

CASE STUDY

The determinants of remittances to India

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Abstract

This paper analyses the macroeconomic determinants of remittances to India and assesses the impact of the current global slowdown on these flows. The paper shows that remittances exhibit a strong trend, whereby they have increased at a robust rate of 10 per cent a year since 1992. The movement of remittances is limited around the trend and traditionally has not been affected by the domestic or external macroeconomic variables. This pattern has changed since 2000, when the remittances have responded positively to the domestic interest rates and the Indian stock market; and negatively to the external interest rates. Looking ahead, a slowdown in the economic growth rate in advanced economies is unlikely to reduce the flow of remittances to India in the short term; but a prolonged slowdown, if it significantly reverses the migration of Indians, can reduce the trend growth rate.

Keywords: remittances, financial crisis, India, Indian migration

Introduction

Remittances are one of the largest and most stable financial flows to developing countries. They are larger in magnitude and more stable than the private capital flows or official aid flows. Many countries have come to rely on remittances as an important source of foreign exchange earnings. Even in a relatively large economy such as India, remittances have been instrumental, along with the exports of services, in turning around the current account and in the accumulation of reserves. To the extent that remittances are an important source of funds for millions of families across the developing world, the current global economic slowdown has raised the concern that it might result in the remittances to developing countries slowing down.

This paper analyses the determinants of remittances to India and assesses the risk factors that can result in remittances slowing down. Remittances to India have increased at the rate of 10 per cent a year. The movement of remittances around the trend is limited, and until 2000, none of the factors considered in this paper seemed to have influenced the behaviour of remittances around the trend. However, since 2000 remittances have responded to the domestic and international interest rates movements, and to the price movements in the Indian stock market. This perhaps reflects the fact that in recent years, commensurate with the increasing prosperity of the country; easing of restrictions on the current and capital account; and liberalization of the financial sector; remittances are partly driven by an investment motive.

Looking ahead, the recent developments in the global economic conditions are not likely to slowdown the trend rate of remittances to India unless the global con-

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ditions make the pool of migrants from India smaller. However, in the short run remittances would be susceptible to a domestic or global slowdown if it erodes India's attractiveness as an investment destination.

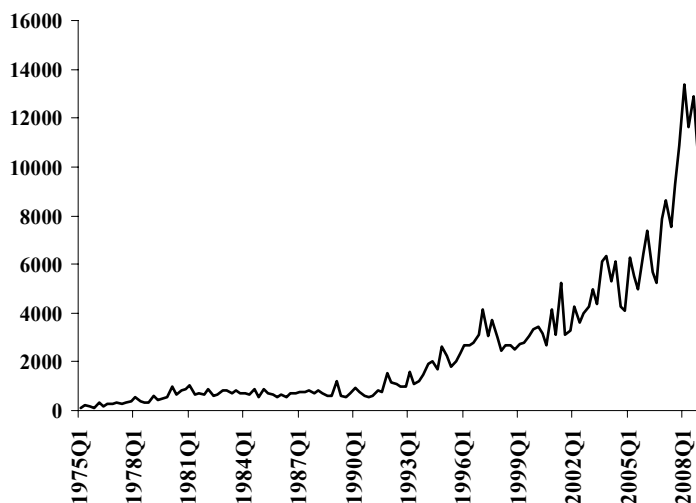
The paper is organized as follows. In section 2 we describe the data and underlying trends in remittances. Section 3 presents the empirical results, and the last section concludes.

Data and trends

For data on remittances to India we use Reserve Bank of India's (RBI) databases—Handbook of Statistics on Indian Economy and the RBI Bulletins; and the International Monetary Fund's (IMF) databases—the Balance of Payments Statistics (BOPS) and the International Finance Statistics (IFS). The rest of the data are obtained from the IFS, World Economic Outlook (WEO) or other sources, as indicated in Appendix A.

In Figure 1, we plot the total remittances that India received. The rapid pace of growth since 1991 is consistent with the increasing integration of India with the rest of the world and advanced economies in particular, through the greater movement of people, and goods and services. Since there seems to be little action worth explaining in remittances prior to the 1990s, and 1991 being the crisis year, in the empirical analysis in the next section we focus only on the period since 1992.

Figure 1. Remittances to India (in millions USD)



Source: IMF's IFS and RBI

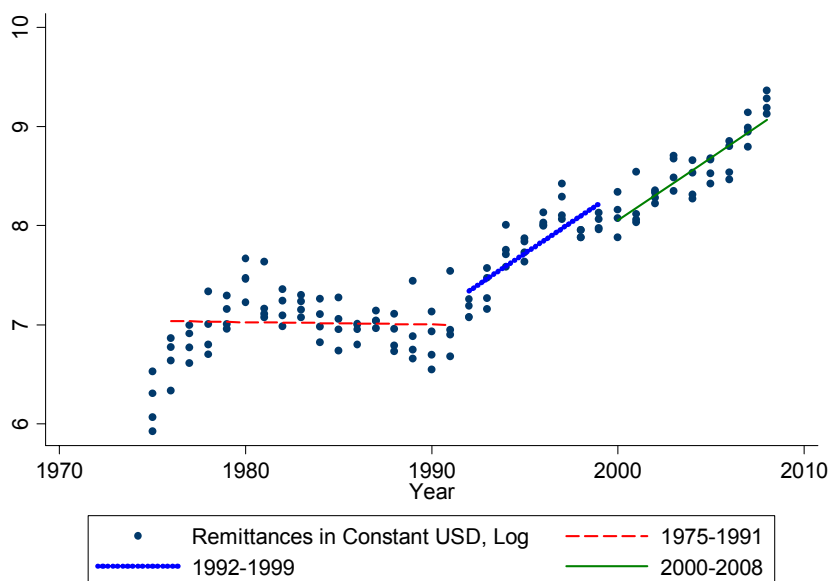
Econometric Analysis

We use quarterly data for 1992-2008 and the regression model given in Equation 1 to analyze the determinants of remittances to India:

$$Y_t = \alpha \text{Trend} + \sum \beta_i \text{Quarterly Dummy}_i + \sum \gamma_j \text{Domestic Variable}_j + \sum \delta_j \text{External Variable}_j + \varepsilon_t \quad (1)$$

Where Y_t refers to log remittances in constant USD. On the right hand side of the equation, we include a linear trend; quarterly dummies; and a set of domestic and external variables. The behaviour of the dependent variable is shown in Figure 2 below.

Figure 2. Remittances (Log) to India in Constant USD and the Linear Trend



Source: IFS, RBI and author's own calculations

The growth seems almost flat in pre 1992 period. The growth picks up in 1992, and seems similar in the period before and after 2000. Dickey Fuller tests indicate that the remittances are trend stationary. Durbin Watson tests show that there is serial correlation of order 1 in the regressions, thus we report our estimates correcting the standard errors for serial correlation and possible heterogeneity using the Newey West estimates.

We consider a comprehensive set of domestic and external factors as the potential determinants of remittances (see Gordon and Gupta (2004) and Gupta (2006)). The demand for remittances is likely to be influenced by the economic conditions in the recipient countries, thus we include GDP growth of India. We account for the economic conditions in the source countries by including the GDP growth of the US, GCC countries or the countries in the Middle East (the largest destination of migrants from India). We also include oil prices as an indicator of the financial health of the Gulf Cooperation Council (GCC) countries.

Just like any other financial flows, remittances may also be affected by the factors which determine the relative earnings of these investments in the native country and the host country. Thus, we include domestic and external interest rates;

stock market index; and the exchange rate movements as the potential determinants of remittances. We also include proxies for domestic uncertainties. Finally, in order to look at the responsiveness of remittances to specific events we include the dummies for events such as the Asian crisis; the issuance of Resurgent India Bond and the India Millennium Bond etc.

Results are reported in Tables I-4. In Table I we estimate the trend growth rate of remittances. We use quarterly data for 1975-2008 in columns I-III and the quarterly data for 1992-2008 in the rest of the columns.

Table I. Trend in Remittances [*Dependent Variable: Log Remittances in Constant USD*]

	I	II	III	IV	V
Annual Trend since 1975	.068*** [22.3]	.023*** [4.04]	.019*** [3.19]		
Annual Trend from 1992 onwards		.087*** [9.06]	.104*** [6.59]		
Annual Trend from 2000 onwards			-0.029 [1.35]		
Quarterly trend since 1992				.025*** [19.2]	.025*** [19.54]
Dummy for quarter2					0.063 [0.89]
Dummy for quarter3					-0.04 [0.57]
Dummy for quarter4					-0.084 [1.19]
Observations	136	136	136	68	68
R-squared	0.79	0.87	0.87	0.85	0.86

Note: Standard errors are given in parentheses. *, **, *** indicate that the coefficients are significant at 10, 5, and 1 percent levels respectively.

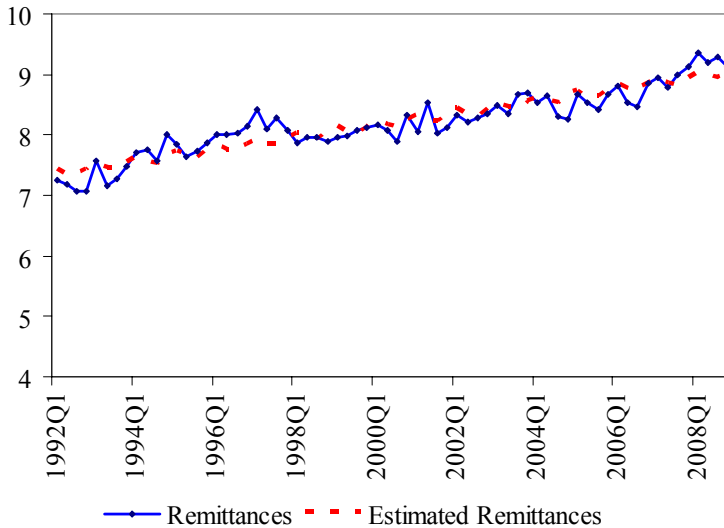
In column I, we include an annual trend which shows the average pace of growth of remittances in constant USD to be about 7 per cent a year. In column II we show that the pace of growth of remittances is much higher since 1992 (9 per cent a year from 1992, as compared to 2.3 per cent between 1975 and 1991). We do not find the pace of growth of remittances to have changed since 2000. In column IV we include a quarterly trend and quarterly dummies in column V to allow for seasonality in the data.

Actual and estimated remittances based on the specification in column V, Table I are shown in Figure 3. One thing that is evident from the chart is that the trend tracks the behaviour of remittances pretty well and that the movement of remittances around the trend is limited.

Next we look at the determinants of remittances using a “kitchen sink specification”. Results in Column I in Table 2 show that besides the trend, none of the variables included have a significant coefficient. The insignificance of the variables could be due to multicollinearity. In order to see which variables might be more suscepti-

ble to multicollinearity we calculate the correlation coefficients between different variables.¹ However, the correlations are quantitatively not very large, thus there seems to be independent variation in each variable.²

Figure 3. Actual and Estimated Remittances



Source: IFS, RBI and author's own calculations

In Columns II-V we drop oil prices, share prices in the US, labor or exchange rate variables from the regressions. In addition, instead of oil prices we include the growth rate of GCC countries; or the average growth rate of the countries in the Middle East, and their coefficients are found to be insignificant. We also allow for a differential impact of a depreciation or appreciation of the exchange rates by interacting the exchange rate variable with a dummy for the period 2002-2007 when the exchange rate appreciated, and through another interaction with a dummy for the year 2008 when the rupee depreciated. The results are unchanged.

Structural Break in 2000: Another reason for the insignificant coefficients could be that the relationship between different variables and remittances has changed over-time. Thus, we let the slopes to differ in 1992-1999 and 2000-2008 in Table 3.³ In Column I we interact each variable with a dummy for 1992-1999 and with a dummy

¹ We regress each variable on a trend and quarterly dummies and calculate the correlation coefficients for the residuals thus obtained.

² Another potential concern can be the endogeneity. However, for a large economy like India where remittances are small as compared to the size of the economy endogeneity should not be a concern. The only potential variable where endogeneity might be an issue is the exchange rate. Thus in robustness tests we include lagged exchange rates.

³ The choice of the year 2000 is admittedly arbitrary. Similar results are obtained if we allow for a shift in the relationship starting in other years around 2000. Chow test results (not reported) confirm the hypothesis of a structural break in 2000.

Table 2. Correlates of Remittances*[Dependent Variable: Log Remittances in Constant USD]*

	I	II	III	IV	V
Quarterly trend since 1992	0.029*** [2.94]	0.026*** [4.23]	0.027*** [3.99]	0.023*** [4.10]	0.024*** [4.21]
Dummy for Quarter 1	0.08 [1.13]	0.07 [1.11]	0.07 [1.13]	0.07 [1.05]	0.07 [1.12]
Dummy for Quarter 2	-0.02 [0.20]	-0.03 [0.46]	-0.03 [0.45]	-0.04 [0.53]	-0.03 [0.46]
Dummy for Quarter 3	-0.07 [0.88]	-0.08 [1.14]	-0.08 [1.14]	-0.08 [1.18]	-0.08 [1.15]
Real GDP Growth, US	0.02 [0.52]	0.02 [0.53]	0.02 [0.64]	0.01 [0.48]	0.02 [0.56]
Real GDP Growth, India	0.01 [0.38]	0.01 [0.50]	0.01 [0.47]	0.01 [0.57]	0.01 [0.48]
Share Price index in India, log	0.07 [0.30]	0.03 [0.15]	0.03 [0.13]	0.08 [0.44]	0.09 [0.68]
Real lending Interest Rates, India	0.00 [0.23]	0.00 [0.07]	0.00 [0.11]	0.00 [0.18]	0.00 [0.03]
Log Exchange Rate, Period Average	-0.34 [0.42]	-0.26 [0.31]	-0.23 [0.34]	-0.17 [0.20]	
Real Labor	0.01 [0.39]	0.02 [0.47]	0.02 [0.72]		0.01 [0.36]
Share Price Index in the US, log	0.02 [0.05]	0.04 [0.11]		0.13 [0.51]	0.00 [0.01]
Oil Prices Index, Log	-0.11 [0.37]				
Observations	67	67	67	67	67

Note: Newey West standard errors are given in parentheses. *, **, *** indicate that the coefficients are significant at 10, 5, and 1 per cent levels respectively

for 2000-2008. We also include a different intercept for 2000-2008. Regression results in the last column in Table 3 show that the way remittances respond to certain macro variables has changed overtime. In particular, remittances respond significantly differently to changes in the interest rates in India, labor and the Indian stock market index in more recent years. Results show that an increase in the Indian interest rate by 100 basis points increases remittances by 7 per cent above their trend; a decrease in labor by 100 basis points increases remittances by 6 per cent above their trend; and a 1 per cent increase in the stock market index increases remittances by 0.4 per cent. One interpretation of these results is that in recent years remittances are being directed to India with an investment objective than before.

Non Linearities in the Regressions: Next we allow for a non linear relationship between these variables and remittances by defining a dummy for the periods when

the variable in question takes low values and another dummy when it takes high values, and including these dummies in the regressions, rather than the variables themselves (see Appendix A). Results (not reported here for brevity) show that the reason we get insignificant relationships between oil prices, exchange rate variable, the GDP growth variables, or the stock market index in the US is not due to non linearities in the relationship between these variables and remittances.

Table 3. Correlates of Remittances, Allowing for Structural Break

	I	II	III	IV
Quarterly trend since 1990	0.03*** [3.27]	0.03*** [3.21]	0.02*** [3.12]	0.02*** [2.80]
Dummy for Quarter 1	0.1 [1.44]	0.1 [1.34]	0.09 [1.31]	0.09 [1.36]
Dummy for Quarter 2	-0.03 [0.40]	-0.02 [0.23]	-0.02 [0.35]	-0.02 [0.27]
Dummy for Quarter 3	-0.07 [0.96]	-0.06 [0.97]	-0.07 [1.07]	-0.07 [1.09]
Growth rate US*Dummy for 1992-1999	0.05 [1.04]	0.07 [1.19]	0.05 [0.81]	0.05 [0.88]
Growth rate India*Dummy for 1992-1999	0.02 [0.81]	0.05 [1.41]	0.06* [1.96]	0.06* [1.99]
Share Price Index, India (log)*Dummy for 1992-1999	0.22 [0.88]	0.26 [1.08]	0.31 [1.23]	0.35* [1.95]
Lending Rate, India*Dummy for 1992-1999	0 [0.19]	0.01 [1.45]	0.01 [1.20]	0.01 [1.20]
Exchange Rate (log)*Dummy for 1992-1999	0.99 [0.94]	0.03 [0.04]	-0.29 [0.40]	
Libor*Dummy for 1992-1999	0.10* [1.91]	0.11** [2.36]	0.10** [2.31]	0.10** [2.41]
Share Price Index, US (log)*Dummy for 1992-1999	-0.59 [1.63]	-0.28 [0.90]		
Oil Prices*Dummy for 1992-1999	0.6 [1.55]			
Dummy=1 if for post 2000	6.7 [1.14]	3.43 [0.62]	2.41 [0.48]	0.64 [0.97]
Growth rate US*Dummy for 2000-2008	-0.03 [0.81]	-0.03 [1.09]	-0.04 [1.31]	-0.04 [1.39]
Growth rate India*Dummy for 2000-2008	-0.02 [0.69]	-0.01 [0.59]	-0.01 [0.50]	-0.01 [0.46]
Share Price Index, India (log)*Dummy for 2000-2008	0.2 [0.55]	0.19 [0.77]	0.25 [1.08]	0.40*** [2.88]
Lending Rate, India*Dummy for 2000-2008	0.06 [1.30]	0.06 [1.44]	0.06 [1.39]	0.07** [2.07]

Table 3. *Continued...*

	I	II	III	IV
Exchange Rate (log)*Dummy for 2000-2008	-0.79 [0.68]	-0.69 [0.60]	-0.74 [0.67]	
Libor*Dummy for 2000-2008	-0.04 [1.07]	-0.04 [1.19]	-0.05 [1.50]	-0.06** [2.27]
Share Price Index, US(log)*Dummy for 2000-2008	0.08 [0.13]	0.05 [0.10]		
Oil prices*Dummy for 2000-2008	-0.09 [0.31]			
Observations	67	67	67	67

Note: Newey West standard errors are given in parentheses. *, **, *** indicate that the coefficients are significant at 10, 5, and 1 per cent levels respectively.

Effect of Specific Events/Uncertainties on Remittances: Next, we assess the vulnerabilities of remittances to certain events, such as the political uncertainty, a war like situation, possible loss in confidence in the Asian economies during the Asian crisis etc. by including dummies for these events in the regressions. However, their coefficients are not significant, thus, remittances do not seem to be affected by these events and uncertainties.

Robustness Tests: Finally, we subject our results to a battery of robustness tests. We estimate our regressions using ordinary least squares, rather than Newey West estimates; allow for a different serial correlation structure, include different data series available for the same variable; and include lagged values of the variables. Our results are robust to these tests (results not presented).

Assessing the Vulnerability of Remittances: Next we use our results to assess the impact of the current global slowdown on remittances to India. Here we distinguish between the factors that can affect the trend rate at which the remittances have been increasing and the factors which can affect the movement of remittances around the trend (i.e. libor, real interest rate in India and the India stock market).

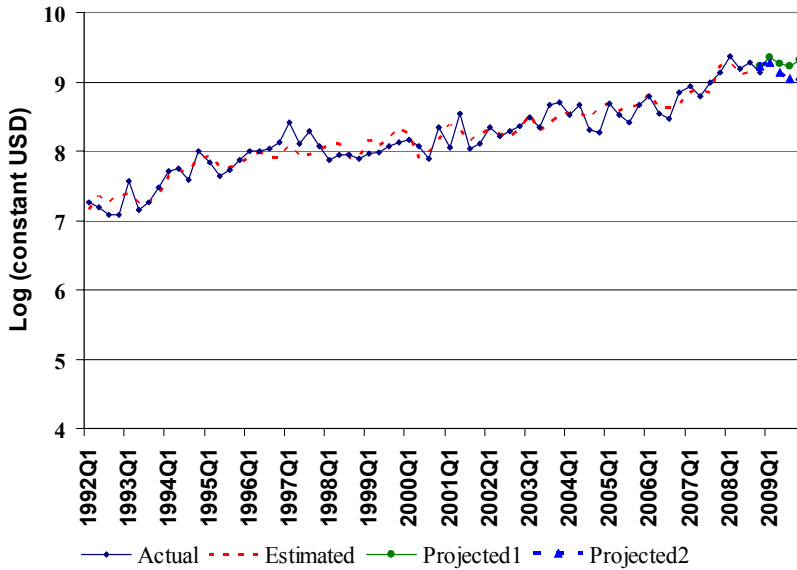
In Figure 4 below we show actual and estimated remittances based on the specification in the last column in Table 3. We also project remittances in 2009 under two scenarios. The first scenario is when all the macroeconomic variables remain at the level of last available observation (quarter 3, 2008) and the second scenario is when all the other variables remain at the same level as in Q3, 2008 but the libor rises by 100 basis points. In the first scenario there is a modest increase in remittances and in the second scenarios remittances decline.

On the factors affecting the trend, Gupta (2006) shows that the trend is correlated highly with the stock of migrants abroad. We do not include this variable here due to the lack of data for the last few years, but as far as the current slowdown is concerned, unless it reduces the stock of migrants abroad, the remittances are likely to grow at the same brisk pace as they have in the last two decades.

The resilience of Indian remittances is evident from the fact that even when overall remittances to the developing world were slowing already in 2008, India recorded one of the highest inflows of remittances. Besides the factors cited by World Bank (2009) two other factors that probably work in India's favour are: (i) It is a large economy and an economy that is proving to be an attractive investment

destination for external capital as well as for remittances'; (ii) the migrants from India consist primarily of skilled workers and perhaps work in cyclically insulated services (such as IT, health, education) rather than in cyclically volatile sectors such as construction.

Figure 4. Actual, Estimated and Projected Remittances



Conclusion

This paper shows that remittances to India have exhibited a strong trend, whereby they have increased at a robust rate of 10 per cent a year since 1992. The movement of remittances is limited around the trend and has not traditionally been affected by the domestic or external macroeconomic variables. This pattern has changed somewhat since 2000, and remittances have responded to the domestic and international interest rates movements, and to the price movements in the Indian stock market. Looking ahead, the recent developments in the global economic conditions are not likely to slowdown the flow of remittances to India even if the current global weaknesses persist or deteriorate further.

One possible case in which the remittances are likely to slowdown is when the global conditions make the pool of migrants from India smaller, which is unlikely to happen in the near term.

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Appendix A: Data Sources and Definitions

Variable Name	Definition/Construction of Variable	Source
Remittances	Private transfers on current account in constant US\$,	IMF's IFS ; RBI's website
Labor	3 month Labor in US\$	IFS
Lending Rate	Lending Rates - inflation rate based on CPI for India	IFS
Asian crisis	Dummy takes a value 1 for the quarters in which crisis occurred in Asia (1997:3,4; 1998:1,2)	Constructed using the exchange rate data, IFS
Oil prices	in constant US\$	IFS
Stock Price Index, India	Index in Constant Indian rupees: Nominal index deflated by CPI, India	IMF, IFS
Stock Price Index, US	Index in constant USD	IMF, IFS
Exchange rate	with respect to US dollar	IMF's IFS
Political uncertainty	Dummy equals 1 if the central government resigned mid-term	Gordon and Gupta (2004), updated
Geo-political tensions	Dummy takes a value 1 for the quarters of Kargil war, nuclear tests, and border stand-off in summer 2002.	Dow Jones Newswire
Issuance of RIB, IMD bonds	Dummy equals one for the quarters in which RIB, IMD were issued	Gordon and Gupta (2004)
GDP growth rate		CSO and IFS, IMF
Drought	Dummy takes a value 1 if the agricultural growth is negative	Constructed using the data from the CSO
US,		IMF, IFS
GCC, Growth rate for the Middle East		

Appendix B: Construction of Dummies to Include Non linearities:

We define a dummy which takes a value one when the Indian growth rate is less than 3 per cent, and zero otherwise; and another dummy which takes a value one when the Indian growth rate exceeds 7 per cent, and zero otherwise. Similarly, we define dummies for the quarters when the US growth rate is very high (exceeds 4 per cent) or very low (below 1 per cent). We also define dummies for large appreciations (more than 2 per cent) and large depreciations (more than 2.5 per cent) in the Rupee-dollar exchange rate. We define a dummy when the agricultural production growth rate is negative. Finally, we include dummies for large increases (exceeds 10 per cent) or decreases in oil prices (at least 10 per cent).