

Impact of Remittances on Domestic Investment: the Role of Institutional and Financial Development

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A standard view in development economics is that developing countries are unable to undertake the required investment because of inadequate financing, poor institutions and undeveloped financial markets. This paper investigates the impact of remittance inflows into the developing countries on investment under different levels of institutional and financial development. The empirical analysis is carried on a sample of 79 developing countries covering the period 1995-2005. The estimates suggest that remittance inflows, sound institutions and well-developed financial sector increase domestic investment. Moreover, the results also indicate that when the institutional setting and the depth of financial intermediation are such that access to external finance is limited, remittance inflows are an important source of financing investment. The findings are robust to alternative static and dynamic panel estimators and different measures of institutional quality and financial development. An important implication of these findings is that the extent to which an economy benefits from remittance inflows is driven by the prevailing institutional environment and the level of financial development.

JEL classifications: C23, E22, F24, G21, I38, O16, O17

1. Introduction

This paper investigates the relationship between remittances and domestic investment under different levels of institutional and financial development. Studies show that increasing the productive capacity of the developing world is fundamental to overcoming the developmental challenges confronting these countries (Feinstein 2003; Sachs 2005). However, investing in productive capacity requires financial resources. This fact, in part, explains the importance attached to such external financial inflows as foreign direct investment (FDI) and official development assistance (ODA).

An important source of external financial inflows into the developing world is remittances. According to the World Bank, the world's remittance inflows stood at 131 billion US\$ in the year 2000. By 2005, remittance inflows more than doubled to 263 billion US\$. Among the least developed countries, remittance inflows in 2005 constitute 5.4% of GDP whilst FDI stood at 2.7% of GDP in the same period. Not surprisingly, policy makers and researchers are beginning to look into the economic implications of remittance inflows. However, the nature of the economic implications of remittance inflows is not fully understood. For instance, previous studies have not examined the link between remittance inflows and domestic investment under different institutional environments and different levels of financial development.

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This is an important gap in the understanding of the economic consequences of remittance inflows. It is well documented that an important constraint on developing countries is the financial wherewithal to increase productive capacity (Levine & Zervos 1998; Rajan & Zingales 1998). This implies that an important avenue to understanding the economic implications of remittance inflows lay in investigating the link between remittance inflows and domestic investment. In this respect, a number of micro-level studies (Adams 2006; Osili 2004; Woodruff & Zenteno 2007) suggest that remittance-receiving households spend more on investment goods than those households without remittance receipts. Paradoxically, Chami, Fullenkamp, Jahjah (2005) and IMF (2005) do not find any evidence to suggest that remittance inflows are sources of investment finance at the macro-level.

This paper argues that the extent to which remittance inflows are used to finance investment is potentially driven by the ease with which business enterprises can raise external (both domestic and international) finance. In view of the importance of both financial development and institutional quality in the development literature, it is important to analyze their moderating effects on the remittance-investment nexus simultaneously. For instance, a country may have respectable institutions, say, well defined property rights but it requires vibrant financial markets to mobilize both local and international capital and channel them into productive usage. In the same way, no matter how competent a country's financial sector appears to be, political stability, less corruption, an efficient bureaucracy and avenues of redress are paramount in bolstering investor confidence. The paper, therefore, contributes to the literature by focusing on the link between remittance inflows and domestic investment under different institutional environments and different levels of financial development.

The empirical analysis is carried out on a sample of 79 developing countries for which relevant data were available during 1995-2005. An important limitation of the analysis is that the measure of remittance inflows does not adequately capture money transfers through informal channels such as friends, drivers, traders and the *hawala* service providers. The results show that remittance inflows, institutional quality and the level of financial development have significant and positive effects on domestic investment. In addition, the results indicate that the marginal impact of remittance inflows on investment is greater under low levels of institutional and financial development. The findings are robust to alternative specifications such as static and dynamic panel estimators, different measures of institutional quality and financial development and control for other sources of external inflows (FDI and ODA). These results imply that remittance inflows are an important source of investment finance particularly under institutional and financial environments where access to external finance is limited, this insight is not evident in extant literature.

The rest of the paper is organized as follows. The next section outlines the hypotheses. Data and methodology models are presented in Sections 3 and 4, respectively. In Section 5 the empirical results and the analysis are reported. Conclusions are presented in Section 6.

2. Literature Review and Hypotheses

Under-development can be conceived as a self-sustaining phenomenon characterized by inadequate productive capacity. Within this conception, Lewis (1954) argues that the key to economic development lies in increased investment. Rostow (1960) shares a similar view when he observes that the question of how to transform an under-developed country into a developed economy is reducible to how to increase investment. However, when a nation is under-developed, the wherewithal to invest can be severely limited. To be sure, several studies show that one of the principal factors that constrain the economic progress of poor countries is lack of finance to undertake the needed investment (Levine & Zervos 1998; Rajan & Zingales 1998).

Over the past few years, a number of these developing countries has become the beneficiaries of remittance inflows. The emerging evidence, particularly from micro-level studies, suggests that remittance inflows have the potential to increase domestic investment both directly and indirectly. For instance, Osili (2007) finds that about 40% of remittance inflows are meant for investment. Adams (1998) finds that remittance-receiving households are most likely to acquire irrigated farmlands than those without remittance receipts. Similarly, Woodruff and Zenteno (2007) report that about 27 per cent of Mexican small businesses depend on remittance inflows. In a survey of the global evidence, Adams (2006) finds that remittance-receiving households spend more on investment goods and invest more on entrepreneurial activities than other households.

Moreover, there is increasing evidence to suggest that remittance inflows enhance the ability of domestic banks to extend credit to the private sector and thereby give additional impetus to domestic investment. For example, Adams (2006) finds that remittance-receiving households tend to save more than the average household. In a study of the impact of remittance inflows on the breadth and depth of the banking sector, Demirgüç-Kunt, López-Córdova, Pería and Woodruff (2011) find that remittance inflows strongly influence the number of bank branches, accounts per capita and deposits. At the macro-level, Aggarwal, Demirgüç-Kunt and Pería (2011) report that remittance inflows increase the deposits and the amount of credit intermediated by the domestic banks across a sample of developing countries. The foregoing suggests:

Hypothesis 1 *Remittance inflows increase domestic investment.*

The discussion leading to Hypothesis 1 implicitly assumes that investment opportunities are readily available and that the principal binding constraint is lack of financial resources to undertake investment. However, the availability and the nature of investment opportunities depend crucially on institutions. Sound institutions are important in providing the enabling environment for entrepreneurs. Moreover, the institutional framework is also vital in guaranteeing the interests of third parties, thereby ensuring that investors' funds are not expropriated (De Soto 2000). Without the enabling environment and the security of third party interests, the incentives to invest are stymied. A recent paper by Roe & Siegel (2011) suggests that institutions that do not rein in corruption, secure property rights, stream-line government interventions and legal procedures stifle investment. Consistent with the above, several studies show that countries characterized by poor institutions stagnate (Acemoglu, Johnson & Robinson

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2005). Moreover, a country's ability to attract and benefit from FDI and ODA is linked to its institutional quality (Bevan, Estrin & Meyer 2004; Phelps 2009).

For many migrants, political instability, corruption and *go-slow* bureaucracies in their respective countries are drags on how much is remitted for investment purposes. On the contrary, when the institutional environment is congenial, migrants tend to diversify their investment portfolios towards their home countries (Barajas et al. 2009). Moreover, remittance-receiving households are most likely to start up new businesses or expand the existing businesses under sound and secure institutions whereas the opposite is potentially true in poor institutional environments. As a corollary, Catrinescu et al. (2009) find that the impact of remittances on growth is higher in countries with higher institutional quality. This paper is concentrating on investment as a bearer of economic growth and how the institutional quality impacts on the link between remittance inflows and investment. It is postulated that:

Hypothesis 2: *High quality institutions increase the use of remittances for investment.*

The third and final hypothesis relates to how the level of financial development influences the link between remittance inflows and domestic investment. Financial development may increase domestic investment by reducing transaction costs, lowering information asymmetry, enhancing risk management and facilitating access to finance. Indeed, Bagehot (1873) argues that the relatively developed level of financial intermediation in England was critical to the industrial revolution. Following King and Levine (1993), a series of empirical studies shows that financial development has a positive effect on investment (Ndikumana 2005; Rajan & Zingales 1998) and economic development (Adamopoulos 2010; Levine & Zervos 1998). Related literature shows that financially developed countries attract more private capital inflows (Kinda 2010) and derive more economic gains from such inflows (Hermes & Lensink 2003).

A priori, the importance of financial development in facilitating remittance inflows and their investment effects is even more apparent. Freund and Spatafora (2008) suggest that the cost of money transfer is a significant determinant of remittance inflows. This is due in part to the monopoly enjoyed by the money transfer organizations operating in most of these countries. However, Alberola and Salvado (2006) show that competition from local financial intermediaries is associated with lower costs of remittance transfer. Second, financial intermediaries have the potential to mobilize remittance inflows and channel them into the productive sectors of the receiving countries. Third, they are likely to induce the remitters to increase the investment-motivated component of remittances. Fourth, a well-developed financial sector is likely to incentivize remittance-receiving households to save and/or invest. As the World Bank (2006, p 149) point out, "[i]n contrast to cash transactions, remittances channeled through bank accounts may encourage savings and enable a better match for savings and investment in the economy". It is also suggested that under a well-developed financial environment, a record of regular receipt of remittance could be used as collateral to secure credit for investment purposes (Ratha 2009). These imply that financial sector development can enhance the use of remittance inflows for domestic investment, hence:

Hypothesis 3: *A more developed financial sector increases the use of remittances for investment*

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The next two sections describe the data and the methods used to test these three hypotheses.

3. Data

Annual data on a sample of 79 developing countries for which data were available over the period 1995 to 2005 used to examine the effect of remittance inflows on domestic investment under different levels of institutional and financial development. All the variables, their definitions and sources are reported in Appendix A.

Investment's share of GDP, (*Investment/GDP*), is measured by the World Bank's gross fixed capital formation to gross domestic product. According to the descriptive statistics in Table 1, the representative country invests on average 22% of total output over the period. There is a considerable spread, however. For instance, Sierra Leone invested only 8% of total output as compared to China which invested close to 36% of GDP over 1995-2005. One of the core questions of this paper is how remittance *per se* explains such variability in investment.

The conception of remittances adopted here relates to international migrations. It refers to the financial resources migrants transfer to their countries of origin. These remittance inflows are constructed as the sum of workers' remittances, compensation of employees and migrant transfer. These data series are obtained from the World Bank's World Development Indicators (2008). An important limitation of the remittances measure is that it does not adequately capture money transfers through informal channels such as friends, drivers, traders and the *hawala* service providers. As such the remittance variable used here is "recorded" remittance inflows. Averaged over 1995-2005, remittance inflows as measured above, constitute over 3.7% of GDP in a typical country within the sample. They constitute even larger shares of GDP in countries such as Yemen (14.34%), Lebanon (14.68%), Haiti (15.24%), Albania (16.05%), Moldova (18.78%) and Jordan (21%).

Table 1: Descriptive Statistics

	Mean	Median	Std Error	Min	Max	Skewness	N
Investment/GDP	21.63%	21.20%	5.14	8.09%	35.55%	0.26	79
Remittances/GDP	3.69%	1.54%	4.74	0%	21.45%	1.789	79
Trade/GDP	86.57%	79.91%	46.27	24.67%	303.62%	1.824	79
GDP Growth	4.36%	4.00%	1.96	0.8%	12.37%	1.33	79
Lending Rate	18.61%	17.29%	9.66	6.36%	66.11%	1.786	79
Asset/GDP	46.50%	34.90%	39.53	6.27%	169.5%	1.772	73
Credit/GDP	35.28%	24.35%	33.89	2.18%	153.62%	1.825	73
Institutions	65.38	65.47	8.59	44.55	85.18	-0.23	79

Remark: Definitions and sources are reported in Appendix A.

The existing literature proposes various indicators of financial development (Beck et al. 2000). The prime measure of financial development employed in this paper is *Credit/GDP*. It captures the activities of financial intermediaries with regards to

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mobilizing savings from private entities to private firms. An alternative measure of financial development used is *Assets/GDP*. It includes credits to both private and state-owned enterprises. Both measures of financial development are obtained from the 2008 version of the Beck et al. (2000) data-base. The International Country Risk Guide (ICRG) provides an assessment of the institutional development of various countries under the caption 'political risk'. This index is the primary measure of institutional development in this paper. An alternative measure provided by the Heritage Foundation is also used.

A set of standard control variables is included in order to isolate the effects of the variables at the core of this investigation. The first of these relates to the view that investment outlays respond to economic growth. Intuitively, one could conceive growth of total output as an increase in purchasing power and, hence, demand. In the aggregate, such increases in demand are invitations to expand the productive capacity as outlined in Keynesian economics thinking. This effect is controlled for by the inclusion of GDP growth rate– *GDP Growth*. However, the financial resources required to undertake the necessary investment are scarce and costly. This is likely to constrain investment, *ceteris paribus*. The *lending rate* is used to control for this effect. The third control variable relates to *access to the international market*. Whereas the importance of domestic market cannot be over-emphasized, access to the international market is an increasingly important factor considering where to invest and at what scale. The share of trade (exports plus imports) in GDP is used to proxy access to the international market.

Table 2 presents the pair-wise correlation coefficients among the variables. As can be seen from the second column, investment is positively and significantly correlated with the economic growth rate and access to the international market but negatively correlated with the prevailing lending rate. Of particular interest, remittance inflows, the two measures of financial development and institutional quality are positively and significantly correlated with investment outlays. In line with the previous studies, there is a significant and positive correlation between financial and institutional development which, in turn, under-scores the need to examine the moderating effects of financial and institutional development simultaneously. The correlation coefficients also show that there is a significant inverse relationship between the remittance share of GDP and the level of financial development and the quality of the general institutional framework. Whilst acknowledging that correlations do not necessarily imply causality, the significance and the signs of the correlation coefficients between investment and the covariates are consistent with the discussions thus far.

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Table 2: Bi-variate Correlation of the variables of Interest

	Investment /GDP	Remittances /GDP	Trade /GDP	GDP Growth	Lending Rate	Assets /GDP	Credit/ GDP
Investment/ GDP	1						
Remittances/GDP	0.10*	1					
Trade/ GDP	0.29*	0.03	1				
GDP Growth	0.22*	0.03	0.04	1			
Lending Rate	-0.24*	-0.02	-0.25*	-0.22*	1		
Assets/ GDP	0.21*	-0.08*	0.43*	-0.05	-0.34*	1	
Credit/ GDP	0.21*	-0.10*	0.45*	-0.05	-0.34*	0.97*	1
Institutions	0.19*	-0.11*	0.42*	0.05	-0.23*	0.43*	0.45*

Note: This Table presents the simple correlation matrix of the variables in the main regressions. The definitions of the variables and their sources are reported in Appendix A. The stars indicate significance at the 5 percent or better levels

4. Methodology

The task is to examine the relationship between remittances and investment and the moderating role of institutional and financial development in such remittances-investment relationship with a data-set consisting of 11 annual observations per 79 countries. The first consideration, therefore, pertains to estimation techniques suitable for such a short unbalanced panel. The second consideration relates to endogeneity problems as well as complications emanating from auto-correlation and heteroscedasticity. The paper employs both static and dynamic panel estimators as per Arellano & Bond (1991) and Blundell & Bond (1998) to minimize these concerns.

To start with, the observations are pooled across countries over the years such that:

$$INV_{it} = \beta_0 + \beta_1 Rem_{it} + \beta_2 INST_{it} + \beta_3 FD_{it} + \beta_4 Rem_{it} * INST_{it} + \beta_5 Rem_{it} * FD_{it} + X'_{it} \beta_6 + \varepsilon_{it} \quad (1)$$

where INV_{it} refers to investment over GDP of country i as of time t and Rem is remittances/GDP. $INST$ is a measure of institutional quality, and FD is a proxy for financial development. X is a set of control variables as discussed above. In accordance with Hypothesis 1, the marginal impact of remittance inflows on investment $\partial INV / \partial Rem = (\beta_1 + \beta_4 \overline{INST} + \beta_5 \overline{FD})$ is expected to be significantly different from zero. A positive and significant coefficient of the interaction term between institutional quality and remittances (β_4) would imply that remittances are more effective in inducing investment in sound institutional environments. In that case, higher institutional quality would be deemed as complimenting remittance inflows to boost investment according to Hypothesis 2. The converse would suggest that remittances are lifeline to investment in institutionally difficult settings. An analogous interpretation pertains to (β_5), where $\beta_5 < 0$ would lead to a rejection of Hypothesis 3.

In the first instance, the parameters of equation (1) are estimated using the Ordinary Least Square (OLS), the random effect (RE) and the fixed effects (FE). The restricted F-statistics, Breuch and Pagan (1980) LM and the Hausman (1978) specification tests are employed to discriminate among these three static estimators. However, these

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static estimators side-step several issues such as auto-correlation and endogeneity problems.

The literature on investment models suggests that investment outlays are auto-correlated (Bloom 2009). Innovations in current investment outlays may only decay with lags. The main explanation lies in the business cycles effects. Several studies try to get around the autocorrelation menace by averaging observations over 5-year periods (see, for example, Giuliano & Ruiz-Arranz 2009). Apart from the fact that such an approach leads to excessive loss of information, it seems quite arbitrary. For instance, it amounts to assuming that the waves of contractions and expansions of economic activities are of regular 5-year intervals. An alternative pursued here is the inclusion of lag(p) realizations of investment among the right hand variables such that:

$$INV_{it} = \beta_0 + \sum_{s=1}^p \gamma_s INVT_{it-s} + \beta_1 Rem_{it} + \beta_2 INST_{it} + \beta_3 FD_{it} + \beta_4 Rem_{it} * INST_{it} + \beta_5 Rem_{it} * FD_{it} + X_{it}'\beta_6 + \varepsilon_{it} \quad (2)$$

where $\varepsilon_{it} = \mu_i + \delta_t + v_{it}$, $\delta_t \sim IID(0, \sigma_\delta^2)$, $\mu_i \sim IID(0, \sigma_\mu^2)$, $v_{it} \sim IID(0, \sigma_v^2)$ and independent of each other and among themselves.

The inclusion of the lag dependent variable does render pooled OLS and the RE estimators bias and this bias does not necessarily decay with the sample size. This is evident in the fact that the country specific effects μ_i are correlated with INV_{it} and its lagged realizations even in the absence of serial correlation of v_{it} . Certainly, one cannot rule out the possibility of correlation between INV_{it} and δ_t . The recent global crisis is an uncompromising reminder of this possibility. At first glance, the FE estimator seems to be a way around the problem. But the within estimator is also biased and potentially inconsistent in view of the fairly large number of countries relative to the short-time period (Nickell 1981).

Starting with Anderson and Hsiao (1981), various dynamic panel solutions have been suggested in the literature. The main feature of this family of panel estimators is that they rely on internal instruments. Essentially, the approach involves taking the first difference of equation (2) which wipes out the unobserved time invariant country effects and then instruments the covariates in the transformed expression with the levels of the lagged realization of the respective variables (see Blundell & Bond 1998 or Baltagi 2008 for an excellent exposition).

5. Empirical Results

The Breusch and Pagan (1980) LM and the Hausman (1978) specification tests suggest that among the static specifications the fixed effect specification with time dummies is superior. The fixed-effect estimates are presented in the first three columns of Table 3. They show that economic growth (*GDP Growth*) and access to the international markets (*Trade/GDP*) positively induce investment. As expected, the *lending rate* adversely impacts on investment expenditure. The estimates in column 1 suggest that without any consideration for the institutional and financial development remittance inflows have a statistically insignificant impact on investment outlays.

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This result is consistent with the view that remittances are not meant for capital accumulation (Martin 1991). It is also in line with the findings of the IMF (2005) that remittance receipts have no growth effects. However, there is emerging evidence that a significant fraction of remittances is invested (Amuedo-Dorantes & Pozo 2006; Adams 2006). In the case of rural Pakistan, Adams (1998) finds that the propensity to acquire irrigated farmland is significantly greater among households receiving remittances than those without. Even in urban Mexico, Woodruff and Zenteno (2007) report that about 27 per cent of small businesses depend on remittance inflows from the USA. In his survey of the global evidence on the uses of remittances, Adams (2006) finds that remittance-receiving households spend more on investment goods and invest more on entrepreneurial activities than households without.

Moreover, households receiving remittances are not necessarily the best entrepreneurs in town. In countries where the financial market is fairly developed, such households could conveniently put aside some of their remittance receipts in the bank, for instance. Thus, a portion of purely altruistic motivated remittances can in this fashion find its way via financial intermediation into the business sector. Furthermore, migrants can remit to their home countries in search of fair returns by taking advantage of the intermediation provided by the financial intermediaries. Institutional quality also makes a difference. Poor institutional quality of a receiving country increases the risk of expropriation, distorts the investment opportunities and increases the required return on investments. The implication is that the impact of remittances on investment outlay is potentially conditioned on both financial and non-financial institutional qualities and these ought to be examined together.

Consequently, the parameters of equation (1) are re-estimated taking into consideration the quality of prevailing institutions and financial development. The results lend credence to the view that in examining the remittances-investment nexus, one has to investigate simultaneously the moderating role of both financial development and institutional quality. The estimates reported in columns 2 and 3 of Table 3 show that remittances, financial development and institutional quality *per se* induce investment expenditure. Furthermore, the results suggest that remittance inflows do not complement institutional quality or financial development as postulated in Hypotheses 2 and 3. On the contrary, remittance inflows are potentially more important for investment outlays in institutionally and financially under-developed economies.

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Table 3: Institutional and Financial Development in the Investment-Remittances Nexus

Dependent Variable: Investment/GDP (Gross Fixed Capital Formation to GDP)

	Static Panel: FE			Dynamic Panel: GMM		
	1	2	3	4	5	6
Investment/GDP(1)				0.545*** (0.023)	0.613*** (0.025)	0.529*** (0.030)
Investment/GDP(2)				-0.233*** (0.022)	-0.190*** (0.020)	-0.188*** (0.023)
GDP Growth	0.120*** (0.039)	0.140*** (0.038)	0.118*** (0.035)	0.078*** (0.021)	0.154*** (0.020)	0.113*** (0.017)
Lending Rate	-0.032 (0.021)	-0.044** (0.021)	-0.041** (0.019)	-0.024** (0.012)	0.016 (0.022)	-0.004 (0.019)
Trade/GDP	0.037*** (0.013)	0.028** (0.012)	0.056*** (0.011)	0.039*** (0.007)	0.015* (0.008)	0.042*** (0.006)
Remittances/GDP	0.078 (0.055)	0.818** (0.370)	0.945*** (0.340)	0.019 (0.036)	0.599*** (0.156)	0.808*** (0.235)
Credit/GDP		0.093*** (0.018)			0.037** (0.016)	
Remittances *Credit		-0.008*** (0.003)			-0.004*** (0.001)	
Assets/GDP			0.230*** (0.021)			0.128*** (0.015)
Remittances *Asset			-0.002*** (0.000)			-0.001*** (0.000)
Institution		0.060* (0.034)	0.106*** (0.031)		0.095** (0.042)	0.153*** (0.033)
Remittances *Institutions		-0.007 (0.006)	-0.013** (0.005)		-0.006* (0.003)	-0.012*** (0.004)
Constant	18.336*** (1.323)	11.536*** (2.621)	5.165** (2.508)	12.614*** (0.851)	3.413 (3.475)	-1.586 (2.370)
No. of Obs.	753	689	689	500	461	461
No. of Countries	79	73	73	77	70	70
R Square	0.100	0.168	0.301			
F-Stats.	5.251	6.707	14.314			
Chi Square				5068.16	62459.875	37909.442
[p-value]				[0.0000]	[0.0000]	[0.0000]
AR(1) test				-3.546	-3.882	-3.880
[p-value]				[0.0004]	[0.0001]	[0.0001]
AR(2) test				0.387	0.663	0.870
[p-value]				[0.6987]	[0.5071]	[0.3845]
Sargan				63.331	54.247	44.359

Note: Robust standard errors are in the parentheses; *** denotes significant at 1%; ** significant at 5%; and * denotes significant at 10% significant level. Year dummies are included in all the specifications. The first three columns report the estimates from the static specifications, and the last three columns are from the dynamic models

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The question at this stage, though, is whether these results are robust in a dynamic setting where the potential endogeneity problem of reverse causality is controlled. Columns 4, 5 and 6 of Table 3 summarize results of the Arellano and Bond (1991)² dynamic estimators. In each of the 3 cases, the Sargan test under the null hypothesis that the over-identifying restrictions are valid could not be rejected. The statistics of the Arellano-Bond tests of first- and second-order auto-correlations in the first-difference errors suggest that the idiosyncratic errors are independently and identically distributed in all the specifications.

As in the static case, without controlling for the effects of financial and institutional development, the impact of remittances on investment is statistically negligible. However, the estimates reported in columns 5 and 6 show that the impact of remittances on investment is significant and varies with the level of institutional and financial development. Thus, the estimates from the dynamic approach reiterate the need to examine the effect of remittances on investment within the context of the financial and institutional environment. In general, the evidence supports the hypothesis that remittance receipts increase investment expenditure. Contrary to Hypotheses 2 and 3, the levels of institutional and financial development do not complement remittance inflows to spur investment. Rather, the institutional framework and the level of financial intermediation are substitutes for remittance receipts with regard to investment expenditure.

Specifically, the coefficient estimates on the interaction terms indicate that the impact of remittances on investment varies inversely with the level of financial development and the quality of the economy's institutions. Figure 2 shows the marginal effects of remittances at the 25th, 50th and 75th percentiles of institutional and financial development (with the *t-statistics* in the brackets). Figure 2a is constructed at the 25th, 50th and the 75th percentiles of institutional quality whilst holding financial development (*credit/GDP*) at the median level. In general, Figure 2a gives a pictorial impression of the reported inverse relationship between the marginal effects and the institutional quality. For instance, at the 25th percentile of overall institutional quality, the marginal effect of remittance inflows on investment is 0.18. This implies that under a poor institutional environment, when remittance inflows as a share of GDP increase by 5 percent, the investment share of gross domestic product increases by almost 1 per cent³. However, the corresponding increase in investment is under 0.6 percent in respect of institutions qualities above the 75th percentile. The implication is that when the institutions that could secure the interest of third parties are weak, funds needed to undertake investment projects are limited to self-finance, and whatever entrepreneurs could raise from the diaspora.

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Figure 2a: The Marginal Effects of Remittances on Investment by the Levels of Institutional Quality

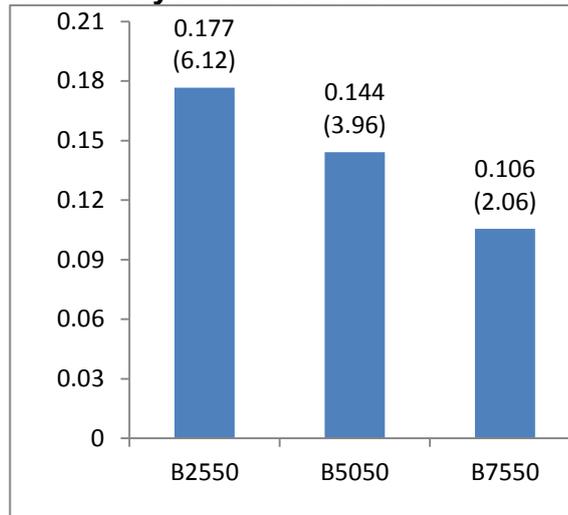


Figure 2b: The Marginal Effects of Remittances On Investment by Levels of Financial Development

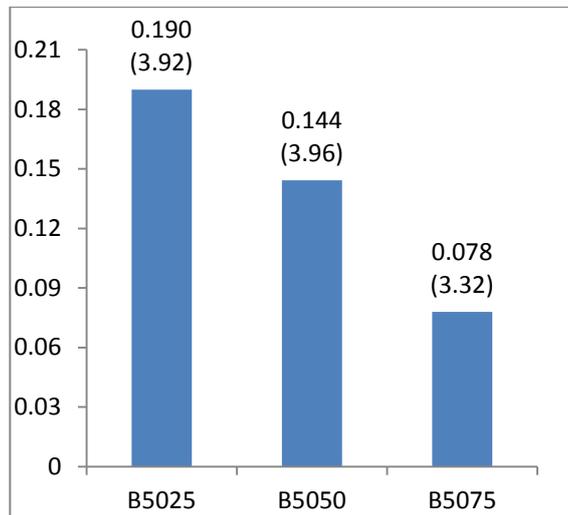


Figure 2b shows a pattern of substitution between remittances and financial development. Holding the level of institutional quality at the median, the marginal effect of remittances increases as one migrates from financially developed (above 75th percentile) to moderately (median) and then ultimately to financially under-developed (below 25th percentile) environments. For the typical financially under-developed economy (25th percentile and below), 1 per cent increase in remittance receipts is associated with 0.19 per cent increase in investment outlays. In the case of more financially development economies (75th percentile and above), the marginal effect of remittances on investment falls to 0.08 per cent. This implies that in economies where the level of financial intermediation is developed, the importance of remittance receipts as a source of capital falls by close to 60 per cent as compared to economies characterized by low levels of financial intermediation. The result thus suggests that when access to credit is limited, remittance receipts become an important source of financing investment expenditure.

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This finding is reminiscent of Giuliano and Ruiz-Arranz (2009) and Fayissa and Nsiah (2008). In the words of Giuliano and Ruiz-Arranz (2009), remittances are substitutes for the lack of financial depth. Similarly, Fayissa and Nsiah (2008) conclude "... remittances boost growth in countries where the financial system is less developed by providing an alternative way to finance investment and helping overcome liquidity constraints". A potential criticism of the estimates of both Giuliano and Ruiz-Arranz (2009) and Fayissa and Nsiah (2008) is that neither of them controlled for the moderating effects of institutional development and how it might impact on their findings. Given the apparent consensus among financial and political economists that the institutional framework affects the level of financial intermediation (Boyd, Levine & Smith 2001), this concern does hold some bite. Indeed, Giuliano and Ruiz-Arranz (2009, p. 151) write, "... we cannot eliminate the possibility that omitted variables drive some of the results".

Thus far, the results using both static and dynamic panels are presented. Across all these estimators, remittance inflows impact positively on investment and this impact varies inversely with both the levels of institutional quality and financial development. This suggests that the qualitative implications of our findings are not sensitive to estimators.

Further Sensitivity Analyses

In what follows a series of further sensitivity checks are performed. As pointed out earlier, the findings indicate that remittances boost investment outlays in economies where the domestic financial sector is under-developed. It is, however, likely that in the absence of well-functioning domestic financial systems, entrepreneurs rely more on external inflows in general. In such case, the estimates may over-state the importance of remittances. In the worst case, remittances could simply be capturing the effect of other external inflows such as foreign direct investment and official development assistance. The empirical results presented in Appendix B control for these possibilities by including foreign direct investment (FDI/GDP) and official development assistance (ODA/GDP) which are the two major sources of external inflows to the developing world.

The estimates indicate that foreign direct investment impacts positively on investment at the conventional significance levels. On the other hand, official development assistance does not seem to have significant effect on investment except in the pooled OLS case where the effect is negative. Nevertheless, the effect of remittance inflows on investment remains significantly positive. In line with previous findings earlier in this paper, the positive impact of remittances on investment is more pronounced in economies that are financially less developed and lack sound institutional frameworks. In effect, the inclusion of the other two major sources of external inflows does not alter the main findings.

One potential limitation of the discussion so far is the use of the ICRG index as the only measure of institutional quality. The question posed here is whether the findings are robust to an alternative measure of institutional quality. This is important because, the findings with regard to the substitutive nature of the relationship between remittances and institutional quality appear to contradict the findings of Catrinescu et al. (2009). Catrinescu et al. report that the marginal effect of remittances on growth per capita is higher in superior institutional settings than under weak institutional environments. In an attempt to probe this issue further, the Heritage Foundation Index of Economic

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Freedom (*InstitutionHF*) is used as an alternative measure of institutional quality. The data are available for 67 out of the 79 countries in the main sample.

The results, as reported in Appendix C, tend to support the previous findings. First, the results indicate that across all the specifications in Appendix C, remittance inflows have positive and significant impact on investment except for the fixed-effect specification where the effect is positive but statistically insignificant. Second, the interaction between remittances and financial development remains negative in all specifications and significant. Finally, the interaction term involving remittance receipts and the alternative measure of institutions is negative implying substitutive effects. This effect is significant at the conventional levels in all the three models. Thus, the estimates involving the alternative measure of institutions reinforce the main findings that remittances induce investments particularly in economies with weak institutions and under-developed financial intermediation.

6. Conclusions

Financial constraint is one of the main impediments that keep poor nations from getting a foothold on the development ladder. One question that emerged recently following the increasing inflow of remittances to developing countries is whether such inflows induce investment? This paper contributes to the literature by investigating the relationship between remittance inflows and domestic investment under different levels of institutional and financial development. The principal finding is that the effect of remittances on domestic investment varies inversely with both the institutional quality and the depth of financial intermediation.

Consistent with the literature on the role of institutional quality in economic performance, the results suggest that the quality of the prevailing institutions impacts positively on investment outlays. The findings thus imply that sound institutions give life to capital and accordingly impact positively on investment among the remittance-receiving countries. As documented by the financial development literature, the estimates indicate that financial development has a significantly positive impact on investment. This suggests that mobilizing and channeling financial resources for investment purposes, the level of financial development eases the financial constraints on investment.

Given the positive role of institutional quality and financial development, sound institutions and financial development are expected to boost the effect of remittances on investment. On the contrary, the results reveal that institutional quality and the level of financial development interact inversely with remittance receipts. In particular, the coefficient estimates indicate that the marginal impact of remittance inflows under weak institutional environment is about 40 per cent more than its impact under sound institutional settings. Similarly, the marginal impact of remittances in financially under-developed settings is more than twice the marginal effects observed among financially more developed countries. The policy implication of these findings is that the extent to which an economy benefits from remittance inflows is driven by the prevailing institutional environment and the level of financial development.

An important caveat is that the remittance inflows employed in this study are limited to official money transfers. Records of transfers through informal channels such as friends, drivers, traders and the *hawala* service providers are unavailable and,

therefore, not considered in this paper. Nonetheless, it is quite unlikely that this limitation will significantly alter the main policy implication of the study.

Endnotes

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² In addition to Arrelano & Bond (1991), Blundell & Bond's (1998) System Generalized Moment Method (SGMM) estimates are obtained. The implications of the SGMM estimates are essentially similar to those reported in Table 3. They are reported here for the sake of page limits.

³ $5(e^{0.18} - 1) = 0.986$ compared to $5(e^{0.11} - 1) = 0.581$

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Appendix A: Definition and Source of the Variables

<i>Variables</i>	<i>Description</i>	<i>Sources</i>
<i>Investment/GDP</i>	Gross Fixed Capital Formation: It includes land improvements such as fences, ditches, and drains; plant, machinery and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings.	
<i>GDP Growth</i>	The growth rate of gross domestic product	
<i>Trade/GDP</i>	The sum of exports and imports of goods and services as a share of the gross domestic product.	
<i>Remittances/GDP</i>	Workers' remittances and compensation of employees comprise current transfers by migrant workers and wages and salaries earned by non-resident workers. Workers' remittances are classified as current private transfers from migrant workers who are residents of the host country to recipients in their country of origin. They include only transfers made by workers who have been living in the host country for more than a year, irrespective of their immigration status. Compensation of employees is the income of migrants who have lived in the host country for less than a year. Migrants' transfers are defined as the net worth of migrants who are expected to remain in the host country for more than one year that is transferred from one country to another at the time of migration.	World Development Indicators (2008)
<i>Lending rate</i>	The rate charged by banks on loans to prime customers	
<i>Assets/GDP</i>	Assets are the claims of the deposit money banks and other financial institutions on the whole nonfinancial real sector, including government, public enterprises and the private sector.	
<i>Credit/GDP</i>	Claims on the private sector by the deposit money banks and other financial institutions as a share of gross domestic product. Unlike <i>assets</i> , it does not include credits to government and public enterprises.	The 2008 version of Beck., Demirgüç_Kunt & Levine (2000)
<i>Institutions</i>	It is an index of overall political risk. Countries with the low risk are assigned the high points. Conversely, countries with better institutions (low risk) receive higher rating and vice versa. The minimum point is 0 and the maximum is 100	International Country Risk Guide

Note: In this table, we present the variables in the main regressions, their definitions and sources. The first column gives the names of the variables as in the relevant tables. Column 2 describes the variables and the last column provides the sources.

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Appendix B: External Inflows and Investment

Dependent Variable: Investment/GDP (Gross Fixed Capital Formation to GDP)			
	Pooled OLS	Fixed Effects	Difference GMM
<i>Investment/GDP(1)</i>			0.629*** (0.027)
<i>Investment/GDP(2)</i>			-0.169*** (0.031)
<i>GDP Growth</i>	0.177*** (0.055)	0.132*** (0.039)	0.182*** (0.033)
<i>Lending Rate</i>	-0.066*** (0.019)	-0.046** (0.021)	0.039* (0.022)
<i>Trade/GDP</i>	0.031*** (0.005)	0.025** (0.012)	0.020*** (0.007)
<i>Remittances /GDP</i>	0.938*** (0.339)	0.830** (0.368)	0.727*** (0.165)
<i>ODA/GDP</i>	-0.070** (0.030)	0.040 (0.045)	-0.013 (0.031)
<i>FDI/GDP</i>	0.054 (0.047)	0.097*** (0.036)	0.082** (0.033)
<i>Institutions</i>	0.054* (.,028)	0.051 (0.034)	0.047 (0.041)
<i>Remittances *Institutions</i>	-0.010* (0.005)	-0.007 (0.006)	-0.009*** (0.003)
<i>Credit/GDP</i>	0.008 (0.007)	0.091*** (0.018)	0.041** (0.020)
<i>Remittances *Credit</i>	-0.003* (0.002)	-0.008*** (0.003)	-0.003** (0.001)
<i>Constant</i>	16.720*** (1.943)	11.670*** (2.606)	4.445 (2.758)
<i>No. of Obs.</i>	689	689	461
<i>No. of Countries</i>	73	73	70
<i>R Square</i>	0.218	0.182	
<i>F Statistics</i>	9.294	6.637	
<i>Chi Square</i>			23363.893
<i>AR(1) test</i>			-3.898
<i>AR(2) test</i>			0.573
<i>Sargan</i>			51.885

Note: In this table we check whether or not our main results are robust to the control of other external inflows such as FDI and ODA. The estimates in this table suggest that the inclusion of other sources of external inflow does not materially alter the impact of remittances on investment. Robust standard errors are in the parentheses; *** denotes significant at 1%; ** significant at 5%; and * denotes significant at 10% significant level. Year dummies are included in all the specifications.

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Appendix C: Alternative Measure of Institutional Quality in the Investment-Remittances Nexus

	Pooled OLS	Fixed Effect	Difference GMM
<i>Investment/GDP(1)</i>			0.674*** (0.035)
<i>Investment/GDP(2)</i>			-0.252*** (0.037)
<i>GDP Growth</i>	0.224*** (0.058)	0.201*** (0.042)	0.195*** (0.029)
<i>Lending Rate</i>	-0.064*** (0.018)	-0.020 (0.021)	0.021 (0.023)
<i>Trade/GDP</i>	0.036*** (0.005)	0.018 (0.012)	0.002 (0.008)
<i>Remittances /GDP</i>	0.791*** (0.291)	0.585 (0.373)	0.872*** (0.215)
<i>Credit/GDP</i>	0.004 (0.008)	0.069*** (0.019)	0.034** (0.020)
<i>Remittances *Credit</i>	-0.002 (0.002)	-0.009*** (0.003)	-0.008*** (0.002)
<i>InstitutionHF</i>	0.012 (0.031)	0.194*** (0.044)	0.123*** (0.047)
<i>Remittances *InstitutionsHF</i>	-0.009* (0.005)	-0.006* (0.004)	-0.009** (0.004)
<i>Constant</i>	17.788*** (1.949)	7.150*** (2.717)	2.754 (2.632)
<i>No. of Obs.</i>	622	622	414
<i>No. of Countries</i>	67	67	64
<i>R Square</i>	0.229	0.195	
<i>F Statistics</i>	9.936	7.227	
<i>Chi Square</i>			22539.19
<i>AR(1) test</i>			-4.073
<i>AR(2) test</i>			0.729
<i>Sargan</i>			42.072

Note: This table contains the results of the various estimators using the Heritage Foundation measure of institutional quality. The first three columns report the estimates from the static specifications, and the last two columns are from the dynamic models. There are some differences in the point estimates depending on the estimator. The qualitative insights that remittances impacts positively on investment and that this impact is higher in institutionally weak and financially underdeveloped economies remain unchanged. Robust standard errors are in the parentheses; *** denotes significant at 1%; ** significant at 5%; and * denotes significant at 10% significant level. Year dummies are included in all the specifications.