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Are Workers' Remittances a Hedge
Against Macroeconomic Shocks? The
Case of Sri Lanka

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Abstract

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We estimate a vector error correction (VEC) model for Sri Lanka to determine the response of remittance receipts to macroeconomic shocks. This is the first attempt of its kind in the literature. We find that remittance receipts are procyclical and decline when the island's currency weakens, undermining their usefulness as shock absorber. On the other hand, remittances increase in response to oil price shocks, reflecting the fact that most overseas. Sri Lankan are employed in the Gulf states. The procyclicality of remittances calls into question the notion that remittances are largely motivated by altruism.

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I. INTRODUCTION

Despite Sri Lanka's astonishing resilience the island remains vulnerable to external shocks. With average growth of close to 6 percent over the last five years and a single recession since independence, Sri Lanka's growth performance is remarkable. Nevertheless, the country's export base is narrow with garment and tea exports accounting for two-thirds of merchandize exports; and the expiration of the multifiber agreement in 2005 has added to competitive pressures. Tourism another major exchange earner has recovered from the tsunami, but faces new threats from a deteriorating security situation. Finally, the country's heavy reliance on oil, particularly in energy generation, exposes it more than others to movements in world prices. Between 2003 and 2005, Sri Lanka's oil balance deteriorated by 2.4 percentage points of GDP, compared to 1.7 percentage points of GDP for the average low-income country in Asia.

On the other hand, Sri Lanka has access to a large and relatively stable source of foreign exchange—workers remittances. Over the last three decades, workers remittances have increased by an annual average of 10 percent and since 1994 constitute the largest source of foreign financing for the island. Some 4 percent of the Sri Lankan population work abroad, mostly in the oil rich Gulf states, making Sri Lanka one of the leading recipients of remittances as a share of GDP. Remittances are a particularly attractive source of foreign financing, because they are much more stable over time than private capital flows. In addition, they are unrequited transfers, which unlike other capital flows, do not create obligations in the future.

This paper explores to what extent, workers remittances have helped cushion Sri Lanka against economic shocks and are likely to do so in the future. It is widely believed that workers remittances are to a great extent, if not solely, motivated by altruism (e.g., Lucas and Stark (1985), Rapoport and Docquier (2005)). Under this assumption, they should be negatively correlated with income in the home country and as such constitute an insurance against shock. Similarly, they should be positively correlated with incomes in the host countries—in this case the Gulf states—and, hence, provide a welcome hedge against rising oil prices. Alternatively, remittances could be motivated by portfolio considerations, in which case they should respond to interest rate differentials and, in general, be more aligned with the business cycle in the home country. Under either hypothesis, other macroeconomic variables are likely to have a bearing on the amount of money sent home, notably the exchange rate and the price level in the home country.

A few studies, investigate the cyclicality of inward remittances, but most do not go beyond descriptive statistics. IMF (2005) reports the correlation between detrended global remittances and detrended global GDP and finds that remittances are procyclical, albeit to a lesser extent than official aid, exports, and portfolio investment. Using the same approach on a country-by-country basis, Giuliano and Ruiz-Arranz (2005) show that remitting patterns vary across countries with procyclical remittances observed in two thirds of countries and counter-cyclical remittances in the rest. Cross-country differences in the cyclicality of remittances are confirmed by Sayan (2006). In a recent cross-country study (Lueth and Ruiz-Arranz, 2006), we estimate a gravity model of bilateral remittance flows for a limited number of developing countries and find that remittances are aligned with the business cycle

in the home country. They also decline when the investment and political climate worsen and do not seem to respond to adverse shocks at home.

A couple of papers have tried to establish correlations between remittances and macroeconomic variables for a single recipient country. Straubhaar (1986) regresses real Turkish inward remittances on German real wages and employment, exchange rate overvaluation, real interest rate differentials (all in variations), and a dummy for changes in Turkish government. He finds that wages and employment in the sending country have a positive impact on remittances. El Sakka and McNabb (1999) try to explain nominal remittances received by Egypt using as regressors real income levels in the sending and receiving country, interest differentials, Egyptian inflation, and the black market premium for foreign exchange. The authors find that remittances increase with Egyptian inflation and income abroad and decline with the black market premium. For India, Gupta (2005) regresses real inward remittances on oil prices and migrants' real overseas earnings and finds the latter to enter significantly and positive. In a second class of regressions, she finds that changes in US employment and an Indian drought dummy have a positive impact on the cyclical component of remittances. Bouhga-Hagbe (2004) uses a vector error correction (VEC) specification to model workers remittances received by Morocco. The cointegration vector suggests that, over the long run, inward remittances are positively correlated with French wages and negatively correlated with real GDP in Morocco.

These attempts to establish a relationship between workers remittances and a set of macroeconomic variables suffer from a number of pitfalls. Some studies fail to discuss and account for the time series properties of the variables under investigation, although regressions of nonstationary variables are known to be spurious. One study runs a regression in variations—supposedly removing any nonstationarity—but fails to test for co-integration, thus opening the door for omitted variable bias. Moreover, some of the macroeconomic variables, such as the exchange rate, the price level or GDP, could be affected by remittances on top of affecting remittances. However, most studies ignore issues of endogeneity and reverse causality. Bougha-Hagbe (2004) is the noteworthy exception in accounting for time series properties and endogeneity, but his findings are questionable given that a VEC model with 22 parameters is estimated using 35 observations.

Our analysis tries to overcome the weaknesses of earlier studies and shows that remittance receipts in Sri Lanka may be less of shock-absorber than usually believed. We estimate a VEC model for Sri Lanka remittance receipts using quarterly data from 1996 to 2004. Our main focus lies on the response of remittances to a number of macroeconomic variables, namely real GDP, CPI, exchange rate, interest rate, and oil price. We find that remittances are positively correlated with the oil price, but behave strongly procyclical, and decline when the Sri Lankan currency weakens. Accordingly, remittances to Sri Lanka seem to be less of a hedge against shock than commonly believed. The paper proceeds as follows. Section II presents some stylized facts on Sri Lankan workers remittances, including first evidence on macroeconomic correlations. Section III contains the econometric analysis; and Section IV concludes.

II. STYLIZED FACTS

Reported workers remittances increased at an average annual rate of 10 percent over the last 30 years. Since the mid-1990s they constitute the largest source of foreign financing (Figure 1). In 2005, workers remittances amounted to 8.3 percent of GDP, compared to 2.5 percent of GDP in official development assistance (ODA), 1 percent of GDP in FDI, and ½ a percent of GDP in portfolio investment. Sri Lanka's prime export, textile and garments, amounted to 12 percent of GDP.

Figure 1. Sources of Foreign Financing, 1975–2004
(Percent of GDP)
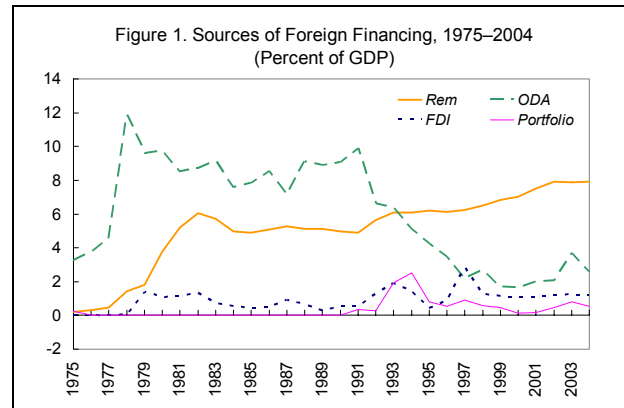
The evolution of Sri Lanka's inward remittances is broadly in line with the trend observed in global remittance flows. As a global aggregate, workers' remittances have become the largest source of foreign financing after FDI, exceeding both official development assistance and portfolio investment by a wide margin. In 2005, remittances to developing countries amounted to $165 billion. Asia and the Pacific is the main destination region for remittances, accounting for 45 percent of the global total. Some of the surge in workers remittances may be attributable to better recording and a shift from informal to formal channels, particularly after September 11, 2001. However, underpinned by mounting demographic pressures in the developing world, remittance flows are unlikely to abate soon. In the case of Sri Lanka, persistent rural poverty, growing inequality, and ethnic tensions will continue to secure stable flows of remittances in the medium term.

Inward remittances are large relative to the Sri Lanka economy. Among 13 countries of broadly equal size, Sri Lanka exhibits the fourth largest remittances-to-GDP ratio (Figure 2). In Asia, Sri Lanka is surpassed only by the Philippines (13.7 percent of GDP), Mongolia (13.3 percent of GDP), and Nepal (12.9 percent of GDP).

Inward remittances are sensitive to swings in oil prices, as close to 85 percent of Sri Lankan migrants reside in countries which are net oil exporters. According to the Sri Lanka Bureau of Foreign Employment (2004), the number of overseas workers amounted to 744,100 in 2004, or 3.8 percent of the population. These workers are concentrated in a few countries with Saudi Arabia, Kuwait, United Arab Emirates, and Qatar hosting 80 percent. Close to 85 percent of foreign workers reside in countries which are net oil exporters.
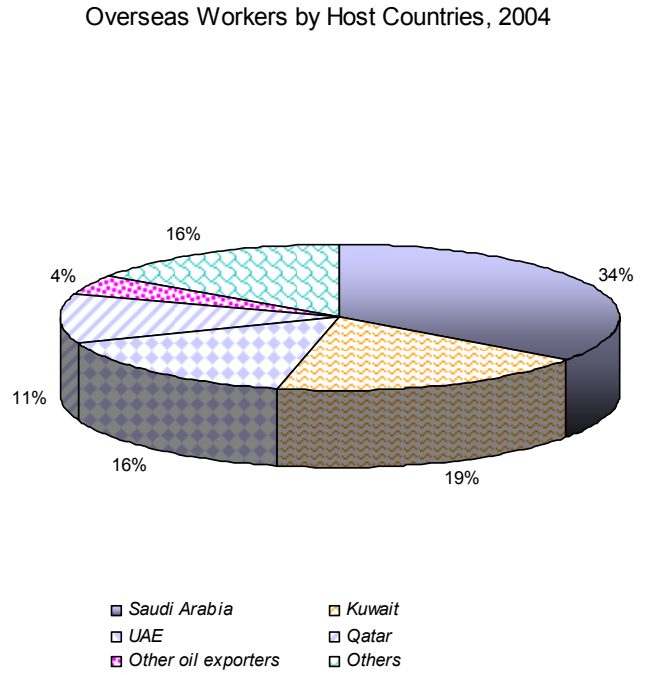
Sri Lanka remittances are less volatile than private capital flows and ODA, confirming a pattern observed for global aggregates (IMF, 2005). The standard deviation of remittances amounts to 43 percent of the mean, compared with 51 percent for ODA, 68 percent of FDI and 164 percent for portfolio investment. Merchandise exports, on the other hand, are less volatile than remittances, deviating only 21 percent from the mean.

Remittances sent to Sri Lanka seem to be procyclical and, strikingly, more so than any other source of foreign exchange. Remittances and GDP, when detrended by the Hodrick-
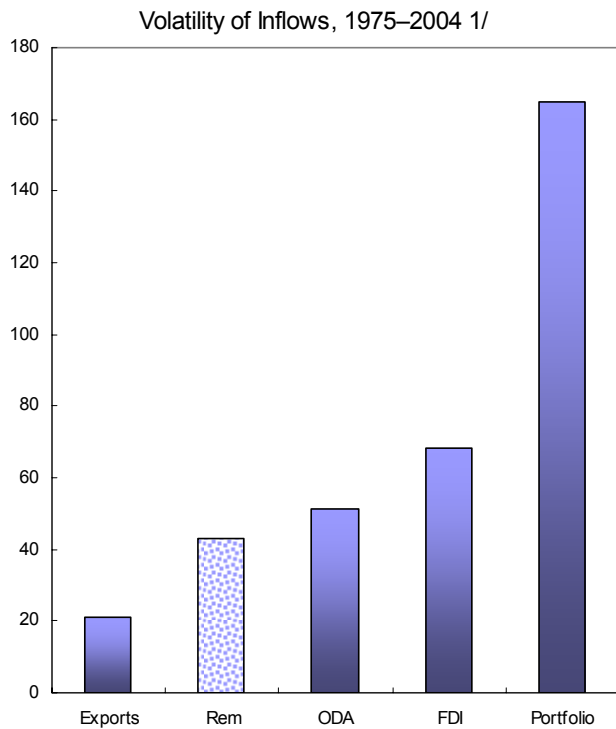
Figure 2. Sri Lanka: Stylized Facts About Remittances

Workers Remittances for Selected Countries 1/
(Percent of GDP)
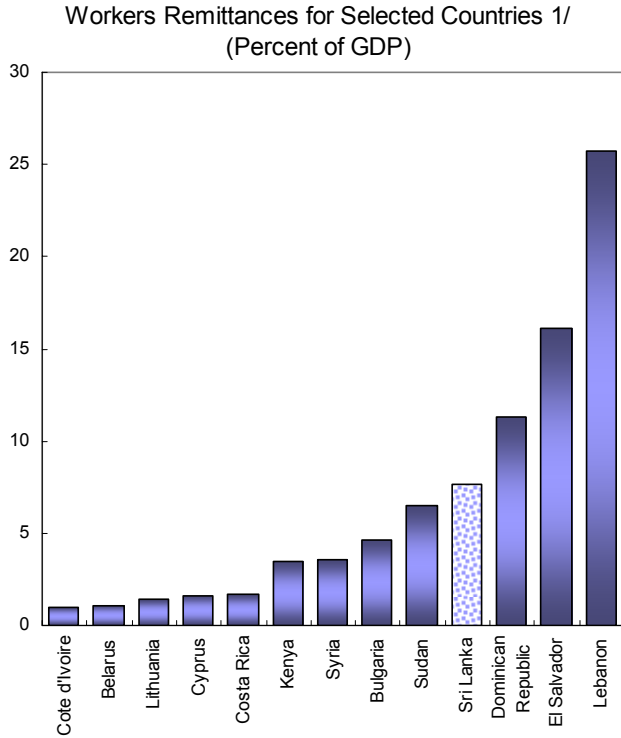
Source: IMF, *Balance of Payment Statistics Yearbook* .
 1/ Latest years. Countries have similar GDP in U.S. dollar terms.

Overseas Workers by Host Countries, 2004

- Saudi Arabia
- UAE
- Other oil exporters
- Kuwait
- Qatar
- Others

Source: Sri Lanka Bureau of Foreign Employment, 2004.

Volatility of Inflows, 1975–2004 1/

Source: IMF, *Balance of Payments Statistics Yearbook* .
 1/ Volatility is expressed in standard deviation as percent of the mean.

Cyclicality of Inflows, 1975–2004 1/
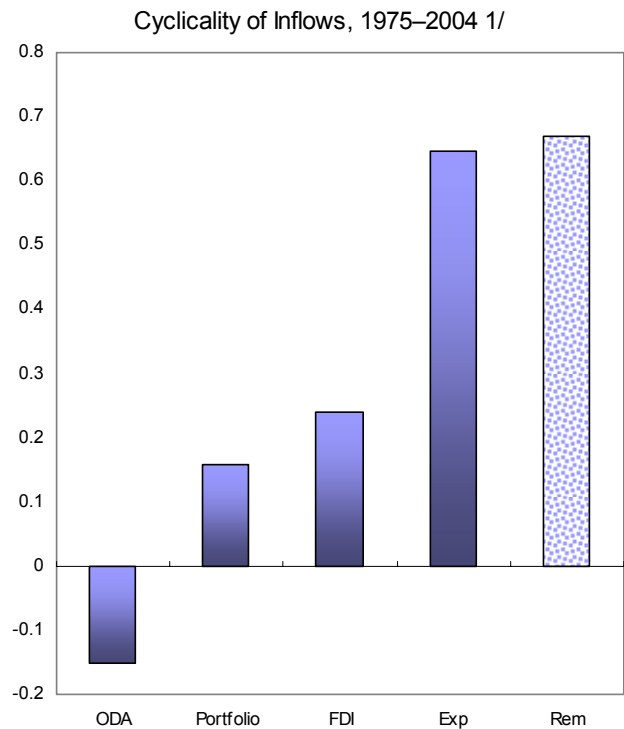
Source: IMF, *Balance of Payments Statistics Yearbook* .
1/ Cyclicality is defined as the correlation between the inflow and GDP, both detrended.

Prescott filter, show a correlation of almost 70 percent over the period 1975–2004, slightly higher than the correlation of exports and GDP. Private capital flows and GDP are positively correlated at only 20 percent, while ODA is counter-cyclical. Figure 3 plots remittance receipts against a couple of macroeconomic aggregates. The procyclicality of remittances is born out by the first figure, which plots the log-differences of Sri Lanka remittance receipts and GDP over 1985–2005. Since the mid-1990s remittances and GDP seem to be moving in log-step. Noteworthy also the year 2001, when Sri Lanka was hit by a number of severe shocks, including a military attack on the Colombo airport, disruptions of the power supply, and severe weather. GDP contracted for the first time in 50 years and remittances recorded the lowest growth in more than 10 years. Similar responses of remittances to dramatic changes in the home country's economic conditions have been observed for other countries (World Bank, 2003). In the Philippines, remittances rose steadily throughout the early 1990s, but became more volatile with the financial crisis in the late 1990s. In Turkey, remittance receipts increased for most of the 1990s, but started to decline when the crisis hit in 1999 and 2000.

Since the mid-1990s, one also observes a strong positive correlation between remittance receipts and GDP of the workers' host countries. But, although Sri Lankan seek employment mostly in oil exporting countries, the correlation with oil prices is less clear-cut. Moreover, remittances appear to be negatively correlated with the exchange rate (implying less remittances when the currency weakens) and the interest rate (if at all), but not correlated with the price level.
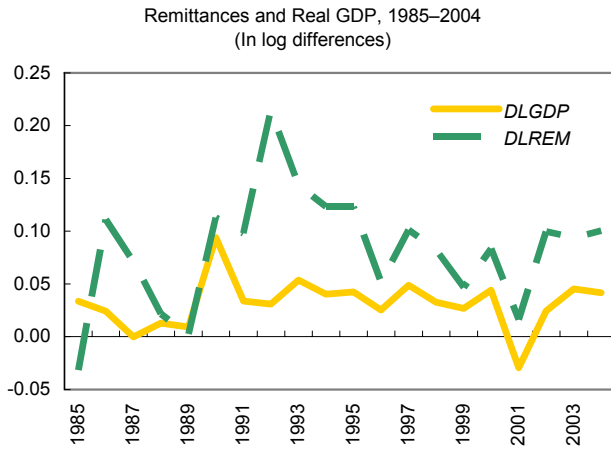
III. ECONOMETRIC ANALYSIS

We estimate a vector error correction model for Sri Lanka to determine the response of remittance receipts to shocks in macroeconomic variables. This approach seems warranted on several grounds. First, most of the macroeconomic variables are endogenous, suggesting a multi-equation estimation. Second, many of the variables are nonstationary, suggesting an estimation in first (or higher) differences. Finally, the variables may be cointegrated, suggesting the inclusion of the cointegration relationship as an additional regressor.

Our dataset covers the period 1996–2004 on a quarterly basis. While annual remittance data is available back to 1975, such a series would contain less observations and is more likely to contain structural breaks. As potential shock variables the dataset includes what the literature usually refers to as macroeconomic determinants of remittances, namely real GDP and CPI in the receiving country, the exchange rate, and a relative rate of return. Another common determinant, real GDP in the host country, is not available on a quarterly basis for the Gulf states. It is proxied by the world oil price, which is of more immediate interest for this study, anyway.

The data used in the analysis are drawn from the IMF databases and the country's national statistics. Remittance (REM) data, in millions of U.S. dollars, is taken from the IMF Balance of Payments Statistics yearbook and comprises the line items workers remittances, compensation of employees, and migrant capital transfers. Real GDP (GDP), in billions of rupees and at 1996 prices, is taken from the WEO database. The relative rate of return (I), in percentage points, is calculated as the difference between Sri Lanka's interest rate on

# Figure 3. Sri Lanka: Correlations of Remittances and Macroeconomic Variables

Remittances and Real GDP, 1985–2004
(In log differences)

Sources: IMF, Balance of Payments Statistics Yearbook, and WEO database.
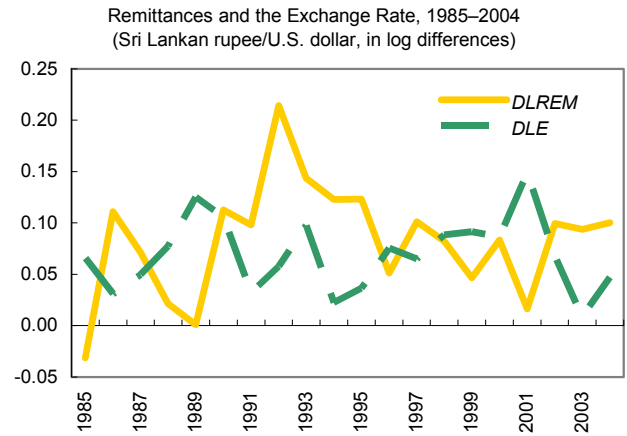
Remittances and the Exchange Rate, 1985–2004
(Sri Lankan rupee/U.S. dollar, in log differences)

Sources: IMF, *Balance of Payments Statistics Yearbook* , and *International Financial Statistics Yearbook* .

Remittances and Oil Price, 1985–2004
(In log differences)

Sources: IMF, *Balance of Payments Statistics Yearbook* , and *International Financial Statistics Yearbook* .

Remittance and Real GDP Per Capita in the Gulf, 1985–2004 1/
(In log differences)
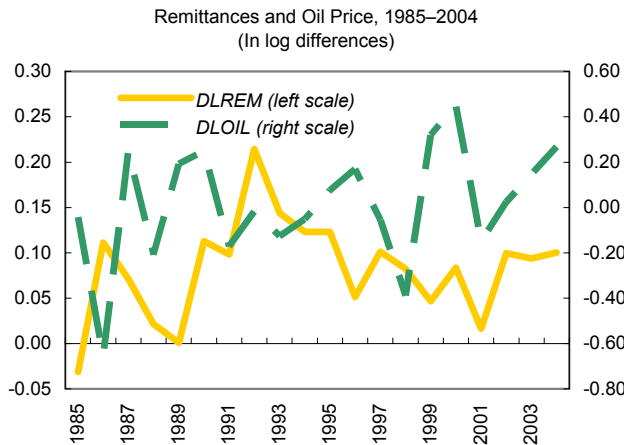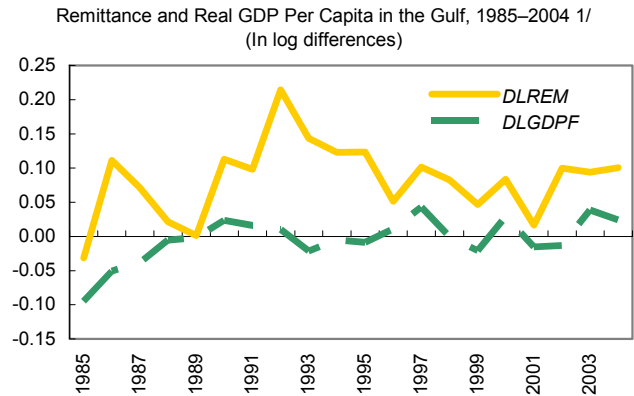
Sources: IMF, *Balance of Payments Statistics Yearbook* , and *International Financial Statistics Yearbook* ; World Bank, *World Development Indicators* .
1/ Average real GDP per capita of Saudi Arabia, Kuwait, United Arab Emirates, Qatar, Bahrain, and Oman weighted by stock of Sri Lankan residents in 2004.
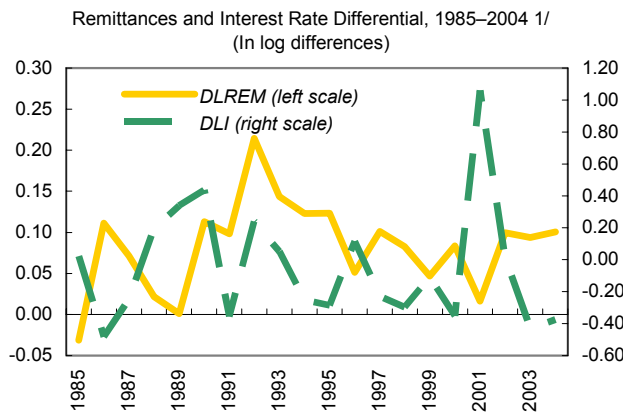
Remittances and Interest Rate Differential, 1985–2004 1/
(In log differences)

Sources: IMF, *Balance of Payments Statistics Yearbook* , and *International Financial Statistics Yearbook* ; World Bank, *World Development Indicators* .
1/ Interest differential between the 3-month deposit rate in Sri Lanka and the 3-month LIBOR.
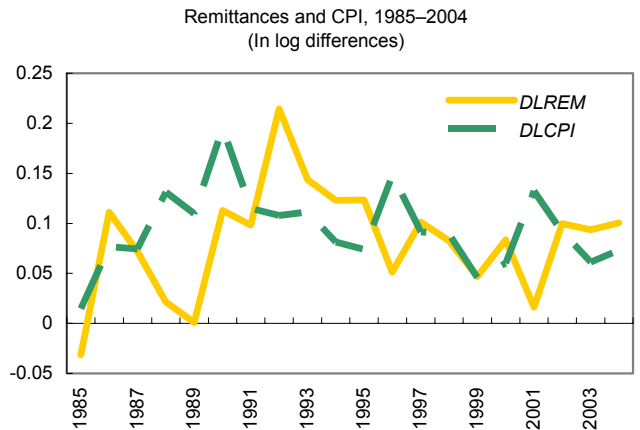
Remittances and CPI, 1985–2004
(In log differences)

Sources: IMF, *Balance of Payments Statistics Yearbook* , and *International Financial Statistics Yearbook* .

3-months fixed deposits and the LIBOR on 3-months dollar deposits. Data on interest rates, the Colombo consumer price index (CPI), the rupee/dollar exchange rate (E) and the oil price (OIL)—a simple average of U.K. Brent, Dubai, and West Texas crude prices—all stem from the International Financial Statistics yearbook. Data is in levels and not seasonally adjusted.

We first test for the presence of unit roots in the macroeconomic time series using the augmented Dickey Fuller test and find that all series are integrated of order one. To determine the appropriate lag length we start with a large number of lags and subsequently eliminate lags with insignificant coefficients. The choice of model, that is

Table 1. Sri Lanka: Augmented Dickey Fuller Test for Nonstationarity 1/
(Sample: 1995Q1–2004Q4)

	Level			First Difference		
	t-ADF	Lags	Model 2/	t-ADF	Lags	Model 2/
Remittances	1.28	3	2	-5.34 ***	2	3
Real GDP	1.16	3	2	-13.28 ***	1	3
CPI	0.84	0	2	-2.91 ***	0	3
Exchange rate	-0.25	1	2	-4.43 ***	0	2
Interest differential	-1.13	1	3	-2.66 ***	0	3
Oil price	1.57	0	3	-4.68 ***	0	3

1/ *** denote rejection at the 1 percent level.
2/ Model 1 includes trend and intercept; Model 2 includes intercept, but no trend; and Model 3 includes neither.

whether to include an intercept or time trend, is based on the approach of Doldado and others (1990). Under this approach, one starts with the least restrictive of plausible models and then introduces restrictions until the null hypothesis of a unit root is rejected (if at all). As shown in Table 1, the data series are found to be nonstationary in levels (have unit roots) and stationary in first differences. Hence, all series are integrated of order one.

Next, we test for the existence of a cointegration vector following Johansen (1991) and find one cointegrating relationship. We use one lag to preserve sufficient degrees of freedom. Both the trace statistic and the eigenvalue statistic confirm the existence of a cointegration relationship between remittances, real GDP, oil prices, the exchange rate, and the price level. No

Table 2. Sri Lanka: Cointegration Test
for REM, GDP, CPI, E, OIL 1/

Hypothesized Number of Cointegration Vector(s)	Eigenvalue	Trace Statistic	Maximum Eigenvalue Statistic
None	0.751	86.684 ***	47.336 ***
At most 1	0.510	39.348	24.280
At most 2	0.216	15.069	8.287
At most 3	0.179	6.782	6.710
At most 4	0.002	0.072	0.072

1/ Rejection at the 1 percent level denoted by ***.

cointegration relationship was found between these variables and the rate of return. Over the long run, remittances move with the other macroeconomic variables based on the following cointegrating relationship (t-statistic in parenthesis):

$$REM = -467.83 - 1.40*OIL + 4.33*GDP - 3.54*E + 1.62*CPI.$$
$$\quad\quad\quad (1.36) \quad\quad (10.18) \quad\quad (2.02) \quad (1.27)$$

Over the long run, remittance receipts decline as oil prices soften, increase as the Sri Lankan economy grows, decline as the currency weakens (E increases), and increase as the domestic price level rises.

The estimation of the VEC model and the impulse response functions confirm the evidence presented in Section II, namely that remittances respond to shocks in GDP, the exchange rate, and oil prices. The estimates of the VEC model are presented in Table 3. The impulse response functions (Figure 4) illustrate how remittances react to one standard deviation shocks in the oil price, the exchange rate, domestic GDP, and the price level, before they are forced back onto their long-term path. The variables are ordered as listed, but other Cholesky orderings do not affect the qualitative results, with one exception. The response of remittances to a CPI shock is ambiguous and will be ignore henceforth.

- *Remittances are procyclical*: remittances increase when economic activity in the home country accelerates and they decrease when economic conditions deteriorate, an indication that investment considerations are at play. In particular, an increase in real GDP by 9 billion of 1996 rupees (1 percent) leads to an increase in remittances by $25 million (2 percent). This suggests that remittances respond to investment opportunities and the business and political climate in the home country as much as to altruistic and insurance considerations. It also implies that remittance flows may not be as important to smooth fluctuations or shocks in the economy as commonly believed.

- *Remittances fall when the exchange rate weakens*: a one percent depreciation of the rupee against the dollar leads to a $10 million to $12 million (0.8 percent) reduction in remittances. Depreciation of the rupee reduces remittances, as migrants may be able to purchase the same goods basket with less dollars.

- *Remittances increase with oil prices*: an oil price increase of $2.8 per barrel increases remittances by $14 million (1 percent) in the first year and another $3 million in subsequent years. In the case of Sri Lanka, oil prices may be a good proxy for the economic activity in its migrants' host countries. This result suggests that greater economic activity in the host country increases the chances of employment and wages, allowing migrants to send more remittances.

IV. CONCLUSION

Remittance receipts seem to be procyclical in Sri Lanka, undermining their usefulness as a shock absorber. This paper explores to what extent Sri Lanka's large receipts of workers remittances serve as a hedge against macroeconomic shocks. Both descriptive evidence and econometric analysis show that workers remittances are positively correlated with real GDP undermining their usefulness as shock-absorber. Moreover, the paper finds strong evidence that remittance receipts decline when the currency weakens and, hence, provide little insurance against balance of payment crisis.
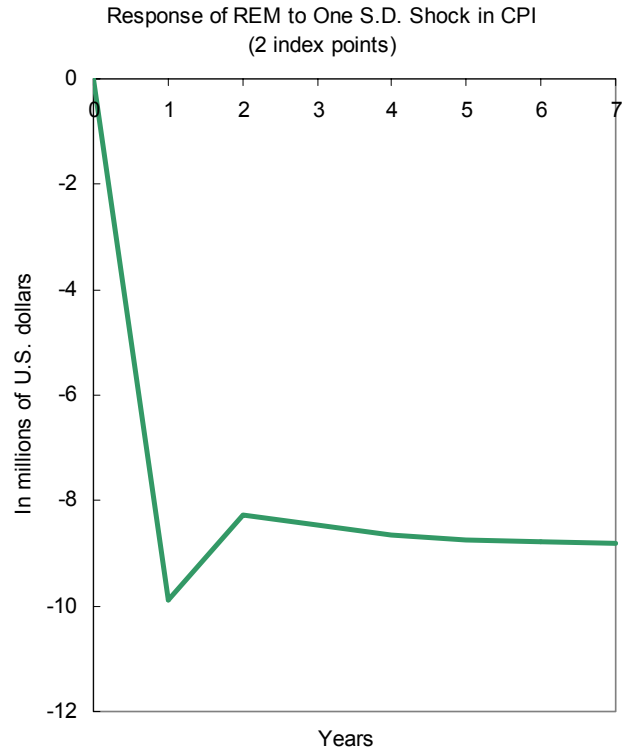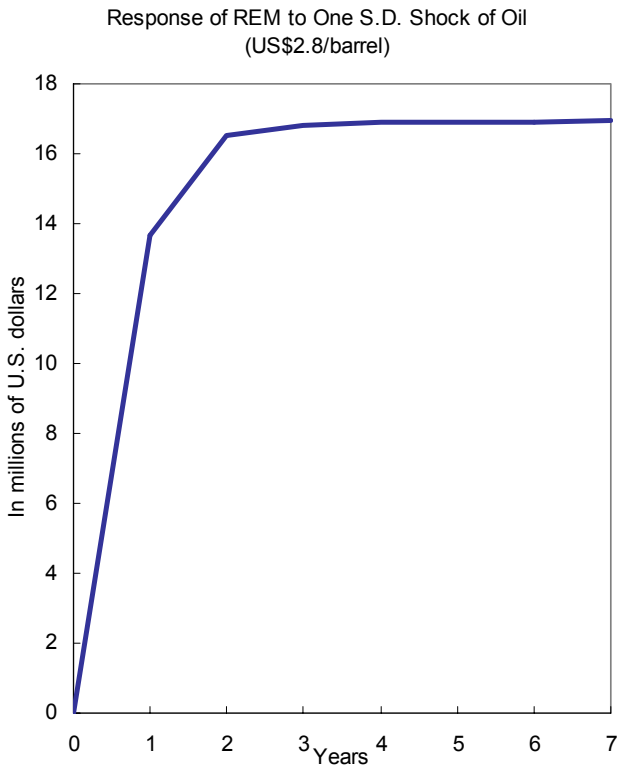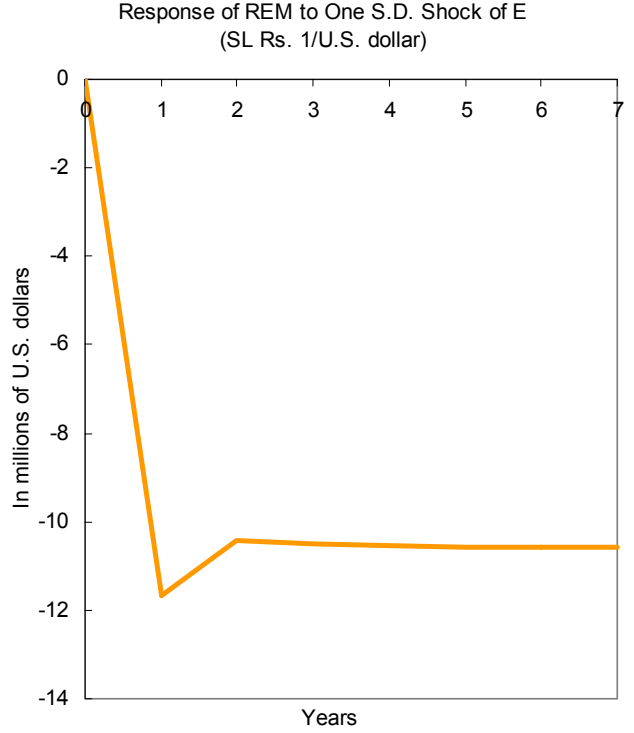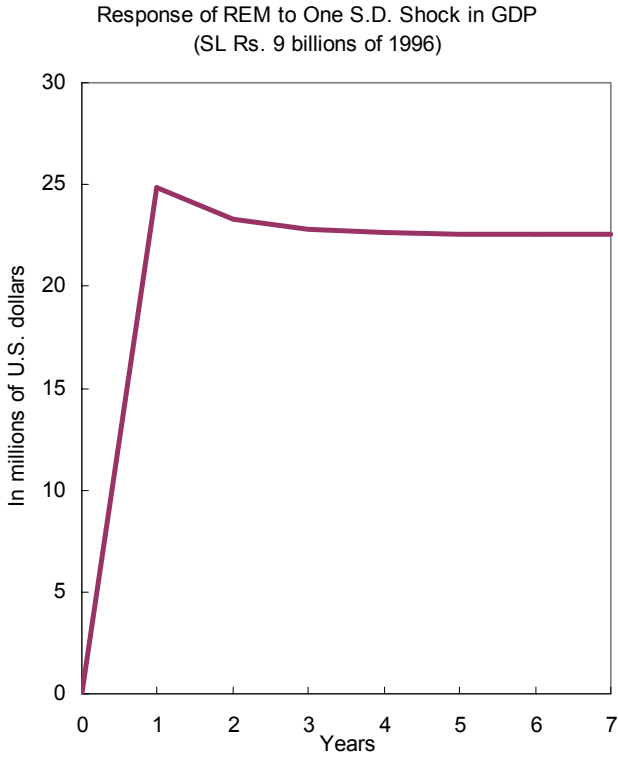
However, remittances are positively correlated with oil prices, offering a hedge against oil shocks. This is particularly important in Sri Lanka, since oil imports account for more than 20 percent of total imports. During the most recent oil shock, robust growth in

Table 3. Vector Error Correction Estimates 1/

Error Correction	D(REM)	D(OIL)	D(GDP)	D(E)	D(CPI)
CointEq1	-0.113	0.002	0.279	-0.013	-0.007
	(0.118)	(0.013)	(0.045)	(0.005)	(0.010)
D(REM(-1))	-0.524	-0.021	-0.239	0.003	0.002
	(0.147)	(0.017)	(0.056)	(0.006)	(0.013)
D(OIL(-1))	1.690	0.179	0.767	-0.051	-0.161
	(1.643)	(0.192)	(0.626)	(0.070)	(0.140)
D(GDP(-1))	0.653	-0.028	0.564	-0.030	0.045
	(0.458)	(0.053)	(0.174)	(0.019)	(0.039)
D(E(-1))	-0.822	0.170	1.054	0.356	0.275
	(3.874)	(0.452)	(1.476)	(0.165)	(0.331)
D(CPI(-1))	1.368	-0.268	-1.865	0.072	0.264
	(2.394)	(0.279)	(0.912)	(0.102)	(0.204)
C	4.081	0.734	4.373	0.745	0.966
	(7.861)	(0.917)	(2.995)	(0.334)	(0.671)
R-squared	0.46	0.11	0.71	0.43	0.29
Adj. R-squared	0.33	-0.09	0.65	0.30	0.17
Sum sq. residuals	15466	211	2244	28	112
S.E. equation	23.93	2.79	9.11	1.01	1.87
F-statistic	3.76	0.55	11.24	3.36	1.87
Log likelihood	-152.28	-79.25	-119.47	-44.92	-68.59
Akaike AIC	9.37	5.07	7.44	3.05	4.45
Schwarz SC	9.68	5.39	7.75	3.37	4.76
Mean dependent	4.32	0.33	1.70	1.34	2.01
S.D. dependent	29.37	2.67	15.42	1.22	2.19
Determinant residual covariance	248,429				
Log likelihood	-452.41				
Akaike information criterion	28.96				
Schwarz criterion	30.76				

1/ Sample: 1996Q1–2004Q4; 36 observations; standard errors in parantheses.

Figure 4. Sri Lanka: Impulse Response Functions

Response of REM to One S.D. Shock in GDP
(SL Rs. 9 billions of 1996)

Response of REM to One S.D. Shock of E
(SL Rs. 1/U.S. dollar)

Response of REM to One S.D. Shock of Oil
(US$2.8/barrel)

Response of REM to One S.D. Shock in CPI
(2 index points)

remittance flows has contributed to finance the current account, strengthen the balance of payments and accumulate reserves.

The procyclicality of remittances calls into question the notion that remittances are largely motivated by altruism. At the same time—and in line with earlier research—we fail to confirm portfolio considerations as a prime motive, since no positive link is established between remittances and relative rates of return.

The results suggest that while remittances should be encouraged they should not be seen as a panacea. Remittances can yield important economic benefits to Sri Lanka, providing financing and supporting consumption and investment. They can also play an important role in the regional development of the country and in reducing vulnerability to oil shocks. On the other hand, they may be of limited value in absorbing shocks to macroeconomic fundamentals (GDP and exchange rate). While it is important to continue facilitating remittance inflows with policies directed at reducing transaction costs, promoting financial sector development, and improving the business climate, remittances should not be seen as a substitute for government policy and structural reform.

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