Remittances, Exchange Rate Regimes and the Dutch Disease: A Panel Data Analysis*

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Abstract

Using disaggregated sectorial data, this study shows that rising levels of remittances have spending effects that lead to real exchange rate appreciation, and resource movement effects that favor the non-tradable sector at the expense of tradable goods production. These are two characteristic of the phenomenon known as Dutch Disease. The results further indicate that these effects operate stronger under fixed nominal exchange rate regimes.

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1 Introduction

International migrant remittances have increased significantly over the last two decades. Remittances received by developing countries, estimated at $221 billion in 2006, increased by 132% compared with 2001 figures, and currently represent 1.9% of total income in emerging economies (World Bank, 2008). Remittances are becoming increasingly important as a source of foreign income in terms of both magnitude and growth rate, exceeding the inflow of foreign aid and private capital in many countries. They currently represent about one-third of total financial flows to the developing world.

While some studies have provided evidence that high remittances are associated with lower poverty indicators and high growth rates (Adams and Page, 2005; Acosta et al, 2008), some concerns have emerged that rising levels of remittances in recipient economies, as any other massive capital inflow, can appreciate the real exchange rate (Amuedo-Dorantes and Pozo, 2004; López et al, 2007), and therefore generate a resource allocation from the tradable to the nontradable sector (Acosta et al, 2007). This phenomenon is usually labeled as the 'Dutch disease'. Rodrik (2007) provides evidence that real exchange rate overvaluation undermines long-term economic growth, particularly for developing countries, in that in those countries, tradable goods production suffers disproportionately from weak institutions and market failures. This underscores the importance of the implications of remittances for real exchange rate movements.

Different from previous studies, we study Dutch disease effects of remittances by estimating an equation that specifies the ratio of tradable-to-nontradable output as the dependent variable, in addition to the standard equation that has the real exchange rate as the regressand. This helps capture resource movement effect, i.e. the effect of remittances on the productive sector of the economy. Conventionally, the real exchange rate has been used because real appreciation serves as summary indicator for the presence of Dutch disease effects. Nevertheless, given the absence of disaggregated data, there is difficulty in disentangling nominal exchange rate effects on the real exchange rate. The introduction of tradable-to-nontradable output ratio and sectorial output shares (agricultural, manufacturing and services) as dependent variables provides an alternative method to empirical analysis of Dutch disease effects of remittances. Arguably, this may be considered as a better approach as we are able to capture

what may be thought of as purely 'real' effects of the Dutch disease phenomenon following inflow of remittances.[1]

An additional contribution is that we test whether spending and resource movement effects of remittances are different under alternative exchange rate regimes. As discussed in Rodrik (2007), real exchange rate fluctuations are in principle the result of changes in real quantities only. However, the presence of nominal rigidities implies that exchange rate policies can affect real quantities. For instance, Levy-Yeyati and Sturzenegger (2005) use data for 179 countries to show that policy interventions of exchange rate markets affect the real exchange rate in the short to medium term.

Finally, the estimation procedure adopted in this study is designed to tackle some important concerns. Most of the macroeconomic explanatory variables are jointly determined with the position of the real exchange rate and sectorial output variables. We implement a GMM in differences distributed lag model specification that controls for endogeneity by using internal instruments i.e. instruments based on lagged values of the explanatory variables. Since resource movement and sectorial output reallocation do not occur instantaneously but are subject to inertia, lagged levels are weak instruments for the distributed lag regression in differences. Consequently, we use a relatively efficient estimator that combines equations in levels with others in differences in a single system. Finally, the small sample raises a concern for overfitting bias. For robustness, we alternate the number of lags used as instruments, restrict the number of explanatory variables and conduct a sensitivity analysis that makes use of external instruments.

2 Remittances and Dutch Disease Effects

The Salter-Swan-Corden-Dornbusch paradigm serves as the theoretical underpinning for empirical models used to analyze the impact of capital inflows on the real exchange rate in developing economies. The model showcases the transmission mechanism by which an increase in capital inflows (remittances in this case) could cause a real exchange rate appreciation. A higher real household income triggers an expansion in aggregate demand, which for exogenously given prices of tradable goods, culminates

[1] The price effect and nominal exchange rate effects could be termed 'nominal' effects of remittances.

in higher relative prices of nontradable goods (spending effect), which causes further movement of resources toward this sector away from the tradable sector (resource movement effect). A rise in the relative price of nontradable goods corresponds to a real exchange rate appreciation. Acosta et al (2007) develop a microfounded dynamic stochastic general equilibrium model that also considers an additional transmission mechanism: the increase in household income results in a decrease in the labor supply. A shrinking labor supply is associated with higher wages (in terms of the price of tradable output), that in turn leads to higher production costs and a further contraction of the tradable sector. Both the real exchange rate and the ratio of tradable to nontradable output therefore serve as summary indicators of Dutch disease effects viz. the spending effect and resource movement effect.

3 Data and Descriptive Statistics

We employ an unbalanced panel data set comprising 109 developing and transition countries for the period 1990-2003. Countries were selected on the basis of data availability, with at least 3 consecutive years of information on remittance flows. Country list and period coverage are reported on Table 1. Although we have 1,370 country-year observations on remittances, sample sizes are typically smaller in the regressions that follow, determined by the number of observations on covariates included. Remittance data is obtained from World Bank (2008), data on exchange rate regimes comes from Levy-Yeyati and Sturzenegger (2005) while the rest of the variables come from World Development Indicators.

Following López et al (2007), we use the real effective exchange rate index as a measure of real exchange rate. A nominal effective exchange rate index represents the ratio of an index of a currency's period-average exchange rate to a weighted geometric average of exchange rates for the currencies of selected countries, weighted by each country's trade in both manufactured goods and primary products with its partner countries. A real effective exchange rate (REER) index represents a nominal effective exchange rate index adjusted for relative changes in consumer prices, a proxy of cost indicators of the home country. Since it is defined as the relative price of domestic to foreign goods, an increase in REER imply a real exchange rate appreciation. The REER data comes from the International Financial Statistics database.

In order to capture resource movement effects, the ratio of tradable to nontradable (TNT) output is computed and used as a dependent variable. In the absence of systematic and comparable data on traded goods output, we approximate that ratio by defining 'tradable output' as the sum of agriculture and manufacturing output, and 'nontradable output' as services. Data on agriculture, manufacturing and services output as a share of GDP are from World Development Indicators.

Table 2 shows descriptive statistics for the sample. In all developing regions, remittances have increased in importance in absolute terms, in per capita figures, and as a share of GDP in the last decade. In particular, remittance flows increased threefold in East Asia as well as in Pacific and South Asia between 1995 and 2003, and more than doubled in Latin American and Caribbean countries. At the same time, developing countries have on average experienced real exchange rate appreciation. Simple average of East Asian and Pacific currencies shows appreciation of around 41% between 1995 and 2003, while for other developing regions currencies have appreciated on average between 1.6 and 17.9% during the same period. Developing regions have also experienced on average a resource allocation from tradable to non-tradable output, with stronger reallocations in Eastern Europe, Central Asia, Latin America and the Caribbean.

As preliminary evidence of real exchange rate appreciation and the existence of the Dutch disease following an increase in remittance flows, Figures 1 and 2 show the evolution of REER and the TNT ratio for a group of high remittance-recipient countries: Barbados (remittances representing 4.3% of GDP in 2003), Dominican Republic (14.6% of GDP in 2003), Ecuador (6.1%), El Salvador (14.7%), Honduras (12.4%), Jordan (22.3%), Lesotho (25.3%), Mauritius (4.1%), and Sri Lanka (7.8%). In these nine countries, there is a clear positive relationship between remittance flows and the real exchange rate as can be seen in Figure 1. At the same time, it is clear that there is a negative relationship between remittances and tradable/nontradable output composition in these countries as depicted in Figure 2. The question that we attempt to address next is whether these figures are representative of the case of remittances causing Dutch disease effects or the result of some other spurious relationship.

4 Econometric Methodology

We focus on the relationship between remittances and key macroeconomic indicators that capture the presence of Dutch disease effects. The real exchange rate will serve initially as the dependent variables. We then explore the impact of remittances on the tradable-to-nontradable output ratio, as well as on agriculture, manufacturing and service sectors in these countries. We specify a dynamic panel model that is estimated using a generalized method of moments estimator (GMM), tailored to deal with potential endogeneity in all explanatory variables. The dynamic specification is given by the following distributed lag model:

$$y_{it} = \sum_{j=0}^{p} \alpha_j r_{i,t-j} + \beta x_{it} + (\eta_i + \lambda_t + \varepsilon_{it}) \qquad i = 1, 2, ..., N; \qquad t = 2, 3, ..., T. \tag{1}$$

where y_{it} denotes the dependent variable for country i in period t; r_{it} represents remittances and is assumed to be endogenous. To capture the delayed effect of remittances on the productive sectorial structure we allow a lag length equal to p in some of the specifications. The control set x_{it} is a vector of current values of additional explanatory variables and is also assumed to be endogenous, η_i is a stochastic unobserved country-specific time-invariant effect and λ_t is included to account for time-specific effects. ε_{it} is a disturbance term that is assumed to be serially uncorrelated and independent across individuals.

An identification problem may arise if some of the explanatory variables are correlated with the error term. For instance, in presence of risk-sharing strategies among distant family members, a drought will certainly affect agriculture output while at the same time increase remittances from international migrants. We therefore estimate all equations using the GMM system estimator, which estimates the model and its first-differenced version as a system of equations. If the instruments are valid, the GMM coefficient captures the immediate impact of the isolated exogenous component of the covariates on the dependent variable.[2] The GMM system estimator allows for the use of either lagged differences and lagged levels of the explanatory variables as instruments for endogenous variables. We

[2] We abstract from a description of this estimator since it has been widely used in several studies. See Arellano and Bover (1995) and Blundell and Bond (1998) for technical details on the GMM system estimator.

report as 'internal' instruments the first lagged difference and the second lag level of all explanatory variables, since all of them are somehow likely to be correlated with the error term. Furthermore we conduct sensitivity analysis by restricting the set of explanatory variables and including external instruments as well.[3]

The validity of the lagged differences of the explanatory variables as instruments occurs 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 determine whether the GMM estimator is consistent or not, we employ two specification tests to address this issue. These are a test of over-identifying restrictions and a test for second-order serial correlation in the error term. The standard Sargan test of overidentifying restrictions has a null hypothesis that the instruments are overall valid. The Arellano and Bond's (1991) test for second-order serial correlation has a null hypothesis that there is no second-order serial correlation in the differenced error term (the residual of the equation in differences). It should be noted that first-order correlation is expected in the differenced equation even in the error term is uncorrelated (unless it follows a random walk). In contrast, the presence of second-order correlation indicates serial correlation of the error term and that it follows a moving average process of at least order one.

5 Results

5.1 Remittances and the Real Exchange Rate

Table 4 presents results using the preferred GMM system estimator where the dependent variable is the real exchange rate.[4] For comparison purposes, OLS country fixed-effects results are reported in Table 3. As previously mentioned, these estimates could be biased if any explanatory variable is correlated with unobserved time-varying determinants of real exchange rate evolution.

[3] This is done using GMM-IV system estimator.

[4] GMM system estimation was performed using the DPD package for OX (Doornik et al, 2006).

Baseline control set specification The basic control set used in all regressions includes Gross Domestic Product (GDP) per capita, M2 (as % of GDP), a terms of trade index (goods and services), trade openness (sum of exports and imports as % of GDP), GDP growth (in %) and year indicators. A positive coefficient shows that an increase in the variable in question causes a real exchange rate appreciation. The covariates in the baseline real exchange rate equation exhibit the expected signs and are statistically significant at 1% level in the preferred GMM specification.

Variations in the external terms of trade have clear implications for the real exchange rate, such that a positive shock to the price of exports relative to imports results in a real exchange rate appreciation. The trade openness variable proxies for trade restrictions and captures how such policies influence the real exchange rate through their impact on the price of nontradables. An increase in import tariffs raises the price of imported goods and affects prices of nontradables through an income and substitution effect. A priori, the expected sign of the coefficient of this covariate is not clear. The negative income effect from the higher price of imports decreases demand for all goods and services, resulting in a downward pressure on the prices of nontradable goods thereby causing a depreciation of the real exchange rate. The negative impact on aggregate income can be exacerbated as a result of lower productivity following the restrictions on trade. The counteracting substitution effect on the other hand, causes an increase in demand for nontradables as consumers switch from imported goods. This increases the price of nontradables causing an appreciation of the real exchange rate (Edwards, 1989). In the results, the latter effect turns out to be greater.

A higher GDP per capita is expected to increase incomes and hence increase demand for nontradables, causing a real appreciation, an outcome known as Harrod-Balassa-Samuelson. This is observed in the results, as the coefficient on GDP per capita is positive and statistically significant. However, recent experiences in emerging economies indicate that intermittent periods of large portfolio capital inflows were associated with a consumption boom, very robust GDP growth, increasing demand for imports and sizable trade deficits. In general, an overexpanded economy is followed by a currency depreciation required to correct the external deficits. An interesting observation from the GMM estimation is the negative sign borne by the coefficient on GDP growth and the positive one from the

OLS 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 and consistent with the aforementioned argument. Similar conclusions can be drawn from the behavior of M2 in both econometric specifications. In principle excess money growth puts upward pressure on prices of non-tradable goods, and is associated with inflationary tendencies and appreciation of the real exchange rate. However, the evidence is that the resultant lower interest rate following a monetary expansion discourages financial investment in local currency. On immediate impact, such low financial returns may cause a temporary nominal depreciation not driven by fundamentals, and given price stickiness, a real depreciation. This observable event is known as carry-trade intermediation[5]

The role of remittance flows Column (1) in Table 3 shows that an increase in the remittances to GDP ratio is associated with a real exchange rate appreciation, with the coefficient being statistically significant at the 10 % level. We further introduce remittances measured in US dollars per capita (column 2), without significantly changing the main result. Table 4 presents analogous results using the preferred GMM system estimator. While the first two columns replicate the model specification in Table 3, results are more robust and coefficients are significant at the 1% level. In all cases, the estimations satisfy the Sargan test for overidentifying restrictions and the serial correlation tests indicating the validity of the instrument; and robust-to-endogeneity results show that remittance flows do generate real exchange rate appreciation.[6]

It could be argued that rather than being altruistically motivated, remittances are driven by selfish motivations including exploitation of investment opportunities. Another possible scenario is that profit-driven private capital flows that commove with remittances represent the driving force behind the positive relationship between remittances and the real exchange rate. Thus we use various conditional sets to assess the strength of remittances exerted on the real exchange rate; the results are in columns (3) through (5) of Table 4. When we control for Foreign Direct Investment (FDI as % percentage

[5] Refer to Plantin and Shin (2007) for a description.

[6] For better coefficient interpretation, we postpone the quantitative analysis to the section that considers real output decompositions. The regressand in this section (real exchange rate) is a pure index number.

of GDP), we observe a bigger and significant positive coefficient on remittances, while FDI impact is much smaller and not statistically significant. The inclusion of non-FDI private inflows, which mostly account for portfolio investment, does not alter the initially observed impact of remittances on the real exchange rate. The coefficient on the non-FDI variable is found to be statistically significant and bears the expected sign.[7]

The direction and magnitude of the effect of a fiscal expansion on the real exchange rate depends on the sectorial allocation of the spending and the marginal propensity to spend on nontradables respectively. Typically, government expenditure is mostly allocated to nontradable goods and leads to a real exchange rate appreciation. An expansionary fiscal policy may be aimed at compensating a drastic decrease in aggregate output; for instance, rebuilding infrastructure after a weather related natural disaster. Presumably such fiscal expansions will be associated with an increase in government transfer payments, and these public transfers may in turn be correlated with private ones such as remittances, thereby rendering the relationship between remittances and the real exchange rate a spurious one. The effect of remittances is further confirmed nonetheless, as government expenditure enters the regression with a positive and statistically significant impact on the real exchange rate, while remittances still bears a positive and significant coefficient.

Exchange rate regimes Economic theory suggests that in the presence of price stickiness, exchange rate flexibility helps to generate optimal short-to-medium run movements in international relative prices following external shocks. For instance under a purely flexible nominal exchange rate system, a negative shock affecting the competitiveness of the tradable sector would yield a nominal (and real) depreciation that compensates such loss of competitiveness.[8] With a nominal peg and sticky prices, the lack of rapid adjustment in prices can result in a significant drop in tradable output. However, if altruistic remittances compensate the decline in households' income, the excessive nominal appreciation of the domestic currency may be sustained by the inflow of foreign currency. Under such circumstances, remittances can inflate the price of nontradables, deepen the real appreciation and

[7] Portfolio investment is usually associated with increasing demand for local currency needed to buy the domestic securities (adding upward pressure to the price of the local currency).

[8] See Acosta et al (2007) for details.

consequently render the production structure biased towards that sector. The emergent issue then is whether countries operating a nominal exchange rate peg have witnessed a different evolution of the real exchange rate in response to remittances. The last column considers the introduction of a dummy variable interacted with remittances. In accordance with the basic classification in Levy-Yeyati and Sturzenegger (2005), the dummy variable assumes a value of one for countries that operate an exchange rate peg, and zero otherwise. Following the preceding argument, the positive and significant coefficient on this interacted variable suggests that a fixed exchange rate regime allows for an even more pronounced spending effect of remittances and thus higher real appreciation.

5.2 Remittances and Sectorial Output Decomposition

We have noted that real exchange rate appreciation is an indicator of the presence of Dutch disease effects. However, disentangling nominal exchange rate effects on the real exchange rate remains a difficult task in the absence of disaggregated data. Consequently, we consider a second set of regressions, with the ratio of tradables to nontradable output (TNT) as the dependent variable, and present the results in Table 5. From a theoretical perspective, this new set of regressions allows us to distinguish the resource movement effect from the spending effect of remittances inflows.

For a given set of explanatory variables which constitutes the same control set previously described, we sequentially introduce remittances to GDP ratio, and the same variable lagged one and two periods as additional regressors, to capture medium run effects of remittances. Remittances lags are introduced one at a time in order to avoid overfitting bias.[9] We find a negative and statistically significant effect of remittances on tradable-nontradable output ratio in each case, suggesting that an increase in remittances leads to movement of resources towards the nontradable sector. The magnitude of the resource movement effect is such that a one percentage point increase in remittances to GDP leads to a percentage point reduction in the TNT ratio on impact. This is a sizeable number particularly, taking into consideration the fact that only the exogenous component is reported. Furthermore based on prior analysis, it is inferable that an increase in remittances could in principle make a decline in tradables output more persistent, and thus result in more remittances aimed at compensating the fall

[9] See Roodman (2007) for details on instruments and overfitting bias.

in income. In line with this reasoning, the distributed lag specification indicates that the impact is marginally greater in subsequent periods following the inflow of remittances, as shown in columns (1) through (3).

In columns (4) through (7), we have results of specifications that include FDI, non-FDI private flows, government expenditure, and investment as a share of GDP, each variable being introduced one at a time as an additional control variable. Across these estimations, the resource movement toward the nontradable sector following an increase in remittances is found to be robust. The negative relationship between FDI and TNT, is in consonance with the evidence on FDI inflows being principally directed into real estate and other infrastructure development, as well as toward the provision of major services like electricity, transportation and water in emerging economies (ECLAC, 1999). With respect to the control variables, an inspection of the baseline specification reveals that most coefficients exhibit the expected signs and are statistically significant. Improvements in the terms of trade and openness to trade improves the performance of the tradable sector. Finally, it noteworthy that both GDP per capita and GDP growth move in accordance with the Harrod-Balassa-Samuelson effect, and hence the analysis involving real output decomposition allows us to identify the dynamics in the real economy driving the real exchange rate and to some extent disentagle the effect of the nominal exchange rate on the real exchange rate. Consequently, we could deduce that the carry-trade intermediation previously discussed may not be playing a role here.

Again, there could be differences in the resource movement effect of remittances depending on the exchange rate regime. Presumably, fixed exchange rates regimes are less able to neutralize the spending effect of remittances, and hence lead to a greater resource reallocation. Column 8 of Table 4 shows the striking result that resource movement effects are present exclusively in fixed exchange rates regimes, since there is no statistically significant evidence that such contemporaneous reallocation effects towards nontradable output exists, at least in the short run, in countries that do not operate an exchange rate peg.

Sectorial Decomposition Behind the decrease in the TNT ratio following an increase in remittances, certain sectors could be shrinking while others gain importance in the productive structure

of the economies. Table 6 present results of regressions that examine the relationship between remittances and sectorial output variables. We find that an increase in remittances causes a decline in both the shares of agriculture and manufacturing in GDP, but only the negative coefficient on manufacturing is statistically significant at a 1% level. On the contrary, the share of services in GDP rises as remittances increase. In particular, a 1% increase in remittances results in a 0.37% increase in the share of services in GDP. An additional interesting observation is the impact of per capita GDP; an increase in GDP per capita increases the share of services but decreases agriculture's share with no statistically significant effect on manufacturing output share. This observation is consistent with the idea that as a country develops, it tends to have a higher service share in the economy, in contrast to agriculture production.[10]

5.3 Sensitivity Analysis

We use a final set of regressions to further assess the robustness of the key results from the previous estimations, allowing for additional 'external' instruments related to remittances aside from lag levels and differences of the explanatory variables; the results are given in Table 7. We consider instruments that have been previously used in the literature, including the primary school enrollment rate and weighted GDP per capita of the five main migrant host countries for each country.[11] We find that the effect of an increase in remittances on the real exchange rate remains positive and statistically significant, irrespective of the measure of remittances used. The coefficients are slightly smaller in magnitude, however. It also remains true that countries that run a fixed exchange rate system experience a greater real appreciation following an increase in remittances. Further results confirm the statistically significant decrease in the TNT ratio when remittances increase. Finally, the impact of remittances on agriculture share is found to be positive but statistically insignificant, that on manufacturing is still negative, statistically significant and slightly larger than previous estimates, and that on services is also larger, positive and statistically significant, corroborating system GMM results that

[10] For the sake of simplicity in our exposition we choose not to report the coefficients of the distributed lag model and the ones resulting from the extentend sensitivity set previously in use. Nonetheless results remain largely unchanged, and are available upon request.

[11] Amuedo-Dorantes and Pozo (2004) use primary enrollment rates as instrument for remittances, while Lopez et al (2007) use the instrument related to the weighted GDP per capita of the main host countries.

only include internal instruments.

6 Concluding Remarks

This study has shown that rising levels of remittances in emerging economies can have an important spending effect that culminates in an increase in the relative price of nontradables and real exchange rate appreciation. The results also indicate that a resource movement effect that favors the nontradable sector at the expense of tradable goods follows an increase in remittances. In particular, the evidence shows that the share of services in total output rises while the share of manufacturing declines, these being characteristics of the phenomenon known as the Dutch-Disease. These results still hold after dealing with endogeneity issues and controlling for economic growth, terms of trade, trade openness, monetary aggregates and fiscal policy.

There is also evidence that Dutch disease effects operate stronger in fixed exchange rate regimes. Moreover we find that only countries that implement a nominal exchange rate peg witness resource movements effects that favor the nontradable sector. One possible explanation is that countries with a nominal peg cannot adjust their international relative prices after a negative shock to the tradable sector. The expenditure switching effect of a nominal depreciation is thus prevented, and as a result tradable output contracts. The inflow of remittances aimed at compensating the resulting decline in households' income may help to sustain the overappreciated nominal exchange rate. Another possibility is that countries that are dollarized depend a very limited set of monetary policy instruments and are unable to sterilize large capital inflows that immediately translate into larger domestic monetary aggregates and subsequently into nontradable price inflation.

A crucial question that arises is whether such macroeconomic adjustments following inflow of remittances are detrimental to these economies in terms of economic growth and welfare, and what policy mixes are worth pursuing to address them. We leave these for future research.

A Appendix-Variables Description

REER (Real Effective Exchange Rate) Index: Ratio of an index of a currency's period- average exchange rate to a weighted geometric average of exchange rates for the currencies of selected countries, weighted by each country's trade in both manufactured goods and primary products with its partner countries, and adjusted for relative changes in consumer prices. Base Year = 1995. Source: International Financial Statistics (IMF).

TNT (Tradable/Non-Tradable Output): Ratio of the sum of agriculture and manufacturing output (as a share of GDP) over services' output (as a share of GDP). Source: World Development Indicators, World Bank.

Agriculture (% GDP): Value added of the agricultural sector (ISIC divisions 1-5) as a share of GDP. Agriculture comprises value added from forestry, hunting, and fishing as well as cultivation of crops and livestock production. Source: World Development Indicators (World Bank).

Manufacturing (% GDP): Value added of the manufacturing sector (ISIC divisions 15-37) as a share of GDP. Source: World Development Indicators (World Bank).

Services (% GDP): Value added of the service sector (ISIC divisions 50-99) as a share of GDP. Services comprises value added from wholesale and retail trade (including hotels and restaurants), transport, and government, financial, professional, personal services such as education, health care, and real state services. Source: World Development Indicators (World Bank).

Remittances (% GDP): Percentage of workers' remittances, compensation of employees, and migrant transfers credit in USD (source: World Bank, 2008) over GDP in current USD (source: World Development Indicators, World Bank).

Remittances per capita: Ratio of workers' remittances, compensation of employees, and migrant transfers credit in USD (source World Bank, 2008) over total population (source World Development Indicators, World Bank).

GDP per capita: Constant GDP at 1995 USD over total population. Source: World Development Indicators (World Bank).

M2: Money and quasi money (M2) as % of GDP. Source: World Development Indicators (World

Bank).

Terms of Trade: Index of the relative price of a country's exports of goods and services with respect to imports. Source: World Economic Outlook Database (IMF).

Trade Openness: Sum of exports and imports of goods and services as % of GDP. Source: World Development Indicators (World Bank).

GDP growth: Annual percentage growth rate of constant GDP at market prices based on 1995 USD. Source: World Development Indicators (World Bank).

Fixed exchange rate: Indicator variable taking value of 1 if the country has a fixed exchange rate regime, and 0 otherwise (intermediate or floating exchange rate). Source: Levy-Yeyati and Sturzenegger (2005).

Foreign direct investment (FDI): Net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor, as a % of GDP in current USD. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. Source: World Development Indicators (World Bank).

Non-FDI private inflows: Net private debt flows (including commercial bank lending, bonds, and other private credits), and portfolio equity investment, as a % of GDP in current USD. Source: World Development Indicators (World Bank).

Government expenditure growth: Annual percentage growth rate of general government consumption, including all current expenditures for purchases of goods and services by all levels of government (excluding most government enterprises), and capital expenditure on national defense and security. Source: World Development Indicators (World Bank).

Investment: Gross domestic investment includes outlays on additions to the fixed assets of the economy plus net changes in the level of inventories. Fixed assets include land improvements, plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including commercial and industrial buildings, offices, schools, hospitals, and private residential dwellings. Inventories are stocks of goods held by firms to meet temporary or unexpected fluctuations in production

or sales. Expressed as a % of GDP. Source: World Development Indicators (World Bank).

Primary school enrolment rate: Gross primary school enrollment ratio, regardless of age, to the population of the age group that officially corresponds to the level of primary shown. Source: World Development Indicators (World Bank).

GDP per capita of the main migrant host countries: GDP per capita of the five main migrant host countries for each country, weighted by migrants stock. Source: Aggarwal et al. (2006).

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Figure 1: Remittances and Real Effective Exchange Rate Evolution. Selected Countries.

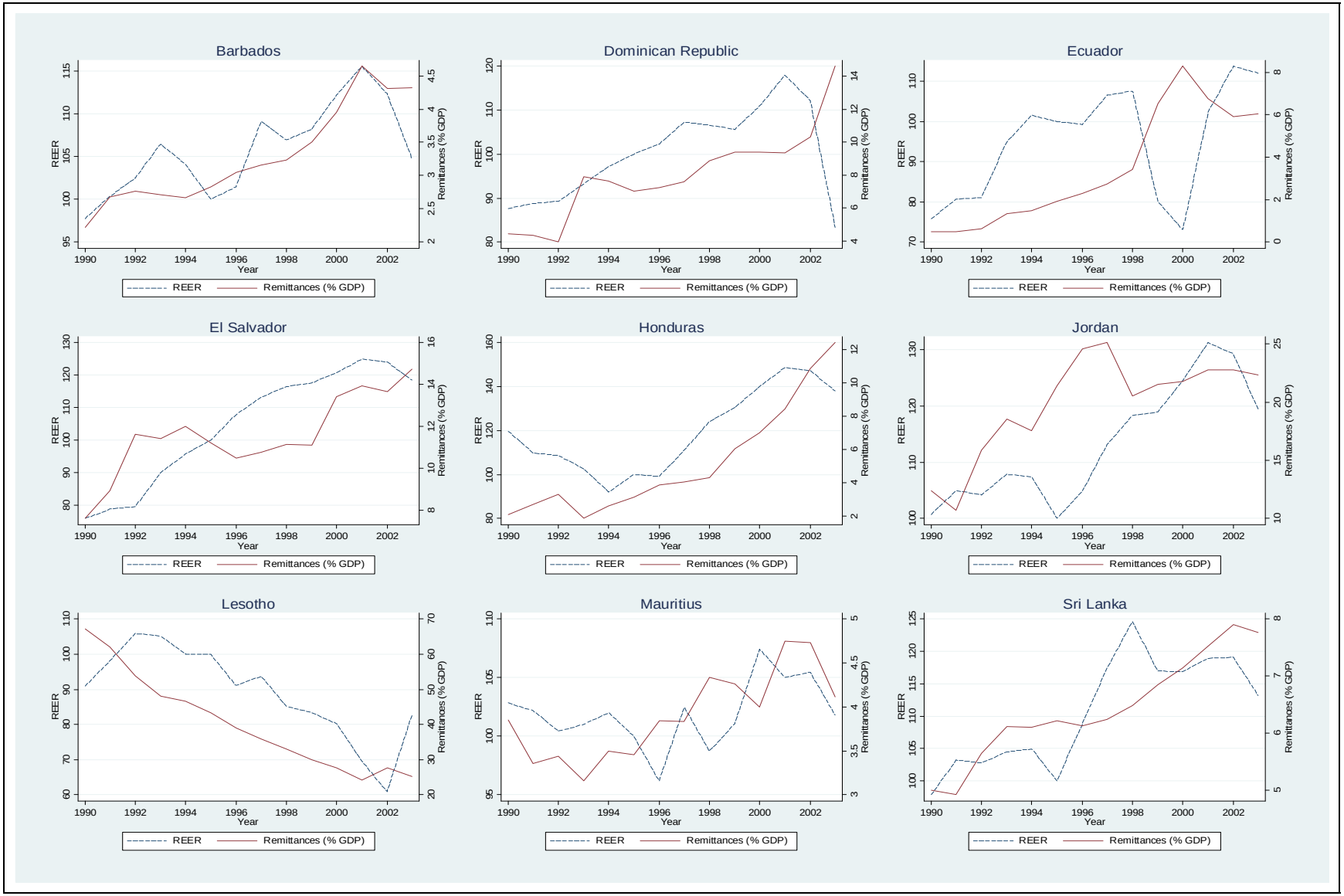

Figure 2: Remittances and Tradable/Non-Tradable Output Evolution. Selected Countries.

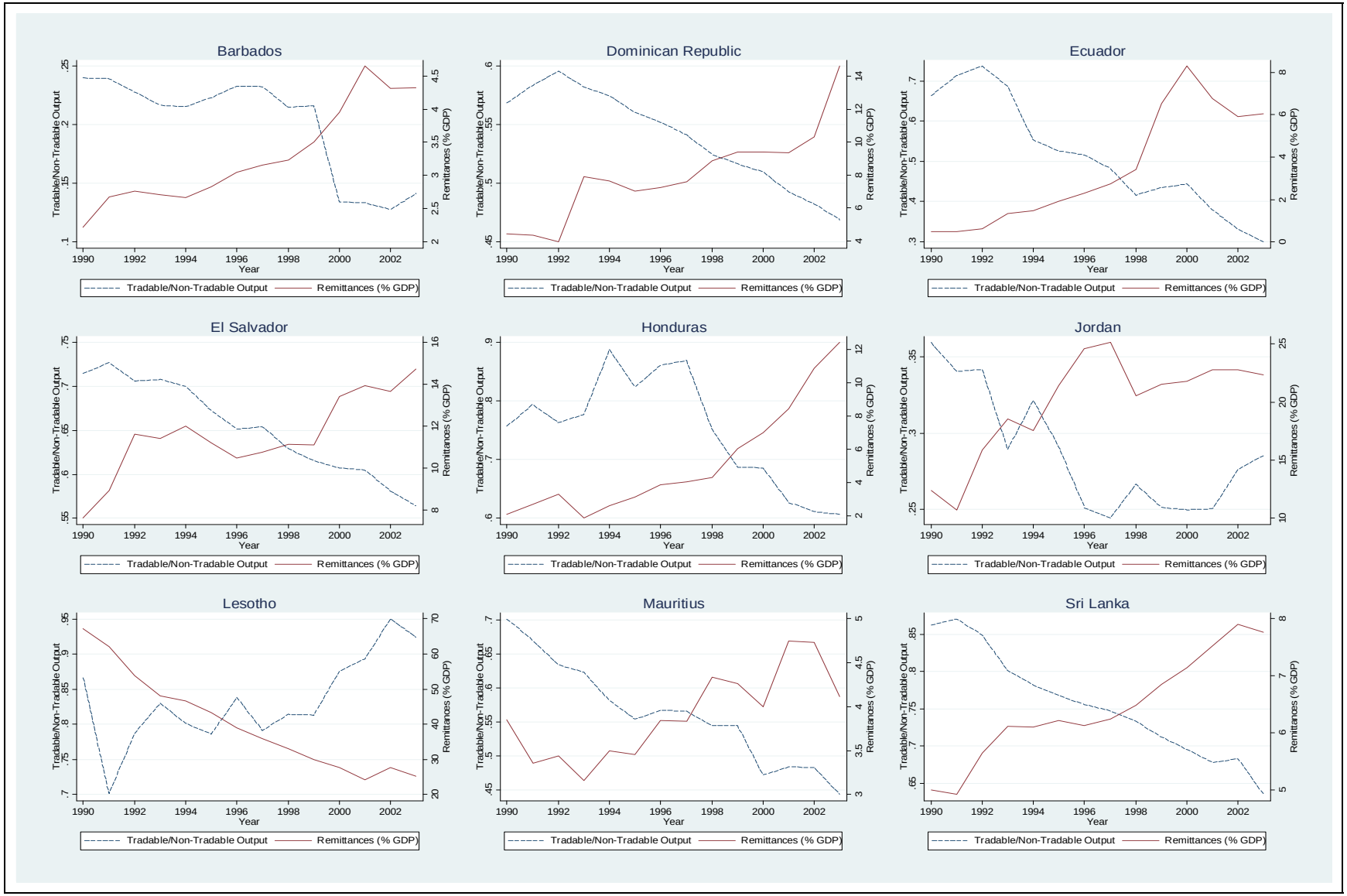

Table 1: Data Coverage for Remittance Data.

Country	Year Coverage
Albania	1992-2003
Antigua and Barbuda	1990-2003
Argentina	1992-2003
Armenia	1995-2003
Azerbaijan	1995, 1998-2003
Bangladesh	1990-2003
Barbados	1990-2003
Belarus	1993-2003
Belize	1990-2003
Benin	1990-2003
Bolivia	1990-2003
Botswana	1990-2003
Brazil	1990-2003
Bulgaria	1996-2003
Burkina Faso	1990-2003
Cambodia	1992-2003
Cameroon	1990-2003
Cape Verde	1990-2003
China	1990-2003
Colombia	1990-2003
Comoros	1990-2003
Congo, Rep.	1995-2003
Costa Rica	1990-2003
Cote d'Ivoire	1990-2003
Croatia	1993-2003
Dominica	1990-2003
Dominican Republic	1990-2003
Ecuador	1990-2003
Egypt, Arab Rep.	1990-2003
El Salvador	1990-2003
Estonia	1994-2003
Ethiopia	1990-2003
Fiji	1990-2003
Gabon	1995-2003
Ghana	1990-2003
Grenada	1990-2003
Guatemala	1990-2003
Guinea	1994-2003
Guyana	1992-2003
Haiti	1990-2003
Honduras	1990-2003
Hungary	1995-2003
India	1990-2003
Indonesia	1990-2003
Iran, Islamic Rep.	1991-2003
Jamaica	1990-2003
Jordan	1990-2003
Kazakhstan	1995-2003
Kenya	1990-2003
Kyrgyz Republic	1993-2003
Lao PDR	1990-2003
Latvia	1996-2003
Lebanon	1990-2003
Lesotho	1990-2003
Lithuania	1993-2003

Country	Year Coverage
Macedonia, FYR	1993-2003
Madagascar	1990-2003
Malawi	1994-2003
Malaysia	1990-2003
Mali	1990-2003
Mauritania	1990-2003
Mauritius	1990-2003
Mexico	1990-2003
Moldova	1995-2003
Mongolia	1998-2003
Morocco	1990-2003
Mozambique	1990-2003
Myanmar	1990-2003
Namibia	1990-2003
Nepal	1993-2003
Nicaragua	1992-2003
Niger	1990-2003
Nigeria	1990-2003
Oman	1990-2003
Pakistan	1990-2003
Panama	1990-2003
Papua New Guinea	1990-2003
Paraguay	1990-2003
Peru	1990-2003
Philippines	1990-2003
Poland	1994-2003
Romania	1994-2003
Russian Federation	1994-2003
Samoa	1990-2003
Sao Tome and Principe	1990, 1998-2003
Senegal	1990-2003
Sierra Leone	1990-2003
Slovak Republic	1990-2003
South Africa	1990-2003
Sri Lanka	1990-2003
St. Kitts and Nevis	1990-2003
St. Lucia	1990-2003
St. Vincent and the Grenadines	1990-2003
Sudan	1990-2003
Swaziland	1990-2003
Syrian Arab Republic	1990-2003
Tajikistan	1997-2003
Tanzania	1995-2003
Thailand	1990-2003
Togo	1990-2003
Trinidad and Tobago	1990-2003
Tunisia	1990-2003
Turkey	1990-2003
Uganda	1999-2003
Ukraine	1996-2003
Vanuatu	1990-2003
Venezuela, RB	1990-2003
Yemen, Rep.	1990-2003
Zimbabwe	1990-1994

Source: World Bank (2008)

Table 2: Summary Statistics by Region: 1995-2003

Region	Countries	Total Remittances (millon USD)		Remittances per capita (USD)		Remittances/GDP		REER appreciation (%)	Tradable/Non-Tradable Output	
		1995	2003	1995	2003	1995	2003	1995-2003	1995	2003
East Asia and the Pacific	13	9,690	32,500	6.01	18.61	0.78	1.66	40.79	1.15	1.01
Eastern Europe and Central Asia	21	7,970	12,100	19.16	29.24	0.85	0.96	14.16	0.90	0.63
Latin America and the Caribbean	28	13,400	34,900	30.18	69.56	0.85	2.13	2.85	0.52	0.41
Middle East and North Africa	9	11,600	18,100	60.35	81.43	4.75	5.20	17.92	0.55	0.49
South Asia	5	10,000	30,400	8.25	21.77	2.12	4.08	1.57	0.98	0.79
Sub-Saharan Africa	33	3,150	5,730	6.58	9.91	1.07	1.55	1.85	0.94	0.85
Total	109	57,805	133,730	12.82	27.53	1.17	2.12	10.43	0.82	0.68

Source: World Bank (2007), International Finance Statistics (IMF), and World Development Indicators (World Bank).

Table 3: Remittances and the Real Exchange Rate, Fixed Effects Estimation.

Variables	(1)	(2)
Remittances (% GDP)	0.403*	
	(0.239)	
Remittances (USD per capita)		0.085***
		(0.019)
GDP per capita ('000s USD)	10.882***	10.043***
	(3.125)	(3.043)
M2 (% GDP)	0.143	0.176*
	(0.095)	(0.094)
Terms of Trade (Goods and Services)	0.289***	0.285***
	(0.034)	(0.031)
Trade Openess (X+M/GDP)	0.038	0.016
	(0.055)	(0.054)
GDP growth (%)	0.199***	0.192***
	(0.048)	(0.047)
Year Indicators	Yes	Yes
Country Fixed Effects	Yes	Yes
Observations	884	884

Note: *** Significant at 1% level. ** Significant at 5% level. * Significant at 10% level.

Table 4: Remittances and the Real Exchange Rate, GMM System Estimation.

Variables	(1)	(2)	(3)	(4)	(5)	(6)
Remittances (% GDP)	0.346***		0.424***	0.243***	0.403***	0.168**
	(0.054)		(0.055)	(0.078)	(0.050)	(0.066)
Remittances (% GDP) * Fixed Exchange Rate						0.290***
						(0.044)
Remittances (USD per capita)		0.033***				
		(0.002)				
FDI (% GDP)			-0.038			
			(0.059)			
Non FDI Private Inflows (% GDP)				0.649***		
				(0.117)		
Government Expenditure growth (%)					0.051***	
					(0.010)	
GDP per capita ('000s USD)	0.778***	0.901***	1.371***	-0.217	1.010***	0.722**
	(0.300)	(0.181)	(0.227)	(0.209)	(0.279)	(0.283)
M2 (% GDP)	-0.149***	-0.170***	-0.099***	0.002	-0.121***	-0.151***
	(0.019)	(0.015)	(0.015)	(0.016)	(0.014)	(0.020)
Terms of Trade (Goods and Services)	0.342***	0.375***	0.345***	0.477***	0.423***	0.341***
	(0.008)	(0.011)	(0.011)	(0.015)	(0.009)	(0.010)
Trade Openess (X+M/GDP)	0.215***	0.169***	0.139***	0.071***	0.200***	0.225***
	(0.010)	(0.016)	(0.011)	(0.015)	(0.013)	(0.011)
GDP growth (%)	-0.243***	-0.176***	-0.147***	-0.132***	-0.274***	-0.257***
	(0.040)	(0.033)	(0.049)	(0.026)	(0.048)	(0.039)
Year Indicators	Yes	Yes	Yes	Yes	Yes	Yes
Observations	884	884	858	793	819	884
Sargan Test	0.723	0.765	0.848	0.941	0.678	0.717
AR(1)	0.019	0.016	0.000	0.005	0.000	0,019
AR(2)	0.130	0.150	0.021	0.136	0.516	0.135

Notes: *** Significant at 1% level. ** Significant at 5% level. * Significant at 10% level. Two-step estimation.

Instruments include the first lagged difference and the second lag level of remittances, GDP per capita, M2, terms of trade, trade openess, and GDP growth.

Table 5: Remittances and the Tradable/Non Tradable Ratio, GMM System Estimation.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Remittances (% GDP)	-0.010***			-0.008***	-0.009***	-0.008***	-0.012***	-0.002
	(0.001)			(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Remittances (% GDP) t-1		-0.014***						
		(0.001)						
Remittances (% GDP) t-2			-0.015***					
			(0.001)					
FDI (% GDP)				-0.009***				
				(0.001)				
Non FDI Private Inflows (% GDP)					0.000			
					(0.001)			
Government Expenditure growth (%)						0.000		
						(0.000)		
Investment (% GDP)							0.004***	
							(0.001)	
Remittances (% GDP) * Fixed Exchange Rate								-0.010***
								(0.001)
GDP per capita ('000s USD)	-0.130***	-0.135***	-0.145***	-0.126***	-0.134***	-0.133***	-0.133***	-0.129***
	(0.004)	(0.004)	(0.005)	(0.004)	(0.008)	(0.004)	(0.005)	(0.005)
M2 (% GDP)	-0.001	0.001***	0.000	0.000	0.001***	0.000	-0.001***	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Terms of Trade (Goods and Services)	0.001***	0.002***	0.006***	0.002***	0.003***	0.002***	0.002***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Trade Openess (X+M/GDP)	0.002***	0.002***	0.005***	0.003***	0.002***	0.002***	0.002***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP growth (%)	-0.001***	0.002***	0.002***	0.000	-0.001**	-0.001**	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Year Indicators	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	845	768	690	822	762	784	845	845
Sargan Test	0.808	0.850	0.848	0.851	0.975	0.846	0.812	0.790
AR(1)	0.088	0.036	0.014	0.117	0.060	0.027	0.093	0.081
AR(2)	0.100	0.432	0.090	0.121	0.100	0.336	0.112	0.095

Notes: *** Significant at 1% level. ** Significant at 5% level. * Significant at 10% level. Two-step estimation.
Instruments include the first lagged difference and the second lag level of remittances, GDP per capita, M2, terms of trade, trade openess, and GDP growth.

Table 6: Remittances and Sectorial Output, GMM System Estimation.

Dependent Variable	Agriculture (% GDP)	Manufacturing (% GDP)	Services (% GDP)
Remittances (% GDP)	-0.016	-0.118***	0.367***
	(0.025)	(0.017)	(0.038)
GDP per capita ('000s USD)	-3.754***	0.237	4.061***
	(0.162)	(0.158)	(0.131)
M2 (% GDP)	-0.023***	0.035***	0.016**
	(0.007)	(0.008)	(0.008)
Terms of Trade (Goods and Services)	0.029***	0.024***	0.057***
	(0.003)	(0.004)	(0.005)
Trade Openess (X+M/GDP)	0.035***	0.033***	-0.044***
	(0.004)	(0.004)	(0.006)
GDP growth (%)	-0.045***	0.044***	-0.010
	(0.007)	(0.006)	(0.010)
Year Indicators	Yes	Yes	Yes
Observations	871	845	871
Sargan Test	0.733	0.913	0.703
AR(1)	0.037	0.001	0.017
AR(2)	0.146	0.029	0.441

Notes: *** Significant at 1% level. ** Significant at 5% level. * Significant at 10% level. Two-step estimation Instruments include the first lagged difference and the second lag level of remittances, GDP per capita, M2, terms of trade, trade openess, and GDP growth.

Table 7: Remittances, Real Exchange Rate, Tradable/Nontradable Ration, and Sectorial Output, GMM-IV System Estimation.

Dependent Variable	Real Effective Exchange Rate			Tradable / Non-Tradable Output	Agriculture (% GDP)	Manufacturing (% GDP)	Services (% GDP)
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Remittances (% GDP)	0.294***		0.141**	-0.007***	0.031	-0.135***	0.450***
	(0.069)		(0.064)	(0.001)	(0.036)	(0.036)	(0.048)
Remittances (% GDP) * Fixed Exchange Rate			0.182*				
			(0.098)				
Remittances (USD per capita)		0.028***					
		(0.003)					
GDP per capita ('000s USD)	0.810***	0.699***	0.859***	-0.124***	-3.863***	0.188	3.971***
	(0.241)	(0.189)	(0.279)	(0.005)	(0.197)	(0.188)	(0.154)
M2 (% GDP)	-0.120***	-0.182***	-0.124***	-0.001	-0.010	0.045***	0.033**
	(0.024)	(0.022)	(0.025)	(0.000)	(0.010)	(0.012)	(0.010)
Terms of Trade (Goods and Services)	0.384***	0.369***	0.390***	0.002***	0.042***	0.024***	0.079***
	(0.013)	(0.011)	(0.013)	(0.000)	(0.005)	(0.004)	(0.006)
Trade Openess (X+M/GDP)	0.232***	0.231***	0.241***	0.002***	0.042***	0.031***	-0.056***
	(0.015)	(0.017)	(0.016)	(0.000)	(0.006)	(0.006)	(0.008)
GDP growth (%)	-0.210***	-0.158***	-0.207***	-0.001**	-0.045***	0.048***	-0.021**
	(0.043)	(0.030)	(0.045)	(0.000)	(0.006)	(0.006)	(0.010)
Year Indicators	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	884	884	884	845	871	845	871
Sargan Test	0.978	0.985	0.982	0.994	0.989	0.997	0.98
AR(1)	0.004	0.004	0.003	0.031	0.012	0.000	0.000
AR(2)	0.120	0.152	0.117	0.128	0.166	0.022	0.518

Notes: *** Significant at 1% level. ** Significant at 5% level. * Significant at 10% level. Two-step estimation.

Instruments include the first lagged difference and the second lagged level of remittances, GDP per capita, M2, terms of trade, trade openess, and GDP growth, as well as the first lagged level of two external instruments: primary school enrollment rates,