria
Botswana	Gabon	Mongolia*	Tajikistan*
Bulgaria*	Gambia*	Morocco	Tanzania
Burkina Faso*	Georgia*	Mozambique*	Togo*
Burundi	Ghana*	Namibia*	Tonga*
Cambodia*	Guatemala*	Nepal	Tunisia*
Cameroon	Guinea*	Nicaragua*	Ukraine*
Cape Verde	Guinea-Bissau*	Niger*	Uzbekistan*
China	Haiti*	North Macedonia	Vietnam*
Comoros	Honduras*	Oman	Zambia
Republic of Congo	Hong Kong SAR China	Pakistan	

Annex II. Correlation Between Imports as a Share of Consumption and the Size of the Economy

Figure AII.1. Correlation between Imports as a Share of Consumption and the Size of the Economy



Annex III. Descriptive Statistics and Data Histograms

Table AIII.1. Summary Statistics (Baseline Regression)

a. Fixed ER Regime

	Mean	SD	Min	Max
Remittance (percent of GDP)	5.54	6.82	0.00	32.59
Log of GDP per capita	9.35	0.94	6.83	11.15
Terms of Trade	103.58	19.07	47.07	181.77
Current Account (percent of GDP excl. Remittance)	-7.85	13.71	-54.25	45.46
Reserve (percent of GDP)	29.19	25.61	1.23	142.53
Financial Openness	0.44	0.34	0.00	1.00
Government Expenditure (percent of GDP)	17.56	6.95	7.29	43.48
Real Interest Rate Differential (with US)	2.88	3.97	-11.57	16.93
Observations	385			

b. Flexible ER Regime

	Mean	SD	Min	Max
Remittance (percent of GDP)	1.29	2.06	0.00	11.34
Log of GDP per capita	10.01	0.97	7.04	11.40
Terms of Trade	102.31	12.34	72.52	166.48
Current Account (percent of GDP excl. Remittance)	-2.46	6.64	-41.73	18.77
Reserve (percent of GDP)	17.27	11.68	0.45	83.77
Financial Openness	0.67	0.34	0.00	1.00
Government Expenditure (percent of GDP)	16.72	4.75	6.59	28.12
Real Interest Rate Differential (with US)	2.33	4.25	-29.45	22.61
Observations	428			

Table AIII.2. Summary Statistics (Regressions without Policy Rates; larger sample)

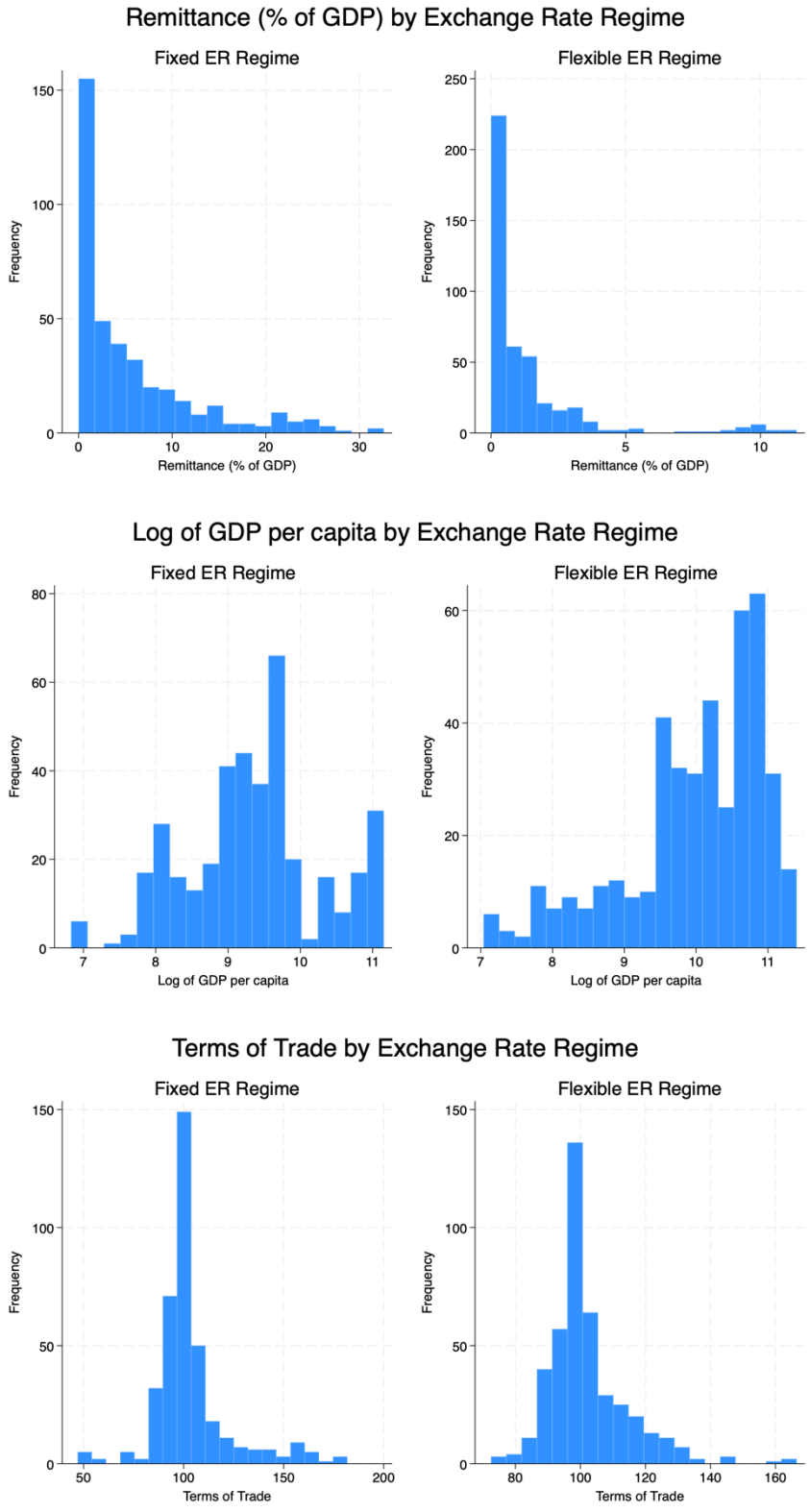
a. Fixed ER Regime

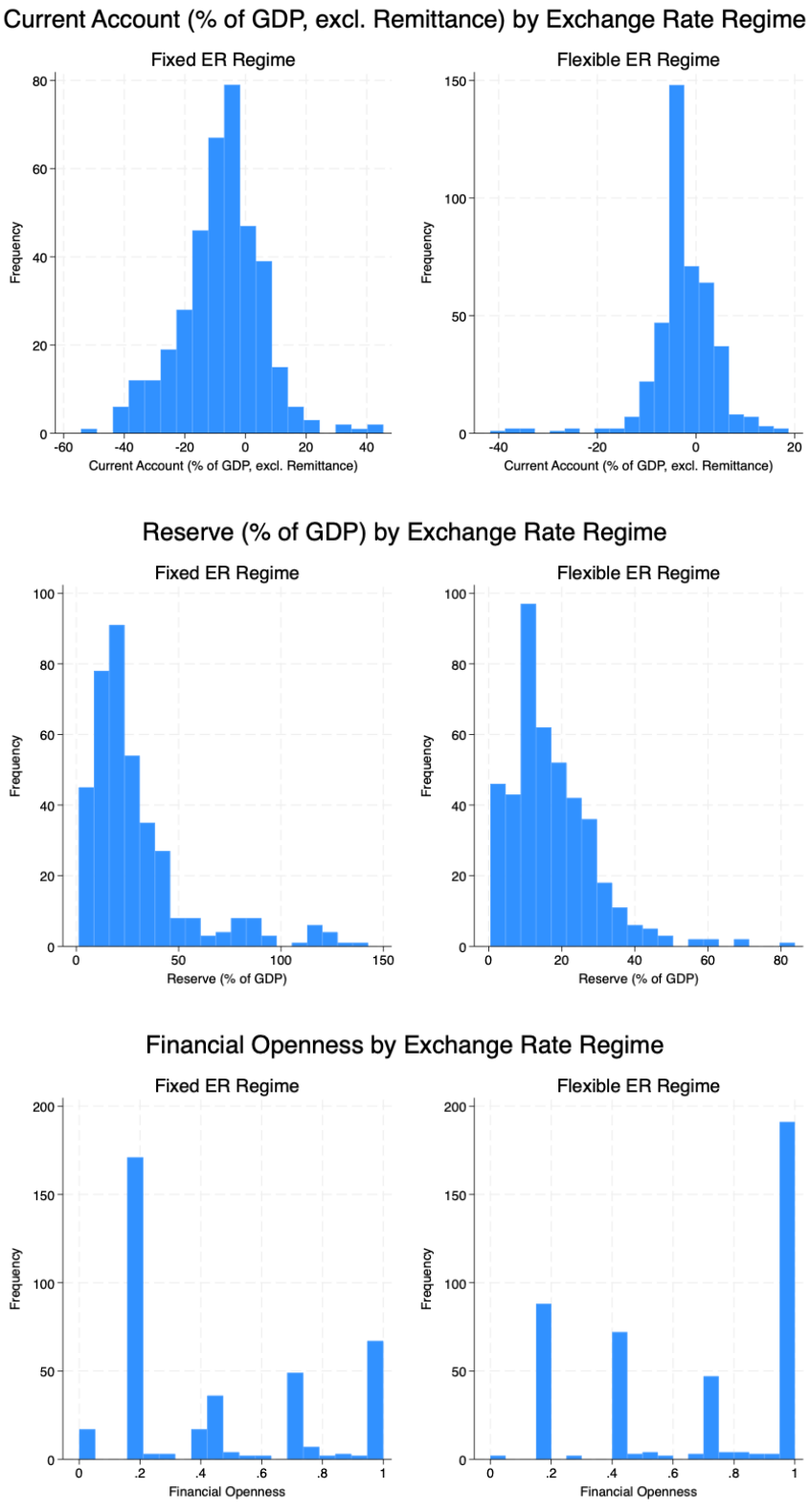
	Mean	SD	Min	Max
Remittance (percent of GDP)	6.35	7.51	0.00	43.77
Log of GDP per capita	9.15	1.01	6.76	11.79
Terms of Trade	103.37	15.73	49.71	181.77
Current Account (percent of GDP excl. Remittance)	-9.83	12.63	-56.26	39.90
Reserve (percent of GDP)	22.58	20.52	0.26	142.53
Financial Openness	0.44	0.35	0.00	1.00
Government Expenditure (percent of GDP)	16.05	6.01	2.36	43.48
Observations	902			

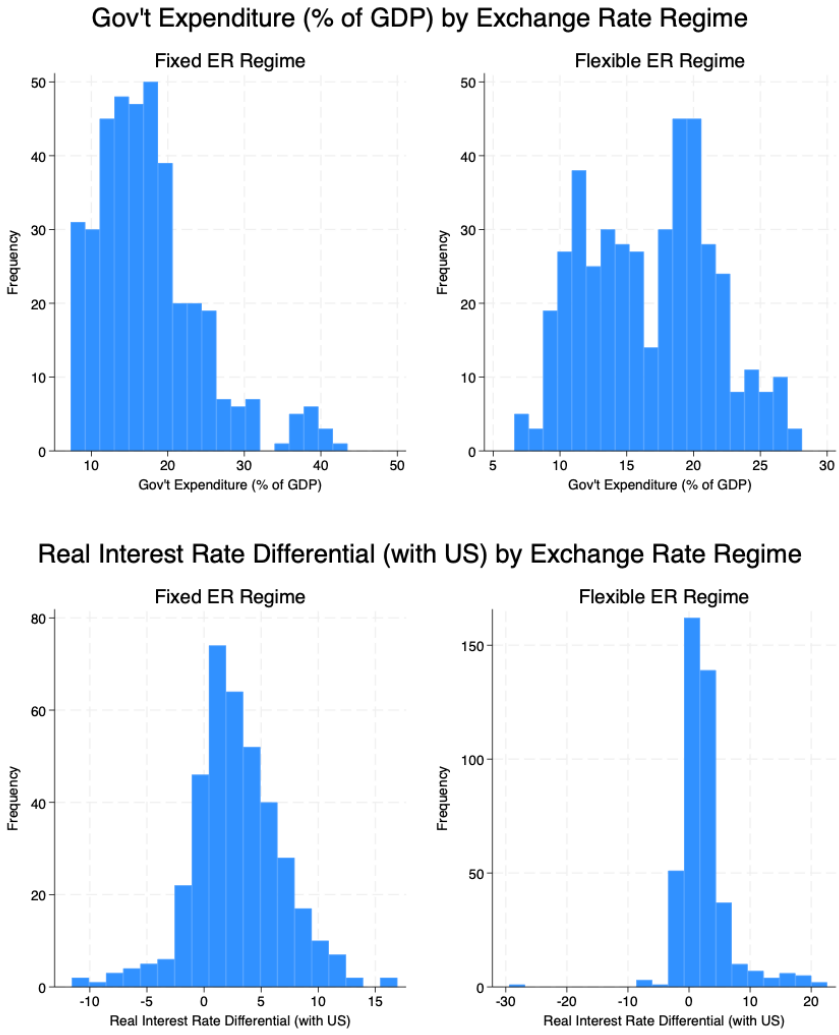
b. Flexible ER Regime

	Mean	SD	Min	Max
Remittance (percent of GDP)	2.39	4.02	0.00	31.18
Log of GDP per capita	10.03	1.01	7.04	11.65
Terms of Trade	101.52	10.76	72.52	166.48
Current Account (percent of GDP excl. Remittance)	-4.52	8.90	-47.29	18.77
Reserve (percent of GDP)	13.52	11.50	0.10	83.77
Financial Openness	0.72	0.34	0.00	1.00
Government Expenditure (percent of GDP)	17.15	4.77	5.63	29.60
Observations	844			

Figure AIII.1. Histograms for All Variables (Baseline Regressions)







References

Acosta, P. A., Lartey, E. K., and Mandelman, F. S. (2009). "Remittances and the Dutch disease." *Journal of International Economics*, 79(1), 102-116.

Barajas, A., R. Chami, D. Hakura, and P. Montiel (2010). "Workers' Remittances and the Equilibrium Real Exchange Rate: Theory and Evidence." International Monetary Fund Working Paper 10/287.

Bakker, B. B., (2024). "Reconciling Random Walks and Predictability: A Dual-Component Model of Exchange Rate Dynamics". IMF Working Paper 2024/252, International Monetary Fund.

Bakker, B. B., (2025). "From Inflows to Impact: How FDI and Remittances Drive Divergent Growth in CAPDR Countries" forthcoming IMF working paper. Presented at the 2024 CAPDR regional conference.

Ball, C. P., Lopez, C., and Reyes, J. (2013). "Remittances, inflation and exchange rate regimes in small open economies", *The World Economy*, 36(4), 487-507.

Beaton, M. K., Cerovic, M. S., Galdamez, M., Hadzi-Vaskov, M., Loyola, F., Koczan, Z., and Wong, J. (2017). "Migration and remittances in Latin America and the Caribbean: engines of growth and macroeconomic stabilizers?" IMF Working Paper 2017/144, International Monetary Fund.

Blundell, R., and Bond, S. (1998). "Initial conditions and moment restrictions in dynamic panel data models." *Journal of Econometrics*, 87(1), 115-143.

Chinn, M. D., and Ito, H. (2008). "A new measure of financial openness." *Journal of Comparative Policy Analysis*, 10(3), 309-322.

Darvas, Z. (2012). "Real effective exchange rates for 178 countries: a new database," Working Paper 2012/06, Bruegel.

Darvas, Z. M. (2021). "Timely measurement of real effective exchange rates." Bruegel working paper no. 15/2021.

Engel, C., and Wu, S. P. Y. (2023). "Liquidity and exchange rates: An empirical investigation." *The Review of Economic Studies*, 90(5), 2395-2438.

Engel, C., and Wu, S. P. Y. (2024). "Exchange Rate Models are Better than You Think, and Why They Didn't Work in the Old Days," National Bureau of Economic Research (NBER). Working Paper Series, No. 32808.

Fullenkamp, C., Cosimano, M. T. F., Gapen, M. T., Chami, M. R., Montiel, M. P., and Barajas, M. A. (2008). "Macroeconomic consequences of remittances." IMF COcasional Paper 259, International Monetary Fund.

Hassan, Gazi M., and Mark J. Holmes. (2013). "Remittances and the real effective exchange rate," *Applied Economics* 45: 4959–70.

Gabaix, X., and Maggiori, M. (2015). "International liquidity and exchange rate dynamics." *The Quarterly Journal of Economics*, 130(3), 1369-1420.

Ilzetzki, E., Reinhart, C. M., and Rogoff, K. S. (2019). "Exchange arrangements entering the twenty-first century: Which anchor will hold?" *The Quarterly Journal of Economics*, 134(2), 599-646.

Ilzetzki, E., Reinhart, C. M., and Rogoff, K. S. (2022). "Rethinking exchange rate regimes." In Handbook of international economics (Vol. 6, pp. 91-145). Elsevier.

Itskhoki, O. (2021). “The story of the real exchange rate,” *Annual Review of Economics*, 13(1), 423-455.

Itskhoki, O., and Mukhin, D. (2021). “Exchange rate disconnect in general equilibrium,” *Journal of Political Economy*, 129(8), 2183-2232.

Jordà, Ò. (2005). “Estimation and inference of impulse responses by local projections,” *American Economic Review*, 95(1), 161-182.

Lane, P. R., and Milesi-Ferretti, G. M. (2007). “The external wealth of nations mark II: Revised and extended estimates of foreign assets and liabilities, 1970-2004.” *Journal of International Economics*, 73 (2), 223–250.

Lane, P. R., and Milesi-Ferretti, G. M. (2018). The external wealth of nations revisited: international financial integration in the aftermath of the global financial crisis. *IMF Economic Review*, 66, 189-222.

Lartey, E. K., Mandelman, F. S., and Acosta, P. A. (2012). “Remittances, exchange rate regimes and the Dutch disease: A panel data analysis,” *Review of International Economics*, 20(2), 377-395.

Lopez H., L. Molina and M. Bussolo (2007). “Remittances and the Real Exchange Rate.” World Bank Policy Research Working Paper 4213, April 2007.

Mandelman, F. S. (2013). “Monetary and exchange rate policy under remittance fluctuations,” *Journal of Development Economics*, 102, 128-147.

Meese, R. A., and Rogoff, K. (1983). “Empirical exchange rate models of the seventies: Do they fit out of sample?,” *Journal of international economics*, 14(1-2), 3-24.

Ottonello, P. (2013). “Optimal exchange rate policy under collateral constraints and wage rigidity,” Inter-American Development Bank, Research Department.

Rajan, R., and Subramanian, A. (2007). “Does aid affect governance,” *American Economic Review*, 97(2), 322-327.

Rodrik, D. (2008). “The real exchange rate and economic growth.” Brookings papers on economic activity, 2008 (2), 365-412.

PUBLICATIONS