INVESTIGATING THE BUSINESS CYCLE PROPERTIES OF REMITTANCES TO THE CARIBBEAN
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Abstract
This paper investigates the business cycle properties of remittances to four Caribbean countries – Barbados, Dominica, Jamaica and Trinidad and Tobago. To extract the cyclical components, the study uses the structural time series framework proposed by Harvey (1989). Variance decompositions and impulse response functions are then employed to analyse the underlying relationships between the variables. Results suggest that remittances to Barbados and Jamaica are significantly influenced by their domestic business cycles. Meanwhile, remittances to both Dominica and Trinidad and Tobago seem to be more affected by the US business cycle than economic developments in Dominica or Trinidad and Tobago, respectively.
Keywords: Remittances, Caribbean, Business cycles
JEL classification: F24; F44; O54; E32

1. Introduction
Remittances have risen significantly over the last two decades. Official World Bank estimates suggest than in 1990, global remittances stood at US$68.5 billion, and since then grew by an average of 10.9% per annum to reach $443.5 billion in 2008. Interestingly, this rapid pace of growth seems to be driven by developing countries, where remittances account for a significant portion of GDP and now constitute the second largest source of external finance after foreign direct investment.

Commensurate with the upsurge in remittance flows has been a widening interest in their economic impact. Indeed, the literature has identified several benefits that remittances can bring. For instance, remittances have been shown to “lossen up” the budget of the receiving household and so, is associated with reductions in poverty and possibly income inequality (Adams and Page, 2005; Spatafora, 2005). Some studies even show that remittances may raise the level of children’s education (Yang, 2004; Duryea et al., 2005) and alleviate liquidity constraints in the absence of well-functioning capital markets (Cornelius, 1990; McCormick and Wahba, 2003). But, remittances are not an unmixed blessing. There is some evidence to suggest that remittances can reduce the recipient’s incentive to work (Zachariah et al., 2001; Mora, 2013), lead to an appreciation in the real exchange rate (Bourdet and Falck, 2006; Amuedo-Dorantes and Pozo, 2004) or even facilitate money laundering and finance terrorism (El Qorchi et al. 2003).

Given the potential impacts of these flows, several researchers have focused on the factors influencing the volume of remittances received. The microeconomic determinants of remittances is by far the most developed strand of the literature. These studies focus on the decision to remit and largely revolve around the three motivations identified by

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Lucas and Stark (1985): (1) altruism; (2) self-interest, and; (3) enlightened self-interest. Whereas, at a macro level, the literature focuses on the macro-variables that may influence the magnitude of funds remitted to countries once the decision to remit has been made. Thus far, the macro-variables identified include a host of demographic, financial, political factors and economic factors. Without dismissing the role of various variables in influencing the magnitude of funds received, this study focuses on how business cycles in the home (receiving) country and the host (sending) country affect the remittance cycle.

Economic activity in the host country has been long recognised as a key determinant of remittances (for instance, Swamy 1981). The level of economic activity in the sending country affects the income levels and job prospects of several migrant workers. Hence, an economic downturn in the host country can pose significant threats to the migrant's financial viability and by extension, ability to remit funds. For instance, Içduygu (2005) notes that downturns in host countries like Germany played a crucial role in explaining downward trends in remittances to Turkey in previous years; Spatafora (2005) opines that a drop in mining jobs in South Africa led to a significant decline in remittances to Lesotho; and Castillo-Ponce et al (2011) reports that employment in the US significantly affects remittances to Mexico. This implies that the positive relationship between remittances and economic activity in the sending country can bring about serious macroeconomic consequences. Particularly, the procyclical nature of remittances may contribute to the transmission of a contraction in the host economy to the receiving country through the reductions in the amounts remitted (Sayan and Tekin-Koru, 2005). Hence, an understanding of the cyclical co-movements between remittances and economic activity in the host country is imperative.

The relationship between the remittance cycle and business cycles in the home country is also important. But, the nature of this relationship is not straightforward and largely depends on whether remittances are sent for altruistic purposes or for portfolio decisions regarding saving and/or investment. Under a theory of altruism, remittances are expected to move countercyclically with the economic cycle of the recipient country. The altruistic motive assumes that migrants remit funds in order to support their families. So, any deterioration in the standard of living or a negative income shock would lead to greater remittance inflows.

But, remittances are not sent for altruistic purposes alone: under the portfolio hypothesis, remittances are profit-driven and so move procyclically with the home country’s output. If remittances are indeed profit driven, then, they cannot be used to offset economic fluctuations in the receiving countries. In fact, Vargas-Silva (2008) notes that for remittance dependent countries, a stop in the inflow of remittances during a downturn may even accentuate recessions. This is particularly concerning given the current economic climate.

In the face of the Great Recession – which began with the collapse of the US subprime market in late 2007 – global remittances fell in 2009. The Latin America and the Caribbean region was among the hardest hit, with remittances contracting by about 11.8 percent (according to the World Bank World Development Indicators database). This begs the question, was the fall-off in remittances due to recessions in main remittance senders (i.e. the advanced countries), or was the economic decline in the receiving countries the main cause? This paper investigates the cyclical relationship between
remittances to four Caribbean countries – Barbados, Dominica, Jamaica and Trinidad and Tobago – domestic output and real output in the United States (US) - which represents the most preferred destination for migrants from the Caribbean (see ECLAC, 2006). The study seeks to answer the following questions: Are Caribbean remittance cycles sensitive to the receiving country’s business cycle? Are they affected by the US business cycle? And finally, which cycle (US or domestic) are Caribbean remittances most responsive to? To answer these questions, the study undertakes various methodological approaches. The rest of this paper is outlined as follows: Section 2 provides an overview of the related literature, Section 3 describes the dataset and some stylised facts of the sampled countries, Section 4 presents the findings and finally, Section 5 concludes.

2. Review of the Related Literature

From a theoretical perspective, there are several forces driving migrants’ decision to remit. As noted by Rapoport and Docquier (2006), remittances combine an altruistic component, a repayment of loans component, an insurance component, an inheritance component, a strategic motive component and an investment component. These authors summarise the effect of various variables on remittances as predicted by the theoretical literature. For the purpose of this study, the author focuses on how remittances respond to the income of the recipients and the income of the migrant.

Under most components identified by Rapoport and Docquier, remittances tend to be positively correlated with the migrant’s income. However, the sign on the recipient income is ambiguous: it may be purely positive (investment motive), or negative (altruism) or in some cases both (exchange and loan repayment). The complexity of this situation is further exacerbated by the fact that the various motives may work against each other, and so may even offset each other (Coronado, 2009). Thus, some form of empirical investigation is necessary at the macro-level.

In modelling the relationship between remittances received and economic conditions, previous studies tended to use regression analyses with these variables of interest in levels (see for instance Swammy, 1981; El-Sakka & McNabb, 1999). However, as noted by Sayan (2006) “Any negative (positive) relationship between real output and remittances found from multiple regression exercises based on time series or panel data does not necessarily imply that remittances are countercyclical (procyclical) to the business cycle”. This largely reflects the fact that the estimated coefficients from these series may be confounded by structural shifts in the economy, or general trends in the series. Hence, in order to evaluate cyclical properties of remittances, several authors have opted to de-trend the series, so that the underlying signal can be evaluated.

Among the first to empirically investigate the cyclical properties of remittances was Sayan (2004). Using the Hodrick-Prescott filter to de-trend the series, the author investigated whether there is a relationship between the amount of remittances sent to Turkey and the up- and downswings that Turkish and German economies experience. The empirical results suggest that real remittances are procyclical with the GDP in Turkey, but acyclical with German output.

Since the seminal work of Sayan (2004), other researchers have also investigated the cyclical properties of remittances:
Using panel econometric techniques, Frankel (2009) found evidence that remittances are countercyclical with respect to income in the worker’s country of origin, while procyclical with respect to income in the migrant’s host country.

For the case of India, Gupta (2005) found that remittances tend to be higher when economic conditions abroad are benign, and remittances are somewhat countercyclical to the domestic economy, that is, they rise during the periods of negative agriculture growth.

Sayan (2006) analysed the business cycle properties of real remittances against the behaviour of real output of twelve recipient countries individually and as a group. Reported results for the group of countries indicate that remittances move countercyclically (or negatively) with output. But, a look at individual countries indicated that for some countries in the sample, remittances are countercyclical (Bangladesh and India) whereas others are procyclical (Jordon and Morocco) or acyclical (Algeria, Jamaica, Lesotho, Pakistan, Turkey, Dominican Republic, Ivory Coast and Sengal).

Investigating the case of Mexico, Vargas-Silva (2008) found that there is a strong negative correlation between remittances and Mexico’s business cycle, while the cyclical component of remittances has a very weak relationship with the cyclical component of US output.

Using an unobserved components state-space model (via the Beveridge-Nelson decomposition), Coronado (2009) analysed the business cycle properties of remittances and output series for three pairs of countries: the United States–Mexico, the United States–El Salvador, and Germany–Turkey. His results indicated that remittances move counter-cyclically with all the receiving countries’ real output. But, remittances to Mexico seem to be counter-cyclical with the United States business cycle (contradicting the theoretical literature), while remittances from the United States to El Salvador and remittances from Germany to Turkey are strongly pro-cyclical with output fluctuations in US.

With respect to the case of El-Salvador and the Dominican Republic, Borja (2013) found evidence of countercyclical relationship between remittances domestic output and that remittances are affected by developments in US output.

Drawing on the above literature, this study investigates the cyclical properties of remittances to four Caribbean countries. The Caribbean region, in this author’s opinion, provides an excellent case study. These islands have historically been among the largest recipients of remittances as a share of GDP. Of course this is not surprising, given that the region has one of the highest emigration rates in the world. Specifically, estimates from the Migration and Remittances Factbook 2010 suggests that 10 Caribbean countries were among the top 30 emigration counties (as a percentage of population) and 8 Caribbean countries were among the top emigration countries of tertiary education. Given the importance of remittances to these states, it is critical to investigate the cyclical fluctuations of these flows and their correlations with cyclical fluctuations of income in the receiving country and that of US – the preferred destination of Caribbean migrants.
3 Data and Stylised Facts

3.1 Data. To meet the objectives of this study, annual data on total remittance flows to Barbados (1970-2009), Dominica (1976-2009), Dominican Republic (1970-2009), Jamaica (1976-2009) and Trinidad and Tobago (1975-2009) are taken from the World Bank’s World Development Indicators. Following Sayan (2004), the respective output series for each country is chosen bearing in mind the national income accounting definitions of various measures of output. According to national accounting conventions, gross national income (GNI) includes net factor income from abroad – which includes remittance flows – and so, this figure should be excluded from any analysis of remittances and the home country’s output. Thus, real GDP is chosen as a proxy of the output of receiving country, while real GNI in the US is used as an estimate of the host country output.

Observations on GNI and real GDP are obtained from the United Nations (UN) National Accounts Main Aggregates. It should be noted that since the time series data on remittances and US GNI are in nominal terms, the series are converted into real terms by using the respective deflators from the UN database.

3.2 Stylised Facts. Despite fitting the United Nations’ description of Small Island Developing States (SIDS), the countries of the Caribbean have not surrendered to the difficulties of small size in competitive external markets. Indeed, World Bank based indicators of economic development show that Barbados and Trinidad and Tobago had achieved the status of high income nations, countries with per capita GDP greater than $12,476, by 2004 and 2006, respectively. Dominica and Jamaica have been among the group of upper middle income countries, those with per capita GDP ranging from $4,036 - $12,475, since 1997 and 2005, respectively.

Figure 1: Real GDP of Barbados, Dominica, Jamaica and Trinidad and Tobago (US$ Million)
Growth in tourism services, financial and business markets, and manufacturing activity have been the main reasons for economic development in these countries, with some countries displaying a greater proficiency in some areas. For instance, tourism is main impetus for Barbados, followed closely by financial services, while the agriculture (mainly bananas) are the main drivers of growth in Dominican economy. Jamaica and Trinidad and Tobago are the two countries that are heavily industrialized, with 2009 output from the mining, manufacturing and utilities sectors accounting for 12.2 percent of GDP in Jamaica and 43.6 percent in Trinidad and Tobago. The strength of industrialization in Jamaica and Trinidad and Tobago is due to a combination of their relatively greater market size, a stronger appetite for economic diversification and the domestic exploitation of mineral resources.

Over 1970 – 2009, real economic activity in Barbados grew at an average rate of 1.4 percent, compared to average growth of 3.8 percent in Dominica, 1.1 percent in Jamaica and 3.4 percent in Trinidad and Tobago. However, as Figure 1 shows, these countries have been subjected to several cyclical swings outside of the Great Recessions and many of these were coordinated with recessions in the countries’ main trading partners – the US, Canada and the UK. In Barbados, reductions in real economic activity have occurred during 1974, 1981-1982, 1990-1992 and 2001. The most severe point of decline occurred over 1990-1992, when the decline was at a rate of 3.3 percent, on average. In Trinidad and Tobago, the falls in real output during the 1980s and early 1990s were mainly due to reductions in international oil prices. Dominica was the country with the least volatile economic growth rates, while Jamaica had the lengthiest period of decline. During the years 1974-1980, which were characterized by political and social instability, there was an average decline in real economic activity of 2.9 percent.

As alluded to earlier, Caribbean countries tend to be have a high remittance-to-GDP ratio. This begs the question, “how has remittances responded to these cyclical swings?” In what follows, I discuss the empirical methods undertaken to investigate the cyclical components of remittances to these countries.

3.3 Obtaining the Cyclical Components

While a host of methods have been proposed for de-trending macroeconomic variables, the Hodrick-Prescott (HP) filter is by far the most popular technique used in literature. The HP filter is used to obtain a smoothed estimate of the long-term trend component of a series. Once the trend is estimated, the remaining series forms the cyclical component of the series. However, the HP filter approach to business cycles has been criticized by several authors. For instance, Cogley and Nasan (1995) argues that the HP filter can generate business cycle dynamics even if none are present in the original data. Furthermore, the HP filtered data can exhibit periodicity and co-movement over business cycle horizons even if none are present in the input series. In this study, these issues are avoided by adopting an alternative approach to the HP filter.

To extract the cyclical components of the remittance and output series, the basic or univariate structural time series framework of Harvey (1989) is employed. Unlike classical decompositions of time series data, where the parameters of the various time
series components are fixed, structural time series models allow the coefficients to change over time. A structural time series model for annual observations may be written as:

\[ y = \mu_t + \psi_t + \varepsilon_t \]  

(1)

where \( \mu_t \) is the trend, \( \psi_t \) is the cycle and \( \varepsilon_t \) is the irregular.

The trend component is specified as

\[ \begin{align*}
\mu_t &= \mu_{t-1} + \beta_{t-1} + \eta_t, \\
\beta_t &= \beta_{t-1} + \xi_t,
\end{align*} \]

\( \eta_t \sim NID(0, \sigma_\eta^2) \) \hspace{1cm} \( \xi_t \sim NID(0, \sigma_\xi^2) \)  

(2)  

Here, \( \mu_t \) is the level, \( \beta_t \) the slope, \( \eta_t \) and \( \xi_t \) are the level and slope disturbances respectively, and are mutually uncorrelated. \( \eta_t \) allows the level of the trend to shift up or down, while \( \xi_t \) allows the slope to change. Hence, setting either \( \eta_t \) or \( \xi_t \) to zero gives a fixed level or slope, respectively.

The cyclical component of the model, \( \psi_t \), is modeled as:

\[ \begin{bmatrix} \psi_{t-1} \\ \psi_t \end{bmatrix} = \rho \begin{bmatrix} \cos \lambda_c & \sin \lambda_c \\ -\sin \lambda_c & -\cos \lambda_c \end{bmatrix} \begin{bmatrix} \psi_{t-1} \\ \psi_{t-2} \end{bmatrix} + \begin{bmatrix} \zeta_{t-1} \\ \zeta_t \end{bmatrix}, \quad t = 1, \ldots, T \]  

(4)

Where \( \lambda_c \) is the frequency, in radians, in the range \( 0 < \lambda_c < \pi \), \( \zeta_t \) and \( \zeta_{t-1} \) are two mutually uncorrelated white noise disturbances with zero mean and common variances \( \sigma_\zeta^2 \), and \( \rho \) is a dampening factor. It is clear that the stochastic cycle becomes a first-order autoregressive process if \( \lambda_c \) is 0 or \( \pi \).

In estimating the model, the variance of the cycle itself \( \sigma_\psi^2 \), rather than \( \sigma_\zeta^2 \), is taken to be the fixed parameter. Since \( \sigma_\psi^2 = (1 - \rho^2)\sigma_\zeta^2 \), it follows that \( \sigma_\psi^2 \to 0 \) as \( \rho \to 1 \) and (4) above reduces to the deterministic but stationary cycle:

\[ \psi_t = \psi_0 \cos \lambda_c t + \psi_1 \sin \lambda_c t, \quad t = 1, \ldots, T \]  

(5)

One key question may be: how is the form of the trend or cycle determined? The estimation procedure is done by casting the model in state space form and applying a Kalman Filter (Harvey and Shepherd, 1993). The extent to which the variables change over time is determined by the parameters \( \sigma_\mu, \sigma_\beta, \sigma_\eta, \sigma_\xi \). The stochastic form is first specified. \( \sigma_\mu, \sigma_\beta, \sigma_\eta, \sigma_\xi \) taking a value of zero would indicate that the corresponding component is deterministic and the model would be rectified to suit. After the form is verified, the cyclical component of each series is extracted. Once the cyclical components have been isolated, the study proceeds to evaluate the underlying relationships between domestic business cycles, US business cycles and remittances to the Caribbean.
4. Empirical Estimations and Analysis

4.1 Some preliminary result.

As previously discussed, the cyclical components are modelled and extracted using the structural time series framework by Harvey (1989). The augmented Dickey-Fuller (ADF) test by Dickey and Fuller (1979, 1981) is employed to determine the order of integration of these variables. Under the ADF test, the series is assumed to be non-stationary. Hence, failure to reject the null hypothesis implies that the time series has a unit root. Table 1 presents the results of the ADF unit root test, which implies that all series are stationary. As a starting point, the bivariate contemporaneous and asynchronous (calculated using the one lead and one lag of the independent variable) cross correlation coefficients are estimated. Correlations provide a simple way of assessing the potential linkages between remittances and the business cycle. Remittances are said to be procyclical and synchronous with real output if the contemporaneous correlation (i.e. the cross correlation at time t=0) between the two series is positive and statistically significant. Meanwhile, if the relationship between the two variables is negative and significant at time t = 0, then remittances are said to be countercyclical. The same logic follows for the asynchronous correlation coefficients, bearing in mind that asynchronous cross correlations enables one to identify the timing and direction that remittance receipts respond to output drops (Sayyan, 2006). Finally, if all correlations are insignificant, then one can conclude that the relationship between the two variables is acyclical.

Table 1: Unit Root Tests

<table>
<thead>
<tr>
<th>Remittances Cycles</th>
<th>ADF test statistic</th>
<th>1 % Critical Values</th>
<th>Nature of the test</th>
<th>Order of Integration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barbados</td>
<td>-5.827</td>
<td>-2.629</td>
<td>No intercept; no trend</td>
<td>I(0)</td>
</tr>
<tr>
<td>Dominica</td>
<td>-5.076</td>
<td>-2.642</td>
<td>No intercept; no trend</td>
<td>I(0)</td>
</tr>
<tr>
<td>Jamaica</td>
<td>-5.120</td>
<td>-2.642</td>
<td>No intercept; no trend</td>
<td>I(0)</td>
</tr>
<tr>
<td>Trinidad and Tobago</td>
<td>-6.448</td>
<td>-2.644</td>
<td>No intercept; no trend</td>
<td>I(0)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output Cycles</th>
<th>ADF test statistic</th>
<th>1 % Critical Values</th>
<th>Nature of the test</th>
<th>Order of Integration</th>
</tr>
</thead>
<tbody>
<tr>
<td>US GNI</td>
<td>-5.749</td>
<td>-2.629</td>
<td>No intercept; no trend</td>
<td>I(0)</td>
</tr>
<tr>
<td>Barbados Real GDP</td>
<td>-5.632</td>
<td>-2.629</td>
<td>No intercept; no trend</td>
<td>I(0)</td>
</tr>
<tr>
<td>Dominica Real GDP</td>
<td>-6.223</td>
<td>-2.629</td>
<td>No intercept; no trend</td>
<td>I(0)</td>
</tr>
<tr>
<td>Jamaica Real GDP</td>
<td>-5.780</td>
<td>-2.629</td>
<td>No intercept; no trend</td>
<td>I(0)</td>
</tr>
<tr>
<td>Trinidad and Tobago</td>
<td>-5.271</td>
<td>-2.629</td>
<td>No intercept; no trend</td>
<td>I(0)</td>
</tr>
</tbody>
</table>

Correlations between the cyclical components are presented in Table 2. Panel A shows the response of Caribbean remittances to economic fluctuations in the respective receiving countries. In line with the altruistic motive to remit, there is a negative and significant relationship between remittances to Barbados and the island’s output. Moreover, the relationship appears to contemporaneous – that is, Barbadian migrant workers respond almost instantaneously to a drop in the Barbadian real GDP. But, the asynchronous coefficients are insignificant, even at the 10 percent levels of significance. For the remaining three countries, remittances are rendered as a-cyclical, at least based on conventional levels of significance testing.
Table 2: Correlations of Cyclical Components

<table>
<thead>
<tr>
<th>Nature of Co-Movement</th>
<th>A Correlations with Domestic Business Cycle</th>
<th>B Correlations with US Business Cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>t - 1</td>
<td>t</td>
</tr>
<tr>
<td>Remittances to Barbados</td>
<td>-0.013</td>
<td>-0.216**</td>
</tr>
<tr>
<td>Remittances to Dominica</td>
<td>0.134</td>
<td>0.002</td>
</tr>
<tr>
<td>Remittances to Jamaica</td>
<td>0.137</td>
<td>0.240</td>
</tr>
<tr>
<td>Remittances to Trinidad and Tobago</td>
<td>-0.070</td>
<td>-0.075</td>
</tr>
</tbody>
</table>

Note: ** and * indicates significance at the 5 per cent and 10 per cent levels of significance respectively. Some of the bivariate regressions displayed some evidence of non-normality. Hence, observation specific dummies were included to correct for this issue.

Panel B reports the cyclical relationships between remittances and US output. Remittances to Dominica and Jamaica both seem to be positively related to upturns in the US economy. However, there is some difference in the timing of the responses of remittances to these two countries and US economic activity. Remittances to Jamaica appear to lag the economic cycle in the US by one year. Meanwhile, Dominican workers seem to be much quicker in increasing their support to those left behind – these workers increase their remittances in the same year when an increase in US income is experienced. In stark contrast with the theoretical literature, remittances to Trinidad and Tobago appear be negatively related to US output, while remittances to Barbados seem to be unaffected by the US cycle. However, these results are more indicative, than conclusive.

4.2 Impulse Response and Variance Decompositions

The correlations presented above only provide a cursory analysis of the cyclical relationship between the variables under study and unfortunately, cannot make a strong statement about the co-movements between remittances and output. In order to make more robust inferences about the underlying relationship among the variables, the study relies on a vector autoregressive (VAR) model. The use of the VAR addresses issues such as endogeneity by treating all the variables in the system as endogenous. This is indeed a great advantage over the basic bivariate analyses, given that remittances tend to be endogenously related to the home country output. The Akaike Criteria (AIC) is used to determine the optimal lag specification\(^1\).

In order to identify the structural components of the VAR, the recursive Cholesky orthogonalization is employed, which requires the variables to be ordered in terms of exogeneity. In this paper, the variables are listed as “US output”, “Domestic output” and “Remittances”, indicating that while US output is not contemporaneously affected by real

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\(^1\) Q-statistics indicated the absence of serial correlation in each equation of the VAR. However, there was some evidence of non-normality. Hence, some observation-specific dummies were (exogenously) included in the VAR.
GDP in the Caribbean or their remittances, the outputs of the selected Caribbean countries are affected by themselves and US output. Finally, remittances to the Caribbean are affected by themselves, domestic output and US output.

Innovation accounting is used to determine the dynamic responses of the variables over a five-year horizon. The variance decomposition provides information concerning the relative importance of each innovation towards explaining the behavior of endogenous variables. Meanwhile, the impulse response functions trace how remittances received by these Caribbean islands respond to shocks to the US and domestic business cycle over time. Table 3 shows the forecast error variance in the cyclical component of remittances to the sample of Caribbean countries.

| Table 3: Forecast Error Variance Decompositions |
|-------------------------------|------------------|------------------|------------------|
|                           | Horizon | US Output | Domestic Output | Remittances |
| **A. Barbados**            |         |           |                 |             |
| 1                          | 0.366   | 18.513    | 88.122          |
| 3                          | 2.047   | 18.281    | 79.672          |
| 5                          | 2.049   | 18.296    | 79.654          |
| **B. Dominica**            |         |           |                 |             |
| 1                          | 16.154  | 2.024     | 81.821          |
| 3                          | 22.272  | 3.084     | 74.643          |
| 5                          | 22.284  | 3.090     | 74.626          |
| **C. Jamaica**             |         |           |                 |             |
| 1                          | 0.412   | 16.476    | 83.111          |
| 3                          | 10.095  | 15.962    | 73.943          |
| 5                          | 10.102  | 15.962    | 72.936          |
| **D. Trinidad and Tobago**|         |           |                 |             |
| 1                          | 15.810  | 4.940     | 76.249          |
| 3                          | 22.152  | 7.700     | 70.147          |
| 5                          | 22.243  | 7.708     | 70.049          |

While the variance decompositions give an idea of the influence of output at home and abroad on remittance flows, it gives no indication of the direction of the relationship. To give an idea of the directional relationships, the impulse response functions are plotted. Looking first at the response of remittances to shocks in the home country output (Figure 2), it is clear that based on the 95 percent confidence bands (the dotted lines), the impulse analysis only yield statistically significant contemporaneous effects for Barbados and Jamaica.

In line with the correlation analyses presented in Table 2, a positive shock to the real GDP of Barbados leads to significant fall in remittance inflows. This effect is short-lived, though; and disappears about two years later. Thus, taking into consideration the combined evidence of, the correlation coefficients, variance decomposition and impulse response functions, it can be concluded that the remitting behavior of workers from Barbados are broadly consistent with studies that view altruism as the primary motive behind remittances. In this vein, remittances can aid in cushioning the blows of macroeconomic downturns, at least in the short-run.
In stark contrast to Barbados, the moving average responses for Jamaica indicate that the home country business cycle has a strong positive impact on the remittance cycle – which lasts for above two years. This is, of course, in line with the profit-driven motivations to remit. As for remittances to Dominica and Trinidad, the analysis undertaken in this paper hints that remittances received by these two countries can be assumed to move acyclically with respect to their domestic business cycles. But, this does not necessarily imply that remittances may not be influenced by domestic conditions in these countries. As noted by Coronado (2009), the insignificant relationship could be due to two opposing forces (i.e. altruistic components and self-interest components) cancelling out each other.

Finally, the response of remittances to shocks in the host country output is investigated (Figure 3). Results suggest that neither remittances to Jamaica or Barbados have a statistically significant response to shocks to the US business cycle. Meanwhile, remittances to Dominica and Trinidad both appear to be largely affected by shocks to economic output abroad. In line with one’s a-priori expectations, remittances to Dominica jump in the event of an unexpected shock to US output. The case of Trinidad and Tobago is quite interesting: following a one standard-deviation shock to the US output series, remittances to Trinidad and Tobago significantly decline – which directly violates the predictions of both micro and macroeconomic remittance theory. But this finding does not seem that out of place, when taken within the context of a profit-driven remitter. Under this scenario, the Trinidadian migrant may find it more profitable to keep their savings in the US when the US economy is booming (see for instance, Sayan 2004) and so, reduce his/her remittances. Of course, more detailed research – i.e. at the micro-level – would be needed to fully justify this statement.
5. Concluding Remarks
This paper investigates the cyclical components of remittances to four Caribbean states. Based on the theoretical literature, remittances received should be positively related to economic activity abroad, but may be either procyclical or countercyclical with respect to the receiving county’s income. The results are quite interesting. Results suggest that only remittances to Barbados and Jamaica are significantly influenced by their domestic business cycles. Meanwhile, both Dominica and Trinidad seem to be more affected by the US business cycle than economic developments in Dominica and Trinidad, respectively.

While this paper has added some insights to the relationship between Caribbean remittances and business cycles in the host and home country, it is not without its limitations. In particular, the study uses aggregate remittances to four Caribbean states rather than bilateral remittances, as disaggregated information on Caribbean remittances inflows are not readily available for most countries under study. Using an aggregated series limits the analysis, as one may not be able to fully discern the procyclical nature between the remittances from county i and output from a that country. Given the limited availability of bilateral remittances flows, and the fact that the US stands as the destination of choice for most Caribbean migrants, the US business cycle would be an understandable choice. But, an obvious question would be “how realistic is the assumption that remittance behavior of Caribbean workers in the US is typical remitting
habits of all Caribbean workers abroad?” Another limitation of the study is that in instances where acyclicality is found, there is no way of knowing if remittances are indeed acyclical to output, or if the presented results are due to either issues in the data or due to opposing components of remittances cancelling out each other. Against this backdrop, the results should be taken with some degree of caution. But, notwithstanding the limitations of this study, the insight gained should still prove useful to policy makers in the Caribbean, particularly those interested in promoting remittances as part of their development strategy.

References


ECLAC. 2006. Migration in the Caribbean: What do we know? Port of Spain, Trinidad and Tobago.


