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ABSTRACT

Remittances, Financial Development, and Growth^{*}

Despite the increasing importance of remittances in total international capital flows, the relationship between remittances and growth has not been adequately studied. This paper studies one of the links between remittances and growth, in particular how local financial sector development influences a country's capacity to take advantage of remittances. Using a newly-constructed dataset for remittances covering about 100 developing countries, we find that remittances boost growth in countries with less developed financial systems by providing an alternative way to finance investment and helping overcome liquidity constraints. The study also explores some common myths about remittances and suggests that they are predominantly profit-driven and mostly pro-cyclical.

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I. Introduction

Remittances by international migrants to their countries of origin constitute the largest source of external finance for developing countries after foreign direct investment (FDI). Officially recorded remittance inflows amounted to \$125 million in 2004, exceeding total development aid by 50 percent. In fifteen developing countries, remittances account for more than 10 percent of gross domestic product (Figures 1 to 3). Despite the increasing importance of remittances in total international capital flows, the relationship between remittances and growth has not been adequately studied. This contrasts sharply with the extensive research on the relationship between growth and other sources of foreign capital, such as FDI and official assistance flows². Moreover, the conventional wisdom seems to be that, because remittances are used mostly for consumption, they have a minimal impact on long-term growth.

This paper attempts to fill a gap in the existing literature of the macroeconomic impact of remittances and it also explores some common myths about remittances. This study contributes to the debate of the impact of remittances on growth in two important ways. One, we construct a new measure for remittances, covering about 100 countries, substantially improving data limitations on remittance flows. And two, we analyze the importance of remittances in promoting economic growth, looking specifically at the interaction between remittances and the financial sector, an aspect ignored in the literature. In particular, we explore how local financial sector development influences a country's capacity to take advantage of remittances.

The relationship between remittances, financial development and growth is a-priori ambiguous. On one hand, well-functioning financial markets, by lowering costs of conducting transactions, may help direct remittances to projects that yield the highest return and therefore enhance growth rates. On the other hand, remittances might become a substitute for inefficient or nonexistent credit markets by helping local entrepreneurs bypass lack of collateral or high lending costs and start productive activities.³ The empirical analysis finds strong evidence that

² See Alfaro et al. (2004) for an analysis of the relationship between FDI and growth and Easterly (2003) and Rajan and Subramanian (2005) for the link between aid and growth.

³ Entrepreneurs in developing countries confront much less efficient credit markets, and available evidence indicates that access to credit is among their biggest concerns (Paulson and Townsend, 2000).

(continued)

the second channel works: remittances boost growth in countries with less developed financial systems by providing an alternative way to finance investment and helping overcome liquidity constraint. In contrast, while more developed financial systems seems to attract more remittances (the volumes of remittance inflows increase with lower transaction costs and fewer restrictions on payments), they do not seem to magnify their growth impact.

Although this mechanism has not been studied in a macro context, there is some evidence at the micro-level. Dustmann and Kirchamp (2001) find that the savings of returning migrants may be an important source of startup capital for microenterprises. Similarly, in a study of 30 communities in West-Central Mexico, Massey and Parrado (1998) conclude that earnings from work in the United States provided an important source of startup capital in 21% of the new business formations. Woodruff and Zenteno (2001) also find that remittances are responsible for almost 20% of the capital invested in microenterprises throughout urban Mexico.

This paper is at the crossroads of two strands of literature. One is the development impact of remittances⁴. Most of the work done on the macroeconomics of remittances and their impact on growth is qualitative and tends to suggest that remittances are mostly spent on consumption, and are not used for productive investment that would contribute to long-run growth. The second strand of literature looks at the determinants of remittances and how the financial sector infrastructure, and in particular transaction costs, influences the propensity to remit. Authors stress the need to promote competition among money transfer operators to reduce transaction costs and stimulate remittances through formal channels. To the best of our knowledge, this is the first paper that analyzes the evidence of complementarity/substitutability between remittances and financial development in promoting growth.

Our empirical analysis suggests that agents compensate for the lack of development of local financial markets using remittances to ease liquidity constraints, channel resources toward productive investments and hence promote economic growth. To assess the merits of our guess,

Several recent papers also suggest that credit constraints play an especially critical role in determining growth prospects in economies characterized by a high level of income inequality (Banerjee and Newman, 1993; Aghion and Bolton, 1997; Aghion, Caroli and Garcia Penalosa, 1999)

⁴ Lundhal (1985), Stark (1991), Kirwan and Holden (1986)

we analyze the interaction of remittances and financial development using a large sample of developing countries. In our analysis we use standard financial market indicators and employ them in growth regressions to study the impact of the interaction of these variables with remittances on economic growth. The result that remittances may play a significant role in promoting growth in countries with shallower financial systems holds true after addressing concerns regarding endogeneity.

A related point in our analysis concerns some common myths about remittances. First, in contrast with conventional wisdom, we present evidence that remittances are not only consumed but also used for investment. And this is particularly prominent in countries where the financial sector does not meet the credit needs of local entrepreneurs. Second, remittances respond as much to economic incentives and investment opportunities in the home country as to altruistic or insurance motives. In about two-thirds of the developing world, remittances are predominantly profit-driven and increase when economic conditions in the home country improve. That is, remittances are mostly procyclical.

The structure of the paper is as follows. Section 2 describes the data; Section 3 is devoted to the empirics of remittances and growth; Section 4 includes several robustness tests. Section 5 analyzes the cyclical behavior of remittances and Section 6 concludes.

II. Data

This section describes the data on remittances, financial development, economic growth as well as the control variables used in the growth regressions.

The new remittances variable constructed in this study considers a sample of over 100 countries for the 1975-2002 period. The variable represents an improvement over existing remittances series in several dimensions. Previous studies have generally used a broad definition of remittances that include the following three items in the IMF's Balance of Payment Statistics Yearbook (BOPSY) (all the details are in Appendix 1): workers' remittances, compensation of employees, and migrant transfers. Across the board use of this definition entails the risk of including flows, such as earnings of locals working for foreign embassies and international organizations, which do not conform with the view that remittances typically refer to transfers of money by foreign workers to their home countries. Some other countries do not classify remittances separately from other current transfers in the BOP. In such cases, the standard

definition understates the true flows. For these reasons, we decided to adopt a country-specific measure of remittances as opposed to a standardized one.

As a first step, we followed the country specific notes in the BOPSY, where in many cases, detailed definitions and description of estimation methodologies are provided. This initial country-by-country inspection concluded that the compensation of employees item needed to be excluded in about 20 countries, since this category did not qualify as remittance flows. As a second step, to estimate flows more accurately and to obtain data for a larger number of countries, we contacted IMF desk economists and country authorities. Some countries have only recently started to produce and report remittances statistics systematically. In these cases, it is common that the IMF desks or country authorities have more information and for a longer time period than the one reported in the BOPSY. Furthermore, in cases where the country notes in BOPSY were insufficient to assess how remittances were measured, they were able to provide clarification regarding definitions and classification of remittances under various BOP items. We obtained information for more than 29 countries (the list is reported in Appendix 1). These additions increased our sample coverage in a substantial way and improved it qualitatively, compared to previous studies. All regressions employ the ratio of remittances to GDP (REM/GDP).

In this study we use four variables to proxy for financial development, all of them related to the banking sector. First, liquid liabilities of the financial system ($M2/GDP$). They equal currency plus demand and interest bearing liabilities of banks and non-financial intermediaries divided by GDP. It is considered the broadest measure of financial intermediation and includes three types of financial institutions: the central bank, deposit money banks and other financial institutions. Second, the sum of demand, time, saving and foreign currency deposits to GDP (DEP/GDP). It measures the ability of banks to attract financial savings and provide a liquid store of value. Third, claims on the private sector divided by GDP ($LOAN/GDP$). They measure the extent to which the private sector relies on banks to finance consumption, working capital, and investment. Finally, credit provided by the banking sector to GDP ($CREDIT/GDP$), which measures how much intermediation is performed by the banking system, including credit to the public and private sectors. The data for the definitions of the variables are obtained from the International Financial Statistics (IFS) of the International Monetary Fund and from the World Development Indicators (WDI) of the World Bank. The

number of developing countries for which we have data on financial development is also larger than the one used so far (for credits to the private sector all the other datasets have data for only 44 developing countries, compared to our number of 73).

For the first set of regressions, the dependent variable is the growth rate of output, measured as the growth of the real per capita GDP in constant dollars from the WDI. Our set of controls includes (see Table 1 for a definitions and sources of our variables): *Inflation*, measured as the annual percentage change in the consumption price index. *Openness* to international trade, defined as the ratio of the sum of exports plus imports of goods to total output. *Human capital* measured as the average number of years of secondary schooling, obtained from Barro and Lee series. *Government fiscal balance and investment ratio* defined, respectively, as the ratio of central government fiscal balance to GDP and gross fixed capital formation to GDP; and finally *population growth*. All control variables, except inflation and fiscal balance, are specified in natural logs.

In the investment regressions, we proxy the user cost of capital by one of two alternative measures: the lending interest rate and the interest rate spread, which is the difference between the lending rate and the deposits rate. Both variables are taken from the WDI dataset.

Our sample consists of 73 developing countries with annual data for the period 1975-2002.⁵ Following most empirical cross-country studies, we work with a panel of five-year averages of all the variables. Table 2 and Table 3 provide descriptive statistics and bivariate correlations of the variables of interest. Growth, as expected, is positively correlated with investment, government fiscal balance, years of education and our measure of openness, and negatively correlated with inflation. As for our variables of interest, higher remittances are associated with higher growth. Moreover, the correlation between growth and all the measures of financial development is positive, consistent with previous results on the impact of financial development on growth. In turn, remittances are positively associated with investment and openness, and negatively correlated with inflation suggesting that a high rate of domestic inflation may act as a proxy for uncertainty and risk and therefore discourage the flow of

⁵ We started with a larger dataset, but data for all variables was only available for 73 countries. Furthermore, some observations were excluded following an analysis of outliers.

remittance earnings. These relations are consistent with previous findings in the literature ⁶. Finally, the correlation between remittances and the financial development variables is positive across the four indicators, though very small for loans and bank credit. Although these correlations provide a good initial description of the interrelation among variables, they do not control for other country characteristics and do not imply causality in either direction.

III. Empirical Analysis

III.A Estimation Methodology

To explore the relationship between remittances, financial development and growth, we work with a pooled (cross-country, time series) dataset consisting of 73 developing countries. We split the sample period 1975-2002 into 6 non-overlapping 5-year periods⁷ (except for the last period for which we average our data for only three years).

As a starting exercise, we estimate the impact of remittances on economic growth by ordinary least squares (OLS). For illustrative purposes, we do not include in our first regression any variable for financial development. We estimate the following equation:

$$GDP_{it} = \beta_0 + \beta_1 GDP_{i,t-1} + \beta_2 Rem_{it} + \beta_3 X_{it} + \mu_t + \eta_i + \varepsilon_{it} \quad (1)$$

where $GDP_{i,t-1}$ denotes the (logarithm of) initial level of GDP per capita, Rem is equal to remittances over GDP and X_{it} is the matrix of control variables described in the previous section, μ_t is a time specific effect, η_i is an unobserved country-specific fixed effect and ε_{it} is the error term⁸. We are interested in testing whether the marginal impact of remittances on growth, β_2 , is statistically significant.

⁶ See El-Sakka and McNabb (1999) and Detragiache et al. (2005).

⁷ We use 5-year periods rather than shorter time spans because although the financial development data are available on a yearly basis for most countries in our sample, they might be subject to business cycle fluctuations, which we can be controlled for by averaging over longer time periods.

⁸ Note that equation (1) can be alternatively written with the growth rate as dependent variable as: $Growth_{it} = GDP_{it} - GDP_{i,t-1} = \beta_0 + (\beta_1 - 1)GDP_{i,t-1} + \beta_2 Rem_{it} + \beta_3 X_{it} + \mu_t + \eta_i + \varepsilon_{it}$, where $(\beta_1 - 1)$ is the convergence coefficient.

While remittances have the potential to affect economic activity through a host of channels, in a second set of regressions we examine one specific link between remittances and growth, specifically that working through financial markets. The hypothesis we would like to test is whether the level of financial depth in the recipient country affects the impact of remittances on growth. To this end, we interact the remittances variable with an indicator of financial depth and test for the significance of the interacted coefficient⁹. A negative coefficient would indicate that remittances are more effective in boosting growth in countries with shallower financial systems. In other words, a negative interaction provides evidence of substitutability between remittances and financial instruments. On the other hand, a positive interaction would imply that the growth effects of remittances are enhanced in deeper financial systems, supporting complementarity of remittances and other financial flows.

The regression to be estimated is the following:

$$GDP_{it} = \beta_0 + \beta_1 GDP_{i,t-1} + \beta_2 Rem_{it} + \beta_3 FinDev_{it} + \beta_4 (Rem_{it} \cdot FinDev_{it}) + \beta_5 X_{it} + \mu_i + \eta_t + \varepsilon_{it} \quad (2)$$

Our first sets of OLS regressions, with or without the interaction with financial development, do not address issues regarding endogeneity. Theoretically, however, it is plausible, and also very likely, that both the magnitude of remittances and the efficiency of financial markets increase with higher growth rates. This would lead to an overstatement of the effect of each of the two variables and their interaction on growth. There has been an extensive search for good instruments for financial development. In the literature, variables not subject to reverse causality, such as origins of a country's legal systems and creditor rights (La Porta et al., 1997) are commonly used. Rajan and Subramanian (2005) use the distance from the country of origin as an instrument for remittances. These variables suffer from the drawback that they do not vary over time, so we cannot use them in a panel framework. Therefore, we address the endogeneity problem looking at panel *system Generalized Method of Moments* regressions (SGMM), following Arellano and Bover (1995).¹⁰

⁹ In order to ensure that the interaction term does not proxy for remittances or the level of development of financial markets, these variables are also included in the regression separately.

¹⁰ For a discussion of the reason why a system GMM estimator outperforms a difference GMM estimator see Arellano and Bover (1993) and Blundell and Bond (1997).

III.B Estimation Results

Table 4 reports estimates of equation (1) using various econometric techniques (OLS, FE and SGMM). It shows that the impact of remittances on growth is practically nil when the remittances variable is simply added as an additional explanatory variable in a standard growth regression. While the coefficient estimates increase and become marginally significant when investment is dropped from the specification¹¹, the empirical evidence in favor of a positive role of remittances on growth seems to be at most fragile. These results contrast with some recent literature at the micro level, which has identified positive effects of remittances on consumption, investment, years of education, and health outcomes. This poses the question of whether the impact of remittances is homogeneous across countries or whether it varies along a dimension, which has not been properly accounted for in the estimated specification. We next investigate this avenue. In particular, we explore whether the financial development of the recipient country influences the specific uses given to remittances and their capacity to influence growth.

To this end, we estimate equation (2), which allows the impact of remittances on growth to vary across levels of financial development in the recipient country. The sign of the interacted coefficient provides information regarding the nature of remittances. More specifically, a positive interaction term reveals that they are complementary and that a well functioning financial system enhances the impact of remittances. On the other hand, a negative sign indicates that remittances and financial depth are used as substitutes to promote growth.

Tables 5 and 6 present OLS and SGMM estimates of (2) respectively. We focus our discussion on the latter but it is worth noting that the two are qualitatively and quantitatively very similar. In all regressions, two lags of all endogenous variables are used as instruments for all non strictly exogenous variables, including the remittances and financial depth indicators. In addition, autocorrelation tests and the Hansen test of overidentifying restrictions are performed to assess the validity of the instruments employed. We estimate (2) for each of our measures of financial depth and find that results are consistent across the four indicators (i.e. across columns in the table).

¹¹ This is done in an attempt to better capture the impact of remittances by omitting one of the channels through which remittances are likely to affect growth, that is investment. The results are available upon request from the authors.

The main results are easily summarized. We find strong evidence of a positive and significant coefficient of remittance flows and of a negative interaction between remittances and financial depth. These findings suggest that the marginal impact of remittances on growth is decreasing with the level of financial development. In other words, remittances have contributed to promote growth in countries with shallower financial systems. In contrast, in more developed financial systems, remittances do not seem to magnify their growth impact.. By relaxing liquidity constraints, remittances have compensated for the lack (or the inefficiency) of the financial system and have contributed to channel resources toward productive investments. Remittances have *de facto* act as a substitute for financial services in promoting growth, by offering the response to the needs for credit and insurance that the market has failed to provide.

Table 7 indicates that remittances have a positive impact on growth at both the mean and median level of financial development but this becomes zero –and eventually turns negative– in countries with well developed financial systems (above the 75th percentile of the distribution of the financial variable). In terms of magnitudes, an increase by one percentage point in the deposits to GDP ratio from the median level of 29 percent would enhance growth by 0.18 percentage points. Similarly, the marginal effect of remittances is 0.19 at the median loans to GDP ratio, 0.09 at the median banking sector credit ratio and 0.20 at the median M2 to GDP level. However, these effects can be twice as large in the presence of stringent lending and borrowing restrictions.

On the other hand, with limited capital market imperfections, remittances are not essential to finance investment, as the needs for credit and insurance can be met by a well functioning banking system. In this case, remittances are more likely to be devoted to non growth generating activities, such as conspicuous consumption, or might even discourage labor supply on the side of the recipients and hence reduce growth. This can explain why the impact of remittances declines with financial depth. In turn, the possibility of the marginal impact becoming negative at very high levels of financial development can be argued on moral hazard grounds, along the paper by Chami et al.

Consistent with previous literature, we also find that financial development facilitates economic growth. With regards the effect of the other variables in the regression, they are all consistent with standard growth regression results. Population, inflation and initial GDP are negative and significant, whereas investment ratio and years of schooling help boost economic

growth. Fiscal balance does not appear to have a significant impact on growth in most regressions, with the exception of SGMM, where is negative and significant but only at the 10 percent level.

In all the different specifications used, the Sargan test and the second order correlation tests indicate that we cannot reject the validity of the moment conditions assumed for the estimation.

In an attempt to identify the channels through which remittances affect growth, we also estimate the growth regressions dropping investment as an explanatory variable¹². If the marginal impact of remittances becomes larger, this would provide indirect evidence of a channel working through productive investment. Table 7 shows that this is indeed the case. The marginal impact of remittances at the median and mean levels of financial development increases by about 50 percent in the case of deposits and M2 to GDP. The increase is between 2 and 6 times larger in the case of total credit from the banking sector. These results suggest that an important channel through which remittances influence growth is the volume of investments. The other potential channels may be the efficiency of investments, investment in human capital as well as multiplicative effects from higher savings and internal demand.

To explore the empirical relation between remittances and investment in a more direct way, we estimate the following investment equation:

$$\begin{aligned} INVGD\dot{P}_{it} = & \beta_0 + \beta_1 INVGD\dot{P}_{i,t-1} + \beta_2 Rem_{it} + \beta_3 FinDev_{it} + \\ & + \beta_4 (Rem_{it} \cdot FinDev_{it}) + \beta_5 Z_{it} + \mu_i + \eta_i + \varepsilon_{it} \end{aligned} \quad (4)$$

where $INVGD\dot{P}$ is total investment to GDP and Z is a matrix of controls, which includes per capita real GDP growth to capture the accelerator effect and a measure of the user cost of capital, proxied by the lending interest rate. The remaining variables are defined as above. One expects that growth exerts a positive effect on investment and that higher lending rates hamper the rate of capital accumulation. We have also estimated this equation adding other potential determinants of investment, in particular inflation and openness but the main results

¹² The financial development variable is likely to be affected when investment is eliminated from the regression as well. According to Barro, the investment ratio can bias the results due to reverse causality. Some studies on financial development include the investment variable (see Alfaro, 2004), while others decide to leave it out (see Loayza and Ranciere, 2005).

hold across different variations of the basic specification. In the interest of simplicity, we discuss the results that emerge from the estimation of equation (4), which uses the most conventional determinants of investment only.

Estimation results are reported in Table 8. For each column, indicating the use of a different financial development indicator, the estimated coefficient of the lagged investment variable is large and positive. In turn, the output growth elasticity of investment is also positive and significant. While the coefficient corresponding to the lending interest rate carries the anticipated negative sign, this is not statistically significant. We get similar results if we use the interest rate spread –the difference between the lending rate and the deposits rate– as a measure of the user cost of capital. Regarding the remittances variable, it is remarkable that this is positive and significant across all specifications. Also in accordance with the results previously found, the interaction between remittances and financial depth is negative and significant. These results imply that the marginal impact of remittances on investment is positive across largely all levels of financial development¹³. However, the largest remittances-driven increases in investment have taken place in less financially developed countries. While the marginal impact of remittances on investment ranges between 0.2 and 0.4 at the median level of financial development, the impact can surpass 0.5 at the lowest quartile of the distribution of financial development. Unlike the growth regressions, the investment regressions do not show an independent statistically positive effect of financial development.

Finally, the diagnostic tests (Hansen and first and second order autocorrelation) reveal no evidence against the validity of the instruments used by the SGMM estimator.

To summarize the empirical exercise of this section, the econometric analysis reveals a significant positive impact of remittances on growth and investment once the interaction with financial development is accounted for. The overriding result is the statistical negative significance of the interaction term, indicating that remittances and financial development have been used as substitutes to promote economic growth.

The presence of liquidity constraints impinges investment in physical and human capital, in particular in those developing countries where access to credit and insurance is limited and

¹³ The marginal effect of remittances only becomes zero at very high levels of financial depth, beyond the 90-95 percentile of the distribution.

expensive. Remittances have played the role of alleviating these liquidity constraints, by financing investment and enhancing growth and might have also been instrumental to achieving insurance and consumption smoothing. In contrast, where the financial system was developed enough, remittances have had a much lower impact on growth, even possibly negative. In this case, the financial system was sufficient to meet financing needs for investment, and remittances were used for purposes that did not foster growth.

IV. Robustness: Threshold Estimation

A simple robustness test consists of splitting the sample according to the level of financial development and compare the impact of remittances across sub-samples. In light of the main result of the empirical analysis, we should find a larger impact of remittances in the sub-sample of countries where the financial system is less developed. We split the sample in two ways. First, exogenously according to the median level and second based on an endogenously determined threshold.

Table 9 presents SGMM growth estimates for countries above and below the median of financial development. These results tend to reinforce our previous findings. More specifically, we find that the impact of remittances is positive for the sample of countries with low financial development (below the median level) and it is nil or negative for countries with deeper financial systems. Nonetheless, using a standard t-test we are only able to reject the hypothesis that the marginal impact of remittances is equal across sub-samples in one case..

Following Hansen (1996 and 2000)¹⁴, we use threshold estimation as an alternative robustness test. Threshold estimation has been applied for nonparametric function estimation as well as for empirical sample splitting when the sample is based on a continuously distributed variable. Instead of (exogenously) selecting the sub-samples based on the median level of financial development, threshold estimation allows to endogenously determine the threshold level of financial development at which the sample should be split. Therefore, this is a better strategy to determine the threshold level of financial development at which the relation between

¹⁴ Gauss programs of the applications in these papers can be found at <http://www.ssc.wisc.edu/~bhansen/>

growth and remittances changes, its confidence interval and the impact of remittances across regimes. Threshold estimation takes the form

$$GDP_{it} = \beta_0 + \beta_1 GDP_{i,t-1} + \beta_2 Rem_{it} + \beta_3 FinDev_{it} + \beta_4 X_{it} + \mu_t + \eta_i + \varepsilon_{it} \quad FinDev_{it} \leq \gamma \quad (5)$$

$$GDP_{it} = \alpha_0 + \alpha_1 GDP_{i,t-1} + \alpha_2 Rem_{it} + \alpha_3 FinDev_{it} + \alpha_4 X_{it} + \mu_t + \eta_i + \varepsilon_{it} \quad FinDev_{it} > \gamma \quad (6)$$

where *FinDev* is the threshold variable used to split the sample into two groups¹⁵, γ is the endogenously determined threshold level. This model allows the regression parameters to differ depending on the value of *FinDev*. Hansen (2000) derives an asymptotic approximation to the distribution of the least-squares estimate of the threshold parameter, which allows testing for the existence of a threshold.¹⁶

Estimates of the threshold model, including the threshold parameter and the least square coefficients on each sub-sample, are reported in Table 10. We compute confidence intervals for the regression parameters and the threshold coefficient, and provide an asymptotic simulation test of the null of linearity against the alternative of a threshold. The estimated threshold of deposits is 22.6 percent of GDP, with a 95 percent confidence interval [11, 73]. That of claims to the private sector is 20.8, with a 95 percent confidence interval [16, 22]. The estimated threshold of banking credit occurs at 30 percent and the confidence interval is [29, 33]. Finally, estimation using M2 to GDP produces a threshold at 20.8 percent, with a confidence interval [16, 22]. Incidentally, the estimated threshold levels are relatively similar to the median values of the corresponding financial development variables, except for M2/GDP, where is lower.

The test of the null hypothesis of no threshold against the alternative of threshold is performed using a Wald test under the assumption of homoskedastic errors¹⁷. Using 1000

¹⁵ The threshold variable could be the dependent variable, a regressor or a third variable, not included in the regression, and it is assumed to have a continuous distribution.

¹⁶ This approach derives OLS estimates and does not correct for endogeneity. We are not aware of any attempt to find such a distribution for SGMM estimates. Nevertheless the exercise still provides interesting insights, especially in view of the similarities between OLS and SGMM estimates suggested by our previous findings.

¹⁷ We also compute heteroskedasticity-consistent Lagrange multiplier tests for a threshold, as in Hansen (1996). In general, they suggest the same sample split as the tests assuming homoskedasticity. We present

(continued)

bootstrap replications, the p-value for the threshold model is very close to zero in each case. There is, therefore, evidence for a regime change at the determined level of financial development. Estimates of the growth regression model for each sub-sample indicate that the marginal impact of remittances is not statistically different from zero in the high financial development regime. On the other hand, remittances have a larger positive impact, and often statistically significant, in the low-financial development sub-sample. It is worth noting that most of the controls in the growth regression, not only the remittances variable, behave differently across sub-samples.

To summarize, our robustness checks consisted of splitting the sample according to the degree of financial depth and comparing the impact of remittances on growth across sub-samples. First, we split countries in the sample in an exogenous manner, more specifically, according to the median level of financial development. Second, we split the observations in our sample according to an endogenously determined threshold. Results are consistent across methodologies and confirm the findings of the previous section, namely that remittances have a larger impact on growth in shallower financial systems. On the other hand, remittances do not seem to have an impact on financially developed countries.

V. Cyclical Behavior of Remittances: Profit-Driven Capital Flows or Compensatory Transfers?

By providing evidence that remittances promote investment, prominently in countries with weak financial sectors, the previous sections have contributed to somehow override the conventional wisdom that remittances are used mostly for consumption. In this section, we explore a second common myth, namely that remittances tend to be more stable and less affected by economic cycles in the recipient country than other capital flows. Since there is no rigorous analysis supporting this evidence, we present the first systematic effort to document empirically the cyclical properties of remittances.

the latter ones because the threshold which maximizes the Wald statistic under homoskedasticity is the same as the one which minimizes the least-squares criterion.

In the second part of this section we analyze how the cyclicality of remittances is associated to the depth of the financial system. Are remittances more likely to be procyclical in more or less financially developed countries? In other words, does financial development smooth or amplify the cyclicality of remittances? This part will then provide indirect supportive evidence for the channels through which remittances can promote growth, outlined in this paper.

To assess the cyclical properties of remittance flows, we follow the Hodrick-Prescott filtering technique, commonly used in the literature and consisting of decomposing the time series of output and remittances into their stochastic trend and cyclical component. Following Kaminsky, Reinhart and Vegh (2004), we define remittances as *countercyclical*, *procyclical* or *acyclical* when the correlation between the cyclical component of remittances and output is negative/positive or not statistically significant, respectively.

Figure 4 shows the correlations of the cyclical components of remittances and output for about a hundred developing countries. It is apparent from the figure that remittances are procyclical –to different degrees- for two thirds of the countries¹⁸. In principle, this correlation could have any sign, since migrants could send remittances when their home country is booming in order to take advantage of the good state of the economy; or in bad times, for altruistic and insurance motives, to help out their family members. There is, thus, some indication that migrants tend to send remittances when the economic situation in the country of origin is favorable, possibly in search of investment opportunities. This investment channel is probably the most important channel to explain our results about the positive link between remittances and growth.

We now turn to the second question of this section: whether more developed financial systems are associated with more or less procyclicalities of remittances. If remittances are more compensatory in nature (i.e. if they are sent for altruistic reasons in order to help the family in the home country), they should be negatively correlated with the home country GDP, or countercyclical. In contrast, if they are profit-driven, they should be positively correlated with GDP, or procyclical. That is, a larger procyclicalities of remittances is associated with the search

¹⁸ At the aggregate level, the average across all countries, weighting them equally, is about 0.1.

of investment opportunities (i.e. profit-driven remittances) rather than with an insurance or altruistic motive to remit (i.e. compensatory transfers). Because profit-driven remittances are more likely to be invested and altruistic-driven remittances more likely to be consumed, we would expect remittances to have a greater impact on growth where remittances are more procyclical. This assessment together with the finding of the previous section—remittances are most effective in less financially developed countries—, implies that we should expect remittances to be more procyclical in countries with shallower financial systems.

The hypothesis that procyclicality of remittances is larger in shallower financial systems is tested computing correlation coefficients between the following two indicators: one, the median over the 1975-2002 period of financial development –measured by deposits, banking credit, claims to the private sector or M2 to GDP– and two, the series of correlations displayed in Figure 4, representing the cyclical behavior of remittances with respect to output. We also estimate bivariate regressions of the cyclical indicator of remittances on each of the financial development measures.

Table 11 shows that all correlations and estimation coefficients are negative across all measures of financial development and range from -0.13 to -0.35. Furthermore, all coefficients are significant at the 10 percent level, except for those associated to the banking credit variable. This indicates that countries where remittances are more procyclical are associated with less developed financial systems and it is consistent with the main conclusion of the paper, that of substitutability between remittances and the financial sector.

It is worth noting that this evidence suggests a rather interesting, and *a priori* paradoxical result, namely that remittances tend to be more countercyclical –that is, more compensatory transfers in nature– in countries with deeper financial systems, where agents could, in principle, get insured against bad shocks more easily. On the other hand, remittances are more likely to seek investment opportunities by responding to the home country economic conditions in countries with less developed financial sectors, where doing business could be more difficult. Thus, financial depth smoothes or counter-balances the cyclicity of remittances.

VI. Conclusions

What is the macroeconomic impact of remittances? Is there evidence that remittances foster productive investment? How does financial development influence the growth effects of

remittances? To shed some light on these important questions, in this paper we analyzed the relationship between remittances and growth and its interaction with the financial development in the recipient country. We used a newly constructed cross-country series for remittances covering a large number of developing countries over the period 1975-2002. We find that remittances have promoted growth in less financially developed countries by providing an alternative way to finance investment. This finding controls for the endogeneity of remittances and financial development using a SGMM approach, does not depend on the particular measure of financial sector development used, and is robust to a number of robustness tests. By becoming a substitute for inefficient or inexistent credit markets, remittances help alleviate credit constraints contributing to improve the allocation of capital and to boost economic growth. The findings suggest that there is an investment channel through which remittances can promote growth where the financial sector does not meet the credit needs of the population. We also analyzed the cyclical properties of remittances and concluded that they are predominantly profit-driven and mostly procyclical.

These findings do not, however, give insights on all the channels through which remittances may affect growth. In particular, we did not explore other possible measures of countries' characteristics, including institutional aspect that may explain this effect. It is possible, for example, that factors other than the degree of financial development may explain why remittances can have an impact on growth. Although this type of omitted variable problem is reduced given our specification, we cannot eliminate the possibility that omitted variables drive some of the results. We did not explore in great detail the potential moral hazard implications of remittances either. Nonetheless, we interpret the nil or even negative impact of remittances at high levels of financial development as suggestive evidence that remittances are more likely to discourage labor supply in more financially developed countries.

Overall, our empirical analysis provides the first macroeconomic evidence of how remittances and financial development may interact in promoting growth. The evidence that remittances contribute to overcome liquidity constraints and help undertake profitable investment in countries with less developed financial systems is encouraging. But while many policy-makers stress the need to stimulate remittances across the board by reducing transfer costs, the biggest challenge is to understand why remittances do not seem to boost growth in

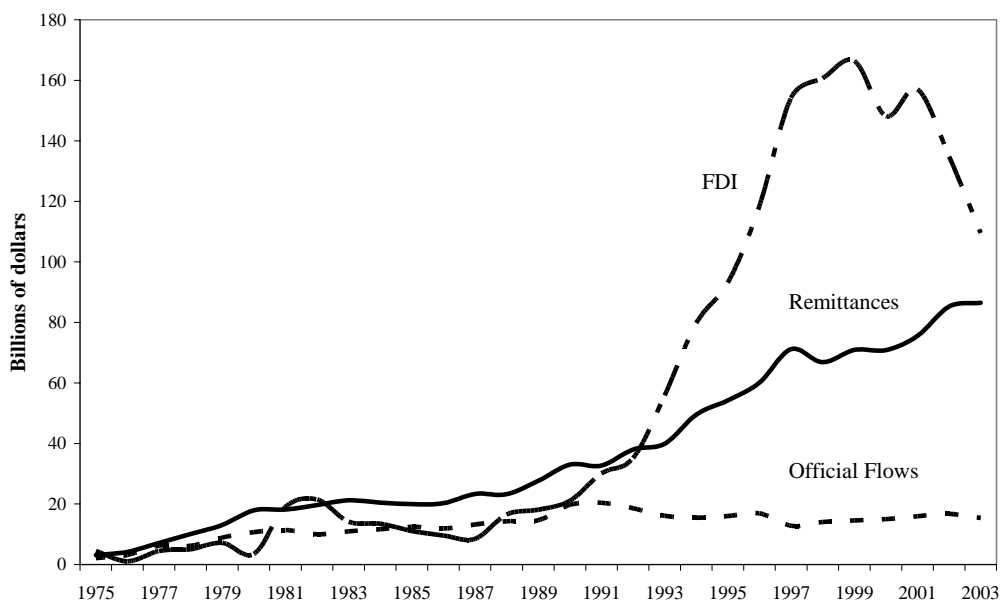
References

- Adams, R., 1989, "Workers Remittances and Inequality in Rural Egypt", *Economic Development and Cultural Change*, 38, 1: 45-71
- Adams, R., 1992, "The Impact of Migration and Remittances on Inequality in Rural Pakistan", *Pakistan Development Review*, 31, 4: 1189-2203
- Adams, Richard, and John Page, 2003, "International Migration, Remittances and Poverty in Developing Countries," *World Bank Policy Research Working Paper* 3179.
- Adams, Jr., Richard, 1991, "The Effects of International Remittances on Poverty, Inequality and Development in Rural Egypt," Research Report 86. *International Food Policy Research Institute*, Washington, DC.
- Adams, Jr, Richard, 1998, "Remittances, Investment and Rural Asset Accumulation in Pakistan," *Economic Development and Cultural Change*, 47 (1): 155-173.
- Adams, Jr., Richard, 2003a. "Economic Growth, Inequality and Poverty: Findings from A New Data Set," *World Bank Policy Research Working Paper* 2972. Washington, DC.
- Adams, Jr., Richard, 2003b, "International Migration, Remittances and the Brain Drain: A Study of 24 Labor-Exporting Countries," *World Bank Policy Research Working Paper* 3069. Washington, DC.
- Aghion, P. and P. Bolton, 1997, "A Theory of Trickle-Down Growth and Development", *Review of Economic Studies* 64(2): 151-172.
- Aghion, P, E. Caroli and C. Garcia-Penalosa, 1999, "Inequality and Economic Growth: The Perspective of the New Growth Theories", *Journal of Economic Literature*, Vol. 37(4), pp. 1615-1660.
- Alfaro, L., A. Chanda, S. Kalemli-Ozean, S. Sayek, 2004 "FDI and Economic Growth: the Role of Local Financial Markets," *Journal of International Economics* 64, 89-112
- Banerjee, A. V. and A. Newman, 1993, "Occupational Choice and the Process of Development," *Journal of Political Economy*, 101, 274-298
- Barham, B. and S. Boucher, 1998, "Migration, Remittances and Inequality: Estimating the Net Effects of Migration on Income Distribution", *Journal of Development Economics*, 55: 307-31
- Beck, T., R. Levine, N. Loyaza, 2000, "Finance and the Sources of Growth," *Journal of Financial Economics* 58, 261-300.
- Chami, R., C. Fullenkamp, and S. Jahjah, 2003, "Are Migrant Remittance Flows a Source of Capital for Development?," *IMF Working Paper*, International Monetary Fund, Washington D.C.
- Chandavarkar, A. B., 1980, "Use of Migrants' Remittances in Labor-Exporting Countries," *Finance and Development* 17 (June).
- Cox Edwards, Alejandra, and Manuelita Ureta, 2003, "International Migration, Remittances, and Schooling: Evidence from El Salvador," *NBER Working Paper* 9766.

- Detragiache, E., P. Gupta, and T. Thressel, 2005, "What Explains Financial Sector Development and Performance in Lower Income Countries,?" Mimeo IMF
- Djajic, S., 1986, "International migration, remittances and welfare in a dependent economy", *Journal of Development Economics*, 21: 229-234
- Dustmann, C. and O. Kirchamp, 2001, "The Optimal Migration Duration and Activity Choice after Re-Migration", IZA Discussion Paper 266.
- Easterly, W. 2003, "Can Foreign Aid Buy Growth?", *Journal of Economic Perspective*, Vol. 17, no. 3: 23-48.
- El-Qorchi, Mohammed, Maimbo, Samuel and Wilson, John, 2003, "Informal Funds Transfer Systems: An Analysis of the Informal Hawala System," Occasional Paper 222. International Monetary Fund, Washington, DC.
- El-Sakka, M., R. McNabb, 1999, "The Macroeconomic Determinants of Emigrant Remittances," *World Development*, 27(8), 1493-1502.
- Galor, O., Zeira, J. "Income Distribution and Macroeconomics," *Review of Economic Studies*, 60: 35-52
- Greenwood and Jobanovic, 1990, "Financial Development, Growth and the Distribution of Income," *Journal of Political Economy*, 98, 1076-1107
- Hansen, B. 2000, "Sample Splitting and Threshold Estimation," *Econometrica*, Vol. 68, No. 3, (May 2000), 575-603.
- Hansen, B., 1996, "Inference When a Nuisance Parameter is Not Identified Under the Null Hypothesis," *Econometrica*, Vol. 64, No. 2 (March, 1996), 413-430.
- King, R., Levine, R. 1993, "Finance, Entrepreneurship and Growth: Theory and Evidence," *Journal of Monetary Economics* 32, 513-542
- Kirwan, F. and D. Holden, 1986, "Emigrants' Remittances, Non-Traded Goods and Economic Source in the Source Country", *Journal of Economic Studies*, Vol. 13, n. 2: 52-58
- Levine, R., Loyaza, N., Beck, T., 2000, "Financial Intermediation and Growth: Causality and Causes," *Journal of Monetary Economics*, 31-77
- Loayza, N., R. Ranciere, 2004, "Financial Development, Financial Fragility and Growth," *Policy Research Working Paper* 3431, The World Bank
- Lucas, R., 1987, "Emigration to South Africa's Mines," *The American Economic Review*, Vol. 77 no. 3, 313-330
- Lundhal, M., 2005, "International Migration, Remittances and Real Incomes: Effects on the Source Country", *Scandinavian Journal of Economics* 87(4): 647-657
- Massey, D. and E. Parrado, 1998, "International Migration and Business Formation in Mexico", *Social Science Quarterly*, 79 (1), 1-20
- McConrmick and Wahba, 2000, "Overseas Employment and Remittances to a Dual Economy," *The Economic Journal*, vol. 100 no 463, 509-534
- Organization for Economic Cooperation and Development (OECD), Various years, *Trends in*

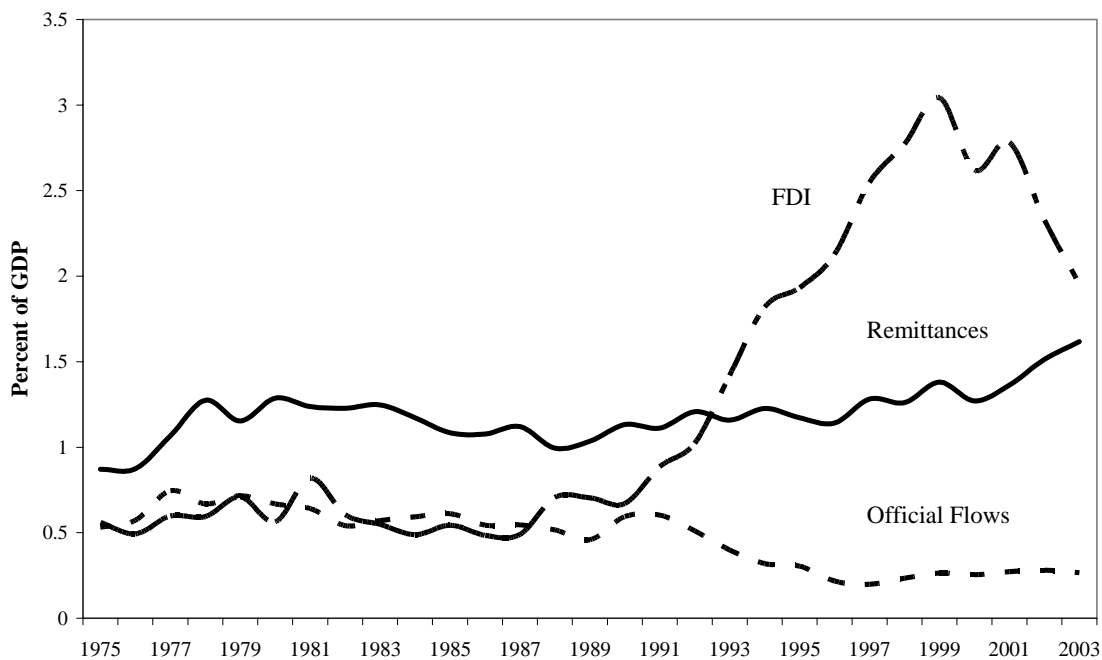
- International Migration: Annual Report*, Paris, France.
- Organization for Economic Cooperation and Development (OECD), 2004, Working Abroad: the Benefits Flowing from Nationals Working in Other Economies, available at: www.oecd.org/dataoecd/30/20/32297831.pdf (Paris, France).
- Paulson, A. and R. Townsend, 2000, "Entrepreneurship and Financial Constraints in Thailand", Working Paper, Northwestern University
- Rajan, R. and A. Subramanian, 2005, "What Undermines Aid's Impact on Growth?", IMF Working Paper no. 05/126.
- Rapoport, H. and f. Docquier, 2005, "The economics of Migrants' Remittances", *Handbook on the Economics of Reciprocity, Giving and Altruism*, forthcoming
- Ratha, Dilip, 2003, "Workers' Remittances: An Important and Stable Source of External Development Finance," *Global Development Finance 2003 - Striving for Stability in Development Finance* Ch. 7: 157–175 (Washington, DC: World Bank).
- Rozelle, S., Taylor, E. and deBrauw A. (1999), "Migration, Remittances and Agricultural Productivity in China," *American Economic Review*, Vol. 89 no. 2, 287-291
- Russell, Sharon, 1986, "Remittances from International Migration: A Review in Perspective," *World Development*, 14 (6): 677-696.
- Stark, O., 1991, *The Migration of Labor*, Oxford and Cambridge, MA: Basil Backwell
- Taylor, J. Edward and Adelman, Irma, 1996, "Village Economies: The Design, Estimation and Use of Villagewide Economic Models" (Cambridge: Cambridge University Press)
- Taylor, J. and T. Wyatt, 1996, "The Shadow Value of Migrant Remittances, Income and Inequality in a Household-Farm Economy", *Journal of Development Studies*, 32, 6: 899-912
- United Nations, 2002, *International Migration Report 2002*, Department of Economic and Social Affairs, Population Division. New York, NY.
- Woodruff, C. and R. Zenteno, 2001, "Remittances and Micro-Enterprises in Mexico", mimeo, University of California San Diego
- World Bank, 2001, *World Development Report, 2000/01*, Washington, DC.

Figure 1. Remittances, Official flows and FDI, 1975-2003



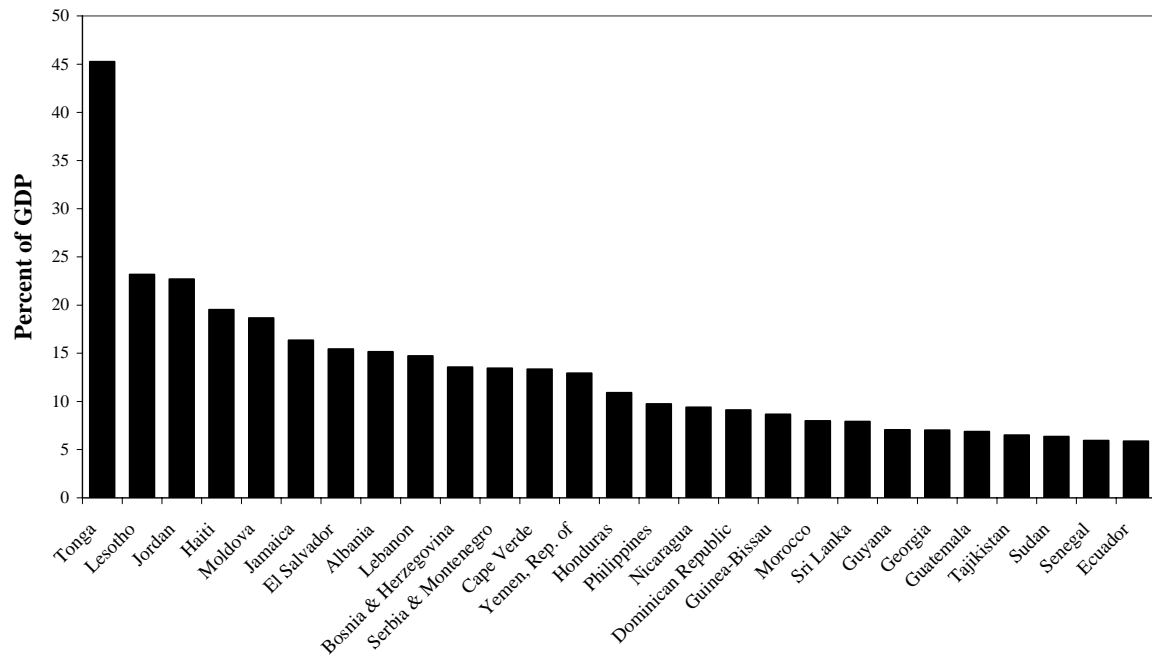
Source: IMF Balance of Payments Statistics and authors' calculations

Figure 2. Remittances, Official flows and FDI, 1975-2003



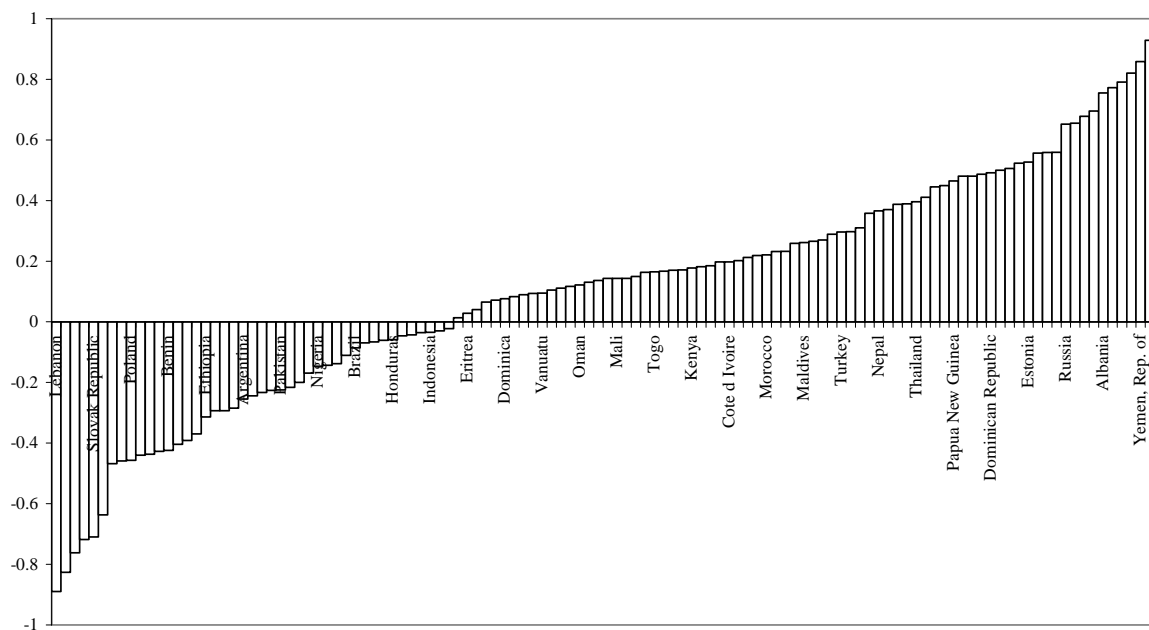
Source: IMF Balance of Payments Statistics and authors' calculations

Figure 3. Largest Recipients of Remittances in 2002



Source: IMF Balance of Payments Statistics and authors' calculations

**Figure 4. Country Correlations between the Cyclical Components of Remittances and GDP
1975-2002**



Source: IMF Balance of Payment Statistics and Authors' Calculations

Table 1. Definition and source of the variables

Variable	Description
Growth	Growth of real percapita GDP in constant dollars. <i>Source:</i> World Development Indicators, World Bank.
Remittances/GDP	Remittances are defined as sum of three components. Details on Appendix 1. <i>Source:</i> Balance of Payment Yearbook, International Monetary Fund.
Investment/GDP	Gross Fixed Capital Formation as a share of GDP. <i>Source:</i> Word Development Indicators, World Bank.
FiscalBalance/GDP	Fiscal balance of the central government as a share of GDP. <i>Source:</i> Word Development Indicators, World Bank.
Openness	Exports plus imports as a share of GDP. <i>Source:</i> World Development Indicators, World Bank.
Inflation	Annual Percentage change in CPI. <i>Source:</i> World Economic Outlook, International Monetary Fund
Population growth	Log difference of Population. <i>Source:</i> World Development Indicator, World Bank
Years of Education	Human Capital measured as the average years of secondary schooling in total population. <i>Source:</i> Barro and Lee (1996). See update version at: http://www.cid.harvard.edu/ciddata.ciddata.html
Loans/GDP	Claims on the private sector, divided by GDP. <i>Source:</i> International Financial Statistics, International Monetary Fund
Credit/GDP	Domestic credit provided by banking sector divided by GDP. <i>Source:</i> World Development Indicators, World Bank.
M2/GDP	This measures includes the liquidity liabilities of the financial system: they equals currency plus demand and interest bearing liabilities of banks and non-financial intermediaries divided by GDP. <i>Source:</i> World Development Indicators, World Bank.
Deposits/GDP	This measure is defined as the sum of demand deposits, time, saving and foreign currency deposits divided by GDP. <i>Source:</i> International Financial Statistics, International Monetary Fund

Note: This table describes the variables collected for our study. The first column gives the names of the variable as we use it; the second column describe the variables and provides the source from which it was collected.

Table 2. Summary statistics, 5 year-averages for the period 1975-2002

Variable	Mean	Median	Standard Deviation	Minimum	Maximum	Number of observations
GDP growth	1.2	1.3	3.4	-14.2	11.0	306
LogInvGdp	3.0	3	0.3	1.6	3.8	306
GovFiscalBal	-4.1	-3.6	4.3	-28.1	15.2	306
Inflation	16.8	9.5	28.5	-2.3	273.6	306
LogOpeness	3.8	3.8	0.6	2.4	5.2	306
LogPopGrowth	0.6	0.8	0.7	-2.8	1.6	306
LogYearEdu	1.2	1.4	0.7	-2.0	2.4	306
Rem/GDP	2.9	1.5	4.0	0	22.6	306
Loan/GDP	27.7	22.6	20.4	2.4	133.3	305
Credit/GDP	47.1	31.8	31.8	0.9	193.8	306
M2/GDP	37.8	30.9	25.1	8.1	164.5	306
Dep/GDP	32.2	27.7	20.6	5.8	142.5	306

Note: This table reports the summary statistics of the main regression variables. Definition and data sources of the variables are in Table 2. Outliers have been excluded.

Table 3: Bivariate Correlations of Variables of Interest

	GDP growth	Log InvGdp	Gov Fiscal Balance	Inflation	Log Openness	Log PopGrowth	LogYearEdu	Rem/GDP	Loan/GDP	Credit/GDP	M2/GDP	Dep/GDP
GDP growth	1											
LogInvGdp	0.43*	1										
GovFiscalBal	0.12*	0.09	1									
Inflation				1								
LogOpenness	-0.26*	-0.04	0.00		1							
LogPopGrowth	0.15*	0.39*	0.11*	-0.28*		1						
							1					
LogYearEdu	0.10*	-0.11*	0.06	-0.22*	-0.19*			1				
Rem/GDP	0.06	0.34*	0.14*	0.12*	0.32*	-0.48*			1			
Loan/GDP	0.14*	0.19*	-0.19*	-0.16*	0.27*	0.14*	0.04			1		
Credit/GDP	0.18*	0.38*	0.06	-0.10*	0.33*	-0.23*	0.41*	0.07			1	
M2/GDP	0.05	0.28*	-0.17*	0.06	0.22*	-0.15*	0.35*	0.06	0.69*			1
Dep/GDP	0.23*	0.40*	-0.09*	-0.25*	0.42*	-0.19*	0.37*	0.27*	0.76*	0.64*		
											0.95	
	0.21*	0.39*	-0.08	-0.18*	0.41*	-0.27*	0.47*	0.22*	0.83*	0.67*	*	1

Note: This table reports the correlation matrix of the main regression variables. Definitions and data sources of the variables are in Table 2. Stars denote significance at 10 percent level or better.

Table 4. Linear Growth Effects of Remittances

Dependent variable is GDP per capita growth

	OLS	FE	SGMM
LogInGDP	-0.698*** (0.244)	-5.896*** (0.992)	-1.059 (1.038)
LogPopGrowth	0.214 (0.404)	-0.911 (0.806)	0.057 (0.544)
GovFiscalBal	0.119** (0.050)	0.156** (0.064)	0.209 (0.180)
LogInvGDP	4.698*** (0.571)	5.232*** (0.795)	5.039*** (1.138)
LogYearEdu	0.668* (0.363)	-0.631 (0.854)	1.246 (1.664)
LogOpennes	-0.338 (0.316)	1.171* (0.687)	-1.147* (0.634)
Inflation	-0.022** (0.010)	-0.007 (0.007)	-0.035** (0.015)
Rem/GDP	0.043 (0.051)	0.022 (0.087)	0.010 (0.096)
Constant	-4.921** (2.425)	35.507*** (8.892)	0.034 (8.442)
Observations	315	315	315
R-squared	0.35	0.68	0.31
Number of countries			73
AR(1) test			0.00
AR(2) test			0.52
P-value Hansen test			0.55

Robust standard errors in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1% . All regressions include time dummies

Table 5. Growth, Remittances and Financial Development, OLS estimates

Dependent variable is GDP per capita growth

	DEP/GDP	LOAN/GDP	CREDIT'/GDP	M2/GDP
LogInGDP	-0.654** (0.254)	-0.661*** (0.255)	-0.661*** (0.245)	-0.734*** (0.244)
LogPopGrowth	0.368 (0.418)	0.262 (0.419)	0.242 (0.413)	0.333 (0.419)
GovFiscalBal	0.134*** (0.052)	0.116** (0.050)	0.090 (0.055)	0.133** (0.053)
LogInvGDP	4.255*** (0.701)	4.312*** (0.668)	4.580*** (0.611)	4.091*** (0.624)
LogYearEdu	0.524 (0.371)	0.573 (0.368)	0.695* (0.368)	0.651* (0.364)
LogOpennes	-0.477 (0.340)	-0.356 (0.341)	-0.477 (0.344)	-0.493 (0.324)
Inflation	-0.019** (0.009)	-0.019** (0.009)	-0.023** (0.010)	-0.018** (0.009)
RemGDP	0.253** (0.106)	0.228** (0.113)	0.213* (0.112)	0.197* (0.100)
DepGDP	0.032*** (0.012)			
RemGDP*DepGDP	-0.004** (0.002)			
LoanGDP		0.024** (0.010)		
RemGDP*LoanGDP		-0.005** (0.002)		
CreditGDP			0.008 (0.008)	
RemGDP*CreditGDP			-0.003* (0.002)	
M2GDP				0.025*** (0.009)
RemGDP*M2GDP				-0.003** (0.001)
Constant	-4.253 (2.780)	-4.612* (2.695)	-4.967* (2.559)	-3.156 (2.606)
Observations	306	305	307	314
R-squared	0.36	0.35	0.34	0.35

Robust standard errors in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%. All regressions include time dummies

Table 6. Growth, Remittances and Financial Development, SGMM estimates

Dependent variable is GDP per capita growth

	DEP/GDP	LOAN/GDP	CREDIT/GDP	M2/GDP
LogInGDP	-1.394* (0.745)	-2.462*** (0.897)	-1.482* (0.755)	-1.974** (0.827)
LogPopGrowth	0.114 (0.527)	-0.141 (0.561)	-0.066 (0.604)	0.240 (0.556)
GovFiscalBal	0.397** (0.180)	0.354** (0.150)	0.284* (0.153)	0.306* (0.155)
LogInvGDP	3.200*** (0.974)	2.626** (1.304)	4.041*** (1.219)	3.629*** (1.164)
LogYearEdu	1.245 (1.120)	2.555** (1.268)	1.198 (1.238)	2.516* (1.362)
LogOpennes	-1.425* (0.732)	-1.444 (0.935)	-1.083* (0.603)	-1.463* (0.775)
Inflation	-0.029** (0.013)	-0.024** (0.011)	-0.034** (0.013)	-0.027** (0.013)
RemGDP	0.406** (0.170)	0.397** (0.166)	0.251* (0.134)	0.389** (0.153)
DepGDP	0.070*** (0.022)			
RemGDP*DepGDP	-0.008*** (0.003)			
LoanGDP		0.084*** (0.026)		
RemGDP*LoanGDP		-0.009*** (0.003)		
CreditGDP			0.034*** (0.012)	
RemGDP*CreditGDP			-0.005*** (0.002)	
M2GDP				0.047*** (0.015)
RemGDP*M2GDP				-0.006*** (0.002)
Constant	7.874 (6.419)	15.870** (7.863)	4.840 (7.566)	9.466 (7.529)
Observations	306	305	307	314
Number of countries	72	71	73	73
AR(1) test	0.00	0.00	0.00	0.00
AR(2) test	1.00	0.78	0.91	0.75
P-value Hansen test	0.86	0.77	0.77	0.57
R-squared	0.23	0.10	0.24	0.21

Robust standard errors in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%.
All regressions include time dummies

Table 7. Marginal Effect of Remittances on Growth by Levels of Financial Depth

	DEP/GDP	LOAN/GDP	CREDIT/GDP	M2/GDP
Financial Depth at with mg. effect of remittances is zero:				
With investment	50.8	44.1	50.2	64.8
Without investment	57.2	45.1	74.4	72.1
Marginal effect of remittances at:				
Median level of Financial Depth				
With investment	0.18	0.19	0.09	0.20
Without investment	0.27	0.23	0.21	0.29
Mean level of Financial Depth				
With investment	0.15	0.15	0.02	0.16
Without investment	0.23	0.17	0.14	0.24

Notes: These statistics are based on SGMM estimates and are statistically significant at 5 percent significance level

Table 8. Investment, Remittances and Financial Development, SGMM estimates

Dependent variable is Investment to GDP

	DEP/GDP	LOAN/GDP	CREDIT'/GDP	M2/GDP
Lagged InvGDP	0.874*** (0.110)	0.837*** (0.095)	0.865*** (0.104)	0.854*** (0.110)
Real GDP Growth	0.534** (0.214)	0.518*** (0.181)	0.555*** (0.189)	0.528** (0.208)
Lending rate	-0.014 (0.019)	-0.015 (0.020)	-0.021 (0.019)	-0.005 (0.014)
RemGDP	0.398* (0.231)	0.710** (0.341)	0.507** (0.242)	0.690** (0.295)
DepGDP	0.027 (0.038)			
RemGDP*DepGDP	-0.006** (0.003)			
LoanGDP		0.052 (0.047)		
RemGDP*LoanGDP		-0.012** (0.006)		
CreditGDP			0.017 (0.026)	
RemGDP*CreditGDP			-0.005* (0.003)	
M2GDP				0.054 (0.039)
RemGDP*M2GDP				-0.008** (0.003)
Constant	-1.471 (2.054)	-1.726 (2.476)	-0.974 (2.554)	-2.405 (2.302)
Observations	343	344	343	350
Number of countries	109	110	112	112
AR(1) test	0.00	0.00	0.00	0.00
AR(2) test	0.83	0.78	0.89	0.87
P-value Hansen test	0.81	0.76	0.80	0.81
R-squared	0.58	0.54	0.56	0.58

Robust standard errors in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%.

All regressions include time dummies

Table 9. Marginal Impact of Remittances on Growth Below and Above the Median Level of Financial Depth

	DEP/GDP		LOAN/GDP		CREDIT/GDP		M2/GDP	
	Above Median	Below Median	Above Median	Below Median	Above Median	Below Median	Above Median	Below Median
LogInGDP	-0.619 (0.607)	-0.596 (0.757)	-1.140** (0.451)	-0.295 (0.609)	-0.949* (0.554)	-1.050 (0.758)	-1.140* (0.580)	-1.542** (0.691)
LogPopGrowth	-0.480 (0.407)	1.098 (1.669)	0.518 (0.585)	2.128** (0.985)	0.041 (0.685)	1.348 (1.110)	-0.055 (0.465)	1.018 (0.937)
GovFiscalBal	0.086 (0.112)	0.323* (0.166)	0.354** (0.132)	0.005 (0.156)	0.236 (0.150)	0.201 (0.215)	0.077 (0.136)	0.280** (0.124)
LogInvGDP	5.433*** (1.628)	3.641*** (1.207)	6.541*** (1.794)	5.139*** (0.933)	4.424*** (0.966)	3.624*** (1.240)	5.880*** (1.054)	4.729*** (1.389)
LogYearEdu	0.251 (1.269)	-0.002 (1.016)	3.312** (1.487)	0.432 (0.740)	1.614 (1.462)	1.594 (0.952)	3.436*** (1.250)	1.375 (0.880)
LogOpennes	-0.826 (0.590)	-0.859 (1.061)	-1.211** (0.592)	-1.037 (0.826)	-1.160** (0.545)	-0.684 (0.820)	-1.570*** (0.546)	-1.997** (0.736)
Inflation	-0.100*** (0.023)	-0.002 (0.008)	-0.017* (0.009)	-0.010 (0.014)	-0.037** (0.017)	-0.015 (0.025)	-0.065** (0.024)	-0.010 (0.008)
RemGDP	-0.093 (0.070)	0.113 (0.143)	-0.107 (0.084)	0.121 (0.161)	-0.134* (0.068)	0.035 (0.154)	-0.129** (0.061)	0.264** (0.122)
FD/GDP	-0.003 (0.014)	0.017 (0.053)	-0.005 (0.018)	-0.041 (0.049)	0.017 (0.010)	0.022 (0.032)	-0.004 (0.014)	0.020 (0.057)
Constant	-3.654 (6.800)	-0.933 (9.574)	-5.383 (7.429)	-8.498 (6.687)	0.763 (6.464)	-0.166 (7.761)	-2.444 (5.729)	5.177 (6.655)
Observations	151	155	150	155	151	156	156	158
Number of countries	38	34	35	36	38	35	36	37
AR(1) test	0.06	0.00	0.20	0.01	0.10	0.01	0.03	0.01
AR(2) test	0.94	1.00	0.87	0.33	0.34	0.32	0.68	0.42
P-value Hansen test	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
R-squared	0.35	0.33	0.09	0.36	0.19	0.29	0.28	0.37
T-stat Ho:	1.3		1.3		1		2.9	
Above Med =Below Med								

Robust standard errors in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%. All regressions include time dummies

Table 10. Threshold Estimation

	DEP/GDP		LOAN/GDP		CREDIT/GDP		M2/GDP	
Estimated threshold	>22.6%	≤22.6%	>20.8%	≤20.8%	>30%	≤30%	>20.8%	≤20.8%
LogInGDP	-0.407 (0.297)	-1.707*** (0.440)	-0.608** (0.304)	-0.598 (0.375)	-0.661** (0.265)	-1.259** (0.484)	-0.727*** (0.266)	-1.577** (0.615)
LogPopGrowth	0.105 (0.431)	2.460** (0.977)	-0.376 (0.361)	2.182*** (0.721)	-0.320 (0.377)	2.325*** (0.817)	-0.137 (0.410)	2.918** (1.110)
GovFiscalBal	0.062 (0.069)	0.294*** (0.074)	0.123 (0.089)	0.065 (0.065)	0.048 (0.059)	0.277** (0.123)	0.094 (0.058)	0.382** (0.146)
LogInvGDP	5.536*** (0.788)	3.264** (1.244)	5.184*** (0.878)	4.951*** (1.037)	5.825*** (0.756)	3.648*** (0.696)	4.546*** (0.729)	3.656** (1.574)
LogYearEdu	0.832 (0.515)	0.984 (0.622)	0.458 (0.549)	0.786 (0.527)	0.374 (0.528)	1.374** (0.578)	0.601 (0.397)	1.145 (0.877)
LogOpennes	-0.275 (0.374)	-1.919*** (0.648)	-0.509 (0.376)	-0.598 (0.630)	-0.158 (0.362)	-1.570** (0.645)	-0.173 (0.342)	-1.541 (1.093)
Inflation	-0.018 (0.012)	0.011 (0.012)	-0.022* (0.012)	-0.010 (0.011)	-0.017* (0.010)	0.001 (0.015)	-0.016 (0.013)	0.012 (0.016)
RemGDP	0.027 (0.053)	0.212 (0.161)	0.052 (0.058)	0.178 (0.119)	-0.004 (0.052)	0.216** (0.104)	0.018 (0.052)	0.467** (0.195)
FD/GDP	0.006 (0.010)	0.152* (0.089)	0.007 (0.010)	-0.124** (0.061)	-0.012* (0.007)	-0.058 (0.051)	0.011 (0.009)	0.069 (0.142)
Constant	-10.569*** (2.988)	7.417 (5.573)	-5.683* (3.289)	-6.542 (4.260)	-8.289*** (2.912)	5.030 (4.378)	-5.336* (2.820)	4.247 (7.776)
Observations	199	107	169	137	206	101	247	67
R-squared	0.33	0.56	0.38	0.41	0.41	0.48	0.31	0.58
F-test for no threshold	32.16		38.94		56.25		42.14	
Bootstrap P-value	0.017		0.004		0.000		0.000	

Threshold estimation based on Hansen (2000). Robust standard errors in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%. All regressions include time dummies .

Table 11. Cyclical Behavior of Remittances and Financial Depth

	DEP/GDP	LOAN/GDP	CREDIT/GDP	M2/GDP
Correlations 1/	-0.18*	-0.16*	-0.13	-0.17*
Reg Estimates 2/	-0.29*	-0.35*	-0.18	-0.23*

Notes: 1/ Displays pairwise correlation coefficients between the cyclical indicator of remittances in Figure 4 and the median over the period 1975-2002 of each of the financial depth (FD) variables for 116 developing countries. 2/ Displays regression estimates from OLS regressions of the cyclical indicator of remittances and each of the FD variables. A star denotes significance at the 10% level or better.

Appendix 1. Definitions of the Remittance Variable

The analysis of the impact of remittances uses a panel of 70 developing countries, during the period 1975-2002.

Unless otherwise indicated, total remittances are constructed as the sum of three items in the IMF's *Balance of Payment Statistics Yearbook* (BOPSY): "Workers' Remittances", "Compensation of Employees" and "Migrant Transfers".

Workers' Remittances (part of current transfer in the current account) are current transfers made by migrants who are employed and resident in another economy. This typically includes those workers who move to an economy and stay, or are expected to stay, a year or longer.

Compensation of Employees (part of the income component of the current account) instead comprises wages, salaries and other benefits (cash or in kind) earned by nonresident workers for work performed for residents of other countries. Such workers typically include border and seasonal workers, together with some other categories, e.g., local embassy staff.

Migrant Transfer (part of the capital account) include financial items that arise from the migration (change of residence) of individuals from one economy to another.

Following the country-specific notes in the BOPSY, *Compensation of Employees* is excluded from total remittances for the following countries: Argentina, Azerbaijan, Barbados, Belize, Benin, Brazil, Cambodia, Cape Verde, China, Cote d'Ivoire, Dominican Republic, Ecuador, El Salvador, Guyana, Panama, Rwanda, Senegal, Seychelles, Turkey and Venezuela.

Moreover the BOPSY specifies that migrants' transfer are recorded under "*Other Current Transfers*" for Kenya, Malaysia and the Syrian Arab Republic.

Additional adjustments or additions to the series were made on the basis of information received from IMF country desks and national authorities, as follows:

1. Bosnia and Herzegovina: desk provided data from 1998-2003
2. Bulgaria: Other current transfers are included in remittances

3. Caribbean¹⁹: Desk provided data for 1991-2002
4. I.R. of Iran: Other current transfers are used as figure for remittances
5. Lebanon: Desk provided data for 1997-2003
6. Lesotho: Desk provided data for 1982-2003
7. Macedonia, FYR: Desk provided data for 1993-1997
8. Moldova: Desk provided data for 2000
9. Niger: Desk provided data for 1995-2003
10. Romania: Desk provided data for 2000-2003
11. Slovak Republic: Desk provided data for 1999-2003
12. Tajikistan: Desk provided data for 1997-2001
13. Ukraine: Desk provided data for 2000
14. Venezuela: desk provided data for 1997-2003

¹⁹ The Caribbean region includes Antigua and Barbuda, Barbados, Belize, Dominica, the Dominican Republic, Grenada, Guyana, Haiti, Jamaica, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname and Trinidad and Tobago.

Appendix 2: Sample of countries

Country	
Argentina	Mexico
Barbados	Mozambique
Benin	Nepal
Bolivia	Nicaragua
Botswana	Niger
Brazil	Pakistan
Cameroon	Panama
Chile	Paraguay
China	Peru
Colombia	Philippines
Costa Rica	Poland
Croatia	Romania
Dominica	Russia
Dominican Republic	Samoa
Ecuador	Senegal
Egypt	Seychelles
El Salvador	Sierra Leone
Eritrea	Slovak Republic
Estonia	Slovenia
Ethiopia	South Africa
Guatemala	Sri Lanka
Guyana	St. Kitts and Nevis
Haiti	St. Lucia
Honduras	Sudan
Hungary	Swaziland
India	Syrian Arab Rep.
Indonesia	Thailand
Iran, Islamic Rep. of	Togo
Jamaica	Tonga
Jordan	Trinidad and Tobago
Kenya	Tunisia
Malawi	Turkey
Malaysia	Uruguay
Mali	Venezuela
Malta	Zimbabwe
Mauritania	
Mauritius	