Central Bank of Trinidad & Tobago

Research Papers

The Sensitivity of Remittance Inflows to the Global Financial Crisis: Evidence from Trinidad and Tobago and Jamaica

Samantha Joseph
Aaron Miller
Reshma Mahabir
Tricia Harewood

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AIMS AND SCOPE

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The Sensitivity of Remittance Inflows to the Global Financial Crisis: Evidence from Trinidad and Tobago and Jamaica

Samantha Joseph
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Abstract

The global financial crisis has heralded a significant decline in the value of worker remittances to developing countries. Research on the impact of the crisis on remittance inflows to the Caribbean region has been lacking. This paper seeks to fill a gap in the literature by examining the sensitivity of remittance inflows to Trinidad and Tobago and Jamaica. Using a Vector Autoregressive model and official statistics, the impulse response analysis found that remittance flows to Trinidad and Tobago were not sensitive to the global financial crisis, while remittances to Jamaica displayed a high level of sensitivity. Results also indicated that the domestic unemployment rates in both countries had a relatively small but growing influence on remittance inflows. Despite severe data limitations, work was also undertaken regarding the assessment of remittances in the form of goods, confirming the importance of the "barrel trade" in the Caribbean region.

Introduction

The global financial crisis and consequent worldwide economic slowdown have affected most economies, including the Caribbean. One set of financial flows that has been affected is that of remittances. The World Bank (2010) found that global remittances in 2009 had fallen by US$29 billion when compared to 2008.[2] The report also highlighted that the high unemployment rate in the United States (US), even in light of the recovery of other economic fundamentals, has continued to affect remittance flows in 2010. Consequently, the value of remittances is not anticipated to recover to pre-crisis levels until 2011 (Table 1).

Keywords: Remittances, Global Financial Crisis, Trinidad and Tobago, Jamaica
JEL Classification: F24, E3

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2. World Bank (2010) Report.

Table 1

Worker Remittances Inflows by Region, 2006-2011
(US$ billions)

Years	2006	2007	2008	2009	2010e	2011f
Developing countries	235	290	336	316	335	339
East Asia and Pacific	58	71	86	86	94	103
Europe and Central Asia	37	51	58	46	48	52
Latin America and Caribbean	59	63	64	57	60	64
Middle East and North Africa	26	32	35	32	33	34
South Asia	43	54	72	75	79	83
Sub-Saharan Africa	13	19	21	21	22	23
Low Income countries	20	25	32	32	35	37
Middle Income countries	215	265	304	283	301	322
World	317	385	443	414	437	465

Source: World Bank (2010)
Note: e-estimated, f-forecast

Remittances are an important source of finance for many developing economies. In Jamaica, the largest remittance recipient in the English-speaking Caribbean, remittances comprised some 15 per cent of the country's Gross Domestic Product (GDP) in 2007. Although remittance inflows to Trinidad and Tobago accounted for less than 1 per cent of the country's GDP in 2007, a significant proportion of households depended on this form of income. In a study done by Hosein and Franklin (2007), 70 per cent of the respondents indicated that remittances formed a significant part of their total income.

To date, there has not been any detailed examination of the sensitivity of remittance inflows to CARICOM member states to the global financial crisis. This paper attempts to conduct such an analysis for Trinidad and Tobago and Jamaica. Employing official statistics on remittances, a Vector Autoregressive model (VAR) was used. The US black unemployment rate, interest rate and disposable income, as well as the recipient countries' unemployment rates were specified as the endogenous variables. The paper also explores the importance of remittances entering the countries via informal channels - the so called "barrel trade".

The paper is divided into five sections. The first examines the pattern of remittances in the pre-crisis period. This section also lays out some difficulties in measuring remittances and estimates the value of remittances entering Jamaica and Trinidad and Tobago by way of barrels. Section 2 examines how the global financial crisis has affected remittances across the world. A review of the literature is undertaken in Section 3. Section 4 uses the official statistics to test the sensitivity of remittances to the global financial crisis. Section 5 concludes and advances some recommendations based on the study.

Section 1: Remittances - Pre Crisis

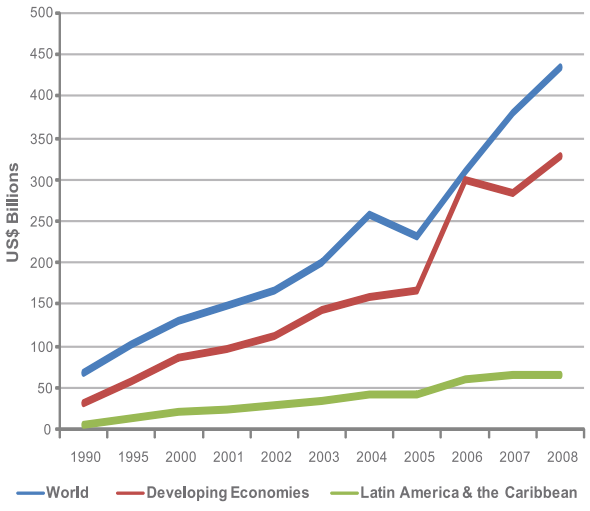
1.A. Remittances Through Formal Channels

1.A.(i) Global Formal Remittances

According to the World Bank (2006), remittance flows expanded 900 per cent in the two and a half decades since 1980. Global remittances amounted to US$443 billion in 2008, of which remittances to developing economies reached US$336 billion (Figure 1). It is important to note that the percentage of total remittances directed to developing countries increased steadily between 1990 and 2008, moving from US$31.2 billion (45 per cent of total) to US$336 billion (75 per cent of total) (Ratha *et al*, 2010). A similar pattern is evident for Latin America and the Caribbean, where remittance flows increased from US$5.8 billion in 1990 to US$64 billion in 2008.

Figure 1

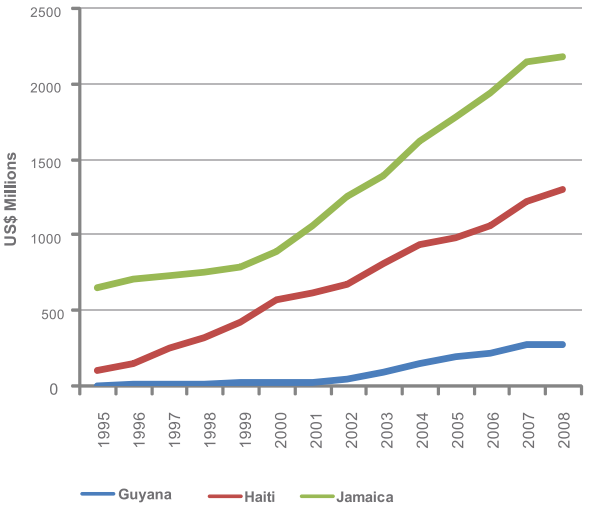
Remittance Inflows: World, Developing Economies, and Latin America and the Caribbean 1990-2008 (US $ billion)



Source: World Bank (2009)

Figure 2

Workers' Remittances: Selected Caribbean Countries 1995-2008 (US$ million)



Source: World Development Indicators (2009)

Growth in official remittances to developing countries was estimated to be greater than that of all other types of financial flows (Global Development Finance, 2008). As Table 2 shows, remittances rose by 506 per cent, compared to 169 per cent for official development assistance (ODA), 111 per cent for private debt and portfolio equity and 109 per cent for foreign direct investment (FDI) flows between 1995 and 2008.

Table 2

Comparative Data on Remittances and other Financial Flows 1995-2008 (US$bn)

	1995	2008	1995-2008 % change
Worker Remittances	58	328	506
Foreign Direct Investment (FDI)	107	206	109
Private Debt and Portfolio Equity	170	189	111
Official Development Assistance (ODA)	59	100	169

Source: Global Development Finance (2008)

Remittances flowing to CARICOM countries also increased for the 1995-2008 period. The top three recipients in the group were Jamaica, Haiti and Guyana (Figure 2). Remittances flowing into Jamaica increased from US$653 million to US$2,181 million during the period.[3] With regard to the Organization of Eastern Caribbean States (OECS), Grenada was the largest recipient.

1.A.(ii) Migration to the USA: Jamaica and Trinidad and Tobago

According to the United Nations (UN DESA, 2008) the number of persons originating from the Latin American and Caribbean region and living outside of their home countries has consistently risen over the last twenty years. This trend has also been replicated by the CARICOM group of countries. As indicated by Nurse (2004), the US has been the primary destination of migrants from both Trinidad and Tobago and Jamaica. This can be attributed to proximity, familiarity of culture and language, and

[3] The World Bank estimates of remittances are based on IMF Balance of Payments data, and may consequently differ from individual Central Bank data. In the case of Trinidad and Tobago the figures except for 2008 are consistent with official Central Bank data, however for Jamaica the World Bank figures tend to be higher by an average of 10 per cent.

the established diaspora. According to the United States Census of 2000, there were 553,827 Jamaicans in the US compared to 197,398 citizens from Trinidad and Tobago (UN Migration Database, 2010).

1.A. (iii) Remittance Trends and Patterns: Trinidad and Tobago and Jamaica

The IMF (2008) defines remittances as:

> *"...a percentage of household income from foreign economies arising mainly from the temporary or permanent movement of people to those economies. Remittances include cash and non-cash items that flow through formal channels, such as electronic wire, or through informal channels, such as money or goods carried across borders."*

In the fifth edition of the Balance of Payments Manual (BPM5), the IMF categorized remittances into workers' remittances (current transfers), compensation of employees (income) and migrant transfers (capital transfers). In its sixth edition of the Balance of Payments Manual (BPM6), remittances have been redefined as follows:

(1) Personal transfers – All current transfers in cash or in kind between residents and nonresident households.
(2) Employee compensation – Transfers between non resident households.
(3) Personal remittances – Personal transfers and employee compensation plus capital transfers between households – Total net worth of migrant's household at the initial time of migration.
(4) Total remittances – Personal remittances plus social benefits (social insurance and assistance)
(5) Total remittances plus current and capital transfers to nonprofit institutions serving households (NPISHs).

Despite the existence of an IMF standard for the compilation of remittance statistics, there are substantial methodological differences in the measurement of remittance flows among countries and regions. This inconsistency hampers comparative analysis.

In Trinidad and Tobago, statistics on remittances are available in the annual Balance of Payments (BOP) Reports compiled jointly by the Central Bank and the Central Statistical Office (CSO). Data are obtained from two principal sources, namely enterprise surveys and the domestic commercial banking system. The institutions surveyed quarterly include the two money transfer agencies operating in the country (Western Union and Money Gram) as well as the National Postal Agency. At present, Trinidad and Tobago's compilation of remittances is conducted using BPM5.

Remittance flows to Jamaica, as measured by the Bank of Jamaica, include migrant worker transfers, alimony and other support maintenance, pensions and gifts in cash or kind. The institutions surveyed include remittance companies, authorized foreign exchange dealers and building societies. The data are published on a monthly basis in the Bank of Jamaica's Remittances Update. In line with BPM6, the Bank of Jamaica has re-categorized its presentation of remittance data to show personal transfers, social benefits and net compensation of employees. The remittances report notes that the discrepancy between remittance flows as measured in BPM5 versus BPM6 is growing largely on account of flows to NPISHs.

From the very outset one can see differences in the measurement of remittances in the two countries. One exclusion from the Trinidad and Tobago figures is that of compensation of employees. Also, the Central Bank of Trinidad and Tobago does not include in its measure of remittances alimony and other support maintenance, pensions and gifts in cash or in kind. It is possible that the difference in the measurement may account for the significantly smaller values that are recorded for remittance flows to Trinidad and Tobago.

It is important to note that both countries have excluded the funds that are transferred through banks, which could be substantial. These payment formats include electronic

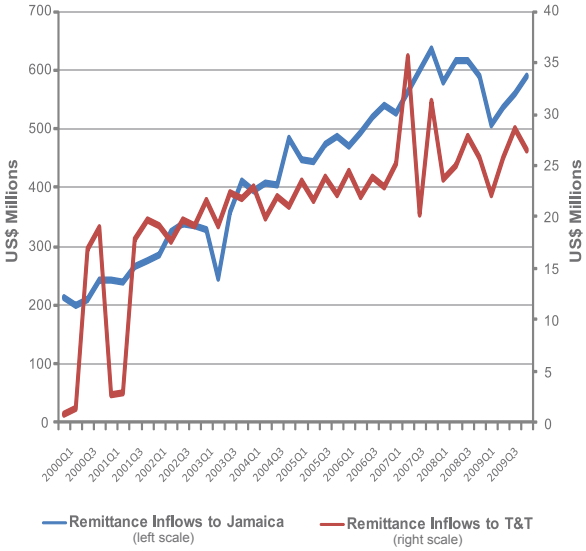
fund transfers, transfers by telegram, fax and telephone. The Automatic Teller Machine (ATM) can also be used to transfer funds to the home country. Anecdotal evidence suggests that migrants are increasingly transferring money to their friends and family via direct transfers to bank accounts, especially because of relatively low transaction costs. The exclusion of these sources of remittance inflows means that remittances for both Jamaica and Trinidad and Tobago are underestimated.

According to information from the respective Central Banks over the last decade, remittance flows to Jamaica and Trinidad and Tobago have been increasing. In 2000, Jamaica and Trinidad and Tobago recorded US$851 million and US$38 million in remittance inflows respectively, compared to US$2,325 million and US$112 million respectively in 2007 (Figure 3).

Table 3 provides a snapshot of the relative importance of remittance inflows with regard to the key macroeconomic variables such as exports, imports, FDI and GDP for the respective countries. The ratios for Jamaica are significantly larger than those for Trinidad and Tobago. Remittances to Jamaica were 13.9 per cent of GDP in 2008 compared to 0.7 per cent for Trinidad and Tobago. In relation to FDI and exports, the ratios for Jamaica were 342.3 per cent and 133.9 per cent respectively, compared to 21.4 per cent and 1.2 per cent respectively for Trinidad and Tobago in 2009.

Figure 3

Remittance Inflows to Jamaica and Trinidad and Tobago 2000-2007 (US$ millions)



Source: Bank of Jamaica and Central Bank of Trinidad and Tobago.

1.B. Remittances Through Informal Channels

The preceding discussion focused on remittance flows that occur through the formal channels such as money transfer organizations. However, remittances also enter through unofficial channels.

1.B. (i) Definition and Estimates of Informal Remittances

Informal remittances consist of various money and goods transfers by migrants without the use of official contracts, making the true extent of these flows unlikely to be captured by formal financial records (Freund and Spatafora, 2005). Thus, remittance flows are likely to be grossly understated due to the thriving informal remittance sector. Freund and Spatafora (2005) estimated that informal remittances range between 35 and 75 per cent of formal remittances in developing countries.

Formal methods of transferring money appear to be more efficient and safer than sending money in an informal way such as via returning residents or friends. However, the transaction costs and exchange rate uncertainty may serve as a deterrent to the use of formal services (Kappel 2008).

The decision to remit money informally may also be influenced by various other factors, such as the legal status of migrants in the host country, access to financial institutions in the receiving country, tax evasion and illicit movement of money (Pieke, Van Hear and Lindley 2005). Kappel (2008) espoused that taxes on remittances are negatively correlated with money sent via official

Table 3
Remittance Inflows in relation to Key Macroeconomic Indicators for Jamaica and Trinidad and Tobago; 2000-2009 (in per cent)

Year	Remittances/Exports of Goods and Services		Remittances/Imports of Goods and Services		Remittances/FDI		Remittances/GDP	
	Trinidad & Tobago	Jamaica	Trinidad & Tobago	Jamaica	Trinidad & Tobago	Jamaica	Trinidad & Tobago	Jamaica
2000	0.97	50.51	1.23	22.64	8.03	168.59	0.48	8.76
2001	0.99	64.64	1.21	26.29	6.31	153.14	0.50	10.33
2002	2.01	86.36	2.12	30.54	11.06	235.15	0.84	11.68
2003	1.66	71.44	2.20	25.63	17.25	135.58	0.82	10.40
2004	1.36	91.22	1.77	35.70	8.89	243.67	0.76	14.46
2005	0.95	97.41	1.61	33.32	15.35	237.55	0.76	14.54
2006	0.78	82.93	1.37	30.50	18.30	200.57	0.68	14.76
2007	0.83	83.14	1.44	27.86	13.33	226.70	0.77	15.29
2008	0.54	73.67	1.05	22.66	5.42	141.52	0.68	13.91
2009	1.19	133.85	1.57	35.22	21.4	342.30[1]	0.75	n.a.

Sources: Central Bank of Trinidad and Tobago, Bank of Jamaica, Statistical Institute of Jamaica and World Development Indicators (2010)

channels as it reduces one's disposable income. On the other side of the coin, he noted that placing tax exemptions on remittances could lead to fraud by way of tax dodging.

Some authors argue that the informal remittance sector does not promote financial responsibility, money management, entrepreneurial development or financial education on the part of receivers as a bank or other financial institution would do (Puri and Ritzema, 1999). However, Pieke, Van Hear and Lindley (2005) argued against this view given that the lines between the formal and informal remittance sectors are often blurred.

Informal remittance transfers are facilitated by hand delivery, money transfer as a part of other businesses, dedicated money transmitters (independent, ethnic, and niche national operators), microfinance operations (credit unions) and migrant associations. Some of the niche national and ethnic operators are: Hundi (Pakistan, Bangladesh), Hawala (Middle East) and Kyeyo Money (Uganda), (Maimbo 2004).

1.B. (ii) Informal Remittances in the Caribbean

The Caribbean region does not have a sophisticated trust-based informal remittance network such as the Middle East's Hawala system. The majority of informal remittances is transmitted throughout the region by hand.

Transaction costs for formal remittance services vary across the region. According to the World Bank, Remittance Prices Database (2010), the average cost of remitting US$500 from the US to Jamaica during the first quarter of 2010 (inclusive of fees and exchange rate

margin) is 5.39 per cent or US$26.96. This compares to 7.22 per cent or US$36.10 in Guyana.[4] The flat fee charged by Western Union to transfer US$500 to Trinidad and Tobago from Brooklyn is $US25; this fee is lower for Jamaica, costing US$20. Similarly the average cost of remitting US$500 from the state of New York to Trinidad and Tobago via Western Union is US$43.00, while a similar transaction to Jamaica costs US$30.

Based on these calculations, it is cheaper to send money to Jamaica than to Trinidad and Tobago. This may be as a result of the distance between the respective countries and the US. The higher transaction cost in Trinidad and Tobago discourages the use of formal channels for remittances to this country.

According to the World Bank (2010), a 5 per cent reduction in the transmission cost (relative to the value sent) could increase the value of remittances to developing countries by as much as US$16 billion. Furthermore, Freund and Spatafora (2005) noted that the formalization of the informal sector can result in additional business for the formal institutions such as banks.

1.B. (iii) Non Cash Remittances: The Barrel Economy in the Caribbean - An Insight

In the Caribbean, there is a culture of migrants engaging in "barrel trade," i.e. migrants send goods to their friends and family members in lieu of or in addition to financial assistance. The goods remitted include those that are more expensive or not available in the home country, in addition to food and educational items. Non-cash remittances constitute the bulk of the value transmitted by migrant labourers (Maphosa, 2005). Some migrants send these goods during specific periods such as the Christmas season and just before the reopening of school. Others send goods for resale.

There are two reasons for sending non-cash remittances. First, such remittances respond to the specific and immediate needs of family and friends. For example, when a country is facing shortages in basic commodities, non-cash remittances can provide a form of relief to the recipients. Second, sending non-cash remittances provides some degree of certainty that these will be used as the migrant sender intended. For example, in Jamaica, a significant number of citizens migrate leaving their children behind in the care of friends and family. These migrants provide parental support by sending barrels of items for these children – hence the term "barrel children". These barrels would usually contain clothes, toys, food and educational material.

1.B. (iv) Barrel Trade in Trinidad and Tobago and Jamaica - An Analysis

The majority of barrels sent to Trinidad and Tobago, according to information provided by the Customs Department, originate from the US. Most contain food, clothing, electronics and household items. Upon entry into Trinidad and Tobago, the barrels are examined by the Customs Office and the applicable taxes are levied. Recipients typically pay an import duty of 20 per cent and a 15 per cent valued added tax. The Customs Department noted that the peak time for the receipt of barrels is during the last quarter of the year corresponding to the Christmas season.

The number of barrels entering Trinidad and Tobago through Port of Spain (one of the three main clearing areas for barrels) in 2009 is estimated at 37,823 with a value of TT$25.4 million (US$3.9 million). This represents reductions of 13 per cent and 9 per cent respectively when compared to 2008 (Figure 4). Before the global financial crisis, the value of barrels coming through Port of Spain was increasing, moving from TT$24.2 million (US$3.9 million) in 2007 to TT$27.8 million (US$4.4 million) in 2008.

Partial information[5] from the clearing sheds at Point Lisas, Medway and Port of Spain suggests that in 2009 the value of barrels received at these ports was at least TT$55.4 million (US$8.9 million).

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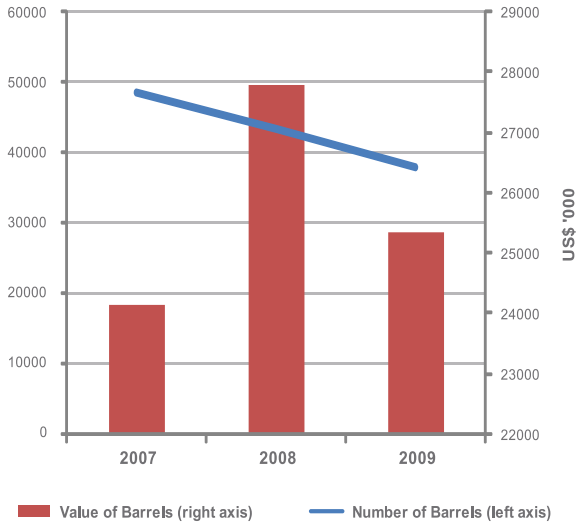
4. Trinidad and Tobago is not included in the World Bank database.
5. In Trinidad and Tobago barrels are received at twelve different ports.

Figure 4

The Barrel Trade in Trinidad and Tobago – Port of Spain



Source: Trinidad and Tobago Customs Division

Information provided by the Jamaica Customs Department, while insufficient for a pre and post crisis analysis, indicates that between December 2009 and July 2010, 97,794 barrels of a non-commercial nature were received. The value of these barrels was estimated at JA$1.075 billion (approximately US$12.7 million). Unlike Trinidad and Tobago which imposes a tariff on the value of the barrel, Jamaica Customs uses a standard notional charge of JA$5,000 for all barrels containing personal effects, i.e., barrels of a non-commercial nature.

The above analysis highlights the importance of including non-cash remittances in the computation of official remittances. Such an effort would necessitate close collaboration among the relevant customs departments.

Section 2: The Global Financial Crisis and the Slowdown in Remittances

2.A. (i) The Transmission of the Global Financial Crisis to Remittance Flows

The global financial crisis began with the failure of the subprime mortgage market in the US in August 2007. By September 2008, the situation had evolved into an economic crisis with negative implications for remittance flows. The transmission path of the crisis is depicted in Figure 5.

The crisis resulted in a stock market collapse in 2008 and increased stock price volatility thereafter, leading to a decline in consumer confidence, restrained consumer spending and an increase in unemployment. The US housing market suffered greatly as newly unemployed homeowners failed to make their mortgage payments. As a result, banks adopted a more risk-averse stance and tightened credit, causing a marked slowdown in business activity (Mohantry, 2009).

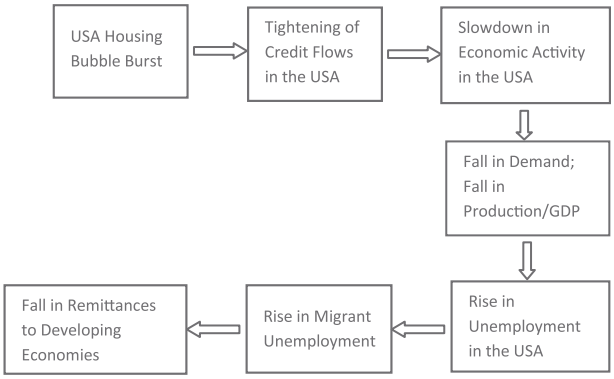
Economic activity weakened throughout 2008 and this was reflected in the slowdown in GDP growth. Figure 6 illustrates the fall in GDP growth rates for the US, Canada and the UK. These countries are the major recipients of Caribbean migrants. According to Nurse (2004), the US receives an average of 80 per cent of all Caribbean migrants. Thus, a negative shock to US macroeconomic indicators has the greatest potential for impacting remittance flows to the region. The quarter-on-quarter growth rates started to decline from the first quarter in 2008 for the UK, compared to the second quarter for the US and the third quarter for Canada. In 2009, the growth rate for the UK experienced a more drastic decline than Canada and the US, falling from 0.7 per cent in the first quarter of 2008 to -2.6 per cent in the first quarter of 2009.

In the three economies, the fall in the level of economic activity was coupled with rising unemployment, as large financial services companies such as Lehman Brothers and manufacturers such as General Motors either ceased to exist or significantly reduced their workforce. This resulted in an increase in the US unemployment rate from 6.2 per cent in the third quarter of 2008 to 10.0 per cent in the fourth quarter of 2009. Canada and the UK exhibited similar trends. Figure 7 shows that unemployment rates in the three economies in 2010 have not yet returned to pre-crisis levels.

The rising level of unemployment has had negative consequences for migrant workers. The International Labour Organization (2009) found that the unemployment rate for migrants tends to be above the rate for the general population. This is because firms usually resort to migrant labour in order to keep wages under control and to expand growth in times of economic prosperity.

Figure 5

Channels through which the global financial crisis affected remittances



However, in economic downturns, these migrants are the first to lose their jobs (Awad, 2009). Taran (2009) pointed out that:

> *"The financial crisis has a higher impact on a few sectors of the economy, some of which employ large numbers of migrant workers. Worldwide, migrant workers are particularly concentrated in construction, manufacturing, agriculture, hotel and catering, and health and care work, including domestic services. These sectors are also especially hit by the current crisis."*

According to the US Department of Homeland Security, the number of unemployed legal permanent residents of Caribbean origin increased by 32 per cent from 2008 to 2009, from 11,946 to 15,744 migrants (Figure 8).

Employment of legal permanent residents of Caribbean origin in the construction and production sector was particularly affected, decreasing by approximately 35 per cent and 21 per cent respectively between 2008 and 2009. On the other hand, there was an increase in the employment of migrants in the services and agricultural sectors (US Department of Homeland Security, 2010).

2.A. (ii) The Impact on Global Formal Remittances

The upward annual trend in remittance flows was reversed in 2008 mainly on account of the global financial crisis and the subsequent increase in unemployment. Estimates from the World Bank indicate that during 2008-2009 remittance inflows to developing countries fell by 6.0 per cent, from US$336 billion to US$316 billion (Ratha *et.al.*, 2010).

As Figure 9 illustrates, growth in remittances fell sharply from late 2007 for many regions and became negative in 2009 for most regions except South Asia. The annual growth rate of remittance flows for Latin America and the Caribbean was estimated by the World Bank (2010) to have fallen from 2.1 per cent in 2008 to -12.3 per cent in 2009. Officially, remittance inflows to Jamaica registered a sharp decline (17 per cent) during 2009 compared to annual growth rates of between 9 and 20 per cent during the previous decade. The World Bank

Figure 6

Quarterly Real GDP Growth for Canada, the UK and the USA.
(Percentage change over the previous quarter)

Source: OECD Database

(2010) forecast that in 2010, global remittance flows will recover and grow, albeit at a much slower rate than the pre-crisis period.

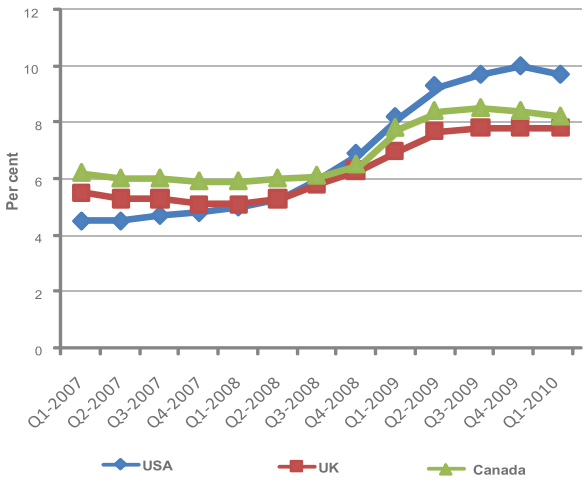
In addition to the decline in the growth rates of remittances, recipients of these flows had to contend with falling purchasing power of the value of cash remittances. A 2008 study undertaken by the Inter American Development Bank's Multilateral Investment Fund (MIF) discovered that the purchasing power of remittances was on the decline for the first time in recorded history. This was attributed to the appreciation of local currencies against the US dollar and rising fuel and food prices (IDB, 2008).

2.A. (iii) The Impact on Formal Remittances to Trinidad and Tobago and Jamaica

As Figure 10 depicts, during the onset of the global financial and economic crisis, remittance inflows

Figure 7

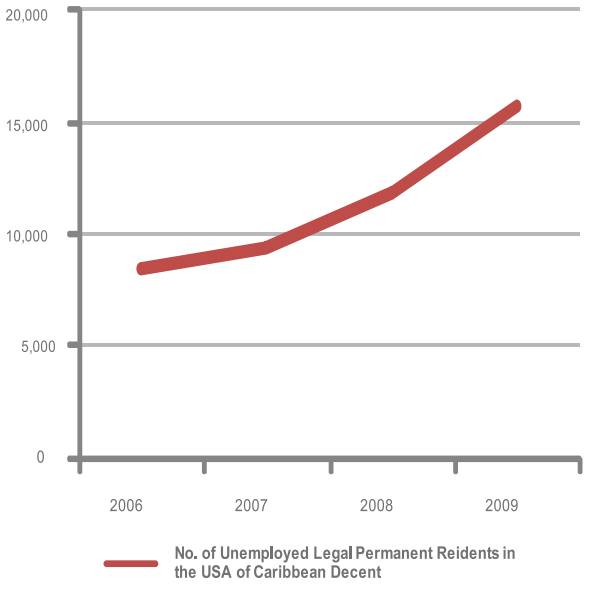
Unemployment rates for Canada, the UK and the US (percentage of the labour force)



Source: OECD Database

Figure 8

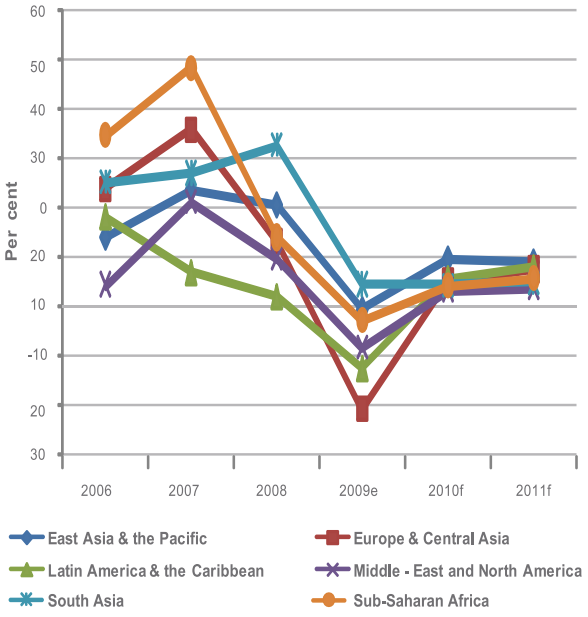
Number of Unemployed Legal Permanent Residents in the US of Caribbean Origin, 2006-2009.



Source: US Department of Homeland Security.

Figure 9

Estimated and Projected Growth Rates for Remittances 2006 to 2011 (per cent)



Source: World Bank (2010).
Note: e indicates estimated and f indicates projected.

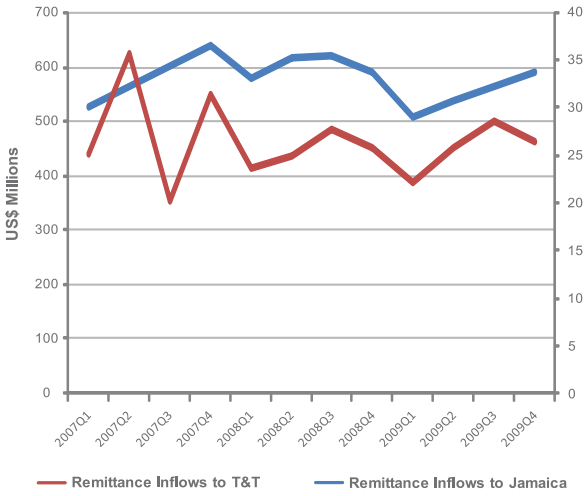
declined. Remittances to Jamaica fell 17.9 per cent from US$617.5 million in the first quarter of 2008 to US$507.2 million in the first quarter of 2009. There has been some subsequent recovery in the value of inflows of remittances. Remittance inflows to Trinidad and Tobago fell by 19.9 per cent from the second quarter of 2008 to the last quarter of that year. However, it is important to note that overall remittance inflows to Trinidad and Tobago have been decreasing since the second quarter of 2007.

Outflows of remittances from the two economies have fluctuated over the last decade (Figure 11). For Trinidad and Tobago remittance outflows increased from US$44.8 million to US$85.5 million between 2007 and 2009. However, remittance outflows from Jamaica fell by 21.7 per cent during this period from US$303.2 million to US$237.4 million. In the case of Trinidad and Tobago, one hypothesis to explain the rise in remittance outflows is the increasing presence of foreign nationals, particularly from China, in the domestic construction sector.

In the case of Jamaica, remittance inflows are on average six times greater than remittance outflows and the net balance has grown from US$658 million in 2000 to US$1,555 million in 2009. For Trinidad and Tobago, remittance outflows are on average a little more than half of remittance inflows and the net balance remained between US$40-US$50 million over the 2000-2008 period, though this balance was considerably reduced in 2009.

Figure 10

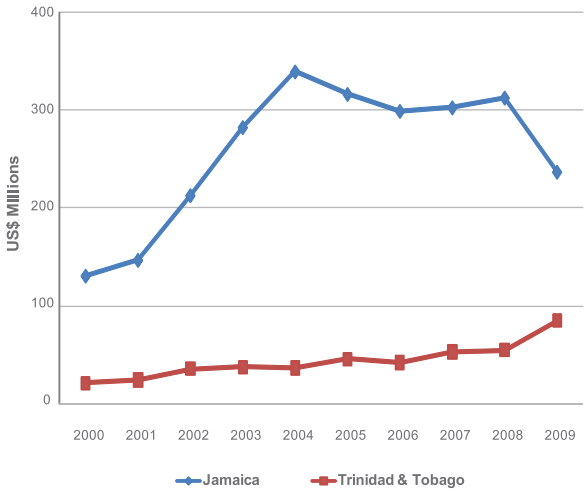
Remittance Inflows to Jamaica and Trinidad and Tobago for the Period 2007 to 2009 ($US millions)



Sources: Central Bank of Trinidad and Tobago and the Bank of Jamaica.

Figure 11

Remittance Outflows from Jamaica and Trinidad and Tobago ($US millions)



Source: Central Bank of Trinidad and Tobago (2009) and Bank of Jamaica (2009).

Section 3: Review of the Literature

3.A. (i) Migrant Labour and Remittance Inflows

A shock to the host economy can have serious implications for migrant labour as well as remittance inflows. The ILO (2009) found that the migrants who were hardest hit by the global financial crisis were those employed in the construction, manufacturing, and hotels and restaurants sectors. Migrants in the health care, education, domestic services and agriculture sectors have not experienced significant job losses. The ILO also reported that female migrants are usually located in the health, education and domestic services sector, while the males are primarily in construction and manufacturing activities.

The Migration Policy Institute (USA) (2009) reported that irregular migrants have been greatly impacted by the financial crisis. The report also highlighted that existing irregular migrants would prefer to work in precarious living and working conditions instead of returning to their home countries during the crisis period. This results from the fact that there may be little prospect of finding a job in the home country and these migrants have accumulated expenses in the host country. The Institute also reported that since the onset of the financial crisis, there has been a slowdown in migrant flows from Mexico and Central America.

In a study conducted by the International Organization for Migration (2009), it was found that in some Southeast and Central Asian countries, governments halted the entry of foreign migrants as a result of the economic downturn. A number of countries, such as Australia, Italy, Kazakhstan and the Russian Federation have reduced migrant quotas. The UK is also increasing the academic and financial requirements for entry into the highly skilled category of workers.

Previous crises have also affected migrant labour. During the Asian crisis of 1997 to 1999, several governments sought to deport immigrants as well as export their own unemployed citizens to more buoyant economies. Similarly, the 1973 oil crisis had negative implications for migration and by extension migrant labour, particularly in the construction and manufacturing sectors (Development Research Centre, 2009).

3.A. (ii) Impact of Crises on Remittance Flows

Several studies have examined the impact of the recent global crisis on remittance flows to developing economies. Cali and Dell' Erba (2009), using home and host country macroeconomic variables, migrant characteristics, as well as information on past systemic banking crises, found that the crisis impacted both the inflow and outflow of remittances. The most important determinant of remittance outflows was the stock of immigrants in the host countries. The crisis had a negative but not significant effect in the higher income countries. The results suggested that the effects of the crisis on remittances did not operate through observable economic variables in the host countries.

Orozco (2009), via the use of survey instruments, found that by 2009 40 per cent of migrants of Latin American origin residing in the US were sending less money than in 2008. The average amount sent fell from US$241 in 2008 to US$230 in 2009. The study found that the impact on remittance flows was influenced by the migrants' gender, country of origin, employment status and access to savings.

Barajas *et al* (2010) used data on the distribution of migrants and GDP growth forecasts in order to assess the impact of the global economic crisis on African GDP via remittances in 2009 to 2010. The study estimated remittance declines in African countries between 3 and 14 percentage points, with migrants to Europe being hardest hit, while migrants within Africa were relatively unaffected by the crisis. The impact of the crisis on GDP in remittance dependent economies was 2 per cent for 2009.

Jha *et al* (2009), in collaboration with the Asian Development Bank, examined the impact of the Asian crisis on remittances. They found that the crisis did not only affect remittance flows but also the remittance market. The crisis led to the consolidation of some banks and financial institutions, while transfer costs fell in most of the Asian economies. Three of the top recipients of remittances in the world are located in Asia. During the Asian crisis, the flow of remittances to these economies fell significantly. The deceleration was more muted than that for other types of capital flows, reflecting the resilient nature of remittances to Asian economies.

The ILO (2009), in a study conducted for the Republic of Liberia, found that the global financial crisis caused a decline in the number of Liberians working abroad. Therefore, remittances flowing into Liberia fell. The Central Bank of Liberia also noted that Liberian migrants living abroad may have responded to the crisis by increasing their savings because of the high level of uncertainty. The Bank recorded monthly declines in remittance inflows from the onset of the crisis until March 2009.

One of the transmission mechanisms of the crisis to remittance flows was through housing activity in the US, given that a large number of migrants are employed in the construction industry. According to the Statistical Portrait of the Foreign-Born Population in the United States (2008), the total foreign-born population working in the construction sector was 2,803,538, which represented 26 per cent of the labour force. It is therefore expected that a downturn in the construction sector for which housing activity is a proxy should negatively impact migrant transfers.

Ruiz and Vargas-Silva (2010) illustrated using VAR analysis that an increase/decrease in housing activity will cause positive/negative movement in remittance flows from Mexican migrants in the construction sector. The authors also identified more rigid restrictions on illegal immigrants during an economic downturn as one way in which remittances were reduced during the crisis.

Despite its generally negative impact, the effect of the global crisis on remittances was not homogenous across regions. Some nations have in fact experienced increases. The Philippines is one such nation, where migrants remitted an extra US$0.4 billion between January and August 2009 relative to the corresponding period of 2008 (Jha *et al*, 2009). Such resilience may be attributed to the fact that the majority of Filipino migrants were domiciled in Asia (78.1 per cent). They were therefore less exposed to the economic downturn which has its epicenters in North America and Europe (Riester, 2009). Nepal is another Asian nation that experienced a rise in remittances in the first quarter of 2009 compared to the same period in 2008. Riester posited that the significant increase (28 per cent) may be a precursor to return migration.

Remittances contribute to the development of society by allowing households to improve their standard of living, as well as increase national savings and the inflow of foreign exchange (Giuliano, *et al,* 2005; Alleyne, 2007; Orozco, 2007; Kirton, 2005). A fall in remittances could therefore have serious implications for households, communities and nations that are dependent on these flows.

Section 4: Empirical Analysis of Trinidad and Tobago and Jamaica

4.A. Snapshots of the Economies

Though both Jamaica and Trinidad and Tobago share the broad characteristics of a small developing country and are part of the same integration bloc (CARICOM), their economic structures and development paths have been quite different (Table 4). The Trinidad and Tobago economy is heavily dependent on the hydrocarbon sector both as a source of economic growth and as a generator of foreign exchange. Jamaica on the other hand relies mainly on tourism and the bauxite/alumina industry as well as remittances.

Jamaica's unemployment rate has exceeded that of Trinidad and Tobago, although both have generally been on a declining path. According to the literature, a higher level of unemployment is likely to result in a higher inflow of remittances as migrants attempt to provide support for their families in the home country. This suggests that Jamaica would, other things being equal, attract more remittances than Trinidad and Tobago.

In general, inflation has been higher in Jamaica than in Trinidad and Tobago. Inflation is expected to influence remittance flows in two ways. Higher inflation implies that migrants would need to remit more funds (in local currency equivalent) to maintain the purchasing power of the transfers. It could also encourage more transfers of goods, which become relatively cheaper in the foreign country.

The Trinidad and Tobago economy has been growing at a faster pace than Jamaica, although both economies contracted in 2009. The external current account balance for Jamaica has been negative for the past decade, while Trinidad and Tobago, due to energy exports, has been able to maintain a positive balance. From the macroeconomic indicators outlined, it is evident that Trinidad and Tobago was in a better economic position than Jamaica in the runup to the global financial crisis.

4.B. Empirical Tests

4.B.(i) Data Analysis

To facilitate the investigation of the sensitivity of remittances, two data sets were constructed for Jamaica and Trinidad and Tobago. The data covered the time period 2000 to 2009 and were of a quarterly frequency, The dependent variable was official remittance inflows, using data from the Central Banks.

From the literature, it was noted that approximately 80 per cent of Caribbean migrants settled in the US. As such, the model uses the US economy as a proxy for

Table 4

Macroeconomic snapshot of Trinidad and Tobago and Jamaica:
Real GDP Growth, Current Account Balance, inflation, unemployment, and GDP for the period 2000-2009.

	T&T	Jamaica	T&T	Jamaica	T&T	Jamaica	T&T	Jamaica	T&T	Jamaica
Years	Unemployment rate (per cent)		Inflation rate (per cent) (yr-on-yr)		GDP (US$ mn) (current marker prices)		Real GDP Growth (per cent)		Current Account Balance (US$ mn)	
2000	12.2	15.5	5.6	6.0	8,186.5	2,206.6	7.3	0.9	544.3	-291.8
2001	10.8	15.0	3.2	8.5	8,872.9	2,301.4	4.2	6.0	445.8	-732.0
2002	10.4	14.2	4.3	7.2	8,955.1	2,468.6	7.9	-3.5	76.4	-1,004.5
2003	10.5	11.4	3.0	13.8	10,748.1	2,418.2	14.4	3.5	984.7	-857.7
2004	8.4	11.7	5.6	13.7	13,338.5	2,622.7	7.9	1.4	1,647.1	-502.5
2005	7.9	11.3	7.2	12.6	16,021.2	2,838.8	5.8	1.1	3,594.3	-1,071.4
2006	6.2	10.4	9.1	5.7	18,460.2	3,135.2	13.5	3.0	7,270.5	-1,182.7
2007	5.5	9.9	7.6	16.8	20,994.2	3,320.4	4.6	1.4	5,364.3	-2,038.3
2008	4.6	10.6	14.5	16.8	26,105.7	3,472.1	2.3	-0.9	8,518.8	-2,794.0
2009	5.3	11.4	1.3	10.2	21,197.0	3,174.5	-3.2	-3.0	4,274.9	-922.8

Sources: The Review of the Trinidad and Tobago Economy (various years), the Central Bank of Jamaica, World Bank 2009 and Annual Economic Survey for Trinidad and Tobago 2008,

remittance-sending economies. Host country variables include the US black unemployment rate which serves as a proxy for the crisis. This rate was used because Caribbean migrants are more likely to be captured in this category. US personal disposable income was used as a measure of foreign income and a US three month Treasury bill rate was used as a proxy for the interest rate. Domestic unemployment rates were used as the home country variables.

Data sources for the host country variables include the United States Bureau of Labour Statistics and the Federal Reserve Bank of St. Louis. The unemployment rates for Trinidad and Tobago and Jamaica were collected from the Central Bank of Trinidad and Tobago and the Statistical Institute of Jamaica, respectively. However, with regards to the Jamaican unemployment rate, a few data points were missing. Consequently, a two point adjacent moving average was used to fill in the missing data points.

4.B. (ii) Anticipated Effects of Each Variable on Remittances

The literature provides some guidance as to the expected direction of influence of the variables used in the model.

Host (foreign) country variables:

(a) Black Unemployment Rate: The black unemployment rate in the host country was used instead of the overall unemployment rate as it would better depict the economic situation of Caribbean migrants. As the black unemployment rate increases in the host country, it is expected to negatively impact remittance inflows to the home country.

(b) US Personal Disposable Income: Personal disposable income is expected to be positively correlated with remittances. As personal disposable income increases, remittance inflows will also rise, other things remaining equal.

(c) Interest Rate: The interest rate in the host country is negatively correlated with remittance flows to the home country. As the interest rate increases, borrowing and loan payments become more costly, reducing migrants' disposable income. Also, increasing interest rates in the host economy will be an incentive to save and forego repatriating money to the home country. This would lead to a fall in remittances.

Home country variables: The economic conditions in the migrants' country of origin are important in determining the amount of funds remitted. Adverse economic conditions would be positively correlated with remittance inflows. For example, if the home country is in a recession or is suffering from any disaster, whether natural or economic in origin, it is expected that remittance inflows will increase. For the purpose of this model, the domestic unemployment rate is used as the only home country variable.

The domestic unemployment rate: It is expected that a high level of unemployment in the home country would attract a greater share of remittances to that country.

Table 5 summarizes the *a priori* expectations of these variables with regards to the relationship with remittances.

Table 5

A Priori Expectations - Impact of Independent Variables on Remittances

VARIABLE	*A PRIORI* SIGN
US Black Unemployment	NEGATIVE (-)
US Personal Disposable income	POSITIVE (+)
US Interest Rates	NEGATIVE (-)
TT/Jamaica Unemployment Rate	POSITIVE (+)

4.B.(iii) Empirical Approach

The paper uses an Unrestricted Vector Autoregressive model (VAR). This model is commonly used for forecasting interrelated time series as well as the impact of random disturbances on a system of variables (Watson and Teelucksingh, 2002). In addition to data description and forecasting, the VAR model is also used for structural inference and policy analysis. In structural analysis, certain assumptions about the causal structure of the data under investigation are imposed and the resulting impacts of unexpected shocks or innovations to specified variables are summarized. These causal impacts are usually summarized with impulse response functions and forecast error variance decompositions.

The equation for the VAR systems can be expressed as follows:

$$REM_{it} = \alpha_{10} + \alpha_{11}REM_{t-1} + \alpha_{12}USPI_{t-1} + \alpha_{13}USBU_{t-1} + \alpha_{14}USINT_{t-1} + \alpha_{15}UNEM_{t-1} + \varepsilon_{t-1}^{rem}$$

$$USPI_{it} = \alpha_{20} + \alpha_{21}USPI_{t-1} + \alpha_{22}REM_{t-1} + \alpha_{23}USBU_{t-1} + \alpha_{24}USINT_{t-1} + \alpha_{25}UNEM_{t-1} + \varepsilon_{t-1}^{uspi}$$

$$USBU_{it} = \alpha_{30} + \alpha_{31}USBU_{t-1} + \alpha_{32}REM_{t-1} + \alpha_{33}USPI_{t-1} + \alpha_{34}USINT_{t-1} + \alpha_{35}UNEM_{t-1} + \varepsilon_{t-1}^{usbu}$$

$$USINT_{it} = \alpha_{40} + \alpha_{41}USINT_{t-1} + \alpha_{42}REM_{t-1} + \alpha_{43}USPI_{t-1} + \alpha_{44}USBU_{t-1} + \alpha_{45}UNEM_{t-1} + \varepsilon_{t-1}^{usint}$$

$$UNEM_{it} = \alpha_{50} + \alpha_{51}UNEM_{t-1} + \alpha_{52}REM_{t-1} + \alpha_{53}USPI_{t-1} + \alpha_{54}USBU_{t-1} + \alpha_{55}USINT_{t-1} + \varepsilon_{t-1}^{unem}$$

Where

REM	=	Remittance inflows to the respective destination country
USPI	=	US Personal Disposable Income
USBU	=	US Black unemployment rate
USINT	=	US Interest rate
UNEM	=	Unemployment rate of the respective destination country

In matrix notation the following formulation yields:

$$\begin{bmatrix} REM \\ USPI \\ USBU \\ USINT \\ UNEM \end{bmatrix} = \begin{bmatrix} \alpha 11 & \alpha 12 & \alpha 13 & \alpha 14 & \alpha 15 \\ \alpha 21 & \alpha 22 & \alpha 23 & \alpha 24 & \alpha 25 \\ \alpha 31 & \alpha 32 & \alpha 33 & \alpha 34 & \alpha 35 \\ \alpha 41 & \alpha 42 & \alpha 43 & \alpha 44 & \alpha 45 \\ \alpha 51 & \alpha 52 & \alpha 53 & \alpha 54 & \alpha 55 \end{bmatrix} \begin{bmatrix} REM_{t-1} \\ USPI_{t-1} \\ USBU_{t-1} \\ USINT_{t-1} \\ UNEM_{t-1} \end{bmatrix} + \begin{bmatrix} \alpha 10 \\ \alpha 20 \\ \alpha 30 \\ \alpha 40 \\ \alpha 50 \end{bmatrix} + \begin{bmatrix} \varepsilon t^{rem} \\ \varepsilon t^{uspi} \\ \varepsilon t^{usbu} \\ \varepsilon t^{usint} \\ \varepsilon t^{unem} \end{bmatrix}$$

$$Y_t \qquad \beta \qquad Y_{t-1} \qquad A \qquad E_t$$

The matrix representation of the VAR model can be simplified further as follows:

$$Y_t = A + \beta Y_{t-1} + E_t$$

Where Y is a vector of five endogenous variables, β is a matrix of coefficients to be estimated and E is a vector of random errors that are contemporaneously correlated with each other. However, they are not correlated with their lagged variable and the right hand side variables. (See Appendix 1(4) for coefficients of equation 1).

In this model, the effects of an external shock such as the global financial crisis can be identified through the impulse response function which traces the response of an endogenous variable to a unit change in one of the innovations. If the innovations are not correlated with each other, it is very easy to interpret the impulse response. However, in most cases the error term is usually correlated and hence a common component cannot be identified with any specific variable. Therefore, the Choleski Decomposition was utilized to attribute the effects of a common component to the first variable in the ordering.

The results presented should be considered with three caveats. Firstly, one limitation is the inability of the authors to construct a lengthy time series due to the unavailability of data. Secondly, as acknowledged in previous sections, the data collected by the Central Banks underestimates the true value of remittance inflows. Thus the impact of the crisis may be underestimated in the results. One final issue is that the methodologies employed by the Central Banks differ, as Jamaica uses BPM6 guidelines while Trinidad and Tobago uses BPM5.

4.B. (iv) Empirical Results

4.B. (iv)a The Issue of Correlation

In conducting the empirical analysis, the first step involved investigating the presence of multicollinearity. This is where two or more variables are correlated and the relative contributions of each variable in explaining the dependent variable cannot be distinguished. Based on the results of the Trinidad and Tobago dataset, there are no strong correlations between any two variables in the model with the exception of US personal disposable income and the local rate of unemployment. All of these variables have been retained in the model. However, the presence of such multicollinearity does pose a limit to clearly distinguishing the individual impacts of the independent variables.

4.B. (iv)b Order of Integration

The VAR model must be stable in order to get reliable results and hence reaffirming the appropriateness of the model. Each variable was subjected to an Augmented Dickey-Fuller test for unit roots, which revealed that all the variables admitted two unit roots with the exception of Trinidad and Tobago's remittance inflow which was stationary. Trinidad and Tobago and Jamaica's unemployment rates and remittance inflows to Jamaica admitted one unit root. All the I(1) variables were first differenced, while the I(2) variable was differenced twice for stationarity. The results of the ADF test for all the time series are depicted in Table 6.

In order to estimate the unrestricted VAR it is important to determine the lag length of the endogenous variables. The various information criteria for all the lags including the Likelihood Ratio test at a 5 per cent level of significance, concluded that a maximum of one lag should be used for both the Trinidad and Tobago and Jamaica datasets.

Table 6

ADF test results depicting the number of Unit Roots.

Variables	Level @ @ 5% Sig.	ADF Test Statistic @ 5% sig.	Probability	First Difference @5% sig.	ADF Test Statistic	Probability	Second difference	ADF Test Statistic	Probability
Ttrem0	-3.533083	-5.621877	0.0002						
Usbu2	-3.533083	-0.505503	0.9789	-3.536601	-2.375409	0.3856	-3.540328	-5.909404	0.0001
Uspi2	-3.533083	-1.550901	0.7934	-3.536601	-2.259773	0.4443	-3.540328	-5.028365	0.0013
Usint1	-3.533083	-3.27007	0.0867	-3.536601	-3.188328	0.1024	-3.540328	-4.048138	0.0157
Ttunem1	-3.533083	-2.329683	0.4087	-3.536601	-5.326088	0.0006			
jjrem1	-3.529758	-3.009002	0.1428	-3.533083	-7.271283	0.0000			
junem1	-3.529758	-2.476233	0.3374	-3.533083	-7.697193	0.0000			

*using trend and intercept and ^{0}indicates no unit roots, ^{1} one unit root and ^{2} two unit roots.

Source: Eviews Output

Similarly, when the lag exclusion test was conducted, the results indicated that the variables had joint significance at a maximum of one lag.

The appropriateness of the estimated VAR must be determined by running stability and residual diagnostic tests. For both datasets, the estimated VARs passed the stability test and all the roots have modulus less than one and lie inside the unit circle. Therefore, the estimated VAR satisfies the stability condition. The datasets for both Trinidad and Tobago and Jamaica also passed all the diagnostic tests, hence being free from serial correlation, heteroskedasticity as well as satisfying the condition of normality.

4.B. (iv)c Granger Causality

To establish the path of transmission between remittance inflows to Trinidad and Tobago and Jamaica and the other variables, pairwise Granger causality tests were performed on both datasets. Results indicated unidirectional causality from the US black unemployment rate to US personal disposable income to remittance inflows to Trinidad and Tobago. With regard to Jamaica's dataset, there was also unidirectional causality from the US black unemployment rate to remittance inflows to Jamaica.

4.B. (iv)d Impulse Response Functions

From the estimated VAR, an impulse response function and a variance decomposition were computed to evaluate the dynamic interactions between the variables in the system. An impulse response function traces the effects of a one-time shock to one of the innovations on current and future values of the endogenous variables. Choleski factorization was used to deal with the problem of identification. The ordering from the Granger causality test was used in the Choleski ordering.

Figures (2a) and (2b) in Appendix 1 depict the response of remittance inflows to Trinidad and Tobago and the other variables to a one unit shock to US black unemployment. The results indicate that a one standard deviation shock (increase) to US black unemployment had no significant effect on remittance inflows to Trinidad and Tobago. Remittance inflows for Trinidad and Tobago fell in the second period. The fall was so small that statistically it cannot be distinguished from zero. Therefore, one can conclude that remittance inflows to Trinidad and Tobago were not sensitive to the global financial crisis.

On the other hand, a one standard deviation shock (increase) to US black unemployment caused an immediate decline in remittance inflows to Jamaica by US$3.2 million. Surprisingly, remittance inflows to Jamaica rose in the second period. However, these inflows fell again in the third period until it dissipated by the fourth period.

It is clear therefore that the global financial crisis had different effects on remittance inflows to Trinidad and Tobago and Jamaica. Remittance inflows to Trinidad and Tobago were not sensitive to the global financial crisis. However, such inflows to Jamaica were very sensitive, declining immediately after the crisis.

The overall results were expected given that in Trinidad and Tobago remittance inflows were not very significant and represented less than 1 per cent of GDP. However, remittance inflows to Jamaica are very significant to the overall economy and represent approximately 15 per cent of GDP.

4.B. (iv)e Variance Decomposition

The variance decomposition of the VAR gives information about the importance of each of the random innovations in the explanation of each variable in the system. This is done through an analysis of the forecast error of each variable.

Given the Choleski ordering, the variance decomposition indicated that in the first period the Trinidad and Tobago unemployment rate did not account for any of the variations in remittances following the shock. Over time, however, the Trinidad and Tobago unemployment rate exerted a small influence on the variability in remittances. The influence of the unemployment rate increased throughout the periods, accounting for 3 per cent in the second period and 21 per cent of the variations in the tenth period.

Similar results were displayed for Jamaica with regards to the unemployment rate. For both countries, the US black unemployment rate and US personal disposable income accounted for a very small percentage of the variation in remittance inflows. The results of the variance decomposition indicate that the unemployment rate is becoming increasingly important in determining the variations in remittance inflows (Figures 3a and 3b in Appendix 1).

Section 5: Conclusion

The global financial crisis impacted remittance flows to many developing economies including the Caribbean region. The aim of this paper was to bridge the gap in the literature and examine such movements in Trinidad and Tobago and Jamaica. The results indicated that remittance inflows to Trinidad and Tobago did not display sensitivity to the global financial crisis. This contrasts with Jamaica where remittance inflows displayed a high level of sensitivity. The analysis also suggested that domestic unemployment rates had an initially small but increasing influence on remittance inflows.

The findings of this model must be interpreted with caution, given that there was some degree of multicollinearity between some independent variables and a short time series was used. Moreover, official statistics on remittance inflows to Trinidad and Tobago and Jamaica are not currently comprehensive in coverage. Data provided for this study by Customs Divisions show that the value of goods received via the “barrel trade” is quite important for both countries.

Based on the analysis conducted in this paper, several recommendations emerge:

- Efforts should be made to adopt a standard and more comprehensive measurement of remittances in official statistics in the Caribbean. The BPM6 definition should be used as the common standard. This could be complemented by systematic collection of information on funds that are transferred electronically and not currently measured. Similarly, statistical series on the barrel trade could be developed and disseminated.

- An important aspect in mitigating against the effects of future crises on remittances is to fully understand the impact of the crisis at the micro level. This can be done via post-crisis household surveys, such as those undertaken by the Bank of Jamaica. These surveys allow stakeholders to understand how households dependent on these flows were affected by the fall in remittances.

- Furthermore, in order to stabilize flows, consideration should be given to establishment of national remittance funds designed to encourage migrants to save and invest a percentage of the remittances they send. In times of economic downturn, migrants would be able to access these funds to maintain their needs throughout the crisis period.

As of late 2010, the global economic recovery is not yet fully established. Unemployment rates throughout the world remain relatively high. Consequently, many households in the Caribbean and other developing countries will continue to rely on support from relatives and friends abroad. In this context, it is important to measure, assess and develop policies to facilitate and encourage the best use of remittance flows.

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Appendix 1

(1a) Estimated VAR Trinidad and Tobago

	TTREM	D2USPI	D2USBU	D2USINT	TTUNEM
TTREM(-1)	0.233092	2290.043	-0.016176	-0.006042	-0.033015
	(0.16526)	(3525.67)	(0.02147)	(0.04139)	(0.02787)
	[1.41048]	[0.64953]	[-0.75340]	[-0.14598]	[-1.18459]
D2USPI(-1)	4.63E-06	-0.513832	-2.03E-06	-1.04E-06	3.48E-06
	7.5E-06)	(0.16016)	(9.8E-07)	(1.9E-06)	(1.3E-06)
	[0.61611]	[-3.20831]	[-2.07736]	[-0.55245]	[2.74767]
D2USBU(-1)	-0.921439	2523.886	-0.570999	0.648153	0.124805
	(1.09051)	(23265.6)	(0.14168)	(0.27313)	(0.18392)
	[-0.84496]	[0.10848]	[-4.03021]	[2.37303]	[0.67860]
D2USINT(-1)	-0.533299	-8905.068	-0.038606	-0.176875	0.201369
	(0.76519)	(16324.9)	(0.09941)	(0.19165)	(0.12905)
	[-0.69695]	[-0.54549]	[-0.38834]	[-0.92290]	[1.56039]
TTUNEM(-1)	-1.210189	6477.915	-0.041042	0.021915	0.880501
	(0.39006)	(8321.70)	(0.05068)	(0.09769)	(0.06578)
	[-3.10259]	[0.77844]	[-0.80989]	[0.22432]	[13.3848]
C	26.60268	-105921.3	0.695354	-0.154992	1.518697
	(6.07828)	(129677.)	(0.78969)	(1.52238)	(1.02511)
	[4.37668]	[-0.81681]	[0.88054]	[-0.10181]	[1.48150]
R-squared	0.473746	0.266034	0.412094	0.207810	0.914522
Adj. R-squared	0.388867	0.147652	0.317270	0.080037	0.900736
Sum sq. resids	661.4358	3.01E+11	11.16450	41.49266	18.81342
S.E. equation	4.619160	98547.53	0.600121	1.156924	0.779028
F-statistic	5.581394	2.247253	4.345895	1.626401	66.33352
Log likelihood	-105.8454	-474.6644	-30.33442	-54.62080	-39.98829
Akaike AIC	6.045696	25.98186	1.964023	3.276800	2.485854
Schwarz SC	6.306926	26.24309	2.225253	3.538030	2.747084
Mean dependent	21.88442	-1691.892	0.016216	-0.089459	7.870270
S.D. dependent	5.908743	106742.5	0.726297	1.206201	2.472613

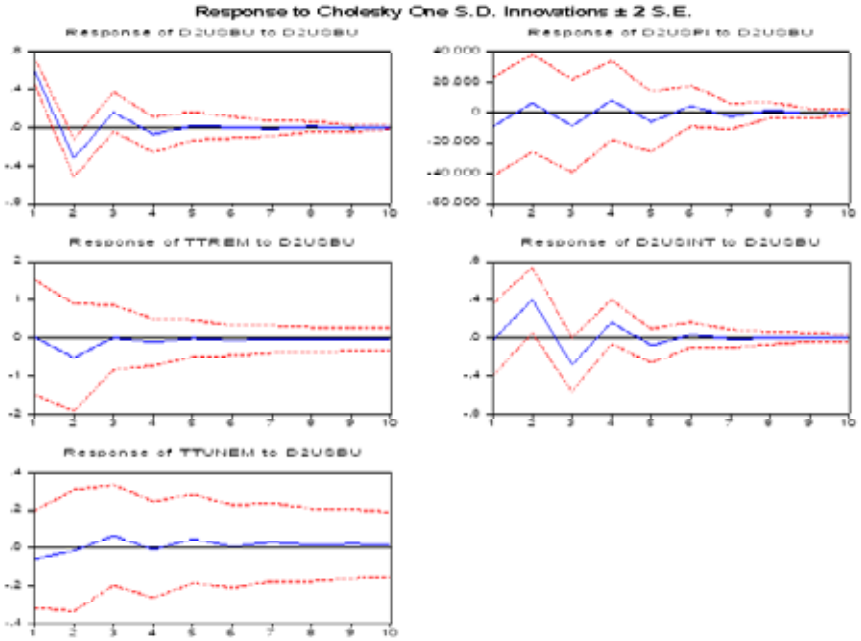
Determinant resid covariance (dof adj.)	4.50E+10
Determinant resid covariance	1.86E+10
Log likelihood	-699.9300
Akaike information criterion	39.45567
Schwarz criterion	40.76182

(1b) Estimated VAR Jamaica

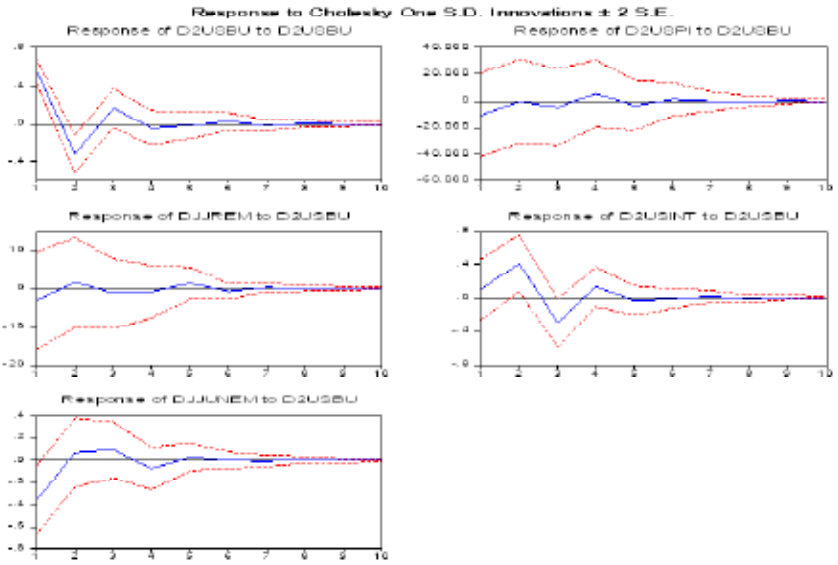
	DJJREM	D2USPI	D2USBU	D2USINT	DJJUNEM
DJJREM(-1)	-0.327857	-762.8905	0.001465	-7.68E-05	0.000938
	(0.19067)	(469.801)	(0.00271)	(0.00545)	(0.00480)
	[-1.71949]	[-1.62386]	[0.53960]	[-0.01410]	[0.19555]
D2USPI(-1)	6.98E-05	-0.454580	-2.79E-06	-3.19E-07	-2.25E-06
	(6.8E-05)	(0.16834)	(9.7E-07)	(2.0E-06)	(1.7E-06)
	[1.02096]	[-2.70034]	[-2.86733]	[-0.16364]	[-1.30906]
D2USBU(-1)	-5.419382	-14260.67	-0.458668	0.584380	-0.043522
	(10.0256)	(24702.4)	(0.14274)	(0.28642)	(0.25229)
	[-0.54056]	[-0.57730]	[-3.21333]	[2.04029]	[-0.17251]
D2USINT(-1)	-3.756718	-18602.97	0.001284	-0.219743	0.207107
	(6.63666)	(16352.3)	(0.09449)	(0.18960)	(0.16701)
	[-0.56606]	[-1.13763]	[0.01359]	[-1.15897]	[1.24009]
DJJUNEM(-1)	-13.02130	-6438.206	0.243384	-0.308941	-0.141966
	(7.36761)	(18153.3)	(0.10490)	(0.21048)	(0.18540)
	[-1.76737]	[-0.35466]	[2.32023]	[-1.46776]	[-0.76571]
C	12.41289	2790.564	0.023599	-0.140726	-0.115700
	(6.64214)	(16365.8)	(0.09457)	(0.18976)	(0.16715)
	[1.86881]	[0.17051]	[0.24954]	[-0.74160]	[-0.69220]
R-squared	0.132563	0.310174	0.489902	0.273721	0.175232
Adj. R-squared	-0.007346	0.198912	0.407628	0.156580	0.042205
Sum sq. resids	46607.64	2.83E+11	9.447689	38.04039	29.51479
S.E. equation	38.77464	95538.27	0.552054	1.107750	0.975751
F-statistic	0.947495	2.787776	5.954527	2.336669	1.317266
Log likelihood	-184.5649	-473.5169	-27.24549	-53.01374	-48.31924
Akaike AIC	10.30080	25.91984	1.797054	3.189932	2.936175
Schwarz SC	10.56203	26.18107	2.058284	3.451162	3.197405
Mean dependent	10.36486	-1691.892	0.015315	-0.089459	-0.086299
S.D. dependent	38.63300	106742.5	0.717273	1.206201	0.997017

Determinant resid covariance (dof adj.)	2.39E+12
Determinant resid covariance	9.87E+11
Log likelihood	-773.4447
Akaike information criterion	43.42944
Schwarz criterion	44.73559

(2a) Impulse Response Trinidad and Tobago



(2b) Impulse Response Jamaica



(3a) Variance decomposition Trinidad and Tobago

Period	S.E.	TTREM	D2USPI	D2USBU	D2USINT	TTUNEM
1	4.619160	98.62278	0.705696	0.001343	0.670181	0.000000
2	4.922578	91.22916	3.517669	1.076718	0.795367	3.381088
3	5.044458	87.95217	3.376561	1.025574	0.758779	6.886919
4	5.146938	84.76895	3.244311	1.039652	0.734927	10.21215
5	5.235398	82.15371	3.149467	1.005029	0.715680	12.97611
6	5.313662	79.91031	3.068636	0.989707	0.699791	15.33156
7	5.382154	78.03245	2.997731	0.967057	0.687467	17.31529
8	5.442764	76.42556	2.942042	0.951446	0.675950	19.00500
9	5.496164	75.05407	2.890596	0.936364	0.666931	20.45204
10	5.543437	73.87319	2.848925	0.923880	0.658606	21.69540

(3b) Variance decomposition Jamaica

Period	S.E.	DJJREM	D2USPI	D2USBU	D2USINT	DJJUNEM
1	38.77464	94.98823	4.346022	0.665750	0.000000	0.000000
2	41.12620	87.93797	4.416572	0.742019	0.093286	6.810150
3	41.51991	86.29040	4.455040	0.825170	0.551281	7.878105
4	41.59443	85.98862	4.604339	0.867189	0.688772	7.851078
5	41.63739	85.82279	4.645958	0.971049	0.687422	7.872777
6	41.65540	85.75406	4.658744	1.008399	0.698516	7.880284
7	41.66014	85.73655	4.665339	1.012213	0.706809	7.879088
8	41.66168	85.73100	4.668703	1.012145	0.709122	7.879033
9	41.66245	85.72818	4.670163	1.012489	0.709401	7.879763
10	41.66278	85.72695	4.670731	1.012711	0.709398	7.880212

(4): Coefficient of Estimated VAR

Table : Coefficients and Constants for TTREM and JJREM Equations

	COEFFICIENT	VARIABLE	VALUE
Trinidad & Tobago	α10	constant	26.60268
	α11	T & T Remittances	0.233092
	α12	US Personal Disposable income	4.63E-6
	α13	US Black Unemployment	-0.921439
	α14	US Interest Rates	-0.533299
	α15	Trinidad & Tobago's Unemployment Rate	-1.210189
Jamaica	β10	constant	12.41289
	β11	Jamaica Remittances	-0.327857
	β12	US Personal Disposable income	6.98E-5
	β13	US Black Unemployment	-5.419382
	β14	US Interest Rates	-3.756718
	β15	Jamaica's Unemployment Rate	-13.02130

Central Bank of
Trinidad & Tobago