



Motives for sending Remittances to Jamaica: An application of the BPM6¹ definition of Remittances

Chandar Henry, Jermaine Moulton and Jermaine Ricketts²
Economic Information and Publications Department
Research and Economic Programming Division
Bank of Jamaica

February 2009

Abstract

This paper seeks to explore the motives of migrants in sending remittances to Jamaica. Remittances were estimated by using the definition proposed in the sixth edition of the Balance of Payments manual and were utilized throughout the paper. The literature reveals three motives for sending remittances: altruism, self-interest/investment and tempered altruism or enlightened self-interest. A VAR model was used to examine the possible motives migrants might have when remitting to Jamaica. The results indicate a combination of altruistic and self-interest/investment motive for sending remittances.

JEL Classification Numbers: **C32, D64, F21, F24**

Keywords: Remittances, Altruism, Investment, Motive, VAR.

¹ BPM6 is the sixth edition of the Balance of Payments and International Investment Position Manual, which was published in December 2008.

² The views expressed in this paper are those of the authors and do not necessarily reflect those of the Bank of Jamaica (BOJ) or its policy.

TABLE OF CONTENTS**Page Number**

Statistical Notes	3
1.0 Introduction	4
2.0 Measurement Issues of Remittances	5
2.1 Definition of Remittances	5
2.2 Application of the revised definition	7
3.0 Theories of Remittances	9
3.1 Self-interest	9
3.2 Pure Altruism	10
3.3 Tempered Altruism/Enlightened Self-interest	11
4.0 Data and Variable Selection	12
5.0 Stylized Facts	13
6.0 Empirical Methodology	14
6.1 The VAR	14
6.2 Other Tests	17
7.0 Results	17
8.0 Conclusion	21
9.0 Reference List	23
Appendices	27

STATISTICAL NOTES**Page Number**List of Tables

1. Summary of unit root tests on quarterly data	17
2. Variance decomposition of remittances for quarterly analysis	19
3. Summary of unit root tests on monthly data	20
4. Variance decomposition of remittances for monthly analysis	21
5. Latin America and Caribbean countries' remittance details	28
6. Major components of remittances and the difference with the old def ⁿ	29
7. Key macroeconomic indicators	30
8. Macroeconomic shares	30
9. Selected ratios	31
10. Variable details	31
11. Correlation matrix for quarterly series	32
12. Correlation matrix for monthly series	32

List of Figures

1. Remittance inflows with the old and new definitions	7
2. Monthly average remittance inflows	8
3. Contribution of remittances by source country	8
4. Quarterly level series	33
5. Monthly level series	34
6. Impulse response functions for quarterly analysis	35
7. Impulse response functions for monthly analysis	36

1.0 INTRODUCTION

In light of the current global economic downturn, increasing attention has been placed on remittances, as it is a significant international source of income for many developing countries (LDCs). According to the World Bank (2008), remittance flows to LDCs totalled US\$251 billion in 2007.

The Latin America and Caribbean (LAC) region is one of the world's largest recipients of remittances. The region's remittance inflows are important as it represents more than 10 per cent of GDP in several countries in the region (World Bank estimates, 2008)³. Inevitably, these remittance inflows offer indispensable support in financing the current account deficit faced by Jamaica and other countries in the region. The buoyancy of remittances, according to Gupta (2005), has been instrumental in substantially mitigating current account deficit on the balance of payments (BOP) account. Other studies have concurred, as they have established a positive relationship between remittances and current account balance (Alleyne, 2006; Aydas, 2005 and Jackson, 2005).

Remittances have become a stable source of foreign exchange for many developing countries. In recent times, remittance inflows in some remittance-receiving countries have surpassed other forms of foreign exchange flows, such as foreign direct investment (FDI) and other types of private capital flows (Gupta, 2005). This is in line with the findings of Jackson (2005), as he purported that the importance of remittances as a source of foreign exchange in Jamaica becomes obvious when compared to the major traditional foreign exchange earners such as tourist expenditures, FDI and alumina exports⁴.

Numerous studies have tried to examine the motives of migrants in sending remittances. Investigating these motives is crucial, as remittances are perceived as an important source of foreign exchange in emerging economies. Understanding the motives for remitting can aid policy makers in understanding and facilitating remittances through the formal

³ See table 5 for further details.

⁴ See table 6 for further details for Jamaica.

financial system as well as channelling more remittances for investment purposes (Schiopu and Siegfried, 2006).

Historically, the BOP manual (BPM) has defined the flows that are classified as remittances. The sixth edition of the manual (BPM6) was published in December 2008 with several amendments, one of which was a change in the definition of remittances. It was believed that a revision to the definition was necessary, as it would provide further clarification on the flows that constitute remittances.

Using this revised definition of remittances, the paper aims to analyze the determinants of these flows in order to uncover the motives of migrants for remitting to Jamaica from January 1995 to September 2008. Studies have classified the determinants of remittances as being either socio-demographic or macroeconomic in nature. For the purpose of this paper, the focus is on macroeconomic determinants.

The remainder of the paper is organized as follows. The revised definition for remittances based on the BPM6 is outlined in section 2. Section 3 outlines the main theories suggested for remittances. Data and the variables used in this paper are discussed in section 4. A descriptive behaviour of the data is given in section 5. Section 6 describes the empirical methodology, while section 7 outlines the results. The paper is concluded in section 8.

2.0 MEASUREMENT ISSUES OF REMITTANCES⁵

2.1 Definition of Remittances

According to the BPM5, remittances are defined primarily by ‘workers remittances’. Workers remittances cover current transfers by migrants who are employed in new economies and are considered residents in these new economies. The BPM6 implemented an expansion in the items considered as remittances. First, the concept ‘workers remittances’ was replaced with personal transfers. Second, three classifications of remittances, namely: (1) personal remittances; (2) total remittances and (3) total

⁵ This section is based on the BPM6.

remittances and transfers to non-profit institutions serving households (NPISH)⁶ were introduced.

Personal remittances represent personal transfers plus compensation of employees less taxes and social contributions plus capital transfers between households less transport and travel expenditures made by residents employed by non-residents. Personal transfers is a new concept that consists of all current transfers in cash or in kind made or received by resident households to or from non-resident households. These transfers are independent of the source of income of the sender, irrespective of whether the sender receives income from labour, entrepreneurial or property income, social benefits or any other type of transfers. It is also independent of the relationship between the individuals.

Compensation of employees is comprised of wages, salaries, and other benefits, in cash or kind, earned by individuals in economies other than those in which they are residents. Included are contributions paid by employers, on behalf of employees, to social security schemes or to private insurance or pension funds to secure benefits for employees. Employees, in this context, include seasonal or other short-term workers (less than one year) and border workers who have centres of economic interest in their own economies.

Capital transfers result in a change in the stocks of assets of one or both parties in a transaction without affecting the savings of either party. The transfer of ownership of non-financial assets or forgiveness of debt is defined as capital transfers in kind. A transfer of cash is a capital transfer only when it is linked to or conditional on the acquisition or disposal of a fixed asset.

Travel refers to the acquisition of goods and services in an economy by individuals who are visiting but not resident in that economy. Travel excludes the acquisition of valuables and consumer durables.

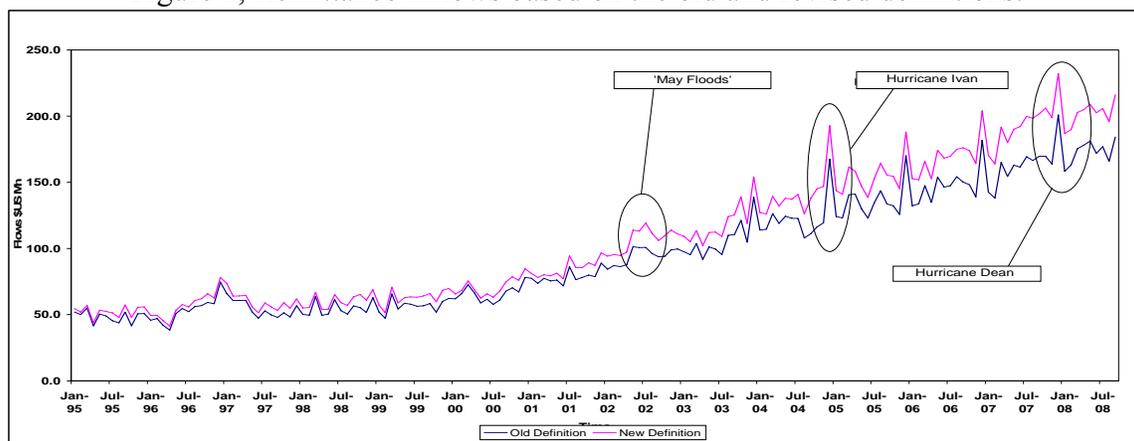
⁶ These refer to entities that provide goods and services to households or communities free of charge or at prices that are economically insignificant, except those that are controlled and financed by government units.

The second classification of remittances was total remittances. Total remittances include personal remittances plus social benefits. Social benefits refer to returns payable under social security funds and pension funds.

The final proposed classification of remittances was total remittance and transfers to non-profit institutions serving households. Total remittances and transfers to NPISHs include total remittances plus current and capital transfers to NPISHs. This classification of remittances incorporates donations from overseas based governmental and private sector enterprises to charitable organizations, such as Food for the Poor and Salvation Army. This is the definition of remittances that was used in the paper to reveal the motives for remitting to Jamaica.

2.2 Application of the revised definition

Figure 1, Remittance inflows based on the old and revised definitions.



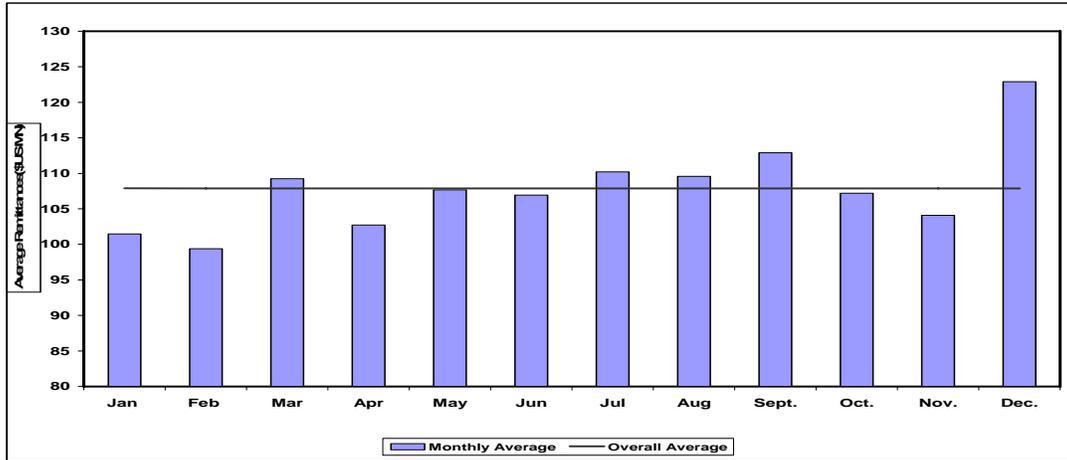
Source: BOJ

Looking at the results, the impact of applying the revised definition of remittances was minimal in 1995 (figure 1). Although both definitions displayed a similar pattern (an upward trend) over the review period, the difference between the two definitions becomes greater as the series continues⁷. Also, remittances deviated slightly from its normal trend path in 2002, 2004 and 2007. These deviations can be attributed to the May floods in 2002 and hurricanes Ivan and Dean in 2004 and 2007, respectively. These

⁷ This is attributed to the increasing flows of current transfers to NPISH (see table 6).

natural disasters caused remittances to increase, as funds were sent to aid in the island’s recovery process.

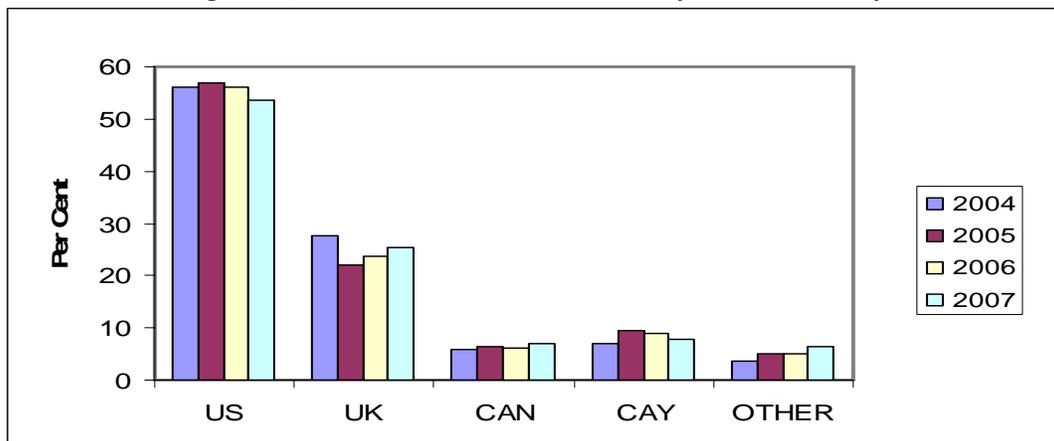
Figure 2, Monthly average remittance inflows.



Source: BOJ

The data also exhibited some level of seasonality. As noted in figures 1 and 2, remittance inflows tend to increase during March of each year, which is synonymous with the Easter holidays. Remittances tend to decrease in the months subsequent to the Easter holidays, then increase in the July to September ‘back to school’ period. Remittance inflows are again reduced in the months after the ‘back to school’ period. Further calculations revealed that remittances inflows were highest in December, which is explained by the Christmas and New Year’s holiday period. The seasonality is indicated in figure 2; where March, July to September and December months were above the annual average remittance inflows.

Figure 3, Contribution of remittances by source country.



Source: BOJ

Analyzing the source of Jamaica's remittances from 2004 to 2007 revealed that the US is the largest source, accounting for, on average, approximately 55 per cent of total remittances received. The US was followed by the United Kingdom, The Cayman Islands and Canada which accounted for, on average, 25, 7 and 6 per cent, respectively.

3.0 THEORIES OF REMITTANCES⁸

A plethora of literature has examined the various theories of remittances. A common trend within the literature is that there are three main rationales for sending remittances: self-interest, pure altruism and tempered altruism or enlightened self-interest.

3.1 Self-Interest⁹

As its name suggest, the self-interest motive purports that migrants send money to households in their home country in the pursuit of personal gain. A possible reason for the self-interest motive is the intent of a migrant to return to his/her home country. Vargas-Silva and Huang (2006) suggested that some emigrants send remittances because they expect to return home in the future and can benefit from the household's gratitude from having sent remittances. Lucas and Stark (1985) mentioned that when emigrants intend to return to their home country, they would send more remittances to ensure that their social assets, that is, relationships with family and friends are intact.

Anticipation of a bequest is another factor that studies have offered in an attempt to explain the self-interest motive for sending remittances. Those who support this view suggested that a migrant might use remittances as a strategy for investing in future inheritance (Rapoport and Docquier, 2005 and Hoddinott, 1994). Lucas and Stark (1985) provided one of the best explanations for the self-interest motive in sending remittances. They believed that if inheritance is conditioned by behaviour, an avaricious migrant's motive for supporting his or her family might include the concern to maintain favour in the line of inheritance. Others have argued that if there is a minimal amount of money to

⁸ This section benefits from work done by Lucas and Stark, 1985; van Dalen et al, 2005 and Rapoport and Docquier, 2005.

⁹ Self-interest and investment are used interchangeably throughout the paper.

be remitted, parents and other family members can encourage transfers above this benchmark level by offering a ‘reward’ in the form of land or any other inheritable assets (Hoddinott, 1994).

The ‘exchange argument’ motive for remitting is a possible reason in explaining the self-interest motive for sending remittances. Here, migrants use remittances to purchase various types of services such as taking care of their assets or relatives (Rapoport and Docquier, 2005). It is assumed that migrants trust family members or caretakers to acquire and/or maintain the assets or relatives on their behalf.

In summarizing the self-interest theory of remittances, Rapoport and Docquier (2005) claimed that a positive relationship exists between migrants sending remittances and their income and education, recipient household wealth and short-run income shortfalls as well as familial ties. They however stated that the relationship between migrants remitting and the recipient households’ long run income is ambiguous.

3.2 Pure Altruism

For many persons, altruism would first come to mind when considering a migrant’s motive for remitting. Altruism refers to a migrant’s genuine care for his/her remaining household members. Lucas and Stark (1985) mentioned that migrants enjoy remitting because they care about household consumption. Others have argued that only permanent migrants remit for altruistic purposes, as temporary migrants are more likely to remit for investment and future consumption smoothing (Glytsos, 2002).

With an altruistic model, the strength of family ties as well as the net earnings of recipients will be important. According to the altruism model offered by Rapoport and Docquier (2005), the more migrants earn, the more remittances recipient households should anticipate. Furthermore, strong family ties between migrants and remaining households would increase the probability of migrants remitting. On the other hand, remittances would decline with an increase in the recipient household’s wealth and the length of time the migrant stays in the host country.

Many studies have investigated the validity of this motive and most have concluded that altruism is insufficient in explaining remittance inflows. Alleyne (2006) suggested that there is a strong investment motive rather than an altruistic motive for remitting. Lucas and Stark (1985) concurred, as they believed it is incorrect to assume that the fundamental factor for sending remittance is altruism. van Dalen et al (2005) also confirmed this claim, as he believed that trying to model altruism would yield inconclusive results.

3.3 Tempered Altruism or Enlightened Self-interest

The tempered altruism or enlightened self-interest view of remittances is suggested as an alternative to the pure altruistic and self-interest motives. This proposed motive views remittances as a mutually beneficial arrangement between a migrant and his/her household (Lucas and Stark, 1985). This mutually beneficial arrangement or ‘contract’ has two elements, investment and risk.

Many studies have viewed the sending of remittances as a repayment of the principal invested by family members in the education of a migrant (Johnson and Whitelaw, 1974; Rempel and Lobdell, 1978; van Datel et al, 2005). Rapoport and Docquier (2005) concurred, as they viewed remittances as repayment of loans that were used to finance the migrant’s investments in human capital or expenditures in the course of migration. The higher the ‘loan’, the recipient family would expect more to be remitted.

Migration can be viewed as a household strategy for risk-diversification, a subtle form of insurance (van Dalen et al, 2005). Lucas and Stark (1985) suggested that households might want to spread their risk by sending some of their members away. It is purported that migrants and the remaining household members should enter into a contract, wherein migrants would insure the remaining household in the event there is a shortfall in their income and the migrant would receive assistance from the remaining household members in case of unemployment or retirement.

4.0 DATA AND VARIABLE SELECTION

Monthly and quarterly data spanning the period January 1995 to September 2008 were collected. The existing literature classifies variables explaining remittances into either host country or home country variables¹⁰. The home country variables used in the paper were consumer price index (CPI), the end of period US selling rate (EX_RATE), unemployment rate (UNEMP), remittance inflows (REM), and Jamaica's Gross Domestic Product (JAGDP). The US Gross Domestic Product (USGDP) was the only host country variable used in this study. Interest rate differential (INT) was always utilized in the paper.

The consumer price index was used to capture movement in prices. If the motive for sending remittances was self-interest, then there would be a reduction in the amount sent if there is inflation. If remittances were sent because of an altruistic motive, remittances would increase in the presence of inflation.

The end of period US dollar selling rate was utilized, as it gives an indication of Jamaica's macroeconomic stability. An increase in the exchange rate is indicative of a depreciation of the domestic currency, while a decrease reflects an appreciation of the domestic currency.

A country's unemployment rate is oftentimes used as an indication of its economic performance. It has been argued that unemployment significantly influences remittances, especially in developing countries (Loser et al, 2006). The correlation between unemployment and remittances would be determined by migrants' motives for remitting. A negative relationship is expected if the fundamental rationale for remitting is for investment purposes, whilst altruism would cause remittances to increase if unemployment increases.

¹⁰ The home country refers to Jamaica, while the host country used in this paper was the US as more than half of the remittance flowing to Jamaica comes from the US (see figure 3).

Interest rate differential is the difference between the rates on the six-month Jamaica T-bills and the six-month US T-bills. A large interest rate differential makes assets in the domestic economy attractive (Williams, 2008). If remittances are sent for investment/self-interest purposes, there will be an increase in the amount of remittances sent. The opposite is true if remittances are sent to finance the consumption needs of a migrant's remaining household members.

The GDP of the US and Jamaica were used to depict income for migrants and household members, respectively. If the host country's economy grows, in this case the US, more remittances would be expected in the home country, regardless of the motive for remitting. On the other hand, economic growth in the home country would have an unambiguous effect on remittances. If the remitter's motive is investment oriented, then less remittances will be sent. However, if altruism is the fundamental factor for remitting, more remittances will be sent as there would be a reduction in household income.

5.0 STYLIZED FACTS

This section reviews the behaviour of the variables (on a quarterly basis) used in the paper except remittances. Quarterly CPI displayed an upward trend over the review period; starting at 29.78, the lowest for the sample period and finished at 136.46 in September 2008. The average quarterly CPI for the review period was 68.08. A noticeable accelerated upward drift was observed in the series in the quarters subsequent to hurricanes Ivan and Dean and in the three quarters of 2008.

The average end of period quarterly US selling rate was JA\$50.36, with the highest reported in the quarter ending September 2008 at JA\$72.16 and the lowest at JA\$33.41 in the quarter ending March 1995. The Jamaican dollar depreciated against the US dollar over the review period as depicted by the upward trend noticed in the series. However, the Jamaican dollar showed some appreciation in the June and September quarters in 1996.

Unemployment rate for Jamaica at the beginning of the sample period was 16.37 per cent and declined in the following two quarters. The series then started to trend upwards and peaked in the quarter ending June 1997 at 17.2 per cent, the highest over the review period. The unemployment rate remained relatively stable for the next five years, as it moved within a 150 basis points band. Subsequent to the December 2002 quarter, the unemployment rate started to fall and displayed more volatility. The lowest unemployment rate was reported in September 2006 quarter at 9.25 per cent and the average rate for the sample period was calculated at 13.66 per cent.

The average quarterly interest rate differential was calculated at 16.04 per cent. Further examination of the data revealed that the widest differential was reported in the quarter ending December 1995 at 37.15 per cent and the narrowest at 6.55 per cent in March 2007. Interest rate differential was most volatile in the three years of the financial sector meltdown that took place in the island in the mid to late 1990s. The series became stable after June 1999, especially for the quarters between March 2004 and June 2007.

Quarterly GDP growth, for Jamaica and the US was somewhat stable over the period under consideration. A deeper examination of the data revealed that the average quarterly GDP growth rate for Jamaica was 0.3 per cent, while the US quarterly average GDP growth rate was 0.6 per cent.

6.0 EMPIRICAL METHODOLOGY

6.1 The VAR

Vector autoregression (VAR) is commonly utilized for forecasting systems of interrelated time series and for analyzing the dynamic impact of random disturbances on the system of variables (Eviews Users Guide II, 2007). VAR treats all variables in a model as symmetrical without assuming whether a variable is dependent or independent. Thus, VAR bypass the need for structural modelling by assuming each endogenous variable in the system is a function of the lagged values of all the endogenous variables in the system.

Consider an n -equation VAR. This equation can be represented in a matrix form as:

$$A(L)Y_t = A + \varepsilon_t \quad [1]$$

where

$$A(L) = I - a_1L - a_2L^2 - \dots - a_nL^n \quad [2]$$

From equations [1] and [2], Y_t is an $n \times 1$ vector of endogenous variables, A is an $n \times 1$ vector of constants and ε_t is an $n \times 1$ vector of random variables that may be contemporaneously correlated, but are uncorrelated with their own lagged values and uncorrelated with all of the right-hand side variables. $A(L)$ is an $n \times n$ matrix of normalized polynomial of the endogenous variables in lag operators, with the first entry of each polynomial on A is unity. The VAR specified in [1] can be extended to include exogenous variables, such as:

$$A(L)Y_t = A + \mu x_t + \varepsilon_t \quad [3]$$

In [3], μ is an $n \times k$ coefficient matrix and x_t is the $k \times 1$ vector of exogenous variables and/or dummy variables.

The right-hand side of the equations in the VAR contains only the predetermined variables. As a result, ordinary least squares (OLS) estimation can be applied, as the estimates are asymptotically efficient and consistent. Before estimating the model, the lag length must be chosen so that the actual data generating process can be captured. It is important to not over fit (selecting a higher order lag length than the true lag length) and thereby increase forecasting errors or under fit the VAR and generate autocorrelated residuals. Several tests and lag length criteria have been purported to help select the optimal lag length to use in VAR (see Lütkepohl, 1991). This paper uses the Akaike Information Criterion (AIC), Hannan-Quinn Information Criterion (HQ) and the Schwartz Criterion (SC) to select the appropriate lags to use in the VAR.

VAR provides impulse response functions and variance decompositions, which aid in the interpretation of the results. Impulse response functions provide information to analyze the dynamic behaviour of a variable due to innovations in other variables in the VAR. The impulse response traces the time path of a variable in response to a shock in another

variable. The y -axis gives the intensity and direction of the shock, while the x -axis gives the duration of the shock. This paper applied the Choleski decomposition to get the impulse response functions. According to Doan (1984), the Choleski decomposition method is ideal to identify orthogonalized innovations in each variable as well as the dynamic responses of such innovations. This method imposes an ordering of the variables in the VAR and attributes all of the effect of any common component to the variable that comes first in the VAR system (Eviews User Guide II, 2007). The theorized ordering of the variables was:

$$\text{USGDP} \rightarrow \text{INT} \rightarrow \text{EX_RATE} \rightarrow \text{CPI} \rightarrow \text{JAGDP} \rightarrow \text{UNEMP} \rightarrow \text{REM} \quad [4]$$

This ordering is informed on the *a priori* knowledge that an unexpected high foreign (US)GDP growth is believed to be potentially inflationary if the economy is close to full capacity. This will cause bond prices to drop and yield and interest rates to rise. Interest rates are theorized to affect exchange rates through induced portfolio adjustments (McFarlane, 2002). For example, a higher rate of return on investments overseas could lead to greater demand for foreign currency, which influences the exchange rate. Exchange rate is expected to influence the CPI through the pass-through effect. The CPI in turn is expected to influence local GDP in the sense that an increase in prices will lead to a reduction in demand, which could result in a contraction in GDP (the opposite is also true). Local GDP is expected to have a direct impact on the unemployment level/rate, which could influence the amount of remittances received.

Whereas the impulse response function illustrate the qualitative response of a variable in the system to shocks of another variable, variance decomposition separates the variation in an endogenous variable into the component shocks to the VAR (Eviews User Guide II, 2007). Thus, the variance decomposition provides information about the relative importance of each innovation. The paper also interprets the results of the VAR through variance decomposition analysis¹¹.

¹¹ The VAR coefficients were not interpreted, as coefficients on successive lags tend to oscillate and there may exist complicated cross equation feedback (Sims, 1980).

6.2 Other tests

The time series property of each variable was evaluated using the Augmented Dickey-Fuller and the Phillips-Perron unit root tests. Diagnostic checks for heteroskedasticity and serial correlations were conducted to ensure the validity of the model as well as to guarantee that the results garnered are efficient and unbiased.

Seasonal fluctuations in data make it difficult to analyze, whether the changes in the data for a specified period reflect increases or decreases in the level of the data or due to regularly occurring variation¹². The use of raw data in such cases can be quite misleading. Remittance inflows displayed some seasonality thus, the ratio to moving average method or the multiplicative decomposition approach was used to seasonally adjust the series.

7.0 RESULTS

The results of the unit root tests on the quarterly series revealed that only JAGDP and USGDP were level stationary. All the other variables were stationary after differencing was applied (see table 1).

Table 1, Summary of unit root test results on the quarterly data.

Variables	Augmented Dickey-Fuller			Phillips-Perron		
	Level	Transformed series ¹	Order of integration	Level	Transformed series	Order of integration
CPI	3.85	-3.91	I(1)	2.74	-3.9	I(1)
EX_RATE	-0.01	-4.6	I(1)	0.3	-4.3	I(1)
INT	-2.12	-6.04	I(1)	-2.32	-5.94	I(1)
UNEMP	-1.36	-8.53	I(1)	-1.12	-18	I(1)
JAGDP	-15.14	N/A	I(0)	-9.44	N/A	I(0)
REM	-1.69	-7.06	I(1)	-2.56	-22.35	I(1)
USGDP	-5.47	N/A	I(0)	-5.46	N/A	I(0)

Note: 1. Augmented Dickey-Fuller and Phillips-Perron critical value = -3.43.

The lag length criteria inform that a lag length of one should be used in the VAR. The White's heteroskedasticity test with cross terms revealed that there was evidence of

¹² Explanatory Notes-Monthly Seasonal Adjustment of Statistical Time Series.

homoskedastic error terms. This attest to the validity of the specifications as well as the unbiasedness and efficiency of the estimates. Additionally, the LM serial correlation test and the correlograms conclude that the residuals are serially uncorrelated. Further, the AR roots graph indicated that all the variables in the VAR were stationary as all the characteristic roots are less than unity, that is, lies inside the unit circle.

Impulse Response¹³ and Variance Decomposition analysis on the quarterly data

The results indicated that remittance inflows are strongly autoregressive over the forecast horizon. Examining the response of remittance to the shock to domestic unemployment rate revealed an investment motive, as depicted by the negative response observed in that function. In addition, the shock to domestic economic growth insinuated an altruistic motive as indicated by the negative response seen by remittances.

The shock to CPI has a small but positive effect on remittances, which decays after three quarters. This is in line with the altruistic argument for sending remittances. Of significance is the response of remittances to innovations in the exchange rate variable. Remittances responded with a lag and subsequently declined, suggesting that devaluation of the domestic currency would cause fewer remittances to be sent.

The simulations implied that a shock to interest rate differential innovations would result in more remittances being sent. This positive response of remittances from a shock to remittances indicates that there is room for policies that can encourage migrants to invest locally in financial instruments.

Remittances responded positively to the shock in USGDP, which confirms *a priori* expectation. That is, remittances should increase with increasing income of migrants. Equally, a reduction in the income generating potential of migrants would lead to a reduction in remittances to Jamaica. Overall, the results indicate a combination of the altruistic and investment motives.

¹³ The graphs can be viewed in appendix 6.

Table 2 shows the variance decomposition of remittances over six quarters. The results indicated that remittances accounted for most of the variability in itself. Next to remittances was USGDP, which accounted for, on average, 12 per cent of the innovations in remittances. This result confirmed the findings of Vargas-Silva and Huang (2006), who indicated that host country determinants are more important in explaining remittance flows. Interest rate differential and home country economic growth also contributed significantly to the variations of remittances. These results highlight the importance of the investment driven determinants. CPI explained the smallest proportion of the variance in remittances.

Table 2, Variance decomposition of remittances (%).

Horizon	REM	UNEMP	JAGDP	CPI	EX_RATE	INT	USGDP
1	100	0	0	0	0	0	0
2	73.73	4.93	5.61	1.67	0.01	2.47	11.57
3	62.31	10.59	4.08	1.49	1.74	7.41	12.37
4	59.09	10.48	5.10	1.43	2.85	8.53	12.53
5	59.83	9.95	4.56	1.49	2.82	8.49	12.86
6	59.7	10.03	4.53	1.49	2.82	8.56	12.88

Sensitivity Analysis

The validity of the results garnered from the VAR was tested by using monthly data for most of the variables¹⁴. Money supply (M2) was used as a proxy for both domestic and host country economic growth. The rationale for using M2 as the proxy for economic growth was based on Fisher's equation of exchange:

$$MV = PY \quad [5]$$

Where M is the quantity of money, V is the velocity of circulation of money (which serves as the link between money and output), P is the price level and Y is aggregate output/income. From this equation, it is believed that the demand for money is a function of an economy's wealth.

¹⁴ UNEMP, JAGDP AND USGDP were not included in this analysis due to the unavailability of monthly data.

The unit root tests revealed that all the variables in consideration were non-stationary except JAM2 and USM2. First differencing was applied to the non-stationary variables.

Table 3, Summary of unit root test on the monthly data.

Variables	Augmented Dickey-Fuller			Phillips-Perron		
	Level	Transformed series ¹	Order of integration	Level	Transformed series	Order of integration
CPI	3.85	-3.91	I(1)	3.28	-6.43	I(1)
EX_RATE	-0.01	-4.6	I(1)	-2.02	-8.71	I(1)
INT	-2.12	-6.04	I(1)	-2.62	-11.51	I(1)
JAM2	-10.69	N/A	I(0)	-22.93	N/A	I(0)
REM	-1.71	-5.36	I(1)	-2.52	-7.52	I(1)
USM2	-11.59	N/A	I(0)	-15.02	N/A	I(0)

Note: 1. Augmented Dickey-Fuller and Phillips-Perron critical value = -3.43.

The lag length criteria suggested that a lag of two should be incorporated in the VAR. The diagnostic checks revealed homoskedastic errors and serially uncorrelated residuals. Furthermore, the AR roots graph indicated that all the variables in the VAR were stationary.

Impulse Response¹⁵ and Variance Decomposition analysis on the monthly data

The impulse response functions for the monthly variables confirm most of the results that were garnered from the quarterly analysis. The only difference was with the response of remittances to a shock in exchange rate. With monthly data, remittances respond positively to a shock in exchange rate, while the simulation in exchange rate resulted in a negative response by remittances when quarterly data was applied. The positive response of remittances to a shock in exchange rate suggests that a devaluation in the domestic currency will lead to more remittances flowing into Jamaica.

The variance decomposition indicated that remittances accounted for most of the variability in itself. USM2 was next to remittances, which confirms the results from the quarterly analysis as well as further highlighting the importance of host country

¹⁵ The graphs can be viewed in appendix 6.

determinants in explaining remittance flows. Interest rate differential also was significant in explaining the variability in remittances, followed by JAM2. The CPI and exchange rate variables do not explain the variance in remittances significantly.

Table 4, Variance decomposition of remittances (%).

Horizon	REM	JAM2	CPI	EX_RATE	INT	USM2
1	100	0	0	0	0	0
2	86.42	1.17	0.06	0.33	5.42	6.6
3	75.67	6.49	0.56	1.02	7.37	8.89
4	66.19	7.83	2.26	2.82	9.25	11.65
5	62.29	8.98	2.31	3.02	10.32	13.08
6	59.77	9.09	2.42	3.27	11.62	13.83

8.0 CONCLUSION

The paper aims to uncover the motives migrants have in sending remittances to Jamaica from January 1995 to September 2008. Looking at the revised definition for remittances, as proposed by the BPM6, both definitions displayed similar pattern, that is, an upward trend over the review period, with a gradual divergence observed between the two definitions. Although the review period for the paper ends at September 2008, preliminary data subsequent to September 2008 reveals a deceleration in remittances to Jamaica. This reduction in remittances is predicated by the current global economic downturn, which is consistent with the findings from our analysis. The literature revealed three main motives for sending remittances: altruism, self-interest and tempered altruism/enlightened self-interest. The data indicated that more than half of all remittances to Jamaica originate from the US, followed by the United Kingdom and the Cayman Islands. Furthermore, remittances have consistently been a main source of foreign exchange for the island and an indispensable support for financing Jamaica's current account deficit.

A VAR framework was applied to quarterly data and it was discovered that a mixture of altruistic and investment motives were present in sending remittances to Jamaica. The VAR also points to the importance of host country variable in influencing the amount of

remittances received, as indicated by the variance decomposition. In testing the validity of the quarterly analysis, monthly data was applied. The results confirmed most of the results that were garnered from the quarterly analysis.

The main policy implication from these findings is the need for effective policies to be implemented to channel remittances for investment purposes. These policies could be in the form of a tax concession for remitters or other non-fiscal policies. To qualify for these benefits, migrants would have to submit proof of sending remittances. Additionally, the government could organize a centralized remittance bureau, whose mandate would be to promote the use of remittances for economic development.

Further work on remittances to Jamaica is definitely encouraged. These could include other areas on the importance of remittances to Jamaica that were not highlighted in this paper.

9.0 REFERENCE LIST

- Acosta, Pablo, Cesar Calderon, Pablo Fajnzylber, and Humberto Lopez. 2006. "Remittances and Development in Latin America." *World Economy* 29, no. 7: 957-987.
- Akkoyunlu, Sule, and Boriss Siliverstovs. 2007. "The Role of Remittances in Migration Decision: Evidence from Turkish Migration." German Institute of Economic Research Discussion Papers, no. 691.
- Alleyne, Dillon. 2006. "Motivations to Remit in CARICOM: A GMM Approach." *Social and Economic Studies* 55, no. 3: 69-87.
- Alper, Ahmet Murat, and Bilin Neyapti. 2006. "Determinants of Workers' Remittances: Turkish Evidence from High-Frequency Data." *Eastern European Economics* 44, no. 5: 91-100.
- Amuedo-Dorantes, Catalina, and Susan Pozo. 2006. "Remittance Receipt and Business Ownership in the Dominican Republic." *World Economy* 29, no. 7: 939-956.
- Aydas, Osman Tuncay, Kivilcim Metin-Ozcan, and Bilin Neyapti. 2005. "Determinants of Workers' Remittances: The Case of Turkey." *Emerging Markets Finance and Trade* 41, no. 3: 53-69.
- Balance of Payments and International Investment Position Manual, 6th Edition. 2008. *IMF: Washington D.C.*
- Chami, Ralph, Connel Fullenkamp, and Samir Jahjah. 2003. "Are Immigrant Remittance Flows a Source of Capital for Development." IMF Working Paper, no. 189.
- Clark, Ken, and Stephen Drinkwater. 2007. "An Investigation of Household Remittance Behaviour: Evidence from the United Kingdom." *The Manchester School* 75, no. 6: 717-741.
- Doan, Thomas, Robert Litterman, and Christopher Sims. 1984. "Forecasting and Conditional Projection Using Realistic Prior Distributions." *Econometric Reviews* 3, no. 1: 1-100.
- Docquier, Hillel, and Frederic Rapoport. 2005. "The Economics of Migrants' Remittances." The Institute for the Study of Labour Discussion Papers, no. 1531.
- Enders, Walter. 2004. "Applied Econometric Time Series (2nd ed.)." New Jersey: John Wiley & Sons.
- Engle, Robert F., and Clive W. J. Granger. 1987. "Co-integration and Error Correction: Representation, Estimation, and Testing." *Econometrica* 55, no. 2: 251-276.

EvIEWS 6 User's Guide II. 2007.

Funkhouser, Edward. 1995. "Remittances from International Migration: A Comparison of El Salvador and Nicaragua." *Review of Economics and Statistics* 77, no. 1: 137-146.

Glytsos, Nicholas P. 2002. "Dynamic effects of Migrant Remittances on Growth: An Econometric Model with an Application to Mediterranean Countries." *Centre of Planning and Economic Research*, no.74.

Gupta, Poonam. 2005. "Macroeconomic Determinants of Remittances: Evidence from India." IMF Working Paper, no. 224.

Jackson, Dwayne. 2005. "Remittance Inflows in Jamaica." BOJ Working Paper.

Johnson, George E., and W. E. Whitelaw. 1974. "Urban-Rural Income Transfers in Kenya: An Estimated-Remittances Function." *Economic Development and Cultural Change* 22, no. 3: 473-479.

Hayle, Elaine. 2005. "Remittance Inflows and Jamaica." BOJ Working Paper.

Hoddinott, John. 1994. "A Model of Migration and Remittances Applied to Western Kenya." *Oxford Economic Papers* 46, no. 3: 459-476.

Kritz, Mary M., and Douglas T. Gurak. 2001. "The Impact of Immigration on the Internal Migration of Natives and Immigrants." *Demography* 38, no. 1: 133-145.

Lake, Lisa. 2005. "Remittances and the Jamaican Economy: From Fundamentals to Effective Policy Recommendations." BOJ Working Paper.

Lopez, Jose Roberto, and Mitchell A. Seligson. 1991. "Small Business Development in El Salvador: The Impact of Remittances." In *Migration, remittances, and small business development: Mexico and Caribbean Basin countries*, 175-206. Series on Development and International Migration in Mexico, Central America, and the Caribbean Basin, vol. 4, 1991.

Loser, Claudio, Caitlin Lockwood, Adam Minson and Lucia Balcazar. 2006. "The Macro-Economic Impact of Remittances in Latin America- Dutch Disease or Latin Cure?" XXIII G24 Technical Group Meeting: Suntec, Singapore.

Lucas, Robert E. B., and Oded Stark. 1985. "Motivations to Remit: Evidence from Botswana." *Journal of Political Economy* 93, no. 5: 901-918.

Lütkepohl, Helmut. 1993. "New Introduction to Multiple Time Series Analysis." New York: Springer-Verlag.

- McFarlane, Lavern. 2002. "Consumer Price Inflation and Exchange Rate Pass-Through in Jamaica." BOJ Working Paper.
- McLean, Esmond. 2008. "An Investigation of Recent trends In the Remittance Industry: Evidence from Jamaica." BOJ Working Paper.
- Moulton, Jermaine. 2007. "Are Interest Rate Spreads Viable Policy Targets?" Central Bank of Trinidad and Tobago Working Paper.
- Orozco, Manuel. 2007. "Migrant Foreign Savings and Asset Accumulation." In *Reducing Global Poverty: The Case for Asset Accumulation*, 225-238. Washington, D.C.: Brookings Institution Press, 2007.
- Ozcicek, Omer, and W. Douglas McMillin. 1999. "Lag Length Selection in Vector Autoregressive Models: Symmetric and Asymmetric Lags." *Applied Economics* 31, no. 4: 517-524.
- Ramirez, Miguel D., and Hari Sharma. 2008. "Remittances and Growth in Latin America: A Panel Unit Root and Panel Cointegration Analysis." Department of Economics Working Paper no. 51: Yale University.
- Rempel, Henry, and Richard A. Lobdell. 1978. "The Role of Urban-to-Rural Remittances in Rural Development." *Journal of Development Studies* 14, no. 3: 324-341.
- Salisu, Mohammed. 2005. "The Role of Capital Flight and Remittances in Current Account Sustainability in Sub-Saharan Africa." *African Development Review/Revue Africaine de Developpement* 17, no. 3: 382-404.
- Schiopu, Ioana, and Nikolaus Siegfried. 2006. "Determinants of Workers' Remittances - Evidence from the European Neighbouring Region." ECB Working Paper, no. 688.
- Sims, Christopher A. 1980. "Macroeconomics and Reality." *Econometrica* 48, no.1:1-48.
- Tahir, Rizwan, and Ahmed Abdul Ghani. 2006. "Modelling Bahrain's Economy: A Vector Autoregression (VAR) Approach."
- Tracey, Marlon. 2007. "A VAR Analysis of the Effects of Macroeconomic Shocks on Banking Sector Loan Quality in Jamaica." BOJ Working Paper.
- van Dalen, Hendrik P., George Groenewold, and Tineke Fokkema. 2005. "The Effect of Remittances on Emigration Intentions in Egypt, Morocco, and Turkey." *Population Studies* 59, no. 3: 375-392.

Vargas-Silva, Carlos, and Peng Huang. 2006. "Macroeconomic Determinants of Workers' Remittances: Host versus Home Country's Economic Conditions." *Journal of International Trade and Economic Development* 15, no. 1: 81-99.

Williams, Kamilah. 2008. "The International Oil Market: An Application of the Three-Agent Model." BOJ Working Paper.

Williams, Pierre. 2008. "Estimating Jamaica's Real Equilibrium Exchange Rate." BOJ Working Paper.

World Bank Publications, World Bank. 2008.

APPENDICES



- **Appendix 1 (A1):** LAC Remittance Details
- **Appendix 2 (A2):** Jamaica's Main Foreign Exchange Earners
- **Appendix 3 (A3):** Variable Definition and Data Information
- **Appendix 4 (A4):** Bivariate Associations
- **Appendix 5 (A5):** Level Series
- **Appendix 6 (A6):** Impulse Response Functions

A1: LAC remittance details

Table5, Remittance details for the first 25 LAC countries for 2007.

Countries	Remittance			Remittance as a Share of GDP (%)
	Inflows (US\$Mn)	World Rank	LAC Rank	
Mexico	25037	3	1	2.8
Colombia	4523	21	2	3.0
Brazil	4382	23	3	0.3
Guatemala	4254	24	4	10.6
El Salvador	3711	28	5	18.4
Dominican Republic	3414	30	6	9.3
Ecuador	3094	32	7	6.9
Honduras	2625	37	8	24.5
Jamaica	2325	41	9	18.1
Peru	2131	42	10	1.9
Haiti	1222	62	11	20.0
Bolivia	927	69	12	6.6
Nicaragua	740	76	13	12.1
Costa Rica	635	82	14	2.3
Argentina	604	84	15	0.2
Paraguay	469	90	16	3.2
Guyana	278	99	17	23.5
Panama	180	107	18	0.8
Barbados	140	115	19	N/A
Suriname	140	116	20	N/A
Venezuela, RB	136	118	21	0.1
Uruguay	97	124	22	0.4
Trinidad & Tobago	92	125	23	0.4
Belize	75	127	24	5.3
Grenada	55	129	25	N/A

Source: World Bank

A2. Main foreign exchange earnersTable 6, Major components of remittances and the difference with the old definition
(US\$Mn)

Year	Personal Transfer & Social Benefits	Net compensation of employees	Total Remittances	Current Transfers to NPISH	Total Remittances & transfers to NPISH	Old Definition of Remittances	Difference
1995	582.3	38.4	620.7	8.4	629.1	582.3	46.8
1996	635.4	37.6	673.0	8.4	681.4	635.4	46.0
1997	654.4	53.8	708.2	9.2	717.4	654.4	63.0
1998	654.7	61.1	715.8	9.1	724.9	654.7	70.2
1999	681.0	65.2	746.2	9.6	755.8	681.0	74.8
2000	789.5	53.8	843.3	7.8	851.1	789.5	61.6
2001	940.1	67.2	1007.3	8.1	1015.4	940.1	75.3
2002	1130.6	74.5	1205.1	74.5	1279.6	1130.6	140.0
2003	1269.5	71.6	1341.1	84.0	1425.1	1269.5	155.6
2004	1465.9	90.2	1556.1	133.3	1689.4	1465.9	223.5
2005	1621.2	98.9	1720.1	130.1	1850.2	1621.2	229.0
2006	1769.3	102.4	1871.7	156.4	2028.1	1769.3	258.7
2007	1964.3	99.3	2063.6	261.6	2325.0	1964.3	360.7
2008*	1554.7	62.0	1616.7	196.2	1812.9	1554.7	258.2

* The 2008 value excludes December 2008 quarter, due to the unavailability of the data.

Source: BOJ

Table 7, Key macroeconomic indicators (US\$ Mn).

Year	Remittances	Foreign Direct Investment	Tourist Expenditure	Exports	Alumina Exports	Imports	GDP
1995	629.1	147.4	1068.8	1796.0	632.0	2625.3	6459.1
1996	681.4	183.7	1092.3	1721.0	607.0	2715.2	7462.2
1997	717.4	203.3	1130.8	1700.3	651.7	2832.6	8394.3
1998	724.9	369.1	1196.9	1613.4	600.7	2743.9	8718.3
1999	755.8	523.7	1279.6	1499.1	626.5	2685.6	8795.8
2000	851.1	455.8	1332.6	1562.8	684.3	3004.3	8929.4
2001	1015.4	613.9	1232.2	1454.4	642.6	3072.6	9087.9
2002	1279.6	478.8	1208.7	1309.1	603.8	3179.6	9652.2
2003	1425.1	720.7	1355.1	1385.6	688.4	3328.2	9368.3
2004	1689.4	601.6	1437.9	1601.6	814.6	3545.1	10111.4
2005	1850.2	682.5	1545.1	1664.3	920.3	4245.6	11112.6
2006	2028.1	882.2	1870.1	2133.62	1040.5	5077.0	11963.9
2007	2325.0	866.5	1905.3	2226.4	1193.1	6614.8	12873.3

Source: BOJ

Table 8, Macroeconomic shares (%).

Year	Remittances as a Share of GDP	FDI as a Share of GDP	Tourist Expenditure as a Share Of GDP	Exports as a Share of GDP	Alumina Exports as a Share Of GDP
1995	9.7	2.3	16.5	27.8	9.8
1996	9.1	2.5	14.6	23.1	8.1
1997	8.6	2.4	13.5	20.3	7.8
1998	8.3	4.2	13.7	18.5	6.9
1999	8.6	6.0	14.5	17.0	7.1
2000	9.5	5.1	14.9	17.5	7.7
2001	11.2	6.8	13.6	16.0	7.1
2002	13.3	5.0	12.5	13.6	6.3
2003	15.2	7.7	14.5	14.8	7.3
2004	16.7	5.9	14.2	15.8	8.1
2005	16.7	6.1	13.9	15.0	8.3
2006	17.0	7.6	15.6	17.8	8.7
2007	18.1	6.7	14.8	17.3	9.3

Source: BOJ

Table 9, Selected ratios (%).

Year	Remittances as a share of Tourist Exp	Remittance as a share of Exports	Remittances as a share of FDI	Remittances as a share of Imports	Remittances as a share of Alumina Exports
1995	58.9	35.0	426.8	24.0	99.5
1996	62.4	39.6	370.9	25.1	112.3
1997	63.4	42.2	352.9	25.3	110.1
1998	60.6	44.9	196.4	26.4	120.7
1999	59.1	50.4	144.3	28.1	120.6
2000	63.9	54.5	186.7	28.3	124.4
2001	82.4	69.8	165.4	33.0	158.0
2002	105.9	97.7	267.3	40.2	211.9
2003	105.2	102.9	197.7	42.8	207.0
2004	117.5	105.5	280.8	47.7	207.4
2005	119.7	111.2	271.1	43.6	201.0
2006	108.5	95.1	223.6	40.0	194.4
2007	122.0	104.4	268.3	35.1	194.9

Source: BOJ

A3. Variable Definitions and Data Information

Table 10, Variable details.

Variable	Definition	Unit	Period	Source
CPI	Consumer price index	Index No.	1995-2008	BOJ
EX_RATE	E.O.P US selling rate	Ja dollars	1995-2008	BOJ
INT	Interest rate differential	Percent	1995-2008	BOJ
JAGDP	Jamaica's GDP growth	Percent	1997-2008	BOJ/STATIN
JAM2	Jamaica M2 growth	Percent	1995-2008	BOJ
REM	Total remittance inflows	US\$ Mns	1995-2008	BOJ
UNEMP	Ja's unemployment rate	Percent	1996-2008	BOJ/STATIN
USGDP	US GDP growth	Percent	1998-2008	Bloomberg LP software
USM2	US M2	Percent	1995-2008	Bloomberg LP software

A4. Bivariable associations

Table 11, Correlation matrix for quarterly series.

	CPI	EX_RATE	INT	JAGDP	REM	UNEMP	USGDP
CPI	1.0000						
EX_RATE	0.9571	1.0000					
INT	-0.3261	-0.3628	1.0000				
JAGDP	-0.0094	0.0187	0.0782	1.0000			
REM	0.4568	-0.1521	0.4312	-0.1359	1.0000		
UNEMP	-0.4248	-0.6693	0.2652	-0.0541	-0.4475	1.0000	
USGDP	-0.0423	-0.045	0.1775	-0.1758	0.6852	0.0769	1.0000

The correlation matrix indicates a positive with remittances and CPI, US GDP, interest rate differential, while a negative between remittances and Jamaica's GDP, exchange rate and Jamaica's unemployment rate.

Table 12, Correlation matrix for monthly series.

	CPI	EX_RATE	INT	JAM2	REM	USM2
CPI	1.0000					
EX_RATE	0.4549	1.0000				
INT	-0.5785	-0.5080	1.0000			
JAM2	0.3961	0.4368	-0.3681	1.0000		
REM	0.2619	0.1638	0.5629	-0.4195	1.0000	
USM2	0.4682	0.4813	-0.5972	0.4646	0.4634	1.0000

The correlation matrix reveals that remittances is positively correlated with CPI, exchange rate, interest rate differentials and US M2, while a negative associated is observed between remittances and Jamaica's M2.

A5. Level Series

It is obvious that JAGDP, JAM2, USM2 and USGDP were the only stationary variables.

Figure 4, Quarterly series.

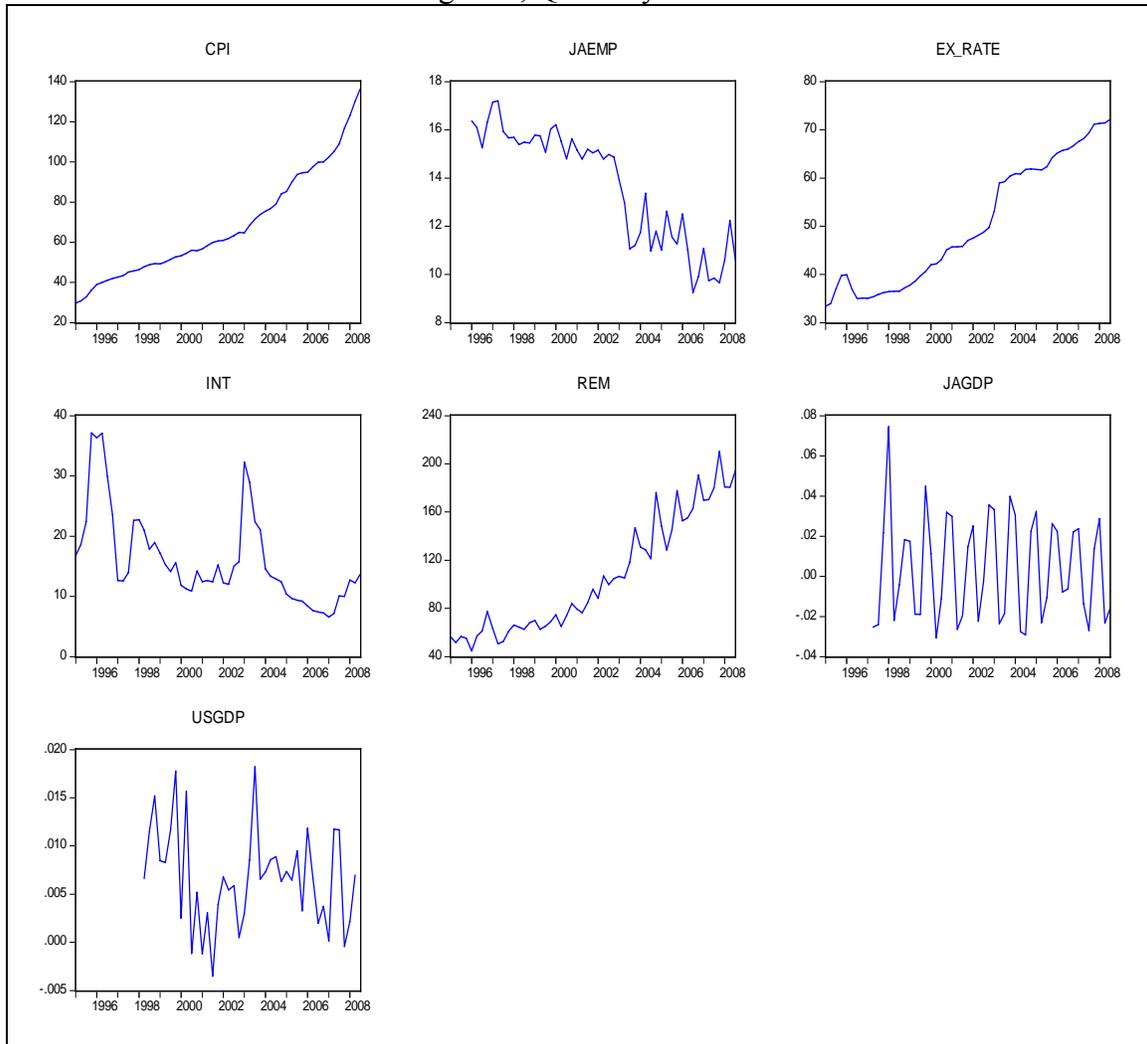
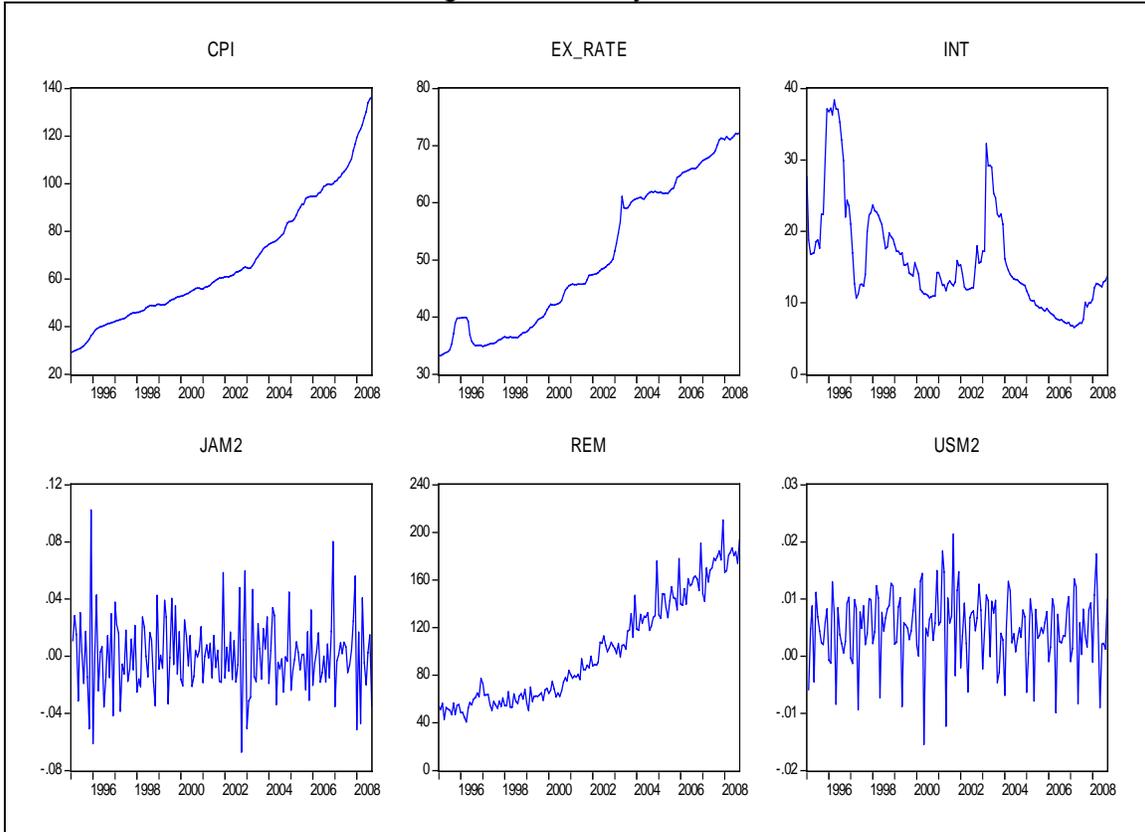


Figure 5, Monthly series.



A6. Impulse response functions

Figure6, Impulse response functions on the quarterly variables.

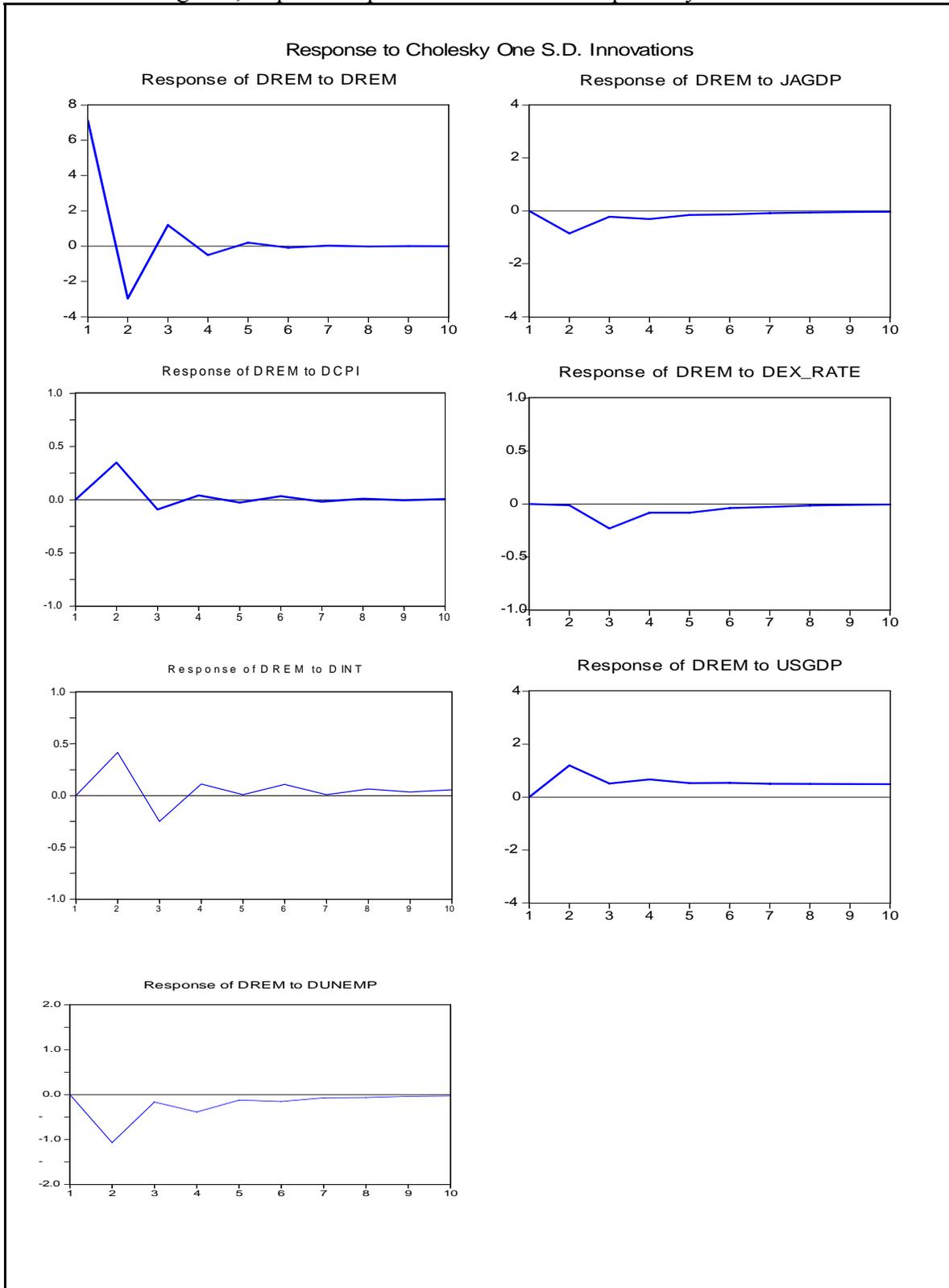


Figure7, Impulse response functions on the monthly variables.

