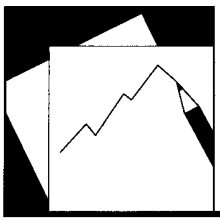
WP/09/216



# IMF Working Paper

# Determinants and Macroeconomic Impact of Remittances in Sub-Saharan Africa

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# Determinants and Macroeconomic Impact of Remittances in Sub-Saharan Africa

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## Abstract



The paper investigates the determinants and the macroeconomic role of remittances in sub-Saharan Africa, assembling the most comprehensive dataset available so far on remittances in the region and incorporating data on the diaspora. It finds that remittances are larger for countries with a larger diaspora or when the diaspora is located in wealthier countries, and that they behave countercyclically, consistent with a role as a shock absorber. Although the effect of remittances in growth regressions is negative, countries with well functioning domestic institutions seem nevertheless to be better at unlocking the potential for remittances to contribute to faster economic growth.

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## I. INTRODUCTION

Workers' remittances to developing countries have substantially increased over the past decade, both globally and in sub-Saharan Africa (SSA). While remittances to sub-Saharan Africa are lower than those to other major regions in per capita and in absolute terms, differences are much less pronounced relative to the GDP of recipient countries. A number of African countries are among the largest recipients of remittances relative to their GDP, and for some of them remittances represent a major source of foreign exchange.

However, there has been little research on the determinants of remittances to Africa and their impact on economic growth. Cross-country studies have tended to focus on low-income countries generally, possibly incorporating a dummy variable to capture the specificities of SSA countries. While using a broad sample increases the degree of freedom, it may also introduce unwanted heterogeneity if the factors that explain remittances differ across country groups.

This paper addresses two main questions: (1) Motivated by the large differences in the size of remittances in SSA countries, it analyzes the determinants of remittances. (2) In light of the magnitude of remittances in at least some countries in the region, it analyzes their macroeconomic impact, looking specifically at their link with economic growth.

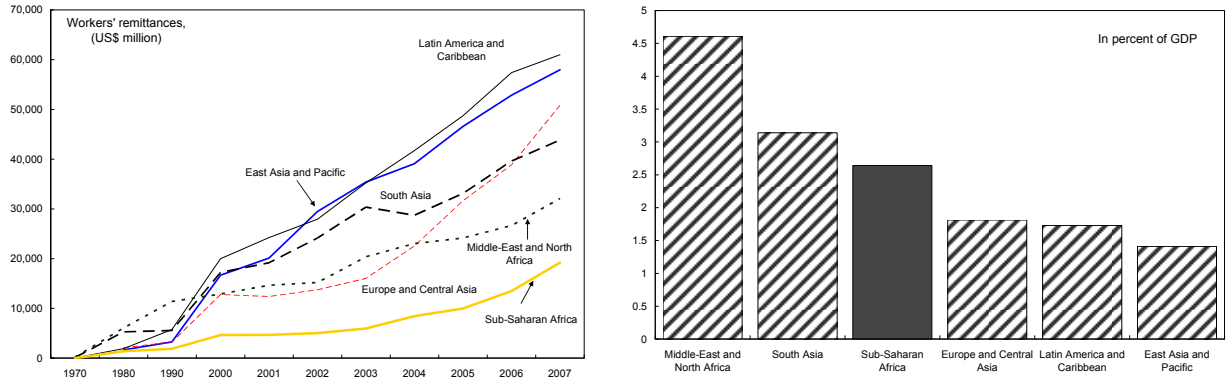
This paper aims to contribute to the literature in several ways. (1) By looking specifically at SSA, it achieves a richer analysis of the role of remittances in the region than that provided by studies with global coverage. (2) It augments the most commonly used datasets with expanded data coverage of African countries. (3) It constructs estimates of stocks of emigrants from countries receiving remittances and uses them (along with income levels of the countries hosting them) as potential determinants of remittances.

In what follows, Section II presents some background information on recent patterns in migration and remittance flows; Section III provides a review of the literature; Section IV discusses the data, describes the methodology, and presents the results; and Section V draws conclusions.

## II. REMITTANCES IN SUB-SAHARAN AFRICA

Reported remittances have substantially increased throughout the developing world (Figure 1), rising from about US$20 billion in 1980 to an estimated US$265 billion in 2007. In SSA, an estimated US$19 billion in remittances in 2007 corresponded to about 2½ percent of regional GDP, an amount similar to the official development assistance the region received. However, on a global scale remittance flows to SSA are quite small; they account for only 5 percent of total remittances to developing countries, and in terms of GDP are dwarfed by the amounts received in the Middle East and South Asia.

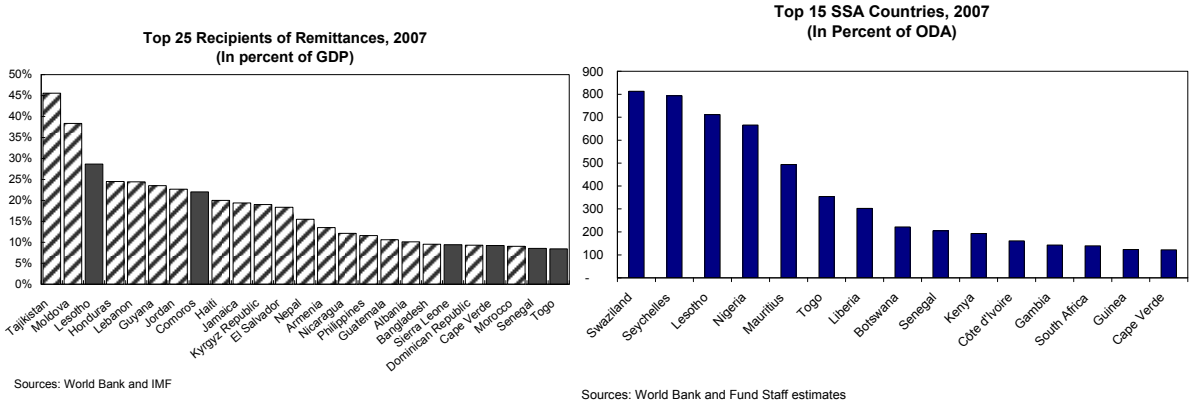
Figure 1. Remittances by Major Region




Sources: IMF, World Bank, and authors' calculations.

The general picture hides striking variations by country (Figure 2). Of the 25 largest recipients of remittances in 2007 in terms of GDP, six were in Africa (Cape Verde, Comoros, Lesotho, Senegal, Sierra Leone, and Togo). As a source of foreign exchange, in Benin, Cape Verde, Comoros, Eritrea, Gambia, Lesotho, and Uganda, remittances in 2006 represented more than 25 percent of each country's export earnings. Furthermore, while for the region as a whole the amounts of aid and recorded remittances are similar, in numerous countries remittances were a multiple of official assistance.

Figure 2. Main Recipients of Remittances




Sources: IMF, World Bank, and authors' calculations.

## III. Macroeconomic Aspects of Remittances: A Review of the Literature

### A. Determinants of Remittances

A number of factors might determine remittances.[2] Remittances may be motivated by self-interest. For example, people might send remittances to enhance their social status or keep a connection with parents in the hope of inheriting their wealth. Remittances could also be viewed as repayments of loans that financed the cost of migration. Lucas and Stark (1985) in examining household data from Botswana found that remittances are positively associated with the wealth of the family left at home.

Remittances might also be motivated by altruism or family arrangements. An insurance motive is a good example: If some family members are located elsewhere, the welfare of the family would be less affected by economic fluctuations in a given country. When family members in one country are hit by an adverse shock, family members in another could help them to overcome this hardship.

In this situation migrants would decide how much to send home depending on both their own income and the income of their family at home. Aggregate remittances would therefore depend on wages in the host economy, income in the home economy, and the total number of migrants. Elbadawi and Rocha (1992) examine data for four North African and two European countries and find that remittances are positively associated with the income level of the host country and the stock of migrants. Similarly, El-Sakka and McNabb (1999) find in data from Egypt that remittances are positively associated with host county income.

As a result of such studies, many researchers argue that remittances could be countercyclical and provide a more stable source of foreign exchange. Correlations between remittances and the level of economic activity in the home country, however, have been inconclusive. While many studies find that home income is negatively correlated with remittances (e.g., Bouhga-Hagbe, 2006; El-Sakka and McNabb, 1999; Yang and Choi, 2007), Sayan (2006) argues that the countercyclicality of remittances has little empirical grounds. He computes unconditional correlations between detrended remittances and detrended real GDP for 12 countries only to observe that remittances are in most cases acyclical and even procyclical.

Similarly, Yang (2008) found that Filipino migrants sent less money in foreign currency when the peso depreciated during the Asian financial crisis, which suggests that migrants have a target amount they want the family to receive. Along the same lines, Straubhaar (1986) shows that the total flow of remittances into Turkey is not affected by exchange rate variations.

Remittances could also reflect a portfolio choice about investment opportunities in the home country. If so, remittances might be expected to be positively associated with variables like

[2] See Rapoport and Docquier (2006) for a survey of various theories and empirical evidence on motivations to remit.

the interest rate differential between home and host countries and the quality of economic policies or institutions in the home country. Generally, however, studies typically find remittances to be driven by the need to support migrant workers' families rather than by investment considerations (Aggarwal and Spatafora, 2005).

While El-Sakka and McNabb (1999) found that remittances are negatively associated with the interest rate differential, Elbadawi and Rocha (1992) found no significant correlation with the depreciation-adjusted interest rate differential. They interpret this result as meaning that from the portfolio choice perspective a high interest rate in the home country is likely to reflect the unstable economic situation there so that migrants may remit less. Similarly, Straubhaar (1986) shows that remittances in Turkey are not affected by changes in the real rate of return on investment. His explanation is that many remitters have little option but to send money, given the severe economic hardship faced by their families at home.

Once migrants have decided how much to remit, they must then decide how to send it. High official costs such as a money transfer fee or the presence of a dual exchange rate would affect the extent to which remittances are transmitted formally and recorded. Investigating the influence of transaction costs and financial development on recorded remittances in 104 countries, Freund and Spatafora (2005) found that both transaction costs and the presence of a dual exchange rate regime have a significantly negative effect on remittances. Similarly, Elbadawi and Rocha (1992) and El-Sakka and McNabb (1999) found that recorded remittances are negatively correlated with the black market exchange rate premium.[3]

### B. Remittances and Economic Growth

Do remittances promote economic growth? Neither theoretical nor empirical studies have provided a conclusive answer. While remittances lead to an increase in the level of income in the recipient country and plausibly help reduce poverty (Gupta et al., 2007), it is not at all obvious that remittances increase output and promote long-term economic growth.

There are a few channels through which remittances could raise economic growth: First, if an increase in remittances raises investment, remittances could be expected to affect growth positively.[4] This effect could be large to the extent that remittances alleviate the credit constraints faced by most people in developing countries (Funkhouser, 1992, and Woodruff and Zenteno, 2004). Thus the positive effect of remittances on investment or on economic growth is likely to be larger for countries where the financial system is relatively underdeveloped. This substitutability between remittances and financial development has

[3] In their study the exchange rate is expressed in terms of the amount of foreign currency in exchange for one unit of home currency. A positive black market premium, therefore, means that the official rate overvalues the home currency compared to the black market or parallel rate.

[4] Remittances could have a positive impact on investment rates because remittance flows mask inward investment. Also, if recipients of remittances (which raise income but do not count as part of GDP) invest some proportion of remittances, the ratio of investment to GDP would rise. A preliminary analysis conducted during this study did not show remittances having a significant impact on investment rates.

been found empirically (for example, Fajnzylber and Lopez, 2007, and Giuliano and Ruiz-Arranz, 2005).

If remittances are predominantly consumed rather than invested, any growth effects through higher investment could be subdued. Even in this case, however, remittances could foster investment by reducing the volatility of consumption and contributing to a more stable macroeconomic environment. Using a sample of 70 countries, including both advanced and developing economies, Chami et al. (2009) find evidence supporting the notion that remittance flows provide a stabilizing influence on output. Their results, however, also indicate a threshold effect, suggesting that this stability-enhancing contribution is achieved rather quickly and would not be very significant in countries receiving large flows of remittances. Higher incomes owing to remittances could also result in improvements in development indicators (e.g., access to education or population health) that could promote growth.

On the other hand, there are also several factors that could result in remittances hampering GDP growth. In countries receiving remittances the currencies could appreciate, which might be harmful to their long-run economic growth (a Dutch disease effect). For example, Amuedo-Dorantes and Pozo (2004) found that remittances caused sizable real exchange rate appreciation in Latin American countries. Moreover, remittances may reduce the labor supply or labor market participation of recipients. If these negative factors dominate, remittances could be detrimental to economic development in SSA (Chami, Fullenkamp, and Jahjah, 2003). More generally, remittances could be associated with adverse labor market developments if predominantly well-educated people emigrate. While this does not represent an impact of remittances (as opposed to emigration), the correlation between remittances and macroeconomic variables may partly reflect such labor market effects.

The theoretical literature does not provide much guidance about the size or even direction of the impact of remittances on economic growth, but the empirical literature is not much clearer. Chami, Fullenkamp, and Jahjah (2003) regress per capita real growth on investment, change in remittances, and net private capital inflows (NPCIs) as well as regional dummy variables; they obtain positive coefficients for both investment and NPCIs, but the coefficient of remittances comes out negative. They therefore suggest that remittances are unlikely to promote economic growth because of a moral hazard problem (i.e., reduced labor market participation), as well as other factors outlined above, and question whether remittances can be a source of development capital.

Fajnzylber and Lopez (2007) and Giuliano and Ruiz-Arranz (2005) take a more differentiated approach. They address circumstances in which remittances may be more, or less, effective in stimulating economic growth by including interaction terms between remittances and other variables that might complement remittances in promoting growth.

Fajnzylber and Lopez (2007) regress per capita real growth both on remittances and on a set of controls with panel data for Latin American countries. Their specifications include an interaction term between remittances and either human capital, institutions, or financial depth. They find that the impact of remittances on economic growth depends on the context.

Specifically, the coefficient on remittances is negative but the interaction term becomes positive when human capital or institutions interact with remittances. By contrast, remittances have a positive coefficient, but the interaction term with financial depth has a negative coefficient. In other words, human capital accumulation or an improvement in institutional quality complements the positive role of remittances in economic growth, but financial depth substitutes for remittances in promoting economic growth. Therefore, according to those findings remittances are deemed ineffective for promoting economic development for countries with low-quality institutions or low human capital accumulation. But their findings also suggest that remittances could be helpful to economic growth when recipient countries do not have well-developed financial systems.

Giuliano and Ruiz-Arranz (2005), in a study with global scope, confirm these findings. They estimate a model similar to but simpler than the one used by Fajnzylber and Lopez (2007) and find that the interaction term between remittances and financial depth is again negative, suggesting they can be substituted for each other, while both remittances and financial depth have positive coefficients.

## IV. Empirical Analysis

### A. Data

The new data set constructed for this paper comprises 36 countries in SSA for 1990 through 2005.[5] Remittances are defined as the sum of three items in the IMF's *Balance of Payments Statistics Yearbook* (BOPSY)—workers' remittances, compensation of employees, and migrants' transfers[6]—but for most countries only one or two of the items are available from the BOPSY. Other sources were therefore used to complement the sample, such as the World Bank's *World Development Indicators* and country-specific datasets maintained by the IMF's African Department.

The data were then adjusted according to the country-specific notes in the BOPSY, along the lines of Freund and Spatafora (2005) and Guiliano and Ruiz-Arranz (2005). For instance, compensation of employees was excluded from total remittances for Cape Verde,

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[5] The sample include therefore 17 more SSA countries than the dataset used by Guiliano and Ruiz-Arranz (2005). Appendix A provides a list of countries in our sample, variables, and sources. We confine our dataset to the period from 1990 to 2005 given data availability constraints and because we are especially interested in recent rises in the volume of remittances.

[6] According to the IMF's *Balance of Payments Manual, Fifth Edition* (BPM5), workers' remittances refers to "current transfers by migrants who are employed in new economies and considered residents there (a migrant is a person who comes to an economy and stays, or is expected to stay, for a year or more)." Compensation of employees comprises "wages, salaries, and other benefits earned by individuals—in economies other than those in which they are residents—for work performed for and paid for by residents of those economies." Thus compensation is similar to workers' remittances except in that migrants' duration of stay is less than a year. "Migrants' transfers" are "change in financial items that arise from the migration (change of residence for at least a year) of individuals from one country to another."

Côte d'Ivoire, Rwanda, Senegal, and Seychelles. For Kenya, "other current transfers" were taken as the measure of remittances, since the BOPSY explicitly specifies that remittances are recorded under "other current transfers."

There is considerable variation across countries in the ratio of remittances to GDP (Table 1); for some countries remittances relative to GDP are higher than 10 percent. Table 3 reports bivariate correlations among the variables used in the analysis of the determinants of remittances. Remittances, as expected, are positively correlated with financial deepening (M2/GDP and the absence of a dual exchange rate regime) and the share of expatriates in the population, and are negatively associated with income in the home country. Furthermore, M2/GDP and domestic credit/GDP are relatively highly correlated, which is reassuring because we will use these two as indicators for financial depth.[7]

No annual data on the stock of expatriates are available. To estimate this variable, we started with the data compiled by Parsons et al. (2007) on international bilateral migration. This database provides the number of migrants from each of 226 origin countries to each of 226 destination countries in 2000.[8] From this we inferred data on the stock of expatriates for our 36 SSA countries during 1990–2005 using World Development Indicators (see Appendix B for a more detailed discussion).

Measures of the differentials in interest rates and income between the country receiving remittances and the originating country were constructed as a weighted average of bilateral differentials, using the stocks of emigrants from the receiving country across countries (from Parsons et al., 2007) as weights.

[7] We also use "private credit by deposit money banks and other financial institutions" as another indicator for financial development. This does not change the empirical results much since this variable is highly correlated with "domestic credit provided by banks," which we use here. Summary statistics and empirical results using this variable are not reported.

[8] In fact, the numbers of migrants in this database may not exactly represent the numbers in 2000. The database is estimated with information collected from the 2000 census round. The actual year in which the census is conducted differs by country. See Parsons et al. (2007) for details.

Table 1. Summary Statistics for Variables: Determinants of Remittances

| Variable (all in logs except otherwise indicated) | Obs. | Mean | Std. dev. | Min | Max |
|---|---|---|---|---|---|
| Remittances/GDP | 520 | -4.43 | 1.78 | -10.17 | -0.24 |
| Remittances/GDP (not in logs) | 520 | 0.046 | 0.098 | 0.000 | 0.790 |
| Real GDP per capita (home income) | 574 | 6.17 | 1.04 | 4.53 | 8.93 |
| M2/GDP | 564 | -1.37 | 0.61 | -4.79 | 0.55 |
| DC/GDP | 533 | -1.57 | 0.91 | -6.12 | 0.61 |
| Host income | 576 | 8.29 | 1.43 | 5.80 | 10.17 |
| Expatriates/Population | 574 | 6.69 | 16.62 | -60.26 | 143.20 |
| Political risk | 416 | 3.77 | 0.56 | 0.69 | 4.52 |
| Real exchange rate | 574 | -5.12 | 2.25 | -9.88 | -0.84 |
| Interest rate differential (not in logs) | 491 | 2.04 | 11.90 | -98.97 | 50.99 |
| Dual exchange rate dummy (not in logs) | 574 | 0.14 | 0.35 | 0 | 1 |

Table 2. Summary Statistics for Variables: Growth Equation

| Variable (all in logs except otherwise indicated) | Obs. | Mean | Std. dev. | Min | Max |
|---|---|---|---|---|---|
| Δ log (Real GDP per capita) | 538 | 0.01 | 0.06 | -0.63 | 0.32 |
| Remittances/GDP | 520 | -4.43 | 1.78 | -10.17 | -0.24 |
| Investment/GDP | 574 | -1.62 | 0.45 | -3.36 | 0.35 |
| DC/GDP | 533 | -1.57 | 0.91 | -6.12 | 0.61 |
| M2/GDP | 564 | -1.37 | 0.61 | -4.79 | 0.55 |
| Lagged real GDP per capita | 538 | 6.16 | 1.04 | 4.53 | 8.93 |
| Population growth | 538 | 0.10 | 0.06 | -0.63 | 0.31 |
| Government expenditure/GDP | 574 | -22.05 | 0.41 | -23.46 | -20.78 |
| Trade openness | 574 | -0.42 | 0.51 | -2.73 | 0.81 |
| Political risk (Institutions) | 416 | 3.77 | 0.56 | 0.69 | 4.52 |
| Inflation | 538 | 0.10 | 0.13 | -0.11 | 0.84 |
| Real exchange rate | 574 | -5.12 | 2.25 | -9.88 | -0.84 |
| Change in terms of trade | 538 | -0.02 | 0.17 | -1.11 | 0.95 |
| Deposit rate | 491 | 10.04 | 8.12 | 0 | 54.67 |

Table 3. Correlations Between Variables Used as Determinants of Remittances

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|---|---|---|---|---|---|---|---|---|---|---|
| (1) | | -.147 | .209 | -.175 | -.118 | .162 | .133 | .043 | -.381 | -.045 |
| (2) | | | .269 | .338 | .210 | .100 | .376 | .418 | -.096 | .059 |
| (3) | | | | .511 | .237 | .079 | .314 | .529 | -.113 | .043 |
| (4) | | | | | .381 | -.137 | .027 | .381 | .120 | .084 |
| (5) | | | | | | -.194 | -.063 | .300 | .195 | .122 |
| (6) | | | | | | | .133 | .039 | -.269 | -.059 |
| (7) | | | | | | | | .225 | -.074 | -.027 |
| (8) | | | | | | | | | -.035 | .117 |
| (9) | | | | | | | | | | .194 |
| (10) | | | | | | | | | ` | |

* Number of observations: 334
* Variables (all in logs except otherwise indicated):
(1) Remittances/GDP
(2) Real GDP per capita (home income)
(3) M2/GDP
(4) DC/GDP
(5) Host income
(6) Expatriates/Population
(7) Political risk
(8) Real exchange rate
(9) Interest rate differential (not in logs)
(10) Dual exchange rate dummy (not in logs)

Table 4. Correlations Between Variables Used in Growth Equation

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) | | .052 | .301 | -.108 | -.044 | .076 | .086 | .347 | -.029 | -.046 | -.045 | -.024 |
| (2) | | | .092 | -.150 | .009 | .082 | .260 | .114 | -.214 | .039 | -.017 | -.331 |
| (3) | | | | -.250 | -.148 | .385 | .378 | .456 | -.021 | .041 | .036 | .075 |
| (4) | | | | | -.120 | .146 | -.077 | .043 | -.039 | .406 | .001 | .011 |
| (5) | | | | | | -.035 | -.032 | -.118 | -.050 | -.063 | -.080 | -.061 |
| (6) | | | | | | | .571 | .264 | .091 | .325 | .053 | .203 |
| (7) | | | | | | | | .371 | .023 | .191 | .088 | .092 |
| (8) | | | | | | | | | -.161 | 250 | -.005 | -.000 |
| (9) | | | | | | | | | | -.124 | .077 | .657 |
| (10) | | | | | | | | | | | .010 | -.055 |
| (11) | | | | | | | | | | | | .018 |
| (12) | | | | | | | | | | | | |

* Number of observations: 318
* Variables (all in logs except otherwise indicated):
(1) Δ log (Real GDP per capita)
(2) Remittances/GDP
(3) Investment/GDP
(4) DC/GDP
(5) Population growth
(6) Government expenditure/GDP
(7) Trade openness
(8) Political risks (Institutions)
(9) Inflation
(10) Real exchange rate
(11) Change in terms of trade
(12) Deposit rate

## B. Empirical Approach

We estimate two equations, one describing the determinants of remittances (Eq. 1) and one describing determinants of growth (Eq. 2), For the former we specify

$$\ln(REM/GDP)_{it} = \alpha_i + \gamma_t + \beta_1 \ln y_{it} + \beta_2 \ln FinDev_{it} + \beta_3 \ln y^*_{it} + \beta_4 \ln(Mig/Pop)_{it} + \beta_5 \ln Ins_{it} + \beta_6 \ln REX_{it} + \beta_7 ID_{it} + \beta_8 Dual_{it} + \varepsilon_{it}, \quad (1)$$

where *REM/GDP* denotes the ratio of remittances to GDP, *y* is home income, *FinDev* stands for an index for the financial development, *y** is host income, *Mig/Pop* is the ratio of expatriates to population, *Ins* denotes institutional quality, *REX* is the real exchange rate, *ID* is the interest rate differential, *Dual* is the dual exchange rate dummy variable, and $\alpha_i$ and $\gamma_t$ are country- and time-specific dummies.

For the relationship between growth and remittances, we adopt the following:

$$\Delta \ln y_{it} = \alpha_i + \gamma_t + \beta_1 \ln y_{it-1} + \beta_2 \ln(REM/GDP)_{it} + \beta_3 \ln(Inv/GDP)_{it} + \beta_4 \ln FinDev_{it} + \beta_5 \ln Pop_{it} + \beta_6 \ln Ins_{it} + \beta_7 \ln REX_{it} + \beta_8 \ln(GovExp/GDP)_{it} + \beta_9 \ln Open_{it} + \beta_{10} Inflation_{it} + \beta_{11} \Delta \ln TOT_{it} + \beta_{12} \ln(REM/GDP)_{it} \ln Ins_{it} + \beta_{13} \ln(REM/GDP)_{it} \ln FinDev_{it} + \varepsilon_{it}, \quad (2)$$

where *y* is real per capita GDP, *Inv* denotes investment, *Pop* stands for population, *GovExp* is the government expenditure-to-GDP ratio, *Open* is trade openness, and *TOT* denotes the terms of trade. In selecting regressors, we follow the standard list of variables discussed in the literature (e.g., Giuliano and Ruiz-Arranz, 2005; and Fajnzylber and Lopez, 2007) to which we add indicators for investment and financial development:

- Lagged per capita real GDP represents the convergence term. Under the convergence hypothesis, richer countries tend to grow more slowly than poorer countries, so the coefficient on this variable is expected to be negative.
- Population growth may be interpreted as growth of the labor force, which is one of the production factors.
- Government expenditure has been included in estimating the growth equation of this type in the literature to represent the burden of government.
- Trade openness and the quality of institutions have been confirmed as important channels of economic growth (see for example, Frankel and Romer, 1999, and Acemoglu, Johnson, and Robinson, 2001).
- The real exchange rate is included to see the extent to which currency overvaluation affects economic growth.
- Finally, change in the terms of trade is included as a proxy for external shocks.

As a starting point, a panel fixed effect (FE) estimation was used to estimate the determinants of remittances and the impact of remittances on economic growth.[9] However, potential endogeneity problems may render these estimates inconsistent. For example, income in the home country and financial deepening are likely to be correlated with the error terms because of the reverse causality from remittances to those variables (Gupta, Pattillo, and Wagh, 2007; and Giuliano and Ruiz-Arranz, 2005). In the growth equation, remittances are likely to be correlated with the error terms because remittances are affected by income and possibly by growth, according to the determinants equations. To deal with this issue, a fixed-effect two-stage least square (FE 2SLS) estimation method was run, using the variables in our system as instruments.[10] In doing so we test whether the instruments selected are reasonably highly correlated with endogeous regressors using the weak instrument test developed by Cragg and Donald (1993) or Kleibergen and Paap (2006) and test their exogeneity using the Sargan's overidentifying restrictions test. [11]

In all the regressions that follow we have also included time-specific dummy variables to deal with any time-specific effect. This should help reduce the degree of heteroskedasticity in the error terms; that would make estimates from FE 2SLS more reliable because they are as asymptotically efficient as estimates from GMM with spherical errors.

### C. Results

Table 5 reports the estimation results for the determinants of remittances. As expected, the coefficients of host country income and stock of expatriates are positive and robust, which means that countries with a large diaspora attract more remittances and that the location of expatriate communities matters—the wealthier the country where expatriates are located, the higher the remittances they send back home.

Remittances to SSA do seem to play a shock-absorbing role. The coefficient of real per capita GDP in the home country is negative regardless of the choice of estimation methods. This suggests that when adverse economic shocks decrease incomes in their home country, migrants would remit more to protect their family from those shocks. Another way of interpretating this result is that migrants send remittances so that those left behind can maintain a certain quality of life. In that case, migrants must send more if those who receive remittances become poorer.

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[9] The dependent variable used here is the ratio of remittances to GDP. We also tried different measures, such as remittances to population or just the volume of remittances, but the results were robust to the choice of measure for remittances.

[10] While 2SLS estimators might be asymptotically less efficient than 3SLS or GMM when the error terms are not spherical, they are consistent even with nonspherical errors and have better small- sample properties. Moreover, 2SLS estimators are known to be more robust than 3SLS or GMM to estimating problems, such as specification errors and multicollinearity. We also note that if the error terms are spherical, i.e., homoskedastic and not autocorrelated, 2SLS estimators and 3SLS or GMM estimators will become identical.

[11] Often, critical values for the Cragg-Donald F-statistic are not available, though Stock and Yogo (2005) did compute critical values for some limited cases, and only valid with i.i.d. errors. Thus we do not report the critical values with the Cragg-Donald F-statistics in the results. Also the Kleibergen-Paap (2006) test substitutes Cragg-Donald F-statistic in the case of non-i.i.d. errors.

Turning to the effect of the real exchange rate on remittances, however, our result implies that a real appreciation of the exchange rate would reduce the amount of remittances. This result contrasts with that of Yang (2008). One reason for this negative relation could be that migrants would replace cash with noncash remittances such as gifts because the purchasing power of a given amount would be relatively higher in the host country than at home.

Table 5. Determinants of Remittances

| Dependent Variable: log (Remittances/GDP) | | | | |
|---|---|---|---|---|
| Variables (all in logs) | FE | | FE 2SLS | |
| | M2/GDP | DC/GDP | [1] | [2] |
| Home income | -3.236*** | -2.952*** | -3.158*** | -3.258*** |
| | (-6.08) | (-4.48) | (-5.14) | (-3.02) |
| M2/GDP | 0.698*** | | 1.232*** | |
| | (3.37) | | (3.06) | |
| Domestic credit/GDP | | 0.160 | | 0.890*** |
| | | (1.15) | | (3.86) |
| Host income | 4.255*** | 4.555*** | 2.567** | 3.690*** |
| | (3.64) | (3.60) | (2.09) | (2.66) |
| Expatriates/Population | 0.024*** | 0.021*** | 0.027*** | 0.016 |
| | (3.59) | (2.85) | (3.29) | (1.59) |
| Institutions | 0.400*** | 0.378** | 0.491*** | 0.274 |
| | (2.72) | (2.43) | (3.21) | (1.60) |
| Real exchange rate | -0.765*** | -0.581** | -0.760** | -0.699** |
| | (-3.06) | (-2.14) | (-2.39) | (-1.99) |
| Interest rate differential | -0.039*** | -0.039*** | -0.030*** | -0.025** |
| | (-3.56) | (-4.30) | (-3.52) | (-2.64) |
| Dual exchange rate | -0.131 | -0.029 | -0.126 | 0.113 |
| | (-0.83) | (-2.16) | (-0.83) | (0.61) |
| Observations | 352 | 334 | 318 | 296 |
| R squared | 0.8171 | 0.8122 | 0.8251 | 0.8129 |
| Kleibergen-Paap statistic for weak instruments | N.A. | N.A. | 31.289 | 52.756 |
| p-value for overidentification test of all instruments | N.A. | N.A. | 0.3162 | 0.2796 |

Note: 1) Standard errors are robust to autocorrelation in errors.
2) t-values are in parentheses.
3) ***, **, and * indicate 1%, 5%, and 10% significance.
4) Time-specific dummies are included but estimates are not reported here.

[1] Financial depth: M2/GDP
Instrumented: Home income, M2/GDP
Instruments: 1st lag of real GDP per capita and institutions; 1st and 2nd lags of M2/GDP

[2] Financial depth: DC/GDP
Instrumented: Home income, DC/GDP
Instruments: 1st lag of real GDP per capita and institutions; 1st and 2nd lags of DC/GDP

Alternatively, an overvalued exchange rate could be associated with restrictions on the use by the recipients of foreign exchange if the government resorts to rationing to control the balance of payments. This situation could make sending remittances less attractive. Moreover, if the investment motive is also a factor, an appreciation of the home currency could affect the timing of remittances and in the short run reduce the amount: Migrants would postpone their remittances to a time when the exchange rate would be more favorable.

As expected from the portfolio approach, the coefficient on institutional quality is significantly positive and robust: countries with better institutions or a more stable political system would receive more remittances relative to GDP. Institutional quality can be viewed as reflecting the business environment, which in turn should influence the amount of remittances driven by the investment motive.

As in previous studies, remittances are associated negatively and significantly with the interest rate differential. A high interest rate in the home country and hence a high interest rate differential is likely to reflect instability in the home economy, especially for SSA countries. In that case, migrants would not send more remittances home for investment.

Remittances are estimated to be positively correlated with financial deepening. Countries with more developed financial markets would attract more remittances relative to GDP. This is consistent with the findings of Freund and Spatafora (2005). Financial development should ease the process of money transfers and may reduce the fee associated with sending remittances through competition, so that it can raise the amount or share of remittances transferred through official channels, which our data on remittances captures. However, in this study, unlike Freund and Spatafora (2005), the existence of a dual exchange rate does not seem to have a significant effect on remittances. The difference may be due to the samples used in the studies, our sample being limited to SSA countries.

We conducted several robustness tests:

- First, we used remittance per capita instead of remittances-to-GDP as the dependent variable. The results in Table 5 are not affected in any meaningful way.

- We also estimated the same equation using two-step GMM and the results remained broadly unchanged.

We now turn to the empirical findings on the impact of remittances on economic growth. Table 6 reports the estimation of the growth equation (Eq. 2). The regressions return fairly robust estimated coefficients for remittances, the variables describing the insitutional and external environment, and GDP per capita. However, we do not obtain clear results for the role of investment or the indicators for financial development.

Concerning the impact of remittances on growth, we can see that the overall effect is negative and significant (columns 3 through 6), whether or not interaction terms or a measure for financial deepening is included. Regressions without interaction terms indicate that a 1 percent rise in the remittances-to-GDP ratio would reduce the per capita GDP growth rate by about 0.03 percentage point. This result is consistent with the finding of Chami, Fullenkamp, and Jahjah (2003), who also find the estimates of remittances on growth negative, which leads them to question the growth-enhancing role of remittances.

With regard to GDP per capita, the variables related to the institutional environment, and the external variables, the signs of the estimated coefficients are fairly robust and generally consistent with our expectations based on the literature. Lagged GDP per capita, the convergence term, is significantly negative, suggesting that wealthier countries in our sample tended to grow less fast. Trade openness is positively correlated with economic growth. High inflation, which may represent lack of price stability or more generally economic stability, is associated with lower growth. Finally, the effect of institutions on growth is positive—the better the institutional quality of a country, the faster its economic growth.

## Table 6. Impact of Remittances on Growth

Dependent Variable: Δ log (per capita real GDP)

| Variables (all in logs) | FE | | FE 2SLS | | | |
|---|---|---|---|---|---|---|
| | [1] | [2] | [3] | [4] | [5] | [6] |
| Remittances/GDP | -0.009*** | -0.010*** | -0.027*** | -0.030*** | -0.140*** | -0.252** |
| | (-3.09) | (-3.33) | (-4.08) | (-3.91) | (-3.34) | (-2.29) |
| Investment/GDP | -0.001 | 0.007 | -0.084*** | -0.076*** | -0.077** | 0.020 |
| | (-0.06) | (0.71) | (-4.43) | (-3.61) | (-2.24) | (0.49) |
| Domestic credit/GDP | -0.025*** | | 0.002 | | 0.142*** | |
| | (-3.52) | | (0.15) | | (2.67) | |
| M2/GDP | | -0.022* | | 0.058** | | -0.203 |
| | | (-1.89) | | (2.02) | | (-1.61) |
| Lagged per capita real GDP | -0.213*** | -0.174*** | -0.367*** | -0.289*** | -0.241*** | -0.317*** |
| | (-7.48) | (-6.61) | (-7.36) | (-6.13) | (-4.18) | (-4.33) |
| Population growth | 0.155 | 0.062 | 0.065 | -0.193 | -0.073 | -0.749* |
| | (0.71) | (0.28) | (0.27) | (-0.74) | (-0.28) | (-1.90) |
| Government expenditure/GDP | 0.026** | 0.023* | 0.018 | -0.003 | 0.076*** | -0.049* |
| | (2.12) | (1.74) | (1.03) | (-0.17) | (2.96) | (-1.82) |
| Trade openness | 0.019 | 0.021 | 0.082*** | 0.067*** | 0.083*** | 0.071*** |
| | (1.27) | (1.45) | (4.22) | (3.46) | (3.76) | (2.57) |
| Institutions | 0.044*** | 0.041*** | 0.053*** | 0.060*** | 0.298*** | 0.173** |
| | (6.06) | (5.57) | (6.05) | (6.22) | (3.79) | (1.98) |
| Inflation | -0.021 | -0.004 | -0.141*** | -0.107*** | -0.156*** | -0.050 |
| | (-0.82) | (-0.14) | (-4.29) | (-3.15) | (-3.73) | (-0.96) |
| Real exchange rate | -0.018 | -0.004 | -0.043* | -0.017 | 0.013 | -0.019 |
| | (-1.11) | (-0.24) | (-1.93) | (-0.79) | (0.37) | (-0.68) |
| Change in terms of trade | -0.007 | -0.011 | -0.024 | -0.033* | 0.002 | -0.028 |
| | (-0.46) | (-0.67) | (-1.39) | (-1.80) | (0.12) | (-1.33) |
| (Rem/GDP)*(DC/GDP) | | | | | 0.040*** | |
| | | | | | (2.82) | |
| (Rem/GDP)*(M2/GDP) | | | | | | -0.075** |
| | | | | | | (-2.47) |
| (Rem/GDP)*(Institutions) | | | | | 0.050*** | 0.025 |
| | | | | | (2.98) | (1.44) |
| Observations | 342 | 359 | 308 | 327 | 243 | 279 |
| R squared | 0.4282 | 0.4032 | 0.4002 | 0.3065 | 0.3367 | -0.0024 |
| Kleibergen-Paap statistic for weak instruments | N.A. | N.A. | 10.101 | 9.760 | 1.682 | 1.092 |
| p-value for overidentification test of all instruments | N.A. | N.A. | 0.5626 | 0.5535 | 0.1853 | 0.1497 |

Note: 1) Standard errors are robust to autocorrelation in errors.
2) t-values are in parentheses.
3) ***, **, and * indicate 1%, 5%, and 10% significant.
4) Time-specific dummies are included but estimates are not reported here.

[3] Financial depth: DC/GDP
Instrumented: lagged per capita real GDP, rem/GDP, investment/GDP, DC/GDP
Instruments: expatriates/population; 1st lag of investment/GDP and DC/GDP; 2nd lag of trade openness, per capita real GDP, and Rem/GDP

[4] Financial depth: M2/GDP
Instrumented: lagged per capita real GDP, rem/GDP, investment/GDP, and M2/GDP
Instruments: expatriates/population; 1st lag of investment/GDP and M2/GDP; 2nd lag of trade openness, per capita real GDP, and rem/GDP

[5] Financial depth: DC/GDP
Instrumented: lagged per capita real GDP, rem/GDP, investment/GDP, DC/GDP, and two interaction terms
Instruments: expatriates/population; 1st lag of interest rate differential, investment/GDP, DC/GDP, institutions, and population growth; 2nd lag of trade openness and per capita real GDP; 4th lag of rem/GDP; host income and its 1st lag

[6] Financial depth: M2/GDP
Instrumented: lagged per capita real GDP, rem/GDP, investment/GDP, M2/GDP, and two interaction terms
Instruments: 1st lag of M2/GDP and trade openness; 2nd lag of host income, interest rate differential, per capita real GDP, and investment/GDP; 1st and 2nd lags of expatriates/population and government expenditure/GDP; 1st to 3rd lags of rem/GDP

Turning to financial development, the coefficients of the two indicators, domestic credit and M2 each as a percent of GDP, are unstable across different specifications, and in some the coefficient of M2 is negative. Similarly, the role of investment is unclear, with estimated coefficients that differ across specifications, depending on which financial indicators are used. Examining the interaction terms, the signs of the coefficient for the interaction term between remittances and financial development is positive for domestic credit (DC) and negative for M2.

These results are somewhat puzzling because both variables have been used in previous studies to proxy financial development and have yielded similar results. One possible explanation for these findings is that for our sample M2 may not be a good index for financial development. In particular, domestic credit may be a better indicator to describe the ability of the financial sector to fund the economy, while M2 would capture the deposit gathering activity of the financial system. In an environment characterized by rationing and involuntary savings or inappropriately developed institutions to support credit (availability of creditor information, clear property rights, reliable legal framework), the two indicators could diverge.

For the interaction between remittances and the strength of institutions, the interaction term has a positive coefficient, suggesting that remittances have a less negative or positive impact where the institutional environment is conducive to growth. This result would emphasize the importance for home countries to have well functioning domestic institutions, allowing to unlock the potential for remittances to contibute to faster economic development.

## V. CONCLUSIONS

The paper set out to analyze the determinants and the macroeconomic role of remittances in SSA. It has assembled the most comprehensive dataset available so far on remittances in the region, comprising data for 36 countries from 1990 through 2005. It also includes data on the size of the diaspora based on information that has only recently become available and arguably are a crucial determinant of remittance flows. Both the existing theoretical and empirical literature provide mixed views, especially on the role of remittances in promoting faster growth. We hoped that a study focusing on SSA countries only would yield clearer evidence.

Our findings suggest that the size and the location of the diaspora are important determinants of remittances, which are larger for countries with a larger disapora and when the diaspora is located in wealthier countries. Remittances vary countercyclically with variations in GDP per capita, consistent with the hypothesis that remittances can help mitigate economic shocks. Moreover, remittances appear to respond to some indicators for the quality of the institutional environment in the home country.

The findings on the impact of remittances on economic growth are less clear-cut. One result of our analysis that is fairly robust across specifications is a negative coefficient of remittances in growth regressions. This result would suggest that the adverse effects of remittances on growth may dominate, at least in SSA countries. Remittance flows could very well reduce the volatility of consumption or alleviate financial constraints. On average, however, the evidence would indicate that the combined effect of the resulting real

appreciation of the exchange rate, the brain drain, or adverse incentives on labor force participation offsets these positive contributions.

Our findings would also suggest that countries with well functioning domestic institutions seem to be better at unlocking the potential for remittances to contribute to faster economic growth. A deeper financial sector or a more stable political environment could contain the adverse effects of remittance flows on growth and enhance their positive contributions. Identifying these key institutional reforms and documenting success cases are left to future research.

## APPENDIX A. LIST OF VARIABLES AND COUNTRIES USED FOR THE ANALYSIS

| Variables | Description | Source |
|---|---|---|
| Remittances | Sum of workers' remittances, compensation of employees, and migrants' transfers (expressed in US$) | BOPSY (IMF), WDI (World Bank), and African Department at the IMF |
| Real GDP per capita | Real GDP per capita in 2000 constant US$ | WDI |
| Nominal GDP | Nominal GDP in US$ | World Economic Outlook (WEO; IMF) |
| Population | Population | WEO |
| Nominal exchange rate | Nominal exchange rate measured as the amount of USD for one unit of local currency unit (US$/local currency unit) | WEO |
| CPI | Consumer Price Index (100 in 2000) | WEO |
| Inflation | CPI inflation | Authors' computation |
| Investment | Gross investment in US$ | WEO |
| Dual exchange rate regime | Dual exchange dummy, 1 for dual or multiple exchange rate regime | Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER; IMF) |
| M2 | Money and quasi-money (M2) in US$ | WDI |
| Terms of trade | Export price index/ Import price index (100 in 2000) | WEO |
| Trade openness | (Imports + Exports)/GDP | WEO |
| Stock of expatriates | Number of expatriates by origin (see Appendix B for details.) | WDI and Parsons et al. (2007) |
| Private investment | Private investment in US$ | WEO |
| Public investment | Public investment in US$ | WEO |

**APPENDIX A. LIST OF VARIABLES AND COUNTRIES USED FOR THE ANALYSIS (concluded)**

| Variables | Description | Source |
|---|---|---|
| Institutional quality | ICRG political risk index (0: highest risk, 100: lowest risk) | International Country Risk Guide (ICRG; Political Risk Service Group) |
| Deposit rate | Deposit rate | IFS |
| Real exchange rate | Real exchange rate against US$ $(\frac{USD}{LCU_i}\frac{CPI_i}{CPI_{US}})$ | Authors' computation |
| Government expenditure | General government total expenditure and net lending in US$ | WEO |
| Host income | Weighted average of real per capita GDP in top 4 expatriates-receiving countries (in 2000 constant US$) | WDI and Parsons et al. (2007) |
| Nominal interest rate differential | Deposit rate of home country – Deposit rate of country with largest migrants share from that country | IFS and Parsons et al. (2007) |
| Domestic credit | Domestic credit provided by banks (% of GDP) | WDI |

*** Countries in our Sample (in alphabetical order)**
Benin, Botswana, Burkina Faso, Cameroon, Cape Verde, Comoros, Republic of Congo, Côte d'Ivoire, Eritrea, Ethiopia, Gabon, The Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, São Tomé & Príncipe, Senegal, Seychelles, Sierra Leone, South Africa, Sudan, Swaziland, Tanzania, and Togo. **(36 countries)**

## APPENDIX B. CONSTRUCTION OF THE STOCK OF EXPATRIATES DATA

This appendix describes in detail how we construct data on the stock of expatriates from available sources of migration data. The data we use to compute the stock of expatriates include net migration into each country and the stock of migrants within each country (both from the WDI but recorded only every five years as well as the international bilateral migration database compiled by Parsons et al. (2007).

Suppose there is a country, which we call **home**. We call the rest of the world **foreign**. Assume for simplicity that place of birth determines citizenship. Assume further that all available stock data are measured at the end of a given period.

Let us define the following variables (see the diagram below):

1. Stocks

$H_t$ : number of people born in home and living there

$H_t^*$ : number of people born in home but living in foreign

$F_t$ : number of people born in foreign but living in home

$F_t^*$ : number of people born in foreign and living there

$P_t$ : population of home ( $= H_t + F_t$ )

2. Flows

$EH_t$ : number of home-born people who migrate from home to foreign

$IH_t$ : number of home-born people who migrate back to home from foreign

$EF_t$ : number of foreign-born people who migrate from home to foreign

$IF_t$ : number of foreign-born people who migrate from foreign to home

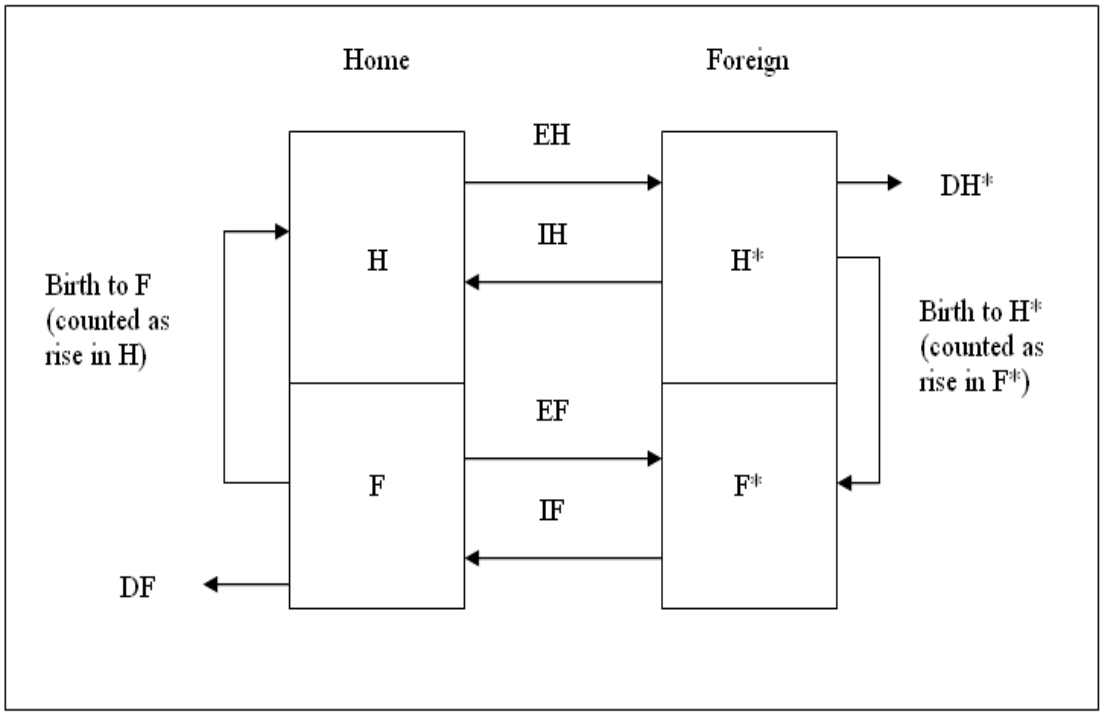
$E_t$ : number of out-migration from home ( $= EH_t + EF_t$ )

$I_t$ : number of in-migration to home ( $= IH_t + IF_t$ )

$M_t$ : net migration ( $= I_t - E_t$ )

$DH_t^*$ : number of home-born people who die in foreign

$DF_t$ : number of foreign-born people who die in home




What we know is: $P_t$, $F_t$ (migration stock from the WDI), hence $H_t$, and $M_t$ (net migration from the WDI). But what we want to know is: $H_t^*$ (stock of expatriates). The flow of migration is characterized by the following equations:

$$H_t^* = H_{t-1}^* - DH_t^* + EH_t - IH_t \tag{B1}$$

$$F_t = F_{t-1} - DF_t + IF_t - EF_t \tag{B2}$$

Note that births to migrants are counted as increases in the natives for the country where they live on the assumption we made earlier. Turning to net migration we know by definition,

$$M_t = I_t - E_t = (IH_t - EH_t) + (IF_t - EF_t),$$

which implies

$$(EH_t - IH_t) = (IF_t - EF_t) - M_t. \tag{B3}$$

Combining (1), (2), and (3), we have

$$H_t^* = H_{t-1}^* - DH_t^* + F_t - F_{t-1} + DF_t - M_t. \tag{B4}$$

To construct the stock of expatriates from home, we need a value of $H_t^*$ for some period $t$ as well as the number of deaths of migrants, i.e., $DH_t^*$ and $DF_t$. We address these issues as follows: First, to obtain the stock of expatriates from home at some period, we make use of the international bilateral migration database of Parsons et al. (2007). Then, to estimate the number of deaths of migrants, we first assume the death rate depends only on place of birth.

On this assumption, we can compute the death of migrants as follows:

$$DH_t^* = d_t H_{t-1}^*,$$
$$DF_t = d_t^* F_t, \tag{B5}$$

where $d_t$ is the death rate of home-born people and $d_t^*$ the death rate of foreign-born people. We use the crude death rate of home, available from the WDI, to measure $d_t$ and a simple average of crude death rates for our sample countries to measure $d_t^*$. Combining (B4) and (B5) yields the equation for computing the stock of expatriates:

$$H_t^* = H_{t-1}^*(1-d_t) + F_t - F_{t-1}(1-d_t^*) - M_t. \tag{B6}$$

One remaining issue in constructing the data as described so far is that data on migration stock within a country, $F_t$ in our term, are available only every five years. Thus we interpolate between two recorded observations linearly to obtain annual data on the stock of expatriates.

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