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For developing countries, remittances are an important and expanding source of capital, equivalent to two-thirds of overall foreign direct investment and nearly 2 percent of gross domestic product.

This article examines the relationship between remittance inflows, financial sector development, and the real exchange rate. The authors test whether financial sector development can prevent appreciation of the real exchange rate. In particular, they show that well-developed financial sectors can more effectively channel remittances into investment opportunities.

Using panel data for 109 developing and transition countries for 1990–2003, the authors find that remittances by themselves tend to put upward pressure on the real exchange rate. But this effect is weaker in countries with deeper and more sophisticated financial markets, which seem to retain trade competitiveness.

JEL classification: F40, F41, O10
Key words: real exchange rate, remittances, financial development

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Over the past decade, the aggregate value of remittances to recipient countries has soared. For instance, in 2007 aggregate remittances peaked at $240 billion dollars, up from a mere $2.98 billion dollars in 1975 and $90 billion dollars in 2003 (World Bank 2008b). Official (recorded) remittances have surpassed total amounts of official development assistance and now represent approximately two-thirds of overall foreign direct investment (see Figure 1). Furthermore, remittances account for an estimated 1.9 percent of gross domestic product (GDP) in the developing world (World Bank 2008b). Thus, remittances have become an increasingly important source of external financing for developing countries.

Economists have thoroughly examined the micro and macro effects of migrant remittances on receiving countries. Research shows that remittances can increase physical and human capital for recipient households (Cox Edwards and Ureta 2003; Woodruff and Zenteno 2007; Fajnzylber and Lopez 2008; Yang 2008) and can reduce overall poverty levels (Adams and Page 2005; Acosta et al. 2008). More importantly for this article, remittances can exert pressure on the real exchange rate, leading to appreciation of the local currency (Amuedo-Dorantes and Pozo 2004; Acosta, Lartey, and Mandelman 2007; Lopez, Molina, and Bussolo 2007; Lartey, Mandelman, and Acosta 2008). Simply, this pressure on the real exchange rate is analogous to "Dutch disease" dynamics: Developing countries receive aggregate inflows from migrants working abroad, and this increase in financial capital puts upward pressure on recipient countries' local currency.

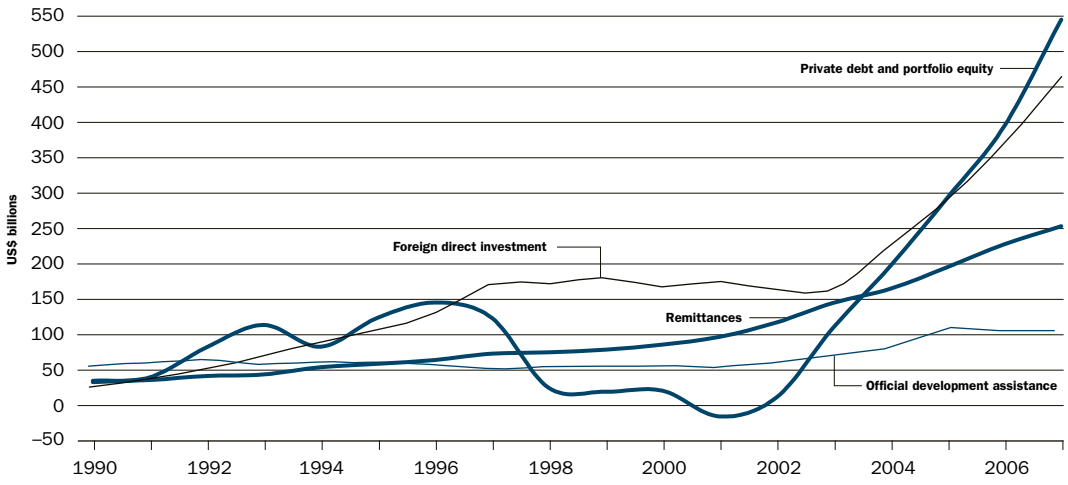
This effect stems from the fact that additional income in the form of remittances is mostly consumed, in particular on nontradable goods and services. If such funds were otherwise channeled through investment, the real exchange rate appreciation would attenuate or even disappear (Acosta, Lartey, and Mandelman 2007; Lopez, Molina, and Bussolo 2007). We argue in this article that such attenuation is dependent upon the level of financial development in the recipient country.

Several studies show that investment rates are typically higher in countries with a well-developed financial sector (King and Levine 1993; Levine and Zervos 1998; Levine, Loayza, and Beck 2000). Therefore, we expect that high-remittance recipient countries with comparatively better developed financial systems can more effectively direct remittance flows toward investment activities. We predict, therefore, that upward pressure on the real exchange rate is weaker in countries with comparatively better developed financial sectors. To the best of our knowledge, this study is the first to directly tackle the interactive relationship between remittances, the real exchange rate, and financial development in developing countries.

We contribute to the literature by specifying how financial development helps maintain a competitive exchange rate in an environment of growing remittances. Our results show that financial development can attenuate real exchange rate appreciation.

The article begins with a review of the literature on remittances, financial development, and the exchange rate. The next sections present the methodology, descriptive statistics, data, and empirical results. The article concludes with brief comments and policy recommendations.

Figure 1
Remittances and other capital flows to developing countries



Note: Data for 2007 are estimates.
Sources: International Monetary Fund (2008); World Bank (2005, 2008a, 2008c)

A review of other studies

Dutch disease and real exchange rate appreciation. The term *Dutch disease*, often used in the literature, generally refers to any upward pressure on the real exchange rate resulting from financial capital inflows such as foreign aid, natural resource booms, or, as we explore in this article, migrant remittances. Upward pressure on the exchange rate is thought to harm the tradable sector. This pressure can be explained using two different mechanisms.

The first mechanism is demonstrated in the Salter-Swan-Conder-Dornbusch model, which assumes that prices for tradable goods are exogenously determined. This model points to a "spending effect," by which the increase in wealth following higher capital inflows, combined with exogenous tradable prices, causes the prices of nontradable goods and services to rise. These higher prices lead to an expansion in the nontradable sector. By definition, an increase in the price of nontradables relative to the price of tradables translates into real exchange rate appreciation. The expansion of the nontradable sector creates a "resource movement effect," drawing additional resources toward the sector. Both the spending effect and the resource movement effect put upward pressure on the local currency (Corden and Neary 1982).

A second mechanism, discussed in Acosta, Lartey, and Mandelman (2007), is that remittances tend to increase household aggregate wealth. An increase in household wealth may lead to a decrease in labor supply as households substitute more leisure for work.[1] A shrinking labor supply, in turn, puts upward pressure on wages. Rising wages raise production costs, and higher production costs can lead to a further contraction of the tradable sector. Both the resource reallocation effects and the labor effects can cause an appreciation of the exchange rate, thereby reducing the international competitiveness of the tradable sector, and may lead to tradable sector contraction, higher wages, and higher production costs.

Empirical evidence seems to support both views. For instance, Amuedo-Dorantes and Pozo (2004), Rajan and Subramanian (2005), Winters and Martins (2005), and Lopez, Molina, and Bussolo (2007) all find that remittances can, in fact, cause real exchange rate appreciation. Other

1. Note that "leisure" is a catchall word for such nonemployment activities as investment in additional schooling and childcare.

studies test the hypothesis that remittances may lead to a decrease in the labor supply, finding empirical support in El Salvador (Acosta 2006), Mexico (Hanson 2007), and other countries in Latin America and the Caribbean (Fajnzylber and Lopez 2008).

Financial sector development. The literature on remittances and financial sector development presents myriad theoretical arguments and mixed statistical results. Researchers argue that remittances can contribute to financial sector development if recipients deposit remittances into domestic banks (Aggarwal, Demirgüç-Kunt, and Martinez Peria 2006; Fajnzylber and Lopez 2008). However, there is still a debate on whether the development impact of remittances is higher in more financially developed countries. While Mundaca (2005) shows that remittances' impact on growth increases with financial development, Giuliano and Ruiz-Arranz (2006) find evidence that remittances boost growth in countries with less developed financial systems. Giuliano and Ruiz-Arranz interpret their result by noting that remittances may provide an alternative way to finance investment and help overcome liquidity constraints. On the other hand, Alberola and Salvado (2006) and Freund and Spatafora (2008) argue that financial development and market competition stemming from additional bank entry can stimulate higher remittance flows to the country by reducing transaction costs.

What can help mitigate the loss of international competitiveness caused by the Dutch disease effects of remittances? In an attempt to integrate the aforementioned literature, we argue that financial sector development is important. Like Mundaca (2005), we expect that remittances can potentially increase growth, but we qualify her argument. Her conclusion may be true if the propensity to invest is great enough that the effect of remittances attenuates the exchange appreciation effects. In particular, we argue that a well-developed financial sector can help channel remittances into investment opportunities and that these new opportunities can lead to higher growth.

Our methodology, data, and descriptive statistics

Methodology. To test our hypothesis, we specify a model that uses a generalized method of moments (GMM) estimator, which is tailored to deal with potential endogeneity in all explanatory variables and thus helps account for unobserved determinants of real exchange rate evolution. Panel data estimation techniques test remittances' effect on real exchange rate appreciation. To address the impact of financial market development on the exchange rate, we use two measures—bank credit as a share of GDP and bank deposits as a share of GDP (see Aggarwal, Demirgüç-Kunt, and Martinez Peria 2006; Demirgüç-Kunt and Maksimovic 2001)—as proxies for financial development.

The dynamic equation is

$$(1)\quad y_{it} = \alpha' x_{it} + \beta' r_{it} + \delta' r_{it} * f_{it} + \theta' f_{it} + \eta_i + \lambda_t + \varepsilon_{it},$$

where y is the real exchange rate index, x represents a set of explanatory variables, r is remittance flows (as a share of GDP), f represents financial development (bank credit or deposits as a share of GDP), η is an unobserved country-specific effect, λ is a time-specific effect, and ε is the error term.

An identification problem may arise if some of the explanatory variables are correlated with the error term. To prevent this problem, we estimate all equations, including equation (1) and its first-differenced version as a system of equations, using the GMM system estimator, which allows for the use of lagged differences and lagged levels of the explanatory variables or other variables as instruments. In our case, we use both "internal" and "external" instruments. Since all of our internal instruments are likely to be correlated with the error term, we include the first lagged difference and the second lag level of all explanatory variables. Following Aggarwal, Demirgüç-Kunt, and Martinez Peria (2006), we also add two external instruments: the primary school enrollment rate and the weighted GDP per capita for each of the five main migrant host countries. We designate this model GMM-IV.

The validity of the lagged differences of the explanatory variables as instruments holds under two conditions: (1) that the differences of the explanatory variable and the errors are uncorrelated

and (2) that there is no serial correlation in the errors. Since the validity of instruments determines whether the GMM-IV estimator is consistent or not, we employ two specification tests: The standard Sargan test of overidentifying restrictions evaluates the null hypothesis that the instruments are valid overall. The Arellano and Bond (1991) test evaluates the null hypothesis that no second-order serial correlation exists in the differenced error term. Note that first-order correlation is expected in the differenced equation, even if the error term is uncorrelated, unless it follows a random walk. By contrast, the presence of second-order correlation indicates that serial correlation exists in the error term and that it follows a moving average process at least of order one.

As in Lopez, Molina, and Bussolo (2007) and Lartey, Mandelman, and Acosta (2008), we use a real effective exchange rate (REER) index as a measure of the real exchange rate. We begin with a nominal effective exchange rate index that is the ratio of a currency's period-average exchange rate over a weighted geometric average of exchange rates for the currencies of selected countries. These geometric averages are weighted by each country's trade in both manufactured goods and primary products. A REER index represents the nominal effective exchange rate index, adjusted for relative changes in consumer prices, a reasonable proxy of cost indicators for the home country. Since the REER is defined as the price of domestic goods relative to foreign goods, an increase in REER implies a real exchange rate appreciation.

Following Lartey, Mandelman, and Acosta (2008), other explanatory variables that enter our baseline model (vector x) include excess money growth, terms of trade, trade openness, GDP per capita, and GDP growth.

Excess money growth can put upward pressure on the prices of nontradable goods, which may produce inflationary tendencies in the economy and independently cause an appreciation of the real exchange rate. Variations in the external terms of trade can also alter the real exchange rate. For instance, a positive shock to the price of exports relative to imports may result in a real exchange rate appreciation.

The trade openness variable proxies trade restrictions and captures how such policies influence the real exchange rate through their impact on the price of nontradables. For instance, an increase in import tariffs raises the price of imported goods, which can affect prices of nontradables through income and substitution effects. The negative income effect from higher import prices may decrease demand for all goods and services, putting downward pressure on the prices of nontradable goods. Downward pressure in nontradable prices can cause a depreciation of the real exchange rate. The substitution effect, on the other hand, may cause an increase in demand for nontradables as consumers switch away from imported goods. This substitution effect would boost the price of nontradables and could cause the real exchange rate to appreciate. Some studies have argued that the substitution effect is likely to dominate; therefore, a tightening of trade restrictions can cause a real exchange rate appreciation (Edwards 1989). We account for this argument in our model.

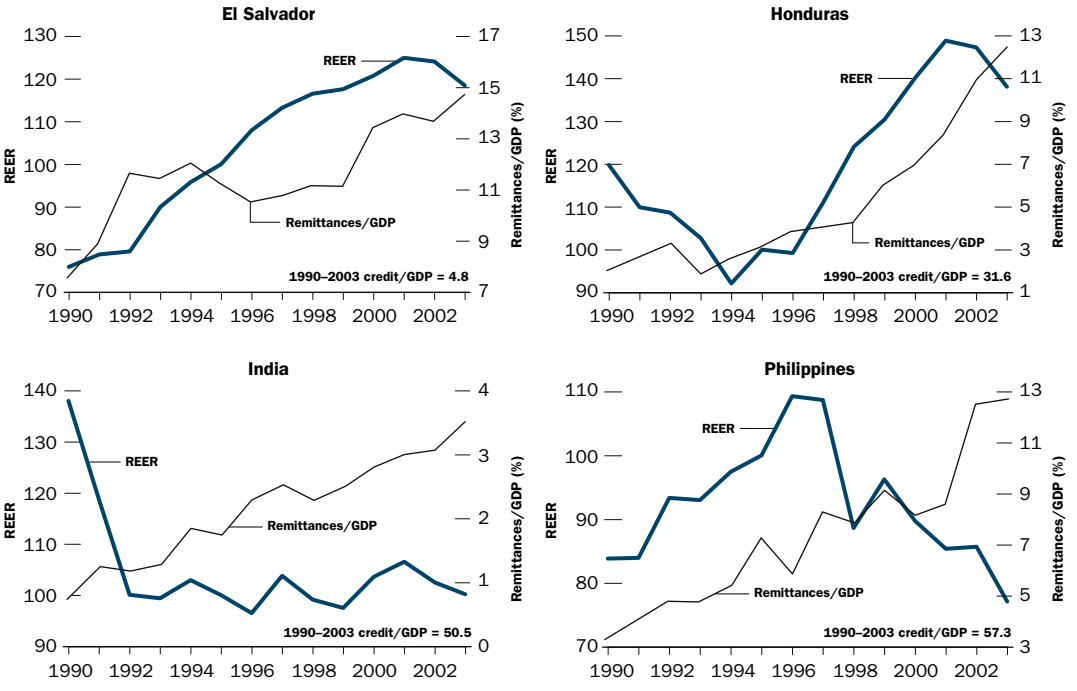
Finally, higher GDP per capita is expected to increase incomes and hence increase demand for nontradables. However, recent experiences in emerging economies indicate that intermittent periods of large portfolio capital inflows are associated with a consumption boom, very robust GDP growth, increasing demand for imports, and sizable trade deficits (Kaminsky, Reinhart, and Végh 2004). In general, an overexpansion in the economy is often followed by currency depreciation in order to correct any external deficits. With this tendency in mind, we also control for GDP growth.

Data. We use an unbalanced panel data set comprising 109 developing and transition countries for the period 1990–2003. Countries were selected based on data availability, and we use only countries that have at least three consecutive years of information available on remittance flows. Table 1 reports country and period coverage. Although we have 1,370 country-year observations with remittance data, sample sizes are typically smaller in the regressions that follow and depend on the availability of covariates included. Remittance data are from the World Bank (2008b); REERs are from International Financial Statistics (International Monetary Fund); the remaining data are from the World Bank (2008c). GDP per capital is reported in constant (2000) U.S. dollars.

Table 1
Coverage for remittance data

Country	Year coverage	Country	Year coverage
Albania	1992–2003	Macedonia, FYR	1993–2003
Antigua and Barbuda	1990–2003	Madagascar	1990–2003
Argentina	1992–2003	Malawi	1994–2003
Armenia	1995–2003	Malaysia	1990–2003
Azerbaijan	1995, 1998–2003	Mali	1990–2003
Bangladesh	1990–2003	Mauritania	1990–2003
Barbados	1990–2003	Mauritius	1990–2003
Belarus	1993–2003	Mexico	1990–2003
Belize	1990–2003	Moldova	1995–2003
Benin	1990–2003	Mongolia	1998–2003
Bolivia	1990–2003	Morocco	1990–2003
Botswana	1990–2003	Mozambique	1990–2003
Brazil	1990–2003	Myanmar	1990–2003
Bulgaria	1996–2003	Namibia	1990–2003
Burkina Faso	1990–2003	Nepal	1993–2003
Cambodia	1992–2003	Nicaragua	1992–2003
Cameroon	1990–2003	Niger	1990–2003
Cape Verde	1990–2003	Nigeria	1990–2003
China	1990–2003	Oman	1990–2003
Colombia	1990–2003	Pakistan	1990–2003
Comoros	1990–2003	Panama	1990–2003
Congo, Rep.	1995–2003	Papua New Guinea	1990–2003
Costa Rica	1990–2003	Paraguay	1990–2003
Cote d'Ivoire	1990–2003	Peru	1990–2003
Croatia	1993–2003	Philippines	1990–2003
Dominica	1990–2003	Poland	1994–2003
Dominican Republic	1990–2003	Romania	1994–2003
Ecuador	1990–2003	Russian Federation	1994–2003
Egypt, Arab Rep.	1990–2003	Samoa	1990–2003
El Salvador	1990–2003	Sao Tome and Principe	1990, 1998–2003
Estonia	1994–2003	Senegal	1990–2003
Ethiopia	1990–2003	Sierra Leone	1990–2003
Fiji	1990–2003	Slovak Republic	1990–2003
Gabon	1995–2003	South Africa	1990–2003
Ghana	1990–2003	Sri Lanka	1990–2003
Grenada	1990–2003	St. Kitts and Nevis	1990–2003
Guatemala	1990–2003	St. Lucia	1990–2003
Guinea	1994–2003	St. Vincent and the Grenadines	1990–2003
Guyana	1992–2003	Sudan	1990–2003
Haiti	1990–2003	Swaziland	1990–2003
Honduras	1990–2003	Syrian Arab Republic	1990–2003
Hungary	1995–2003	Tajikistan	1997–2003
India	1990–2003	Tanzania	1995–2003
Indonesia	1990–2003	Thailand	1990–2003
Iran, Islamic Rep.	1991–2003	Togo	1990–2003
Jamaica	1990–2003	Trinidad and Tobago	1990–2003
Jordan	1990–2003	Tunisia	1990–2003
Kazakhstan	1995–2003	Turkey	1990–2003
Kenya	1990–2003	Uganda	1999–2003
Kyrgyz Republic	1993–2003	Ukraine	1996–2003
Lao PDR	1990–2003	Vanuatu	1990–2003
Latvia	1996–2003	Venezuela, RB	1990–2003
Lebanon	1990–2003	Yemen, Rep.	1990–2003
Lesotho	1990–2003	Zimbabwe	1990–1994
Lithuania	1993–2003		

Figure 2
Remittances and real effective exchange rate evolution for selected countries



Source: International Monetary Fund (2008) and World Bank (2008b, 2008c)

Descriptive statistics. Figure 2 shows preliminary evidence of real exchange rate appreciation following an increase in remittance flows. The figure breaks down countries with both well-developed and underdeveloped financial sectors and illustrates the evolution of the REER between 1990 and 2003 in four high-remittance recipient countries: El Salvador (remittances representing 14.7 percent of GDP in 2003), Honduras (12.4 percent of GDP in 2003), India (3.5 percent), and the Philippines (13 percent). In the first two countries, where bank credit amounts to less than 32 percent of GDP, a clear positive relationship exists between remittance flows and real exchange rate appreciation. However, for the latter two countries, with bank credit surpassing 50 percent of GDP, such a relationship no longer holds. Even though remittances have been increasing steadily in the sample period, the REER evolution has been erratic in India and the Philippines.

Table 2 shows descriptive statistics for the sample. In all developing regions, remittances have increased in absolute terms and as a share of GDP in the last decade. In particular, between 1995 and 2003 remittance flows increased threefold in East Asia as well as in the Pacific and South Asia and more than doubled in Latin American and Caribbean countries. At the same time, developing countries have on average experienced real exchange rate appreciation. A simple average of East Asian and Pacific currencies shows an appreciation of around 41 percent between 1995 and 2003, while for other developing regions currencies have appreciated on average between 1.6 percent and 17.9 percent during the same period. A priori, no relationship seems to exist between bank credit and bank deposit levels and real exchange rate appreciation. East Asia and the Pacific and the Middle East and Northern Africa regions stand out in terms of financial development in comparison with the rest of the developing world.

The next section clarifies whether this relationship can be generalized and whether the correlation remains valid after controlling for other macroeconomic variables and after accounting for endogeneity.

Table 2
Summary statistics by region, 1995–2003

Region	Countries	Total remittances (US$mil) 1995	Total remittances (US$mil) 2003	Remittances/GDP 1995	Remittances/GDP 2003	REER appreciation (%), 1995–2003	Bank credits/GDP 1995	Bank credits/GDP 2003	Bank deposits/GDP 1995	Bank deposits/GDP 2003
East Asia and the Pacific	13	9,690	32,500	0.78	1.66	40.79	50.12	62.65	43.33	56.36
Eastern Europe and Central Asia	21	7,970	12,100	0.85	0.96	14.16	28.70	31.99	20.72	27.62
Latin America and the Caribbean	28	13,400	34,900	0.85	2.13	2.85	50.81	52.75	33.30	39.14
Middle East and North Africa	9	11,600	18,100	4.75	5.20	17.92	64.43	79.16	44.49	56.60
South Asia	5	10,000	30,400	2.12	4.08	1.57	39.68	46.24	28.74	41.55
Sub-Saharan Africa	33	3,150	5,730	1.07	1.55	1.85	26.22	25.80	18.56	24.17
Total	109	57,805	133,730	1.17	2.12	10.43	39.74	43.50	28.89	37.71

Note: Remittance figures correspond to total flows received by the region. REER appreciation, bank credit, and bank deposit figures correspond to country simple averages in each region.
Source: World Bank (2008b, 2008c) and International Finance Statistics (International Monetary Fund)

Our empirical results

Table 3 presents ordinary least squares (OLS) country fixed-effects results where the dependent variable is the real exchange rate index. Control variables include GDP per capita, M2 (a monetary aggregate) as a percent of GDP, a terms-of-trade index (goods and services), trade openness (the sum of exports and imports as a percent of GDP), GDP growth (as a percentage), and year indicators. A positive coefficient shows that an increase in the variable causes a real exchange rate appreciation. The first column shows that an increase of 1 percentage point in the remittances-to-GDP ratio generates a real exchange rate appreciation of 0.4 percentage points, with the coefficient being statistically significant at a 10 percent level. The other covariates exhibit the expected signs, and most of them are statistically significant as well, with the exception of trade openness and excess money growth.

We then introduce measures of financial development, both solely and interacted with remittances. The first proxy variable for financial development, the ratio of bank credit to GDP, is shown in the second column of Table 3. While remittances by themselves tend to cause the real exchange rate to appreciate, in countries with higher credit such an effect is attenuated. A similar conclusion is reached when the variable measuring financial access is bank deposits to GDP (results shown in the third column).

As mentioned in the previous section, our estimates could be biased if any explanatory variable is correlated with unobserved time-varying determinants of real exchange rate evolution. Therefore, we employ the GMM-IV system estimator (with both internal and external instruments), and Table 4 presents results analogous to those in Table 3. In all considered specifications, the estimations satisfy the Sargan test for overidentifying restrictions and the serial correlation tests, indicating that the internal and external instruments included are valid. The large number of explanatory variables, accompanied by a relatively large p-value for the Sargan test estimates, raises a concern about a potential overfitting bias. However, we found no clear pattern in the coefficient estimates when we reduced or increased the number of instruments.[2]

The results reported in Table 4 suggest that a 1 percentage point increase in remittances causes the average currency to appreciate by 0.29 percentage points. This impact is smaller compared with

2. An interesting observation from the GMM estimation is the negative coefficient on GDP growth, in contrast to the positive sign in the OLS fixed-effects estimation. While the basic OLS model probably describes the standard association between economic growth and real exchange rate appreciation, the GMM coefficient captures the isolated exogenous impact of economic growth on real exchange rates, which in this case is negative. The GMM finding is consistent with the aforementioned argument.

Table 3
Fixed effects estimation for remittances, financial development, and the real exchange rate (dependent variable is the real exchange rate index)

Variables	(1)	(2)	(3)
Remittances (% GDP)	0.403*	1.773***	3.426***
	(0.239)	(0.416)	(0.800)
Bank credits (% GDP)		0.060	
		(0.047)	
Remittances (% GDP) * bank credits (% GDP)		–0.017***	
		(0.004)	
Bank deposits (% GDP)			0.010
			(0.189)
Remittances (% GDP) * bank deposits (% GDP)			–0.043***
			(0.016)
GDP per capita (US$000s)	10.882***	9.376***	11.773***
	(3.125)	(3.122)	(3.363)
M2 (% GDP)	0.143	0.223*	0.267
	(0.095)	(0.114)	(0.199)
Terms of trade (goods and services)	0.289***	0.288***	0.385***
	(0.034)	(0.034)	(0.048)
Trade openness (X + M/GDP)	0.038	0.018	0.043
	(0.055)	(0.054)	(0.062)
GDP growth (%)	0.199***	0.191***	0.203***
	(0.048)	(0.048)	(0.053)
Year indicators	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes
Observations	884	882	748

Note: *** denotes significance at the 1 percent level; **, significance at the 5 percent level; and *, significance at the 10 percent level. Standard errors are shown in parentheses.

the fixed-effects estimate (column 1 in Table 3) although it is still statistically significant at a 1 percent level. Column 2 confirms the aforementioned result: A country with higher bank credit as a percentage of GDP can assuage exchange rate appreciation. For instance, an increase of 1 percentage point in the ratio of remittances to GDP in a country where bank credit represents 20 percent of GDP generates a currency appreciation of 0.422 percentage points (0.542 – 0.006 * 20). However, a similar increase in a country with 60 percent of bank credit/GDP causes the real exchange rate to appreciated only 0.185 percentage points (0.542 – 0.006 * 60). Also note that, for a given remittance level, an increase in bank credit/GDP would generate depreciation in the real exchange rate; this effect is statistically significant at the 1 percent level.

Table 4
GMM-IV system estimation for remittances, financial development, and the real exchange rate (dependent variable is the real exchange rate index)

Variables	(1)	(2)	(3)
Remittances (% GDP)	0.294***	0.542***	2.428**
	(0.069)	(0.161)	(0.082)
Bank credits (% GDP)		–0.043***	
		(0.013)	
Remittances (% GDP) * bank credits (% GDP)		–0.006**	
		(0.003)	
Bank deposits (% GDP)			–0.128
			(0.134)
Remittances (% GDP) * bank deposits (% GDP)			–0.032**
			(0.015)
GDP per capita (US$000s)	0.810***	1.112***	1.212***
	(0.241)	(0.297)	(0.395)
M2 (% GDP)	–0.120***	–0.036	0.079
	(0.024)	(0.035)	(0.116)
Terms of trade (goods and services)	0.384***	0.378***	0.554***
	(0.013)	(0.014)	(0.032)
Trade openness (X + M/GDP)	0.232***	0.216***	0.128***
	(0.015)	(0.017)	(0.025)
GDP growth (%)	–0.210***	–0.187***	0.025
	(0.043)	(0.035)	(0.034)
Year indicators	Yes	Yes	Yes
Observations	884	882	748
Sargan test	0.978	1.000	1.000
AR(1)	0.004	0.004	0.001
AR(2)	0.120	0.166	0.268

Notes: *** denotes significance at the 1 percent level; **, significance at the 5 percent level; and *, significance at the 10 percent level. Standard errors are shown in parentheses. The estimation is two-step. Instruments include the first lagged difference and the second lagged level of remittances, bank credits, bank deposits, GDP per capita, M2, terms of trade, trade openness, and GDP growth, as well as the first lagged level of two external instruments—primary school enrollment rates and weighted GDP per capita of the five main migrant host countries (weighted by migrant stocks).

We obtain similar results when the variable measuring financial development is the ratio of bank deposits to GDP. A country with 20 percent of bank deposits to GDP raises the currency approximately 1.788 percentage points. On the other hand, this effect diminished to 0.508 in a country with 60 percent of bank deposits to GDP. Therefore, our results support the hypothesis that financial sector development can help mitigate any real exchange rate appreciation generated by additional remittance flows.

Table 5
GMM-IV system estimation for remittances, credit, legal origin, and the real exchange rate (dependent variable is the real exchange rate index)

	Sample	
Variables	**British legal origin**	**Non-British legal origin**
Remittances (% GDP)	–1.120	2.435***
	(2.528)	(0.561)
Bank credits (% GDP)	–0.401***	0.077
	(0.107)	(0.050)
Remittances (% GDP) * bank credits (% GDP)	0.033	–0.032***
	(0.039)	(0.007)
GDP per capita (US$000s)	3.966***	1.685**
	(1.388)	(0.799)
M2 (% GDP)	0.648**	0.203***
	(0.275)	(0.076)
Terms of trade (goods and services)	0.380***	0.282***
	(0.132)	(0.036)
Trade openness (X + M/GDP)	0.020	0.200***
	(0.075)	(0.034)
GDP growth (%)	0.521***	–0.186***
	(0.147)	(0.060)
Year indicators	Yes	Yes
Observations	307	575
Sargan test	1.000	1.000
AR(1)	0.002	0.054
AR(2)	0.079	0.523

Notes: *** denotes significance at the 1 percent level; **, significance at the 5 percent level; and *, significance at the 10 percent level. Standard errors are shown in parentheses. The estimation is two-step. Instruments include the first lagged difference and the second lagged level of remittances, bank credits, GDP per capita, M2, terms of trade, trade openness, and GDP growth, as well as the first lagged level of two external instruments—primary school enrollment rates and weighted GDP per capita of the five main migrant host countries (weighted by migrant stocks).

Finally, we ask whether these results hold for countries with legal systems of different origins. It is often argued that countries with a British-origin legal system have a long tradition in finance and that this tradition enables the countries to be more efficient in channeling funds into investment activities through the financial sector. If this argument is true, we would expect remittance recipient countries with British-origin legal systems to more effectively channel capital into investment needs. These countries, therefore, should be less likely to exhibit currency appreciation upon receiving higher remittance flows. We divide the sample between countries with legal systems of either British or non-British origin; Table 5 reports results for both subsamples. The countries with British ties do not seem to exhibit local currency appreciation of the same magnitude as the countries without British legal traditions.

Conclusion

We study the effect of remittances on the real effective exchange rate conditional on the level of financial sector maturity. Like several other studies, our study argues that remittances can raise the exchange rate. We argue, however, that how much the local currency appreciates depends on how well the domestic economy can channel the remitted capital into new investments. Thus, countries with deeper and more sophisticated financial markets should help assuage the appreciation effects of remittances on the local currency.

We find empirical support for this hypothesis, with robust results using a variety of measures and an assortment of different econometric model specifications. Moreover, our argument can be generalized. The financial sector mitigates local currency appreciation, helping to keep the domestic economy internationally competitive. In addition, financial market development may prove to be a key way to manage Dutch disease effects more broadly. Our empirical findings are relevant for scholars interested in aggregate capital movements, their distributional consequences for domestic sectors within the economy, and management of the exchange rate.

References

Acosta, Pablo. 2006. Labor supply, school attendance, and remittances from international migration: The case of El Salvador. World Bank Policy Research Working Paper 3903, April 1.

Acosta, Pablo, Cesar Calderón, Pablo Fajnzylber, and Humberto Lopez. 2008. What is the impact of international remittances on poverty and inequality in Latin America? *World Development* 36, no. 1:89–114.

Acosta, Pablo A., Emmanuel K.K. Lartey, and Federico S. Mandelman. 2007. Remittances and the Dutch disease. Federal Reserve Bank of Atlanta Working Paper 2007-8, April.

Adams, Richard H., Jr., and John Page. 2005. Do international migration and remittances reduce poverty in developing countries? *World Development* 33, no. 11:1645–69.

Aggarwal, Reena, Asli Demirgüç-Kunt, and Maria Soledad Martinez Peria. 2006. Do workers' remittances promote financial development? World Bank Policy Research Working Paper 3957, July 1.

Alberola, Enrique, and Rodrigo César Salvado. 2006. Banks, remittances and financial deepening in receiving countries: A model. Banco de España Working Paper 621.

Amuedo-Dorantes, Catalina, and Susan Pozo. 2004. Workers' remittances and the real exchange rate: A paradox of gifts. *World Development* 32, no. 8:1407–17.

Arellano, Manuel, and Stephen Bond. 1991. Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *Review of Economic Studies* 58, no. 2:277–97.

Corden, W. Max, and J. Peter Neary. 1982. Booming sector and de-industrialisation in a small open economy. *Economic Journal* 92, no. 368:825–48.

Cox Edwards, Alejandra, and Manuelita Ureta. 2003. International migration, remittances, and schooling: Evidence from El Salvador. *Journal of Development Economics* 72, no. 2:429–61.

Demirgüç-Kunt, Asli, and Vojislav Maksimovic. 2001. Firms as financial intermediaries: Evidence from trade credit data. World Bank Policy Research Working Paper Series 2696, October.

Edwards, Sebastian. 1989. Exchange rate misalignment in developing countries. *World Bank Research Observer* 4, no. 1:3–21.

Fajnzylber, Pablo, and J. Humberto Lopez, eds. 2008. *Remittances and development: Lessons from Latin America*. Washington, D.C.: World Bank.

Freund, Caroline, and Nikola Spatafora. 2008. Remittances, transaction costs, and informality. *Journal of Development Economics* 86, no. 2:356–66.

Giuliano, Paolo, and Marta Ruiz-Arranz. 2006. Remittances, financial development, and growth. IZA (Institute for the Study of Labor) Discussion Paper 2160, June.

Hanson, Gordon H. 2007. Emigration, remittances and labor force participation in Mexico. *Integration and Trade Journal* no. 27 (July–December): 73–103.

International Monetary Fund. 2008. *Balance of payments statistics yearbook*. Washington, D.C.: IMF.

Kaminsky, Graciela L., Carmen M. Reinhart, and Carlos A. Végh. 2004. When it rains, it pours: Procyclical capital flows and macroeconomic policies. NBER Working Paper 10780, September.

King, Robert G., and Ross Levine. 1993. Finance and growth: Schumpeter might be right. *Quarterly Journal of Economics* 108, no. 3:717–37.

Lartey, Emmanuel K.K., Federico S. Mandelman, and Pablo A. Acosta. 2008. Remittances, exchange rate regimes, and the Dutch disease: A panel data analysis. Federal Reserve Bank of Atlanta Working Paper 2008-12, March.

Levine, Ross, Norman Loayza, and Thorsten Beck. 2000. Financial intermediation and growth: Causality and causes. *Journal of Monetary Economics* 46, no. 1:31–77.

Levine, Ross, and Sara Zervos. 1998. Stock markets, banks, and growth. *American Economic Review* 88, no. 3:537–58.

Lopez, Humberto, Luis Molina, and Maurízio Bussolo. 2007. Remittances and the real exchange rate. World Bank Policy Research Working Paper 4213, April 1.

Mundaca, Gabriela. 2005. Can remittances enhance economic growth? The role of financial markets development. University of Oslo. Photocopy.

Rajan, Raghuram G., and Arvind Subramanian. 2005. What undermines aid's impact on growth? NBER Working Paper 11657, October.

Winters, L. Alan, and Pedro M.G. Martins. 2004. When comparative advantage is not enough: Business costs in small remote economies. *World Trade Review* 3, no. 3:347–83.

Woodruff, Christopher, and Rene Zenteno. 2007. Migration networks and microenterprises in Mexico. *Journal of Development Economics* 82, no. 2:509–28.

World Bank. 2005. *Global economic prospects 2006: Economic implications of remittances and migratio*n. Washington, D.C.:IMF.

———. 2008a. *Global development finance 2008*. Washington, D.C.:World Bank.

———. 2008b. *Migration and remittances factbook 2008*. Washington, D.C.: World Bank.

———. 2008c. *World development indicators 2008*. Washington, D.C.:World Bank.

Yang, Dean. 2008. International migration, remittances, and household investment: Evidence from Philippine migrants' exchange rate shocks. *Economic Journal* 118, no. 528:591–630.