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Are Bilateral Remittances Countercyclical?

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Abstract

By putting together a relatively large data set on bilateral remittances of emigrants, this paper is able to shed light on the important hypothesis of smoothing. The smoothing hypothesis is that remittances are countercyclical with respect to income in the worker's country of origin (the recipient of the remittance), while procyclical with respect to income in the migrant's host country (the sender of the remittance). The econometric results confirm the hypothesis. This affirmation of smoothing is important for two reasons. First, it suggests that remittances should be placed on the list of criteria for an optimum currency area. Second, it brings into doubt plans by governments in some developing countries to harness remittances for their own use, in that government spending in these countries generally fails the test of countercyclicity which remittances pass.

JEL Classification number: F24

Key words: Migration, emigrant, immigrant, remittance, currency union, international, procyclical, countercyclical, economic development

Are Bilateral Remittances Countercyclical?

It has been remarked that the economic theory of migration tends to fall between the two stools of international trade¹ and labor economics.² But the connection to a third stool has in the past been especially under-studied: international finance and macroeconomics. The research described here concerns macroeconomic aspects of migrants' remittances.

Remittances are a large and growing source of foreign exchange in many developing countries. Total recorded workers' remittances received by developing countries increased 73% between 2001 and 2005, reaching a total of \$167 billion.³ By 2008 they had doubled to \$338 billion.⁴ Remittances have grown more rapidly than private capital flows, or official development assistance. They constitute more than 15% of GDP in Tonga, Moldova, Lesotho, Haiti, Bosnia, Jordan, Jamaica, Serbia, El Salvador and Honduras. In places like the Philippines, El Salvador, the Caribbean, and North Africa, remittances can be the most important single source of foreign exchange. Remittances constitute a particularly valuable component of the balance of payments in downturns, when markets in locally produced commodities are depressed or when international investors have lost interest.

1. The Hypothesis

The hypothesis of this study is that remittances for some countries can play the role that capital flows are in theory supposed to play. In theory, the increased integration of developing countries into the world financial system should have carried a variety of benefits: smoothing short-term income disturbances, diversification, helping to finance high-return investment opportunities in low capital/labor ratio countries, and disciplining policies and institutions in the recipient country. It is sometimes possible to observe these theoretical benefits in operation. In practice, however, capital flows have -- as often as not -- failed to deliver on this promise.⁵ Rather than smoothing short-term disturbances such as fluctuations on world markets for a country's export commodities, private capital flows are often procyclical: pouring in during boom times and

¹ Among trade economists, the subject goes back at least to Bhagwati and Hamada (1974).

² Rapoport and Docquier (2005) review the theory that has been developed as part of the New Economics of Labor Migration. Recent contributions include Özden and Schiff (2006) and Kugler and Rapoport (2007).

³ Statistics cited here come from "Economic Implications of Remittances and Migration" in *Global Economic Prospects 2006*, World Bank, pp. 86-92.

⁴ Sanket Mohapatra and Dilip Ratha, "Impact of the Global Financial Crisis on Migration and Remittances," *Economic Premise*, World Bank Feb. 2010, 2.

⁵ Prasad, Rogoff, Wei, and Kose (2003); Prasad, Rogoff, Wei and Kose (2004); Prasad and Rajan (2008).

disappearing in recessions.⁶ Rather than flowing on average from high capital/labor countries (e.g., the US) to low capital/labor countries, the tendency has been for capital often to “flow uphill.”⁷ Rather than rewarding only countries that follow sound economic policies and punishing only those that follow bad policies, capital sometimes aids and abets irresponsible budget deficits, including among autocratic and kleptocratic rulers, especially if they have control of a natural resource.⁸

What reasons are there, a priori, for thinking that remittances might be better than capital flows in delivering the benefits of smoothing, diversification, financing high-return investment opportunities, and disciplining policies? The sending of remittances is a decentralized decision made by individuals, based on a familiarity with and appreciation for the needs, desires, constraints, and opportunities faced by themselves and their families. These private individuals do not have the government’s problem of needing to spend money in the short-term to win re-election or stave off coups. They are more likely than a central government to know which family members are in truly desperate circumstances through no fault of their own, or in which households the husband will “drink away” the money, or to know whether it makes sense to save up to buy a house or store or establish some other small business. Theory says that private agents do a good job of making these decisions. In the case of private capital flows, historical and statistical evidence casts doubt on this claim. In the case of emigrants’ remittances, it seems more likely to be true.

The World Bank (2006; Box 4.5) argues “In contrast [to oil windfalls], remittances are widely dispersed, the great bulk of them is allocated in small amounts, and for the most part, remittances avoid the government ‘middleman.’ Hence the expectation is that they can avoid the negative effects of natural resource windfalls on poverty, growth, and institutional capacity.” But so far this proposition is more of an assertion than a hypothesis that has been widely and successfully tested empirically.

This hypothesis is especially important because many governments in remittance-receiving countries reflexively treat remittances as a source of foreign exchange that needs to be harnessed for national development,⁹ rather than letting the recipients spend it on “unproductive” uses such as imports of consumer goods. This rhetoric is common even among benevolent governments, let alone the kleptocracies. Some observers have suggested that private citizens might do a good job determining and disposing of

⁶ Kaminsky, Reinhart, and Vegh (2005); Reinhart and Reinhart (2009); Perry (2009); Gavin, Hausmann, Perotti and Talvi (1996); Mendoza and Terrones(2008).

⁷ Lucas (1990); Alfaro, Kalemli-Ozcan and Volosovych (2005); Gourinchas and Jeanne (2007); Prasad, Rajan, and Subramanaian (2007); Kalemli-Ozcan, Reshef, Sorensen, and Yosha (2009).

⁸ E.g., Lane and Tornell (1998).

⁹ Chami, Fullenkamp and Jahjah (2005).

remittances.¹⁰ But the proposition remains a hope or assertion that has been expressed, as much as a hypothesis that has been empirically demonstrated. It remains in need of testing. If the hypothesis is true, then efforts by national governments to harness remittances are likely to be harmful, above and beyond the obvious point that taxing them could “kill the goose” that is flying the golden eggs into the country. Government spending in developing countries tends to be procyclical, not countercyclical.¹¹

The specific hypothesis to be tested in this paper is that emigrants’ remittances are counter-cyclical: that they increase when the country of origin (the recipient of the remittances) is in relative recession and decrease relatively when the origin country has above-trend relative income. Under this hypothesis, remittances tend to smooth consumption and investment intertemporally. As mentioned, this is a criterion that private capital flows usually fail. For remittances, the countercyclical hypothesis has been tested by others, and has sometimes been found wanting. But some of these papers are missing something. For one thing, many simply do not have enough data. To specify an equation well-targeted to isolate the question of interest, it is best to use bilateral remittance data. Yet such data are hard to come by; most countries don’t collect or report them at all.¹² As a result, studies of bilateral remittances often have an inadequate number of observations. The other item missing in some studies is the cyclical position of the host country, which should matter just as much as the cyclical position of the country of origin. If the recipient’s income is included without the sender’s, one can estimate a coefficient of the wrong sign, when the recipient’s income is highly correlated with the sender’s (for example due to dependence on exports or other channels).

Indeed the countercyclical hypothesis is equally of interest with respect to countries that are net *hosts* to immigrants (net senders of remittances) as for the counterparty countries (the recipients of remittances). Not all of these hosts are industrialized countries.¹³ If the inward flow of migrants and the outward payment of

¹⁰ Chami, Barajas, Cosimano, Fullenkamp, Gapen and Montiel (2008) see macroeconomic advantages of remittances of the sort considered here. Martin (1990), on the other hand, points out that a steady flow of remittances can undermine the incentive for governments to create a sound institutional framework – a sort of natural resource curse for remittances.

¹¹ Talvi and Végh (2005); Gavin and Perotti (1997); Alesina, Campante and Tabellini (2008).

¹² Jiménez-Martin, Jorgensen, and Labeaga (2007) estimate bilateral workers’ remittance flows from the 27 members of the EU, to all recipient countries. Ratha and Shaw (2005), in the absence of hard data on bilateral flows, allocate the totals across partners.

¹³ Roughly 10 per cent come from developing countries. South Africa, for example, receives many immigrants from neighboring countries to work in its mines, farms, and factories, and sends remittances back to the home countries. In many Gulf countries, immigrants (called *ex-patriate* workers) constitute more than half of the private-sector labor force, both skilled and unskilled. For example, outward remittances from Saudi Arabia (not included in the developing country statistic) are about 7% of all remittances globally.

remittances is especially high in boom times and lower than average in bad times, this can be an important macroeconomic stabilizer. In the boom times it means alleviation of potential labor shortages and less danger of excessive monetary expansion, overheating, and inflation.¹⁴ In the down times it means alleviation of domestic unemployment and a needed improvement in the balance of payments.

We have already mentioned one motivation for exploring the cyclical pattern of remittances: it is an indication whether they play the role of improving intertemporal welfare that capital flows are supposed to play in theory, but fail to provide in practice. The procyclicality of capital flows is sometimes, for shorthand, given the name Dutch Disease (an analogy with the side-effect of inflows during commodity booms, which in turn first got its name from the discovery of offshore natural gas by the Netherlands). This paper also has a second motivation: to shed light on the decision of countries to adopt a common currency.

There are two possible relationships between the currency union decision and remittances. On the one hand, a likely benefit of adopting the currency of an important neighbor is to facilitate the payment of remittances. One would like to test that bilateral currency links promote bilateral remittances, in the same way that Rose (2000) famously discovered that they promote bilateral trade. On the other hand, if remittances are indeed counter-cyclical, then they belong on the list of Optimum Currency Area criteria.¹⁵ Optimum Currency Area theory (OCA) says that the gains to a country of giving up its currency (particularly the facilitation of trade and other international transactions) outweigh the costs of losing monetary independence (which is losing the ability to respond to shocks) only if its shocks are highly correlated with those of the relevant neighbors *or* if it has alternative mechanisms to cushion itself against the effects of asymmetric shocks.¹⁶ The list of alternative cushioning mechanisms is headed by labor mobility, followed by possible international transfers or other financial flows. If remittances are countercyclical, then they belong on this list of OCA criteria, and for some countries would be more important than the international transfers.

2. Previous Studies

Where earlier authors have findings, the results are interesting, but mixed. On the one hand, Rajan and Subramanian (2005) find that although the Dutch Disease analogy does extend to foreign aid (inflows leading to real appreciation and slow growth), it does *not* appear to extend to private remittances. On the other hand, Amuendo-Dorantes and Pozo (2004) find that an increase in workers' remittances to countries in Latin America and the Caribbean leads to real appreciation of the local currencies, a major symptom of

¹⁴ There were problems in the Gulf countries in 2006-2008, for example.

¹⁵ Singer (2008) makes the argument that remittances should be and are a determinant of the currency decision. His equation uses the level of remittances, but he cites earlier authors' evidence of countercyclicality.

¹⁶ Mundell (1961).

Dutch Disease. Acosta, Lartey and Mandelman (2009), using data from El Salvador, also find that remittances have the Dutch Disease effect of raising the relative price of nontraded goods, but they also find welfare-improving smoothing behavior.¹⁷

On the specific question of cyclicality, the World Bank has econometric evidence that per capita remittances respond significantly to per capita income in the home country.¹⁸ But the evidence is weaker regarding the host country. Remittances are a more stable source of foreign exchange than capital flows, including even Foreign Direct Investment. But are they actually countercyclical? An IMF study of 12 developing countries finds “no.”¹⁹ Others find more supportive results.²⁰ The area is wide open for further research.

The recorded data on remittances in countries’ balance of payments are imperfect, and certainly undercount the flows.²¹ There are also some conceptual questions where to draw the line between remittances and, for example, investment or charitable contributions.

In the case of *bilateral* data on migration and remittances, availability of any sort has been extremely limited until now. Thus most existing studies have either operated at the level of a large cross-section of each country’s data on their *aggregate* remittances²² or have focused on bilateral flows as reported by a single country that is a center of immigration (such as the United States) or emigration (such as Jamaica²³). The latter sort of data set – bilateral within a region – is needed to study questions such as those relevant for the regional currency area decision. The former sort of global data set can

¹⁷ There are also examples of inflows of remittances from emigrants apparently sustaining violent conflict -- Northern Ireland, Eritrea/Ethiopia, Israel/Palestine -- which again resemble effects of mineral wealth.

¹⁸ World Bank (2006, Tables 4A.2.1 and 4A.2.3)

¹⁹ Sayan (2006).

²⁰ Clarke and Wallstein (2004) and Yang (2007) find that remittance receipts go up in response to a natural disaster. Kapur (2005) finds that they go up in response to an economic downturn. Yang and Choi (2007) find that they respond to rainfall-induced economic fluctuations.

²¹ Ghosh (2006) and Jiménez-Martin, Jorgensen, and Labeaga (2007, p. 8, 14).

²² The working paper version of this paper, estimated regression equations for remittances that are received by four of the smaller countries of southern Africa. In this case it is a safe bet that the majority of emigrants reside in South Africa, and so we can use South African income as foreign income. The results suggested countercyclicalities for most of these countries, especially when the coefficients on domestic and foreign (i.e., South African) income are constrained to be equal in magnitude and of opposite signs.

²³ In a study of remittances into Jamaica, Lake (2006) finds that they do respond to the difference between US and Jamaican income. She also argues against Jamaican government taxes or regulation on remittances.

be used to study some questions along the lines of the Dutch Disease analogy. But a more comprehensive bilateral data set would help tremendously to study both categories of remittance issues. One could hope to attain far better estimates of the cyclicity of remittances, and the effects of a common currency, if one had a relatively large bilateral data set, rather than proceeding one country at a time or one region at a time as most researchers have had to do in the past.

The present study resembles Lueth and Ruiz-Arranz (2006, 2008), and indeed uses the data set on bilateral remittances that they generously made available, among other data sources. But Lueth and Ruiz-Arranz find that “remittances may not play a major role in limiting vulnerability to shocks,” indeed that they are procyclical. Schiopu and Siegfried (2006) also created a data set on bilateral remittances between a subset of European Union countries and neighbors. The EU data set was expanded in Jiménez-Martin, Jorgensen and Labeaga (2007).

It is to be expected that the stock of immigrants is a major determinant of the remittances. Indeed Freund and Spatafora (2005) find that it has a powerful effect.²⁴ Figure 1 shows a plot of the relationship between the stock of immigrants and remittances. The strong correlation is clear. To some extent this is simply a scale effect. When we adjust for size of the country pair (via population in the source country and GDP in the host country) in Figure 2, the correlation is naturally much weaker, but is still there.²⁵

3. Results

We begin with the data set collected by Lueth and Ruiz-Arranz, which includes 64 pairs of countries. Most of the members of this eclectic set are in Europe and Asia; but the Middle East and Australia are also included among the sending countries, along with New Zealand, Liberia and Libya for one partner each. In Table 1 we control explicitly for the lagged stock of bilateral migrants. This variable is only available for these countries in a few years. So we make a virtue out of necessity by running a pure cross-section equation, thereby maximizing the number of countries for which both variables are available, to explain remittances in 2005 as a function of the stock of migrants in 2000. The cyclicity of remittances in 2005 is likely to be determined not just by the behavior of remittances-per-2000-migrant, but also by the flow of migration in 2001, 2002, 2003, and 2004 (and perhaps 2005), to the extent that the cyclical position in those years is correlated with the cyclical position in 2005. In other words we will capture not only the decision of migrants whether to send money home in response to an international difference in cyclical position, but also the decision of workers whether to

²⁴ The other variables in their equation are per capita income in both countries, a measure of the transaction cost, and the exchange rate spread, and a dummy variable for dual exchange rates. Faini (2006) argues that the skill level of the migrant has a negative effect on remittances.

²⁵ The data point representing remittances from Portugal to Moldova looks like an outlier. But investigation reveals that this is a real phenomenon, not a data error or artifact.

migrate in the first place. This combined effect is just as interesting as the pure remittance decision.²⁶

The lagged stock of emigrants is very highly significant statistically in Table 1, as expected. In column (2) we also control for income per capita in the sender country; it too is significant.

The variable of interest is the difference in cyclical position between the sender country and the recipient country. In this table, cyclical position is computed as the (logarithmic) difference between GDP in 2005 and the long run trend value of GDP. The estimated coefficient is positive and highly significant. (The t-statistic is almost 4.) This is evidence in favor of the countercyclical hypothesis: remittances sent back home are high when income is above potential in the country to which the worker has migrated or when income is below potential in the country of origin. The effect is evidently very large. Apparently remittances are a “luxury good.” Perhaps remittances are essentially zero until the income of the worker surpasses a threshold, so that a moderately high marginal propensity to send remittances after that point shows up as a high elasticity of remittances with respect to income.

Even when the stock of migrants is lagged five years, it may contain an element of endogeneity.²⁷ Therefore we apply Instrumental Variables, in column (3) of Table 1. There are many plausible geographic, political and cultural determinants of migration. To keep it simple, we used instrumental variables which showed up as significant (positive) determinants of migration in “first stage” regressions, beginning with the border dummy and the island variable. The change vis-à-vis the OLS equation is slight; while the overall significance of the regression falls slightly, the procyclicality of remittances is still significant at the 1% level.

Next, in Table 2, we expand our data set into a panel running from 1979 to 2005, thereby allowing a big increase in the number of observations, to 1200 or more. To do so, we have to drop the stock of migrants from the right-hand side of the equation. But we can replace it with a list of gravity-style determinants of migration, including size, bilateral distance, and other geographic and cultural variables. One advantage is that any suspected endogeneity of the lagged stock of migrants is eliminated. The barebones version includes only the size of the two countries, in this case represented by population,

²⁶ One might ask, if the cyclical behavior of migration flows is of equal interest to the cyclical behavior of remittances per migrant, why not also the stock of migrants? Two answers. First, in most cases the stock of migrants has been determined over a long history (by geographic, political, cultural and other factors), during which cyclical considerations are not relevant; we should get a better-specified equation and better estimates when controlling for it. It is only over a horizon of a few years that the cyclical question arises. Second, it is important to control for *some* sort of scale variable. It would not do to treat the absolute dollar level of US-Mexico remittances on a par with the absolute dollar level of Luxembourg-Lesotho remittances.

²⁷ Japan, for example, was essentially in recession throughout the 1990s; ten years of stagnation continued to reduce the stock of immigrants.

which is essential as a scale variable. (We also retain income per capita in the sender country, which is highly significant across all specifications.)

In Table 2 the cyclical position of the two countries is represented by their unemployment rates. It has the hypothesized negative sign, and the effect is even stronger statistically than before: a t -statistic between 6 and 10. When we add the other gravity determinants, in columns 1-3, most are of the hypothesized signs. Distance is the most highly significant, which is not much of a surprise. The landlocked and island variables are both statistically significant as well, with the hypothesized negative and positive coefficients respectively. Surprisingly, the common border and common language variable are not statistically significant. Perhaps migration and remittances across a shared border are less likely to be captured by the official data. Regardless, the important point is that the countercyclicalities of remittances is still highly significant.

We allow for time effects, country effects (whether they are fixed effects or random effects), and even country-pair effects. The fixed effects could be important if there are differences in how unemployment is measured across countries, for example. The countercyclicalities of remittances appears robust.²⁸

Finally, we expand the set of countries by merging the Lueth and Ruiz-Arranz data set with two others. One comes from the InterAmerican Development Bank, and reports bilateral observations on remittances from the United States to eight small countries in Central America (including Panama and the Dominican Republic). Because Panama and El Salvador are in this data set, we are able to add a dummy variable for a currency union. The third is the European Commission's bilateral data set for the 27 members of the EU.²⁹ We believe that this three-way merge produces the most comprehensive data set on bilateral remittances to date. To maximize the number of pairs of countries, we choose to conduct cross-sections in the years 2003 and 2004. We use as the lagged stock of migrants the level in 2000. This produces about 330 observation pairs, which we believe is the largest that anyone has analyzed.

Figure 3 plots bilateral remittances, expressed relative to the lagged stock of migrants, against the relative cyclical position of the host and origin countries. The regression estimations reported in Table 3 show a highly significant coefficient on the cyclical position. This finding is not changed when we control for the income in the sender country, though the latter is highly significant, as is the lagged stock of migrants. The use of instrumental variables for the stock of migrants diminishes the countercyclicalities estimate slightly, but its t -statistic is still well above 3.

²⁸ The countercyclicalities does not show well, however, if the income measure is used in the panel data set or if the unemployment measure is used in the pure cross-section. I am indebted to Maurice Kugler for suggesting one possible explanation of this puzzle: the relative variation of detrended unemployment across countries may be limited, and the same with the variation *over time* of detrended income.

²⁹ Jiménez-Martín, Jorgensen and Labeaga (2007). Inspection of country pairs that appear in more than one data set show that the Lueth-Ruiz numbers are much higher, presumably because of a more expansive definition of remittances. In this light, an important next step would be to allow each remittance data set have its own intercept term (in logs).

4. The Effect of a Common Currency

We added a dummy variable equal to 1 when the pair of countries in question were both members of a currency union. It appears highly significant statistically at first, which would suggest that the reduction of transactions cost and exchange risk from a common currency promotes the sending of remittances (even controlling for the enhanced ease of migration). However the currency union dummy loses all significance under instrumental variables. This suggests the possibility that the apparent correlation under the OLS estimates is not really attributable to the effect of currency unions on remittances but rather to the reverse causation: Central American countries are more likely to choose to adopt the dollar as their currency if they have a lot of emigration to the United States.³⁰

Measuring remittances is always problematic. Even aside from transactions that go entirely unreported, different statisticians may draw different lines regarding which international financial transactions are classified as remittances and which are not.³¹ In Table 4 we allow each of our three data sources to have its own constant term, to allow for the likely possibility that some use a more expansive definition of remittances than others. The result shows that the numbers on bilateral remittances for Central America data are substantially higher, other things equal, than the other two data sets. This is consistent with the possibility of more comprehensive reporting, but it is also consistent with the possibility that the close links between Central America (defined here to include Panama and the Dominican Republic) and the United States are not adequately captured by the stock of emigrants. Perhaps we should control for distance, or the cost of transferring money.³²

The effect of the currency union dummy loses its positive sign in Table 4, and indeed turns inexplicably but significantly negative under instrumental variables. Clearly the change in the currency union result, relative to Table 3, arises because the high US share in the trade of El Salvador and Panama is no longer allocated to their dollarization, but instead to the high constant term shown by the Central American countries in general. The number of currency union pairs in this data set (two) is so small that no firm conclusions can yet be reached regarding their effect.

5. Conclusions

To summarize the findings, the creation of a larger bilateral data set, by splicing together three data sets used by a few others, has allowed a moderately strong verdict on the question of cyclicalities. The verdict runs contrary to the analogy with capital flows

³⁰ Singer (2008) finds that remittances as a share of GDP are a statistically significant predictor of the probability that a country will choose a fixed over a floating exchange rate.

³¹ Chami, Fullenkamp, and Gapen (2008).

³² Transactions costs for sending remittances have in the past been surprisingly high, due to lack of competition in such services. Ratha and Riedberg (2005).

and the Dutch Disease: Remittances do appear to respond positively to the cyclical position in the sending country (the migrant's host) and negatively to the cyclical position in the receiving country (the migrant's place of origin). This counter-cyclical pattern is precisely what one wants. It suggests that emigrants' remittances can play some of the stabilizing role that capital flows often promise but seldom deliver. If this empirical finding holds up under further investigation, it carries at least two specific policy implications. First, it suggests – though only indirectly, perhaps -- that governments should not try to harness remittances in the name of national development, but rather in this area should allow private citizens to transact freely, because they are not subject to the political economy forces that make government spending procyclical in so many developing countries. Second, it suggests that remittances should join trade, labor mobility, and transfers, on the list of Optimum Currency Area criteria.

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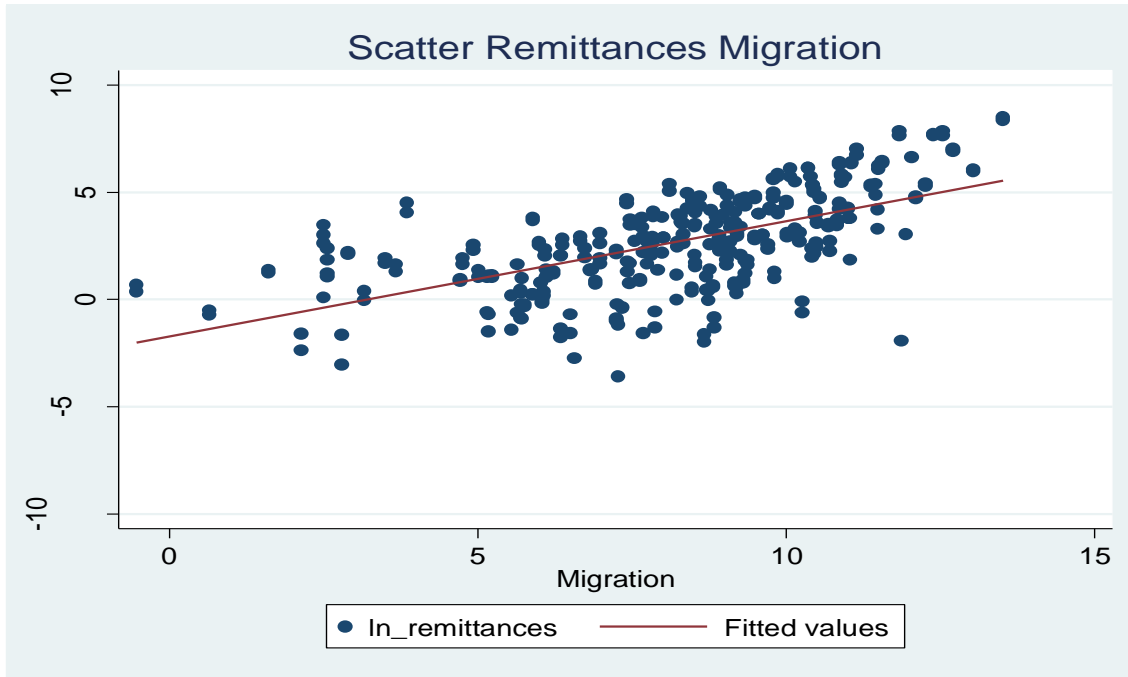
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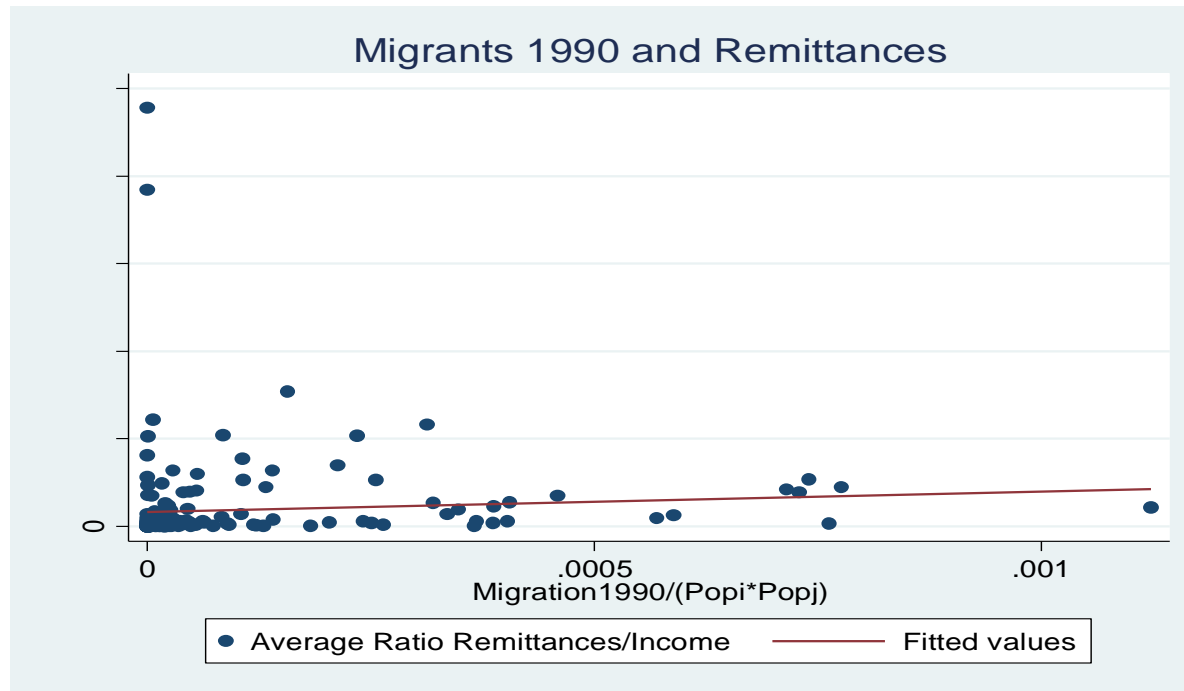
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Figure 1: **Country-pairs with high bilateral migration also, of course, tend to show high bilateral remittances.**



Remittances between included country pairs are around \$113.6 billion.
Total of 540 observations = 266 for 2003 plus 274 for 2004.

Figure 2a : Bilateral stock of migrants (normalized by populations)
versus remittances (normalized by GDPs)



Source: Central America data: FOMIN and the Central Banks. Data from 2000-2007
Jiménez-Martín, S., Jorgensen, N. and Labeaga, J. M. (2007). Data from 2000-2005
IMF. Lueth, E. and Ruiz-Arranz, M. (2006). Data from 1979-2005.

Figure 2b : Bilateral stock of migrants (normalized by populations)
versus remittances (normalized by GDPs), with country identifiers

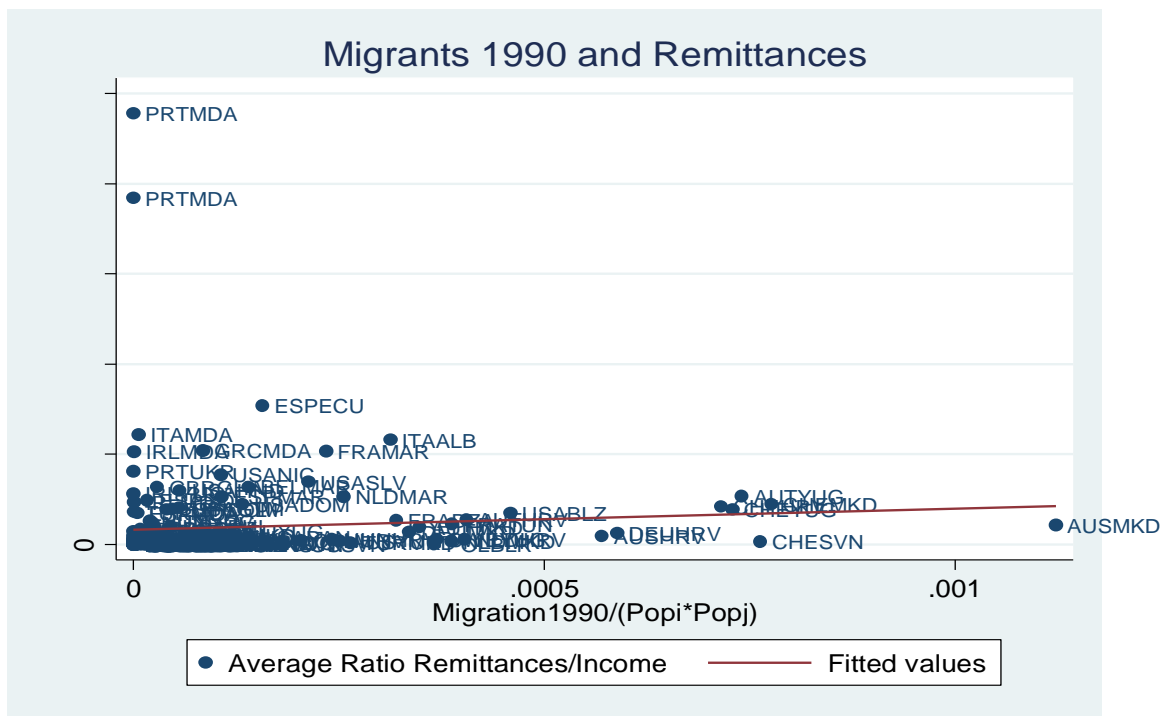
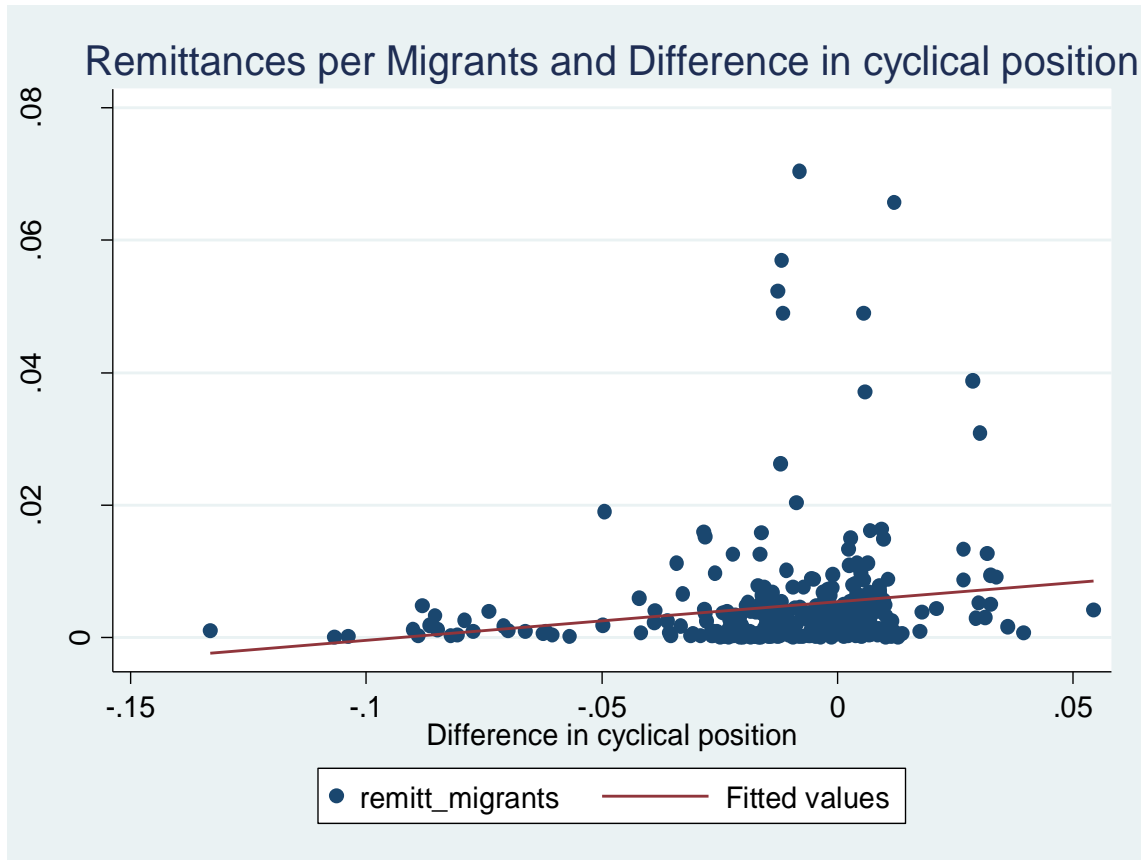


Figure 3: Remittances per migrant (lagged stock) are positively correlated with relative cyclical position. Data for 2003-2004



Sources of data: Western Hemisphere data: FOMIN & the Central Banks;
Jiménez-Martín, Jorgensen & Labeaga (2007); Lueth & Ruiz-Arranz, IMF(2006).

Table 1: Pure Cross-Section Data, 2005 (Lueth & Ruiz-Arranz data set)

| Dependent Variable: | | | |
|---|-----------------------|-----------------------|-----------------------|
| Ln Remittances 2005 between Countries | | | |
| | (1) | (2) | (3) |
| Ln (Stock migrants 2000) | 0.459*** (0.085) | 0.449*** (0.0818) | 0.327** (0.126) |
| Difference in cyclical position (Ln (Real GDP/ Trend GDP)) | 57.585*** (15.875) | 67.909*** (16.998) | 65.300*** (17.335) |
| host relative to origin country | | 0.061*** (0.023) | 0.062** (0.024) |
| GDP per capita Sender | | | |
| Estimated Method | OLS | OLS | 2SLS |
| Instrumental variables | | | Border/Islands |
| F test | 22.63 | 19.27 | 9.35 |
| Probability > F | (0.000) | (0.000) | (0.000) |
| Observations | 64 | 64 | 64 |
| R2 | 0.373 | 0.448 | 0.4259 |
| Root MSE | 1.304 | 1.234 | 1.2577 |
| First stage F-statistic | | | 0.07 |
| P-value | | | (0.933) |
| J-test of overidentifying restrictions | | | 0.138 |
| P-value | | | (0.620) |
| Standard errors in parenthesis | | | |
| Constants not reported | | | |
| Statistical significance: * 10% level, ** 5% level and *** 1% level | | | |

Table 2: Panel Data, 1979-2005 (Lueth&Ruiz-Arranz data set)

| | Dependent Variable: Ln Remittances between Countries | | | | |
|---|---|----------------------|----------------------|----------------------|-----------------------|
| | (1) | (2) | (3) | (4) | (5) |
| Difference in cyclical position (unemployment rate) | | | - | - | |
| host relative to origin country | -10.507*** (0.995) | -8.981*** (0.976) | 11.607*** (1.125) | 11.483*** (1.947) | -12.918*** (1.976) |
| Host country's GDP per capita | 0.076*** (0.005) | 0.026*** (0.007) | 0.049*** (0.006) | 0.049*** (0.009) | 0.023 (0.017) |
| Colonial relationship? (0 = never, 0.5 = post-1945, 1 = always) | 2.444** (1.082) | 0.076 (1.007) | | | |
| Islands ? (0 = neither, 1 = one of the pair, 2 = both) | 0.644** (0.317) | 0.570** (0.284) | | | |
| Landlocked (0 = neither, 1 = one of the pair, 2 = both) | -1.260* (0.288) | -1.431*** (0.259) | | | |
| Language (Dummy for common language) | 0.572 (0.492) | 0.575 (0.440) | | | |
| Border (Dummy for land border) | -0.409 (0.582) | -0.547 (0.523) | | | |
| Ln (Distance between i and j) | -0.909*** (0.191) | -0.561*** (0.174) | | | |
| Ln (Product Population i and j) | 0.941*** (0.080) | 0.609*** (0.078) | 2.963*** (0.243) | 3.017*** (0.400) | 1.209 (0.974) |
| Time Effects | no | yes | no | no | yes |
| Random Effects | yes | yes | no | no | no |
| Fixed Effects for Countries | no | no | yes | no | no |
| Fixed Effects for Country Pair | no | no | no | yes | yes |
| Wald test | 731.55 | 1184.69 | 1306.28 | 71.76 | 44.69 |
| Prob > χ^2 | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Observations | 1200 | 1200 | 1228 | 1228 | 1228 |
| R2 | 0.389 | 0.414 | 0.696 | 0.304 | 0.331 |

Constants not reported

(Standard errors in parenthesis.)

Significance * 10% level, ** 5% level, and *** 1% level

Table 3: Cross-Section 2003-04 -- Composite data set (merging three sources)

| Dependent Variable: | | | | |
|---|---------------------|---------------------|--------------------------------------|---------------------|
| Ln Remittances 2003-04 between Countries | | | | |
| | (1) | (2) | (3) | (4) |
| Ln (Stock migrants 2000) | 0.761*** (0.040) | 0.739*** (0.041) | 1.053*** (0.087) | 1.224*** (0.151) |
| Difference in cyclical position (Ln (Real GDP/ Trend GDP)) | 16.574*** | 16.316*** | 14.988*** | 14.266*** |
| Sender relative to recipient | (2.894) | (2.766) | (3.390) | (3.894) |
| GDP per capita Sender | | 0.037** (0.015) | 0.026 (0.016) | 0.020 (0.019) |
| Currency Union | | 0.873*** (0.322) | -0.053 (0.333) | -0.556 (0.493) |
| Estimation Method | OLS | OLS | 2SLS | 2SLS |
| Instrumental variables | | | border/language/ islands/colonial | border/lang uage |
| F test | 189.17 | 146.94 | 195.83 | 244.72 |
| Prob > F | (0.000) | (0.000) | (0.000) | (0.000) |
| Observations | 333 | 330 | 330 | 330 |
| R2 | 0.528 | 0.547 | 0.468 | 0.359 |
| Root MSE | 1.540 | 1.516 | 1.642 | 1.803 |
| First stage F-statistic | | | 3.04 | 4.06 |
| P-value | | | (0.018) | (0.018) |
| J-test of overidentifying restrictions | | | 12.157 | 8.123 |
| P-value | | | (0.007) | (0.004) |

Constant not reported

(Standard errors in parentheses.)

Statistical significance: * 10% level, ** 5% level, *** 1% level

Three sources of remittance data for 2003-04: Central America data, FOMIN and the Central Banks, via Interamerican Development Bank; EU data: Jiménez-Martín, Jorgensen and Labeaga (2007); IMF data: Lueth and Ruiz-Arranz (2006, 2008).

Table 4: Cross-Section 2003-04 -- Composite data set (merging three data sets and controlling for each one)

| | Dependent Variable: | | | |
|---|---|----------------------|----------------------|----------------------|
| | Ln Remittances 2003-04 between Countries | | | |
| | (1) | (2) | (3) | (4) |
| Ln (Stock migrants 2000) | 0.713*** (0.042) | 0.708*** (0.042) | 1.087*** (0.090) | 1.253*** (0.154) |
| Difference in cyclical position (Ln (Real GDP/ Trend GDP)) | 16.477*** | 15.736*** | 16.004*** | 16.121*** |
| Sender relative to recipient | (2.889) | (2.837) | (3.582) | (4.073) |
| GDP per capita Sender | | 0.026* (0.016) | 0.017 (0.019) | 0.012 (0.022) |
| Currency Union | | -0.376 (0.309) | -0.437*** (0.150) | -0.464*** (0.134) |
| IMF data | -3.605*** (0.394) | -4.289*** (0.537) | -7.338*** (0.900) | -8.670*** (1.358) |
| EU data | -3.771*** (0.404) | -4.308*** (0.515) | -7.621*** (0.938) | -9.069*** (1.463) |
| Central America data | -2.014*** (0.537) | -2.778*** (0.709) | -7.062*** (1.218) | -8.935*** (1.882) |
| Estimated Method | OLS | OLS | 2SLS | 2SLS |

| | | | border/language/ islands/colonial | border/language |
|---|---------|---------|--------------------------------------|-----------------|
| Instrumental variables | | | | |
| F test | 733.58 | 603.79 | 1427.11 | 1611.49 |
| Prob > F | (0.000) | (0.000) | (0.000) | (0.000) |
| Observations | 333 | 330 | 330 | 330 |
| R2 | 0.817 | 0.819 | | |
| Root MSE | 1.510 | 1.501 | 1.67 | 1.832 |
| First stage F-statistic | | | 3.34 | 4.61 |
| P-value | | | (0.011) | (0.011) |
| J-test of overidentifying restrictions | | | 13.365 | 9.214 |
| P-value | | | (0.004) | (0.002) |

Constant not reported

(Standard errors in parentheses.) Statistical significance: * 10% level, ** 5% level, *** 1% level

Three sources of remittance data for 2003-04: Central America data, FOMIN and the Central Banks, via Interamerican Development Bank; EU data: Jiménez-Martín, Jorgensen and Labeaga (2007); IMF data: Lueth and Ruiz-Arranz (2006, 2008).