

Economic Volatility and Remittances

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Abstract

Remittances have been rising fairly rapidly around the world and are the fastest growing source of foreign exchange earnings for developing countries. The empirical literature suggests that remittances can have both positive and negative influences on the growth and development of receiving states. However, the literature has been largely silent on the potential effects that these flows can have on economic volatility in the receiving country. This paper evaluates the impact of remittance flows on economic volatility in a panel of 95 countries over the period 1970 to 2005. The study reports that remittances can play a key role in mitigating the effect of adverse output shocks but exert no significant influence on consumption and investment volatility. Moreover, important differential impacts exist across the various county groupings.

JEL Classification: F240; E320; P500

Keywords: Remittances; Economic volatility;

1. Introduction

One of the main predictions of traditional growth theory is that capital should flow from relatively rich to relatively poor countries, as the rate of return on capital is lower in countries with more capital per worker. While developed countries do supply 90 percent of outward foreign direct investment flows, most of these funds (between 58 and 78 percent) are absorbed by other high-income states. Many developing countries therefore rely on remittance inflows as a source of development finance.

Remittances, defined in a very broad sense as transfers of net worth from one country to another by migrants, have been rising fairly rapidly around the world and are the fastest growing source of foreign exchange earnings for developing countries. Starting in 1970, total workers' remittances and compensation of employees received was just US\$2 billion. Since then the growth in migrant remittances has been phenomenal. By 1990, the figure was almost US\$70 billion, and has been doubling in each decade since, reaching US\$130 billion by 2000, and US\$276 billion by 2006².

The empirical literature evaluating the impact of migrant remittances on the receiving country has identified a number of economic benefits that can be derived. Adams and Page (2005) utilise a database on 71 developing countries and panel data techniques to examine the relationship between remittances, inequality and poverty. The study finds that a 10 percent increase in per capita official international remittances will lead to a 3.5 percent decline in the share of people living in poverty. Similar results are reported by Acosta et al. (2008) for Latin America and the Caribbean, while Adams (1991) finds that once remittances are included in household income, the number of poor households decline by 9.8 percent. Edwards and Ureta (2003) examine the impact of remittances on household schooling decisions

² All figures were taken from World Development Indicators Online.

in El Salvador. Using data from the 1997 National Household Survey, the authors find large and statistically significant effects of remittances on school attendance and retention, especially in poor rural areas. Haas (2006) also notes that remittance receiving households invest more in housing and agriculture, while Woodruff and Zenteno (2007) finds that remittances are also positively associated with investment levels and profits of micro-enterprises.

Amidst these positive effects, remittances may also disrupt economic patterns in the country. Amuedo-Dorantes and Pozo (2004) note that remittances are likely to reduce the range of goods a country exports, as the transfer of resources leads to an appreciation in the real exchange rate. The appreciation in the exchange rate can either impact on the labour supply decisions of individuals or on the demand for goods of certain industries. Using data from 13 Latin American and Caribbean countries, the authors augment a model of the real exchange rate with workers' remittance inflows and found a positive link between remittances and the real exchange rate; every 1-percentage point increase in remittances per capita leads a 0.22 percent rise in the real exchange rate. Depending on the countries level of development remittances can overwhelm underdeveloped financial systems (Ahmed, 2000). Kageyama (2008) also notes that remittances may also have unintended social implications such as disrupting family relations and creating a sense of relative deprivation in non-migrant communities.

The empirical literature therefore suggests that remittances can have both positive and negative effects on the growth and development of receiving states. However, the literature has been largely silent on the potential effects that these flows can have on economic volatility in the receiving country. There are several reasons to suspect that remittances might impact on economic volatility. If remittance flows do lead to an appreciation in the real exchange rate, this could result in a reduction in export growth

as well as a jump in imports. The resultant effect on output is, however, indeterminate. In addition, large reversals in remittance flows can have significant impacts on capital formation, provided that these flows were being used to finance investment. Finally, much of the literature indicates that remittances often act as insurance; they tend to increase when the home country experiences an economic downturn and hence should play a critical role in reducing the vulnerability of individuals to adverse shocks (Rapoport and Docquier, 2005).

Recently, Spatafora (2005) investigated the responsiveness of economic volatility to remittances using a panel of 101 countries over the period 1970 to 2003. His results indicated that remittances were negative and significantly related to the volatility of aggregate output, consumption and investment in the full sample of countries as well as remittance-dependent economies. A shortcoming of the study was that it did not explicitly account for the differences in the country groupings. Moreover, the study failed to explain the implications of remittance volatility on economic instability. In fact, several researchers have consistently promoted the view that remittances are generally a stable source of foreign finance (Buch, Kuckulenz and Le Manchec, 2002; Rhata, 2003). Conversely, Ghosh (2006) argues that if remittances are indeed sensitive to economic conditions in the receiving country, they cannot at the same time be highly stable. He further notes that the more remittances move counter-cyclically, the more they gain in potential volatility. As for investment-related remittances, Ghosh (2006) states that these could be highly volatile depending on the macro-economic situation, business prospects and the political climate in the host and home countries. Craigwell, Jackman and Moore (2008) assessed the impact remittance flows and remittance volatility has had on various measures of economic volatility in 20 small island developing states. Similar to Spatafora (2005), their results suggest that in general, remittance flows have a stabilising influence on output and investment volatility. However, no

direct link between remittances and consumption volatility was obtained. As for remittance volatility, the authors report that fluctuations in remittances have a significant and positive effect on both investment and consumption volatility but no significant impact on output volatility.

This paper attempts to evaluate the impact of remittance flows on economic volatility in panel of 95 countries over the period 1975 to 2005. The study first provides detailed analysis of the trends in remittance flows over the review period and provides a preliminary analysis of relationship between remittance flows and volatility. A cross-country model of economic volatility is estimated and augmented with indicators of remittance flows, for the full sample of countries as well as for various country groupings, to account for other intervening influences on economic volatility. Various tests of the robustness of the results obtained are also provided.

The rest of the paper is organised as follows. Section 2 provides some stylised facts on remittances, while Section 3 outlines the empirical methodology employed in the study. The empirical results are reported in Section 4 and some concluding remarks are given in Section 5.

2. Stylised Facts

The study employs annual observations over the period 1970 to 2005 for 95 countries. Remittances, defined as the sum of migrants' remittances, workers' compensation and migrant transfers³, are expressed as a ratio to gross domestic product (GDP) to capture the importance of remittance flows to national output. Means and standard deviations for the series are provided in Table 1. These averages are calculated for the full sample of countries as well as for seven country groupings: East Asia and Pacific,

³Both the IMF and World Bank define total remittances as the sum of worker's remittances, compensation of employees (the wage, salaries and other benefits earned by migrants who have lived abroad for less than one year) and migrant transfers (financial items that arise from the migration of individuals from one economy to another).

Europe and Central Asia, Latin America and the Caribbean, Middle East and North Africa, South Asia, Sub-Saharan Africa and all high income countries. To examine the trends in remittances, decadal averages are also provided for the 1970s, 1980s, 1990s and 2000s.

On average, remittances as a proportion of GDP were about 6.6 percent for the full sample of countries. The ratio fluctuated around this level for most of the sample period. Since 2000, however, the mean for the series jumped by about 1.1 percent points to 7.4 percent of GDP. Countries in the Middle East and North Africa were, on average, the biggest recipients of remittance flows, with flows representing 16 percent of GDP on an annual basis. Remittance flows to this region were particularly large during the 1980s, estimated at 16 percent of GDP. Following a dip in the 1990s to 14 percent, the ratio has since rebounded to about 15 percent of GDP in the six years after 1999.

Latin America and the Caribbean and South Asian states reported the largest expansions in remittance inflows. In South Asia, remittance flows jumped from just 7.4 percent of GDP in the 1980s to just over 12 percent of GDP between 2000 and 2005. Within this region, Nepal had the greatest rate of change, growing from just 3 percent in 1998 to about one-third of GDP by 2005. Similarly, inflows to Latin America and the Caribbean rose from 6.5 percent in the 1970s to about 11.4 percent by the final period under analysis. In the Dominican Republic inflows more than doubled, advancing from just 6 percent in the 1970s to about 26 percent of GDP by the end of the review period, while in El Salvador inflows escalated from less than 6 percent of GDP in the 1980s to about 33 percent of GDP by 2005. Other notable increases were reported by Guatemala (from less than 4 percent in the early 1990s to about 19 percent by 2005), Honduras (from 5 percent of GDP in 1992 to approximately 43 percent of GDP by 2005) and Jamaica (from 5.7 percent in 1981 to about 34 percent by 2005).

All the other regions examined in Table 1 reported marginal declines in remittance inflows. Remittances as a percent of GDP in East Asia and Pacific contracted by 3.6 percentage points over the review period, by approximately 2.3 percentage points in Europe and Central Asia and by less than one percentage point in both Sub-Saharan Africa and high income states.

Table 1 also provides mean estimates of output volatility over the period 1970 to 2005. The average rolling standard deviation of growth in GDP per capita (see Blanchard and Simon, 2001 for a similar approach to measuring economic volatility) was about 0.03 for the full sample period and all countries. In general, the figure fluctuated about this level over three of the four sub-periods considered and contracted since 2000. Most regions, however, reported declines in measured economic volatility. In Sub-Saharan Africa, the region with the highest rate of volatility in GDP per capita growth, economic volatility fell from 0.063 in the 1970s to just under 3 percent by the final sub-period considered. A similar decrease in volatility was reported for the sample of Middle East and North African countries. The only region not to report a contraction in measured volatility was Latin America and the Caribbean, where the rolling standard deviation statistic fluctuated about the 0.024 to 0.031 level for most of the period. As documented by previous studies in the area (see Kose, Prasad and Terrones, 2005), high-income countries as well as South Asian states had the lowest rates of measured economic volatility, at about 0.020 or less for most of the sample period under investigation.

Figure 1 provides a preliminary investigation of the relationship between economic volatility and remittances for the full sample as well as those countries that are highly dependent on remittance flows. Averages for each variable are obtained for each country in the sample and these are then

used to produce the scatter diagram. The trend line is added to the figure to show the directional relationship between the two variables. A visual examination of the diagram as well as the coefficient on the bivariate regression equations suggests that there exists a positive relationship between the amount of remittances received and economic volatility in both the full sample as well as the group of highly dependent countries.

In addition to the relative size of remittance flows obtained, the fluctuations in these inflows can also have a significant impact on economic volatility. In this case, the rolling standard deviation of remittance growth is calculated for each country. These observations are then averaged over time for each country over the full sample period and plotted against the economic volatility indicator discussed earlier. The results provided in Figure 2 also suggest that there exists a positive relationship between remittance volatility and economic volatility.

To evaluate the statistical strength of association between remittances and economic volatility for the sample of countries, the correlation ratios and p-values are provided in Table 2. In addition to output volatility, the table also adds consumption and investment volatility to the analysis. The correlation ratios provided in the table suggest that there exists a positive relationship between economic volatility and remittances as a percent of GDP as well as remittance volatility. The association between economic volatility and remittances as a percent of GDP, however, is insignificant at normal levels of testing. In contrast, both remittance indicators had a positive and statistically significant association with consumption and investment volatility among the sample of countries considered.

3. Empirical Methodology

3.1 Empirical Model

There are a number of other factors that might impact on economic volatility, such as uncertainty and external economic shocks. The exclusion of these variables from the simple bivariate analysis might mask the underlying relationship between the two variables under investigation. In this section, a simple model of economic volatility is augmented with the remittance indicators to further explore the findings obtained in the previous section. Formally,

$$\sigma_{it}^y = \alpha_i + \beta r_{it} + \delta \sigma_{it}^r + \gamma X_{it} + u_{it}$$

(1)

where α_i are the country-specific effects, σ^y is a measure of economic volatility, r is the ratio of remittances to GDP, σ^r is remittance volatility, X is a matrix of control variables and u is error term observed for each country i and each time period t . Regressions are estimated for the full sample of countries, different regions and income groups.

The control variables employed in the study include inflation (a proxy for monetary policy), government consumption (a proxy for fiscal policy), trade openness, financial openness, growth in GDP per capita, inflation volatility, World GDP growth volatility, economic diversification and the levels and change in the terms of trade.

3.2 Estimation

The coefficient estimates for the equations above are obtained using the panel fixed effects model with cross-section weights. The Hausman tests rejected the null hypothesis of no correlation between the random effects and the explanatory variables and a joint test of the significance of the fixed-effects was significant at the 1 percent level of testing while the White Test rejected the null of no heteroskedasticity. However volatility may be endogenously related to some of the explanatory variables, for example,

remittances tend to be sensitive to economic conditions in the home country. Therefore the authors also employ an instrumental variable estimation technique to explicitly account for simultaneity bias.

Countries are more likely to be concerned about volatility when growth has the potential to become negative: volatility that results in GDP growth varying between 3 and 5 percent per annum is likely to be less problematic than when growth varies between -1 and 1 percent. As a result, Mobarak (2005) generates an indicator of whether growth changed sign (from positive to negative or vice versa) and interacts this with the volatility indicator. A similar measure is adopted in this study.

3.3 Data

The database employed in this study contains cross-sectional time-series data on 95 countries for 1975 to 2005 from the United Nations National Accounts Main Aggregates Database (2007), the International Monetary Fund's International Financial Statistics Database (2007) and the World Bank's World Development Indicators Database (2007)⁴. Three types of economic volatility are utilised (output, private consumption and private investment) and all are measured using five-year standard deviations of their annual growth rates.

The ratio of government consumption to GDP is utilised as a proxy for the fiscal policy stance, while monetary policy impulses are captured by the rate of inflation. Trade openness is approximated by the total trade flows to GDP while financial openness is measured by the Chinn and Ito (2006) financial openness index. Economic diversification is captured by the Herfindahl-Hirschman index of concentration and terms of trade is calculated as the export price index divided by the import price index. All indices are for base year 1990.

⁴ For more information on data sources see Appendix.

4. Results

In this section, the results of the basic econometric regression relating economic volatility and remittances are reported. These are presented to evaluate whether the model specification gives a reasonable representation of volatility in the full sample of countries as well as different country groupings. The basic regression estimates are provided in Tables 3, 4 and 5 for output, consumption and investment volatility respectively.

Looking first at the results for output volatility (Table 3), the econometric model specification chosen is able to explain between 40 and 93 percent of annual output volatility over the review period. Similar to Spatafora (2005), remittances have a negative statistically significant relationship with output volatility for the full sample of countries, suggesting remittances play a crucial role in stabilising aggregate output. This finding holds for most regions considered, the exception being Sub-Saharan Africa where the presence of remittances appears to stimulate output fluctuations and Europe and Central Asia, South Asia and High-income countries, where their impact is insignificant. In the case of Europe and Central Asia and High-income countries, the insignificant relation is somewhat expected, as worker's remittances account for a relatively small portion of their economic activity. The reported result for South Asia, on the other hand, is surprising considering the magnitude of remittance flows to the region. Nonetheless, it is to some extent in line with Stahl and Arnold (1986) who reports that remittances to this region are primarily spent on day-to-day consumption expenditures, debt repayment and unproductive investment such as housing and land, all of which do not contribute to long run growth. In terms of remittance volatility, the positive and significant coefficient on this variable indicates that fluctuations in remittances are associated with increased output volatility. However, this finding only holds in the Middle East and

North Africa, Sub-Saharan Africa and High-income countries where remittances flows tend to be more uncertain.

To this end, the relationship between remittances and consumption volatility is investigated. As for the link between remittances and consumption, a large body of micro-level studies have implied that remittances are primarily used for consumption purposes (Chandavarkar, 1980; Stark and Levhari, 1982 and De Bruyn, 2006). According to Spatafora (2005), remittances help to loosen the budget constraints of their recipients, allowing them to increase their expenditure. Moreover, if economic downturns prompt workers to remit larger sums to family members, remittances may smooth consumption. In contrast, the estimated regression here, which employs consumption volatility as the dependent variable (Table 4), indicates that there is no direct association between consumption instability and remittances or remittance volatility in the full sample of countries. There is, however, some degree of disparity in the country groupings. In the South Asia region, the findings suggest that an increase in the remittances to GDP ratio reduces the volatility of aggregate consumption. Conversely, in the Middle East and North Africa and High-income countries, both remittances and remittance volatility deepens consumption fluctuations.

Turning now to investment volatility (Table 5), both remittances and remittance volatility have an insignificant impact on investment instability. However, an evaluation of the country groupings reveals that in East Asia and the Pacific, Latin America and the Caribbean, Sub-Saharan Africa and High-income countries, the presence remittances does influence investment decisions. Previously, in Table 4, the estimated regression indicated that remittances have no impact on consumption volatility in East Asia and the Pacific, Latin America and the Caribbean and Sub-Saharan Africa countries. The significant relation to investment volatility therefore provides some evidence that remittances to these regions are being used less on

consumption and more on investment goods. Moreover, important differential impacts exist among the regions: in East Asia and Pacific, Sub-Saharan Africa and High-income countries the presence of remittances tends to enhance investment instability while in the Latin America and the Caribbean region, remittances are associated with reduced investment fluctuations.

4.1 Robustness of Results

The results presented in the previous section suggest that the effects of remittances differ depending on the economic activity in the country under consideration. However, these results may be influenced by the estimation approach employed. To evaluate whether the results change significantly in response to this criticism, Table 6 presents the findings of re-estimating the economic volatility equations for the full sample of countries allowing for any potential model misspecifications.

Both the theoretical and empirical literature reveals that remittances do respond to cyclical changes in economic activity. In fact, remittances tend to have counter-cyclical effects; the flows tend to increase when the recipient country experiences a downturn in economic activity. To account for this, the dependent variable is interacted with a dummy variable that takes a value of 1 if there is a change in the sign of growth during the year, and zero otherwise. The coefficient estimates are presented in Table 6. The results are generally similar to those obtained earlier, the exception being that remittance volatility does not have a statistically significant impact on output volatility.

As previously indicated, there may be a simultaneous relationship between remittances and economic activity. If this is indeed the case, one should employ an instrumental variables approach to estimate the econometric equation, to explicitly account for this simultaneity bias. Table 6 also

displays the results from estimating the output equation using two stage least squares. The coefficient on the remittance and remittance volatility variables retains the same sign and statistical significance and therefore the inferences obtained earlier are unchanged.

5. Conclusions

Workers' remittances have grown dramatically worldwide, particularly in developing countries, where they constitute the second largest source of foreign finance after foreign direct investment (FDI) flows. This paper provides an investigation of the relationship between remittances and economic volatility. The basic stylised facts regarding the link between volatility, suggests that there is a positive association between volatility and the amount remittances received, indicating that countries in which remittances are more prevalent tend to have high rates of economic volatility. In addition to the relative size of remittance flows obtained, the fluctuations in these inflows also have a significant impact on economic volatility.

The paper then provided a more formal analysis of the relationship between remittances and economic volatility by estimating panel regression models. Several findings emerged. The study reports that, when interacted with other variables, remittance flows remittances can play a key role in mitigating the impact of adverse output shocks but exert no significant impact on consumption and investment volatility in the full sample of countries. In addition, we find that the effect of remittances differs across the various country groupings.

The empirical results presented earlier are then subjected to robustness of results tests that evaluate whether or not the findings obtained earlier are influenced by the estimation approach employed. When a panel

instrumental variables approach is employed to estimate the econometric equation, the key findings of the paper do not change. The main results were also unchanged when the dependent variable is interacted with a dummy variable that gives more weight to observations when growth changes sign.

Remittance flows can therefore bring benefits and obstacles. The policy implications of this observation is that regions (similar to how oil-producing nations take oil price fluctuations into account when considering policy changes) may have to monitor and forecast future remittance flows and take these projections into account when making changes to either their monetary or fiscal policy stance. The influence that remittances would have over future policy decisions would, however, depend on their overall economic importance. In regions where remittance flows are more prevalent, future trends in this variable should have a greater impact on policy decisions than in less dependent regions.

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Table 1: Trends in Worker Remittances and Economic Volatility

	Full Sample	Sub-Periods			
	1975-2005	1970s	1980s	1990s	2000s
<i>Remittances/GDP</i>					
All Countries	0.066 (0.097)	0.063 (0.111)	0.063 (0.097)	0.062 (0.092)	0.074 (0.102)
Low to Middle-Income Countries					
East Asia and Pacific	0.107 (0.139)	n.a. (n.a.)	0.119 (0.167)	0.107 (0.139)	0.083 (0.092)
Europe and Central Asia	0.031 (0.024)	0.037 (n.a.)	0.054 (0.010)	0.038 (0.013)	0.014 (0.022)
Latin America and the Caribbean	0.078 (0.092)	0.065 (0.067)	0.059 (0.070)	0.063 (0.068)	0.114 (0.123)
Middle East and North Africa	0.155 (0.144)	n.a. (n.a.)	0.160 (0.148)	0.138 (0.131)	0.149 (0.141)
South Asia	0.082 (0.054)	n.a. (n.a.)	0.074 (0.043)	0.063 (0.033)	0.121 (0.072)
Sub-Saharan Africa	0.063 (0.093)	0.077 (0.079)	0.059 (0.089)	0.062 (0.099)	0.069 (0.090)
High Income	0.016 (0.028)	0.016 (0.025)	0.022 (0.039)	0.015 (0.021)	0.009 (0.011)
<i>Economic Volatility</i>					
All Countries	0.030	0.030	0.032	0.031	0.024
Low to Middle-Income Countries					
East Asia and Pacific	0.036	0.037	0.042	0.035	0.032
Europe and Central Asia	0.034	0.038	0.024	0.043	0.035
Latin America and the Caribbean	0.027	0.024	0.031	0.026	0.025
Middle East and North Africa	0.035	0.060	0.039	0.038	0.021
South Asia	0.017	n.a.	0.019	0.015	0.016
Sub-Saharan Africa	0.045	0.063	0.050	0.051	0.029
High Income	0.020	0.024	0.019	0.020	0.019

Note: Based on authors' calculations

Table 2: Correlation between Worker Remittances and Economic Volatility

	Remittance Volatility	Remittances/GDP	Economic Volatility	Consumption Volatility	Investment Volatility
Remittance Volatility	1.000 (0.000)				
Remittances/GDP	-0.153 (0.000)	1.000 (0.000)			
Economic Volatility	0.261 (0.000)	0.029 (0.236)	1.000 (0.000)		
Consumption Volatility	0.254 (0.000)	0.106 (0.000)	0.539 (0.000)	1.000 (0.000)	
Investment Volatility	0.260 (0.000)	0.181 (0.000)	0.424 (0.000)	0.533 (0.000)	1.000 (0.000)

Note: P-values given in parentheses below correlation ratios.

Table 3: Output Volatility and Remittances

	Full Sample	East Asia and Pacific	Europe and Central Asia	Latin America and the Caribbean	Middle East and North Africa	South Asia	Sub-Saharan Africa	High Income	Note: (1) Standard errors are provided in parentheses below coefficients. (2) ***, ** and * indicates significance at the 1, 5 and 10 percent levels of testing, respectively.
Remittances	-0.025*** (0.006)	-0.063** (0.025)	-0.201 (0.122)	-0.036** * (0.010)	-0.060** * (0.020)	0.029 (0.021)	0.053* (0.031)	0.003 (0.035)	
Remittance Volatility	0.007*** (0.002)	-0.009 (0.006)	0.000 (0.009)	-0.002 (0.003)	0.045*** (0.013)	-0.008 (0.011)	0.013*** (0.004)	0.012*** (0.003)	
Growth	-0.043*** (0.009)	-0.023 (0.034)	-0.092** (0.039)	-0.035* (0.019)	-0.074** (0.029)	-0.071 (0.049)	-0.001 (0.023)	-0.055** * (0.015)	
Inflation	-0.001 (0.002)	-0.005 (0.011)	-0.006 (0.010)	-0.000 (0.005)	-0.008 (0.009)	0.012 (0.008)	-0.002 (0.006)	0.002 (0.003)	
Inflation Volatility	0.032*** (0.005)	0.131*** (0.019)	0.061 (0.038)	0.028*** (0.010)	0.065*** (0.013)	-0.058** (0.025)	0.019 (0.019)	-0.031** * (0.010)	
World Growth Volatility	-0.041*** (0.013)	-0.027 (0.084)	-0.196** (0.093)	0.017 (0.028)	0.007 (0.050)	0.075 (0.052)	-0.101** (0.051)	-0.026 (0.021)	
Trade Openness	-0.000 0.002	-0.026** * (0.007)	0.020** (0.012)	0.003 (0.005)	-0.012 (0.012)	-0.033* (0.020)	-0.028** * (0.008)	-0.005** (0.002)	
Terms of Trade	0.005** (0.002)	-0.021** * (0.003)	-0.031 (0.031)	0.021*** (0.005)	0.006 (0.004)	-0.005 (0.008)	0.011** (0.005)	0.013*** (0.004)	
Change Terms of Trade	-0.003 (0.003)	0.032*** (0.007)	0.013 (0.027)	-0.012* (0.007)	-0.004 (0.008)	0.010 (0.009)	-0.004 (0.006)	-0.015* (0.009)	
Government Consumption	0.055*** (0.013)	0.060* (0.033)	-0.162 (0.229)	0.106*** (0.017)	0.177** (0.073)	-0.235** (0.107)	0.067 (0.051)	-0.000 (0.026)	
Capital Account Openness	-0.002*** (0.000)	0.002 (0.003)	-0.000 (0.002)	-0.002** * (0.001)	-0.002 (0.001)	-0.001 (0.002)	0.002 (0.002)	-0.001** * (0.000)	
Concentration Index	0.023* (0.013)	0.535*** (0.093)	0.570** (0.257)	0.013 (0.010)	-0.107* (0.062)	0.107** (0.052)	-0.144** * (0.055)	0.114*** (0.037)	
R-squared	0.682	0.694	0.932	0.737	0.668	0.430	0.592	0.628	
Observations	1624	163	40	374	137	108	343	459	
Cross Sections	95	11	3	23	7	5	24	22	
S.E. of Regression	0.019	0.017	0.008	0.013	0.014	0.008	0.028	0.010	

Table 4: Consumption Volatility and Remittances

	Full Sample	East Asia and Pacific	Europe and Central Asia	Latin America and the Caribbean	Middle East and North Africa	South Asia	Sub-Saharan Africa	High Income	Note: (1) Standard errors are provided in parentheses below coefficients. (2) ***, ** and * indicates significance at the 1, 5 and 10 percent levels of testing, respectively.
Remittances	0.005 (0.017)	0.023 (0.025)	-0.174 (0.181)	-0.005 (0.013)	0.113*** (0.033)	-0.063** (0.026)	0.044 (0.030)	0.110*** (0.029)	
Remittance Volatility	-0.002 (0.004)	-0.004 (0.006)	-0.005 (0.010)	-0.001 (0.004)	0.137*** (0.024)	0.016 (0.014)	0.003 (0.006)	0.011*** (0.004)	
Growth	-0.005 (0.018)	-0.005 (0.037)	-0.094 (0.065)	-0.030 (0.027)	-0.044 (0.047)	-0.050 (0.058)	0.006 (0.026)	-0.059** (0.017)	
Inflation	-0.000 (0.006)	0.002 (0.010)	0.026 (0.017)	-0.002 (0.007)	-0.015 (0.016)	0.012 (0.011)	-0.001 (0.008)	0.001 (0.003)	
Inflation Volatility	0.056*** (0.013)	0.028 (0.026)	-0.071 (0.054)	0.010 (0.013)	0.108 (0.032)	-0.051 (0.038)	0.020 (0.024)	0.025** (0.010)	
World Growth Volatility	-0.062 (0.043)	0.003 (0.088)	0.005 (0.144)	0.007 (0.041)	0.059 (0.099)	0.121* (0.065)	-0.044 (0.065)	-0.041* (0.022)	
Trade Openness	0.025*** (0.005)	* (0.009)	0.051** (0.020)	0.006 (0.008)	0.059*** (0.018)	0.031 (0.023)	0.033*** (0.012)	-0.000 (0.003)	
Terms of Trade	0.004 (0.004)	0.001 (0.005)	0.048 (0.055)	0.010 (0.007)	0.004 (0.007)	-0.019* (0.011)	0.007 (0.005)	-0.006 (0.005)	
Change Terms of Trade	0.003 (0.007)	-0.004 (0.011)	-0.025 (0.047)	0.002 (0.009)	-0.005 (0.015)	0.002 (0.011)	-0.007 (0.008)	0.002 (0.009)	
Government Consumption	-0.057* (0.031)	-0.018 (0.052)	-0.611 (0.368)	0.006** (0.030)	* (0.112)	-0.320** (0.144)	-0.386** (0.058)	* (0.183***)	0.183*** (0.0291)
Capital Account Openness	-0.005*** (0.001)	0.001 (0.003)	* (0.003)	* (0.001)	0.005* (0.002)	-0.001 (0.003)	0.008*** (0.002)	-0.001** (0.000)	
Concentration Index	-0.071* (0.038)	0.547*** (0.135)	-0.504 (0.388)	0.045 (0.033)	* (0.096)	0.064 (0.098)	* (0.060)	0.093** (0.043)	
R-squared	0.656	0.798	0.809	0.853	0.804	0.641	0.722	0.596	
Observations	1624	163	40	374	137	108	343	459	
Cross Sections	95	11	3	23	7	5	24	22	
S.E. of Regression	0.027	0.028	0.011	0.023	0.026	0.012	0.035	0.011	

Table 5: Investment Volatility and Remittances

	Full Sample	East Asia and Pacific	Europe and Central Asia	Latin America and the Caribbean	Middle East and North Africa	South Asia	Sub-Saharan Africa	High Income	Note: (1) Standard errors are provided in parentheses below coefficients. (2) ***, ** and * indicates significance at the 1, 5 and 10 percent levels of testing, respectively.
Remittances	0.002 (0.014)	0.204*** (0.056)	-0.279 (0.695)	-0.110** (0.022) *	0.038 (0.032)	-0.075 (0.051)	0.485*** (0.102)	0.084* (0.046)	
Remittance Volatility	0.004 (0.003)	-0.007 (0.012)	0.005 (0.043)	-0.001 (0.008)	0.072*** (0.021)	0.029 (0.027)	0.013 (0.012)	0.011*** (0.003)	
Growth	-0.006 (0.012)	-0.010 (0.006)	-0.022 (0.238)	-0.094** (0.035) *	0.021 (0.045)	-0.383** (0.103) *	-0.013 (0.053)	0.015 (0.016)	
Inflation	-0.006** (0.003)	-0.026 (0.018)	-0.042 (0.063)	-0.006 (0.009)	-0.008 (0.015)	0.022 (0.023)	-0.002 (0.016)	-0.001 (0.003)	
Inflation Volatility	0.064*** (0.007)	0.088*** (0.032)	0.660*** (0.218)	-0.018 (0.019)	0.100*** (0.024)	-0.356** (0.072) *	0.141*** (0.048)	0.025** (0.010)	
World Growth Volatility	-0.087*** (0.019)	-0.351** (0.144)	0.008 (0.548)	0.030 (0.064)	0.152* (0.087)	0.149 (0.117)	0.051 (0.144)	-0.113** (0.023) *	
Trade Openness	0.005** (0.003)	-0.072** (0.014) *	0.008 (0.072)	0.018** (0.010)	0.041** (0.019)	0.162*** (0.039)	0.054** (0.021)	0.004 (0.003)	
Terms of Trade	0.017*** (0.003)	0.000 (0.005)	0.445** (0.195)	-0.010 (0.012)	-0.007 (0.006)	0.021 (0.017)	0.009 (0.017)	-0.001 (0.005)	
Change Terms of Trade	-0.010* (0.005)	-0.028** (0.009) *	-0.355** (0.170)	0.026* (0.015)	0.002 (0.011)	-0.016 (0.017)	-0.008 (0.020)	0.014 (0.010)	
Government Consumption	0.023 (0.025)	0.177*** (0.053)	-3.978** (1.383) *	0.067 (0.069)	0.180 (0.115)	-0.450 (0.284)	-0.198 (0.128)	0.134*** (0.033)	
Capital Account Openness	-0.003*** (0.000)	-0.010** (0.005)	-0.020 (0.013)	-0.004** (0.002) *	0.006 (0.002)	-0.031** (0.005) *	0.005 (0.005)	0.000 (0.000)	
Concentration Index	-0.033 (0.025)	0.533*** (0.183)	-0.876 (1.490)	-0.130 (0.085)	-0.632 (0.090)	-0.143 (0.131)	0.143 (0.163)	-0.066** (0.032)	
R-squared	0.747	0.864	0.741	0.706	0.807	0.681	0.740	0.534	
Observations	1624	163	40	374	137	108	343	459	
Cross Sections	95	11	3	23	7	5	24	22	
S.E. of Regression	0.045	0.037	0.042	0.041 ²⁴	0.024	0.019	0.068	0.012	

Table 6: Robustness of Results

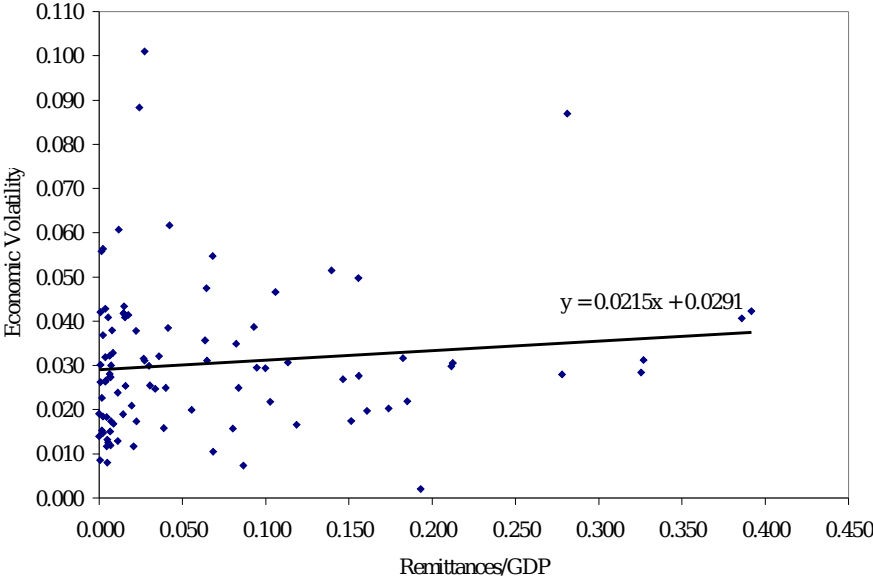
	<i>Sign Change</i>			<i>Instrumental Variables</i>		
	Output Volatility	Consumption Volatility	Investment Volatility	Output Volatility	Consumption Volatility	Investment Volatility
Remittances	-0.011** (0.005)	-0.001 (0.007)	-0.001 (0.011)	-0.031*** (0.008)	-0.011 (0.008)	-0.005 (0.017)
Remittance Volatility	0.001 (0.001)	0.002 (0.002)	0.002 (0.002)	0.008*** (0.002)	0.001 (0.002)	-0.003 (0.003)
Growth	-0.351*** (0.008)	-0.356*** (0.011)	-0.411*** (0.014)	-0.086*** (0.013)	-0.045*** (0.017)	-0.005 (0.019)
Inflation	-0.001 (0.002)	-0.006** (0.002)	-0.003 (0.003)	0.000 (0.003)	0.001 (0.004)	-0.008** (0.004)
Inflation Volatility	0.005 (0.004)	0.010* (0.005)	0.012 (0.008)	0.037*** (0.006)	0.027*** (0.007)	0.073*** (0.008)
World Growth Volatility	0.003 (0.012)	0.006 (0.015)	-0.012 (0.022)	-0.060*** (0.016)	-0.050*** (0.018)	-0.103*** (0.022)
Trade Openness	0.001 (0.001)	0.002 (0.002)	0.001 (0.002)	0.003 (0.002)	0.016*** (0.003)	0.008*** (0.003)
Terms of Trade	0.001 (0.001)	0.002 (0.002)	0.003 (0.003)	0.003 (0.002)	0.010*** (0.003)	0.009** (0.004)
Change Terms of Trade	0.000 (0.002)	-0.003 (0.003)	-0.002 (0.005)	-0.003 (0.003)	-0.007 (0.005)	-0.006 (0.006)
Government Consumption	0.043*** (0.011)	0.060*** (0.016)	0.097*** (0.024)	0.052*** (0.015)	0.006 (0.022)	0.058* (0.031)
Capital Account Openness	-0.001** (0.000)	-0.001*** (0.000)	-0.001** (0.000)	-0.003*** (0.001)	-0.006*** (0.001)	-0.004*** (0.001)
Concentration Index	0.005 (0.006)	0.026 (0.021)	-0.009 (0.030)	0.032* (0.017)	-0.035* (0.020)	-0.027 (0.031)
R-squared	0.676	0.587	0.523	0.679	0.813	0.851
Observations	1624	1624	1624	1524	1524	1524
Cross Sections	95	95	95	95	95	95
S.E. of Regression	0.016	0.023	0.033	0.019	0.024	0.042

Note: (1) Standard errors are provided in parentheses below coefficients.

(2) ***, ** and * indicates significance at the 1, 5 and 10 percent levels of testing, respectively.

Figure 1: Worker Remittances and Economic Volatility

Full Sample



Highly Dependent

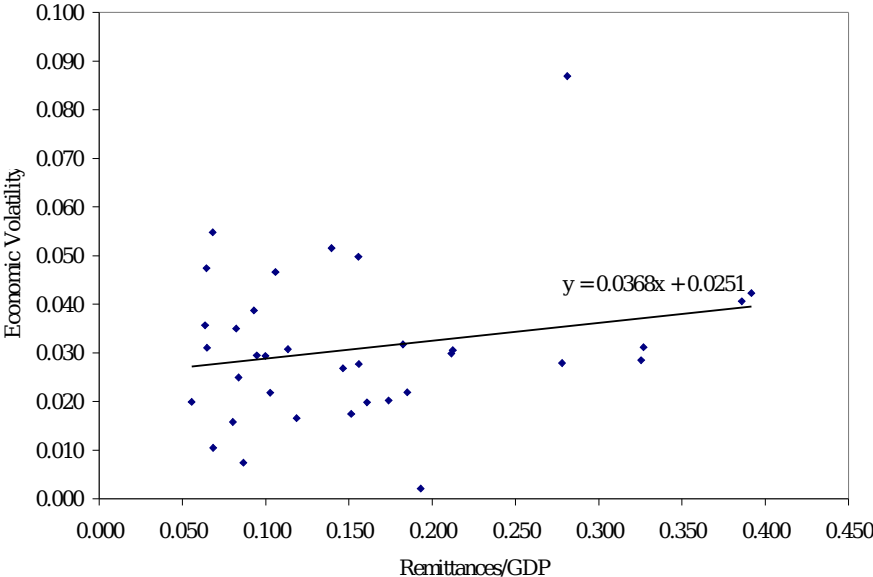
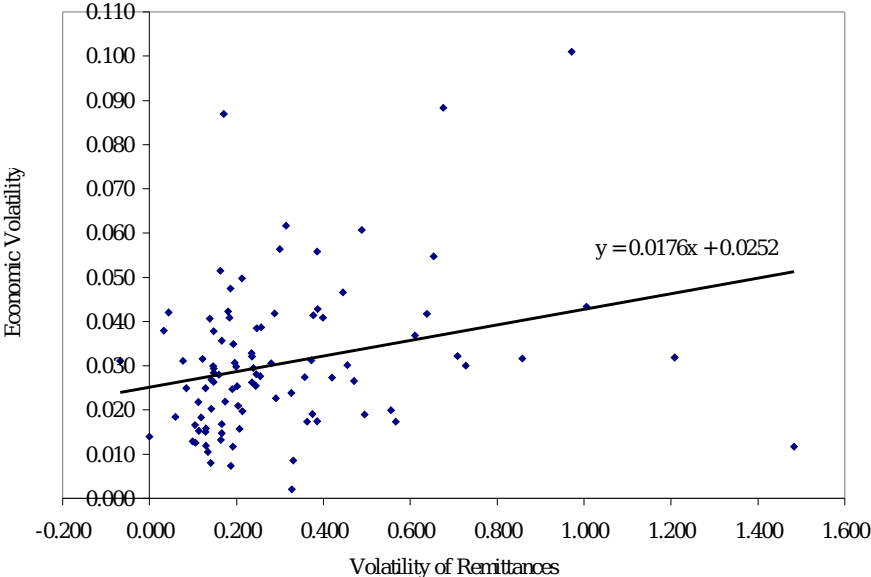
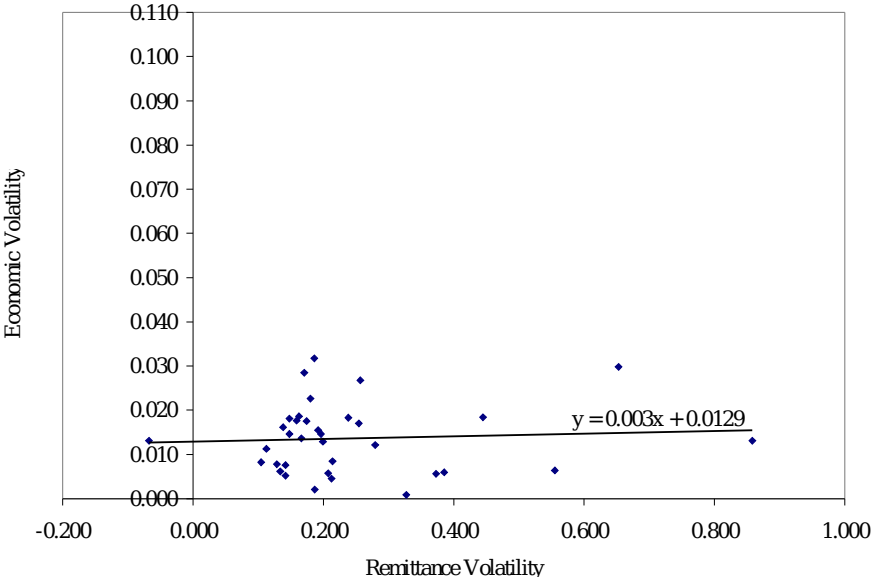


Figure 2: Remittance Volatility and Economic Volatility

Full Sample



Highly Dependent



Appendix: Data Sources, Sample Composition and Data Coverage

This appendix provides further details on the data sources and countries included in each regional grouping outlined in the study.

Data Sources

The database employed in this study contains cross-sectional time-series data on 95 countries from 1975 to 2005 from the United Nations (UN) National Accounts Main Aggregates database, the International Monetary Fund's International Financial Statistics (IFS) database (2007) and the World Bank's (WB) World Development Indicators Database (2007).

Observations on total remittances are taken from the WB Database while observations on the Chinn and Ito (2006) financial openness index are calculated using series from the IFS database.

Real government consumption, real trade are (both expressed as ratios of GDP), terms of trade, household consumption growth, private investment growth, inflation, growth of real GDP per capita and the Herfindahl-Hirschman index of concentration are all calculated from series obtained from the UN's database.

Sample Composition and Data Coverage

Middle to Low Income Countries

East Asia and the Pacific: Cambodia (1992-2005), Fiji (1979-2005), Indonesia (1983-2005), Kiribati (1985-1994), Loa PDR (1984-1999), Malaysia (1975-2003), Mongolia (1998-2005), Philippines (1977-2005), Samoa (1977-1999), Tonga (1975-1977; 1982-1993) and Vanuatu (1982-2005).

Europe and Central Asia: Hungary (1995-2005), Romania (1993-2005) and Turkey (1975-2005).

Latin America and the Caribbean: Argentina (1977-1991), Barbados (1997-2005), Belize (1984-2005), Bolivia (1980-2005), Brazil (1975-2005), Chile (1983-1990), Colombia (1975-2005), Costa Rica (1995-2005), Dominica (1976-1990), Dominican Republic (1975-2005), Ecuador (1990-2005), El Salvador (1977-2005), Guatemala (1988-2005), Haiti (1975-1988; 1998-2005), Honduras (1987-2005), Jamaica (1976-2005), Mexico (1980-2005), Nicaragua (1992-2005), Panama (1980-2005), Paraguay (1975-1984; 1995-2005), Peru (1990-2005), St. Kitts and Nevis (1980-1990) and Trinidad and Tobago (1975-2004).

Middle East and North Africa: Algeria (1977-1991), Egypt (Arab Republic; 1977-2005), Iran (Islamic Republic; 1991-2005), Jordan (1975-2005), Morocco (1975-2005), Oman (1977-1995) and Tunisia (1976-2005)

South Asia: Bangladesh (1976-2005), India (1975-2003), Nepal (1993-2005), Pakistan (1976-2005) and Sri Lanka (1975-2005).

Sub-Saharan Africa: Benin (1975-2004), Botswana (1996-2005), Burkina Faso (1975-1994), Cameroon (1979-2003), Cape Verde (1977-2005), Comoros (1980-1995), Republic of Congo (1995-2004), Gabon (1995-2004), Ghana (1979-2005), Guinea (1995-2004), Lesotho (1995-2005), Madagascar (1984-1996), Malawi (1994-2002), Mauritania (1978-1998), Mauritius (1994-2005), Namibia (1990-2004), Niger (1975-2004), Nigeria (1977-2005), Rwanda (1976-1991;2000- 2005), Senegal (1975-2004), Sierra Leone (1995-2005), South Africa (1976-1989), Sudan (1977-2005), and Togo (1975-2004).

High Income Countries

Australia (1975-2005), Austria (1975-1991; 1995-2005), Cyprus (1986-1994), Finland (1975-2003), France (1975-2005), Germany (1975-2005), Greece (1976-2005), Iceland (1976-2005), Israel (1975-2005), Italy (1975-2005), Japan (1996-2005), Republic of Korea (1980-2005), Malta (1975-2005), Netherlands (1975-2005), Netherlands Antilles (1995-2005), New Zealand (1975-1999), Norway (1977-1991), Portugal (1975-2005), Spain (1975-2005), Sweden (1987-2005), Switzerland (1991-2005) and the United States of America (1977-1989).