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Do remittances promote financial development?

Reena Aggarwal^a, Asli Demirgüç-Kunt^b, Maria Soledad Martínez Pería^{b,*}^a McDonough School of Business, Georgetown University, United States^b The World Bank, United States

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ABSTRACT

Workers' remittances to developing countries have become the second largest type of flows after foreign direct investment. This paper uses data on remittance flows to 109 developing countries during 1975–2007 to study the link between remittances and financial sector development. In particular, we examine the association between remittances and the aggregate level of deposits and credit intermediated by the local banking sector. This is an important question considering the extensive literature that has documented the growth-enhancing and poverty-reducing effects of financial development. We provide evidence of a positive, significant, and robust link between remittances and financial development in developing countries.

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1. Introduction

Remittances, funds received from migrants working abroad, to developing countries have grown dramatically in recent years from U.S. \$3.3 billion in 1975 to U.S. \$289.4 billion in 2007 (World Bank, 2009). They have become the second largest source of external finance for developing countries after foreign direct investment (FDI) and represent about twice the amount of official aid received, both in absolute terms and as a proportion of GDP (Figs. 1 and 2).

As researchers and policymakers have come to notice the increasing volume and stable nature of remittances to developing countries, a growing number of studies have analyzed their development impact along various dimensions, including: poverty, inequality, growth, education, infant mortality, and entrepreneur-

ship.¹ However, surprisingly little attention has been paid to the question of whether remittances promote financial development across remittance-recipient countries.² Yet, this issue is important because financial development has been shown to foster growth and reduce poverty.³ Furthermore, this question is relevant since some

¹ The literature on the impact of remittances on poverty includes: Adams (2004, 2006), Adams and Page (2005), Taylor et al. (2005), Acosta et al. (2007), and Anyanwu and Erhijakpor (2010). Studies investigating the effect of remittances on growth include: Caceres and Saca (2006), Mundaca (2008), and Giuliano and Ruiz-Arranz (2009). Cox-Edwards and Ureta (2003), Hanson and Woodruff (2003), Lopez Cordova (2005), Yang (2008), Acosta et al. (2007), Calero et al. (2009), Adams and Cuecuecha (2010), Amuedo-Dorantes and Pozo (forthcoming), and Bredl (forthcoming) analyze the impact of remittances on education. Studies on the impact of remittances on health or mortality include Kanaiaupuni and Donato (1999), Hildebrandt and McKenzie (2005), Lopez Cordova (2005), Amuedo-Dorantes et al. (2007) and Antón (2010). Massey and Parrado (1998), Woodruff and Zenteno (2007), and Woodruff (2007) study the impact of remittances on microenterprises.

² Using municipality-level data for Mexico in 2000, Demirguc-Kunt and et al. (forthcoming) show that remittances have a positive impact on the number of branches, number of accounts, and value of deposits and credit to GDP.

³ See King and Levine (1993), Beck et al. (2000a,b), and Beck et al. (2007).

* Corresponding author.

E-mail addresses: aggarwal@georgetown.edu (R. Aggarwal), ademirguckunt@worldbank.org (A. Demirgüç-Kunt), mmartinezperia@worldbank.org (M.S.M. Pería).

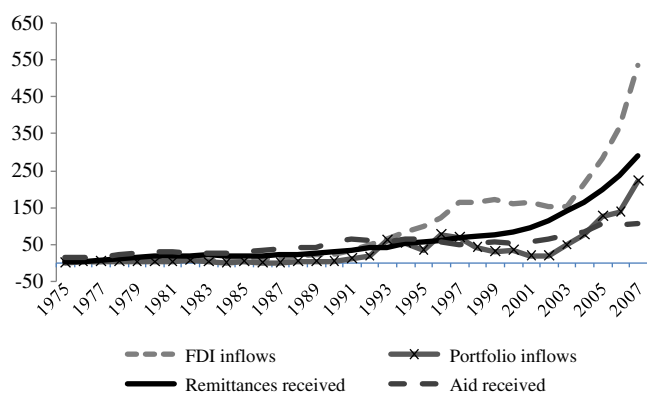


Fig. 1. Inflows to developing countries (billions of USD), 1975–2007.

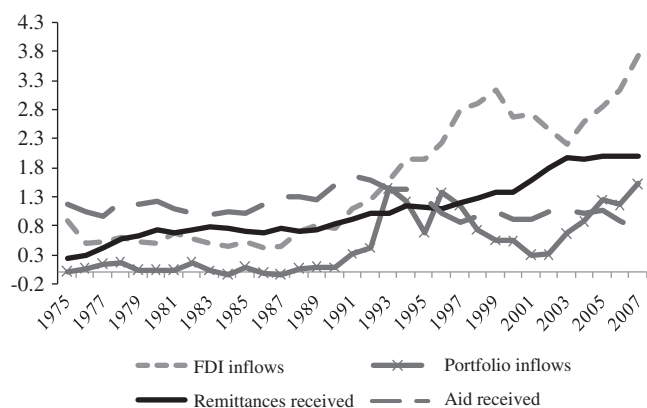


Fig. 2. Inflows to developing countries (% of GDP), 1975–2007.

argue that banking remittance recipients will help multiply the development impact of remittances.⁴

In this paper, we use balance of payments data on remittance flows received by 109 countries over the period 1975–2007 to study the link between remittances and financial sector development as measured by the share of deposits and, separately, credit to GDP. Whether and how remittances might affect financial, particularly banking, development is a priori unclear. On the one hand, because remittances are typically lumpy, recipients might have a need for financial products that allow for the safe storage of these funds (i.e., bank deposits) even if most of these funds are not received through banks. In the case of households that receive their remittances through banks, the potential to learn about and demand other bank products is even larger. At the same time, providing remittance transfer services allows banks to “get to know” and reach out to unbanked recipients or recipients with limited financial intermediation.⁵

On the other hand, because remittances can help relax individuals’ financing constraints, they might lead to a lower demand for credit

and have a dampening effect on credit market development. Also, a rise in remittances might not translate itself into an increase in credit to the private sector if these flows are instead channeled to finance the government or if banks are reluctant to lend and prefer to hold liquid assets. Finally, remittances might not increase bank deposits if they are immediately consumed or if remittance recipients distrust financial institutions and prefer other ways to save these funds.

An important complication in empirically studying the impact of remittances on financial development is the potential for endogeneity biases as a result of measurement error, reverse causation, and omitted variables. Officially recorded remittances are known to be measured with error.⁶ In particular, balance of payments data on remittances tend to record more accurately remittances sent via banks and, in some cases, ignore those sent via non-bank institutions (e.g., money transfer operators) and informal channels (e.g., family and friends).⁷ Estimates of unrecorded remittances range from 50 to 250% of official statistics on remittances.⁸

Reverse causality is also a concern when examining the link between remittances and financial development, since greater financial development might lead to larger measured remittances either because financial development enables remittance flows or because a larger percentage of remittances are measured when those remittances are channeled through formal financial institutions. In addition, financial development might lower the cost of transmitting remittances, leading to an increase in such flows. Finally, omitted factors can explain both the evolution of remittances and of financial development, also leading to biases in the estimated impact of remittances on financial development.

We try to address the concerns mentioned above, using several different empirical approaches. First, we conduct estimations including country and time fixed effects to account for unobserved country characteristics and for common shocks and trends across countries. Second, to mitigate the concern that the link between remittances and banking sector development might be tautological – because balance of payments data on remittances primarily capture flows intermediated by banks – we run our estimations on a sample (albeit smaller) of countries for which we know, based on a survey of central banks (see Irving et al., 2010), that official remittances data encompass flows transmitted through non-bank entities and/or informal mechanisms, as well as by banks.⁹ Third, to try to address biases due to reverse causality, we run regressions lagging all regressors one period and we conduct dynamic system Generalized Method of Moments (GMM) estimations à la Arellano and Bover (1995), using lagged regressors as instruments. Finally, we perform instrumental variables (IV) estimations to try to address, in a more direct manner, the potential endogeneity of remittances arising from measurement error, omitted factors, and/or reverse causation. We use two sets of instruments based on characteristics of the top five remittance-sending countries (i.e., the countries where migrants sending remittances reside) for each country in our sample, namely: (a) measures of economic conditions in remittance-sending countries and (b) variables that

⁶ For a good discussion of the measurement problems associated with remittances data see Reinke (2007).

⁷ Surveying central banks in 77 remittance-receiving countries, Irving et al. (2010) find that statistics produced by developing countries typically under-report remittances paid directly by non-banking institutions – such as money transfer companies, exchange bureaus, post offices, etc. While over 91% of the countries collect remittance data from commercial banks, 56% collect data from money transfer companies, 22% of countries gather statistics from exchange bureaus, and 26% do so from post offices.

⁸ See Freund and Spatafora, 2008.

⁹ Also, as a way to mitigate concerns about the quality of the remittance data, we obtain estimates over the last decade to account for the fact that recent remittances data are likely to be more accurate relative to statistics from the beginning of the sample, when less attention was given to the measurement of these kinds of flows. These results, which are similar to those for the complete sample period, are not reported in the paper, but are available upon request.

⁴ See Hinojosa-Ojeda (2003), Terry and Wilson (2005), and World Bank (2006).

⁵ For example, remittances might have a positive impact on credit market development if banks become more willing to extend credit to remittance recipients because the transfers they receive from abroad are perceived to be significant and stable (i.e., serve as collateral, at least informally).

capture the views held and the policies pursued by policy-makers in remittance-sending countries with respect to international immigration.

We find evidence of a positive and significant link between financial development and remittances, irrespective of the different control variables and estimation techniques used. Furthermore, our findings are robust to measuring financial development by the ratio of deposits or credit to GDP. Though it is difficult to ensure that all the biases associated with measurement error, reverse causality, and omitted factors are successfully addressed, overall the results in this paper suggest that remittances may help foster financial development in developing countries.

The rest of the paper is organized as follows. Section 2 discusses the data used and the methodology pursued to study the link between remittances and financial development. Section 3 presents the empirical results, and Section 4 concludes.

2. Empirical methodology and data

We empirically examine the link between financial development and remittances by estimating a number of variants of Eq. (1)

$$FD_{i,t} = \beta_1 Rem_{i,t-1} + \beta_2 X_{i,t-1} + \alpha_i + u_{i,t} \quad (1)$$

where i refers to the country and t refers to the time period from 1975 to 2007. However, data for the complete time period are not available for all countries and countries are only included if at least five years of data are available. A complete list of countries and years is given in Appendix Table 1. Appendix Table 2 provides definitions and sources for each of the variables in our estimations. Table 1 presents descriptive statistics and Table 2 shows correlations.

FD , financial development, refers either to the share of bank deposits or the ratio of bank credit to the private sector expressed as a percentage of GDP. These are standard measures of financial depth used in the literature (e.g., King and Levine, 1993). Data to construct these ratios come from the *International Financial Statistics* (IMF) and the *World Development Indicators* (World Bank). The average ratio of deposits (credit) to GDP is 31.4% (25.5), but the standard deviation of 23.4 (20.7) indicates that there is significant heterogeneity across countries.

Rem refers to the ratio of remittances to GDP. The data on remittances are obtained from the World Economic Outlook (IMF) and from World Development Indicators (World Bank). Figs. 3 and 4 show the top ten remittance recipient countries in our sample based on averages for the period 1975–2007, measured both in U.S. billion dollars and as a proportion of GDP. India (\$U.S. 7.99 billion), Mexico (\$U.S. 7.08 billion), China (\$US 5.68 billion), Philippines (\$U.S. 4.54 billion), and Egypt (\$U.S. 3.54 billion), are among the largest recipients of remittances in absolute terms as shown in Fig. 3. Relative to GDP, remittances are especially high among low-income, small

economies such as Lesotho (58.03%), Samoa (24.45%), Tonga (23.28%), Jordan (19.72%), and Moldova (17.63%) as shown in Fig. 4.

The matrix X in Eq. (1) refers to a set of variables that the literature has found to be related to financial development. In all estimations we control for country size, defined as the log of GDP in constant dollars, and the level of economic development, as measured by GDP per capita. These variables are included on the grounds that financial sector development requires paying fixed costs that become less important the larger the size of the economy and the richer the country.¹⁰ Also, GDP per capita can proxy for the quality of legal institutions in the country, which have been shown to have a positive impact on financial development.¹¹ In all models, we also control for inflation, measured as the annual percentage change in the GDP deflator. Studies have shown that inflation distorts economic agents' decision-making regarding nominal magnitudes, discouraging financial intermediation, and promoting saving in real assets.¹²

Current and capital account openness have also been found to have a positive effect on financial development.¹³ We include a number of variables to control for the degree of capital and current account openness. First, we include a dummy for the presence of dual exchange rate regimes – a measure of current account and capital account restrictions. Second, we control for the share of exports to GDP.¹⁴ Third, we also control for different capital inflow ratios, most notably: foreign direct investment flows to GDP, aid flows to GDP, and portfolio flows to GDP.¹⁵

We first examine the link between financial development and remittances by running estimations with country and time fixed effects to control for unobserved country characteristics and for common shocks and trends across countries. These estimations should help lessen concerns about endogeneity due to relevant omitted factors. Also, to reduce concerns about reverse causality we lag all regressors in our estimations one period.

To address the criticism that the link between remittances and banking development might be tautological, because balance of payments data on remittances capture primarily flows intermediated by banks, we run our estimations on a smaller sample of countries for which we know that official remittances data encompass flows transmitted through banks but also non-bank entities and/or informal mechanisms. In particular, based on a survey of central banks in Irving et al. (2010), we identify 42 countries in our sample for which remittances data takes into account information provided by non-bank institutions, as well as banks.¹⁶

To tackle the potential bias due to reverse causality, we conduct estimations using lagged values (two and higher) of the regressors as instruments in a GMM dynamic framework à la Arellano and Bover (1995). In particular, Eqs. (2) and (3), are estimated as part of the dynamic system GMM estimates

$$FD_{i,t} = \gamma FD_{i,t-1} + \beta_1 Rem_{i,t} + \beta_2 X_{i,t} + \alpha_i + u_{i,t} \quad (2)$$

Table 1
Descriptive statistics.

Variable	Observations	Mean	Median	Standard deviation
Bank deposits to GDP (%)	2162	31.37	24.33	23.37
Bank credit to GDP (%)	2164	25.51	19.78	20.74
Remittances to GDP (%)	2164	3.50	1.55	5.04
GDP per capita (in thousands US\$)	2164	1.73	1.12	1.77
Log of GDP (in constant US\$)	2164	22.64	22.53	1.90
Inflation (%)	2164	14.86	7.54	34.06
Dual exchange rates	2164	0.18	0.00	0.38
Exports to GDP (%)	2164	34.44	30.34	19.40
Foreign direct investment (FDI) inflows to GDP (%)	2164	2.42	1.35	3.62
Aid inflows to GDP (%)	2164	6.43	3.54	7.71
Portfolio inflows to GDP (%)	2038	0.29	0.00	1.51

¹⁰ See Djankov et al., 2007.

¹¹ E.g., La Porta et al. (1997, 1998); Beck et al. (2000a); Beck et al. (2003); and Djankov et al. (2007).

¹² See Boyd et al. (2001).

¹³ Chinn and Ito (2002, 2006) focus primarily on how openness affects equity market development.

¹⁴ We control for the share of exports to GDP instead of the ratio of exports plus imports because we are concerned primarily with how trade openness can result in an increase in reserves and, hence, in a potential inflow of funds into the financial sector. While exports can lead to such an increase in reserves, we do not expect imports to do so.

¹⁵ Because this last variable is available for fewer countries, in most tables we include regressions with and without this variable.

¹⁶ The aforementioned 42 countries for which we know from Irving et al. (2010) that remittances data capture flows transmitted through banks and non-banks are shown with an asterisk next to their name in Appendix Table 1.

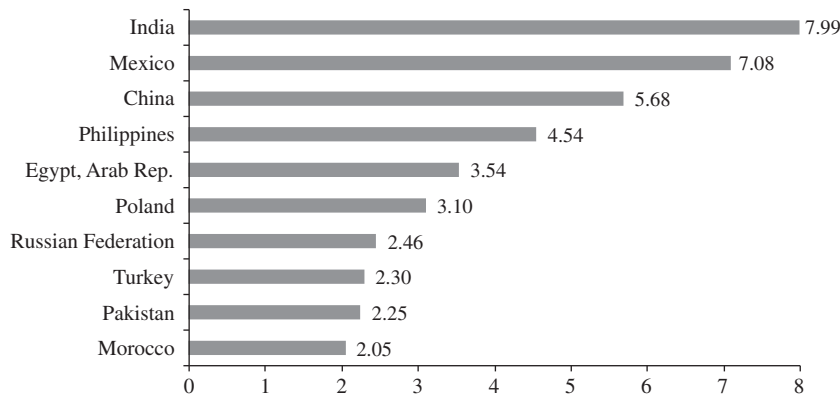


Fig. 3. 10 largest recipients of remittances (in billions of USD), 1975–2007 (average).

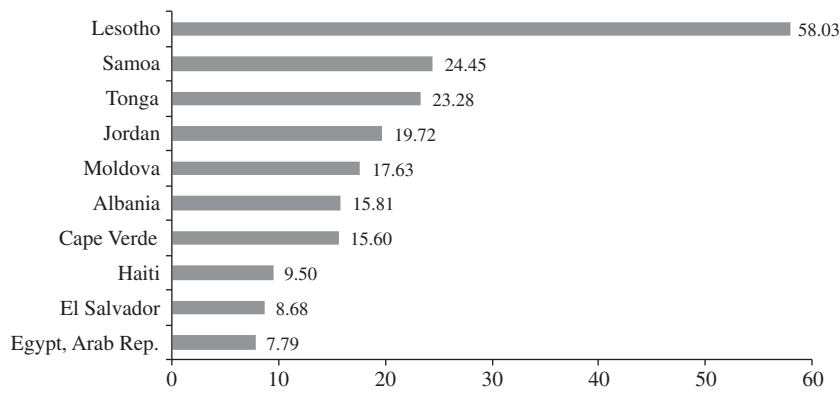


Fig. 4. 10 largest recipients of remittances (in % of GDP), 1975–2007 (average).

$$FD_{i,t} - FD_{i,t-1} = \gamma(FD_{i,t-1} - FD_{i,t-2}) + \beta_1(Rem_{i,t} - Rem_{i,t-1}) + \beta_2(X_{i,t} - X_{i,t-1}) + u_{i,t} - u_{i,t-1} \quad (3)$$

In Eqs. (2) and (3), the use of instruments is required to deal with the likely endogeneity of the explanatory variables (most notably, remittances) and with the fact that in both equations the error term is

correlated with the lagged dependent variable. Assuming that (a) the error terms are not serially correlated, (b) the explanatory variables are weakly exogenous (i.e., explanatory variables are uncorrelated with future realization of the error terms), and (c) there is no correlation between the changes in the right hand side variables and the country specific effects, α_i , then the following moment conditions can be applied to obtain unbiased estimates of the regressors:

$$E[FD_{i,t-s}(u_{i,t} - u_{i,t-1})] = 0 \text{ for } s \geq 2; t = 3, \dots, T \quad (4)$$

Table 2
Correlation matrix.

Variables	Bank deposits to GDP	Bank credit to GDP	Remittances to GDP	GDP per capita	Log of GDP	Inflation	Dual exchange rate	Exports to GDP	FDI inflows to GDP	Aid flows to GDP	Portfolio inflows to GDP
Bank deposits to GDP	1										
Bank credit to GDP	0.80*	1									
Remittances to GDP	0.23*	0.09*	1								
GDP per capita	0.35*	0.33*	-0.12*	1							
Log of GDP	0.01	0.17*	-0.22*	0.15*	1						
Inflation	-0.18*	-0.18*	-0.11*	-0.01	0.15*	1					
Dual exchange rates	-0.17*	-0.17*	-0.12*	-0.08*	0.14*	0.18*	1				
Exports to GDP	0.42*	0.39*	0.04	0.40*	-0.26*	-0.12*	-0.19*	1			
FDI inflows to GDP	0.32*	0.25*	0.17*	0.19*	-0.18*	-0.12*	-0.14*	0.36*	1		
Aid inflows to GDP	-0.14*	-0.25*	0.18*	-0.42*	-0.57*	-0.02	-0.07*	-0.12*	0.00	1	
Portfolio inflows to GDP	0.16*	0.19*	-0.07*	0.21*	0.10*	-0.04	-0.06*	0.07*	0.14*	-0.13*	1

The asterisk denotes significance in the correlation at the 5 percent.

Table 3

Fixed effects estimations. The equation estimated is of the form $FD_{i,t} = b_1 Rem_{i,t-1} + b_2 X_{i,t-1} + a_i + u_{i,t}$ where FD refers to financial development measured as the % of bank deposits and, separately, bank credit to GDP in country i at time t . *Remittances to GDP* is the share of remittances as a % of GDP in country i at period $t - 1$. X is a matrix of controls for each country i at time $t - 1$ including: *GDP per capita*, measured in constant dollars; *Log of GDP*, stated in constant dollars; *Inflation*, defined as the % change in the GDP deflator; *Dual exchange rates*, a dummy capturing periods when multiple exchange rates were in effect; *Exports to GDP*, the share of total exports as a % of GDP; *FDI inflows to GDP*, foreign direct investment expressed as % of GDP; *Aid inflows to GDP*, official development assistance and official aid as % of GDP; *Portfolio inflows to GDP*, portfolio investment liabilities as % of GDP. Columns (1)–(4) include all the countries in the sample, while columns (5)–(8) include only those countries for which a survey of central banks (Irving et al., 2010) has determined that remittances transferred by at least some type of non-banking institution (money transfer operator, credit union, currency exchange bureau, post office etc.) or informal mechanism are included. These countries are indicated with an asterisk in Appendix Table 1. t -statistics are in brackets. *, **, and *** denote significance at the 10, 5, and 1% level, respectively.

Variables	All countries				Countries for which remittances data include flows transferred by non-bank institutions			
	Bank deposits to GDP		Bank credit to GDP		Bank deposits to GDP		Bank credit to GDP	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Remittances to GDP	0.37*** [4.59]	0.35*** [4.06]	0.29*** [3.78]	0.24*** [2.79]	0.47*** [5.30]	0.57*** [6.00]	0.17** [2.13]	0.20** [2.34]
GDP Per Capita	5.04*** [8.13]	6.69*** [9.73]	5.95*** [9.73]	7.34*** [10.83]	3.75*** [4.40]	3.56*** [4.11]	2.35*** [3.05]	2.02*** [2.58]
Log of GDP	9.68*** [5.89]	6.75*** [3.81]	16.05*** [9.91]	13.85*** [7.94]	3.27* [1.67]	3.47* [1.71]	3.15* [1.77]	3.12* [1.69]
Inflation	-0.03*** [3.85]	-0.03*** [4.03]	-0.02*** [2.86]	-0.02*** [3.11]	-0.00 [0.27]	-0.00 [0.23]	-0.02 [1.33]	-0.02 [1.37]
Dual exchange rates	-2.65*** [3.96]	-2.18*** [3.20]	-1.18* [1.78]	-1.06 [1.57]	-1.04 [1.18]	-0.84 [0.94]	-2.15*** [2.66]	-2.26*** [2.77]
Exports to GDP	0.03 [1.21]	0.06** [2.12]	0.06** [2.22]	0.09*** [3.11]	0.037 [0.95]	0.03 [0.87]	0.03 [0.82]	0.03 [0.83]
FDI inflows to GDP	0.17** [2.21]	0.13* [1.67]	0.24*** [3.16]	0.22*** [2.85]	0.37*** [2.57]	0.36** [2.42]	0.55*** [4.25]	0.56*** [4.24]
Aid inflows to GDP	0.01 [0.21]	0.01 [0.09]	-0.01 [0.18]	0.01 [0.25]	0.08 [1.20]	0.06 [0.91]	-0.19*** [3.15]	-0.15** [2.43]
Portfolio inflows to GDP		0.23 [1.57]		0.12 [0.85]		0.33 [1.06]		0.56** [1.98]
Constant	-196.55*** [5.28]	-134.48*** [3.34]	-354.72*** [9.67]	-309.44*** [7.81]	-52.41 [1.17]	-59.88 [1.28]	-52.02 [1.28]	-53.21 [1.25]
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2162	2038	2164	2037	897	847	895	845
Number of countries	109	105	109	105	42	41	42	41
R-squared	0.39	0.40	0.33	0.35	0.38	0.40	0.28	0.28

$$E[Rem_{i,t-s}(u_{i,t}-u_{i,t-1})] = 0 \text{ for } s \geq 2; t = 3, \dots, T \quad (5)$$

$$E[X_{i,t-s}(u_{i,t}-u_{i,t-1})] = 0 \text{ for } s \geq 2; t = 3, \dots, T \quad (6)$$

$$E[(FD_{i,t-s}-FD_{i,t-s-1})(\alpha_i + u_{i,t})] = 0 \text{ for } s = 1 \quad (7)$$

$$E[(Rem_{i,t-s}-Rem_{i,t-s-1})(\alpha_i + u_{i,t})] = 0 \text{ for } s = 1 \quad (8)$$

$$E[(X_{i,t-s}-X_{i,t-s-1})(\alpha_i + u_{i,t})] = 0 \text{ for } s = 1 \quad (9)$$

Hence, lagged (two and higher) values of the difference of regressors can be used as instruments to estimate the equation in levels (i.e., Eq. (2)), and lagged (two and higher) values of the level of regressors can be used as instruments for the regressors in the equation in first differences (i.e., Eq. (3)).

While using lagged values of the regressors as instruments can help deal with the problem of reverse causality, it does not address biases arising due to measurement error, since lagged values of the regressors (in particular, remittances) are likely to suffer from this problem as well. Therefore, we also present Instrumental Variables (IV) estimations where we use external as opposed to internal instruments. In particular, we conduct two set of instrumental variable estimations using, for each country in our sample, characteristics of the corresponding top five remittance-sending countries. We conjecture that variables associated with remittance-sending as opposed to remittance-receiving countries (our unit of observation)

are more likely to be exogenous to financial development in the latter set of countries.

First, we use two-period lagged economic conditions such as GDP per capita and unemployment in remittance-sending countries as instruments for the one-period lag of remittances flows received by the countries in our sample. Economic conditions in the remittance-sending countries are likely to affect the volume of remittance flows that migrants are able to send, but are not expected to affect financial development in the remittance-receiving countries directly, after we control for other variables that are also affected by economic conditions abroad such as exports to GDP, private capital flows to GDP, aid flows to GDP, and local GDP per capita.¹⁷

We identify the top five remittance-sending countries for each country in our sample, using a new bilateral remittances data collected by The World Bank (see *Ratha and Shaw, 2007*). The new dataset covers most countries in the world so it adequately takes into account the importance of South–South flows. On average, the top five countries account for 80% of the remittances received by the countries in our sample.¹⁸ We construct two instruments by multiplying, respectively, the GDP per capita, and the unemployment rate in each of the top five remittance-sending countries by the share of remittances sent by each of these five countries.¹⁹

¹⁷ IMF (2005) finds that stronger economic activity in migrant's host countries increases the remittances sent to their home country.

¹⁸ In constructing the instruments, we renormalize the share of each of these five countries so that the sum over the top five countries adds to 1.

¹⁹ Because the bilateral remittance data is only available for one year, 2005, variation in the instrument is driven by changes in economic conditions.

For the second set of instruments, for each country in our sample, we use data on their top five remittance-sending countries' (1) views and (2) policies regarding international immigration obtained from the *World Population Policies*, a report published since 1976 by the United Nations Department of Economic and Social Affairs Population Division. In particular, policy-makers responsible for migration policies in each country are asked to comment on their views as to whether immigration is “too high”, “satisfactory”, or “too low”. Based on these responses, we create a variable that takes values – 1, when policy-makers view immigration as being too high, 0, when immigration is considered satisfactory and 1, when it is deemed to be too low. Hence, higher values of this variable indicate that policy-makers perceive that immigration should increase. In terms of the policies towards international immigration, policy-makers are asked to report whether their goal is to “lower,” “maintain,” or “raise” the level of immigration. We code this variable -1, 0, or +1 respectively, so that higher values represent more welcoming policies vis-a-vis immigrants. We weight the variables we constructed on the views and, separately, the policies regarding migration in the top five remittance-sending countries, for each country in our sample, by the share of remittances received from each of the corresponding top five remittance-sending countries.

Because the policies and views on migration in remittance-sending countries are determined by the needs and goals of these countries, we do not expect these variables to be correlated with financial development in remittance-receiving countries (other than through their impact on remittances). However, to err on the side of caution, we exclude from these estimations countries (i.e., Mexico, Turkey, Ecuador, Bulgaria and Morocco) whose migrants account for a large percentage of the population in remittance-sending countries, since events in these countries could plausibly influence attitudes towards migration in migrant-recipient/remittance-sending countries. We expect that, other things equal, in countries where immigration is perceived as satisfactory or low and where policy-makers intend to maintain or raise the level of immigration, migrants would be more welcomed, would have an easier time finding employment, and sending remittances back home.

3. Empirical results

Columns (1) through (4) in Table 3 reports estimates of Eq. (1) with country and time effects for the share of deposits (Columns (1) and (2)) and credit to GDP (Columns (3) and (4)), including all countries, assuming that remittances are adequately measured.²⁰ To lessen concerns about endogeneity, we lag all regressors one period. In all regressions we control for the log of GDP, the level of GDP per capita, the inflation rate, the presence of dual exchange rates, the ratio of exports to GDP, the share of foreign direct investment (FDI) inflows to GDP, and the percentage of aid flows to GDP. Because the variable capturing portfolio inflows to GDP is available for fewer countries, we report estimations with and without this variable.

Across all estimations, we find that remittances are positively related to the measures of financial development, but the size of the coefficient in the bank deposits to GDP regressions is larger than the coefficient in bank credit to GDP regressions. A one percentage point increase in the share of remittances to GDP is associated with a 0.35–0.37 percentage point increase in the ratio of deposits to GDP, depending on the specification and the controls, while it is associated with at most a 0.29 percentage point rise in the share of credit to GDP.

As expected, the results also confirm that financial development is positively associated with a country's size and level of income, but negatively correlated with inflation and the adoption of multiple exchange rate regimes (this last result appear to only hold for

Table 4

GMM dynamic system estimations. Results reported below are obtained by estimating the following system of equations $FD_{i,t} = b_1 FD_{i,t-1} + b_2 Rem_{i,t} + b_3 X_{i,t} + a_i + u_{i,t}$ and $FD_{i,t} - FD_{i,t-1} = b_1 (FD_{i,t-1} - FD_{i,t-2}) + b_2 (Rem_{i,t} - Rem_{i,t-1}) + b_3 (X_{i,t} - X_{i,t-1}) + u_{i,t} - u_{i,t-1}$. To compute the system estimator, variables in differences are instrumented with lags of their own levels (two and higher), while variables in levels are instrumented with lags of their own differences (two and higher). FD refers to financial development measured as the % of bank deposits and, separately, bank credit to GDP. *Remittances to GDP* is the share of remittances as a % of GDP. X is a matrix of controls including: *GDP per capita*, measured in constant dollars; *Log of GDP*, stated in constant dollars; *Inflation*, defined as the % change in the GDP deflator; *Dual exchange rates*, a dummy capturing periods when multiple exchange rates were in effect; *Exports to GDP*, the share of total exports as a % of GDP; *FDI inflows to GDP*, foreign direct investment expressed as % of GDP; *Aid inflows to GDP*, official development assistance and official aid as % of GDP; *Portfolio inflows to GDP*, portfolio investment liabilities as % of GDP. t-statistics are in brackets. *, **, and *** denote significance at the 10, 5, and 1% level, respectively.

Variables	Bank deposits to GDP		Bank credit to GDP	
	(1)	(2)	(3)	(4)
Remittances to GDP	0.17** [2.25]	0.17** [2.13]	0.13* [1.85]	0.1 [1.22]
GDP Per Capita	0.19 [0.63]	0.17 [0.37]	0.24 [0.76]	-0.04 [0.10]
Log of GDP	0.64 [1.25]	0.85 [1.09]	1.33** [2.18]	1.05 [1.16]
Inflation	-0.04*** [2.67]	-0.04** [2.29]	-0.03** [2.10]	-0.03* [1.90]
Dual exchange rates	-0.78 [1.05]	-0.61 [0.82]	0.04 [0.06]	0.05 [0.07]
Exports to GDP	-0.00 [0.09]	-0.01 [0.18]	-0.06 [1.41]	-0.04 [0.99]
FDI inflows to GDP	-0.02 [0.19]	-0.07 [0.41]	0.14 [1.31]	0.17 [1.54]
Aid inflows to GDP	-0.04 [0.44]	-0.06 [0.40]	-0.03 [0.39]	-0.02 [0.25]
Portfolio inflows to GDP		0.21 [0.51]		0.73* [1.70]
Lag 1 of deposits to GDP	1.29*** [26.86]	1.30*** [22.08]		
Lag 2 of deposits to GDP	-0.51*** [4.57]	-0.53*** [3.95]		
Lag 3 of deposits to GDP		0.17 [1.15]		
Lag 1 of credit to GDP			1.27*** [10.05]	1.27*** [9.54]
Lag 2 of credit to GDP			-0.25 [1.04]	-0.25 [1.01]
Lag 3 of credit to GDP			0.01 [0.04]	0.02 [0.14]
Constant	-14.07 [1.12]	-19.23 [1.08]	-29.03** [2.09]	-23.38 [1.14]
Time dummies	Yes	Yes	Yes	Yes
Observations	1867	1768	1862	1770
Number of countries	89	87	89	88
Hansen test for over-identifying restrictions	51.12	59.46	52.24	44.76
P-value Hansen test	0.19	0.12	0.16	0.61
Test for 2nd order autocorrelation	1.62	1.61	0.48	0.90
P-value for test for 2nd order autocorrelation	0.11	0.11	0.63	0.37

deposits). While the share of exports to GDP and the percentage of FDI inflows to GDP are, in general, positively associated with financial development, aid flows and portfolio flows do not appear to be correlated with financial development.²¹

To mitigate concerns that the link between remittances and banking development might be tautological and driven by the fact that remittances data primarily capture flows transferred by banks,

²¹ Capital flows might not have a significant impact in our estimations because our measure of financial sector development is a purely bank based measure and capital flows might be mostly channeled through the capital markets instead of being intermediated by banks. Also, this result is consistent with Chinn and Ito (2002, 2006), who find that bank credit indicators do not appear to be affected by financial openness when focusing exclusively on developing countries.

²⁰ We also ran regressions including regional fixed effects, but the results do not change significantly. Hence, these results are available upon request.

Table 5

First stage IV estimations. Results are first-stage estimates of the equation $FD_{i,t} = b_1 Rem_{i,t-1} + b_2 X_{i,t-1} + a_i + u_{i,t}$ where FD refers to financial development measured as the % of bank deposits and, separately, bank credit to GDP in country *i* at time *t*. *Remittances to GDP* is the share of remittances as a % of GDP in country *i* at period *t* – 1. *X* is a matrix of controls for each country *i* at time *t* – 1 including: *GDP per capita*, measured in constant dollars; *Log of GDP*, stated in constant dollars; *Inflation*, defined as the % change in the GDP deflator; *Dual exchange rates*, a dummy capturing periods when multiple exchange rates were in effect; *Exports to GDP*, the share of total exports as a % of GDP; *FDI inflows to GDP*, foreign direct investment expressed as % of GDP; *Aid inflows to GDP*, official development assistance and official aid as % of GDP; *Portfolio inflows to GDP*, portfolio investment liabilities as % of GDP. First-stage estimates are obtained by running $Rem_{i,t-1} = d_1 Z_{i,t-2} + d_2 X_{i,t-1} + a_i + e_{i,t}$ where *Z* is a matrix of instruments including GDP per capita, unemployment rate and views and policies on migration in the top five remittance-sending countries, weighted by the share of remittances sent from each of the top five remittance-sending countries. *t*-statistics are in brackets. *, **, and *** denote significance at the 10, 5, and 1% level, respectively.

Variables	Dependent variable: Remittances							
	Bank deposits to GDP regression				Bank credit to GDP regression			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GDP per capita in remittance-sending countries	0.47*** [11.59]				0.48*** [11.79]			
Unemployment in remittance-sending countries		-0.15*** [5.96]				-0.15*** [6.01]		
Views on immigration in remittance-sending countries			1.47*** [4.49]				1.52*** [4.63]	
Policies on immigration in remittance-sending countries				0.90*** [2.59]				0.93*** [2.68]
GDP Per Capita	-1.19*** [5.94]	-0.39* [1.88]	-0.41* [1.96]	-0.35* [1.67]	-1.20*** [6.01]	-0.40 [1.94]	-0.42** [2.04]	-0.36* [1.73]
Log of GDP	-1.74*** [3.49]	-3.39*** [5.89]	-4.09*** [7.98]	-4.03*** [7.83]	-1.70*** [3.43]	-3.33*** [5.82]	-4.02*** [7.88]	-3.97*** [7.75]
Inflation	0.00 [1.02]	0.00 [0.82]	0.00 [0.67]	0.00 [0.60]	0.00 [1.07]	0.00 [0.85]	0.00 [0.72]	0.00 [0.64]
Dual exchange rates	-0.65*** [3.51]	-0.58*** [2.84]	-0.49** [2.42]	-0.55*** [2.68]	-0.64*** [3.46]	-0.59*** [2.87]	-0.50** [2.43]	-0.56*** [2.70]
Exports to GDP	-0.01 [1.21]	0.00 [0.27]	0.01 [1.03]	0.01 [1.04]	-0.01 [1.30]	0.00 [0.25]	0.01 [1.02]	0.01 [1.05]
FDI inflows to GDP	0.07*** [3.03]	0.07*** [3.01]	0.086*** [3.78]	0.09*** [3.74]	0.06*** [2.98]	0.07*** [2.92]	0.09*** [3.73]	0.08*** [3.69]
Aid inflows to GDP	-0.02 [1.37]	-0.03* [1.79]	-0.02 [1.32]	-0.02 [1.27]	-0.02 [1.17]	-0.03 [1.60]	-0.02 [1.16]	-0.02 [1.14]
Constant	32.17*** [3.38]	91.36*** [5.93]	79.07*** [8.11]	92.26*** [9.69]	31.96*** [3.53]	67.78*** [6.47]	101.84*** [7.93]	100.69*** [7.79]
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2027	1835	1871	1871	2029	1837	1878	1878
Number of countries	102	102	97	97	102	102	97	97
F-statistic for weak instruments	134.4	35.54	20.19	6.71	139	36.15	21.45	7.16
R-squared	0.80	0.80	0.79	0.79	0.81	0.80	0.80	0.79

results in Table 3 columns (5)–(8) repeat the previous estimations for a sample of 42 countries for which we know that balance of payments statistics also encompass remittances received via non-bank institutions or informal sources. Limiting our sample to these countries does not change our results, even though the sample of countries and observations is cut in more than half. Remittances continue to be positively and significantly associated with both credit and deposit to GDP ratios.

Though our baseline estimations in Table 3 include one period lagged regressors, to further address the potential for reverse causation, we report dynamic system GMM estimations à la Arellano and Bover (1995), where multiple lags (2 or higher) of the regressors are used as instruments for the variables in the model (see Table 4). GMM estimations, reported in Table 4, indicate a weaker yet mostly significant link between remittances and financial development.

While lagging regressors or using lags as instrument might help deal with the problem of reverse causation, it does not address the concern that the estimates might be biased due to measurement error. To try to address this issue directly, we conduct instrumental variable estimations. We present results using two sets of instruments. First, we report results using economic conditions in remittance-sending countries as instruments. In particular, we report separate estimations where either GDP per capita or unemployment in the top five remittance-sending countries are used as instruments for remittances. Second, we use remittance-sending countries' views and policies

towards immigration as instruments. In particular, we report estimations where each of these variables is used separately as an instrument. Table 5 shows the first stage results of the instrumental variable estimations, while Table 6 presents the second stage results of these estimations.²² All estimations include country and time fixed effects.

Table 5 (columns (1), (2), (5) and (6)) show that economic conditions in remittance-sending countries are positively and significantly related to remittances. In particular, GDP per capita in remittance-sending countries is positively associated with the percentage of remittances countries receive, while, as expected, higher unemployment in remittance-sending countries is negatively associated with remittances. Table 5 also shows that, as stipulated above, more positive views and welcoming policies towards immigration in remittance-sending countries are associated with higher levels of remittances received by developing countries (see columns (3), (4), (7) and (8)). The F-statistics reported at the bottom of Table 5 indicate that the instruments are not weak, but rather are significantly correlated with remittances.

Tables 6 show the second stage results from the instrumental variables estimations using economic conditions in remittance-

²² We obtain very similar results if we focus on the 42 countries for which we know that remittance statistics were gathered from non-bank sources as well as from banks. These results are available upon request.

Table 6
Second stage IV estimations. The regression equation estimated is of the form $FD_{i,t} = b_1 Rem_{i,t-1} + b_2 X_{i,t-1} + a_i + u_{i,t}$ where FD refers to financial development measured as the % of bank deposits and, separately, bank credit to GDP. *Remittances to GDP* is the share of remittances as a % of GDP. *X* is matrix of controls including: *GDP per capita*, measured in constant dollars; *Log of GDP*, stated in constant dollars; *Inflation*, defined as the % change in the GDP deflator; *Dual exchange rates*, a dummy capturing periods when multiple exchange rates were in effect; *Exports to GDP*, the share of total exports as a % of GDP. GDP per capita, the unemployment rate and views and policies on migration in the top five remittance-sending countries, weighted by the share of remittances sent from each of the top five remittance-sending countries, are used as instruments. t-statistics are in brackets. *, **, and *** denote significance at the 10, 5, and 1% level, respectively.

Variables	Bank deposits to GDP				Bank credit to GDP			
	Instruments				Instruments			
	GDP per capita in sending countries (1)	Unemployment in sending countries (2)	Views on migration in sending countries (3)	Policies on migration in sending countries (4)	GDP per capita in sending countries (5)	Unemployment in sending countries (6)	Views on migration in sending countries (7)	Policies on migration in sending countries (8)
Remittances to GDP	2.04*** [5.98]	1.92*** [3.09]	4.44*** [3.84]	7.56** [2.54]	2.80*** [7.70]	3.33*** [4.63]	4.69*** [4.05]	6.82*** [2.58]
GDP Per Capita	4.88*** [6.31]	4.15*** [5.24]	5.72*** [5.04]	6.76*** [3.61]	6.60*** [7.90]	5.60*** [6.04]	7.34*** [6.29]	8.07*** [4.70]
Log of GDP	17.43*** [7.73]	21.99*** [6.81]	26.08*** [5.00]	38.25*** [3.13]	25.40*** [10.54]	33.21*** [8.92]	32.25*** [6.19]	40.44*** [3.75]
Inflation	-0.03*** [4.15]	-0.03*** [4.38]	-0.04*** [3.48]	-0.04** [2.49]	-0.03*** [3.31]	-0.03*** [3.46]	-0.03*** [2.81]	-0.03** [2.24]
Dual exchange rates	-1.48* [1.93]	-2.22** [2.52]	-0.15 [0.12]	1.72 [0.72]	0.55 [0.67]	0.20 [0.19]	1.89 [1.46]	3.19 [1.47]
Exports to GDP	0.04 [1.30]	0.01 [0.14]	0.01 [0.29]	-0.02 [0.25]	0.07** [1.99]	0.00 [0.03]	0.04 [0.89]	0.02 [0.32]
FDI inflows to GDP	0.03 [0.28]	-0.04 [0.37]	-0.14 [0.94]	-0.41 [1.33]	0.02 [0.25]	-0.12 [1.09]	-0.11 [0.72]	-0.29 [1.06]
Aid inflows to GDP	0.04 [0.63]	0.16*** [2.62]	0.10 [1.25]	0.15 [1.20]	-0.01 [0.12]	0.09 [1.36]	0.05 [0.57]	0.08 [0.68]
Constant	-256.54*** [5.64]	-343.39*** [5.08]	-448.75*** [4.04]	-715.85*** [2.70]	-496.68*** [10.21]	-650.33*** [8.37]	-648.93*** [5.86]	-828.82*** [3.54]
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2027	1835	1871	1871	2029	1837	1878	1878
Number of countries	102	102	97	97	102	102	97	97
R-squared	0.84	0.86	0.71	0.35	0.76	0.76	0.61	0.31

sending countries (see columns (1), (2), (5) and (6)) and policies and views on immigration in these countries (see columns (3), (4), (7) and (8)). After instrumenting for remittances, we continue to find a positive association between remittances and both deposit and credit to GDP. Though the coefficients from the instrumental variable estimations are larger than those obtained in previous estimations, they are within a range that can be justified by the presence of measurement error in the remittance series.²³ Overall, these results suggest that the positive association between remittances and financial development is robust to corrections for potential endogeneity biases.

4. Conclusions

While the development potential of remittance flows has increasingly been recognized, the effect of remittances on financial development had remained largely unexplored. Better understanding the impact of remittances on financial development is important given the evidence on the growth-enhancing and poverty-reducing effects of financial development.

²³ Assuming that remittances are measured with error, it can be shown that the variance of the measurement error will be equal to the product of one minus the ratio of the biased estimate obtained from OLS regressions to the unbiased estimate of remittances obtained from IV estimations, multiplied by the variance of remittances (see Greene, 1993). Plugging our estimates in this formula, we obtain a measurement error well within the existing estimates of the size of informal remittances, which range between 50 and 250% of formal remittances (see Freund and Spatafora, 2008). Hence, we believe that the size of the IV coefficients is justified, given what they imply about the degree of measurement error in existing remittances data.

This paper tries to fill the gap in the literature. Using balance of payments data on remittance flows to 109 countries for the period 1975–2007, we investigate the link between remittances and financial development, focusing on the ratio of bank deposits and credit to GDP. We find a positive and significant association between remittances and financial sector development. This result is robust to using different estimation techniques and accounting for endogeneity biases arising from omitted factors, reverse causation, and measurement error. Overall, by finding that remittances are positively associated with bank deposits and credit, this paper highlights another potential channel through which remittances may have a positive influence on recipient countries' development. However, because concerns about the endogeneity of remittances remain, more research on the link between remittances and financial development is warranted.

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Appendix

Countries and periods included. Table shows the countries and periods included in our estimations. Countries with an asterisk next to their name are those for which Irving et al. (2010) confirm that data on remittances include funds transferred by banks as well as non-banking institutions (e.g., money transfer operators, exchange bureaus, credit unions, etc.).

Country	Years	Country	Years	Country	Years
Albania*	1995–2007	Guatemala	1978–2007	Pakistan	1977–2007
Armenia*	1996–2007	Guinea-Bissau*	1990–2003	Papua New Guinea	1977–2006
Bangladesh	1994–2007	Guyana	1995–2006	Paraguay*	1976–2007
Barbados*	1976–2003	Haiti*	1977–2007	Peru*	1992–2007
Belarus	1996–2003	Honduras*	1976–2007	Philippines*	1978–2007
Belize	1985–2007	Hungary	1996–2005	Poland*	1995–2005
Benin	1992–2006	India*	1976–2007	Romania*	1997–2005
Bolivia	1977–2007	Indonesia*	1984–2007	Russian Federation	1995–2005
Botswana	1976–2007	Iran	1990–2001	Rwanda*	1977–2005
Brazil	1980–2007	Jamaica*	1977–1998	Samoa*	1995–2004
Bulgaria	1992–2005	Jordan	1977–2007	Senegal*	1976–2007
Burkina Faso*	1976–2002	Kazakhstan	1996–2007	Seychelles	1990–2007
Cambodia	1996–2007	Kenya*	1976–2007	Sierra Leone*	1981–2007
Cameroon	1980–2007	Kyrgyz Rep.*	1996–2007	Slovak Republic	1994–2005
Cape Verde*	1988–2007	Lao PDR	1990–2007	Solomon Islands	2000–2007
Central African Republic	1982–1994	Latvia	1997–2005	South Africa	1994–2007
Chad	1986–1995	Lesotho	2000–2007	Sri Lanka	1976–2007
Chile*	1984–2007	Lithuania*	1995–2005	St. Lucia	1984–2007
China	1987–2003	Macedonia	1997–2007	St. Vincent	1987–2006
Colombia*	1976–2007	Madagascar	1976–2006	Sudan	1978–2001
Congo, Rep.	1996–2007	Malawi	1995–2003	Suriname	1979–2006
Costa Rica	1978–2007	Malaysia	1976–2007	Swaziland*	1976–2006
Cote d'Ivoire	1976–2007	Maldives	1998–2005	Syrian Arab Republic*	1978–2006
Croatia	1995–2007	Mali*	1988–2007	Tanzania*	1996–2007
Dominica	1987–2007	Mauritania	1986–1999	Thailand	1976–2007
Dominican Republic	1976–2007	Mauritius	1982–2007	Togo	1976–2007
Ecuador	1977–2007	Mexico*	1980–2007	Tonga	1987–2007
Egypt, Arab Rep.	1978–2007	Moldova*	1996–2007	Trinidad and Tobago	1976–2007
El Salvador*	1977–2007	Mongolia	1999–2007	Tunisia*	1988–2007
Estonia	1995–2005	Morocco*	1976–2007	Turkey	1981–2007
Ethiopia	1983–2007	Mozambique	1995–2006	Uganda*	2000–2007
Fiji*	1980–2006	Namibia	1991–2001	Ukraine	1997–2003
Gabon	1979–2006	Nepal*	1992–2007	Uruguay*	1980–2007
Gambia, The	1979–2006	Nicaragua*	1978–2005	Vanuatu*	1983–2007
Georgia	1998–2007	Niger*	1976–2006	Zimbabwe	1981–1995
Ghana*	1980–2006	Nigeria	1978–2007		
Grenada	1987–2007	Oman	1992–2006		

Variable definitions.

Variable	Definition	Source
Bank deposits to GDP (%)	Deposit money banks' deposits expressed as a percentage of GDP.	International Financial Statistics, IMF
Bank credit to GDP (%)	Deposit money banks' credit extended to the private sector expressed as a percentage of GDP.	Idem
Remittances to GDP (%)	Sum of remittances + migrant transfers + workers compensation. Variable is expressed as a percentage of GDP.	World Economic Outlook, 2005, IMF & World Development Indicators (WDI), World Bank
GDP per capita (in thousands US\$)	GDP per capita in thousand of constant 2000 US\$	WDI
Log of GDP (in constant US\$)	Log of GDP in constant 2000 US\$	Idem
Inflation (%)	GDP deflator (annual %)	Idem
Dual exchange rates	Dummy equals to 1 indicates the presence of multiple exchange rates.	Annual Report on Exchange Arrangements and Exchange Restrictions (IMF)
Exports to GDP (%)	Total exports expressed as percentage of GDP.	WDI
FDI inflows to GDP (%)	Foreign direct investment flows as a percentage of GDP	Balance of Payments Statistics (IMF)
Aid inflows to GDP (%)	Official development assistance and official aid expressed as percentage of GDP.	Idem
Portfolio inflows to GDP (%)	Portfolio Investment Liabilities expressed as percentage of GDP	Idem
GDP per capita in remittance-sending countries (in thousands)	GDP per capita of the five principal remittance-sending countries for each country in our sample, weighted by their share of remittances sent to these countries. Focusing on remittance-receiving country Z, and assuming that the top five remittance-sending countries to Z are countries A, B, C, D and E, the weighted GDP per capita is constructed as: Sum over i[GDP per capita for i * (remittances from i to Z)/(sum of remittances received by Z from A through E)], where i = A to E.	Bilateral remittance data from Ratha and Shaw (2007) . GDP per capita form WDI (World Bank)
Unemployment in remittance-sending countries	Unemployment rate of the five principal remittance-sending countries for each country in our sample, weighted by their share of remittances sent to these countries. Focusing on remittance-receiving country Z, and assuming that the top five remittance-sending countries to Z are countries A, B, C, D and E, the weighted Unemployment is constructed as: Sum over i [Unemployment for i * (remittances from i to Z)/(sum of remittances received by Z from A through E)], where i = A to E.	Bilateral remittance data from Ratha and Shaw (2007) . Unemployment form WDI (World Bank)

(continued on next page)

Appendix (continued)

Variable	Definition	Source
Views on immigration	Views on the immigration situation of the five principal remittance-sending countries for each country in our sample, weighted by their share of remittances sent to these countries. Focusing on remittance-receiving country Z, and assuming that the top five remittance-sending countries to Z are countries A, B, C, D and E, the weighted View on immigration variable is constructed as: $\text{Sum over } i[\text{View on immigration for country } i * (\text{remittances from } i \text{ to } Z) / (\text{sum of remittances received by } Z \text{ from } A \text{ through } E)]$, where $i = A \text{ to } E$.	Bilateral remittance data from Ratha and Shaw (2007) . View on immigration from World Population Policies (United Nations)
Policies on immigration	Desired policies on immigration of the five principal remittance-sending countries for each country in our sample, weighted by their share of remittances sent to these countries. Focusing on remittance-receiving country Z, and assuming that the top five remittance-sending countries to Z are countries A, B, C, D and E, the weighted Policy on immigration variable is constructed as: $\text{Sum over } i[\text{Policy on immigration for country } i * (\text{remittances from } i \text{ to } Z) / (\text{sum of remittances received by } Z \text{ from } A \text{ through } E)]$, where $i = A \text{ to } E$.	Bilateral remittance data from Ratha and Shaw (2007) . Policy on immigration from World Population Policies (United Nations)

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