Are imports driven by exports or the other way around ?Thailand evidence

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Are imports driven by exports or the other way around ?Thailand evidence

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Abstract:

This paper investigates the long run and causal relationship between exports and imports. In addition to the main variables, we include two other macroeconomic variables (exchange rate and money supply) in order to use them as control variables. Thailand is taken as a case study. The standard time series techniques are used for the analysis. The results tend to indicate that there is a long-run theoretical relationship between the variables as evidenced in their being cointegrated. The findings based on variance decompositions analysis suggest that imports are driven by exchange rate and followed by exports. In other words, imports tend to lead exports in the context of Thailand. The findings have strong policy implications for developing countries like Thailand.

Key Words: Lead-lag, Exports, Imports, VECM, VDC, Thailand

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1.1 Introduction

In reality, Exports and imports play an important and integral role in determining the trade of any country. In this sense the dynamics of the relationship between these variables assigned to this study holds significant importance for testing its nature. Sustainability of external deficits always drew attention of the economists. During the past years, studies performed on this argument have focused mainly on the long run relationship between exports and imports. Because the existence of this relationship points out the foreign deficit is just a short term fact and it is sustainable in the long run (Narayan and Narayan, 2005). The stability of the long relationship between exports and imports may suggest that a country has not violated its international budget constraint. Accordingly, policymakers in many countries have been forced to take interest in the combined effects of all macroeconomic policies, such as exchange rate, fiscal and monetary policies on the trade balance.

1.2 Objectives of the study

The study has three main objectives such as follows:

1. To examine whether Thai exports and imports are cointegrated; in other words to determine if there is a long term equilibrium relationship between these variables.
2. To analyze the pattern of causality between Thai exports and imports.
3. To provide and draw some relevant policy implications so as to improve Thai external sector performance.

2. Literature review

During the past years, many studies have been performed on the argument of sustainability of external deficits. They have focused mainly on the long run relationship between exports and imports. These include the studies conducted by Husted (1992), Fountas and Wu (1999), Bahmani-Oskooee and Rhee (1997), Arize (2002) and Zillur Rahman (2011).

Husted (1992) studied quarterly US trade data between 1967 and 1989, having adjusted for the structural break in data,and concluded a long-run relationship between U.S. export and import pointing that its trade deficit had been a short-run phenomenon. But Fountas and Wu (1999), however, concluded other wise, studying US trade data ranging from 1967 to 1994, arguing that US trade deficit was not sustainable. It is worth mentioning that these two studies applied different methods of estimation, namely Engle and Granger (1987) and Stock

and Watson (1988) in Husted and Engle-Granger (1987) and Gregory and Hansen (1996) in Fountas and Wu.

In their paper Bahmani-Oskooee and Rhee (1997) investigated Korean export and import data applying Johansen and Juselius' (1990) system-based cointegration technique and found trade sustainability. Arize (2002) conducted a more comprehensive study covering 50 countries' quarterly data, and identified long-run relationship between export and import for 35 countries including the United States, Indonesia and Thailand. Like Bahmani-Oskooee et al. Arize used export as the forcing variable and tested the long-run relationship with the Johansen and Juselius' system-based cointegration approach along with two residual-based approaches namely the dynamic OLS (DOLS) introduced by Stock and Watson (1988) and the fully modified OLS (FMOLS) by Phillips and Hansen (1990). In Arize's study, Thailand was one of the 35 countries for which long-run relationship was observed.

This study uses monthly data about four macroeconomic variables including exports, imports, exchange rate and money supply in order to test the existence of the long-run relationship between the exports and imports of Thailand. The exchange rate and money supply variables are used as control variables.

3. Methodology used and Data

3.1 The Data

This study utilizes monthly macroeconomic data concerning Thailand which include real exports, real imports, effective exchange rate and money supply respectively which cover a period of 26 years starting from 1988.3. Data for all variables is obtained from Datastream. All data sets are expressed in natural logarithm form to preserve homogeneity.

Figure 1 shows, Thai exports and imports have gone through several upward and downwards movements and also for the other two variables, i.e. exchange rate and money supply during the sample period.

Figure 1

Behavior of Thai Export, Import, Exchange rate and Money supply during the sample period.

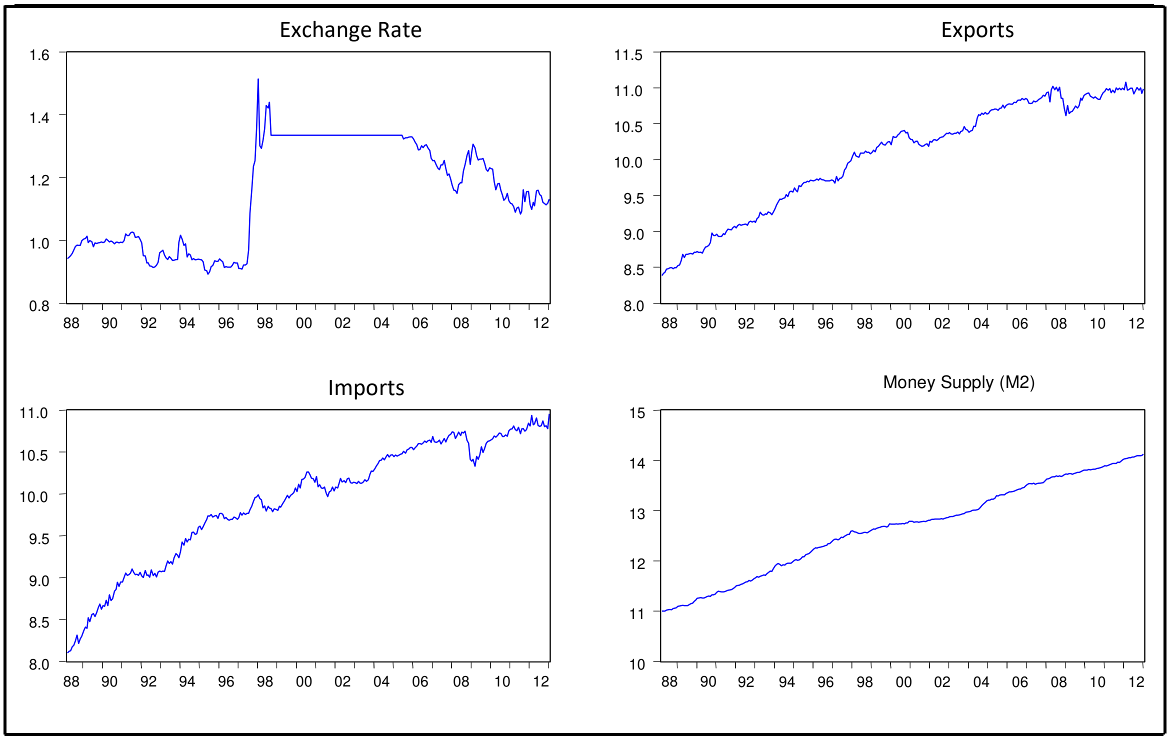


Table 1 presents the descriptive statistics for the logs of exports, imports, exchange rate and money supply variables which are employed in the empirical analysis.

Table 1

Descriptive statistics for Thai Exports, Imports, Exchange rate and Money supply

	Export (LTHEXP)	Import (LTHIMP)	Exchange Rate (LTHXR)	Money Supply (LTHM2)
Mean	10.045	9.911	1.154	12.655
Median	10.243	10.068	1.162	12.738
Std. deviation	0.776	0.725	0.167	0.908
Skewness	-0.526	-0.670	-0.135	-0.199
Kurtosis	2.028	2.488	1.429	1.922
Jarque- Bera[a]	25.588*	25.691*	31.635*	16.443*
	(0.000)	(0.000)	(0.000)	(0.000)

[a] Jarque-Bera is the test for normality.
* P-values are given in the parenthesis.

A comparison of means and median indicate that they are very close to each other during the sample period. An examination of skewness indicates that all variables are negatively skewed. That means that the negatively skewed variables have been on increase during the sample period.

Kurtosis figure indicates that the data are leptokurtic with negative skewness provide non-normal distributions for all variables. This is supported with the significance of the Jarque-Bera statistic which reported in the table.

3.2 Methodology used

Primarily this study tests the existence of unit root in the aforesaid time series data (Import, Export, Exchange Rate and Money Supply). It employed unit root test for understanding the presence or absence of nonstationarity, which in turn helps to determine the predictability of future values based on past values of a time series. In the unit root tests, the augmented Dickey- Fuller (ADF) test consists of estimating the following regression:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_t + \alpha_i \sum_{i=1}^{m} \Delta y_{t-i} + \epsilon_t$$

Where, Δ is the difference operator, ϵ_t is a white noise error term and $\Delta Y_{t-1} = (\Delta Y_{t-1} - \Delta Y_{t-2})$, $\Delta Y_{t-2} = (\Delta Y_{t-2} - \Delta Y_{t-3})$ etc. The null hypothesis is that $\delta = 0$; that is there is a unit root and the alternative hypothesis is that $\delta < 0$; that means the time series is stationary.

After the test of stationarity, the study used Johansen (1991, 1995) cointegration test to identify the existence of any cointegrating relationship between the variables. Whenever, someone gets two time series as nonstationary or I(1) then he can consider that the future values of a variable are not predictable based on past values. But there are still chances that two time series may share a common trend. That means, two variables are cointegrated if they have a long term equilibrium relationship between them. The Johansen cointegration test (1991, 1995) is based on the following vector autoregression (VAR) equation.

$$y_t = A_1 y_{t-1} + \cdots + A_\rho y_{t-\rho} + Bx_t + \epsilon_t$$

Where, y_t is a k- vector of non-stationary I(1) variables, x_t is a d-vector of deterministic variables and ϵ_t is a vector of innovations. The VAR can be rewritten as,

$$\Delta y_t = \Pi y_{t-1} + \sum_{i=1}^{\rho-1} \Gamma_i \Delta y_{t-i} + Bx_t + \epsilon_t$$

If the coefficient matrix Π has reduced rank $r < k$, then there exist $k \times r$ matrices α and β each with rank r such that $\Pi = \alpha \beta'$ and $\beta' y_t$ is stationary. r is the number of cointegrating relations and each column of β is the cointegrating vector. Johansen proposes two different likelihood ratio test of significance named as trace test and maximum eigenvalue test.

Then the study proposes applied LRSM procedure to take care of a limitation of the estimated cointegrating vectors which is that they are atheoretical. LRSM endeavors to estimate theoretically meaningful long-run (or cointegrating) relations by imposing on those long-run relations (and then testing) both exact identifying and over-identifying restrictions based on theories and information of the economies under review.

If the variables are cointegrated, the existence of an error-correction representation may take the following form:

$$\Delta THEXP_t = \alpha_1 + \sum_{i=1}^{m} \beta_{1i} (\Delta THEXP_{t-i}) + \sum_{i=1}^{m} \gamma_{1i} (\Delta THIMP_{t-i}) + \sum_{i=1}^{m} \varepsilon_{1i} (\Delta THXR_{t-i}) + \sum_{i=1}^{m} \theta_{1i} (\Delta THM2_{t-i}) + ECM1_{t-1} + \epsilon_{1t} \quad (1)$$

$$\Delta MYIMP_t = \alpha_2 + \sum_{i=1}^{m} \beta_{2i} (\Delta MYIMP_{t-i}) + \sum_{i=1}^{m} \gamma_{2i} (\Delta MYEXP_{t-i}) + \sum_{i=1}^{m} \varepsilon_{2i} (\Delta MYXR_{t-i}) + \sum_{i=1}^{m} \theta_{2i} (\Delta MYM2_{t-i}) + ECM2_{t-1} + \epsilon_{2t} \quad (2)$$

$$\Delta MYXR_t = \alpha_3 + \sum_{i=1}^{m} \beta_{3i} (\Delta MYXR_{t-i}) + \sum_{i=1}^{m} \gamma_{3i} (\Delta MYEXP_{t-i}) + \sum_{i=1}^{m} \varepsilon_{3i} (\Delta MYIMP_{t-i}) + \sum_{i=1}^{m} \theta_{3i} (\Delta MYM2_{t-i}) + ECM3_{t-1} + \epsilon_{3t} \quad (3)$$

$$\Delta MYM2_t = \alpha_4 + \sum_{i=1}^{m} \beta_{4i} (\Delta MYM2_{t-i}) + \sum_{i=1}^{m} \gamma_{4i} (\Delta MYEXP_{t-i}) + \sum_{i=1}^{m} \varepsilon_{4i} (\Delta MYIMP_{t-i}) + \sum_{i=1}^{m} \theta_{4i} (\Delta MYXR_{t-i}) + ECM4_{t-1} + \epsilon_{4t} \quad (4)$$

Where, ECM explains the error-correction mechanism term. This ECM_{t-1} is the one period lagged value of the estimated error of the cointegrating regression obtained from OLS (Ordinary Least Squares) estimation. The logic behind this model is that generally a long-run equilibrium relationship between two economic variables exists. But, in the short run there can be disequilibrium. Therefore, the error correction mechanism corrects a proportion of disequilibrium in the next period. So, the error correction process is an instrument of reconciling short-run and long-run behavior. The absolute value of δ determines how quickly the equilibrium is restored. Conversely, in the absence of cointegration, a vector autoregression (VAR) needs to be constructed using first differences of the variables. In this case error correction term is excluded from the above specified equation. In identifying the causal relationship, the t-statistics explains the existence of long-run causality, while the significance of F-statistic indicates the presence of short-run causality.

The study also used the variance decomposition technique (VDC) to indicate the relative exogeneity/endogeneity of a variable by partitioning the variance of the forecast error of a variable into proportions attributable to shocks in each variable in the system, including its own. The proportion of the variance explained by its own past shocks can determine the relative exogeneity/ endogeneity of a variable. The variable that is explained mostly by its own shocks (and not by others) is deemed to be the most exogenous of all. The impulse response functions (IRFs) are also used which are graphical ways of exposing the relative exogeneity or endogeneity of a variable. The study uses the generalized method for both

VCMs and IRFs, because it does not affected by the order of variables in the VAR and also it doesn't assumes all other variables are switched off when one variable is shocked.

Finally, the persistence profile analysis is applied to indicate time horizon that required for the equilibrium to be restored if the whole cointegrating relationship is shocked, as a response to external sources other than those variable which are included in the system.

4. Empirical Results and Discussion

4.1 Test of Stationarity

It is important to determine the characteristics of the individual series before conducting the cointegration analysis. Accordingly, I put all the four variables (LTHEXP, LTHIMP, LTHXR, LTHM2) for unit root tests to examine the nature of the variables as I(0) or I(1). I summarize the results of each test in a single table for analytical ease.

Table 2

Augmented Dickey Fuller (ADF) Unit Root Tests

Variables	Level	First Difference	95% ADF Critical Values for Rejection of Hypothesis of a Unit Root for Level	First Difference	Decision	Order of Integration
LTHEXP	-1.610	-6.976	-3.426	-2.871	Nonstationary at level but stationary at first difference	I(1)
LTHIMP	-3.058	-9.169	-3.426	-2.871	Nonstationary at level but stationary at first difference	I(1)
LTHXR	-1.633	-6.433	-3.426	-2.871	Nonstationary at level but stationary at first difference	I(1)
LTHM2	-1.505	-10.384	-3.426	-2.871	Nonstationary at level but stationary at first difference	I(1)

Table 2 shows that, for the ADF test all time series show the existence of unit root by using the level form of data which means all variables are nonstationary in their level form. On the other hand, the unit root test performed on the first differences of the variables indicates the stationarity of the all variables. Therefore, by considering the results from level data and first differenced data I can consider each variable is integrated of order one I(1). So there is possibility that all time series may move together or may share a common trend in the long-run. As the time series are nonstationary; it is appropriate to carry out the cointegration test.

4.2 Order of VAR

For getting the optimal lag length for cointegration analysis, the study used two criteria, namely the Akaike Information Criteria (AIC) and the Schwarz Bayesian Criteria (SBC).

Table 3
Lag Length Criteria

Lag	AIC	SBC
0	2576.0	2568.6*
1	2604.7*	2567.9
2	2601.8	2535.6
3	2596.8	2501.1
4	2586.8	2461.7
5	2584.7	2430.1

*indicates lag order selected by the criteria
AIC: Akaike information criteria
SBC: Schwarz Bayesian criteria

Table 3 shows that SBC has suggested a lag of (0) as optimal, while AIC has indicated (1) as optimal lag length. A lag length of five years is usually considered long in terms of economic sense. However, I selected optimal lag length of (2) which is different from that as suggested by AIC and SBC so as to find complete results.

4.3 Cointegration Tests

Table 4 shows the results of Johansen's cointegration test under the assumption of linear deterministic trends. Johansen's cointegration test detects at least one cointegrating relationship between the variables under study, at 95% significance level, for both trace and maximum eigenvalue statistics. Results of the two statistics produce little contradiction, which is related to the significance level of cointegrating relationships.

Table 4
Johansen maximum likelihood results for multiple cointegrating vectors: Thai Exports, Imports, Exchange rate and Money supply based on monthly data 1988.3 to 2013.1[a]

Ho	H1	Statistic	95% Critical	90% Critical
Maximum Eigen Value Statistics				
R = 0	R =1	32.567[b]	31.790	29.130
R<= 1	R = 2	19.404	25.420	23.100
Trace Statistic				
R = 0	R>= 1	72.207[b]	63.000	59.160
R>= 1	R>= 2	39.639	42.340	39.340
Rank	**Maximized LL**	**AIC**	**SBC**	**HQC**
R = 0	2666.4	2646.4	2609.5	2631.6
R = 1	2682.7	2654.7	2603.0	2634.0
R = 2	2692.4	2658.4	2595.6	2633.2
R = 3	2698.7	2660.7	2590.5	2632.6
R = 4	2702.5	2662.5	2588.6	2632.9

[a] Based on the eigenvalue and trace tests, the results show that overall there is one cointegrating vector amongst the variables.
[b] Both statistics reject H_0 at 0.05 level of significance.
AIC = Akaike Information Criterion; SBC = Schwarz Bayesian Criterion; HQC = Hannan-Quinn Criterion; Maximum LL = Maximum Log Likelihood.

An evidence of cointegration implies that the relationship among the variables is not spurious, i.e., there is a theoretical relationship among the variables (LTHEXP, LTHIMP, LTHXR, LTHM2) and that they are in equilibrium in the long run (although they could deviate from each other in the short-run). Moreover, the cointegrated imports and exports of Thailand explains that this country is not in violation of its international budget constraints and its macroeconomic policies have been effective in bringing total exports and imports into a long-run equilibrium.

4.4 Long-Run Structural Modeling (LRSM)

The long-run structural modeling is used in order to make the coefficients of the cointegrating vector consistent with the theoretical and a priori information of the economy. Since the number of the cointegrating relationship between all variables is one, I imposed an exact identifying restriction of ‘‘unity’’ on the coefficient of exports (LTHEXP) (table 5, vector 1). In order to test the significance of the import (LTHIMP), exchange rate (LTHXR) and money supply (LTHM2), I imposed an over-identifying restriction of ‘‘zero’’ on the coefficient of these variables (table 5, vector 2, vector 3 and vector 4). The results tend to indicate that the null restriction of zero on all of the three variables is rejected. However, based on our earlier evidence of a significant cointegrating relationship as well as strong theoretical reasons, vector1 proceeded for the remainder of the analysis.

Table 5
Maximum Likelihood (ML) Estimates subject to Exactly and Over-Identifying Restrictions[a]

	Vector 1	Vector 2	Vector 3	Vector 4
LTHEXP	1.000	1.000	1.000	1.000
	(None)	(None)	(None)	(None)
LTHIMP	-0.595*	0.000	-1.354	-0.901
	(0.082)	(None)	(None)	(0.107)
LTHXR	-0.560*	-0.926	0.000	-0.462
	(0.071)	(0.148)	(None)	(0.132)
LTHM2	-0.535*	-1.399	-0.185	0.000
	(0.134)	(0.209)	(0.725)	(None)
Trend	0.002	0.006	0.216	-0.0009
	(0.001)	(0.003)	(0.004)	(0.0007)
Log Likelihood	2682.7	2678.6	2676.7	2678.9
Chi-Square	None	8.097*[0.004]	12.064*[0.001]	7.469*[0.006]

[a] The output above shows the ML estimates subject to exactly identifying (Vector 1) and over identifying (Vector 2), (Vector 3) and (Vector 4) restrictions. The above results tend to indicate that the null restriction of zero on LTHIMP, LTHXR and LTHM2 stands.
*Indicates significance at the 5% level or less.

4.5 Vector Error-Correction Modeling (VECM)

The vector error-correction modeling technique is applied to determine the direction of Granger causality between the variables. Table 6 shows that the coefficients of the error-correction terms for both exports (LTHEXP) and money supply (LTHM2) the respective t-values which are significant at 5%. Accordingly, these variables are considered as endogenous or followers. On the other hand, the coefficients of the error-correction for exchange rate (LTHXR) and imports (LTHM2) are insignificant at any level, so they considered as exogenous or leaders. There is also evidence of short-run causality running from imports (LTHIMP) and exchange rate (LTHXR) to both exports (LTHEXP) and money supply (LTHM2), as the F-statistic is significant at 1% level of confidence. Moreover, the significant error-correction term indicates that about 12.6% of disequilibrium is corrected each year by the changes in imports (LTHIMP) and exchange rate (LTHXR) to bring the long-run equilibrium between exports and imports.

Table 6
Vector Error-Correction Estimates[a]

Dependent Variables	LTHEXP	LTHIMP	LTHXR	LTHM2
DLTHEXP (1)	-0.244 (0.064)	0.009 (0.075)	-0.008 (0.042)	-0.032 (0.022)
DLTHIMP (1)	-0.030 (0.055)	-0.316 (0.065)	-0.002 (0.036)	0.014 (0.019)
DLTHXR (1)	0.211 (0.094)	0.066 (0.111)	0.054 (0.062)	0.046 (0.033)
DLTHM2 (1)	-0.112 (0.165)	0.354 (0.194)	0.036 (0.108)	0.140 (0.057)
ECM (-1)	-0.126* (0.040)	-0.050 (0.047)	-0.001 (0.026)	0.047* (0.014)
Chi-sq SC (1)	2.776[0.096]	1.533[0.216]	0.914[0.339]	3.517[0.061]
Chi-sq FF (1)	1.3452[0.246]	8.523[0.004]	0.133[0.715]	0.0002[0.988]
Chi-sq N (2)	132.754[0.000]	49.352[0.000]	11924.6[0.000]	35.939[0.000]
Chi-sq Het (1)	6.555[0.010]	1.756[0.185]	74.729[0.000]	1.497[0.221]

[a] LTHXR = Exchange Rate ; LTHIMP = Imports of Goods and services; LTHEXP= Exports of Goods and services; LTHM2= Money Supply. The above within-sample results tend to indicate that in the long-term LTHXR and LTHIMP are both exogenous, whereas LTHEXP and LTHM2 are both endogenous.
*Implies significance of error-correction term (making LTHEXP and LTHM2 weakly endogenous).

Based on the results in table 6, the existence of an error-correction representation may take the following form:

$$DLTHEXP_{t} = -0.359 - 0.244\ DLTHEXP_{t-1} - 0.03\ DLTHIMP_{t-1} + 0.211 DLTHXR_{t-1} - 0.112\ DLTHM2_{t-1} - 0.126^{*}\ ECM_{t-1} \quad (1)$$

$$DLTHIMR_{t} = 0.156 + 0.009\ DLTHEXP_{t-1} - 0.316\ DLTHIMP_{t-1} + 0.066\ DLTHXR_{t-1} + 0.354\ DLTHM2_{t-1} - 0.050\ ECM_{t-1} \quad (2)$$

$$DLTHXR_{t} = -0.005 - 0.008\ DLTHEXP_{t-1} - 0.002\ DLTHIMP_{t-1} + 0.054\ DLTHXR_{t-1} + 0.036\ DLTHM2_{t-1} - 0.001\ ECM_{t-1} \quad (3)$$

$$DLTHM2_{t} = 0.15 - 0.032\ DLTHEXP_{t-1} + 0.014\ DLTHIMP_{t-1} + 0.046\ DLTHXR_{t-1} + 0.14\ DLTHM2_{t-1} + 0.047^{*}\ ECM_{t-1} \quad (4)$$

The diagnostics of all the equations of the error-correction model (testing for the presence of serial correlation, functional form, normality, and heteroscedasticity) tend to indicate that the equations are more or less well-specified. I also checked the stability of the coefficients by the CUSUM test (Figure 2) which indicates that they are stable; but the CUSUM SQUARE (Figure 3) indicates that the coefficients are unstable. The reason for instability of the coefficients may be due to impact of the financial crisis, and this can be remedied by using dumTH variable.

Figure 2
Plot of Cumulative Sum of Recursive Residuals

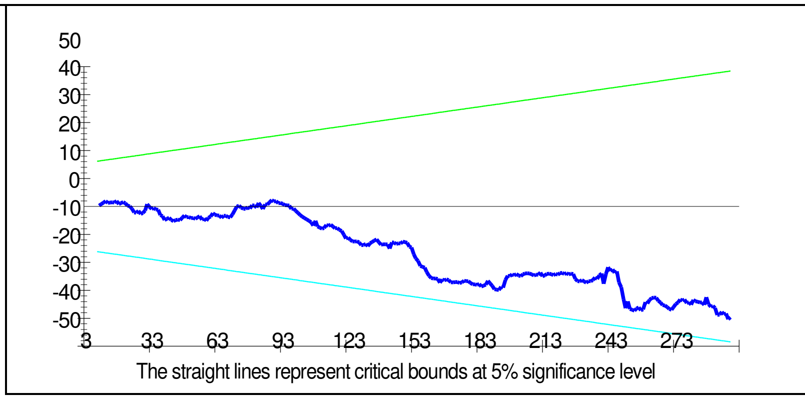
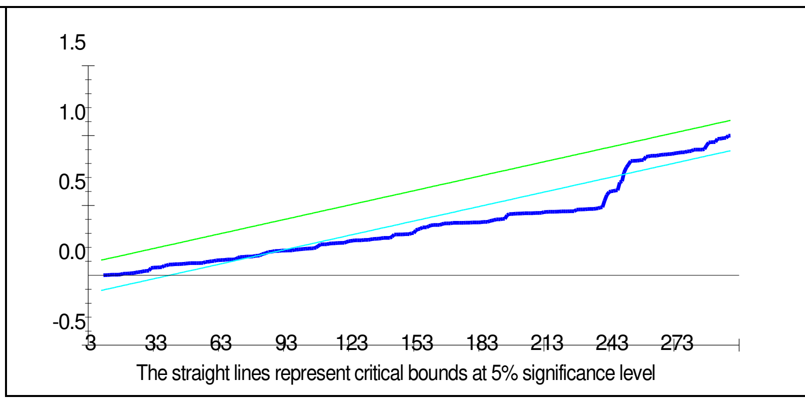


Figure 3
Plot of Cumulative Sum of Squares of Recursive Residuals



4.6 Variance Decomposition Technique (VDC)

The variance decomposition technique (VDC) is designed to indicate the relative exogeneity/ endogeneity of a variable by partitioning the variance of the forecast error of a variable into proportions attributable to shocks in each variable in the system, including its own.

Table 7
Generalized Variance Decomposition (GVDC) Analysis[a]
Percentage of Forecast Variance Explained by Innovations in:

		LTHEXP	LTHIMP	LTHXR	LTHM2
Month	Δ LTHEXP				
	1	0.72	0.25	0.02	0.01
	5	0.62	0.30	0.05	0.03
	10	**0.54**	0.33	0.09	0.05
Month	Δ LTHIMP				
	1	0.23	0.74	0.01	0.02
	5	0.26	0.71	0.01	0.02
	10	0.29	**0.69**	0.00	0.02
Month	Δ LTHXR				
	1	0.00	0.01	0.97	0.02
	5	0.00	0.01	0.96	0.03
	10	0.00	0.01	**0.96**	0.03
Month	Δ LTHM2				
	1	0.01	0.01	0.03	0.95
	5	0.06	0.00	0.02	0.92
	10	0.12	0.00	0.01	**0.87**

[a] The out-of-sample GVDCs show the relative exogeneity and endogeneity of the variables. The elements along the principal diagonal tend to indicate LTHXR is the most exogenous relative to LTHEXP, LTHIMP and LTHM2.

In table 7, at the end of the forecast horizon number 10, I find that 54% of the forecast error variance of exports (LTHEXP) is explained by its own shocks; in the case of imports (LTHIMP) that proportion is 69% percent; in the case of exchange rate (LTHXR) the proportion is 96%; and finally, in the case of money supply (LTHM2) is 87%. That tends to indicate that the exchange rate variable is the most exogenous variable than others and exports is the weakest endogenous one. Since exports and imports represent trade between different countries it is expected that the exchange rate will play major role in the relation between these variables.

4.7 The Impulse Response Functions (IRFs)

They are designed to map out the dynamic response path of a variable due to a one-period standard deviation shock to another variable. The application of the generalized impulse response functions (figures 4, 5, 6 and 7) results in consistency with the earlier results, that the exchange rate variable is the least sensitive to a one standard deviation shock to the other variables.

Figure 4
Generalized Impulse Response Function with shock to Exports (LTHEXP)

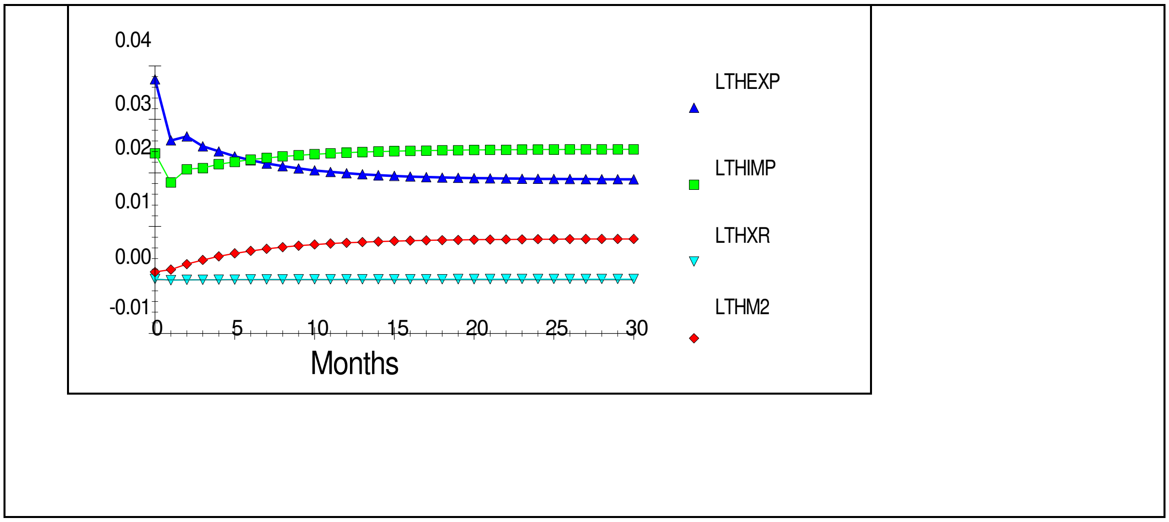


Figure 5
Generalized Impulse Response Function with shock to Imports (LTHIMP)

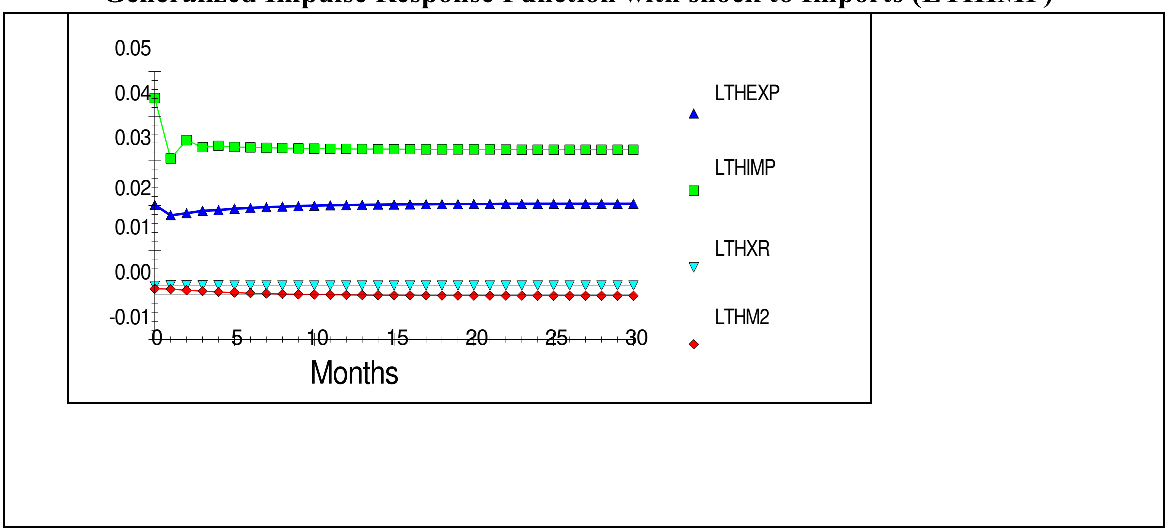


Figure 6
Generalized Impulse Response Function with shock to Exchange Rate (LTHXR)

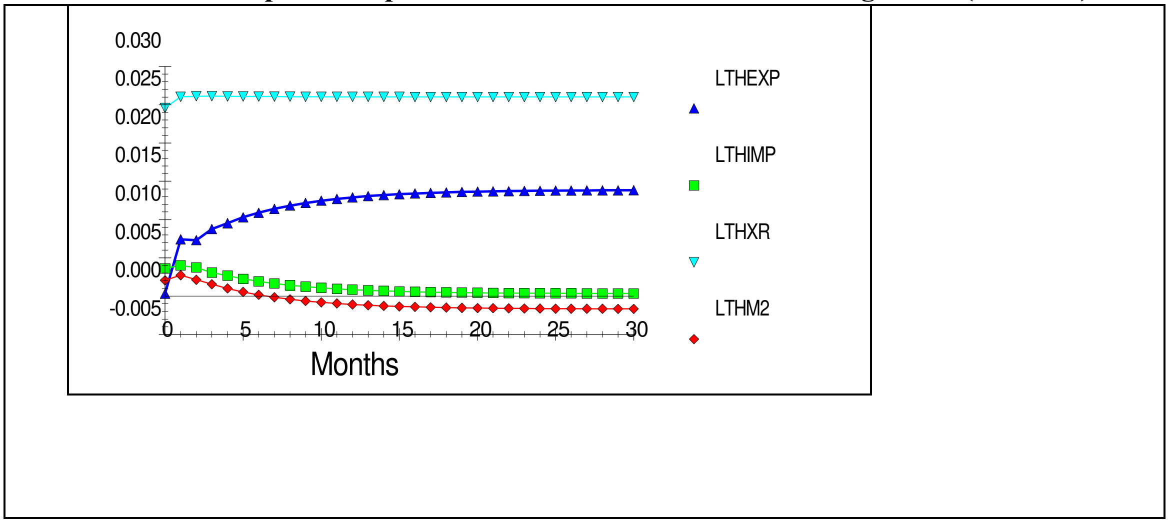
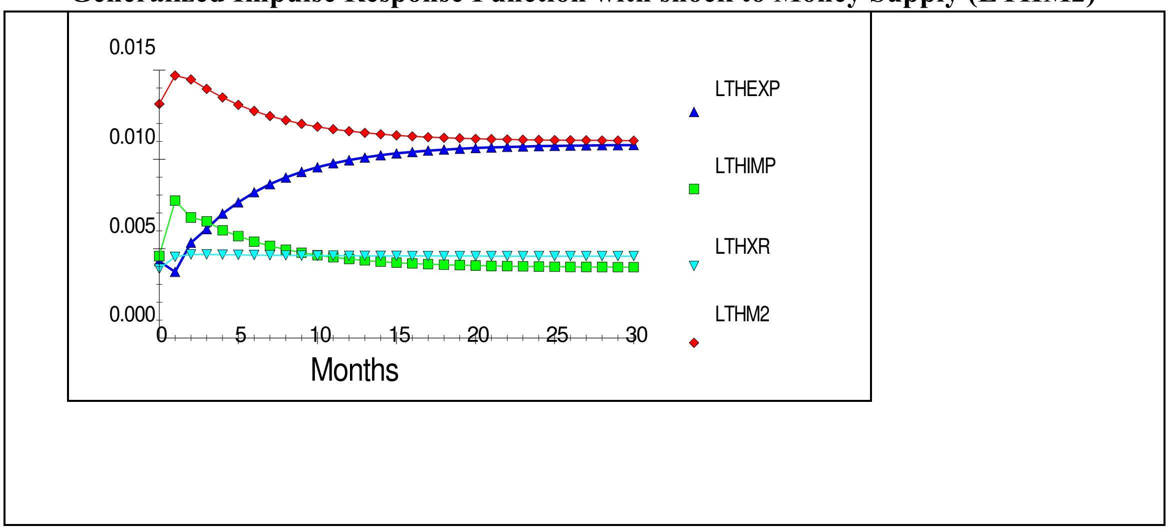


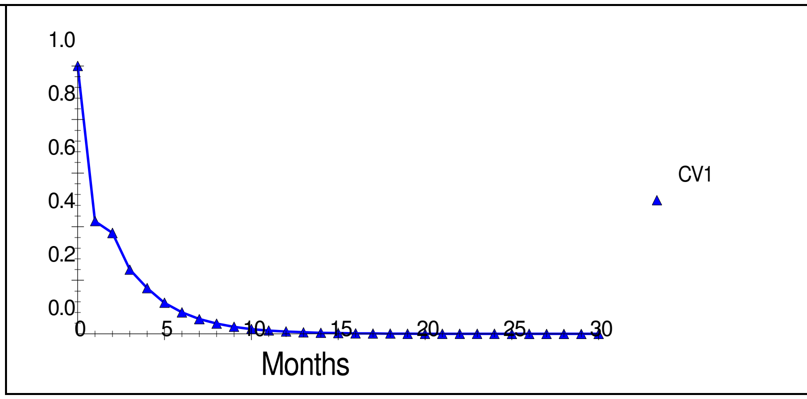
Figure 7
Generalized Impulse Response Function with shock to Money Supply (LTHM2)



4.8 Persistence Profile Analysis (PP)

Figure 8 shows the application of the persistence profile analysis and indicates that if the whole cointegrating relationship is shocked, as a response to external sources other than those variable which are included in the system, it will take about 12 periods (months) for the equilibrium to be restored.

Figure 8
Persistence Profile Analysis of the effect of a system-wide shock to CV'(s)



5. Conclusion

An important example of economic policy is international trade policy. This study reveals that exports, imports, exchange rate and money supply of Thailand follow random walk or are considered as nonstationary time series. There is also evidence of long-run cointegrating relationship between these variables, as the Johansen cointegration test detects at least one cointegrating equation. Accordingly, the cointegrated variables are expected to have causal relationships, I investigate the causal relationship between the variables by specifying the error-correction modeling. According to the results, long-run causality exists between exports and the other variables and short-run unidirectional causality exists from imports, exchange rate and money supply to export. Based on these results, Thailand is not in violation of its international budget constraints and trade imbalances of her are a short-run event, which in the long-run are sustainable. Cointegrating relationship of trade also explains an economy as well-functioning because the deficits are evanescent that will be balanced by future surpluses. Therefore, the macroeconomic policies of Thailand have been effective in bringing total exports and imports into a long-run equilibrium.

For policy implication, both the variance decomposition technique (VDC) and the impulse response functions (IRFs) indicate that exchange rate is the most exogenous. On the face of trade deficit, there is a need to analyze the different policy alternatives to deal with such situation. Restrictions on imports through tariff and money supply might not be desirable. Thus the deficit could be fixed through appropriate exchange rate adjustments. And finally, the persistence profile analysis indicates that if the whole cointegrating relationship is shocked, it will take about 12 periods (months) for the equilibrium to be restored.

References

Arize, Augustine C.(2002), Imports and Exports in 50 Countries Test of Cointegration and Structural Breaks, International Review of Economics and Finance, 11, 101-115

Bahmani-Oskooee, M., and H.J. Rhee, (1997), Are Imports and Exports of Korea Cointegrated? International Economic Journal, 11, 109-114.

.Fountas, S. and Wu, J.L (1999),Are the US Current Account deficits really Sustainable?, International Economic Journal, 13, 28-51

Hussain, M. A.(2014), Economic Growth, exports and imports in Pakistan: Granger causality analysis, Journal of Business in Developing Nations, 13, 31 -38.

Husted, S. (1992), The Emerging U.S. Current Account Deficit in the 1980s: A Cointegration Analysis, Review of Economics and Statistics, 74(1), 159-166.

Johansen, S. (1991), Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models, Econometrica, 59(6), 1551-1580

Marin, D. (1992). Is the export-led growth hypothesis valid for industrialised countries? Review of Economics and Statistics, 74(4), 678-688.

Masih, M. Al-Sahlawi, M. and De Mello, L. (2010), What drives carbon-dioxide emissions: Income or electricity generation? Evidence from Saudi Arabia, Journal of Energy and Development, 33(2), 201 – 213

Pesaran, M.H. and Shin, Y. (2002). Long Run Structural Modeling. Econometric Reviews, 21(1), 49-87.

Shan, J. and Tian, G. G. (1998). Causality between exports and economic growth: The empirical evidence from Shanghai. Australian Economic Papers, 37(2), 195-202.

Sun, E. and Shun, J. (1999), Export-led growth and the US economy: Another look, Applied Economic Letters, 3, 341-344.