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Remittance and Trade Deficit Nexus in Nepal: A VECM Approach

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Remittance and Trade Deficit Nexus in Nepal: A VECM Approach

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Abstract

Once Nepal eased the access to the international labor market, there is an increasing trend of Nepalese working abroad, where annually thousands of young people migrate from the country. Consequently, there has been a sharp increment of remittance inflow in the recent years. Since remittance helps people improve the living standards, it has been observed as a good contributor for the poverty reduction in Nepal. Nevertheless, it might further deteriorate the trade balance, causing higher demand for consumable goods, most of which are imported in Nepal. Using cointegration techniques and a Vector Error Correction Model (VECM) based on the monthly data of merchandise import, worker's remittance and trade deficit for ten years period, this paper studies whether remittance causes the merchandise import and trade deficit to raise in the long run. The cointegration equation show that there is a long-run positive unidirectional causality from remittance to import as well as remittance to trade deficit implying that remittance causes merchandise import and deteriorates trade balance.

Keywords: Trade deficit, Remittance, Nepal, Import, VECM

JEL Classification: F10, F24, C32

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I. INTRODUCTION

Trade, either domestic or international, is considered as one of the most important factors to achieve sustainable growth, employment generation and welfare of the people. International trade becomes crucial if the country is not self-sufficient in factors of production as well as consumption and capital goods. Considering this fact, Nepal introduced liberalized economic and trade policies in the mid-1980s by pushing tariff walls down and removing import restrictions. However, Nepal has been facing trade deficit, which soared up to 20 percent of the GDP towards the second half of the 1990s especially with India and the rest of the world (Khatiwada & Sharma, 2002; Devkota, 2004). A persistent and soaring deficit in international trade may be less likely to resemble good economic condition of an economy, leaving the question of the nation's sustainability in the international trade and finance (Silwal, 2008).

With the introduction of liberal trade and economic policies, Nepal witnessed most of the young population migrating every year in the search of work abroad in the recent decades because of economic as well as non-economic reasons. The work related emigration, excluding India, increased from about ten thousands in early 1990s to more than 300 thousands in 2010 (DOFE, 2011). This emigration resulted to a sharp rise in contribution of remittance to GDP from 2 percent in early 1990s to 23 percent in 2009 which also strengthened the overall balance of payments position and its share in current account receipts (World Bank, 2011). Out of total 55.8 percent households receiving remittance in Nepal, the share of rural is 58 percent (CBS, 2011). Because of remittance flow to the rural sector, the rural-urban migration has increased sharply. Besides, studies show a significant reduction of poverty incidence and inequality due to the high level of remittance inflow.¹ Such flow of income 'percolates and penetrates' the remote places and the poorest sections of society giving the direct access to finance (NPC & UN Country Team, 2010).

Although remittance income is considered good for the country because of aforementioned primary reasons, the question may arise about its compensation to the negative consequences and to act as a positive force in the sustainable development of the economy (Jovicic & Mitrovic, 2006). Various studies have found that families of migrant workers tend to become more extravagant than before on remittances income for their daily subsistence giving up income generating activities, abuse of such income and other behavioral changes.² Furthermore, remittances have a limited impact on long-term growth because it is used mostly for daily consumption purposes by the recipient households (Arunatilake et. al., 2010).

Nepal Living Standards Survey, 2011 finds that out of the total income of remittances receiving households, 31 percent income comes from remittances which are mostly spent on daily consumption (79 percent) followed by repayment of loan (7 percent); capital formation and doing business has a very minimal share however. It is argued that the shortage of labor due to the emigration might compel to keep land barren, reduces the agricultural productivity and ultimately requires importing food grains (Gaudel, 2006). In addition to this, a rise in disposable income may be spendthrift on luxury and branded items, replacing the consumption and production of local goods.

Nonetheless, empirical study about the remittance income and its impact on the import and trade balance by testing the cointegrating relationship has not yet been carried out in the Nepalese context; some studies abroad show consistent results of aforementioned arguments. The estimated vector auto-regression model of Jovicic & Mitrovic (2006) in Serbia for the observed

¹ Nepal Living Standards Survey, 2011 shows a significant reduction of poverty incidence and inequality, Nepal Economic Update, 2011 Report of the World Bank postulates that, such a rapid improvement is due to the surging remittance inflow.

² See Hettige, S. (1991) and Arunatilake et. al. (2010) for details.

period of 62 months shows an autoregressive character of remittance, a positive coefficient of regression on consumer goods import and a negative coefficient on the lagged industrial output. The short run elasticity is 0.0874 whilst the long run elasticity is 0.563 with the conclusion that remittances cause an upward pressure on the import resulting into a huge trade deficit in the long run.

In this context, we model the remittance, merchandise import and trade deficit relationship framework to establish whether remittance causes merchandise import leading to a structural cause to surging trade deficit by testing cointegration relationship and employing Error Correction Model. The rest of the paper is structured as follows. The next section elucidates the data and methodology. Section three discusses results and section four concludes the paper.

II. DATA AND METHODOLOGY

The study uses the monthly data of merchandise import (IMPORT), worker's remittance (REMIT) and trade deficit (TD) obtained from Nepal Rastra Bank. Month is a time variable which starts from 2001 August and ends to 2011 May³. The reason behind the span of dataset chosen is the compilation of Balance of Payments statistics to version five from 2001 in Nepal which revises the compiling procedure and the coverage of remittance data so that historical series is fragmented. IMPORT is a merchandise import of goods and services; REMIT is an inflow of the worker's remittances into the country from abroad and TD is a negative trade balance i.e. absolute value of export-import. All the figures are in million Nepali Rupees.⁴

Before introducing the statistical tools for testing stationarity, we did a graphical plot of the series. Moreover, the monthly time series data of import, remittance and trade deficit may exhibit the seasonality pattern as we may observe more import of goods as well as increased flow of remittances during festive season. For this, we did a seasonal graphical plot of all the series and observed whether the average of the data is anomalous in a specific month.

The baseline of the model is adapted from Jovicic & Mitrovic (2006). They use a Vector Auto Regression (VAR) approach in studying the remittances and consumer goods import relation in Serbia by including 62 months' data of remittances inflow, consumer goods import and industry output. In this study, industrial output variable is excluded due to the unavailability of monthly data. Instead of industrial output, the impact analysis to the output is attempted to capture in an indirect approach modeling the import and merchandise trade deficit individually with the remittance data to identify whether remittance promotes export. If remittance contributes export promotion, we can argue its positive impact on output.

In Nepal, increase in disposable income owing to the surge of remittance inflow may be spent on daily subsistence, consumption in durable goods, spending on health and some other necessities. Since studies show a little outlay on capital formation and new establishments, it can be argued that remittance has a little support to the export and a substantial part of it is consumed for financing import. Such a relationship can be modeled as:

$$IMPORT_t = \mu + \beta_1 REMIT_t + \varepsilon_t \dots\dots\dots (1)$$

The research hypothesis of the relationship is that remittance has a significant positive impact to the merchandise import and, in the long run, it leads to deterioration to the trade balance of an economy. The presumption can be rationalized that, in Nepal, most of the consumable goods are imported and remitted income may have a little or no promotion to the export. Then, when import rises significantly and export remains constant, it increases the negative trade balance,

³ Nepali fiscal year starts from mid-July. So, Mid-July to Mid-August is counted as August and so on for the statistical conveniences.

⁴ One US Dollar is equivalent to 70.79 Nepali rupees as of 2011.07.27.

leading to a current account balance crisis, unless we receive a huge remittances inflow to correct it. Based on this argument, we develop a subsidiary model with remittance and trade deficit as:

$$TD_t = \mu + \beta_1 REMIT_t + \varepsilon_t \dots\dots\dots (2)$$

In order to test whether variables are stationary or not and exist the cointegration relationship, Augmented Dicky Fuller (ADF) test is carried out for unit root and Johansen's unrestricted rank test for cointegration.

In model (1) and (2), there is a presumption that the disturbances (ε_t) are a stationary white noise series. If $IMPORT_t$ and TD_t are cointegrated with $REMIT_t$, this presumption is unlikely to be true. We assume that both series are cointegrated with $REMIT_t$ at order one ($I(1)$), which means the first difference of the variables are stationary ($\Delta IMPORT_t$, $\Delta REMIT_t$ and ΔTD_t are stationary).

The representation theorem of Engle and Granger (1987) establishes a link between the cointegration and Error Correction Model (ECM). Transforming equation (1), there exists β_1 such that:

$$\varepsilon_t = IMPORT_t - \mu - \beta_1 REMIT_t \dots\dots\dots (3)$$

is $I(0)$. If both series are $I(1)$, the partial difference between the cointegrated variables may be stable around the mean.

Then, there exists an Error Correction Model (ECM) for $IMPORT_t$ and $REMIT_t$:

$$\Delta IMPORT_t = \mu_{IMPORT} + \alpha_{IMPORT} \varepsilon_{t-1} + \sum_{h=1}^l a_{1h} \Delta IMPORT_{t-h} + \sum_{h=1}^l b_{1h} \Delta REMIT_{t-h} + u_{IMPORT_t} \dots\dots (4)$$

$$\Delta REMIT_t = \mu_{REMIT} + \alpha_{REMIT} \varepsilon_{t-1} + \sum_{h=1}^l a_{2h} \Delta IMPORT_{t-h} + \sum_{h=1}^l b_{2h} \Delta REMIT_{t-h} + u_{REMIT_t} \dots\dots (5)$$

where, u_{IMPORT_t} and u_{REMIT_t} are stationary white noise processes for some number of lags l .

Likewise, the same argument and transformation applies with equation (2) to establish an ECM of $REMIT_t$ and TD_t .

The coefficients in the cointegrating equation give the estimated long-run relationship among the variables and coefficients on the VECM describe how deviations from that long-run relationship affect the changes on them in next period. The parameters α_{IMPORT} and α_{REMIT} of the equation (4) and (5) measure the speed of adjustment of $IMPORT$ and $REMIT$ respectively towards the long-run equilibrium.

To find out the proportion of the deviations in import due to the remittance, we did Cholesky decomposition of Vector Autoregressive (VAR). It provides the answer of what is the proportion of the variation in $IMPORT_t$ that is caused by its own shock as well as the shock to the $REMIT_t$ such that:

$$\begin{pmatrix} \varepsilon_{REMIT} \\ \varepsilon_{IMPORT} \end{pmatrix} = \Psi \begin{pmatrix} u_{REMIT} \\ u_{IMPORT} \end{pmatrix} \text{ where, } \Psi = \begin{pmatrix} \psi_{11} & \psi_{12} \\ \psi_{21} & \psi_{22} \end{pmatrix}$$

By assumption of VAR, $\psi_{12}=0$ meaning that $IMPORT$ does not have contemporaneous impact on $REMIT$ whilst $REMIT$ does have to the $IMPORT$.

$$\text{Hence, var} \begin{pmatrix} \varepsilon_{REMIT} \\ \varepsilon_{IMPORT} \end{pmatrix} = \text{var} \Psi \begin{pmatrix} u_{REMIT} \\ u_{IMPORT} \end{pmatrix} = \Psi \text{var} \begin{pmatrix} u_{REMIT} \\ u_{IMPORT} \end{pmatrix} \dots\dots\dots (6)$$

The stability and diagnostics of the model is tested by inverse root test for VEC residuals, cointegration graph and Lagrange-Multiplier (LM) test for autocorrelation in residuals.

There are some limitations in preparing this paper. Nepal faced severe political instability during the period of data coverage. It witnessed not only demolition of many economic infrastructures, but also frequent blockades and several nationwide strikes. These all phenomena might have backed up to rising import owing to the decline in the local industrial output. Further to this, with the three sided open border with India, remitting money into Nepal through unofficial channel may underestimate the official data since the study incorporates only the official figures. Other than remittance, the study does not consider the entire phenomena that might cause import and then trade deficit to rise. Moreover, due to the change in version of BOP compilation in 2001, the study covers the data only from 2001, which might not be able to fully explain the long-run relationship between the variables.

III. RESULT ANALYSIS

The graphical plot of the three study variables namely merchandise import (IMPORT), remittance inflow (REMIT) and trade deficit (TD) used in the model show the non-stationary processes behaving as random walk with drift. Moreover, the trends of IMPORT and REMIT and also TD and REMIT show the movements together over time indicating cointegrated relationship (Annex, Graph 1a & 1b). We do not observe a noticeable seasonal pattern in all the three variables in a seasonal graphical plot (Annex, Graph 2a & 2b).

3.1 Unit Root Test

The summary output of Augmented Dickey Fuller (ADF) test for unit root is presented below:

Table 1: Augmented Dickey Fuller (ADF) Test for Unit Root

Variables	Level		First Difference	
	t-stat	p-value	t-stat	p-value
REMIT	-0.017	0.954	-12.274	0.000*
IMPORT	-0.036	0.953	-12.499	0.000*
TD	0.225	0.973	-12.7641	0.000*

* indicates rejection of null hypothesis at 1 percent level of significance.

Including constant in the equation, the test statistics show that all the three series of IMPORT, REMIT and TD have unit root. At the first difference, all of the included series are stationary (Table 1).

3.2 Cointegration Test

The unit root test shows that merchandise import, remittance and trade deficit are non-stationary at level and stationary at first difference. The Johansen cointegration test results allowing for deterministic trend in cointegration equation with eight lags ordering REMIT, IMPORT and REMIT, TD are presented in Table 2 and 3.

Table 2: Unrestricted Cointegration Rank Test (REMIT and IMPORT)

Hypothesized No. of CE(s)	Trace			Maximum Eigenvalue		
	Trace Statistic	0.05 Critical Value	p-value	Max-Eigen Statistic	0.05 Critical Value	p-value
None*	16.563	15.495	0.034	15.827	14.264	0.028*
At most one	0.735	3.841	0.391	0.735	3.841	0.391

* denotes the rejection of null hypothesis at 5 percent level of significance.

Table 3: Unrestricted Cointegration Rank Test (REMIT and TD)

Hypothesized No. of CE(s)	Trace			Maximum Eigenvalue		
	Trace Statistic	0.05 Critical Value	p-value	Max-Eigen Statistic	0.05 Critical Value	p-value
None*	18.21576	15.49471	0.0190	17.88747	14.26460	0.0128*
At most one	0.328290	3.841466	0.5667	0.328290	3.841466	0.5667

* denotes the rejection of null hypothesis at 5 percent level of significance.

The trace statistics of Johansen cointegration tests show that REMIT and IMPORT as well as REMIT and TD are cointegrated with one cointegrating equation, since we reject null of hypothesis of rank 0 and fail to reject null hypothesis of rank 1 at 5 percent level of significance for both relationships of the tested equations (Table 2 and 3). Maximum Eigenvalue tests for the cointegration also show the consistent results; concluding that there is a cointegrating relationship in both cases.

3.3 Statistical Output

We hypothesize that remittance increases import and trade deficit in the long run. Considering the assumption, the variable REMIT is put in the first while ordering for Vector Auto Regression (VAR) model. Using this order, the statistical output of estimated VECM with two lags are presented in Table 4.

Table 4: The Statistical Estimation of the Coefficients with REMIT and IMPORT

Estimated Equation	Coefficients			Adj. R ² and F-Stat			
No. 3 (Cointegration)	$\varepsilon_t = IMPORT_{t-1} + 3935.684 - 1.341REMIT_{t-1}$ (0.093)*						
No. 4 No. 5 (Error Correction)	$\Delta IMPORT_t = 398581 - 0.343\hat{\varepsilon}_{t-1} - 0.321\Delta IMPORT_{t-1} - 0.262\Delta IMPORT_{t-2} - 0.349\Delta REMIT_{t-1} + 0.026\Delta REMIT_{t-2}$ (218)* (0.096)* (0.099)* (0.091)* (0.156)* (0.145)					Adj. R ² = 0.32 F-Stat = 11.65	
	$\Delta REMIT_t = 264032 + 0.075\hat{\varepsilon}_{t-1} - 0.159\Delta IMPORT_{t-1} - 0.051\Delta IMPORT_{t-2} - 0.314\Delta REMIT_{t-1} - 0.289\Delta REMIT_{t-2}$ (150)* (0.065) (0.068)* (0.062) (0.107)* (0.099)*					Adj. R ² = 0.21 F-Stat = 6.87	
LM Test for Autocorrelation	Lags	LM-Stat	p-value				
	1	1.047	0.903**				
	2	7.118	0.130**				

values in parenthesis are standard errors

*significant at 5% or lower level of significance

**fail to reject null hypothesis at 1% level of significance

The coefficients of cointegration equation of Table 4 show the long-run relationship between the two variables. The parameter of the equation shows that one unit increase in remittance increases merchandise import by 0.341 units in the long run. On the other hand, the coefficient of ECM; α_{IMPORT} is significant whilst α_{REMIT} is not. The insignificance of α_{REMIT} shows that the deviations from the long run relationship is affected only to IMPORT, not REMIT indicating REMIT a weakly exogenous variable. The weak exogeneity of the REMIT tells us that it does not experience the feedback effect in VECM. The deviation in REMIT in any given time will affect IMPORT by 0.343 in the next period and the effect of such deviation in IMPORT to the REMIT is almost zero.

We also estimate a model of REMIT and TD alike previous to confirm whether REMIT shows the similar result as of IMPORT with TD. The ECM of REMIT and TD also show the identical results with IMPORT. In the long run, the cointegration equation shows, one unit rise in REMIT causes TD to increase by 0.296 units. As aforementioned correlation to IMPORT, REMIT is weakly exogenous variable.

Table 5: The Statistical Estimation of the Coefficients with REMIT and TD

Estimated Equation	Coefficients			Adj R ² and F-Stat
Cointegration	$\varepsilon_t = TD_{t-1} + 455.45 - 1.296REMIT_{t-1}$ (0.104)*			
Error Correction	$\Delta TD_t = 395.019 - 0.262\hat{\varepsilon}_{t-1} - 0.310\Delta TD_{t-1} - 0.314\Delta TD_{t-2} - 0.333\Delta REMIT_{t-1} - 0.037\Delta REMIT_{t-2}$ (192.104)* (0.081)* (0.094)* (0.089)* (0.133)* (0.125)			Adj R ² = 0.31 F-Stat = 10.87
	$\Delta REMIT_t = 269.07 + 0.09\hat{\varepsilon}_{t-1} - 0.193\Delta TD_{t-1} - 0.045\Delta TD_{t-2} - 0.313\Delta REMIT_{t-1} - 0.293\Delta REMIT_{t-2}$ (149.13)* (0.063) (0.073)* (0.0069) (0.103)* (0.097)*			Adj R ² = 0.22 F-Stat = 7.31
LM Test for Autocorrelation	Lags	LM-Stat	p-value	
	1	0.583	0.965**	
	2	3.40	0.493**	

values in parenthesis are standard errors

*significant at 5% or lower level of significance

**fail to reject null hypothesis at 1% level of significance

The decomposition of variance using Cholesky of VAR evinces the variations to the IMPORT as well as TD on account of the REMIT. The percent REMIT variance due to the IMPORT is very small whilst the percent IMPORT variance due to the REMIT is very large. The variance to the IMPORT begins from second month from 6 percent, which surges and becomes more than 40 percent within 9 months period. Likewise, the variance to the TD becomes more than 35 percent within the 10 months period. (Annex, Graph 5a, 5b).

The model diagnostics test of the residuals of VECM shows all inverse roots lie within the unit root circle indicating that ε_t is stationary with zero mean (Annex, Graph 3a, 3b). The cointegration graph also confirms that the model is stable since residuals always revert back to the origin in every diversion (Annex, Graph 4a, 4b). In addition, the correlation LM test shows no serial autocorrelation in residuals while incorporating two lags. The LM-Stats and p-values are given in Table 4 and 5.

IV. CONCLUSION

Notwithstanding the fact that remittance has been a substantial source of foreign currency income in Nepal, its pivotal role in development is determined how the recipient households use it. If the country is not self-reliant for the domestically produced goods, a large portion of its spending on consumption may soar up the import. This can lead to a sharp rise in trade deficit over the long run and country can entangle in a remittance-import trap. The paper develops the long-run and short-run relationship between remittance and import and also remittance and trade deficit nexuses by using cointegration technique. The error correction model (ECM) shows the positive relationship of remittance into the import and trade deficit in the long run. This implies that the remittance income seem to have spent mostly on imported goods either for daily consumption or luxury and durable items, which is accelerating import and ultimately inducing

trade deficit to rise. Furthermore, the empirical evidence suggests that remittance does not have a direct impact on export.

The argument in remittance income is whether the money sent back home by the migrants is spent wisely and channelized into the productive sector of the economy in order to produce goods and services within the country. Most of the remittance comes from the workers of poor family in blue-colored jobs. Foreign income for them is a means of livelihood for bread and butter, repayment of loan and the rest for improving the quality of life. Hence, channeling remittance into the productive use is a challenging task. The utilization aspects of the remittance income should be emphasized through some policies and rational efforts.

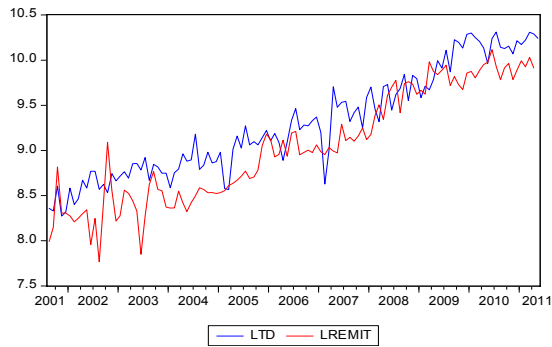
The study can be extended in many ways. It can be developed as a comprehensive model by including the relevant variables such as industry output, economic growth, exchange rate, price level, the level of income that directly affect imports and exports.

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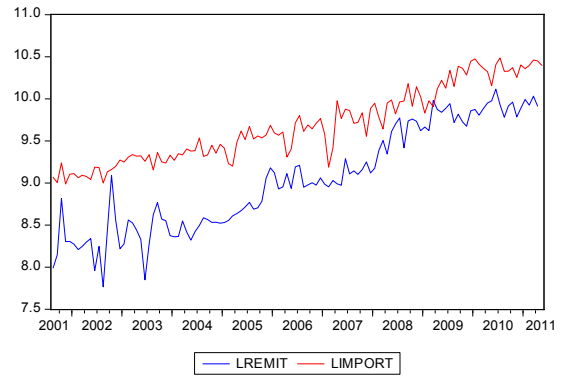
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ANNEXES

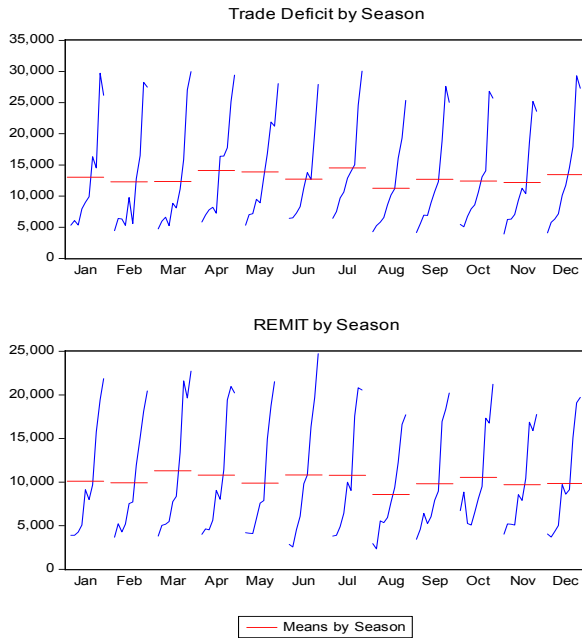
Graph 1a: The movements of Remittance and Trade Deficit over the ten years period



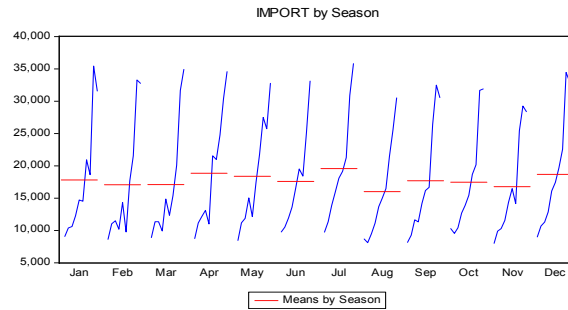
Graph 1b: The movements of Remittance and Import over the ten years period



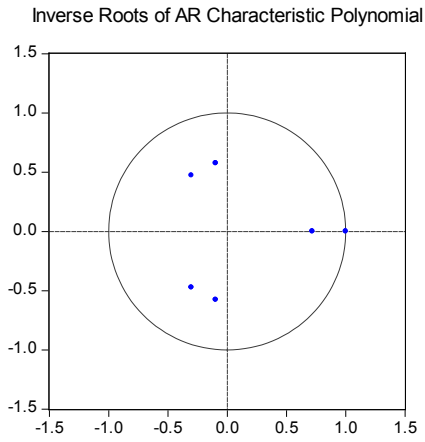
Graph 2a: Seasonality Graph



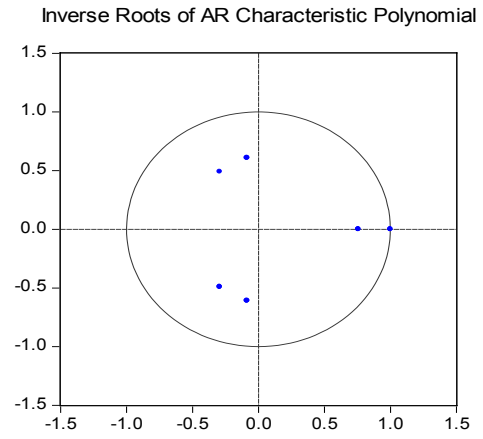
Graph 2b: Seasonality Graph



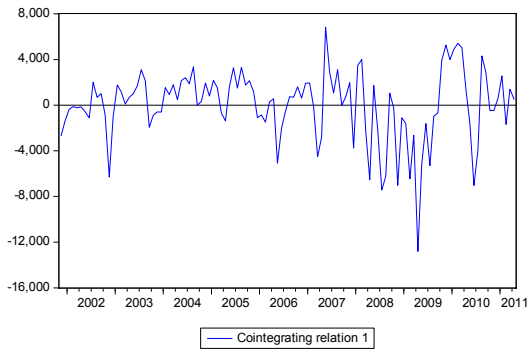
Graph 3a: Inverse Root Test (REMIT, IMPORT)



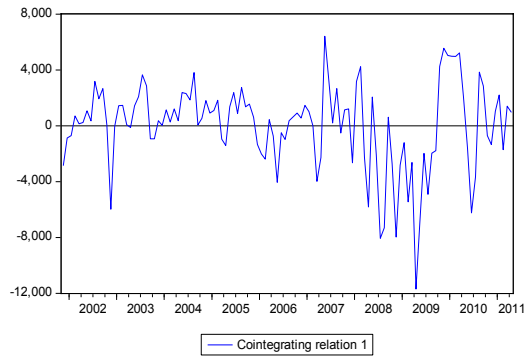
Graph 3b: Inverse Root Test (REMIT, TD)



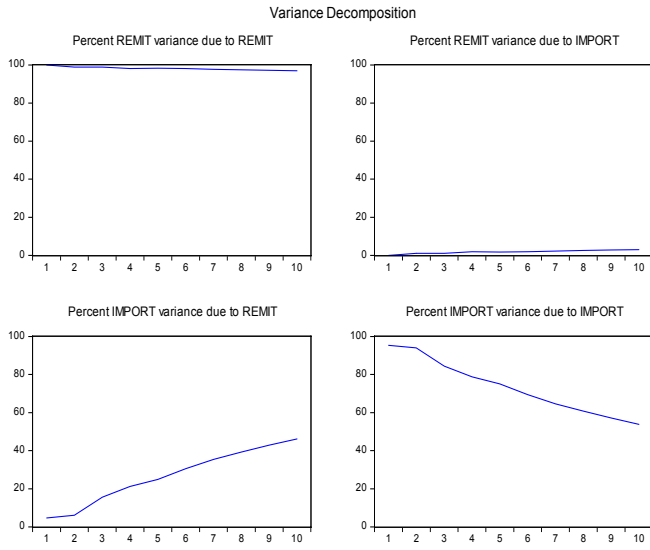
Graph 4a: Cointegration Graph (REMIT, IMPORT)



Graph 4b: Cointegration Graph (REMIT, TD)



Graph 5a: Cholesky Decomposition of VAR (REMIT, IMPORT)



Graph 5b: Cholesky Decomposition of VAR (REMIT, TD)

