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# BILATERAL REMITTANCE INFLOWS TO ASIA AND THE PACIFIC: COUNTERCYCLICALITY AND MOTIVATIONS TO REMIT

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**Abstract**

This paper examines the countercyclicality of remittance inflows to the countries in Asia and the Pacific. It also aims to identify major determinants of remittances using gravity models of bilateral remittances. We find that bilateral remittance inflows are countercyclical against the business cycle of a remittance-receiving country relative to a sending country. The degree to which remittances are countercyclical is found to vary significantly by subregion: Central Asia and Southeast Asia, including many remittance-dependent countries, show stronger countercyclicality than other subregions. The estimated models suggest that migrant stock is a top determinant of remittances, and that an increase in bilateral remittances is explained by a higher occurrence of disasters caused by natural hazards in receiving countries, appreciation of a receiving country's currency value against that of the sending country, lower interest rate differential (receiver–sender), greater capital account openness and higher political instability, and lower costs of remittances. This suggests that an altruistic motivation to remit prevails in the region. We also find that the countercyclicality of remittances rises when recipient countries experience more frequent disasters, a higher old-age dependence ratio, less stringent capital control, and stable political climate.

**Keywords:** remittances, Asia and the Pacific, countercyclicality, business cycle, gravity model

**JEL Classification:** C23, F24, F44

# Contents

# 1. INTRODUCTION

Remittance inflows are important forces for development and sources of income for many families. A large body of research confirms that remittances contribute to poverty alleviation in developing economies by smoothing consumption and enabling households to invest in human and other capital as well as enterprises (Adams 2008; Acosta, Fajnzylber, and Lopez 2007; Yang 2008). They also support foreign exchange reserves and strengthen a country's balance-of-payments position. Moreover, regular inflows can promote financial development by increasing deposits and credits provided by local banks. Therefore, it is essential for countries with a substantial inflow of remittances to have a clear and up-to-date understanding of the drivers of remittances in order to put in place sound macroeconomic policies and measures.

The role of remittance inflows into developing countries has been particularly highlighted during economic downturns as they are more reliable sources of external financing, for example, than foreign direct investment and tourism receipts. Despite the unprecedented economic downturn triggered by the latest COVID-19 pandemic, remittance into low- and middle-income economies declined only by 1.6% in 2020 whereas FDI and tourism receipts fell sharply by 42% and 70% globally during the same period (World Bank 2021; UNCTAD 2021; UNWTO 2021). The resilience of remittance was also witnessed during the 2008 global financial crisis.

Evidence of strong resilience in remittance inflows to developing economies during economic downturns and crises suggests that remittances may be countercyclical to the economic situation of a remittance-receiving country, i.e., a negative association between remittances and business cycles.[1] As international labor mobility and remittances have grown in importance, so have studies investigating the key determinants, including business cycles. However, existing evidence on the role of remittance as countercyclical is inconclusive. Some studies provide evidence of their countercyclicality (Frankel 2011; Bettin, Presbitero, and Spatafora 2017; Ramcharran 2020) while others find mixed results (De et al. 2016; Cismas, Curea-Pitorac, and Vadasan 2020). Many migrants make remittance decisions based on the business cycle of the origin and destination countries, but their remittance motives are not uniform; some migrants send for altruistic motives and send more when their home economy struggles, while others may do so out of self-interest and remit when the home economy is booming. Overall, heterogeneous responses of migrants may offset each other to make remittance flows cyclical, acyclical, or countercyclical as a result.

With a focus on Asian recipients, this paper estimates a gravity model of bilateral remittances to test the countercyclicality of remittance inflows and identify major determinants of remittances in the region. We find that *bilateral* remittance inflows to the region are countercyclical against the business cycles of a receiving country relative to a sending country. Our analyses also suggest that the degree to which remittances are countercyclical varies by subregion: For example, in Central Asia and Southeast Asia there are several countries with high economic dependence on remittances that tend to show stronger countercyclicality than other subregions.

[1] In this study, we refer to a receiving country as one receiving remittances from a sending country \that hosts migrants. Occasionally, we also use the terms "home" or "origin" country (equivalent to a remittance-receiving country) and a destination or a host country (equivalent to a remittance-sending country).

Our empirical results show that in Asia, altruistic motivations prevail more than self-interest motives, and that the countercyclicality of remittances increases with more frequent occurrence of disasters triggered by natural hazards, a higher old-age dependence ratio, a higher interest rate differential, less stringent capital control, and a stable political climate in the recipient countries. Further, our finding on countercyclical remittances is robust when a different business cycle extraction method is used, and aggregate remittance data are used. However, we find that the findings on remitting behaviors are significantly dependent upon the type of data used as most determinants lose their statistical significance in the model with aggregate remittances.

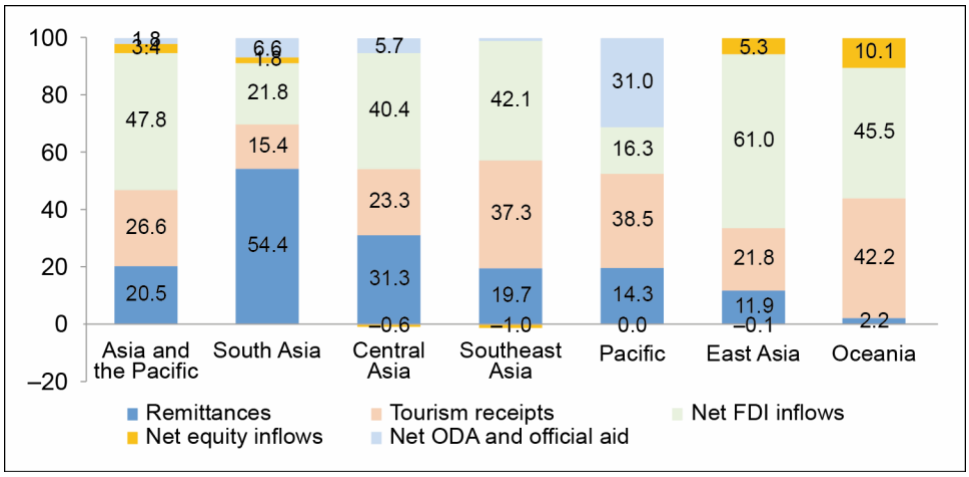
The paper is structured as follows. Section 2 overviews remittance inflows in Asia and the Pacific in comparison with other external financial flows such as FDI and tourism receipts, and presents their trends with business cycles for selective corridors. Section 3 offers a review of existing literature related to the characteristics of remittances specifically in terms of countercyclicality. Sections 4 and 5 discuss data and empirical models, respectively. Section 6 presents findings based on the estimated gravity models. Section 7 concludes with policy implications.

# 2. BACKGROUND

One in three international migrants are from Asia and the Pacific, and the remittance inflows to their home countries constitute one of the largest sources of external financing in the region, accounting for around 20% of total financial flows from 2014 to 2018 as shown in Figure 1 (ADB 2021). By subregion, South Asia recorded the highest share with more than half (54%) of its foreign currency flows coming from remittances. Central Asia also shows greater remittance inflow, following net FDI inflows closely. Oceania came in last with a minimal remittance inflow relative to other financial flows, such as tourism receipts.

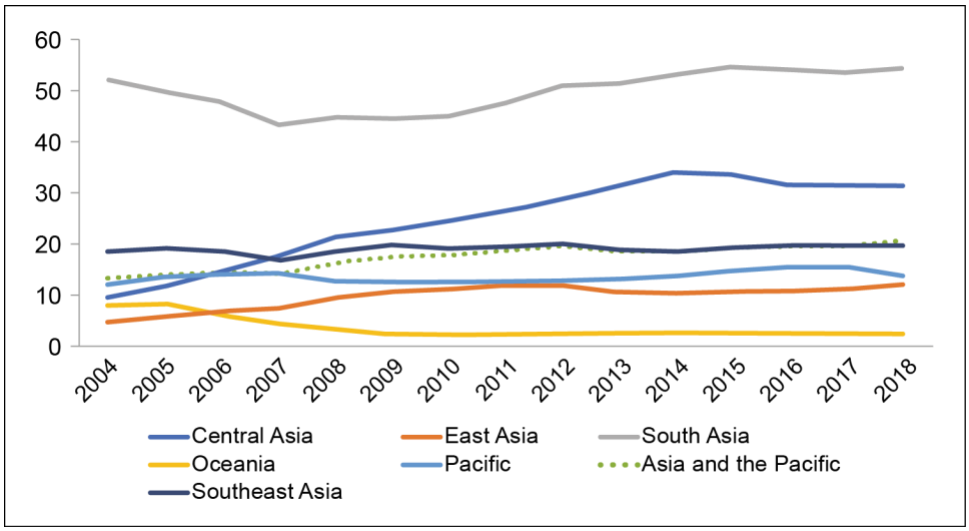
Figure 2 shows that remittance inflows to the region have steadily increased over the last two decades. Remittances to South Asia account for the largest inflow to the region, followed by that of Central Asia, which has seen the inflow of remittances rapidly increasing since 2004. East Asia and the Pacific have also shown higher inflows while Oceania declined before stagnating from 2009.

**Figure 1: Financial Flows by Type**
(%, 2014–2018)



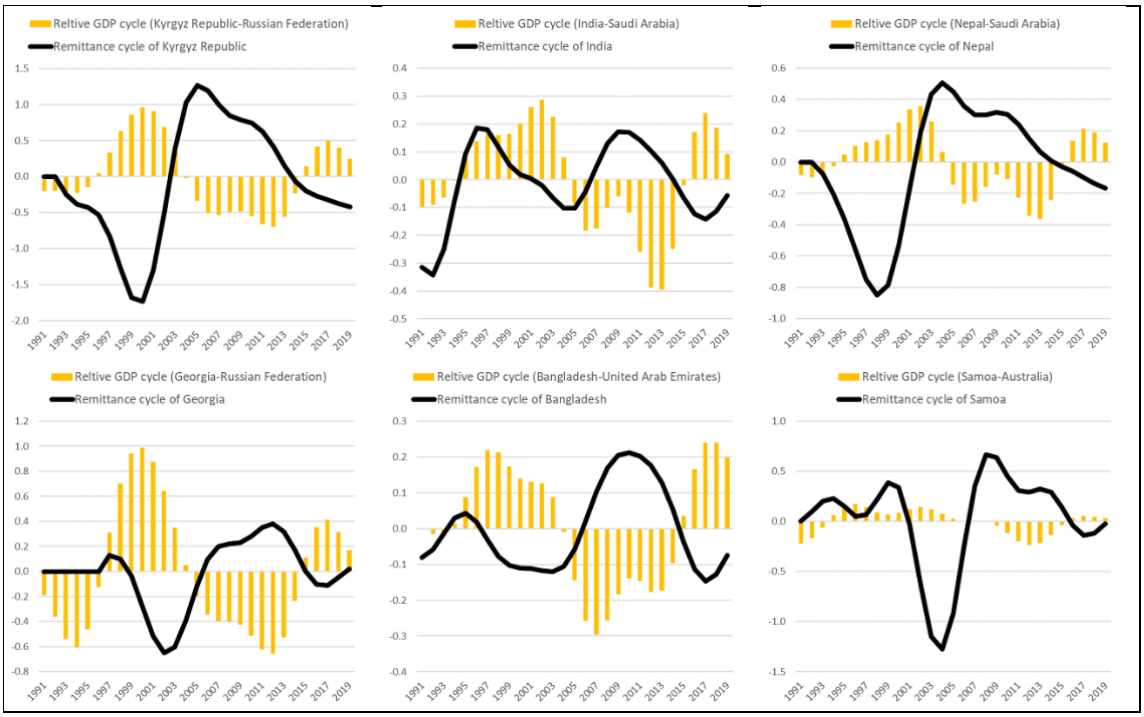

Source: ADB calculations using data from Global Knowledge Partnership on Migration and Development (KNOMAD).

**Figure 2: Remittances by Subregion**
(5-year moving average, % financial flows)




Source: ADB calculations using data from Global Knowledge Partnership on Migration and Development (KNOMAD).

**Figure 3: Business Cycles and Remittances**




Note: Cyclical factors were extracted from GDP using the Christiano-Fitzgerald (CF) filter.
Source: Authors.

Remittance flows can be influenced by the economic conditions of both origin and destination countries, in addition to remitters' idiosyncratic motivations. To illustrate this, Figure 3 shows the cyclical component of remittance inflow together with the relative business cycle of the remittance origin and destination countries. The latter is measured by the difference in cyclical components of the annual log of GDPs between origin and host countries over time in selected countries. Cyclical components were

extracted using the Christiano-Fitzgerald filter using annual data from 1990 onwards (more details on the methodology follow in the Data section). The country pairs in Figure 3 show a strong negative correlation between remittances and relative business cycles of origin and host countries. For example, the Kyrgyz Republic's remittance cycle moves in the opposite direction to its relative business cycle against the Russian Federation, which is the top destination country for Kyrgyz migrants. A similar pattern is also found in the corridors of India–Saudi Arabia, Nepal–Saudi Arabia, Georgia–Russian Federation, Bangladesh–United Arab Emirates, and Samoa–Australia.

# 3. LITERATURE REVIEW

Countercyclical properties of remittances are often discussed in the literature that theoretically and empirically investigates migrants' motivations to remit. The studies about motivations to remit are mostly based on microeconomic theories that are followed by empirical testing using household-level microdata, whereas the literature on countercyclical remittances generally comprises empirical studies using macrodata at national or cross-country levels.

Under the motivation of (pure) altruism, migrants may send remittances to support spouses, children, parents, and other kin or larger social circles out of concern for their welfare. However, various studies, mostly in microeconomic settings, find that other motivations may be at work as donors and beneficiaries of remittances are spatially differentiated, creating room for the expression of additional motives (Rapoport and Docquier 2005).

Remittances may reflect the purchase of various services such as taking care of a migrant's assets, with the size of remittances depending on when the migrant intends to return. Lucas and Stark (1985), for instance, argue that remittances are motivated less by pure altruism than by "tempered altruism" or "enlightened self-interest." Using household data for Botswana, they find greater support for mutual interest rather than pure altruism as a motivation for remittances. Similarly, Cox (1987) shows that transfers represent payments made in exchange for services provided by family members. In contrast to the altruistic model where remittances and the recipient's income are negatively related, under an exchange model an increase in the recipient's income may raise the amount transferred. This may be motivated by protection of the migrant's assets (e.g., land, cattle) or family left behind (children, elderly parents).

Remittances may also be motivated by loan repayment, insurance, or inheritance. In developing economies where imperfect capital markets are prevalent, migration is financed through informal family loans to be paid later through remittances. Using household surveys in Tonga and Western Samoa, Poirine (1997) shows that the loan motivation is stronger than altruism if remittances are not used for capital investment by recipients and do not depend on the magnitude of the loan received. Cox and Jimenez (1998) argue that household transfers are a form of risk sharing under imperfect capital or insurance markets, particularly in rural areas. Informal family networks function as a risk-pooling mechanism to address income variability due to drought, pestilence, illness, or unemployment. For Hoddinott (1994), empirical tests for households in Western Kenya confirm the inheritance motive: wealthier parents are better placed to extract a greater share of the benefits of migration by offering a higher reward above a minimum benchmark.

Such motivations to remit or provide transfers may lead to countercyclical (or procyclical) remittance behavior, i.e., a negative (or positive) correlation between remittance inflows and the receiving country's business or income cycle. Under

altruistic and insurance motives, remittance flows would be negatively correlated with recipients' level of income, while under exchange and inheritance motives, they would be positively related. As such, the empirical literature that aims to test for countercyclical remittance behavior shows mixed results depending on various circumstances, including countries, corridors, and periods in the samples as well as methodologies.

Examining the relationship between bilateral remittance data and the differences in business cycles of host and home countries, Frankel (2011) finds strong remittance countercyclicality. Bettin, Presbitero, and Spatafora (2017) also find that remittances show strong countercyclical behavior, based on bilateral remittances from Italian provinces to developing countries. They find that the negative correlation increases in response to adverse exogenous shocks such as a decline in the terms of trade. Using a gravity model, Leuth and Ruiz-Arranz (2006) found that the dependency ratio and inflation at home are positively related to remittances, supporting the altruistic motive. Remittances, however, do not increase during disasters but are found to be positively related to the home country's business cycle and investment climate, supporting the investment motive. De et al. (2016) study the co-movement of remittance flows with GDP, other foreign currency flows (FDI and ODA), and the behavior of remittances during financial crises, and find that remittances are acyclical in the recipient country, while also being less procyclical than financial flows but more so than ODA. Mughal and Ahmed (2014) find that remittances for India and Pakistan are countercyclical with respect to home output but acyclical in relation to host country output. With a focus on 11 Central and Eastern European countries, Cismas, Curea-Pitorac, and Vadasan (2020) find that remittances are countercyclical in only two countries, while being procyclical and acyclical in four and five countries, respectively. In the case of Mexico, Ruiz and Vargas-Silva (2014) show that remittances are countercyclical in some periods and procyclical in others, while arguing that the changing cyclicality of remittances questions their potential in smoothing cyclical output fluctuations.

# 4. DATA

This study uses annual panel data that span the period 2010 to 2018. The main source is a detailed data set on annual bilateral remittance data from 213 source countries to 213 remittance-receiving countries for the period 2010 to 2018, compiled by the World Bank and KNOMAD. Our sample covers the Asia and the Pacific region with 44 recipient countries. The list of recipient countries included in the study, together with their respective subregional membership, is enumerated in Table 1.

Bilateral migrant stock, considered one of the major determinants of bilateral remittances, is obtained from the World Bank Migration and Remittances Database, which is only available for three years – 2010, 2013, and 2017.

The relative business cycle is defined by the difference in the business cycles between a receiving country and a sending country. A positive sign indicates that the receiving country is experiencing an expansion while a negative one signals a contraction in the receiving country's economy relative to that of the sending country. Specifically, the business cycle is derived by applying the Christiano-Fitzgerald (CF) filter to a country's log of GDP time series (Christiano and Fitzgerald 2003). Then, standardization of the cyclical component, using the z-score, was carried out to account for disparities in the GDP level of sample countries.

**Table 1: List of Recipient Countries, by Subregion**

| Central Asia (8) | East Asia (4) | Pacific (13) |
|---|---|---|
| Armenia | Hong Kong, China | Federated States of Micronesia |
| Azerbaijan | Mongolia | Fiji |
| Georgia | People's Republic of China | Kiribati |
| Kazakhstan | Republic of Korea | Marshall Islands |
| Kyrgyz Republic | Southeast Asia (11) | Palau |
| Tajikistan | Brunei Darussalam | Papua New Guinea |
| Turkmenistan | Cambodia | Samoa |
| Uzbekistan | Indonesia | Solomon Islands |
| South Asia (8) | Lao People's Democratic Republic | Tonga |
| Afghanistan | Malaysia | Tuvalu |
| Bangladesh | Myanmar | Vanuatu |
| Bhutan | Philippines | Australia |
| India | Singapore | New Zealand |
| Maldives | Thailand | |
| Nepal | Timor-Leste | |
| Pakistan | Viet Nam | |
| Sri Lanka | | |

Source: Authors.

Common variables used in basic gravity equations like GDP and GDP per capita were drawn from the World Bank Development Indicators. The CEPII GeoDist Database contains several geographical variables valid for pairs of countries as well as data for other gravity variables such as distance, contiguity, language, and shared history of colonial ties.

Oil price shocks are captured by the average annual oil prices from the World Bank Commodity Pink Sheet. Capital account openness, measured according to the Chinn-Ito (Chinn and Ito 2008), is an index that assesses a country's degree of financial openness. Higher values mean greater capital account openness. This is published on the Portland University website. Interest rate differential refers to the difference in the real interest rate of recipient country i and sender country j. Data on the real interest rate as well as the foreign exchange rate (LCU/USD) were taken from the World Development Indicators (WDI) database. The foreign exchange rate used in the study is calculated as the percentage change in the value of receiving country i's currency against sending country j's currency. Remittance cost from the World Bank Remittance Prices Worldwide is reported quarterly by firm and by country corridor. Annual cost was computed as the simple average cost by year and by country corridor. The occurrence of disasters triggered by natural hazards is available from the International Disaster Database (EM-DAT) developed by the Centre for Research on the Epidemiology of Disasters. Its value is equal to one if disasters caused by natural hazards such as storm, earthquake, or flood occurred within the year.

Young- and old-age dependency ratios, defined as the ratio of dependents (younger than 15 years old and older than 64 years old, respectively) to the working-age (15–64 years old) population, are obtained from the WDI. The International Country Risk Guide data set covered the political risk stability, which is a composite index of a country's political situation. Table 2 presents the list of variables and their sources in more detail. Summary statistics of the data set are also presented in Table 3.

**Table 2: Data Sources**

| Variable | Description | Time Period | Source |
|---|---|---|---|
| Bilateral remittance flows$_{ij}$ | Remittances from sender j to recipient i | 2010–2018 | WB and KNOMAD |
| Stock of migrants$_{ij}$ | Number of migrants from country i residing in country j | 2010, 2013, 2017 | WB Migration and Remittances Database |
| Relative business cycle$_{ij}$ | Business cycle$_i$ – business cycle$_j$ where i = recipient; j = sender | 1990–2018 | Based on Christiano and Fitzgerald (2003) |
| Nominal GDP$_i$ | Nominal GDP of country i | 1990–2018 | WB, WDI |
| GDP per capita$_i$ | Per capita GDP of country i | 1990–2018 | WB, WDI |
| Distance$_{ij}$ | Distance between capitals of the two countries i and j | Time invariant | CEPII GeoDist Database |
| Common language$_{ij}$ | 1 – countries share common official language; 0 – otherwise | Time invariant | CEPII GeoDist Database |
| Shared border$_{ij}$ | 1 – countries are contiguous with each other; 0 – otherwise | Time invariant | CEPII GeoDist Database |
| Colonial history$_{ij}$ | 1 – countries ever had a colonial link; 0 – otherwise | Time invariant | CEPII GeoDist Database |
| Disaster$_i$ | 1 – if any of the following disasters triggered by natural hazards occurred in country i within the year: earthquake, storm, or flood; 0 – otherwise | 2010–2018 | EM-DAT International Disaster Database; authors' calculations |
| Dependency ratio$_i$ (young and old, respectively) | Ratio of dependents (aged under 15/above 65) to the working-age population of the receiving country | 2010–2018 | WB, WDI |
| % change in LCU$_i$ against LCU$_j$ | Annual % change in the value of LCU of recipient i relative to LCU of sender j; $\%\Delta(LCU_i/USD) / (LCU_i/USD)$ | 2010–2018 | WB, WDI |
| Oil price$_j$ | Dubai crude oil price (US$ per barrel) | 2010–2018 | WB Commodity Pink Sheet |
| Oil producer$_j$ | 1 – if Saudi Arabia, Iran, Iraq, UAE, Kuwait, Qatar, Oman, Russian Federation, Libya, Azerbaijan, Kazakhstan; 0 – otherwise | 2010–2018 | Hutt (2016) |
| Interest rate diffential$_{ij}$ | Difference in the real interest rate between recipient i and sender j | 2010–2018 | WB, WDI |
| Capital account openness$_i$ | Degree of capital account openness of country i | 2010–2018 | Portland State University |
| Political stability$_i$ | Average index measuring the political stability of country i (including government stability, socioeconomic conditions, investment profile, internal/external conflicts, etc.) | 2000–2016 | International Country Risk Guide data set |
| Remittance cost$_{ij}$ | Cost of sending US$200 remittance from sender j to recipient i (US$) | 2011–2018 | WB Remittance Prices Worldwide |

Note: WB = World Bank, WDI = World Development Indicators, LCU = local currency unit, USD = US dollar; time subscript *t* is omitted intentionally.

**Table 3: Summary Statistics**

| Variable | Unit | Observations | Mean | Standard Deviation | Minimum | Maximum |
|---|---|---|---|---|---|---|
| Bilateral remittance flows$_{ij}$ | US$ million | 63,532 | 35.40 | 443.49 | 0.00 | 18,529.24 |
| Relative business cycle$_{ij}$ | Not applicable | 79,728 | -0.01 | 1.28 | -6.75 | 7.29 |
| Nominal GDP$_i$ | US$ billion | 85,272 | 431 | 1,570 | 0.03 | 13,900.00 |
| Nominal GDP$_j$ | US$ billion | 79,728 | 374 | 1,540 | 0.03 | 20,500.00 |
| GDP per capita$_i$ | US$ | 85,272 | 9,223.32 | 14,680.66 | 493.75 | 68,150.11 |
| GDP per capita$_j$ | US$ | 80,080 | 17,607.06 | 26,120.58 | 234.24 | 189,422.20 |
| Distance$_{ij}$ | Kilometers | 76,067 | 9753.50 | 4762.26 | 66.77 | 19,904.45 |
| Common border$_{ij}$ | Dummy; 1 = yes | 85,272 | 0.01 | 0.11 | 0.00 | 1.00 |
| Common language$_{ij}$ | Dummy; 1 = yes | 85,272 | 0.12 | 0.32 | 0.00 | 1.00 |
| Colonial relationship$_{ij}$ | Dummy; 1 = yes | 85,272 | 0.01 | 0.07 | 0.00 | 1.00 |
| Stock of migrants$_{ij}$ | Thousands | 19,432 | 11.87 | 113.21 | 0.00 | 3,310.42 |
| Dependency ratio$_i$, young | % | 79,458 | 44.89 | 16.49 | 14.57 | 97.34 |
| Dependency ratio$_i$, old | % | 79,458 | 9.58 | 4.86 | 4.70 | 24.19 |
| % change in LCU$_i$ against LCU$_j$ | % | 74,046 | 8.65 | 273.77 | -99.36 | 13,290.54 |
| Interest rate differential$_{ij}$ | %p | 40,652 | -0.36 | 9.79 | -67.87 | 55.11 |
| Capital account openness$_i$ | Index | 71,706 | -0.01 | 1.45 | -1.92 | 2.33 |
| Capital account openness$_j$ | Index | 68,175 | 0.34 | 1.60 | -1.92 | 2.33 |
| Oil price$_j$ | US$ per barrel | 82,368 | 78.77 | 24.96 | 41.20 | 108.90 |
| Oil producer$_j$ | Dummy; 1 = yes | 85,272 | 0.05 | 0.22 | 0.00 | 1.00 |
| Political stability$_i$ | 0−100 (most stable) | 41,734 | 64.70 | 12.69 | 23.04 | 92.08 |
| Political stability$_j$ | 0−100 (most stable) | 33,198 | 65.24 | 11.56 | 44.96 | 88.21 |
| Disaster$_i$ | Dummy; 1 = yes | 85,272 | 0.57 | 0.50 | 0.00 | 1.00 |
| Remittance cost$_{ij}$ | Cost of sending US$200 (US$) | 917 | 7.26 | 3.99 | 1.16 | 21.61 |

Note: j = sender; i = recipient; LCU = local currency unit; time subscript t is omitted intentionally.

# 5. GRAVITY MODELS OF BILATERAL REMITTANCES

The model for remittances takes the form below, following Leuth and Ruiz-Arranz (2006) and Frankel (2011):

$$\log(\text{remit}_{\text{ijt}}) = \beta_0 + \beta_1 \log(\text{mstock}_{ijt}) + \beta_2 (\text{rbcycle}_{\text{ijt}})$$

$$+\beta_3 \log(\text{GDP}_{\text{it}}) + \beta_3 \log(\text{GDP}_{\text{jt}}) + \beta_4 \log(\text{pcGDP}_{\text{it}}) + \beta_5 \log(\text{pcGDP}_{\text{jt}}) + \boldsymbol{\gamma}' Z_{ij}$$

$$+ \boldsymbol{\delta}' X_{ijt} + \theta_t + (\text{RE or other FE effects}) + \varepsilon_{ijt},$$

where $\text{remit}_{ijt}$ is the total remittance inflow received by country i from country j at time t. Meanwhile, $\text{mstock}_{ijt}$ is the number of migrants from country i in country j and $rbcycle_{ijt}$ is the relative business cycle of a receiving country vis-à-vis a sending country. $GDP_{it}$ $(\text{pcGDP}_{it})$ and $GDP_{jt}$ $(\text{pcGDP}_{jt})$ are the nominal gross domestic product (per capital GDP) of country i in period t and country j in period t, respectively. $Z_{ij}$ is a vector of the time-invariant variables, including distance, contiguity, common language, and colonial history. These explanatory variables constitute the basic model in this study. A time fixed effect $(\theta_t)$ along with other fixed or random effects are included, and $\varepsilon_{ijt}$ is the error term. In the extended model, a vector of determinants that potentially impact remittance flows $(X_{ijt})$ is included.

The relative business cycle is measured by the difference in cyclical position between the sender and receiving country. The Christiano–Fitzgerald filter was used to extract the business cycle component of the GDP of each country as in Gorostiza, Asuncion, and Chongvilaivan (2019) and Haug and Dewald (2004).

Major determinants of bilateral remittance include migrant stock and the level of development of the destination and origin countries. To control for time-invariant factors between country pairs, variables such as distance, contiguity, common official language, and colonial relationship were included.

A variable for oil prices interacted with an oil producer dummy for a sending country was added in the extended model to account for the fact that large numbers of migrants work in major oil-producing countries including the Middle East and the Russian Federation. When oil prices are on the uptrend, oil-exporting and labor-importing countries demand more labor including international migrants, which leads to higher remittance inflows into their origin countries (John 2018).

To capture motives of remittances, the following variables are explored in the extended model: 1) young- and old-age dependency ratios; 2) occurrence of disasters triggered by natural hazards; 3) percentage change in the relative value of the receiving country's currency relative to the sending country's currency; 4) the interest rate differential; 5) capital account openness in receiving and sending countries; and 5) the political stability in receiving and sending countries. In the next chapter, we discuss possible mechanisms through which these motives affect bilateral remittances, along with the empirical findings in the models.

In the extended model, we also include the transaction cost of remittance as lower transaction costs of sending remittances are expected to stimulate remittance inflows through more frequent transactions by senders (Freund and Spatafora 2005) and increased flows through formal channels (Ahmed, Mughal, and Martínez-Zarzoso 2020).

Multiple econometric techniques are carried out in order to check for robustness. A pooled ordinary least squares (OLS) was first employed as a benchmark. To account for unobserved heterogeneity across countries, we employed a panel data approach using fixed effects (FE) both 1) for country pairs and 2) for recipient and sender countries. As an alternative to FE, a random effects model specific for country pairs was further employed. All specifications were controlled for year fixed effects.

# 6. ESTIMATION RESULTS

## 6.1 Basic Models

We first estimate the basic model including migrant stock, relative business cycle, and gravity model variables using 19,168 bilateral remittance observations for 44 Asia and the Pacific recipient countries and an average of 213 sending countries for each recipient country from 2000 to 2018. Table 4 presents the estimation results.

### Relative Business Cycle

The majority of the models specified in Table 4 show that bilateral remittance inflows to Asia move countercyclically with the relative business cycle.[2] While there exist various types of motives that lead to either countercyclical, procyclical, or acyclical remittances, the empirical evidence leans toward countercyclical bilateral remittances as motives like altruism and insurance may play a stronger role than other motives. Under the insurance motive, for example, rural households, who rely solely on

[2] The same finding remains even when both business cycles of receiving and sending countries are included in the model: negative coefficient on receiving country's business cycle, and positive (or statistically zero) coefficient on sending country's business cycle.

agricultural income, diversify their risk and minimize income volatility by paying for migration costs in anticipation of future remittances (Rapoport and Docquier 2005). In such a case, when income (agricultural revenues) drops, financial assistance comes in the form of remittances.

## Migrant Stock

The results suggest that bilateral remittances are strongly associated with migrant stock. The elasticity of nearly one is highly consistent across all specifications, indicating its significant role in determining remittance inflows. This is also consistent with the studies of Freund and Spatafora (2005), the World Bank (2006), and Singh et al. (2009), which find that migrant stock is an important determinant of remittance inflows while the magnitude of the coefficient in this study is larger.[3]

## Gravity Model Variables

Common gravity models involve basic variables representing size and proximity between two countries. In the bilateral remittances setting, these are normally economic size and costs of migration and remittances between sending and receiving countries. The costs are represented by distance, contiguity, common language, and colonial relationship while economic size is measured by the gross domestic product (GDP). The model also accounts for the income level of partner countries, proxied by the per capita GDP as in Leuth and Ruiz-Arranz (2006).

The pooled OLS and RE models suggest that a receiving country's economic size is positively related to bilateral remittances. Lower-income countries tend to have a larger stream of remittances while higher remittances will flow from higher-income countries. However, this changes somewhat subject to the inclusion of migrant stock (and/or fixed effects) since economic size and income in both home and destination countries may affect migration decisions, and therefore migrant stock.[4]

The results also suggest that remittances are smaller the greater the distance between two countries, in line with Frankel (2011) and Rapoport and Docquier (2005). Sharing a border, however, is negatively associated with remittance inflows. Contiguity may encourage nonofficial transfers (Docquier, Rapoport, and Salomone 2011), or migrants tend to choose nonadjacent countries, which are normally of the same business cycle as their country, for purposes of economic hedging (Leuth and Ruiz-Arranz 2006). Further, remittance inflows increase when countries share a common official or primary language as well as colonial history.

[3] Such a strong association between bilateral remittances and migrant stock may be partially explained by the methodology by which bilateral remittances are constructed. The Word Bank uses migrant stock to adjust remittance data, making the bilateral remittance matrix a function of migrant stock. According to Ratha and Shaw (2007), a bilateral remittance matrix is estimated by allotting a country's total remittance inflows to its emigrant stocks based on the bilateral migration matrix.

[4] Pairwise correlation coefficients of log(migrant stock$_{ij}$): 0.37 with log(GDP$_i$); 0.31 with log(GDP$_j$); –0.02 with log(per capita GDP$_i$; and 0.11 with log(per capita GDP$_j$). They are all statistically significant at least at the 10% level.

**Table 4: Estimation Results – Basic Models**

| Variables | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| Log(migrant stock$_{ij}$) | | 1.058*** | | 0.940*** | | 0.987*** | | 0.754*** |
| | | (0.008) | | (0.014) | | (0.004) | | (0.027) |
| Relative business cycle$_{ij}$ | –0.249*** | –0.135*** | 0.002 | –0.021*** | –0.190*** | –0.061*** | –0.077*** | –0.070*** |
| | (0.019) | (0.014) | (0.012) | (0.007) | (0.023) | (0.010) | (0.017) | (0.012) |
| Log(GDP$_i$) | 0.845*** | 0.123*** | 0.737*** | 0.194*** | 0.765 | –0.222 | 0.148 | –0.468 |
| | (0.007) | (0.007) | (0.018) | (0.012) | (0.554) | (0.368) | (0.390) | (0.453) |
| Log(GDP$_j$) | 0.653*** | –0.069*** | 0.513*** | 0.020 | –2.573*** | –0.106 | –2.241*** | –0.458** |
| | (0.010) | (0.009) | (0.026) | (0.015) | (0.524) | (0.187) | (0.378) | (0.214) |
| Log(per capita GDP$_i$) | –0.290*** | –0.054*** | –0.323*** | –0.000 | 0.309 | 1.005*** | 0.588 | 1.308*** |
| | (0.016) | (0.014) | (0.046) | (0.022) | (0.546) | (0.358) | (0.386) | (0.441) |
| Log(per capita GDP$_j$) | 0.503*** | 0.115*** | –0.086** | 0.134*** | 1.765*** | 0.092 | 1.724*** | 0.299 |
| | (0.018) | (0.014) | (0.043) | (0.020) | (0.556) | (0.198) | (0.395) | (0.229) |
| Log(distance$_{ij}$) | –2.180*** | 0.120*** | –1.960*** | –0.154*** | –1.854*** | –0.015 | | |
| | (0.031) | (0.027) | (0.077) | (0.046) | (0.033) | (0.016) | | |
| Contiguity$_{ij}$ | –0.204* | –0.429*** | –0.428 | –0.397** | 0.830*** | –0.114** | | |
| | (0.115) | (0.111) | (0.296) | (0.175) | (0.108) | (0.047) | | |
| Common language$_{ij}$ | 1.855*** | 0.006 | 1.646*** | 0.224*** | 0.616*** | –0.011 | | |
| | (0.054) | (0.046) | (0.147) | (0.070) | (0.056) | (0.028) | | |
| Colonial history$_{ij}$ | 2.465*** | –0.169 | 3.156*** | 0.081 | 2.477*** | 0.047 | | |
| | (0.137) | (0.125) | (0.375) | (0.196) | (0.134) | (0.044) | | |
| Constant | –21.916*** | –9.827*** | –12.036*** | –11.464*** | 27.981** | –8.332 | 31.538*** | 4.806 |
| | (0.405) | (0.296) | (1.032) | (0.453) | (11.290) | (6.686) | (9.233) | (8.241) |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| RE for country pairs | – | – | Yes | Yes | – | – | – | – |
| FE for recipient and sender | – | – | – | – | Yes | Yes | – | – |
| FE for country pairs | – | – | – | – | – | – | Yes | Yes |
| Observations | 19,168 | 6,335 | 19,168 | 6,335 | 19,168 | 6,335 | 19,168 | 6,335 |
| R-squared | 0.579 | 0.900 | 0.532 | 0.895 | 0.830 | 0.988 | 0.083 | 0.500 |
| Number of country pairs | – | – | 2,743 | 2,622 | – | – | 2,743 | 2,622 |

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; i = receiving country; j = sending country.

## 6.2 Extended Models

In the extended models, we investigate an additional set of potential determinants to help explain variations in remittance inflows arising from specific motives to remit of both receiving and sending countries. These variables include the appreciation of the receiving country's currency against the sending country's currency, interest rate differential between home and host country, the capital openness and political stability of the home country and host country, oil prices, disaster occurrences in the home country, and the dependency ratio of the old (65 years old and above) and young (under 15 years of age) population of the home country. The significance of remittance cost is also explored using reduced samples. Columns 1, 3, and 5 in Table 5 confirm the countercyclicality of remittances when these additional explanatory variables are included in the models.

### Motivations to Remit

Dependency ratios, broken down by old age and young age dependency ratios, show positive impacts on remittance in the fixed effects model (columns 3–6 of Table 5) and the model with interaction terms between relative business cycles and motives to remit in Appendix 1. It is worth noting that remittances respond up to two to three times as high to the old-age dependency ratio as they do to the young-age dependency ratio. Increasing remittances with the elderly population could point to delivery of elderly care through financial assistance being provided by migrant children (Pfau and Giang 2009).

Meanwhile, the relatively low impact of the youth dependency ratio on remittances may be explained by the fact that the presence of a higher share of young dependents makes it more difficult for potential migrants to leave the country.

**Table 5: Estimation Results – Extended Models**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Log(migrant stock$_{ij}$) | 1.027*** | 0.708*** | 0.995*** | 0.919*** | 0.985*** | –0.041 |
| | (0.011) | (0.121) | (0.003) | (0.055) | (0.016) | (0.063) |
| Relative business cycle$_{ij}$ | –0.094*** | –0.029 | –0.252*** | 0.037 | –0.233*** | 0.052 |
| | (0.013) | (0.037) | (0.028) | (0.084) | (0.031) | (0.063) |
| Log(GDP$_i$) | 0.234*** | 0.153*** | 4.506*** | 1.777 | 4.537*** | 1.782 |
| | (0.027) | (0.040) | (0.904) | (1.887) | (1.069) | (1.611) |
| Log(GDP$_j$) | –0.064*** | –0.010 | –1.125*** | –0.526 | –0.859* | –0.214 |
| | (0.018) | (0.061) | (0.358) | (1.577) | (0.471) | (0.701) |
| Log(per capita GDP$_i$) | –0.094** | –0.336** | –4.673*** | –2.361 | –4.724*** | –2.239 |
| | (0.043) | (0.161) | (0.888) | (1.835) | (1.064) | (1.502) |
| Log(per capita GDP$_j$) | 0.152*** | 0.204** | 0.491 | 1.253 | 0.266 | 0.660 |
| | (0.035) | (0.091) | (0.370) | (1.747) | (0.474) | (0.728) |
| Log(distance$_{ij}$) | –0.067 | –0.016 | –0.021 | –0.046 | | |
| | (0.048) | (0.126) | (0.018) | (0.077) | | |
| Contiguity$_{ij}$ | –0.449** | –0.628 | –0.036 | 0.359* | | |
| | (0.191) | (0.457) | (0.028) | (0.193) | | |
| Common language$_{ij}$ | –0.093 | 0.285 | –0.015 | 0.092 | | |
| | (0.088) | (0.184) | (0.023) | (0.082) | | |
| Colonial history$_{ij}$ | –0.124 | 0.407* | 0.020 | 0.167 | | |
| | (0.231) | (0.234) | (0.039) | (0.105) | | |
| Disaster$_i$ | 0.332*** | 0.094 | 0.354*** | –0.000 | 0.376*** | 0.028 |
| | (0.026) | (0.130) | (0.021) | (0.155) | (0.027) | (0.150) |
| Appreciation of LCU$_i$ against LCU$_j$ | 0.008*** | 0.007* | 0.008*** | 0.012** | 0.008*** | 0.009* |
| | (0.001) | (0.004) | (0.001) | (0.005) | (0.001) | (0.005) |
| Oil price$_J$ * Oil producer$_j$ | 0.001 | –0.001 | 0.013*** | –0.005* | 0.013*** | 0.001 |
| | (0.001) | (0.002) | (0.003) | (0.003) | (0.003) | (0.002) |
| Dependency ratio, old$_i$ | 0.004 | 0.039 | 0.165*** | 0.122** | 0.139*** | 0.072* |
| | (0.012) | (0.024) | (0.033) | (0.051) | (0.037) | (0.037) |
| Dependency ratio, young$_i$ | –0.012*** | –0.034*** | 0.046*** | –0.033 | 0.050** | –0.029 |
| | (0.003) | (0.011) | (0.016) | (0.030) | (0.020) | (0.019) |
| Interest rate differential$_{ij}$ | –0.003 | | –0.007*** | | –0.005* | |
| | (0.002) | | (0.002) | | (0.003) | |
| Capital account openness$_i$ | 0.099*** | | –0.041 | | –0.012 | |
| | (0.031) | | (0.033) | | (0.044) | |
| Capital account openness$_j$ | 0.034** | | 0.092*** | | 0.080*** | |
| | (0.017) | | (0.023) | | (0.028) | |
| Political stability$_i$ | –0.013*** | | –0.004 | | –0.004 | |
| | (0.004) | | (0.005) | | (0.005) | |
| Political stability$_j$ | –0.005 | | –0.024*** | | –0.022*** | |
| | (0.004) | | (0.005) | | (0.005) | |
| Remittance cost$_{ij}$ | | –0.030** | | 0.014 | | –0.008 |
| | | (0.013) | | (0.011) | | (0.012) |
| Constant | –9.513*** | –4.228 | –48.457*** | –31.663 | –68.221*** | –22.893 |
| | (0.864) | (3.111) | (14.545) | (52.250) | (21.275) | (32.151) |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| RE for country pairs | Yes | Yes | – | – | – | – |
| FE for recipient and sender | – | – | Yes | Yes | – | – |
| FE for country pairs | – | – | – | – | Yes | Yes |
| Observations | 1,418 | 232 | 1,418 | 232 | 1,418 | 232 |
| R-squared | 0.957 | 0.788 | 0.998 | 0.981 | 0.903 | 0.366 |
| Number of country pairs | 900 | 148 | - | - | 900 | 148 |

Notes: LCU = local currency unit; Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; i = receiving country; j = sending country.

The occurrence of disasters triggered by natural hazards consistently shows a positive impact on remittances, supporting the altruistic motive to remit. An increase in remittances in the aftermath of disasters is commonly found in the literature. For example, Mohapatra, Joseph, and Ratha (2013) show that in Bangladesh, per capita consumption was higher in remittance-receiving households than in others after the 1998 flood, while households in Ghana tend to have housing built of concrete rather than mud and have greater access to communication equipment, suggesting that they are better prepared against disasters. Similarly, Bettin and Zazarro (2018) find that remittances play a key role in *ex post* response and reconstruction as well as *ex ante* risk preparedness for those countries that have experienced more disruptive events in the past.

On the impact of the foreign exchange rate, the results show that remittance inflows increase as the home currency appreciates against the sending country's currency. This may suggest that migrants tend to have a targeted remittance amount or share of their labor income earned in the host countries despite the variation in foreign exchange rates (Yang 2008).[5] If the sending country's currency depreciates (or the home currency appreciates), migrants should send more units of the sending country's currency to compensate the fall in the value to maintain the same level of support for their families. This finding is in line with altruistic rather than opportunistic or exchange behavior. It is also consistent with other studies, including Leuth and Ruiz-Arranz (2006) and Ahmed and Martínez-Zarzoso (2016).

However, the exchange rate impact on remittances needs to be taken with caution. There may be feedback effects between foreign exchange rates and remittances, especially in economies with high levels of remittance inflows relative to GDP. Ratha and Moghaddam (2020) find that a 10% rise in the remittances to GDP ratio leads to an exchange rate appreciation of 0.009 units. Furthermore, referred to as the "Dutch Disease," remittances are associated with higher economic growth and currency appreciation from increased foreign exchange inflows, in turn reducing export competitiveness. For the case of Bangladesh, Forhad (2019) finds that appreciation of the home currency through remittances reduces its trade competitiveness and its exports. Acosta, Baerg, and Mandelman (2009) find that remittances do tend to appreciate exchange rates, but this effect diminishes with deeper and more sophisticated financial systems.

Migration costs are often substantial and beyond a family's means, requiring financing from other relatives or moneylenders based on market interest rates. The negative sign of the coefficient on interest rate differential (recipient–sender) may imply that this debt is repaid by the migrant through remittances when interests rates are low. Hassan and Holmes (2018), modeling the interest rate elasticity of remittances as debt-repayment responsiveness, find that remittances increase significantly when lending rates fall in the home country over the long run, while the relationship is positive in the short run. Our finding is consistent with the long-run altruistic transfer.

Higher capital account openness is also found to increase remittances as lower barriers to cross-border capital transfers may stimulate remittances. Capital controls amplify the cost of sending remittances by functioning like a tax that will eventually be passed on to consumers, or stringent restrictions (i.e., burdensome regulatory and compliance requirements) make it costly to send money home (Beck and Martinez-Peria 2009; Beine, Lodigiani, and Vermeulen 2009; Cooray and Mallick 2013).

[5] According to IFAD, the average amount sent by migrants ranges from $200 to $300, which is about 15% of what they earn. *Remittances matter: 8 facts you don't know about the money migrants send back home* | | *UN News.*

The results suggest that greater political instability leads to higher remittances. This reinforces the claim of countercyclical remittances in that remittances can act as a shock absorber during political instability as Ajide and Alimi (2019) empirically find. The argument is that political disturbances induce remittance inflows to help families in home countries deal with hardships.

## Other Determinants

We find that the higher costs of sending funds to home countries reduce remittances.[6] The estimated coefficient is negative, but not necessarily significant, depending on the model specification. Overall, this finding supports the global initiative towards the Sustainable Development Goal (No. 10c) of bringing down the cost of remittances from 6.5% as of December 2020 to 3% by 2030 (United Nations, World Bank websites).

When it comes to the bilateral remittances sent from migrants in oil-producing countries, oil prices turn out to be a significant determinant. Given that major destinations for many Asian migrants include Middle Eastern countries and the Russian Federation, the positive coefficient on oil price implies that remittances increase with economic performances of the major oil exporters hosting many Asian migrants.

## Relative Business Cycle Interacting with Motives to Remit

As the countercyclicality of remittances can be the manifestation of multiple channels of motivations to remit, variables for the motives may have an effect in such a way that they amplify or reduce the degrees of countercyclicality of remittances. Under the extended models, we empirically test this by adding an interaction term between the relative business cycle and each of the motivations-to-remit variables.

**Table 6: Motivations to Remit and Relative Business Cycle**

| Variable | Sign of Coeff. | Motivation to Remit | Sign of Interaction with Relative Business Cycle | Effect on Countercyclicality |
|---|---|---|---|---|
| Occurrence of disasters triggered by natural hazards | + | Altruistic/insurance | insig | N/A |
| Appreciation of $LCU_i$ against $LCU_j$ | + | Altruistic | insig | N/A |
| Dependency ratio (old) | + | Altruistic | − | Amplifying |
| Dependency ratio (young) | + | Altruistic | + | Reducing |
| Interest rate differential | − | Debt repayment/altruistic | − | Amplifying |
| Capital account openness, recipient | insig. | N/A | − | Amplifying |
| Capital account openness sender | + | Cost saving | insig. | N/A |
| Political stability, recipient | Insig. | N/A | − | Amplifying |
| Political stability, sender | − | Altruistic | insig. | N/A |

Note: Based on the models (sender and recipient FE) in Appendix 1; N/A = not applicable; Insig. = statistically insignificant.

Source: Authors.

[6] When a variable for the costs of sending remittances in major corridors is included, aggregated by country pair, this significantly reduces the number of samples to about 230 observations from around 1,400.

Table 6 suggests that having a more elderly population to support and a higher interest rate differential makes bilateral remittances more countercyclical in receiving countries. However, the negative coefficient on the interaction term for the young-age dependency ratio implies that receiving countries with a larger youth population to support show reduced countercyclicality in their remittance inflows. The empirical results also suggest that receiving countries where cross-border financial transactions are less restricted and the political climate is more stable will likely show more countercyclical remittances. However, sending countries' capital account openness and political stability do not appear to affect the degree of remittance countercyclicality, although they are significant determinants for bilateral remittance flows.

## 6.3 Countercyclicality of Remittances by Asian Subregion

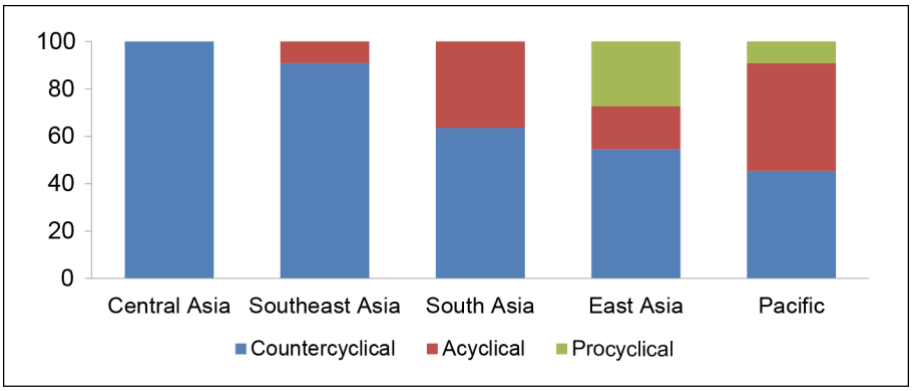
While we find that remittances to Asia and the Pacific are countercyclical, it is worth exploring the variability in the behavior of remittances by Asian subregion. In the following analysis using the basic and extended models with the subregion dummy variables interacted with the relative business cycle, remittances are classified as: (i) countercyclical if the subregion-specific coefficient on the relative business cycle is negative and significant at 10% or lower; (ii) procyclical if the coefficient is positive and statistically significant; and (iii) acyclical if the coefficient is not statistically different from zero.

Figure 4 shows the proportion by which subregions experience countercyclicality, acyclicality, and procyclicality in their remittance inflows. Not all subregions point to strong countercyclical remittances. Central Asia shows the strongest countercyclical remittances, with all models pointing to the same conclusion. This is followed by Southeast Asia with 90% of the models showing countercyclical remittances. For South Asia, around 60% of the models suggest countercyclicality while the remaining 40% point to acyclicality. In contrast, remittances are dominantly acylical or procyclical in the Pacific (55%). In East Asia, 45% of the models suggest either acyclical or procylical remittances.

While it will require an in-depth analysis to identify underlying causes for varying degrees of countercyclicality by subregion, it may be in part associated with how diversified each subregion is in their geographical concentration of destination countries. In other words, the countries relying on a small number of sending countries will likely show more conspicuous remitting behavior patterns (i.e., stronger countercyclical remittances, in this case) than those with more diversified destinations. [7]

[7] We calculated the Herfindahl-Hirschman Index (HHI) that represents the geographical concentrations of sending countries, using bilateral remittances in 2018 by subregion. The index is defined by $\mathrm{HHI_i} = \sum_j \left(\frac{r_{ij}}{R_i}\right)^2$ where $R_i = \sum_j r_{ij}$ where r is the remittance sent from country j to country i and R is the total remittance inflows to country i. Central Asia shows the highest value of 0.535 while the Pacific shows the lowest of 0.106 (Southeast Asia 0.124, East Asia 0.124, and South Asia 0.111).

**Figure 4: Countercyclicality of Remittances by Asian Subregion**
(%)




Note: Countercyclical = negative and significant (at equal to or less than 0.1 level); procyclical = positive and significant; acyclical = insignificant; based on basic and extended models – total (#model = 11) 5 subregion-specific coefficients per model; columns 1–8 in basic model and columns 1, 3, 5 in extended model; Pacific includes Australia and New Zealand.

## 6.4 Endogeneity and Robustness Check

We have so far applied the Christiano–Fitzgerald (CF) filter in extracting the cyclical fluctuations of both the recipient and sending economies. The CF filter is a band-pass filter that builds on the same principles as the Baxter and King approach. It dominates the Baxter–King filter in terms of optimal approximation to the band-pass filter and is useful for real-time applications (Christiano and Fitzgerald 2003; Grochova and Rozmahel 2015). To find out whether our finding about the countercyclicality of remittances is robust to the choice of business cycle extracting methods, we also use one of the widely used detrending methods, the Hodrick–Prescott (HP) filter.[8] Appendix 2 shows that using the HP filter does not affect the previous findings on countercyclical remittances. Furthermore, most of the determinants except for the interest rate differential maintain the same findings.

An important concern is the potential endogeneity bias. For example, while migrant stock influences remittances, the potential migrants' decision on where to move may be more toward the host country sending higher remittances. A greater inflow of remittances could result in the appreciation of the receiving country's currency. Higher remittances, following a mass exodus of the working-age population, may trigger a higher dependency ratio (Leuth and Ruiz-Arranz 2006). Migrants may leave their countries of origin to escape political instability, leading, in turn, to an increase in remittances to finance oppositions supporting political reforms (Miller and Ritter 2014; Williams 2017). Higher remittances may also trigger capital account openness (Beine, Lodigiani, and Vermeulen 2009) as the home country is pressured to open up its capital market when migrants wish to invest in the market (Cooray and Mallick 2013).

To mitigate the contemporaneous effects interacting between remittances and other variables under consideration, we run the extended models with the lag of migrant stock as well as all the motive variables, namely dependency ratios, interest rate differential, foreign exchange rate, capital account openness, and political stability. Appendix 3 shows that the countercyclicality of remittances does not change and most of the motive variables except for capital account openness and political stability

[8] The default in Stata was used in determining the frequency range, which was set to 2–8 for annual data. While the common value for the smoothing parameter λ is 1,600 for quarterly series, this was adjusted to 6.25 by Stata in consideration of the annual frequency of the data (Ravn and Uhlig 2002).

continue to show the same signs and significance as in the previous extended models. The coefficients of capital account openness in sending countries turned insignificant while those in receiving countries remained negative but became significant. Lagging the political stability of the reporter country reversed the sign from negative to positive. Although they retained their significance, coefficients of oil prices switched from positive to negative.

Bilateral remittance data often include zero value remittances due to misreporting and the lack of accurate data. Using the OLS method may yield bias and inconsistent estimates arising from a case of omitted variable. It also plausibly discards useful information as taking logarithms forcibly drops country pairs with zero remittances. With this, an alternative model for gravity equation using the Heckman (1979) selection method was explored. We show in Appendix 4 that the results from the Heckman method are robust.

Studies using bilateral remittance data tend to find remittances countercyclical, while those using nondirectional, aggregate remittance data do not. For example, Bettin, Presbitero, and Spatafora (2017), Frankel (2011), and Poghosyan (2020) all make use of bilateral remittance data and find that remittances have countercyclical properties, with the exception of Leuth and Ruiz-Arranz (2006). On the other hand, De et al. (2016), Mughal and Ahmed (2014), and Ruiz and Vargas-Silva (2014) all use aggregate remittance data and find that remittances are acylical or procylical, with some limited findings of countercyclicality.

Building on the bilateral remittances data set, we create a new data set aggregated by receiving country. Similar specifications using the basic and extended models are applied. The results in Appendix 5 demonstrate that aggregate remittances still show a negative association with receiving countries (columns 2, 4) but the significance of most of the determining factors, but disaster occurrence is lost. This suggests that the findings on remitting behaviors could be significantly influenced by the type of data set used in the empirical analysis.

# 7. CONCLUSIONS

Countercyclical remittance inflows have a large potential role in mitigating and absorbing macroeconomic shocks, particularly for developing economies where remittances have grown to be one of the largest sources of external financing. Countercyclical remittances also help migrants' families smooth consumption, finance education, and ease credit constraints, working as economic buffers during difficult times.

Our analysis indicates the countercyclical property of remittance inflows to Asia and the Pacific. That is, migrants send more money when the home economy is struggling. This observation is consistent with remittances being influenced by the remitter's altruistic motive. Remittance flow behavior varies across subregions. Central Asia demonstrates the strongest countercyclicality followed by Southeast Asia and South Asia, while the Pacific seems to show neutral movement in relation to the business cycle. The results also suggest that the countercyclicality of remittances depends on the remitter's motivations. For example, recipient countries with an aging population, less stringent capital control, and a stable political climate are more likely to show stronger countercyclical remittance inflows. Our analysis also points to the evidence that the countercyclicality of remittance manifests itself more strongly in corridor-specific analysis than in analysis using aggregate remittance inflows.

Aside from the business cycles, other key determinants of bilateral remittances include, not surprisingly, migrant stock along with exchange rate, capital account openness, and political stability. The cost of sending remittances is negatively associated with remittances, depending on the model specification. This underlines the need to bring down remittance cost, in accordance with Sustainable Development Goal 10c, which targets reducing transaction costs to less than 3% by 2030.

The findings of this study carry several policy implications and call for the attention of policymakers and stakeholders. One important finding of our study is that it shows a clear sign of resilience in remittances to Asia during the downturn of the economy. Governments can leverage these characteristics through reforming various areas of remittance policies by lowering the costs of remittances, accelerating financial sector development, introducing measures to incentivize and facilitate remittances, and maintaining a stable political climate.

Several countries have taken such actions during the COVID-19 pandemic. Digital adoption should also be pursued to improve efficiency, lower the average costs of remittances, and expand financial inclusion. This requires strengthening of digital ecosystems in receiving countries, which will take time and investments. Regional institutions can provide technical assistance and infrastructure loans towards this end. Over the longer term, regional cooperation can also be fostered to encourage the interoperability of online remittance systems (Ratha 2020).

That said, it is important to note that the degree of resilience is not uniform across countries and some countries may be less resilient to shocks than others. With remittance inflows being subject to a number of small to large economic shocks in recent years, appropriate action plans should be prepared in advance to deal with potential shocks so that instruments are enacted immediately in times of shock. Such a plan should include a mix of macroeconomic policies to keep the balance of payments in check and social protection policies to strengthen the support system for remittance-receiving families.

While a business cycle is an important determinant of remittance inflow, the key driver of the flow is migrant stock. To ensure that prospective migrants find gainful employment, source countries should also strengthen labor market information systems (LMIS) to monitor labor market trends and anticipate future skills needs, such as skills for green transition, economic diversification, and demographic and technological change. A lack of systematic information on skills prevents additional benefits for both migrant source and host countries from being realized.

There is also a need to improve data on remittances and migration, including estimates of migration flows and unofficial remittance transfers. Given the significant impacts of remittances on developing countries and recipient households, it is important to monitor and understand how remittances flow during crises, especially at the micro level (migrants and recipient households) (Takenaka et al. 2020). National governments can invest in the collection and dissemination of national data on the remittance market, while regional institutions can assist in bringing countries together and establishing standards of data collection and measurement, and also providing funding support for infrastructure and institutions.

# APPENDIX 1: INTERACTION BETWEEN RELATIVE BUSINESS CYCLE AND MOTIVATIONS TO REMIT

| Relative Business Cycle Interacted with => | *Disaster$_i$* (1) | *Appreciation of LCU$_i$ against LCU$_j$* (2) | *Dependency Ratio, old$_i$* (3) | *Dependency Ratio, young$_i$* (4) | *Interest Rate differential$_{ij}$* (5) |
|---|---|---|---|---|---|
| Log(migrant stock$_{ij}$) | 0.996*** | 0.995*** | 0.995*** | 0.995*** | 0.994*** |
| | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) |
| Relative business cycle$_{ij}$ | –0.241*** | –0.250*** | –0.197*** | –0.309*** | –0.247*** |
| | (0.038) | (0.029) | (0.030) | (0.032) | (0.028) |
| *Interaction term* | –0.010 | 0.000 | –0.005*** | 0.002*** | –0.004*** |
| | (0.014) | (0.000) | (0.001) | (0.000) | (0.001) |
| Log(GDP$_i$) | 4.465*** | 4.599*** | 4.800*** | 4.424*** | 5.129*** |
| | (0.917) | (0.892) | (0.910) | (0.901) | (0.914) |
| Log(GDP$_j$) | –1.083*** | –1.139*** | –1.204*** | –1.179*** | –1.158*** |
| | (0.361) | (0.357) | (0.362) | (0.357) | (0.355) |
| Log(per capita GDP$_i$) | –4.652*** | –4.774*** | –4.941*** | –4.566*** | –5.209*** |
| | (0.892) | (0.881) | (0.889) | (0.885) | (0.884) |
| Log(per capita GDP$_j$) | 0.459 | 0.520 | 0.557 | 0.563 | 0.529 |
| | (0.364) | (0.371) | (0.373) | (0.369) | (0.373) |
| Log(distance$_{ij}$) | –0.020 | –0.020 | –0.016 | –0.022 | –0.023 |
| | (0.018) | (0.018) | (0.017) | (0.018) | (0.018) |
| Contiguity$_{ij}$ | –0.035 | –0.035 | –0.028 | –0.041 | –0.041 |
| | (0.028) | (0.028) | (0.027) | (0.028) | (0.028) |
| Common language$_{ij}$ | –0.015 | –0.015 | –0.011 | –0.018 | –0.015 |
| | (0.023) | (0.023) | (0.022) | (0.023) | (0.023) |
| Colonial history$_{ij}$ | 0.021 | 0.022 | 0.018 | 0.012 | 0.013 |
| | (0.038) | (0.038) | (0.038) | (0.038) | (0.038) |
| Disaster$_i$ | 0.358*** | 0.355*** | 0.346*** | 0.353*** | 0.333*** |
| | (0.022) | (0.021) | (0.022) | (0.021) | (0.022) |
| Appreciation of LCU$_i$ against LCU$_j$ | 0.008*** | 0.008*** | 0.008*** | 0.008*** | 0.008*** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| Oil price$_J$ * Oil producer$_j$ | 0.012*** | 0.013*** | 0.013*** | 0.012*** | 0.014*** |
| | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) |
| Dependency ratio, old$_i$ | 0.167*** | 0.164*** | 0.176*** | 0.171*** | 0.156*** |
| | (0.032) | (0.033) | (0.033) | (0.033) | (0.033) |
| Dependency ratio, young$_i$ | 0.046*** | 0.047*** | 0.046*** | 0.044*** | 0.051*** |
| | (0.016) | (0.016) | (0.016) | (0.016) | (0.016) |
| Interest rate differential$_{ij}$ | –0.008*** | –0.007*** | –0.008*** | –0.008*** | –0.007*** |
| | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) |
| Capital account openness$_i$ | –0.040 | –0.041 | –0.042 | –0.040 | –0.037 |
| | (0.033) | (0.032) | (0.033) | (0.032) | (0.032) |
| Capital account openness$_j$ | 0.091*** | 0.091*** | 0.094*** | 0.092*** | 0.105*** |
| | (0.023) | (0.023) | (0.023) | (0.023) | (0.022) |
| Political stability$_i$ | –0.004 | –0.005 | –0.005 | –0.005 | –0.006 |
| | (0.005) | (0.005) | (0.005) | (0.005) | (0.005) |
| Political stability$_j$ | –0.024*** | –0.024*** | –0.024*** | –0.024*** | –0.025*** |
| | (0.005) | (0.005) | (0.004) | (0.004) | (0.004) |
| Constant | –48.584*** | –49.657*** | –51.667*** | –46.653*** | –57.775*** |
| | (14.400) | (14.435) | (14.656) | (14.554) | (14.775) |
| Year FE | Yes | Yes | Yes | Yes | Yes |
| FE for recipient and sender | Yes | Yes | Yes | Yes | Yes |
| Observations | 1,418 | 1,418 | 1,418 | 1,418 | 1,418 |
| R-squared | 0.998 | 0.998 | 0.998 | 0.998 | 0.998 |

*continued on next page*

**Appendix 1** *table continued*

| Relative Business Cycle Interacted with => | Capital Account Openness$_i$ (6) | Capital Account Openness$_j$ (7) | Political Stability$_i$ (8) | Political Stability$_j$ (9) |
|---|---|---|---|---|
| Log(migrant stock$_{ij}$) | 0.994*** | 0.996*** | 0.995*** | 0.996*** |
| | (0.003) | (0.003) | (0.003) | (0.004) |
| Relative business cycle$_{ij}$ | –0.251*** | –0.258*** | –0.001 | –0.270*** |
| | (0.029) | (0.029) | (0.049) | (0.049) |
| *Interaction term* | –0.017*** | 0.004 | –0.004*** | 0.000 |
| | (0.004) | (0.004) | (0.001) | (0.000) |
| Log(GDP$_i$) | 4.888*** | 4.569*** | 4.057*** | 4.547*** |
| | (0.925) | (0.915) | (0.886) | (0.918) |
| Log(GDP$_j$) | –1.213*** | –1.100*** | –1.026*** | –1.105*** |
| | (0.361) | (0.356) | (0.345) | (0.358) |
| Log(per capita GDP$_i$) | –5.025*** | –4.735*** | –4.364*** | –4.713*** |
| | (0.896) | (0.896) | (0.873) | (0.898) |
| Log(per capita GDP$_j$) | 0.595 | 0.456 | 0.432 | 0.465 |
| | (0.374) | (0.368) | (0.352) | (0.374) |
| Log(distance$_{ij}$) | –0.018 | –0.020 | –0.015 | –0.020 |
| | (0.017) | (0.018) | (0.017) | (0.018) |
| Contiguity$_{ij}$ | –0.035 | –0.036 | –0.027 | –0.035 |
| | (0.028) | (0.028) | (0.027) | (0.028) |
| Common language$_{ij}$ | –0.010 | –0.015 | –0.007 | –0.014 |
| | (0.022) | (0.023) | (0.022) | (0.023) |
| Colonial history$_{ij}$ | 0.016 | 0.021 | 0.019 | 0.020 |
| | (0.039) | (0.038) | (0.037) | (0.039) |
| Disaster$_i$ | 0.341*** | 0.354*** | 0.372*** | 0.354*** |
| | (0.023) | (0.021) | (0.021) | (0.021) |
| Appreciation of LCU$_i$ against LCU$_j$ | 0.008*** | 0.008*** | 0.009*** | 0.008*** |
| | (0.001) | (0.001) | (0.001) | (0.001) |
| Oil price$_J$ * Oil producer$_j$ | 0.013*** | 0.013*** | 0.011*** | 0.013*** |
| | (0.003) | (0.003) | (0.002) | (0.003) |
| Dependency ratio, old$_i$ | 0.172*** | 0.165*** | 0.167*** | 0.165*** |
| | (0.034) | (0.033) | (0.031) | (0.033) |
| Dependency ratio, young$_i$ | 0.045*** | 0.047*** | 0.053*** | 0.046*** |
| | (0.016) | (0.016) | (0.016) | (0.016) |
| Interest rate differential$_{ij}$ | –0.007*** | –0.007*** | –0.008*** | –0.007*** |
| | (0.002) | (0.002) | (0.002) | (0.002) |
| Capital account openness$_i$ | –0.030 | –0.042 | –0.011 | –0.042 |
| | (0.033) | (0.033) | (0.032) | (0.033) |
| Capital account openness$_j$ | 0.094*** | 0.096*** | 0.090*** | 0.093*** |
| | (0.023) | (0.023) | (0.022) | (0.023) |
| Political stability$_i$ | –0.005 | –0.004 | –0.006 | –0.004 |
| | (0.005) | (0.005) | (0.005) | (0.005) |
| Political stability$_j$ | –0.024*** | –0.023*** | –0.024*** | –0.024*** |
| | (0.004) | (0.005) | (0.004) | (0.004) |
| Constant | –53.083*** | –49.861*** | –42.987*** | –49.421*** |
| | (14.839) | (14.723) | (14.120) | (14.820) |
| Year FE | Yes | Yes | Yes | Yes |
| FE for recipient and sender | Yes | Yes | Yes | Yes |
| Observations | 1,418 | 1,418 | 1,418 | 1,418 |
| R-squared | 0.998 | 0.998 | 0.998 | 0.998 |

Notes: LCU = local currency unit; Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; i = receiving country; j = sending country.

# APPENDIX 2: ROBUSTNESS CHECK – HP FILTERING

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Log(migrant stock$_{ij}$) | 0.935*** | 1.021*** | 0.988*** | 0.997*** | 0.754*** | 0.976*** |
| | (0.014) | (0.011) | (0.004) | (0.003) | (0.027) | (0.016) |
| Relative business cycle$_{ij}$ (HP) | –0.025*** | –0.063*** | –0.037*** | –0.238*** | –0.052*** | –0.226*** |
| | (0.010) | (0.020) | (0.009) | (0.018) | (0.010) | (0.024) |
| Log(GDP$_i$) | 0.197*** | 0.262*** | –0.456 | 4.139*** | –0.676 | 4.244*** |
| | (0.012) | (0.027) | (0.371) | (0.843) | (0.462) | (1.013) |
| Log(GDP$_j$) | 0.019 | –0.053*** | –0.084 | 0.419 | –0.447** | 0.388 |
| | (0.016) | (0.018) | (0.189) | (0.347) | (0.217) | (0.475) |
| Log(per capita GDP$_i$) | –0.005 | –0.134*** | 1.020*** | –5.288*** | 1.291*** | –5.307*** |
| | (0.022) | (0.041) | (0.357) | (0.883) | (0.446) | (1.053) |
| Log(per capita GDP$_j$) | 0.150*** | 0.168*** | 0.296 | –0.612 | 0.532** | –0.571 |
| | (0.022) | (0.036) | (0.197) | (0.375) | (0.226) | (0.502) |
| Log(distance$_{ij}$) | –0.154*** | –0.085* | –0.016 | –0.030 | | |
| | (0.047) | (0.048) | (0.017) | (0.019) | | |
| Contiguity$_{ij}$ | –0.356** | –0.455** | –0.113** | –0.060** | | |
| | (0.176) | (0.198) | (0.048) | (0.028) | | |
| Common language$_{ij}$ | 0.254*** | –0.081 | –0.013 | –0.010 | | |
| | (0.072) | (0.086) | (0.029) | (0.023) | | |
| Colonial history$_{ij}$ | 0.078 | –0.132 | 0.060 | 0.020 | | |
| | (0.198) | (0.235) | (0.044) | (0.038) | | |
| Disaster$_i$ | | 0.372*** | | 0.476*** | | 0.493*** |
| | | (0.028) | | (0.020) | | (0.024) |
| Appreciation of LCU$_i$ against LCU$_j$ | | 0.009*** | | 0.009*** | | 0.009*** |
| | | (0.001) | | (0.001) | | (0.001) |
| Oil price$_J$ * Oil producer$_j$ | | 0.001 | | 0.003 | | 0.004 |
| | | (0.001) | | (0.003) | | (0.003) |
| Dependency ratio, old$_i$ | | 0.008 | | 0.053** | | 0.038 |
| | | (0.012) | | (0.021) | | (0.027) |
| Dependency ratio, young$_i$ | | –0.013*** | | 0.130*** | | 0.125*** |
| | | (0.003) | | (0.012) | | (0.014) |
| Interest rate differential$_{ij}$ | | –0.001 | | 0.004** | | 0.005** |
| | | (0.002) | | (0.002) | | (0.002) |
| Capital account openness$_i$ | | 0.115*** | | 0.036 | | 0.049 |
| | | (0.032) | | (0.027) | | (0.037) |
| Capital account openness$_j$ | | 0.029* | | –0.007 | | –0.008 |
| | | (0.017) | | (0.021) | | (0.025) |
| Political stability$_i$ | | –0.014*** | | –0.007 | | –0.006 |
| | | (0.004) | | (0.005) | | (0.006) |
| Political stability$_j$ | | –0.008** | | –0.018*** | | –0.017*** |
| | | (0.004) | | (0.004) | | (0.005) |
| Constant | –11.570*** | –9.993*** | –5.521 | –67.583*** | 7.734 | –82.249*** |
| | (0.465) | (0.875) | (6.696) | (14.300) | (8.362) | (20.980) |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| RE for country pairs | Yes | Yes | – | – | – | – |
| FE for recipient and sender | – | – | Yes | Yes | – | – |
| FE for country pairs | – | – | – | – | Yes | Yes |
| Observations | 6,183 | 1,418 | 6,183 | 1,418 | 6,183 | 1,418 |
| R-squared | 0.895 | 0.957 | 0.988 | 0.998 | 0.497 | 0.906 |
| Number of country pairs | 2,534 | 900 | – | – | 2,534 | 900 |

Notes: LCU = local currency unit; Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; i = receiving country; j = sending country.

# APPENDIX 3: ENDOGENEITY CHECK

| | (1) | (2) | (3) |
|---|---|---|---|
| Log(migrant stock$_{ij}$) (t-1) | 1.019*** | 0.998*** | 0.971*** |
| | (0.012) | (0.003) | (0.016) |
| Relative business cycle$_{ij}$ | –0.109*** | –0.136*** | –0.116*** |
| | (0.015) | (0.015) | (0.020) |
| Log(GDP$_i$) | 0.186*** | 3.935*** | 3.994*** |
| | (0.029) | (0.968) | (1.257) |
| Log(GDP$_j$) | –0.070*** | –1.234*** | –1.367*** |
| | (0.021) | (0.365) | (0.488) |
| Log(per capita GDP$_i$) | –0.176*** | –3.617*** | –3.752*** |
| | (0.050) | (0.906) | (1.169) |
| Log(per capita GDP$_j$) | 0.196*** | 1.144*** | 1.335*** |
| | (0.039) | (0.382) | (0.509) |
| Log(distance$_{ij}$) | –0.111** | –0.011 | |
| | (0.056) | (0.013) | |
| Contiguity$_{ij}$ | –0.468* | –0.030 | |
| | (0.250) | (0.031) | |
| Common language$_{ij}$ | –0.043 | –0.013 | |
| | (0.084) | (0.019) | |
| Colonial history$_{ij}$ | –0.131 | 0.016 | |
| | (0.275) | (0.043) | |
| Disaster$_i$ | 0.457*** | 0.892*** | 0.896*** |
| | (0.053) | (0.036) | (0.036) |
| Appreciation of LCU$_i$ against LCU$_j$ (t-1) | 0.008*** | 0.006*** | 0.006*** |
| | (0.001) | (0.001) | (0.001) |
| Oil price$_J$ * Oil producer$_j$ (t-1) | 0.001 | –0.019*** | –0.024*** |
| | (0.001) | (0.007) | (0.009) |
| Dependency ratio, old$_i$ (t-1) | 0.019 | 0.047** | 0.025 |
| | (0.012) | (0.023) | (0.030) |
| Dependency ratio, young$_i$ (t-1) | –0.014*** | 0.074*** | 0.080*** |
| | (0.003) | (0.011) | (0.014) |
| Interest rate differential$_{ij}$ (t-1) | –0.007*** | –0.017*** | –0.015*** |
| | (0.002) | (0.002) | (0.003) |
| Capital account openness$_i$ (t-1) | 0.019 | –0.228*** | –0.204*** |
| | (0.032) | (0.028) | (0.039) |
| Capital account openness$_j$ (t-1) | 0.034* | 0.035 | 0.033 |
| | (0.018) | (0.023) | (0.028) |
| Political stability$_i$ (t-1) | 0.000 | 0.026*** | 0.026*** |
| | (0.003) | (0.004) | (0.004) |
| Political stability$_j$ (t-1) | –0.009** | –0.015*** | –0.012** |
| | (0.004) | (0.004) | (0.005) |
| Constant | –8.188*** | –47.707*** | –61.358** |
| | (0.981) | (15.599) | (24.500) |
| Year FE | Yes | Yes | Yes |
| RE for country pairs | Yes | – | – |
| FE for recipient and sender | – | Yes | – |
| FE for country pairs | – | – | Yes |
| Observations | 1,418 | 1,418 | 1,418 |
| R-squared | 0.947 | 0.998 | 0.919 |
| Number of country pairs | 900 | – | 900 |

Notes: LCU = local currency unit; Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; i = receiving country; j = sending country.

# APPENDIX 4: ROBUSTNESS CHECK – HECKMAN

| | (1) |
|---|---|
| Log(migrant stock$_{ij}$) | 0.995*** |
| | (0.003) |
| Relative business cycle$_{ij}$ (HP) | –0.261*** |
| | (0.016) |
| Log(GDP$_i$) | 4.418*** |
| | (0.892) |
| Log(GDP$_j$) | –1.327*** |
| | (0.308) |
| Log(per capita GDP$_i$) | –4.580*** |
| | (0.948) |
| Log(per capita GDP$_j$) | 0.558* |
| | (0.305) |
| Log(distance$_{ij}$) | –0.048*** |
| | (0.017) |
| Contiguity$_{ij}$ | –0.137*** |
| | (0.052) |
| Common language$_{ij}$ | –0.019 |
| | (0.024) |
| Colonial history$_{ij}$ | –0.064 |
| | (0.056) |
| Disaster$_i$ | 0.353*** |
| | (0.020) |
| Appreciation of LCU$_i$ against LCU$_j$ | 0.008*** |
| | (0.001) |
| Oil price$_J$ * Oil producer$_j$ | 0.013*** |
| | (0.002) |
| Dependency ratio, old$_i$ | 0.175*** |
| | (0.021) |
| Dependency ratio, young$_i$ | 0.041*** |
| | (0.011) |
| Interest rate differential$_{ij}$ | –0.008*** |
| | (0.001) |
| Capital account openness$_i$ | –0.044* |
| | (0.025) |
| Capital account openness$_j$ | 0.095*** |
| | (0.021) |
| Political stability$_i$ | –0.005 |
| | (0.004) |
| Political stability$_j$ | –0.024*** |
| | (0.004) |
| Constant | –41.639*** |
| | (13.523) |
| Year FE | Yes |
| FE for recipient and sender | Yes |
| Observations | 55,307 |
| Uncensored obs | 1,418 |

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; GDP, per capita GDP, distance, contiguity, common language, colonial history, and year dummy variables are used in the first stage of the Heckman two-step estimation; i = receiving country; j = sending country.

# APPENDIX 5: ESTIMATION RESULTS – EXTENDED MODEL USING THE DATA AGGREGATED BY RECIPIENT

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Log(migrant stock$_i$) | | 0.206 | | –0.077 |
| | | (0.255) | | (0.247) |
| Relative business cycle$_i$ | –0.059 | –0.240*** | –0.174 | –0.282* |
| | (0.089) | (0.071) | (0.159) | (0.163) |
| Log(GDP$_i$) | 1.005*** | 0.687*** | –3.607 | 0.361 |
| | (0.215) | (0.172) | (4.438) | (5.311) |
| Log(per capita GDP$_i$) | –0.720* | –0.917*** | 4.653 | 0.353 |
| | (0.370) | (0.323) | (4.485) | (5.272) |
| Oil price | 0.001 | 0.002 | –0.001 | –0.008 |
| | (0.005) | (0.006) | (0.016) | (0.021) |
| Dependency ratio, young$_i$ | –0.027* | –0.036 | –0.027 | –0.084 |
| | (0.014) | (0.028) | (0.038) | (0.074) |
| Dependency ratio, old$_i$ | –0.002 | 0.066 | –0.006 | 0.106 |
| | (0.065) | (0.072) | (0.086) | (0.214) |
| Disaster$_i$ | 0.138* | 0.271*** | 0.125* | 0.228 |
| | (0.075) | (0.093) | (0.068) | (0.137) |
| Appreciation of LCU$_i$ | –0.001 | 0.000 | –0.005 | –0.006 |
| | (0.004) | (0.008) | (0.004) | (0.009) |
| Capital account openness$_i$ | –0.036 | –0.047 | –0.012 | –0.141 |
| | (0.066) | (0.153) | (0.083) | (0.151) |
| Political stability$_i$ | 0.004 | –0.011 | 0.027 | –0.013 |
| | (0.012) | (0.029) | (0.020) | (0.035) |
| Constant | –11.652* | –4.144 | 61.289 | –0.039 |
| | (5.991) | (4.877) | (78.088) | (95.406) |
| Year FE | Yes | Yes | Yes | Yes |
| RE for recipient | Yes | Yes | – | – |
| FE for recipient | – | – | Yes | Yes |
| Observations | 137 | 39 | 137 | 39 |
| R-squared | 0.636 | 0.757 | 0.161 | 0.688 |
| N | 137 | 39 | 137 | 39 |
| Number of rep | 20 | 20 | 20 | 20 |

Notes: LCU = local currency unit; Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; i = receiving country; j = sending country.

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