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Relative Responsiveness of Trade Flows to a Change in Prices and Exchange Rate

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RELATIVE RESPONSIVNESS OF TRADE FLOWS TO A CHANGE IN PRICES AND EXCHANGE RATE

by

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ABSTRACT

RELATIVE RESPONSIVNESS OF TRADE FLOWS TO A CHANGE IN PRICES AND EXCHANGE RATE

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This dissertation includes two essays in international trade. In my first essay I consider Orcutt's (1950) hypothesis in which trade flows respond to changes in exchange rate more quickly than they do to changes in prices. There are several studies which test the Orcutt's hypothesis by imposing lag structure on both relative prices and exchange rate. I employ generalized impulse response analysis as an alternative approach to test Orcutt's hypothesis using the sample of developed and developing countries. The empirical results do not support Orcutt's hypothesis in most cases. In my second essay I investigate the effects of technological progress on the speed with which relative prices and exchange rate affect trade flows. I employ ARDL cointegration approach for two sub-samples (1973-1990 and 1991-2013) of selected developed and developing countries. The results illustrate that due to technological progress the lags of relative prices and exchange rate have been shortened during post 1990.

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To my parent

and my wife

Chapter 1: Introduction

Trade flows (export and import) are one of the aggregate demand components which can be managed by using demand management policy tools (fiscal policy and monetary policy). Exchange rate and relative prices are the two important factors which can affect trade flows. To deal with a shock in trade flows we need to know how exchange rate and relative prices influence them. For instance, if exports decrease due to stagnation in trade partner economies, to remain competitive, a country could have exchange rate devaluation or decrease in relative prices using tariffs and subsidies. Studying how trade flows respond to a change in the exchange rate or relative prices leads us to make a reliable decision in the global market.

One way to scrutinize trade flows behavior is to test Orcutt's (1950) hypothesis. Orcutt believed that trade flows respond to a change in exchange rate quicker than they do to a change in relative prices. If Orcutt's hypothesis is accepted, to manage a shock in trade flows, a country needs to focus on exchange rate policy rather than commercial policy.

Delayed response of trade flows to a change in the exchange rate or relative prices can be attributed to different factors such as recognition lag, decision lag, delivery lag, replacement lag, and production lag (Junz and Rhomberg, 1973). Recognition lag happens because buyers and sellers need time to adapt themselves to changes in relative price and exchange rate. However, this lag is different in terms of timing which is longer in international trade than domestic economy due to language and distance barriers in spreading of information. This lag has been narrowed since the Internet has become explosive around the world which has affected the speed of information distribution. The Internet as a global networking system eases communication among economic agents such as consumers and producers around the world. Furthermore, numerous agencies have become professional in predicting probable future changes which helps economic agents to adjust themselves more quickly in comparison with a few decades ago.

The second lag, decision lag, is the gap between forming new business connections and new orders placement. For example, a change in relative prices or exchange rate forces economic agents to substitute domestic and foreign products and use different inputs to remain competitive in the global market.

The third lag occurs due to distance obstacles to give response to new orders. It takes time for producers to meet an increase in demand of special products. This delivery gap can affect a producer's power in a country where a change in relative price happens. They cannot respond to a change in global market immediately till they receive their new orders.

The fourth lag is replacement lag due to inventories of materials which takes time to be used and replacing new materials to adjust with changes in the global market. Furthermore, producers place their materials orders and have contracts with the materials producers which cannot be cancelled under trade regulations easily. In other words, they have explicit inventories and implicit inventories on the way to deliver.

The last lag is production lag. In response to the global market in producing under new conditions such as input and output prices or new exchange rate policies, producers need time to be convinced to change their production process, such as promoting the capacity of the factory or using the abandoned line of production. If the global market cannot convince producers that their effort to meet new markets is not profitable, they might exit from the market and shut down the company. These lags influence the elasticity of trade flows with respect to prices or exchange rate in the short run and long run. It is reasonable that the long run elasticity of trade flows to a change in prices or exchange rate is higher than short run elasticity. Although the main purpose of this study is to investigate the responsiveness of trade flows to a change in prices and exchange rate, learning those lag limitations could be fruitful in applying trade policies.

This dissertation is organized as follows: chapter 2 reviews the literature. Model and methodology are discussed in chapter 3. Chapter 4 presents the empirical results for two samples of developed and developing countries. Finally, chapter 5 is devoted to testing the influence of relative prices and exchange rate on trade flows pre and post 1990.

Chapter 2: Literature Review

Orcutt (1950) believed that studies which focus on price elasticities of exports and imports reject the effectiveness of currency depreciation. He argued that the estimates of price elasticities of exports and imports are not reliable statistically. However, he showed that without having "retaliatory action" such as restrictions on imports or devaluation in trade partner countries, depreciation would be highly effective in improving trade flows of depreciating countries. He argued that studies underestimate the effectiveness of currency depreciation.

Orcutt mentioned that the price elasticities of exports and imports which are estimated in some studies support the effectiveness of depreciation in improving trade balances (Robinson 1947, Brown 1942, Liu 1949, and White 1949). They investigate that if the sum of the absolute values of price elasticities of exports and imports is greater than one (The Marshall-Lerner condition), depreciation will be effective in improving trade balances. Other studies indicate the ineffectiveness of depreciation (Adler 1945, 1946, Chang 1945-48, Derksen and Rombouts 1939, de Vegh 1941). There is still no consensus among economists around this issue. While Liu *et al*. (2007) indicated M-L condition holds for Hong Kong using ARDL approach, Prawoto (2007) showed that M-L condition holds just in Malaysia and Thailand using DOLS approach for four Asian countries. Irandoust *et al*. (2006) used panel cointegration for eight countries and found that the M-L condition holds just for two cases. However, Bahmani-Oskooee and Kara (2005) studied 28 countries using ARDL approach and found that the M-L condition holds for most countries.

Orcutt (1950) believed that there are some problems in predicting the effect of depreciation on trade balances such as errors and bias due to shift in demand schedule which makes estimation unreliable while we assume that we have stable demand and having shift in supply curve, strong correlation between price and income which makes separation of the effect of price and income more difficult, measurement error due to data collection and constructing indexes for imports and exports, estimation of short-run elasticities instead of long-run elasticities while the long-run elasticities are more larger than short-run elasticities, the demand is more sensitive to large price changes than to small price changes so we should have different estimation for different type of changes. Orcutt (1950) concluded that to avoid those problems we should study individuals commodities instead of using aggregate data on exports and imports since we can assume that we have stable individual demand and the shift will be related just to supply because "consumers are slow to change their habits (Orcutt 1950, p.126).

His famous conjecture is that "although the major variations in demand were probably due to variations in the relative price of the imports and the income of the importing country, minor variations were due to other factors. Even though minor, these variations must have been large relative to the influence of the price variation which was independent of income (Orcutt 1950, p.122)."

After three years of revaluation of the German mark and one year of new rate agreement (Smithsonian conference, 1972) government officials and researchers focus on the effectiveness of such a policy which is not confirmed by empirical work and is assessed under certain assumptions (Junz and Rhomberg, 1973). The timing of the response of trade flows to changes in prices was almost a "pure guesswork" but the timing and magnitude of the realignment attracted a lot of practical attention. Junz and Rhomberg (1973) ask this question that should we consider the lack of equilibrium (trade deficit and trade surplus) in trade flows as a an inefficiency of the exchange rate realignment or timing is the problem and the trade flows will respond to exchange rate changes in future? They try to discuss the question using empirical estimates of time dimension of responses of exports flows of manufactured goods among industrial countries to change in relative prices and exchange rate. They focus on "export market share" which does not fully indicate the competitiveness of the countries by itself and changes in relative prices is just one of its determinants.

The timing of trade effects of the 1972 realignment would happen between eighteen months and two years, however, we should expect delay in response of export flows due to other reasons. The delay in responsiveness of trade flows can be decomposed to different lags such as recognition lag, decision lag, delivery lag, replacement lag, and production lag. It takes time for producers and households to recognize what is going on in the market after a change happens in global market. After figuring out that what is happening in the market, economic agents need to make decision which takes time also. Even the economic agents are quick in making their decision there is delivery lag to meet their needs of new orders. Due to the past orders, they have to wait for making new orders by replacing materials which help them to remain competitive in the market. Finally, producers have to make decision about exiting from the market and shouting down the business or remain in the market by improving the production process.

Using annual data (1953-69) for thirteen industrial countries (Austria, Belgium-Luxembourg, Canada, Denmark, France, the Federal Republic of Germany, Italy, Japan, the Netherlands, Norway, Sweden, the United Kingdom, and the United States) they estimate market share elasticities with respect to a change in prices and exchange rate giving up to five annual lags and pooling the observation from thirteen countries. Junz and Rhomberg (1973) conclude that the lag of trade flows to relative price changes is longer than researchers have assumed which is around four to five years. Considering the exchange rate changes, the response of trade flows is very similar to price changes; however, the result cannot be applied for particular country since they applied pooled observation.

Wilson and Takacs (1979) emphasized the important implication of Orcutt's (1950) conjecture that the speed of response of trade flows to change in exchange rate is more rapid than to change in prices. They criticized Junz and Rhomberg (1973) which is the first study that considers the effect of exchange rate on trade flows. Empirical works such as T.C.Liu (1954) and Goldstein and Khan (1976), did not pay attention to the effect of exchange rate on trade flows. However, Wilson and Takacs believed that Junz and Rhomberg method has certain shortcomings. Junz and Rhomberg measured the market-share changes instead of trade flows directly. They pooled the sample and imposed same parameters restriction on each country in the pool.

Wilson and Takacs (1979) estimate the response of trade flows to change in prices and exchange rate using quarterly data (1957-71) for six major industrial countries (Canada, France, Germany, Japan, the United Kingdom and the United States) during the Bertton Woods period. They estimated demand for exports and demand for imports models which include exchange rate and relative prices and also income as dependent variables. The long run coefficients are derived using summation of different lags of exchange rate and prices based on logarithms of imports and exports demand. Due to lack of econometric standard to choose among different models, they chose the final model based on the signs and significance of different lags on prices and exchange rate. They imposed different lag length (4, 6, 8, 10, and 12) on regressors. In general, the variables in the imports and exports models have expected signs except German and U.K. import equation. Canadian, French, and U.K. exports showed unresponsive to prices and exchange rate. The income (economic activity) coefficients were positive except for Japanese export equation. In general, the results showed that the influence of exchange rate on trade flows is faster than relative prices based on the lag length of those variables in the fixed rate world. The results confirmed the Orcutt's (1950) conjecture, however, the results did not imply the magnitude of the coefficients of exchange rate and prices. Their study just focused on fixed rate era and Wilson and Takacs (1979) suspected that the results are also applicable for floating rates.

Bahmani-Oskooee (1984) used quarterly data (1973-1980) from floating rate era for the sample of seven developing countries (Brazil, Greece, India, Israel, Korea, South Africa, and Thailand) to test the Orcutt's (1950) conjecture. Unlike previous studies, he applied Almon procedure to impose different lags on exchange rate and prices to investigate Orcutt's hypothesis. The contribution of Bahmani-Oskooee's study is that unlike previous studies, he has criteria to impose different lag length to reduce the degree of multicollinearity among several lagged regressors. Following Wilson and Takacs (1979) he used the same model for imports and exports which include income (economic activity), relative prices, and exchange rate. He first estimated the models for the sample period without imposing any lags. After estimating the models, he eliminated the prices or exchange rate variables if they are either insignificant or wrong signed in the first estimation. For imports model, the results showed that relative price coefficients are significant and negative for Korea, South Africa, and Thailand. The exchange rate coefficients are significant and have expected positive sign only for Brazil and Greece. However, the result showed negative sign for Israel. The estimated coefficients for income are significant and positive for all countries except for India and Israel. For exports, the relative price coefficients are negative and significant for Brazil, India, and Israel. The income coefficients are positive and significant only for India and South Africa. However, in case of Israel, it has significant and unexpected negative sign. The exchange rate coefficients are significant and have negative sign for the result of Greece, Israel, and South Africa. Since the interest of Bahmani-Oskooee's paper is testing the Orcutt's (1950) conjecture, in second step, he estimated the model for exports and imports by imposing lags (maximum of eight lags) on exchange rate and prices. The estimated long-run coefficients (sum of the lagged variable coefficients) have expected signs except for Brazilian export demand function in which price coefficient has positive sign. The exchange rate coefficients have also expected signs except for Brazilian exports, Israel imports, Korean, South African, and Thai import and export equations. Income coefficients are also positive and statistically significant in most of cases. The result confirmed the Orcutt's conjecture in nine of 14 equations. In case of Greek, South Africa and the Thai import the lags of exchange rate and prices were equal in length. The opposite of Orcutt's conjecture occurs just in Brazilian and Thai export equations in which price lags are shorter than exchange rate lags. The study supports Orcutt's conjecture and the results reached the same conclusion of Wilson and Takacs (1979) findings for industrial countries.

Due to lack of empirical studies in African countries, Tegene (1989) follows Bahmani-Oskooee (1984) to test the effects of relative prices and effective exchange rates on trade flows using quarterly data (1973-1985) for the sample of less developed countries in Africa (Ethiopia, Cote d'Ivoire, Kenya, Malawi, Mauritius, Tunisia, and Zambia). He used the same process and models for exports and imports as Bahmani-Oskooee did in his paper. The import results illustrated that coefficients of relative prices are significant and have expected negative sign in all cases. However, the coefficients of exchange rate are significant and negative for Malawi and Mauritius. The income coefficients are significant and positive except for Malawi. The export results showed that relative prices coefficients are significant and have correct negative sign. In addition, all exchange rate coefficients are significant and have negative sign for Cote d'Ivoire, Malawi, Mauritius, and Tunisia. However, exchange rate coefficients have positive sign but they are not significant for Kenya and Zambia. Income coefficients in the export equations are significant just for Ethiopia, Kenya, and Tunisia. The long-run coefficients in both exports and import equations confirmed that trade flows are responsive to relative prices and exchange rate. Since the lags of exchange rate are shorter than the lags of relative prices, his findings support Orcutt's (1950) hypothesis for African countries. However, Tegene (1991) found the opposite result using vector autoregressive (VAR) model for the period of 1973-1985 for Ethiopia. The advantage of his approach is that VAR model can show feedback effects among the variables. Using VAR model for exports and imports equations, he investigated Granger-causality between all three variables in exports equation (export, relative price, exchange rate) and imports equation (import, relative price, exchange rate). The results confirmed one-way Granger-causality running from prices and exchange rates to imports and exports without significant feedback. He found that imports and exports have similar response to change in exchange rate and relative prices.

Bahmani-Oskooee and Kara (2003) argue that previous studies suffer from methodological problems in using non-stationary data. This means that previous studies findings suffer from "spurious regression" problem. To provide reliable estimates Bahmani and Kara employ Autoregressive Distributed Lag (ARDL) approach to investigate the Orcutt's (1950) hypothesis.

Using lags of dependent variable and lags of regressors as Instrumental variables (IV), Pesaran and Shin (1997) showed that even having endogenous regressors in ARDL model which allows having serial correlation in the residuals, OLS estimator is still consistent. The Mont Carlo simulation confirmed that ARDL approach works when the model has endogenous regressors, irrespective of whether the regressors are I(1) or I(0) (Pesaran and Shin, 1997, P.4).

Bahmani-Oskooee and Kara used quarterly data over the 1973-98 period for Australia, Canada, Denmark, France, Germany, Italy, Japan, and the US.

They found that price elasticities are less than one which implies inelastic export and import demand. In most cases, exchange rate elasticity has the same pattern. Income elasticities are greater in import demand than export demand. In the sense of responding of imports and exports to change in exchange rate and to change in prices, different countries have different results. They concluded that the results did not show general pattern in supporting Orcutt's conjecture. Bahmani-Oskooee and Kara (2008) also tested the Orcutt's hypothesis for sample of developing countries (Columbia, Greece, Hong Kong, Hungary, Israel, Korea, Pakistan, Philippines, Poland, Singapore, South African, and Turkey). Using the same model and approach (ARDL), their findings are similar to those found for developed countries. Since there is no specific pattern, Orcutt's conjecture supported for import demand function of Columbia, Hungary, Pakistan, and Poland. However, the results confirmed exactly opposite for Israel, Korea, the Philippines, Singapore, and Turkey. Greece, Hong Kong, and South Korea illustrated the same lags for exchange rate and prices. The same is true for export demand function.

Following Orcutt (1950.p126) who believed that we can reduce aggregation bias by using individual commodity data, Bahmani-Oskooee and Hosney (2015) investigate the Orcutt's conjecture for 59 industries between Egypt and European Union. They applied the same approach on Bahmani-Oskooee and Kara (2003). For import demand, the short-run coefficients show that only 20 out of 59 industries support Orcutt's conjecture since the lag length is shorter on the exchange rate than relative prices. Most of these industries are small; however, four of them are listed as large industries (Vegetable and fruit, Manufactures of metals, Office machines, Professional and scientific apparatus). In only nine industries the lag length are shorter for relative prices and among these nine industries, four of them are large industries (Iron and steel, Machinery specialized for particular industries, General industries machinery, Telecommunication and sound-recording and producing apparatus). The lag length for exchange rate and relative prices is the same for 30 remaining industries which includes the largest industry (Petroleum and petroleum related materials). In sum, the Orcutt's conjecture is supported just by 1/3rd of industries. The long-run coefficients illustrate that Egypt's income coefficients are significant for 32 industries in which 21 of them is negative which implies import-substitution policy in Egypt. The relative prices have significant and negative sign in 47 of 59 industries. However, exchange rate has expected negative sign and statistically significant just in 11 industries.

For export demand short-run coefficients Orcutt's conjecture is supported in 21 industries in which four of them are listed in large industries (Cork and wood, Machinery specialized for particular industries, General industrial machinery, Road vehicles). However, in seven industries results show the opposite. In 31 industries the lag length is the same. Again, Orcutt's conjecture is supported just by 1/3rd of industries. In addition, long-run coefficients of European income are significant in 32 industries in which 21 of them are positive and 11 of them are negative. In 38 industries, the exports price has expected negative sign which are statistically significant. Unlike import demand case, exchange rate coefficients are expected positive and significant in 24 industries.

In this thesis I employ Johansen's (1988) cointegration analysis to derive the generalized impulse response function (GIRF). Using this approach can help figure out how trade flows (exports and imports) respond to one standard deviation shock in exchange rate and one standard deviation shock in relative prices. Although there is a problem in using the VAR model when there is more than one cointegration relationship, the "statistical approach to identification" is not reliable (Pesaran and Shin, 2002), but the GIRF is not sensitive to the ordering of the variables in the VAR model (Pesaran and Shin, 1998) which has not been considered in previous studies. To test Orcutt's (1950) hypothesis, I investigate the behavior of exports and imports demand functions to see which one of the shocks (one standard deviation shock in relative prices or one standard deviation shock in exchange rates) will die out sooner. If the effect of one standard deviation shock in exchange rates dies out more quickly than the effect of one standard deviation shock in relative price, the Orcutt's hypothesis holds. Otherwise, I will reject the Orcutt's hypothesis in trade.

Chapter 3: The Models and the Methodology

Based on the literature, I assume that export and import demand functions depend upon income, relative price, and nominal effective exchange rate. I apply the standard export and import demand models which are specified by Wilson and Takacs (1979), Bahmani-Oskooee (1986), Tegene (1989), and Bahmani-Oskooee and Kara (2003). I follow log linear export demand as:

$$\ln X_t = a + b \ln YW_t + c \ln \left(\frac{PX}{PXW}\right)_t + d \ln E_t + \varepsilon_t \qquad (1)$$

Where

X_t = volume of export

YW_t = world income

PX = export price

PXW = price of world exports

E_t = nominal effective exchange rate

ε = error term

In Equation (1) we expect an estimate of ‘b’ to be positive, indicating that at higher level of world income, demand for export will be more. Increase in the price of a home country’s export, reduces exports and decrease in world export price does have the same effect indicating an estimate of ‘c’ would be negative. In other words, relative price has a negative effect on export. Finally, nominal effective exchange rate (number of units of foreign currency per unit of domestic currency) has a negative influence on export (d<0). Depreciation of home currency or decrease in nominal effective exchange rate is expected to increase exports.

Following the literature, I assume the import demand takes the following form:

$$\ln M_t = a' + b' \ln Y_t + c' \ln \left(\frac{PM}{PD}\right)_t + d' \ln E + \mu_t \qquad (2)$$

Where

M_t = volume of import

Y_t = home country income

PD = price of domestic goods

PM = price of imports

E_t = nominal effective exchange rate

μ = error term

In Equation (2) if a home country's income increases, import will increase indicating a home country's income has a positive relationship with imports[1]. An increase in domestic price or a decrease in price of imports affects imports negatively resulting in a negative impact of relative price on imports ($\hat{C}'<0$). I would expect depreciation (decrease in nominal effective exchange rate) decreases imports because at the same level of prices, cheaper home currency makes imports more expensive ($d'>0$).

[1] Note that if the increase in income is due to an increase in production of import substitute goods, a country will import less, resulting in a negative b' in the model (Bahmani-Oskooee and Kara, 2003).

To derive generalized impulse response functions of exports and imports to a shock in nominal effective exchange rate and a shock in relative prices, I rely upon Johansen and Juselius (1990) cointegration approach which estimates coefficients based on the maximum likelihood method. This approach can be used when there is more than one cointegrating vector due to feedback effects among variables. The specification in Johansen and Juselius (1990) follows the error-correction model such as:

$$\Delta X_t = \Gamma_1 \Delta X_{t-1} + \Gamma_2 \Delta X_{t-2} + \ldots + \Gamma_{k-1} \Delta X_{t-k+1} - \Pi X_{t-k} + \varepsilon_t \qquad (3)$$

Where; X is a vector that includes all variables (dependent and explanatory). According to export demand function (Eq-1) and import demand function (Eq-2), Π is a (4×4) cointegrating matrix. Note that in using the Johansen and Juselius (1990) approach we need I(1) variables. If X_t is integrated of order one, let's say non-stationary, ΔX_t is stationary but the right hand side includes both stationary and non-stationary processes. Therefore, only a stationary linear combination of X_{t-1} can allow for stationarity of ΔX_t.

In equation (3) rank of Π is the number of cointegrating vectors, let's say r. Since Π is of reduced rank $r \leq p$ (number of endogenous variables) it can be written as:

$$\Pi = \alpha\beta' \qquad (4)$$

Where α and β are $p \times r$ full rank matrices. Then:

$$\Delta X_t = \Gamma_1 \Delta X_{t-1} + \Gamma_2 \Delta X_{t-2} + \ldots + \Gamma_{k-1} \Delta X_{t-k+1} - \alpha\beta' X_{t-k} + \varepsilon_t \qquad (5)$$

Where

- $\beta' X_{t-1}$ is a $r \times 1$ vector of stationary cointegrating relations.
- All variables in (5) are now stationary.

- α indicates the speed of adjustment to equilibrium.

Johansen and Juselius (1990) proposed two statistics based on the estimates of eigenvalues of Π. The first statistic is λ-max and the other one is trace which can be used to figure out the number of cointegration vectors. Note that Cheung and Lai (1993) illustrate that λ-max and trace statistics should be adjusted by multiplying them by (T-nk)/T where T is the number of observations, n is the number of optimum lags, and k is the number of variables.

Johansen and Juselius (1990) estimate the long run coefficients of cointegrating vectors using the maximum likelihood estimation (MLE). To estimate the long run relationship as:

$$X_t = B'Z_t + \varepsilon_t \qquad (6)$$

Where

- $B' = (\Pi_1, \Pi_2, \ldots, \Pi_k)$
- $Z'_t = (X'_{t-1}, X'_{t-2}, \ldots, X'_{t-k}, 1)$
- $\varepsilon \sim$ iid $N_p(0, \Omega)$ where Ω is the variance-covariance matrix of the errors.

They apply log-likelihood function as follows:

$$\ln L(\beta, \Omega; X) = -T\frac{p}{2}\ln(2\pi) - T\frac{1}{2}\ln|\Omega| - \frac{1}{2}\sum_{t=1}^{T}(X_t - B'Z_t)'\,\Omega^{-1}\,(X_t - B'Z_t) \qquad (7)$$

Maximizing log- likelihood with respect to B' and Ω^{-1} gives the ML estimators.

Using the VAR is sensitive to the number of lags imposed oo the model (Pesaran, 1997). Hence, I employ Schwartz's Bayesian Criterion (SBC) which performs slightly better than

Akaike's Information Criterion (AIC) in choosing the order of VAR; let's say p, even in small samples[2]. I employ unrestricted VAR to determine the order of VAR in equation (3).

The unrestricted vector autoregressive (VAR) model of order k with p endogenous variables is given by:

$X_t = \Pi_1 X_{t-1} + \Pi_2 X_{t-2} + ... + \Pi_k X_{t-k} + ØD_t + \varepsilon_t$ (8)

Where

- X_t is the vector of the p variables at time t
- Π_i are p×p matrices of parameters with i= 1,…,k
- D_t a vector of deterministic components with a vector of coefficients Ø
- ε is a p×1 vector of errors

In using unrestricted VAR to determine the number of optimum lags, we assume that the VAR (k) is linear in the parameters, the parameters are constant, and the error terms are identically and independently distributed and follow a Gaussian (i.e. Normal) distribution.

Impulse Response Functions

When dealing with trade flows, it is of special interest to know how trade flows respond to innovations in the relative prices and exchange rate. Nowadays impulse response analysis has become a common tool. Impulse response analysis makes us able to see the effect of exogenous shock on one variable to other variables in the system. This approach is useful when we have a dynamic system over time. In a dynamic system which includes the lags of explanatory variables, we can give a single shock of one unit of standard deviation in one variable at time t

[2] Note that using AIC and SBC to select optimum number of lags in (3), we have the same optimum lags on all first-differenced variables.

with all errors in other period set to zero and see what will be the effect of that shock on other variables in the system (Koop et al., 1996).

If the k-dimensional VAR(p) is stationary with stable coefficients of $\left\{ A_i \right\}$:

$$\chi_t = A_1 x_{t-1} + \ldots + A_p x_{t-p} + u_t \qquad (9)$$

It can be written as an infinite vector moving average process:

$$\chi_t = \mu + \sum_{i=0}^{\infty} \Phi_i u_{t-i} \qquad (10)$$

Where Φ_0 is the identity matrix I_k and other coefficients can be computed recursively using:

$$\Phi_i = \sum_{j=1}^{i} \Phi_{i-j} A_j \qquad (11)$$

Φ_i (Coefficient matrices of MA) contains the impulse responses of the system with the jth column of representing the responses of each variable to a unit shock to the jth variable in the system (Luetkepohl, 2005).

The impulse response function illustrates the effect of a specific error in one variable to the other variables in the system. The assumption in using impulse response function is that the error terms are uncorrelated (orthogonalized) in the system of equations using Cholesky decomposition. This approach is also sensitive to the ordering of the variables in the VAR (Pesaran and Shin, 1997).

Pesaran and Shin (1997) propose 'generalized' impulse response analysis for the VAR models which does not require Orthogonalization of shocks and it is invariant to the ordering of the variables in the VAR.

Chapter 4: Empirical results

As a case study, I derive impulse response function based on the estimation of cointegrating vectors using the Johansen approach for eight industrial countries (Australia, Canada, Germany, Italy, Japan, Spain, UK, and the USA). The first step in using Johansen-Juselius approach is to make sure that each variable is integrated of order one or I(1). Dickey and Fuller (1979) suggested unit root test using Dickey-Fuller (DF) statistics. The Augmented Dickey-Fuller (ADF) statistics is an augmented version of DF statistics. As table 1 and 2 show, the calculated statistics of the first difference of all variables are less than critical values, it confirms that all variables in this study are I(1). Table 3 and 4 show the number of cointegrating vectors based on trace and λ-max statistics. Since the calculated statistics are less than their critical values, the null of no cointegration is accepted just in the case of Australia's exports. However since the trace test is marginally less I assume that there is at least one cointegrating vector. As can be seen the null of no cointegration is rejected in favor of r=1 which means there is one cointegrating vector in export demand function for Canada and the null of no cointegration is rejected in favor of r=3 which implies three cointegrating vectors for Germany. In the remaining countries there are two cointegrating vectors. For import demand function there is 2 cointegrating vectors for Australia, Germany, and USA. Except from Italy which has three cointegrating vectors, the remaining countries have just one cointegrating vector. Table 5 and 6 show the cointegrating vectors coefficients, which are normalized on dependent variables (export and import). Also, I did the exclusion test for corresponding variables in the models which rely upon the likelihood ratio test that has χ^2 distribution with degrees of freedom equal to the number of cointegrating vectors[3]. The likelihood ratio test can be used to investigate the goodness of fit of two models, one with assuming that the coefficient of the variable in the cointegrating vector is zero (the null) and the

[3] See Bahmani-Oskooee (1996) for more detailed of exclusion test.

other with including the variable in which the coefficient is not zero (the alternative). If the calculated statistics (χ^2) is greater than the critical value, the null is rejected which means we should have the variable in the cointegrating vector. It is clear that no all coefficients are significant. However, as my focus in this essay is impulse response analysis, I use full-information estimates from Johansen's error correction model to trace out generalized impulse response functions.

To scrutinize the impulse response analysis I do not relay upon just visual inspection and I employ the actual values of impulse responses. Tables 7 to 10 illustrate the visual inspection of GIRF for USA as an example for the sample. They show the effect of one standard error shock of exchange rate and relative prices in exports demand function and imports demand function numerically. For exports demand function, the shock of exchange rate dies after 16 quarters and the shock of relative price never dies which implies support for Orcutt's conjecture. However, the shock of exchange rate and the shock of relative price do not die.

The Fig. 1 show that Orcutt's hypothesis holds just for the U.S. export demand function since the shock of exchange rate on export dies out sooner than the shock of relative prices. For other countries the shocks do not die out (Italy and UK) or die out at the same time.

Fig. 2 shows that Orcutt's hypothesis holds for the import demand of Germany and Japan as the shocks of exchange rate dies out sooner than relative price shocks on imports. In the remaining countries in the sample the shocks never die out or die out at the same time.

I have gone through the same process to derive impulse response functions for the sample of developing countries (Hong Kong, Korea, Pakistan, Singapore, Thailand, and Turkey) exports and imports. Table.11 shows that the null of no cointegration can be rejected for Hong Kong, Pakistan, and Singapore export. However, the null of no cointegration cannot be rejected in Korea, Turkey, and Thailand. Since in these three cases the computed value is close to critical values, I assume at least one cointegrating vector. As can be seen I have two cointegrating vectors for Hong Kong and Pakistan. For remaining countries I have just one cointegrating vector. Table 12 illustrates that the null of no cointegration is rejected for import of all cases. Except Pakistan and Thailand which have one cointegrating vector, the other countries have two cointegrating vectors. Table 13 and table 14 illustrate MLE estimation of cointegrating vector coefficients as I had for developed countries.

As can be seen from Fig.3 none of the cases in the sample of developing countries supports Orcutt's hypothesis for export demand model except Korea and Singapore. For import demand model only Korea supports Orcutt's hypothesis. I report IRF table for Thailand (table 15 to 18) as an example of value inspection of impulse responses supporting visual inspection.

Conclusion

Orcutt's (1950) conjectured that trade flows (exports and imports) respond to change in exchange rate more quickly than they do to change in relative prices. Previous studies relay upon trade equations and distributed lag approach. They imposed lags on exchange rate and relative price. If number of significant lags on exchange rate is found to be shorter than the number of significant lags on relative price, Orcutt's hypothesis is supported.

In this essay I use generalized impulse response analysis based on cointegration and error correction modeling approach of Johansen and Juselius (1990) in which the order of lags are the same on all variables. I employ quarterly data over the 1973I-2013IV period for developed (Australia, Canada, Germany, Italy, Japan, Spain, UK, and the USA) and developing (Hong Kong, Korea, Pakistan, Singapore, Thailand, and Turkey) countries. My results were no different than the previous research in which I did not find support for Orcutt's hypothesis for most of the cases. In case of developed countries I just found support for export demand model of USA and import model of Germany and Japan. Furthermore none of the cases in the sample of developing countries supports Orcutt's hypothesis for export demand model except Korea and Singapore. For import demand model only Korea supports Orcutt's hypothesis. My findings for developing countries are similar to those found for developed countries.

Table.1 Augmented Dickey-Fuller (ADF) test, includes intercept but not a trend

variable	Australia	Canada	Germany	Hong Kong	Italy	Japan	Korea	Pakistan	Singapore	Spain	Thailand	Turkey	UK	USA
lx	-0.19	-1.25	-0.07	-1.65	-1.63	-2.87	-0.79	-1.45	-0.95	-0.59	-1.48	-0.86	-1.14	-0.17
dlx	-7.37	-5.35	-6.70	-4.00	-5.18	-7.50	-6.37	-3.95	-4.60	-5.95	-3.76	-3.64	-6.74	-5.63
lpxpw	-0.30	-0.31	-2.90	-2.67	-1.28	-1.52	-1.72	-0.23	-0.95	-2.94	-2.78	-1.20	-3.13	-2.89
dlpxpw	-4.21	-5.99	-6.68	-4.33	-5.63	-6.17	-5.77	-4.63	-5.03	-5.26	-3.91	-4.37	-6.98	-5.43
lm	-0.25	-0.31	-0.88	-1.53	-1.13	-0.63	-1.49	-2.26	-1.16	-0.90	-0.38	-1.84	-0.18	-0.89
dlm	-5.77	-6.41	-5.47	-4.66	-4.97	-5.96	-6.21	-3.88	-5.91	-7.13	-3.72	-5.09	-6.31	-6.22
lpmpd	-3.42	-1.75	-2.39	-1.81	-2.70	-1.38	-1.70	-1.01	-1.94	-2.79	-2.67	-3.57	-2.38	-1.80
dlpmpd	-5.09	-6.56	-6.21	-3.96	-5.41	-5.96	-7.08	-3.40	-5.35	-6.04	-5.01	-1.35	-6.40	-6.35
ly	-1.35	-0.13	-0.76	-0.95	-1.90	-1.71	-2.62	-0.78	-0.60	-1.44	-0.39	-0.58	-2.07	-0.75
dly	-6.20	-5.56	-6.30	-4.41	-6.78	-6.38	-5.96	-5.01	-5.51	-5.47	-3.09	-4.31	-5.48	-5.49
lneer	-1.66	-1.72	-2.75	-2.21	-3.83	-1.77	-1.64	-0.21	-1.12	-2.94	-2.17	-2.20	-2.36	-1.82
dlneer	-4.45	-5.94	-5.81	-5.66	-4.75	-5.03	-6.13	-4.55	-3.76	-6.04	-4.52	-4.64	-5.73	-4.45
lyw	-1.56													
dlyw	-7.23													

Table.2 Augmented Dickey-Fuller (ADF) test, includes intercept and a linear trend

variable	Australia	Canada	Germany	Hong Kong	Italy	Japan	Korea	Pakistan	Singapore	Spain	Thailand	Turkey	UK	USA
lx	-3.87	-1.00	-3.35	-1.65	-1.8	-3.30	-3.75	-0.18	-1.96	-2.17	-2.02	-1.83	-1.5	-3.2
dlx	-7.37	-5.50	-6.70	-4.43	-5.4	-7.97	-6.38	-4.15	-4.65	-5.94	-3.81	-3.63	-6.8	-5.6
lpxpw	-1.22	-2.98	-3.02	-3.71	-3.3	-2.21	-1.65	-0.001	-1.98	-3.03	-2.37	-2.40	-3.1	-2.9
dlpxpw	-4.45	-5.99	-6.68	-4.31	-5.6	-6.14	-6.12	-5.65	-4.99	-5.31	-4.38	-4.35	-7.2	-5.4
lm	-4.66	-2.98	-3.39	-1.77	-2.1	-2.79	-2.43	-1.46	-2.00	-2.11	-2.51	-4.56	-2.4	-2.9
dlm	-5.74	-6.39	-5.44	-5.03	-5.1	-5.94	-6.34	-4.25	-5.98	-7.11	-3.90	-5.07	-6.3	-6.2
lpmpd	-2.32	-1.81	-2.57	-1.32	-1.2	-2.14	-2.33	-2.01	-2.27	-1.43	-2.28	-2.38	-2.1	-3.1
dlpmpd	-5.73	-6.63	-6.14	-4.40	-6.2	-6.04	-7.14	-3.40	-5.42	-6.87	-5.43	-4.63	-6.8	-6.3
ly	-1.32	-2.99	-4.45	-2.36	-0.8	-1.22	-2.31	-0.88	-3.76	-0.32	-2.56	-2.35	-0.8	-2.2
dly	-6.36	-5.56	-6.28	-4.58	-7.1	-6.58	-6.60	-5.01	-5.49	-5.79	-7.59	-4.28	-5.5	-5.5
lneer	-2.15	-1.95	-2.25	-2.17	-2.7	-1.21	-2.59	-2.08	-2.85	-2.54	-1.78	-1.77	-3	-0.8
dlneer	-4.58	-6.26	-6.20	-5.68	-5.4	-5.21	-6.21	-4.52	-3.75	-6.87	-4.72	-4.89	-5.7	-4.9
lyw	-3.93													
dlyw	-7.29													

Table 3

Johansen's maximum likelihood results for export (r = number of co-integrating vectors)

	λ-max				Trace			
Null	r=0	r ≤ 1	r ≤ 2	r ≤ 3	r=0	r ≤ 1	r ≤ 2	r ≤ 3
Alternative	r=1	r = 2	r = 3	r = 4	r=1	r = 2	r = 3	r = 4
Australia	22.51	14.39	5.17	3.32	45.41	22.90	8.50	3.32
Canada	33.38	15.99	6.90	4.70	60.99	27.60	11.61	4.70
Germany	31.47	25.51	11.84	6.47	75.30	43.83	18.32	6.47
Italy	29.65	22.49	8.94	5.93	67.03	37.37	14.88	5.93
Japan	52.28	21.46	10.96	2.47	87.18	34.89	13.44	2.47
Spain	27.09	22.93	7.24	3.78	61.06	33.96	11.03	3.78
UK	41.74	34.46	8.00	5.56	89.77	48.02	13.56	5.56
USA	31.27	28.36	9.42	2.67	71.78	40.46	12.09	2.67
90% critical value	25.80	19.86	13.81	7.53	49.95	31.93	17.88	7.53

Note: The order of the VAR is selected by SBC.

Table 4

Johansen's maximum likelihood results for import (r = number of co-integrating vectors)

	λ-max				Trace			
Null	r=0	r ≤ 1	r ≤ 2	r ≤ 3	r=0	r ≤ 1	r ≤ 2	r ≤ 3
Alternative	r=1	r = 2	r = 3	r = 4	r=1	r = 2	r = 3	r = 4
Australia	34.10	29.27	9.11	3.27	75.77	41.67	12.39	3.27
Canada	22.40	10.23	7.33	2.09	42.05	19.64	9.42	2.09
Germany	32.64	27.55	9.85	3.35	73.41	40.77	13.21	3.35
Italy	29.74	16.08	14.13	6.47	66.43	36.69	20.61	6.47
Japan	39.19	8.86	7.40	4.86	60.32	21.13	12.26	4.86
Spain	35.12	17.19	10.87	2.10	65.30	30.14	12.97	2.10
UK	33.02	14.35	10.89	3.80	62.10	29.07	14.73	3.80
USA	30.25	18.58	11.50	6.27	66.61	36.36	17.77	6.27
90% critical value	25.80	19.86	13.81	7.53	49.95	31.93	17.88	7.53

Note: The order of the VAR is selected by SBC.

Table 5

The maximum likelihood estimate of each co-integrating vectors for export

	log X	log EX	log P_x	log Y_{world}	Intercept
Australia					
CV1	-1.00 (8.48)	0.67 (1.62)	0.70 (4.71)	3.75 (8.15)	-15.68 (7.56)
Canada					
CV1	-1.00 (17.29)	0.53 (4.86)	-0.21 (0.57)	3.55 (17.34)	-14.21 (17.45)
Germany					
CV1	-1.00	-3.76	-0.57	7.39	-11.79
CV2	-1.00	7.83	-12.16	-2.95	-20.88
CV3	-1.00 (9.45)	334.7 (16.00)	-9.14 (1.80)	-153.6 (27.17)	-815.5(12.53)
Italy					
CV1	-1.00	-1.29	1.61	0.25	9.32
CV2	-1.00 (9.68)	0.46 (13.48)	-0.69 (12.67)	3.52 (15.60)	-13.71(16.92)
Japan					
CV1	-1.00	-0.40	0.20	3.15	-7.88
CV2	-1.00 (8.98)	-0.84 (7.43)	0.03 (0.27)	5.52 (23.47)	-16.92(20.81)
Spain					
CV1	-1.00	-2.49	6.84	2.73	3.76
CV2	-1.00 (11.77)	21.26 (16.39)	-26.06 (15.35)	18.55 (16.53)	-179.42 (16.07)
UK					
CV1	-1.00	-1.07	-3.96	2.77	-3.26
CV2	-1.00 (25.35)	-0.10(1.64)	-0.29 (15.35)	2.78 (27.37)	-7.77 (14.39)
USA					
CV1	-1.00	0.92	-4.72	0.68	-2.37
CV2	-1.00 (13.35)	-1.49 (20.61)	-0.71 (13.04)	6.80 (19.84)	-19.57 (20.59)

Note: At the 5% level of significance, the critical value of the χ^2 statistic with one degree of freedom is 3.84.

Table 6

The maximum likelihood estimate of each co-integrating vectors for import

	log M	log EX	log Pm	log Ycountry	Intercept
Australia					
CV1	-1.00	0.84	0.48	3.75	-16.51
CV2	-1.00 (24.81)	1.45 (12.21)	-0.26 (4.00)	2.33 (22.38)	-12.61 (24.89)
Canada					
CV1	-1.00 (0.13)	4.24 (2.40)	-7.67 (6.71)	-3.38 (0.36)	1.23 (0.005)
Germany					
CV1	-1.00	-0.43	-0.33	3.39	-9.09
CV2	-1.00 (13.51)	0.46 (2.46)	-1.48 (12.50)	2.05 (18.12)	-6.81(10.45)
Italy					
CV1	-1.00	-1.50	-0.17	-0.61	14.19
CV2	-1.00	1.71	-3.02	-3.49	12.66
CV3	-1.00 (6.33)	16.91 (8.25)	-7.14 (7.29)	-8.66 (2.21)	-33.23(7.14)
Japan					
CV1	-1.00 (19.92)	1.16 (29.32)	-0.25 (1.14)	-0.84 (6.86)	2.98 (8.00)
Spain					
CV1	-1.00 (1.65)	-4.31 (1.30)	0.55 (0.10)	-2.61 (0.48)	36.07 (2.26)
UK					
CV1	-1.00 (11.90)	-0.45 (0.38)	-1.98 (12.41)	-1.89 (2.38)	15.26 (7.04)
USA					
CV1	-1.00	0.46	-2.73	-0.01	2.48
CV2	-1.00 (6.61)	-0.17(3.43)	0.13 (5.53)	2.53 (6.28)	-6.29 (7.13)

Note: At the 5% level of significance, the critical value of the χ^2 statistic with one degree of freedom is 3.84.

Table.7 Generalized Impulse Response(s) to one S.E. shock in the equation for LNEER for U.S. export

Horizon	LX	LNEER	LPXPXW	LYW
0	-0.0062192	0.026833	0.018995	-0.002495
1	-0.015035	0.036922	0.022375	-0.0065779
2	-0.022255	0.039042	0.021277	-0.0069492
3	-0.025307	0.04229	0.021421	-0.0054507
4	-0.02405	0.04414	0.01911	-0.0053233
5	-0.027671	0.046036	0.018701	-0.0038673
6	-0.027978	0.047112	0.018257	-5.43E-04
7	-0.025749	0.046318	0.016314	0.0017226
8	-0.025996	0.045452	0.014888	0.0016429
9	-0.02724	0.045646	0.014644	0.0017289
10	-0.027051	0.045305	0.014011	0.0027117
11	-0.026638	0.044697	0.013609	0.002811
12	-0.027767	0.044523	0.013819	0.0012366
13	-0.028794	0.044303	0.013815	3.75E-04
14	-0.028574	0.043977	0.013697	0.0010037
15	-0.027731	0.043971	0.013984	0.0013369
16	-0.028007	0.044147	0.014368	3.92E-04
17	-0.028451	0.044142	0.014388	1.59E-04
18	-0.027872	0.044083	0.014263	0.0011457
19	-0.026895	0.044213	0.014364	0.0016691
20	-0.027219	0.044438	0.014559	8.90E-04
21	-0.02781	0.044477	0.014489	6.34E-04
22	-0.027502	0.044386	0.014279	0.0013624
23	-0.02685	0.044429	0.014305	0.001663
24	-0.0273	0.044581	0.014475	8.59E-04
25	-0.027866	0.044574	0.014425	5.93E-04
26	-0.027579	0.04446	0.01426	0.0012324
27	-0.026955	0.044488	0.014312	0.001522
28	-0.027289	0.044625	0.014479	8.57E-04
29	-0.027711	0.044626	0.014441	6.86E-04
30	-0.027411	0.044541	0.0143	0.001284
31	-0.026844	0.04458	0.014346	0.0015449
32	-0.027153	0.044708	0.014485	9.50E-04
33	-0.027532	0.04471	0.014444	7.99E-04
34	-0.027284	0.044637	0.014317	0.0013094
35	-0.026804	0.044671	0.014358	0.0015163
36	-0.027098	0.044781	0.014482	9.77E-04
37	-0.027426	0.04478	0.014445	8.52E-04
38	-0.027199	0.044716	0.014337	0.0013051
39	-0.026769	0.044749	0.014377	0.0014866
40	-0.02703	0.044847	0.014487	0.0010132
41	-0.027304	0.044847	0.014453	9.19E-04
42	-0.027097	0.044793	0.014358	0.0013216
43	-0.026717	0.044826	0.014394	0.0014771
44	-0.026955	0.044914	0.014489	0.0010552
45	-0.02719	0.044914	0.014457	9.81E-04
46	-0.027007	0.044867	0.014374	0.0013331
47	-0.026674	0.044897	0.014408	0.0014642
48	-0.026891	0.044975	0.014492	0.0010882
49	-0.027091	0.044975	0.014462	0.0010311
50	-0.026926	0.044935	0.01439	0.001342

Table.8 Generalized Impulse Response(s) to one S.E. shock in the equation for LPXPXW for U.S. export

Horizon	LX	LNEER	LPXPXW	LYW
0	-0.0061793	0.02171	0.023478	-0.0026152
1	-0.014192	0.028545	0.027182	-0.0064142
2	-0.01822	0.029874	0.02611	-0.0056384
3	-0.022072	0.034151	0.028203	-0.0027975
4	-0.019825	0.039212	0.029483	-0.0028862
5	-0.025267	0.040006	0.027825	-0.0032168
6	-0.027444	0.040038	0.026514	-2.15E-04
7	-0.026758	0.039519	0.024988	0.0021514
8	-0.027253	0.038429	0.023486	0.0012494
9	-0.031187	0.037807	0.023009	-1.65E-05
10	-0.032101	0.036657	0.02215	0.0012094
11	-0.031754	0.03519	0.021398	0.0018424
12	-0.033061	0.034316	0.02153	1.17E-04
13	-0.035623	0.033591	0.021608	-0.0015361
14	-0.035962	0.032483	0.021191	-5.86E-04
15	-0.035386	0.031669	0.021191	9.45E-05
16	-0.036093	0.031277	0.021598	-0.0011979
17	-0.038042	0.030716	0.021599	-0.0024039
18	-0.038237	0.029901	0.021229	-0.0013402
19	-0.037707	0.029327	0.021177	-6.68E-04
20	-0.038465	0.028995	0.02141	-0.0018209
21	-0.040415	0.028475	0.021327	-0.0029293
22	-0.040736	0.027702	0.020934	-0.0020558
23	-0.040431	0.027112	0.020831	-0.0015707
24	-0.041238	0.026747	0.021021	-0.0026512
25	-0.043026	0.026226	0.020947	-0.0036435
26	-0.043304	0.025481	0.020596	-0.0028594
27	-0.043057	0.024916	0.020513	-0.0024421
28	-0.043778	0.024561	0.020687	-0.0033838
29	-0.045361	0.024068	0.020616	-0.0042372
30	-0.045604	0.023381	0.020302	-0.0035284
31	-0.045432	0.022858	0.020228	-0.0031896
32	-0.046117	0.022514	0.020374	-0.0040408
33	-0.047564	0.022045	0.0203	-0.0048045
34	-0.047804	0.021406	0.020019	-0.004186
35	-0.047709	0.020915	0.019953	-0.0039242
36	-0.048359	0.020579	0.020077	-0.0046923
37	-0.049673	0.020132	0.020006	-0.0053684
38	-0.049897	0.019538	0.019755	-0.0048184
39	-0.049854	0.019078	0.019697	-0.0046112
40	-0.050461	0.018753	0.019801	-0.0052972
41	-0.051653	0.018328	0.019731	-0.0058939
42	-0.051864	0.017776	0.019505	-0.005406
43	-0.051869	0.017345	0.019452	-0.0052481
44	-0.052441	0.01703	0.01954	-0.0058644
45	-0.053526	0.016626	0.019471	-0.0063952
46	-0.053728	0.016112	0.019268	-0.0059649
47	-0.053774	0.015707	0.01922	-0.0058493
48	-0.05431	0.015403	0.019293	-0.0064025
49	-0.0553	0.015019	0.019226	-0.0068742
50	-0.055491	0.01454	0.019043	-0.006494

Table.9 Generalized Impulse Response(s) to one S.E. shock in the equation for LNEER for U.S. import

Horizon	LM	LNEER	LPMPD	LYUS
0	0.0034887	0.027586	-0.016115	9.68E-04
1	0.0018037	0.038703	-0.02134	8.78E-05
2	0.0022522	0.040086	-0.020118	-1.16E-04
3	0.0034041	0.042832	-0.018479	0.0014885
4	0.0104	0.046526	-0.019331	0.0030566
5	0.012824	0.050444	-0.022118	0.0043371
6	0.021309	0.054837	-0.024691	0.006394
7	0.02547	0.059333	-0.026133	0.0078975
8	0.029615	0.061677	-0.027308	0.010011
9	0.030962	0.061162	-0.024632	0.010848
10	0.03716	0.06198	-0.023484	0.011653
11	0.038691	0.06453	-0.024665	0.013121
12	0.043533	0.065733	-0.025282	0.014542
13	0.045269	0.065342	-0.0241	0.015493
14	0.049134	0.065416	-0.023551	0.016889
15	0.051499	0.064813	-0.02246	0.018647
16	0.055388	0.063993	-0.021199	0.020129
17	0.057544	0.064286	-0.020844	0.022239
18	0.063002	0.064825	-0.020671	0.024166
19	0.063806	0.064744	-0.019811	0.025268
20	0.064797	0.064495	-0.018732	0.026339
21	0.065592	0.064694	-0.018075	0.027534
22	0.068767	0.064706	-0.017548	0.028511
23	0.067805	0.065497	-0.017401	0.029305
24	0.069425	0.066037	-0.017196	0.030168
25	0.069529	0.066566	-0.017108	0.030701
26	0.070978	0.066939	-0.016906	0.03111
27	0.070267	0.067694	-0.016672	0.03151
28	0.071322	0.068427	-0.016777	0.031828
29	0.07065	0.069488	-0.017172	0.031994
30	0.071836	0.070342	-0.017338	0.032036
31	0.071042	0.071066	-0.01739	0.032071
32	0.071404	0.071686	-0.017634	0.032098
33	0.070995	0.072461	-0.017993	0.032087
34	0.072373	0.073065	-0.018266	0.032087
35	0.071865	0.073777	-0.018604	0.032126
36	0.072571	0.074291	-0.018877	0.032142
37	0.072383	0.074825	-0.019147	0.032155
38	0.073783	0.075087	-0.019232	0.032248
39	0.073575	0.075433	-0.019301	0.032334
40	0.074335	0.075633	-0.019395	0.032456
41	0.074361	0.075863	-0.019515	0.032631
42	0.075831	0.075813	-0.019442	0.032815
43	0.075673	0.075854	-0.019356	0.032994
44	0.076391	0.075808	-0.019305	0.033235
45	0.076568	0.075789	-0.019262	0.03348
46	0.077811	0.075657	-0.019132	0.0337
47	0.077622	0.075662	-0.019007	0.033928
48	0.078223	0.075552	-0.01887	0.034158
49	0.078189	0.075495	-0.018772	0.034355
50	0.079109	0.07538	-0.018614	0.034544

Table.10 Generalized Impulse Response(s) to one S.E. shock in the equation for LPMPD for U.S. import

Horizon	LM	LNEER	LPMPD	LYUS
0	-0.0038239	-0.02212	0.020097	-0.0014514
1	-0.0062019	-0.029509	0.024955	-0.0022531
2	-0.008227	-0.030352	0.023574	-0.0033219
3	-0.011001	-0.032901	0.022848	-0.005744
4	-0.020367	-0.038223	0.025655	-0.0086839
5	-0.025636	-0.040271	0.025481	-0.010447
6	-0.032943	-0.042983	0.025539	-0.01245
7	-0.033048	-0.046396	0.026533	-0.013356
8	-0.034595	-0.046478	0.025707	-0.013846
9	-0.034049	-0.044041	0.022411	-0.014343
10	-0.039715	-0.043613	0.021743	-0.015551
11	-0.040194	-0.045143	0.023405	-0.016898
12	-0.043497	-0.045439	0.02434	-0.017751
13	-0.045724	-0.04473	0.023654	-0.018428
14	-0.049397	-0.044797	0.02351	-0.019065
15	-0.048274	-0.044942	0.022992	-0.019797
16	-0.050796	-0.044774	0.022222	-0.020656
17	-0.052569	-0.045129	0.021931	-0.021739
18	-0.055818	-0.045324	0.021609	-0.022727
19	-0.05415	-0.044866	0.020751	-0.023425
20	-0.055921	-0.043775	0.019819	-0.02429
21	-0.056975	-0.043575	0.019647	-0.025124
22	-0.059523	-0.043608	0.019577	-0.025773
23	-0.057723	-0.044181	0.01968	-0.026282
24	-0.059086	-0.044533	0.019842	-0.026712
25	-0.05914	-0.04504	0.019887	-0.026856
26	-0.060174	-0.045284	0.019572	-0.026898
27	-0.058223	-0.045731	0.019354	-0.027009
28	-0.059073	-0.046123	0.019537	-0.027085
29	-0.05886	-0.046672	0.019784	-0.027084
30	-0.059933	-0.046878	0.01968	-0.027093
31	-0.058321	-0.047154	0.019685	-0.027121
32	-0.058979	-0.047386	0.019958	-0.027142
33	-0.058998	-0.047826	0.020263	-0.027126
34	-0.060234	-0.048077	0.020341	-0.027097
35	-0.058788	-0.048575	0.020603	-0.027042
36	-0.059368	-0.048881	0.020902	-0.026979
37	-0.059397	-0.049152	0.021051	-0.026903
38	-0.060483	-0.049183	0.020971	-0.026877
39	-0.059336	-0.049414	0.021038	-0.026899
40	-0.06008	-0.049454	0.021175	-0.026971
41	-0.060359	-0.049482	0.021218	-0.027054
42	-0.061509	-0.049337	0.021067	-0.02715
43	-0.060584	-0.049363	0.02102	-0.027263
44	-0.061257	-0.049261	0.021049	-0.027401
45	-0.061524	-0.04922	0.021033	-0.027513
46	-0.062481	-0.04909	0.020879	-0.027612
47	-0.061563	-0.049114	0.020816	-0.02772
48	-0.06207	-0.048998	0.020796	-0.027833
49	-0.062214	-0.048941	0.020744	-0.027917
50	-0.062982	-0.048814	0.020577	-0.028004

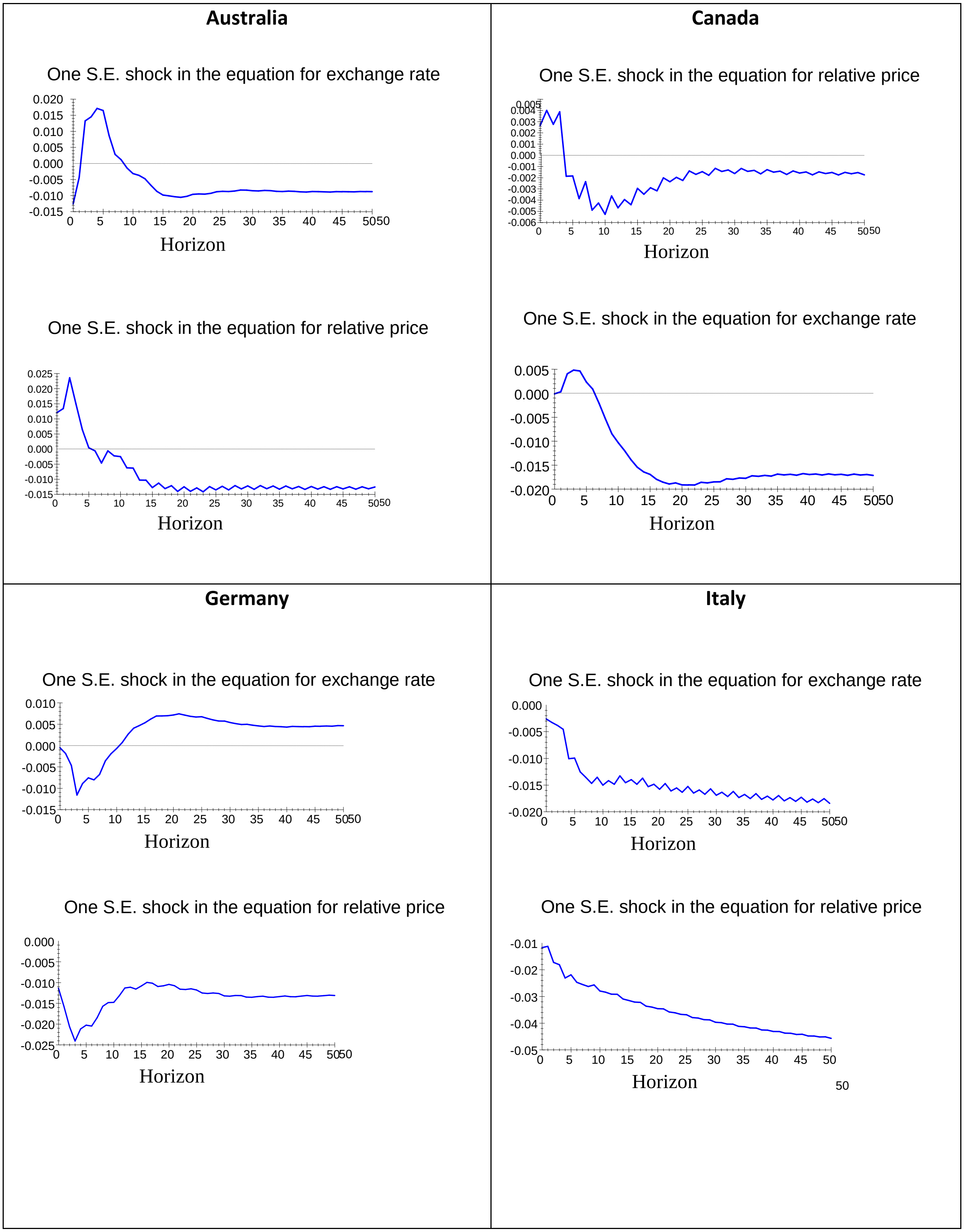
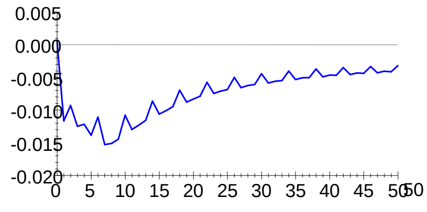


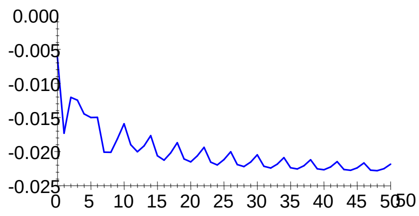
Fig. 1 GIR of export to a one standard error shock in the equation for exchange rate and relative price

Japan

One S.E. shock in the equation for exchange rate

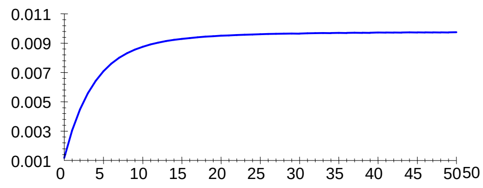


One S.E. shock in the equation for relative price

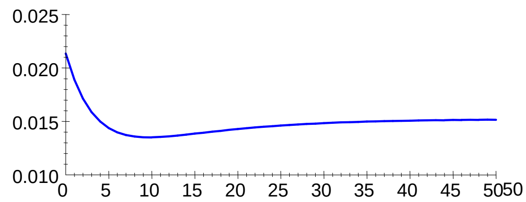


Spain

One S.E. shock in the equation for exchange rate

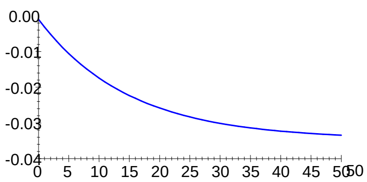


One S.E. shock in the equation for relative price

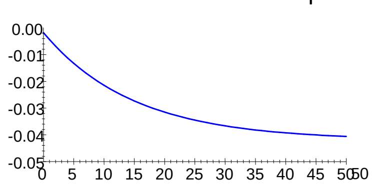


UK

One S.E. shock in the equation for exchange rate

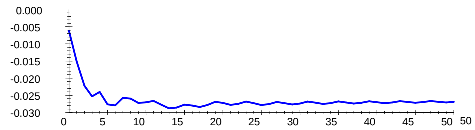


One S.E. shock in the equation for relative price



USA

One S.E. shock in the equation for exchange rate



One S.E. shock in the equation for relative price

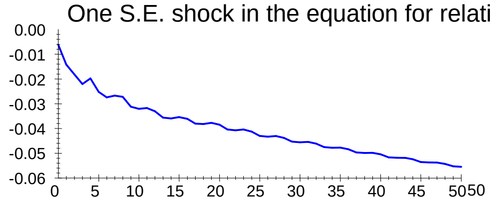


Fig. 1 continued

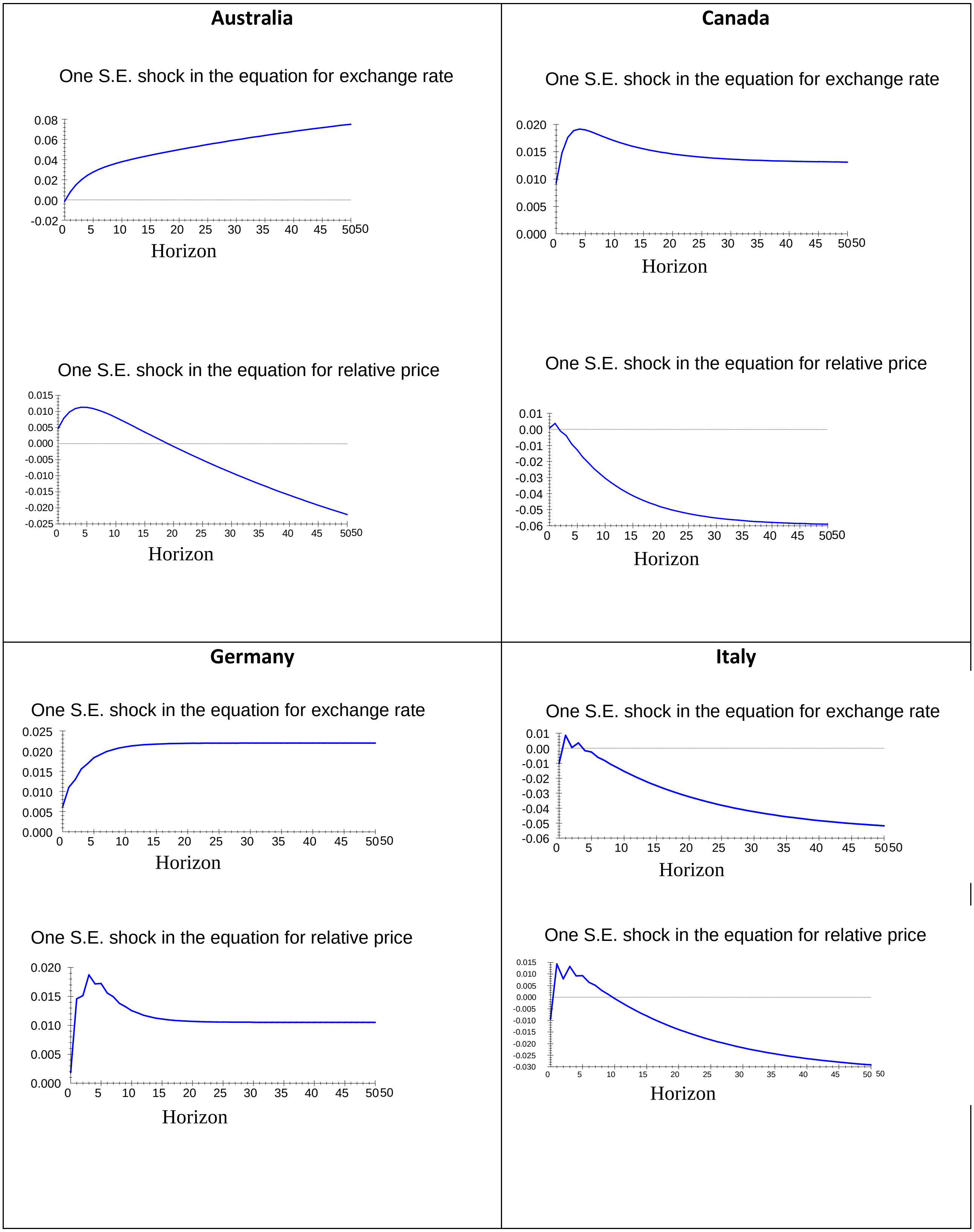


Fig. 2 GIR of import to a one standard error shock in the equation for exchange rate and relative price

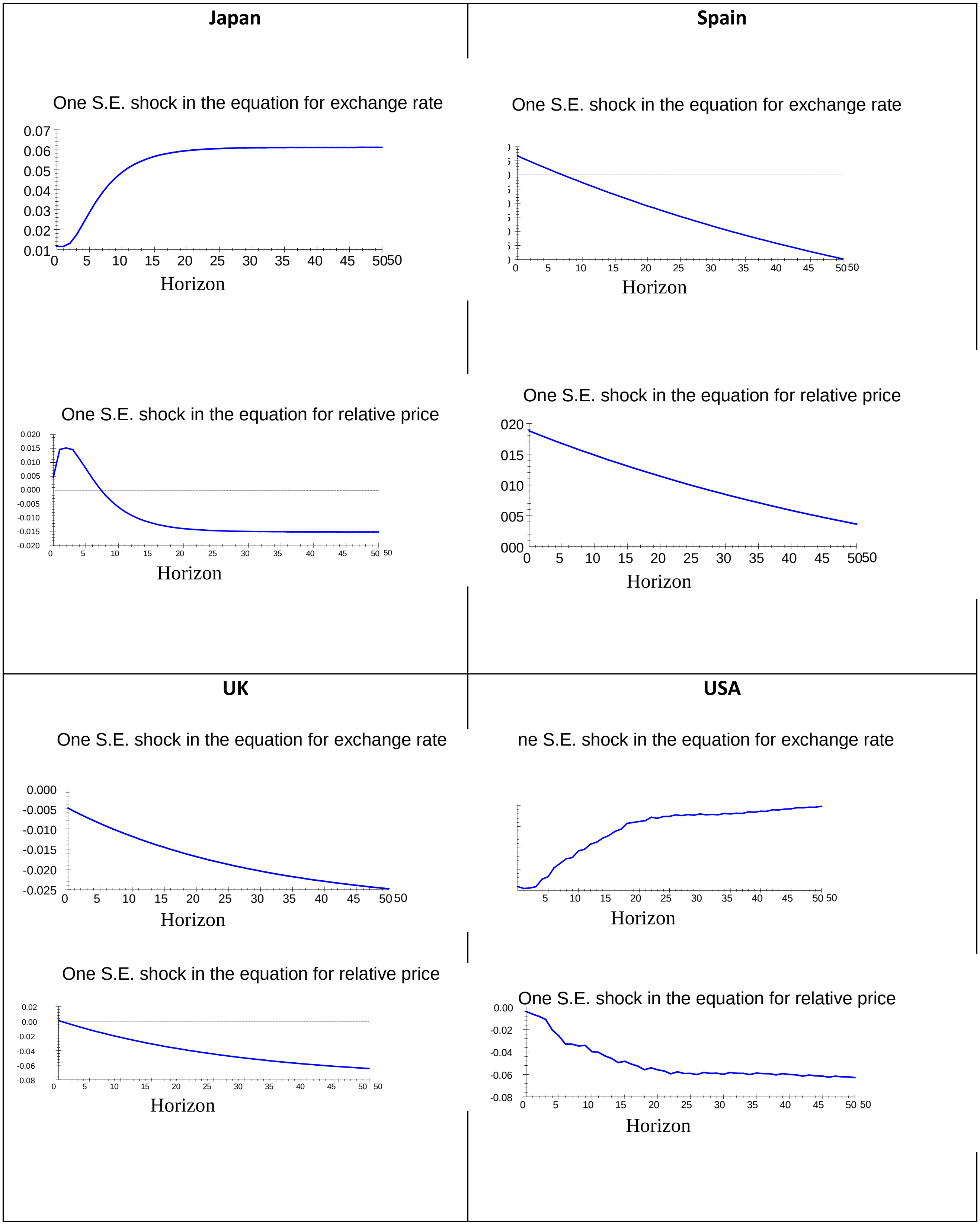


Fig. 2 continued

Table 11

Johansen's maximum likelihood results for export (r = number of co-integrating vectors)

	λ-max				Trace			
Null	r=0	r ≤ 1	r ≤ 2	r ≤ 3	r=0	r ≤ 1	r ≤ 2	r ≤ 3
Alternative	r=1	r = 2	r = 3	r = 4	r=1	r = 2	r = 3	r = 4
Hong Kong	29.52	21.49	11.11	8.29	70.41	40.89	19.40	8.29
Korea	24.70	9.75	7.45	4.05	45.95	21.25	11.50	4.05
Pakistan	35.96	21.06	10.09	5.41	72.53	36.56	15.50	5.41
Singapore	43.95	10.54	6.88	3.35	64.74	20.79	10.24	3.35
Thailand	23.86	15.12	11.68	5.15	55.80	31.95	16.83	5.15
Turkey	25.12	11.54	5.86	4.29	46.82	21.70	10.16	4.29
90% critical value	25.80	19.86	13.81	7.53	49.95	31.93	17.88	7.53

Note: The order of the VAR is selected by SBC and AIC.

Table 12

Johansen's maximum likelihood results for import (r = number of co-integrating vectors)

	λ-max				Trace			
Null	r=0	r ≤ 1	r ≤ 2	r ≤ 3	r=0	r ≤ 1	r ≤ 2	r ≤ 3
Alternative	r=1	r = 2	r = 3	r = 4	r=1	r = 2	r = 3	r = 4
Hong Kong	36.92	29.19	11.04	7.00	84.18	47.25	18.04	7.00
Korea	32.27	30.13	13.75	6.87	83.05	50.77	20.62	6.87
Pakistan	42.24	15.33	8.02	7.48	73.10	30.85	15.52	7.48
Singapore	68.56	29.08	11.13	2.60	111.3	42.83	13.73	2.60
Thailand	47.32	15.62	11.23	9.56	83.77	36.45	20.81	9.56
Turkey	63.67	33.07	17.75	7.91	122.4	58.75	25.67	7.91
90% critical value	25.80	19.86	13.81	7.53	49.95	31.93	17.88	7.53

Note: The order of the VAR is selected by SBC and AIC.

Table 13

The maximum likelihood estimate of each co-integrating vectors for export

	log X	log EX	log P_x	log Y_{world}	Trend
Hong Kong					
CV1	-1.00	0.83	-1.45	-1.04	0.02
CV2	-1.00 (17.60)	-1.99 (15.76)	1.90 (14.05)	4.94 (10.21)	0.002 (16.71)
Korea					
CV1	-1.00 (1.24)	1.89 (4.63)	-0.25 (0.22)	6.20 (16.34)	0.02 (0.95)
Pakistan					
CV1	-1.00	-0.01	-0.23	3.38	0.001
CV2	-1.00 (24.21)	1.82 (9.13)	-0.39 (2.01)	-1.00 (24.32)	0.04 (12.42)
Singapore					
CV1	-1.00 (27.61)	0.83 (8.78)	-0.37 (4.67)	1.92 (28.15)	0.013 (16.64)
Thailand					
CV1	-1.00 (1.45)	3.75 (0.26)	-2.23 (0.33)	1.84 (0.07)	0.003 (0.11)
Turkey					
CV1	-1.00 (4.41)	2.39 (14.07)	-4.75 (12.44)	4.83 (19.87)	0.032 (9.05)

Note: At the 5% level of significance, the critical value of the χ^2 statistic with one degree of freedom is 3.84; with two degrees of freedom is 5.99

Table 14

The maximum likelihood estimate of each co-integrating vectors for import

	log M	log EX	log Pm	log Ycountry	Trend
HongKong					
CV1	-1.00	-3.49	-2.74	-2.51	0.03
CV2	-1.00 (12.66)	0.80 (25.14)	-0.39 (28.63)	1.81 (6.43)	0.003 (10.15)
Korea					
CV1	-1.00	0.71	-0.76	1.23	0.00
CV2	-1.00 (13.42)	0.09 (9.33)	-1.54 (17.67)	-0.25 (15.11)	0.02 (16.96)
Pakistan					
CV1	-1.00 (0.16)	-16.34 (25.09)	-3.87 (1.63)	7.14 (7.88)	-0.29 (16.03)
Singapore					
CV1	-1.00	-0.39	0.30	4.18	-0.04
CV2	-1.00 (16.43)	-0.69 (3.34)	-1.09 (17.34)	0.84 (41.60)	0.001 (49.55)
Thailand					
CV1	-1.00 (26.11)	-1.07 (4.09)	-0.57 (1.37)	3.83 (35.30)	-0.019 (20.62)
Turkey					
CV1	-1.00	0.19	-0.01	1.10	-0.001
CV2	-1.00 (19.04)	0.40(1.59)	-0.13 (6.75)	1.90 (15.74)	-0.004 (1.40)

Note: At the 5% level of significance, the critical value of the χ^2 statistic with one degree of freedom is 3.84; with two degrees of freedom is 5.99

Table.15 Generalized Impulse Response(s) to one S.E. shock in the equation for LNEER for Thailand export

Horizon	LX	LNEER	LPXPXW	LYW
0	0.038922	0.053187	-0.016137	-0.0023654
1	0.060682	0.064551	-0.045473	-0.0041332
2	0.0788	0.032822	-0.046515	-0.0044553
3	0.0876	0.029322	-0.019997	4.34E-04
4	0.083638	0.019741	-0.011514	-0.002438
5	0.10035	0.018569	-0.0020546	-0.0051548
6	0.077709	0.022409	0.0034982	-0.0073533
7	0.058467	0.02186	-0.0061137	-0.0099691
8	0.043284	0.024764	0.011516	-0.020145
9	0.02238	0.012816	0.010873	-0.026936
10	0.02345	0.014577	0.0057631	-0.027956
11	0.020656	0.019949	-0.0073147	-0.025226
12	0.0054947	0.017848	1.18E-04	-0.025056
13	-0.0026283	0.021852	1.45E-04	-0.024932
14	-0.015966	0.016147	2.86E-04	-0.019897
15	-0.0081621	0.0185	-0.0031089	-0.013281
16	0.0099189	0.018326	-0.0097635	-0.013181
17	0.016514	0.020098	-0.0082725	-0.014198
18	0.0037057	0.019657	-0.0034468	-0.016074
19	-0.015658	0.01353	0.0021698	-0.014817
20	0.011879	0.011342	0.013212	-0.01429
21	0.026398	0.011865	0.015851	-0.012728
22	0.058446	0.010119	0.012492	-0.010067
23	0.067028	0.014594	0.0099223	-0.0077813
24	0.044387	0.023465	0.0030209	-0.0079122
25	0.044651	0.025	-0.0018036	-0.0098778
26	0.051049	0.021066	0.0014211	-0.01099
27	0.061599	0.020339	0.0012304	-0.0079101
28	0.055648	0.014896	-0.0013095	-0.0096733
29	0.048105	0.012476	0.004168	-0.011285
30	0.034861	0.015389	0.003321	-0.013294
31	0.019617	0.017838	-0.0028123	-0.012998
32	0.018105	0.021069	-8.21E-04	-0.01383
33	0.020667	0.016163	1.87E-04	-0.015977
34	0.028684	0.011803	0.0034297	-0.018274
35	0.01875	0.012205	0.0081505	-0.018373
36	0.0075454	0.014794	0.0054086	-0.018965
37	0.014043	0.0164	0.0043051	-0.018197
38	0.019223	0.015849	0.0048636	-0.016169
39	0.026641	0.016395	0.0073228	-0.012097
40	0.036636	0.015284	0.0071183	-0.011905
41	0.03503	0.016083	0.0069351	-0.011755
42	0.032914	0.017868	0.0023466	-0.01246

Table.16 Generalized Impulse Response(s) to one S.E. shock in the equation for LPXPXW for Thailand export

Horizon	LX	LNEER	LPXPXW	LYW
0	-0.090449	-0.021947	0.039108	-0.010714
1	-0.11691	-0.013041	0.03019	-0.013078
2	-0.11152	4.01E-04	0.026696	-0.0045989
3	-0.094172	-0.0046999	-0.010222	0.0059267
4	-0.092742	0.0059757	-0.010081	0.015605
5	-0.066843	0.0021095	-0.014448	0.018188
6	-0.091688	-0.0061118	-0.0017224	0.019536
7	-0.10566	0.0021911	-0.0094435	0.021268
8	-0.067245	-0.010259	-0.017195	0.020509
9	-0.048016	-0.0012685	-0.0042374	0.020103
10	-0.037039	-0.008973	-0.010373	0.018989
11	-0.062539	-0.010129	0.012256	0.018055
12	-0.04531	-4.11E-04	0.018854	0.016507
13	-0.041055	-0.0094949	0.024566	0.012645
14	0.0023579	-0.0085923	0.027839	0.010913
15	-0.0091317	-0.0085417	0.031498	0.013009
16	-0.014366	-0.014019	0.021094	0.012264
17	-0.018971	-0.012527	0.028274	0.012762
18	-0.041926	-0.0078906	0.024651	0.01561
19	-0.015103	-0.008436	0.01818	0.018553
20	-0.033322	-0.0087857	0.01462	0.017405
21	-0.038043	-0.010442	0.0061474	0.017743
22	-0.056563	-0.0099368	1.21E-04	0.013863
23	-0.067294	-0.0078967	-0.0011883	0.014129
24	-0.08546	-0.0024749	-0.0010585	0.012741
25	-0.083915	-0.011663	0.0026338	0.01178
26	-0.062001	-0.017313	0.020413	0.011565
27	-0.066446	-0.0182	0.025328	0.011031
28	-0.061792	-0.016091	0.021558	0.010213
29	-0.056991	-0.012338	0.024178	0.010433
30	-0.051571	-0.0099193	0.019011	0.011681
31	-0.043082	-0.0089008	0.02308	0.014605
32	-0.031839	-0.011889	0.028084	0.015727
33	-0.024464	-0.013429	0.027728	0.018118
34	-0.012805	-0.013411	0.01935	0.018809
35	-0.02182	-0.0082496	0.013474	0.021288
36	-0.030304	-0.0024071	0.0063722	0.02133
37	-0.034143	-0.0055466	4.43E-05	0.020835
38	-0.041703	-0.0064631	0.0077969	0.020469
39	-0.039699	-0.010383	0.0073726	0.019078
40	-0.040742	-0.013492	0.012501	0.015124
41	-0.047678	-0.011228	0.011416	0.012594
42	-0.06586	-0.012201	0.0103	0.010755
43	-0.059377	-0.011281	0.01295	0.010868
44	-0.060291	-0.010513	0.019875	0.010551
45	-0.057246	-0.011646	0.020426	0.010961
46	-0.041805	-0.015309	0.024591	0.010771
47	-0.045067	-0.013335	0.024594	0.011857
48	-0.046694	-0.0096242	0.018017	0.012359
49	-0.050674	-0.0094215	0.015295	0.013701
50	-0.042432	-0.0089165	0.015723	0.016657

Table.17 Generalized Impulse Response(s) to one S.E. shock in the equation for LNEER for Thailand import

Horizon	LM	LNEER	LPMPD	LYTH
0	0.0030862	0.048778	-0.022906	0.0055003
1	0.027663	0.059444	-0.053848	0.0047441
2	0.040595	0.057017	-0.05503	0.013286
3	0.037208	0.056202	-0.051479	0.02001
4	0.033581	0.05756	-0.051386	0.020396
5	0.034519	0.058293	-0.05285	0.017881
6	0.036537	0.057891	-0.053313	0.016659
7	0.036905	0.057383	-0.052812	0.017204
8	0.036167	0.057347	-0.052402	0.017936
9	0.035705	0.057551	-0.052451	0.018001
10	0.035832	0.05765	-0.052647	0.017715
11	0.036081	0.057603	-0.052706	0.017572
12	0.036128	0.057542	-0.052646	0.017636
13	0.036041	0.057537	-0.052597	0.017723
14	0.035986	0.057561	-0.052602	0.017731
15	0.036001	0.057573	-0.052626	0.017697
16	0.03603	0.057568	-0.052633	0.01768
17	0.036036	0.05756	-0.052626	0.017687
18	0.036026	0.05756	-0.05262	0.017698
19	0.036019	0.057563	-0.052621	0.017699
20	0.036021	0.057564	-0.052623	0.017695
21	0.036024	0.057563	-0.052624	0.017693
22	0.036025	0.057562	-0.052623	0.017693
23	0.036024	0.057562	-0.052623	0.017695
24	0.036023	0.057563	-0.052623	0.017695
25	0.036023	0.057563	-0.052623	0.017694
26	0.036024	0.057563	-0.052623	0.017694
27	0.036024	0.057563	-0.052623	0.017694
28	0.036023	0.057563	-0.052623	0.017694
29	0.036023	0.057563	-0.052623	0.017694
30	0.036023	0.057563	-0.052623	0.017694
31	0.036023	0.057563	-0.052623	0.017694
32	0.036023	0.057563	-0.052623	0.017694
33	0.036023	0.057563	-0.052623	0.017694
34	0.036023	0.057563	-0.052623	0.017694
35	0.036023	0.057563	-0.052623	0.017694
36	0.036023	0.057563	-0.052623	0.017694
37	0.036023	0.057563	-0.052623	0.017694
38	0.036023	0.057563	-0.052623	0.017694
39	0.036023	0.057563	-0.052623	0.017694
40	0.036023	0.057563	-0.052623	0.017694
41	0.036023	0.057563	-0.052623	0.017694
42	0.036023	0.057563	-0.052623	0.017694
43	0.036023	0.057563	-0.052623	0.017694
44	0.036023	0.057563	-0.052623	0.017694
45	0.036023	0.057563	-0.052623	0.017694
46	0.036023	0.057563	-0.052623	0.017694
47	0.036023	0.057563	-0.052623	0.017694
48	0.036023	0.057563	-0.052623	0.017694
49	0.036023	0.057563	-0.052623	0.017694
50	0.036023	0.057563	-0.052623	0.017694

Table18 Generalized Impulse Response(s) to one S.E. shock in the equation for LPMPD for Thailand import

Horizon	LM	LNEER	LPMPD	LYTH
0	-0.0038346	-0.029193	0.038273	-0.0079144
1	-0.025433	-0.033933	0.053897	-0.0050279
2	-0.035749	-0.031125	0.053943	-0.0058339
3	-0.034753	-0.029487	0.050932	-0.0093574
4	-0.031594	-0.029936	0.049979	-0.010876
5	-0.031	-0.030651	0.050678	-0.0099788
6	-0.032063	-0.030693	0.051265	-0.0089253
7	-0.032708	-0.030398	0.051184	-0.0088653
8	-0.032505	-0.030262	0.050901	-0.0092878
9	-0.032147	-0.030335	0.050823	-0.0094851
10	-0.032089	-0.030422	0.050913	-0.0093855
11	-0.032218	-0.030427	0.050983	-0.0092611
12	-0.032295	-0.030391	0.050973	-0.0092531
13	-0.032272	-0.030375	0.050939	-0.0093029
14	-0.032229	-0.030383	0.050929	-0.0093265
15	-0.032222	-0.030394	0.05094	-0.0093148
16	-0.032237	-0.030394	0.050948	-0.0093001
17	-0.032246	-0.03039	0.050947	-0.009299
18	-0.032244	-0.030388	0.050943	-0.0093049
19	-0.032239	-0.030389	0.050942	-0.0093077
20	-0.032238	-0.030391	0.050943	-0.0093064
21	-0.03224	-0.030391	0.050944	-0.0093046
22	-0.032241	-0.03039	0.050944	-0.0093045
23	-0.03224	-0.03039	0.050944	-0.0093052
24	-0.03224	-0.03039	0.050943	-0.0093055
25	-0.03224	-0.03039	0.050944	-0.0093054
26	-0.03224	-0.03039	0.050944	-0.0093051
27	-0.03224	-0.03039	0.050944	-0.0093051
28	-0.03224	-0.03039	0.050944	-0.0093052
29	-0.03224	-0.03039	0.050944	-0.0093053
30	-0.03224	-0.03039	0.050944	-0.0093052
31	-0.03224	-0.03039	0.050944	-0.0093052
32	-0.03224	-0.03039	0.050944	-0.0093052
33	-0.03224	-0.03039	0.050944	-0.0093052
34	-0.03224	-0.03039	0.050944	-0.0093052
35	-0.03224	-0.03039	0.050944	-0.0093052
36	-0.03224	-0.03039	0.050944	-0.0093052
37	-0.03224	-0.03039	0.050944	-0.0093052
38	-0.03224	-0.03039	0.050944	-0.0093052
39	-0.03224	-0.03039	0.050944	-0.0093052
40	-0.03224	-0.03039	0.050944	-0.0093052
41	-0.03224	-0.03039	0.050944	-0.0093052
42	-0.03224	-0.03039	0.050944	-0.0093052
43	-0.03224	-0.03039	0.050944	-0.0093052
44	-0.03224	-0.03039	0.050944	-0.0093052
45	-0.03224	-0.03039	0.050944	-0.0093052
46	-0.03224	-0.03039	0.050944	-0.0093052
47	-0.03224	-0.03039	0.050944	-0.0093052
48	-0.03224	-0.03039	0.050944	-0.0093052
49	-0.03224	-0.03039	0.050944	-0.0093052
50	-0.03224	-0.03039	0.050944	-0.0093052

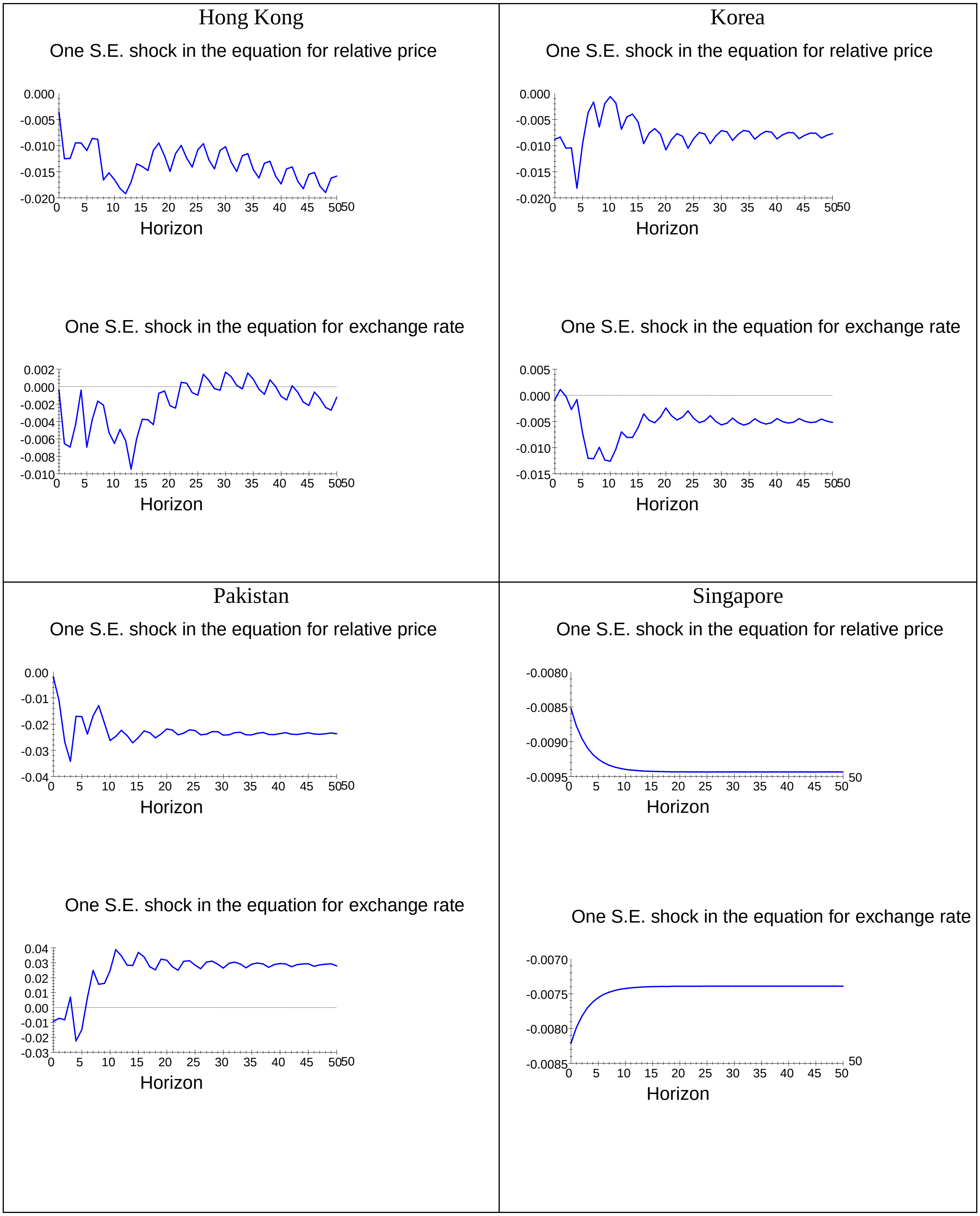
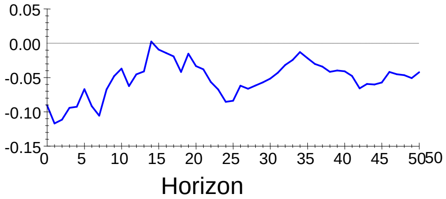


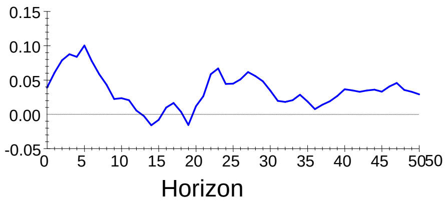
Fig. 3 GIR of export to a one standard error shock in the equation for exchange rate and relative price

Thailand

One S.E. shock in the equation for relative price

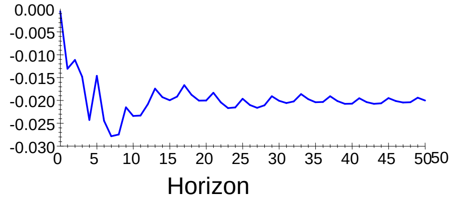


One S.E. shock in the equation for exchange rate



Turkey

One S.E. shock in the equation for relative price



One S.E. shock in the equation for exchange rate

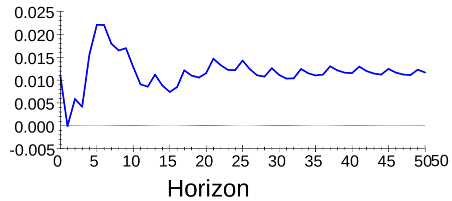


Fig. 3 continued

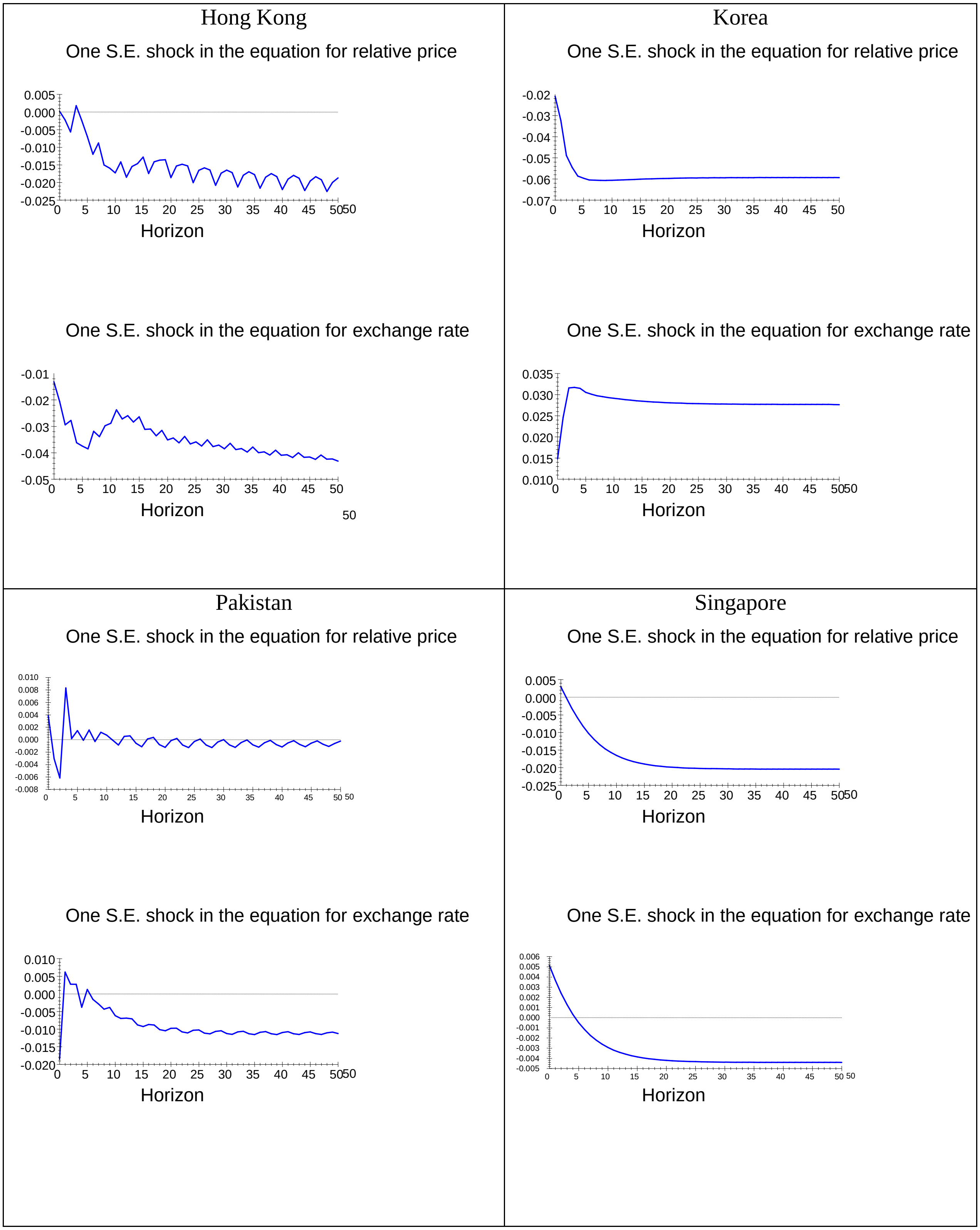
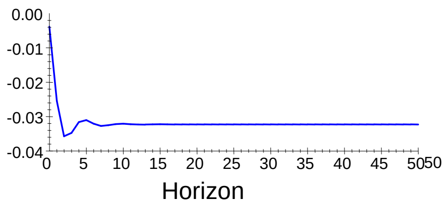


Fig. 4 GIR of import to a one standard error shock in the equation for exchange rate and relative price

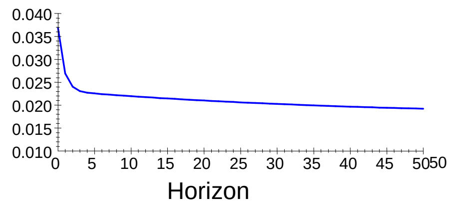
Thailand

One S.E. shock in the equation for relative price

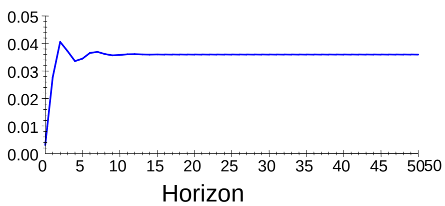


Turkey

One S.E. shock in the equation for relative price



One S.E. shock in the equation for exchange rate



One S.E. shock in the equation for exchange rate

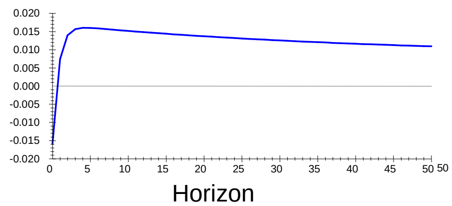


Fig. 4 Continued

Chapter 5: The Influence of Relative Prices and Exchange Rate on Trade Flows Pre and Post 1990

5.1 Introduction

Prior to Bahmani-Oskooee and Kara (2003), the relative responsiveness of trade flows to a change in relative prices and exchange rate has been studied Wilson and Takacs (1979), Junz and Rhomberg (1973), Bahmani-Oskooee (1986), and Tegene (1989, 1991). However, since those studies used non-stationary data, they suffer from "spurious regression' problem. To avoid this problem and to have more accurate and reliable estimates, other approaches such as error-correction and cointegration techniques are recommended. To renew the discussion around the issue, Bahmani-Oskooee and Kara (2003) use Autoregressive Distributed Lag (ARDL) approach of Pesaran et al. (2001) and investigate the relative responsiveness of trade flows to a change in relative prices and exchange rate for 9 industrial countries (Australia, Austria, Canada, Denmark, France, Germany, Italy, Japan, and USA) using quarterly data over 1973-98. Their findings show that, first, in regards to the time of response of trade flows to a change in relative prices and to a change in exchange rate, there is no special patterns like what Orcutt's (1950) hypothesis predict. The time responses are country specific. Second, the long run elasticities are greater in the import demand function compared to those in the export demand function. Third, the price elasticities are less than unity illustrating inelastic export and import demand function. Finally, in contrast to previous studies, the size of price elasticities are smaller than exchange rate ones in general. They conclude that in deciding between commercial policy tools like tariffs and subsidies and exchange rate policy like exchange rate devaluation, there is no specific pattern in their sample and the results are country specific. In other words, trade flows behave differently in different countries. In 2008, Bahmani-Oskooee and Kara studied the same issue for a sample of developing countries (Colombia, Greece, Hong Kong, Hungary, Israel, Korea, Pakistan, the

Philippines, Poland, Singapore, South Africa, and Turkey using the quarterly data of the 1973-2002. According to their findings, like industrial countries, there is no specific pattern of trade flows behavior in the sample and the result are country specific.

In this chapter, while I add ten more year of data (1973-2013) to the sample of developed, developing, and underdeveloped countries, I test another hypothesis and add a new question to the literature. The hypothesis is that after 1990 and due to the information technology boom as a proxy for technological improvement, the influence of relative prices and exchange rate on trade flows has been more rapid. In other words, improvement in information technology makes lags of price and exchange rate shorter in export and import demand function. To test this hypothesis, I divide the whole sample of 1973q1 to 2013q3 into two sub samples; before 1990 (1973-1990) and after 1990 (1991-2013). Using the autoregressive distributed lags (ARDL) approach; I investigate the optimal lags of the ARDL model, which I choose based on AIC criterion.

This chapter is organized as follows: Model and methodology is discussed in section 5.2. Section 5.3 provides empirical results. Finally, section 5.4 summarizes and concludes the study.

5.2. The Models and Methodology

The main advantages of using the ARDL approach is that it can be applied regardless of having I(0) or I(1) regressors (Pesaran et al. 2001). As shown in the previous chapter (Table 1 and 2) all variables are I(1), therefore, following Bahmani-Oskooee and Kara (2008), I proceed with ARDL specified as flollows:

$$\Delta \ln X = \alpha_0 + \sum_{i=1}^{n} \beta_i \Delta \ln X_{t-i} + \sum_{i=0}^{n} \gamma_i \Delta \ln NEER_{t-i} + \sum_{i=0}^{n} \eta_i \Delta \ln PXPXW_{t-i} + \sum_{i=0}^{n} \omega_i \Delta \ln YW_{t-i} + \lambda_1 \ln X_{t-1} +$$

$$\lambda_2 \ln NEER_{t-1} + \lambda_3 \ln PXPXW_{t-1} + \lambda_4 \ln YW_{t-1} + \varepsilon_t \qquad (1)$$

$$\Delta \ln M = \alpha'_0 + \sum_{i=1}^{n} \beta'_i \Delta \ln M_{t-i} + \sum_{i=0}^{n} \gamma'_i \Delta \ln NEER_{t-i} + \sum_{i=0}^{n} \eta'_i \Delta \ln PMPD_{t-i} + \sum_{i=0}^{n} \omega'_i \Delta \ln Y_{t-i} + \lambda'_1 \ln M_{t-1} +$$

$$\lambda'_2 \ln NEER_{t-1} + \lambda'_3 \ln PMPD_{t-1} + \lambda'_4 \ln Y_{t-i} + \mu_t \qquad (2)$$

The first part of the equations which includes parameters β_i , γ_i , η_i , and ω_i in equation (1) and β'_i , γ'_i , η'_i , and ω'_i in equation (2) reflect short-run dynamics of the export and import model. The second part illustrates long-run relationship with parameters of λ_1, λ_2, λ_3, and λ_4 for equation (1) and λ'_1, λ'_2, λ'_3, and λ'_4 for equation (2). The long-run effects of all variables on the level of exports and imports are deduced by the estimates of λ_1 -λ_3 that are normalized on λ_4 and estimates of λ'_1 - λ'_3 that are normalized on λ'_4 respectively. The null hypothesis of existing cointegration in export demand model is:

H_0: $\lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = 0$

H_1: $\lambda_1 \neq 0, \lambda_2 \neq 0, \lambda_3 \neq 0, \lambda_4 \neq 0$

The same hypothesis in the import demand model is:

H_0: $\lambda'_1 = \lambda'_2 = \lambda'_3 = \lambda'_4 = 0$

H_1: $\lambda'_1 \neq 0, \lambda'_2 \neq 0, \lambda'_3 \neq 0, \lambda'_4 \neq 0$

I estimated equation (1) and (2) using the Ordinary Least Squares. Pesaran et al. (2001) proposed the F test which has new critical values instead of having standard F test critical values to investigate the existence of cointegration between the lagged level variables. They tabulated two critical value bounds by assuming all variables to be I(1) which is upper bound and assuming all variables to be I(0) which is lower bound. If the calculated F statistic is greater than the upper bound critical value, the null hypothesis of no cointegration is rejected.

Pesaran and Shin (1998) propose a two stage procedure, which works even with having endogenous regressors. The first stage is selecting ARDL order using Schwartz Bayesian criterion (SBC) or Akaike Information Criterion (AIC).

The power and empirical advantage of the ARDL procedure is that it is the optimal estimator in comparison with other asymptotically efficient estimators such as DOLS, FMLS and MLE (Panopoulou and Pittis, 2004).

The existence of cointegration can be investigated by conducting the bounds test. The F-test critical value tabulated by Pesaran (1998) and Pesaran et al. (2001) allows me to see if there is a long-run relationship among our variables.

5.3. The Results

For each country in the sample, I use data for whole sample (1973-2013) and two subsamples (1973-1990 and post 1991-2013) to estimate the ARDL model for export and import demand functions. The results illustrate that there is a long run relationship amongst variables in the export demand function and import demand function using whole sample (1973-2013) and two subsamples (1973-1990 and 1991-2013) in majority of cases. Tables 19 to 30 report the results.

Having the subsamples and short-run coefficient estimates, the lags of exchange rate are shorter post-1990 in export demand model of Japan. In other cases either lags of exchange rate do not change or remain the same as pre-1990. The lags of relative prices also are shorter in export demand models of Japan, Spain, U.K, and U.S. In addition, short-run coefficients illustrate that the lags of exchange rate are shorter in import demand models of Italy, Pakistan, Singapore, Spain, U.K, and U.S. However, the lags of relative prices are shorter just in import demand model of Pakistan.

I use the normalized long-run estimates and long-run models (1) and (2) to calculate the error terms (ECM). Then I use the ECM_{t-1} instead of linear combination of lagged level variables in export demand and import demand model imposing optimum lags. By this way I investigate if the short-run disequilibrium in variables converges to long-run equilibrium. The larger and significant coefficient of ECM_{t-1} means the faster return of the economy to its equilibrium once shocked (Pesaran and Pesaran, 1997). The negative and highly significant error correction coefficient confirms the cointegration among the variables (Bahmani-Oskooee and Kara, 2008).

As can be seen from tables (19 to 30) the speed of convergence to equilibrium is negative and highly significant (except for Germany's export demand model of post-1990 and import demand model of pre-1990) that corroborates cointegration among variables in export and import demand models. Since the critical value of F statistics is 3.77, the F test confirms cointegration among variables except in export demand model of Canada (whole sample and post-1990), Italy (Whole sample and sub samples), Japan (pre-1990), Korea (post-1990), Spain (whole sample), and the UK (whole sample and post-1990). In import demand model F test confirms cointegration except for Canada (whole sample and sub samples), Germany (whole sample and sub samples), Hong Kong (pre-1990), Korea (post-1990), Pakistan (whole sample), UK (whole sample), and the U.S. (post-1990).

Following Bahmani-Oskooee and Kara (2008) I test the stability of all coefficients of error-correction models using cumulative sums of the recursive residuals (CUSUM) and their squares (CUSUMSQ) tests (Brown et al. 1975). These tests use the recursive residuals from the recursive parameter estimates to evaluate the stability of the model. It is useful to have formal statistical test that can be applied to test the null hypothesis of the model stability. Under the null hypothesis, CUSUM statistic is drawn from a distribution so called the CUSUM distribution. If the CUSUM statistic is outside of the interval, the null of model stability is rejected. Figures 5 to 10 can be used for visual inspection in which the CUSUM test supports the stability of all coefficients in export demand function and import demand function in most cases but not CUSUMSQ.

The Lagrange multiplier test of residual correlation (LM) is a test for autocorrelation in the errors in a regression model. The test statistic is derived from those residuals. The null hypothesis is that there is no serial correlation between residuals. Since the distribution of the LM statistic is χ^2 distribution with the critical value of 9.84, LM test rejects the serial correlation in export demand function and import demand function. However, there is a serial correlation in the minority of cases (export demand model of Australia (pre-1990), Canada (whole sample), Hong Kong (pre-1990), Japan (pre-1990), Korea (whole sample and pre-1990), Pakistan (whole and sub samples), Singapore (pre-1990), Spain (whole and sub samples), UK (whole and post-1990), the USA (sub samples) and import demand model of Australia (whole sample and pre-1990), Canada (whole sample and post-1990), Germany (whole sample), Hong Kong (sub samples), Japan (post-1990), Pakistan (pre-1990), Singapore (whole and sub samples), Spain (whole and sub samples), UK (whole and sub samples), the USA (pre-1990).

Furthermore Ramsey's RESET test is a general specification of linear regression to investigate whether there is a non-linear combination of the explanatory variables in explaining the dependent variable. The RESET statistic which has χ^2 distribution uses the square of the fitted values with critical value of 3.84. The calculated RESET statistic is less than critical value which confirms model specification for export demand model and import demand model except some minority cases (export demand model of Canada (whole sample), Italy (post-1990), Japan (whole sample and post-1990), Korea (whole sample), Pakistan (whole sample and post-1990), Singapore (post-1990), Spain (whole sample and pre-1990), UK (whole sample and post-1990) and import demand model of Canada (post-1990), Hong Kong (whole sample and post-1990), Italy (whole sample), Korea (post-1990), Singapore (post-1990), Spain (whole sample and pre-1990), UK (post-1990). Finally, adjusted R^2 square gives good fit for the export and import demand functions.

5.4. Conclusion

In this chapter I tested the hypothesis that due to internet boom (1990) as a proxy for technological improvement, the lags of relative prices and exchange rate which can be attributed to different factors such as recognition lag, decision lag, delivery lag, replacement lag, and production lag (Junz and Rhomberg, 1973) has been shortened during post-1990 as compared to pre-1990. I divide the whole sample of 1973-2013 to two subsamples; pre- and post- 1990. I employ quarterly data over 1973-2013 for Hong Kong, Italy, Japan, Pakistan, Singapore, Spain, the UK, and the USA. Following Bahmani-Oskooee and Kara (2008), I use ARDL approach to estimate the export and import demand functions. The findings illustrate that the hypothesis of this study cannot be rejected for majority of cases. I claim that technological progress helps relative prices and exchange rate to influence trade flows more quickly.

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Appendix A

Data definition and sources

To do empirical analysis I use quarterly data over 1973q1-2013q3 period for the sample of developed countries (Australia, Canada, Germany, Italy, Japan, Spain, UK, and the USA) and the sample of developing countries which includes Hong Kong (1980q4-2012q4), Korea (1973q1-2012q4), Pakistan (1973q1-2013q2), Singapore (1979q1-2013q2), Thailand (1994q1-2012q4), and Turkey (1994q1-2012q3). The sources of the data are International Financial Statistics of IMF and OECD statistics. The variables are as follows:

M For each country, M is index of the volume of imports

X For each country, X is index of the volume of exports

Y Measure of domestic income proxied by the index of industrial production

YW World Real Income measured by the index of industrial production in industrial countries

PM Index of unit value of imports

PD Domestic price level measured by CPI

PX Index of unit value of exports

PXW Index of unit value of the world exports

E Nominal effective exchange rate

Appendix B

Data definition and sources

To do empirical analysis I employ quarterly data over different periods based on the availability of data. I use the data for Australia (1973-2012), Canada (1973-2013), Germany (1973-2012), Hong Kong (1980-2012), Italy (1973-2013), Japan (1973-2013), Korea (1973-2012), Pakistan (1973-2013), Singapore (1979-2013), Spain (1973-2013), UK (1973-2013), and the USA (1973-2013). The source of the data is International Financial Statistics of IMF. The variables are as follows:

M For each country, M is index of the volume of imports

X For each country, X is index of the volume of exports

Y Measure of domestic income proxied by the index of industrial production

YW World Real Income measured by the index of industrial production in industrial countries

PM Index of unit value of imports

PD Domestic price level measured by CPI

PX Index of unit value of exports

PXW Index of unit value of the world exports

E Nominal effective exchange rate

Table. 19 Australia

	Export				Import		
Panel A:	1973-2012	1973-1990	1991-2012	Panel A:	1973-2012	1973-1990	1991-2012
$\Delta Ln\ X_{t-1}$		0.42	-0.24	$\Delta Ln\ M_{t-1}$	0.06	0.36	0.06
		(2.97)	(-2.66)		(0.77)	(2.66)	(0.78)
$\Delta Ln\ X_{t-2}$		0.20		$\Delta Ln\ M_{t-2}$	-0.27		-0.39
		(1.97)			(-3.66)		(-5.17)
$\Delta Ln\ X_{t-3}$				$\Delta Ln\ M_{t-3}$			
$\Delta Ln\ NEER_t$	-0.61	-0.23	-0.67	$\Delta Ln\ NEER_t$	-0.07	0.34	-0.37
	(-6.01)	(-1.17)	(-5.59)		(-0.83)	(2.58)	(-3.34)
$\Delta Ln\ NEER_{t-1}$		-0.39		$\Delta Ln\ NEER_{t-1}$	-0.07	-0.28	
		(-1.97)			(-0.69)	(-1.97)	
$\Delta Ln\ NEER_{t-2}$		-0.48		$\Delta Ln\ NEER_{t-2}$	0.22	0.37	
		(-1.94)			(2.14)	(2.69)	
$\Delta Ln\ NEER_{t-3}$				$\Delta Ln\ NEER_{t-3}$			
$\Delta Ln\ PXPXW_t$	0.59	-0.04	1.02	$\Delta Ln\ PMPD_t$	0.03	-0.54	0.30
	(4.69)	(-0.17)	(6.73)		(0.27)	(-2.05)	(2.20)
$\Delta Ln\ PXPXW_{t-1}$		0.46		$\Delta Ln\ PMPD_{t-1}$		-0.35	
		(1.34)				(-1.32)	
$\Delta Ln\ PXPXW_{t-2}$		0.97		$\Delta Ln\ PMPD_{t-2}$		0.49	
		(2.80)				(1.94)	
$\Delta Ln\ PXPXW_{t-3}$				$\Delta Ln\ PMPD_{t-3}$			
$\Delta Ln\ YW_t$	-0.35	0.86	0.46	$\Delta Ln\ YH_t$	0.89	1.90	0.66
	(-2.50)	(4.63)	(2.71)		(3.68)	(5.59)	(2.33)
$\Delta Ln\ YW_{t-1}$	0.55	-1.11	-0.43	$\Delta Ln\ YH_{t-1}$	-0.01	-1.27	
	(4.04)	(-6.06)	(-2.57)		(-0.06)	(-2.97)	
$\Delta Ln\ YW_{t-2}$			0.40	$\Delta Ln\ YH_{t-2}$	0.57	-0.02	
			(2.26)		(2.35)	(-0.08)	
$\Delta Ln\ YW_{t-3}$			0.35	$\Delta Ln\ YH_{t-3}$		-0.85	
			(1.85)			(-2.50)	
Panel B:				Panel B:			
Constant	1.22	-6.32	2.52	Constant	-4.98	-8.52	-8.79
	(0.48)	(-3.74)	(0.75)		(-2.57)	(-5.01)	(-2.52)
Trend	0.01	0.002	0.008	Trend	0.01	-0.007	0.007
	(7.06)	(2.08)	(2.65)		(5.43)	(-1.06)	(2.25)
Ln NEER	0.17	0.44	0.05	Ln NEER	0.38	0.43	0.44
	(0.64)	(2.10)	(0.12)		(2.38)	(5.55)	(1.31)
Ln PXPXW	0.03	-0.87	0.67	Ln PMPD	0.27	-0.37	0.54
	(0.22)	(-3.50)	(2.79)		(2.06)	(-1.62)	(1.90)
Ln YW	0.23	1.76	0.23	Ln YH	1.45	2.45	2.31
	(0.47)	(8.06)	(0.42)		(3.79)	(5.49)	(3.56)
Panel C:				Panel C:			
F test	4.84	12.75	4.19	F test	4.35	6.50	5.36
ECM_{t-1}	-0.19	-1.12	-0.22	ECM_{t-1}	-0.34	-0.96	-0.26
	(-4.45)	(-7.51)	(-4.17)		(-4.16)	(-5.37)	(-4.71)
LM	1.09	12.69	3.22	LM	11.87	10.71	6.97
RESET	0.11	0.47	0.03	RESET	0.03	3.18	0.00
CUSUM	Stable	Stable	Unstable	CUSUM	Stable	Stable	Stable
CUSUMSQ	Stable	Stable	Stable	CUSUMSQ	Stable	Stable	Stable
Adj R^2	0.55	0.77	0.61	Adj R^2	0.39	0.65	0.48

Table .20 Canada

	Export				Import		
Panel A:	1973-2013	1973-1990	1991-2013	Panel A:	1973-2013	1973-1990	1991-2013
ΔLn X_{t-1}	-0.48	-0.58	-0.31	ΔLn M_{t-1}	-0.43	-0.65	-0.30
	(-5.98)	(-7.12)	(-3.32)		(-5.96)	(-5.90)	(-3.11)
ΔLn X_{t-2}	0.01			ΔLn M_{t-2}	0.06	-0.34	0.02
	(0.16)				(0.90)	(-2.65)	(0.32)
ΔLn X_{t-3}	-0.18			ΔLn M_{t-3}	-0.28	-0.50	-0.19
	(-2.40)				(-4.64)	(-4.90)	(-2.41)
ΔLn $NEER_t$	-0.17	0.36	-0.31	ΔLn $NEER_t$	0.27	0.27	0.30
	(-1.37)	(1.39)	(-2.95)		(2.15)	(1.14)	(2.86)
ΔLn $NEER_{t-1}$		-0.82		ΔLn $NEER_{t-1}$	0.08		0.22
		(-4.13)			(0.62)		(1.98)
ΔLn $NEER_{t-2}$				ΔLn $NEER_{t-2}$			
ΔLn $NEER_{t-3}$				ΔLn $NEER_{t-3}$			
ΔLn $PXPXW_t$	0.03	-0.07	0.32	ΔLn $PMPD_t$	0.17	0.01	0.13
	(0.37)	(-0.53)	(2.70)		(1.81)	(0.10)	(1.43)
ΔLn $PXPXW_{t-1}$			0.32	ΔLn $PMPD_{t-1}$			
			(2.09)				
ΔLn $PXPXW_{t-2}$			-0.20	ΔLn $PMPD_{t-2}$			
			(-1.90)				
ΔLn $PXPXW_{t-3}$				ΔLn $PMPD_{t-3}$			
ΔLn YW_t	0.55	0.72	0.51	ΔLn YH_t	1.18	0.95	2.15
	(5.97)	(5.73)	(5.02)		(5.69)	(3.92)	(4.79)
ΔLn YW_{t-1}	0.51	0.65	0.28	ΔLn YH_{t-1}	0.98	0.88	0.96
	(5.08)	(5.07)	(2.94)		(4.18)	(2.89)	(1.99)
ΔLn YW_{t-2}	0.45	0.66	0.25	ΔLn YH_{t-2}		0.63	
	(4.38)	(5.39)	(2.72)			(1.96)	
ΔLn YW_{t-3}	0.29	0.43	0.28	ΔLn YH_{t-3}		0.67	
	(2.78)	(3.14)	(2.82)			(2.19)	
Panel B:				Panel B:			
Constant	28.79	1.09	14.71	Constant	-6.40	-9.97	-6.40
	(0.94)	(0.52)	(0.91)		(-1.13)	(-1.41)	(-1.13)
Trend	0.02	0.01	0.009	Trend	-0.005	-0.006	-0.005
	(1.33)	(3.61)	(1.89)		(-0.63)	(-0.48)	(-0.63)
Ln NEER	-2.52	0.19	-1.29	Ln NEER	0.54	0.51	0.54
	(-1.11)	(0.94)	(-1.83)		(0.62)	(0.63)	(0.62)
Ln PXPXW	-0.96	-0.03	0.23	Ln PMPD	0.45	-0.93	0.45
	(-0.80)	(-0.21)	(0.12)		(0.71)	(-0.66)	(0.71)
Ln YW	-3.54	0.19	-1.19	Ln YH	1.99	2.89	1.99
	(-0.70))	(0.37)	(-0.41)		(1.83)	(1.94)	(1.83)
Panel C:				Panel C:			
F test	2.62	5.04	3.33	F test	1.27	0.93	2.77
ECM_{t-1}	-0.03	-0.34	-0.06	ECM_{t-1}	0.003	-0.11	-0.09
	(-3.28)	(-4.61)	(-3.72)		(0.19)	(-1.90)	(-3.38)
LM	10.25	1.40	8.31	LM	22.71	7.39	11.89
RESET	4.73	2.07	0.95	RESET	3.82	1.95	14.42
CUSUM	Stable	Stable	Stable	CUSUM	Stable	Stable	Stable
CUSUMSQ	Unstable	Stable	Stable	CUSUMSQ	Unstable	Stable	Unstable
Adj R^2	0.59	0.79	0.47	Adj R^2	0.57	0.71	0.50

Table.21 Germany

	Export				Import		
Panel A:	1973-2012	1973-1990	1991-2012	Panel A:	1973-2012	1973-1990	1991-2012
$\Delta Ln\ X_{t-1}$	-0.51		-0.81	$\Delta Ln\ M_{t-1}$	-0.73	-0.79	-0.69
	(-6.64)		(-6.26)		(-10.64)	(-6.80)	(-7.59)
$\Delta Ln\ X_{t-2}$	-0.22		-0.43	$\Delta Ln\ M_{t-2}$	-0.39	-0.43	-0.42
	(-2.56)		(-3.17)		(-4.70)	(-3.35)	(-3.83)
$\Delta Ln\ X_{t-3}$	-0.21		-0.35	$\Delta Ln\ M_{t-3}$	-0.48	-0.48	-0.52
	(-2.73)		(-3.53)		(-7.15)	(-5.02)	(-5.72)
$\Delta Ln\ NEER_{t}$	0.58	0.85	0.96	$\Delta Ln\ NEER_{t}$	0.53	0.48	0.35
	(2.65)	(2.70)	(3.28)		(2.90)	(2.04)	(1.05)
$\Delta Ln\ NEER_{t-1}$	0.30	0.58		$\Delta Ln\ NEER_{t-1}$		0.56	
	(1.31)	(3.11)				(2.46)	
$\Delta Ln\ NEER_{t-2}$	0.43	0.36		$\Delta Ln\ NEER_{t-2}$			
	(2.02)	(2.60)					
$\Delta Ln\ NEER_{t-3}$				$\Delta Ln\ NEER_{t-3}$			
$\Delta Ln\ PXPXW_{t}$	-0.62	-0.73	-0.85	$\Delta Ln\ PMPD_{t}$	-0.25	-0.01	-0.19
	(-4.18)	(-3.57)	(-3.74)		(-2.53)	(-0.12)	(-1.10)
$\Delta Ln\ PXPXW_{t-1}$	-0.24			$\Delta Ln\ PMPD_{t-1}$	0.16		
	(-1.49)				(1.58)		
$\Delta Ln\ PXPXW_{t-2}$	-0.24			$\Delta Ln\ PMPD_{t-2}$			
	(-1.53)						
$\Delta Ln\ PXPXW_{t-3}$	-0.23			$\Delta Ln\ PMPD_{t-3}$			
	(-2.68)						
$\Delta Ln\ YW_{t}$	1.30	1.15	1.36	$\Delta Ln\ YH_{t}$	0.85	0.96	0.89
	(17.49)	(11.28)	(14.26)		(6.12)	(4.16)	(4.35)
$\Delta Ln\ YW_{t-1}$	0.43	-0.29	0.98	$\Delta Ln\ YH_{t-1}$	0.77	0.83	0.82
	(3.69)	(-2.98)	(5.03)		(5.17)	(3.21)	(4.32)
$\Delta Ln\ YW_{t-2}$	0.28	-0.07	0.58	$\Delta Ln\ YH_{t-2}$	0.57	0.49	0.54
	(2.33)	(-0.82)	(3.01)		(3.62)	(1.83)	(2.61)
$\Delta Ln\ YW_{t-3}$	0.42	0.14	0.48	$\Delta Ln\ YH_{t-3}$	0.33		0.51
	(3.90)	(1.56)	(3.02)		(2.23)		(2.61)
Panel B:				Panel B:			
Constant	2.45	20.16	2.23	Constant	-6.06	2.62	-10.46
	(1.21)	(1.39)	(0.68)		(-0.21)	(0.07)	(-0.31)
Trend	0.01	0.06	0.01	Trend	0.003	0.01	0.00
	(6.72)	(2.30)	(7.53)		(0.12)	(0.21)	(0.02)
Ln NEER	-1.87	-0.70	-1.40	Ln NEER	6.05	1.00	3.96
	(-4.09)	(-1.07)	(-2.19)		(0.25)	(0.22)	(0.25)
Ln PXPXW	-0.27	-0.47	2.61	Ln PMPD	-2.72	-0.09	-1.26
	(-0.63)	(-1.87)	(3.21)		(-0.27)	(-0.06)	(-0.27)
Ln YW	2.45	-3.69	1.40	Ln YH	-3.57	-0.87	-0.53
	(1.21)	(-1.10)	(6.04)		(-0.18)	(-0.07)	(-0.05)
Panel C:				Panel C:			
F test	5.41	15.08	4.13	F test	2.71	0.14	0.86
ECM_{t-1}	-0.11	-0.96	0.25	ECM_{t-1}	-0.01	-0.04	-0.03
	(-4.70)	(-7.97)	(4.13)		(-3.32)	(-0.76)	(-1.89)
LM	6.42	1.51	0.99	LM	17.93	8.56	6.68
RESET	1.41	2.22	0.62	RESET	2.86	0.17	2.41
CUSUM	Stable	Stable	Stable	CUSUM	Stable	Stable	Stable
CUSUMSQ	Stable	Stable	Stable	CUSUMSQ	Stable	Stable	Stable
Adj R^2	0.81	0.88	0.81	Adj R^2	0.66	0.70	0.62

Table.22 Hong Kong

	Export				Import		
Panel A:	1980-2012	1980-1990	1991-2012	Panel A:	1980-2012	1980-1990	1991-2012
ΔLn X_{t-1}	-0.09	0.38	-0.16	ΔLn M_{t-1}	-0.30	-0.11	-0.28
	(-1.29)	(5.32)	(-1.64)		(-3.89)	(-0.75)	(-3.06)
ΔLn X_{t-2}	-0.68		-0.49	ΔLn M_{t-2}	-0.03	0.15	-0.03
	(-10.98)		(-6.64)		(-0.43)	(1.14)	(-0.39)
ΔLn X_{t-3}	-0.13		-0.27	ΔLn M_{t-3}	-0.38	-0.33	-0.24
	(-1.46)		(-2.83)		(-4.83)	(-2.42)	(-2.58)
ΔLn $NEER_t$	-0.29	-0.04	0.19	ΔLn $NEER_t$	-0.50	-0.37	-0.45
	(-1.24)	(-0.21)	(0.49)		(-2.86)	(-1.30)	(-2.21)
ΔLn $NEER_{t-1}$				ΔLn $NEER_{t-1}$			-0.22
							(-1.08)
ΔLn $NEER_{t-2}$				ΔLn $NEER_{t-2}$			-0.33
							(-1.62)
ΔLn $NEER_{t-3}$				ΔLn $NEER_{t-3}$			
ΔLn $PXPXW_t$	0.04	0.17	-0.43	ΔLn $PMPD_t$	-0.25	-1.14	-0.01
	(0.23)	(0.87)	(-1.53)		(-0.85)	(-1.96)	(-0.04)
ΔLn $PXPXW_{t-1}$				ΔLn $PMPD_{t-1}$			
ΔLn $PXPXW_{t-2}$				ΔLn $PMPD_{t-2}$			
ΔLn $PXPXW_{t-3}$				ΔLn $PMPD_{t-3}$			
ΔLn YW_t	0.98	-1.11	0.96	ΔLn YH_t	1.47	1.20	1.77
	(3.84)	(-7.20)	(3.28)		(10.73)	(6.46)	(11.16)
ΔLn YW_{t-1}	-0.68	-0.87	-0.44	ΔLn YH_{t-1}	0.17	-0.44	0.15
	(-2.90)	(-4.05)	(-1.69)		(0.97)	(-1.25)	(0.70)
ΔLn YW_{t-2}	1.47	2.28	1.40	ΔLn YH_{t-2}	0.40	-0.21	0.45
	(7.19)	(8.82)	(6.01)		(2.28)	(-0.77)	(2.22)
ΔLn YW_{t-3}			0.94	ΔLn YH_{t-3}	0.97	0.47	0.90
			(3.26)		(5.70)	(1.86)	(4.41)
Panel B:				Panel B:			
Constant		20.16	2.15	Constant	-1.09	-2.83	-4.10
		(1.39)	(1.70)		(-0.29)	(-1.75)	(-2.05)
Trend		0.06	0.01	Trend	-0.005	-0.012	
		(2.30)	(12.13)		(-1.19)	(-2.22)	
Ln NEER	-3.05	-0.70	0.72	Ln NEER	-0.61	-0.37	0.22
	(-5.62)	(-1.07)	(2.54)		(-1.35)	(-1.67)	(0.64)
Ln PXPXW	-0.11	-0.47	-1.27	Ln PMPD	-0.91	-1.10	-0.25
	(-0.10)	(-1.87)	(-5.15)		(-3.67)	(-3.52)	(-0.94)
Ln YW	4.16	-3.69	-0.61	Ln YH	1.98	2.23	1.65
	(7.31)	(-1.10)	(-1.52)		(3.92)	(8.13)	(15.34)
Panel C:				Panel C:			
F test	10.40	6.34	7.36	F test	4.92	3.47	5.68
ECM_{t-1}	-0.04	-0.21	-0.38	ECM_{t-1}	-0.23	-0.68	-0.34
	(-6.53)	(-4.98)	(-5.53)		(-4.49)	(-3.81)	(-4.86)
LM	54.67	7.20	27.62	LM	16.75	7.15	4.88
RESET	3.46	0.001	0.006	RESET	16.25	1.04	7.49
CUSUM	Stable	Stable	Unstable	CUSUM	Stable	Stable	Stable
CUSUMSQ	Unstable	Stable	Stable	CUSUMSQ	Stable	Stable	Stable
Adj R^2	0.78	0.93	0.82	Adj R^2	0.83	0.89	0.87

Table.23 Italy

	Export				Import		
Panel A:	1973-2013	1973-1990	1991-2013	Panel A:	1973-2013	1973-1990	1991-2013
$\Delta Ln\ X_{t-1}$	-0.46	-0.42	-0.23	$\Delta Ln\ M_{t-1}$	-0.50	0.28	-0.54
	(-6.39)	(-3.14)	(-2.59)		(-6.43)	(1.77)	(-6.05)
$\Delta Ln\ X_{t-2}$	-0.21	-0.17	0.15	$\Delta Ln\ M_{t-2}$	-0.52	0.30	-0.60
	(-3.14)	(-1.62)	(2.37)		(-7.87)	(2.97)	(-7.83)
$\Delta Ln\ X_{t-3}$			-0.21	$\Delta Ln\ M_{t-3}$	-0.65		-0.72
			(-3.30)		(-13.65)		(-12.33)
$\Delta Ln\ NEER_{t}$	0.49	0.37	-0.10	$\Delta Ln\ NEER_{t}$	-0.28	0.17	-0.04
	(2.28)	(1.12)	(-0.57)		(-1.59)	(0.43)	(-0.21)
$\Delta Ln\ NEER_{t-1}$	-0.74			$\Delta Ln\ NEER_{t-1}$	0.27	1.06	
	(-3.54)				(1.51)	(2.88)	
$\Delta Ln\ NEER_{t-2}$				$\Delta Ln\ NEER_{t-2}$			
$\Delta Ln\ NEER_{t-3}$				$\Delta Ln\ NEER_{t-3}$			
$\Delta Ln\ PXPXW_{t}$	-0.93	-0.61	-0.46	$\Delta Ln\ PMPD_{t}$	0.02	-0.09	-0.04
	(-4.74)	(-1.70)	(-2.73)		(0.16)	(-0.33)	(-0.26)
$\Delta Ln\ PXPXW_{t-1}$	0.36			$\Delta Ln\ PMPD_{t-1}$			
	(1.73)						
$\Delta Ln\ PXPXW_{t-2}$				$\Delta Ln\ PMPD_{t-2}$			
$\Delta Ln\ PXPXW_{t-3}$				$\Delta Ln\ PMPD_{t-3}$			
$\Delta Ln\ YW_{t}$	1.31	1.16	1.08	$\Delta Ln\ YI_{t}$	1.07	2.06	0.98
	(10.63)	(5.31)	(8.55)		(5.16)	(5.15)	(3.86)
$\Delta Ln\ YW_{t-1}$	-0.18	-0.58	0.27	$\Delta Ln\ YI_{t-1}$	0.85		0.90
	(-1.36)	(-2.77)	(1.59)		(3.52)		(3.14)
$\Delta Ln\ YW_{t-2}$	0.42			$\Delta Ln\ YI_{t-2}$	0.96		0.83
	(3.18)				(4.62)		(3.00)
$\Delta Ln\ YW_{t-3}$				$\Delta Ln\ YI_{t-3}$			0.71
							(2.88)
Panel B:				Panel B:			
Constant	-4.26	-0.94	1.67	Constant	-3.66	-5.49	-3.47
	(-1.14)	(-0.40)	(0.87)		(-4.40)	(-9.09)	(-3.18)
Trend	0.006		0.002	Trend	0.005		0.004
	(2.04)		(2.15)		(10.41)		(7.41)
Ln NEER	0.07	-0.27	-0.70	Ln NEER	0.37	0.35	0.56
	(0.24)	(-2.15)	(-3.05)		(3.54)	(5.16)	(2.96)
Ln PXPXW	-1.14	-0.23	-0.24	Ln PMPD	-0.19	-0.19	-0.43
	(-1.64)	(-0.40)	(-0.87)		(-2.35)	(-4.79)	(-2.69)
Ln YW	1.66	1.41	1.25	Ln YI	1.27	1.76	1.06
	(2.90)	(3.58)	(4.42)		(9.25)	(17.60)	(5.74)
Panel C:				Panel C:			
F test	2.25	2.34	2.71	F test	5.96	11.78	4.60
ECM_{t-1}	-0.14	-0.43	-0.23	ECM_{t-1}	-0.47	-1.52	-0.45
	(-3.03)	(-3.06)	(-3.35)		(-4.92)	(-7.03)	(-4.35)
LM	25.16	12.86	11.26	LM	27.39	14.14	48.49
RESET	0.11	0.14	4.41	RESET	14.71	0.66	1.23
CUSUM	Stable	Stable	Unstable	CUSUM	Stable	Stable	Unstable
CUSUMSQ	Unstable	Unstable	Stable	CUSUMSQ	Unstable	Stable	Stable
Adj R^2	0.81	0.81	0.87	Adj R^2	0.80	0.70	0.81

Table-24 Japan

	Export				Import		
Panel A:	1973-2013	1973-1990	1991-2013	Panel A:	1973-2013	1973-1990	1991-2013
$\Delta Ln\ X_{t-1}$	-0.006		0.13	$\Delta Ln\ M_{t-1}$	-0.54	-0.53	-0.70
	(-0.07)		(1.12)		(-8.35)	(-5.24)	(-9.22)
$\Delta Ln\ X_{t-2}$	-0.36		-0.21	$\Delta Ln\ M_{t-2}$	-0.39	-0.25	-0.64
	(-5.04)		(-1.83)		(-5.45)	(-2.29)	(-7.72)
$\Delta Ln\ X_{t-3}$	-0.17			$\Delta Ln\ M_{t-3}$	-0.40	-0.32	-0.53
	(-2.13)				(-6.17)	(-3.65)	(-6.81)
$\Delta Ln\ NEER_{t}$	0.19	0.17	0.38	$\Delta Ln\ NEER_{t}$	0.17	0.16	0.22
	(1.59)	(0.98)	(2.49)		(3.57)	(1.70)	(4.58)
$\Delta Ln\ NEER_{t-1}$		-0.40	-0.03	$\Delta Ln\ NEER_{t-1}$			
		(-2.33)	(-0.28)				
$\Delta Ln\ NEER_{t-2}$		-0.20	0.22	$\Delta Ln\ NEER_{t-2}$			
		(-1.15)	(2.07)				
$\Delta Ln\ NEER_{t-3}$		-0.25		$\Delta Ln\ NEER_{t-3}$			
		(-1.93)					
$\Delta Ln\ PXPXW_{t}$	-0.52	-0.18	-1.02	$\Delta Ln\ PMPD_{t}$	0.11	0.14	0.10
	(-2.21)	(-0.55)	(-3.14)		(1.36)	(0.92)	(1.28)
$\Delta Ln\ PXPXW_{t-1}$		0.71		$\Delta Ln\ PMPD_{t-1}$	0.26	0.26	0.24
		(2.26)			(3.10)	(1.73)	(2.94)
$\Delta Ln\ PXPXW_{t-2}$		0.61		$\Delta Ln\ PMPD_{t-2}$	-0.09		
		(1.82)			(-1.08)		
$\Delta Ln\ PXPXW_{t-3}$				$\Delta Ln\ PMPD_{t-3}$	0.17		
					(1.97)		
$\Delta Ln\ YW_{t}$	0.81	-0.02	1.50	$\Delta Ln\ YJ_{t}$	0.44	0.22	0.50
	(4.93)	(-0.17)	(6.29)		(4.64)	(0.83)	(5.80)
$\Delta Ln\ YW_{t-1}$	-0.02	-0.43	-0.007	$\Delta Ln\ YJ_{t-1}$	0.66	0.99	0.53
	(-0.17)	(-2.70)	(-0.02)		(6.24)	(3.29)	(5.56)
$\Delta Ln\ YW_{t-2}$	1.04	0.89	0.57	$\Delta Ln\ YJ_{t-2}$	0.36	0.61	0.47
	(7.64)	(5.71)	(2.75)		(3.18)	(2.07)	(4.64)
$\Delta Ln\ YW_{t-3}$	0.46	0.34	0.67	$\Delta Ln\ YJ_{t-3}$	0.32		0.38
	(2.92)	(2.05)	(3.52)		(2.93)		(3.79)
Panel B:				Panel B:			
Constant	-0.11	5.76	-0.42	Constant	1.46	3.09	-5.16
	(-0.06)	(1.53)	(-0.46)		(2.15)	(1.40)	(-2.23)
Ln NEER	0.22	1.00	0.04	Ln NEER	1.16	1.42	1.35
	(1.37)	(3.01)	(0.57)		(13.25)	(2.02)	(10.87)
Ln PXPXW	-0.93	-2.30	-0.70	Ln PMPD	-0.26	-0.30	-0.20
	(-2.84)	(-4.80)	(-5.90)		(-1.54)	(-0.55)	(-1.73)
Ln YW	0.79	-1.18	1.03	Ln YJ	-0.49	-1.10	0.77
	(1.42)	(-1.04)	(5.00)		(-2.23)	(-1.02)	(1.77)
Panel C:				Panel C:			
F test	4.68	3.71	5.30	F test	18.29	5.82	18.91
ECM_{t-1}	-0.13	-0.20	-0.45	ECM_{t-1}	-0.11	-0.12	-0.15
	(-4.37)	(-3.96)	(-4.69)		(-8.64)	(-4.96)	(-8.86)
LM	49.8	6.08	13.29	LM	18.28	12.81	9.24
RESET	15.39	3.66	13.44	RESET	0.01	0.19	0.10
CUSUM	Stable	Stable	Stable	CUSUM	Stable	Stable	Unstable
CUSUMSQ	Unstable	Unstable	Unstable	CUSUMSQ	Unstable	Stable	Stable
Adj R^2	0.53	0.71	0.58	Adj R^2	0.63	0.57	0.75

Table. 25 Korea

	Export				Import		
Panel A:	1973-2012	1973-1990	1991-2012	Panel A:	1973-2012	1973-1990	1991-2012
$\Delta Ln\ X_{t-1}$	-0.29	-0.21	-0.22	$\Delta Ln\ M_{t-1}$	-0.40	-0.17	-0.24
	(-3.68)	(-2.01)	(-2.13)		(-6.42)	(-1.26)	(-2.41)
$\Delta Ln\ X_{t-2}$	-0.28	-0.24		$\Delta Ln\ M_{t-2}$		0.19	
	(-3.19)	(-1.94)				(1.74)	
$\Delta Ln\ X_{t-3}$	-0.35	-0.37		$\Delta Ln\ M_{t-3}$			
	(-4.35)	(-3.27)					
$\Delta Ln\ NEER_t$	-0.09	-0.40	-0.001	$\Delta Ln\ NEER_t$	0.01	0.49	0.19
	(-0.76)	(-1.75)	(-0.01)		(0.09)	(1.52)	(1.47)
$\Delta Ln\ NEER_{t-1}$				$\Delta Ln\ NEER_{t-1}$		-1.06	0.36
						(-3.35)	(2.79)
$\Delta Ln\ NEER_{t-2}$				$\Delta Ln\ NEER_{t-2}$		-0.05	0.38
						(-0.20)	(2.78)
$\Delta Ln\ NEER_{t-3}$				$\Delta Ln\ NEER_{t-3}$		-0.57	
						(-1.87)	
$\Delta Ln\ PXPXW_t$	-0.15	-0.41	-0.15	$\Delta Ln\ PMPD_t$	-0.24	0.61	-0.11
	(-1.31)	(-1.89)	(-1.50)		(-1.92)	(1.97)	(-0.88)
$\Delta Ln\ PXPXW_{t-1}$				$\Delta Ln\ PMPD_{t-1}$			0.24
							(1.89)
$\Delta Ln\ PXPXW_{t-2}$				$\Delta Ln\ PMPD_{t-2}$			0.38
							(2.78)
$\Delta Ln\ PXPXW_{t-3}$				$\Delta Ln\ PMPD_{t-3}$			
$\Delta Ln\ YW_t$	0.78	1.12	1.63	$\Delta Ln\ YH_t$	0.89	0.23	1.10
	(3.19)	(2.63)	(8.80)		(4.79)	(0.57)	(5.41)
$\Delta Ln\ YW_{t-1}$	0.10	1.58	-0.87	$\Delta Ln\ YH_{t-1}$	0.26		-0.06
	(0.40)	(3.23)	(-4.11)		(1.32)		(-0.27)
$\Delta Ln\ YW_{t-2}$	1.36	2.49	0.57	$\Delta Ln\ YH_{t-2}$			0.31
	(7.04)	(7.23)	(2.72)				(1.62)
$\Delta Ln\ YW_{t-3}$	0.62	1.75	0.33	$\Delta Ln\ YH_{t-3}$			-0.80
	(2.83)	(4.51)	(1.62)				(-3.90)
Panel B:				Panel B:			
Constant	8.53	14.73	-3.44	Constant	-3.18	-2.13	-2.14
	(1.97)	(3.66)	(-1.26)		(-2.19)	(-0.86)	(-1.19)
Trend	0.02	0.03	0.02	Trend	0.003	0.01	-0.003
	(6.59)	(6.20)	(6.68)		(0.75)	(3.34)	(-0.19)
Ln NEER	-0.74	-0.98	-0.22	Ln NEER	0.59	0.54	0.41
	(-2.02)	(-3.93)	(-0.78)		(2.75)	(1.66)	(1.81)
Ln PXPXW	-0.39	-0.54	-0.26	Ln PMPD	-0.76	-0.78	-0.15
	(-1.90)	(-2.89)	(-0.88)		(-3.39)	(-2.02)	(-0.35)
Ln YW	-0.89	-2.17	1.16	Ln YH	1.00	0.36	1.16
	(-1.29)	(-2.61)	(2.40)		(4.41)	(1.21)	(1.33)
Panel C:				Panel C:			
F test	6.23	12.70	1.48	F test	8.84	5.61	1.13
ECM_{t-1}	-0.19	-0.55	-0.23	ECM_{t-1}	-0.26	-0.64	-0.18
	(-5.04)	(-7.31)	(-2.47)		(-6.00)	(-4.86)	(-2.17)
LM	35.59	11.02	6.98	LM	1.19	5.29	1.29
RESET	3.59	0.82	0.04	RESET	0.29	1.35	9.63
CUSUM	Unstable	Stable	Stable	CUSUM	Stable	Stable	Stable
CUSUMSQ	Stable	Stable	Stable	CUSUMSQ	Unstable	Stable	Stable
Adj R^2	0.68	0.78	0.79	Adj R^2	0.44	0.50	0.62

Table.26 Pakistan

	Export				Import		
Panel A:	1973-2013	1973-1990	1991-2013	Panel A:	1973-2013	1973-1990	1991-2013
$\Delta Ln\ X_{t-1}$	-0.23			$\Delta Ln\ M_{t-1}$	-0.48	-0.64	-0.20
	(-2.42)				(-6.22)	(-5.33)	(-2.05)
$\Delta Ln\ X_{t-2}$	-0.23			$\Delta Ln\ M_{t-2}$	-0.20	-0.53	
	(-2.77)				(-2.84)	(-4.04)	
$\Delta Ln\ X_{t-3}$	-0.14			$\Delta Ln\ M_{t-3}$		-0.32	
	(-1.91)					(-3.06)	
$\Delta Ln\ NEER_t$	-0.60	-0.46	-0.10	$\Delta Ln\ NEER_t$	-0.71	-0.18	-0.38
	(-1.40)	(-0.50)	(-0.27)		(-2.34)	(-0.35)	(-1.16)
$\Delta Ln\ NEER_{t-1}$	-0.38	-1.76	0.22	$\Delta Ln\ NEER_{t-1}$	0.63	0.95	
	(-0.87)	(-1.87)	(0.57)		(2.15)	(1.81)	
$\Delta Ln\ NEER_{t-2}$	-0.67	-1.84	1.07	$\Delta Ln\ NEER_{t-2}$		0.18	
	(-1.53)	(-1.96)	(2.46)			(0.34)	
$\Delta Ln\ NEER_{t-3}$				$\Delta Ln\ NEER_{t-3}$		1.11	
						(2.14)	
$\Delta Ln\ PXPXW_t$	-0.01	-0.28	-0.24	$\Delta Ln\ PMPD_t$	-0.04	-0.45	0.12
	(-0.06)	(-0.61)	(-1.06)		(-0.33)	(-2.15)	(0.70)
$\Delta Ln\ PXPXW_{t-1}$				$\Delta Ln\ PMPD_{t-1}$		0.23	
						(1.08)	
$\Delta Ln\ PXPXW_{t-2}$				$\Delta Ln\ PMPD_{t-2}$		0.27	
						(1.28)	
$\Delta Ln\ PXPXW_{t-3}$				$\Delta Ln\ PMPD_{t-3}$		0.60	
						(2.88)	
$\Delta Ln\ YW_t$	1.12	3.87	-0.10	$\Delta Ln\ YP_t$	-0.009	-0.20	0.07
	(2.58)	(6.94)	(-0.22)		(-0.15)	(-1.83)	(1.27)
$\Delta Ln\ YW_{t-1}$	0.69	1.73	0.15	$\Delta Ln\ YP_{t-1}$	0.21	0.30	
	(1.69)	(3.07)	(0.41)		(3.70)	(2.72)	
$\Delta Ln\ YW_{t-2}$	-0.08		1.23	$\Delta Ln\ YP_{t-2}$			
	(-0.21)		(3.22)				
$\Delta Ln\ YW_{t-3}$	-1.90		-2.07	$\Delta Ln\ YP_{t-3}$			
	(-4.28)		(-4.65)				
Panel B:				Panel B:			
Constant	-7.54	-11.87	3.73	Constant	2.75	1.08	-1.46
	(-2.62)	(-1.38)	(2.33)		(1.37)	(0.41)	(-0.58)
Trend	0.01			Trend		0.02	0.008
	(2.47)					(1.99)	(1.04)
Ln NEER	0.44	0.00	-0.74	Ln NEER	-0.22	-0.14	0.45
	(1.21)	(0.50)	(-5.96)		(-0.82)	(-0.33)	(1.03)
Ln PXPXW	-0.23	-0.30	-0.35	Ln PMPD	-0.33	-2.11	-0.01
	(-0.97)	(-0.58)	(-3.34)		(-0.81)	(-2.34)	(-0.06)
Ln YW	1.77	3.49	0.92	Ln YP	0.54	-0.06	0.60
	(2.74)	(2.66)	(3.01)		(2.54)	(-0.15)	(2.81)
Panel C:				Panel C:			
F test	3.97	6.15	12.94	F test	2.91	4.31	5.99
ECM_{t-1}	-0.34	-0.46	-0.70	ECM_{t-1}	-0.20	-0.39	-0.44
	(-4.02)	(-5.08)	(-7.33)		(-3.44)	(-4.28)	(-4.98)
LM	1.53	4.12	6.14	LM	9.24	2.70	8.96
RESET	4.54	2.67	4.21	RESET	1.31	0.02	0.01
CUSUM	Stable	Stable	Stable	CUSUM	Stable	Stable	Stable
CUSUMSQ	Unstable	Stable	Stable	CUSUMSQ	Unstable	Stable	Stable
Adj R^2	0.55	0.54	0.61	Adj R^2	0.42	0.64	0.32

Table.27 Singapore

	Export				Import		
Panel A:	1979-2013	1979-1990	1991-2013	Panel A:	1979-2013	1979-1990	1991-2013
ΔLn X_{t-1}	-0.09	-0.31	-0.02	ΔLn M_{t-1}		-0.17	-0.09
	(-1.00)	(-2.10)	(-0.18)			(-1.59)	(-1.19)
ΔLn X_{t-2}	-0.30	-0.29	-0.27	ΔLn M_{t-2}			-0.09
	(-3.46)	(-1.99)	(-2.56)				(-1.22)
ΔLn X_{t-3}	-0.17	-0.30		ΔLn M_{t-3}			-0.21
	(-1.91)	(-2.03)					(-2.72)
ΔLn $NEER_t$	-0.17	0.31	-0.30	ΔLn $NEER_t$	0.09	-0.06	0.58
	(-0.58)	(0.73)	(-0.68)		(0.38)	(0.20)	(1.57)
ΔLn $NEER_{t-1}$			-0.05	ΔLn $NEER_{t-1}$		0.52	0.79
			(-0.11)			(1.71)	(2.09)
ΔLn $NEER_{t-2}$			-0.85	ΔLn $NEER_{t-2}$		-0.52	
			(-1.91)			(-1.62)	
ΔLn $NEER_{t-3}$			-0.99	ΔLn $NEER_{t-3}$		1.06	
			(-2.23)			(3.30)	
ΔLn $PXPXW_t$	-0.20	-0.33	-0.40	ΔLn $PMPD_t$	-0.06	-0.59	0.16
	(-1.60)	(-1.59)	(-2.30)		(-0.43)	(-3.03)	(0.88)
ΔLn $PXPXW_{t-1}$				ΔLn $PMPD_{t-1}$			0.48
							(2.45)
ΔLn $PXPXW_{t-2}$				ΔLn $PMPD_{t-2}$			
ΔLn $PXPXW_{t-3}$				ΔLn $PMPD_{t-3}$			
ΔLn YW_t	0.57	0.95	0.72	ΔLn YS_t	0.53	0.30	0.46
	(3.15)	(2.92)	(2.99)		(10.58)	(4.30)	(7.78)
ΔLn YW_{t-1}	0.01	0.62	-0.31	ΔLn YS_{t-1}			
	(0.07)	(2.02)	(-1.54)				
ΔLn YW_{t-2}	0.79	1.28	0.62	ΔLn YS_{t-2}			
	(5.36)	(4.94)	(3.15)				
ΔLn YW_{t-3}	0.36	0.94	0.52	ΔLn YS_{t-3}			
	(2.15)	(3.07)	(2.38)				
Panel B:				Panel B:			
Constant				Constant	1.11	3.35	20.28
					(0.59)	(1.83)	(1.05)
Trend				Trend	-0.008	0.006	
					(-1.99)	(1.01)	
Ln NEER	-1.40	0.10	-0.63	Ln NEER	-0.62	-0.67	-4.84
	(-1.08)	(0.12)	(-0.42)		(-1.38)	(-1.94)	(-1.04)
Ln PXPXW	-2.41	-1.64	-2.42	Ln PMPD	-0.52	-0.43	-1.73
	(-8.77)	(-4.12)	(-4.51)		(-2.05)	(-0.89)	(-0.86)
Ln YW	2.51	0.70	1.70	Ln YS	1.57	0.79	1.48
	(1.85)	(0.87)	(1.12)		(5.91)	(3.21)	(2.93)
Panel C:				Panel C:			
F test	8.83	4.57	6.86	F test	4.80	6.47	4.02
ECM_{t-1}	-0.04	-0.19	-0.06	ECM_{t-1}	-0.15	-0.40	-0.10
	(-6.01)	(-4.45)	(-5.34)		(-4.38)	(-5.32)	(-4.09)
LM	28.80	0.88	12.13	LM	3.36	1.59	2.81
RESET	0.006	0.22	5.34	RESET	1.54	1.01	4.13
CUSUM	Stable	Stable	Stable	CUSUM	Stable	Stable	Stable
CUSUMSQ	Stable	Stable	Stable	CUSUMSQ	Stable	Stable	Stable
Adj R^2	0.33	0.51	0.32	Adj R^2	0.46	0.62	0.54

Table.28 Spain

	Export				Import		
Panel A:	1973-2013	1973-1990	1991-2013	Panel A:	1973-2013	1973-1990	1991-2013
$\Delta Ln\ X_{t-1}$	-0.15	-0.18	-0.20	$\Delta Ln\ M_{t-1}$			-0.22
	(-1.99)	(-1.75)	(-2.00)				(-2.29)
$\Delta Ln\ X_{t-2}$		-0.18	-0.29	$\Delta Ln\ M_{t-2}$			-0.28
		(-1.68)	(-2.96)				(-3.05)
$\Delta Ln\ X_{t-3}$		-0.19	-0.13	$\Delta Ln\ M_{t-3}$			
		(-1.84)	(-1.40)				
$\Delta Ln\ NEER_t$	-0.65	-1.90	0.12	$\Delta Ln\ NEER_t$	-0.22	-0.40	0.08
	(-1.48)	(-3.04)	(0.38)		(-0.48)	(-0.52)	(0.42)
$\Delta Ln\ NEER_{t-1}$		-1.44	1.25	$\Delta Ln\ NEER_{t-1}$	-0.58	-1.08	
		(-2.12)	(3.94)		(-1.17)	(-1.29)	
$\Delta Ln\ NEER_{t-2}$		-1.42	-0.34	$\Delta Ln\ NEER_{t-2}$	1.20	1.45	
		(-2.23)	(-1.44)		(2.50)	(1.84)	
$\Delta Ln\ NEER_{t-3}$				$\Delta Ln\ NEER_{t-3}$			
$\Delta Ln\ PXPXW_t$	0.90	3.38	-0.43	$\Delta Ln\ PMPD_t$	0.34	0.21	0.04
	(2.13)	(4.50)	(-2.01)		(0.93)	(0.27)	(0.44)
$\Delta Ln\ PXPXW_{t-1}$	0.71	3.27	-0.59	$\Delta Ln\ PMPD_{t-1}$			0.18
	(2.08)	(3.91)	(-2.73)				(2.21)
$\Delta Ln\ PXPXW_{t-2}$		2.41		$\Delta Ln\ PMPD_{t-2}$			0.14
		(2.91)					(1.56)
$\Delta Ln\ PXPXW_{t-3}$		1.76		$\Delta Ln\ PMPD_{t-3}$			
		(2.78)					
$\Delta Ln\ YW_t$	0.56	1.41	0.61	$\Delta Ln\ YSP_t$	1.48	1.66	0.91
	(2.04)	(2.98)	(4.74)		(2.48)	(1.37)	(5.19)
$\Delta Ln\ YW_{t-1}$	-0.007	0.75	0.54	$\Delta Ln\ YSP_{t-1}$			0.47
	(-0.02)	(1.65)	(3.87)				(2.26)
$\Delta Ln\ YW_{t-2}$	0.52	1.43	0.24	$\Delta Ln\ YSP_{t-2}$			0.32
	(2.03)	(3.06)	(1.79)				(1.64)
$\Delta Ln\ YW_{t-3}$	0.60	1.38	0.40	$\Delta Ln\ YSP_{t-3}$			
	(2.15)	(2.87)	(3.11)				
Panel B:				Panel B:			
Constant	-15.76		8.74	Constant	-17.88	-29.63	-4.21
	(-1.07)		(3.49)		(-4.78)	(-3.28)	(-5.92)
Trend	0.02		0.01	Trend	0.01	-0.02	0.01
	(3.27)		(17.37)		5.68	(-1.23)	(41.38)
Ln NEER	3.46	0.70	-1.50	Ln NEER	2.26	2.06	0.28
	(1.67)	(2.67)	(-5.16)		(3.37)	(2.08)	(1.85)
Ln PXPXW	-2.74	0.66	0.06	Ln PMPD	0.24	-0.77	-0.21
	(-0.96)	(0.94)	(0.21)		(0.61)	(-0.68)	(-2.42)
Ln YW	0.29	-0.05	0.29	Ln YSP	2.18	5.82	1.28
	(0.17)	(-0.18)	(0.87)		(3.33)	(2.39)	(20.85)
Panel C:				Panel C:			
F test	2.98	7.69	4.65	F test	4.57	4.01	7.13
ECM_{t-1}	-0.10	-0.39	-0.32	ECM_{t-1}	-0.22	-0.39	-0.56
	(-3.49)	(-5.71)	(-4.40)		(-4.31)	(-4.10)	(-5.44)
LM	4.34	3.51	2.95	LM	4.03	4.96	0.79
RESET	85.52	38.55	2.23	RESET	40.27	17.78	1.15
CUSUM	Stable	Stable	Stable	CUSUM	Stable	Stable	Stable
CUSUMSQ	Unstable	Unstable	Stable	CUSUMSQ	Unstable	Unstable	Stable
Adj R^2	0.14	0.46	0.50	Adj R^2	0.17	0.24	0.64

Table.29 UK

	Export				Import		
Panel A:	1973-2013	1973-1990	1991-2013	Panel A:	1973-2013	1973-1990	1991-2013
$\Delta Ln\ X_{t-1}$	-0.22	0.70		$\Delta Ln\ M_{t-1}$	-0.11		
	(-2.75)	(3.63)			(-1.41)		
$\Delta Ln\ X_{t-2}$	-0.19	0.39		$\Delta Ln\ M_{t-2}$	-0.17		
	(-2.38)	(2.85)			(-2.31)		
$\Delta Ln\ X_{t-3}$		0.13		$\Delta Ln\ M_{t-3}$			
		(1.25)					
$\Delta Ln\ NEER_{t}$	-0.11	-0.44	-0.27	$\Delta Ln\ NEER_{t}$	-0.15	-0.30	0.01
	(-0.79)	(-3.03)	(-1.22)		(-1.84)	(-2.76)	(0.15)
$\Delta Ln\ NEER_{t-1}$				$\Delta Ln\ NEER_{t-1}$		-0.12	
						(-1.05)	
$\Delta Ln\ NEER_{t-2}$				$\Delta Ln\ NEER_{t-2}$		-0.14	
						(-1.24)	
$\Delta Ln\ NEER_{t-3}$				$\Delta Ln\ NEER_{t-3}$			
$\Delta Ln\ PXPXW_{t}$	0.08	0.43	0.51	$\Delta Ln\ PMPD_{t}$	-0.03	-0.17	0.02
	(0.57)	(2.90)	(1.78)		(-0.43)	(-1.36)	(0.25)
$\Delta Ln\ PXPXW_{t-1}$		0.29		$\Delta Ln\ PMPD_{t-1}$			
		(2.82)					
$\Delta Ln\ PXPXW_{t-2}$		0.18		$\Delta Ln\ PMPD_{t-2}$			
		(2.01)					
$\Delta Ln\ PXPXW_{t-3}$		0.21		$\Delta Ln\ PMPD_{t-3}$			
		(2.46)					
$\Delta Ln\ YW_{t}$	0.37	0.25	0.60	$\Delta Ln\ YUK_{t}$	0.88	1.01	0.98
	(3.64)	(2.97)	(4.05)		(5.90)	(5.46)	(3.19)
$\Delta Ln\ YW_{t-1}$	0.31	-0.78		$\Delta Ln\ YUK_{t-1}$	0.27		0.65
	(3.16)	(-5.10)			(1.66)		(2.26)
$\Delta Ln\ YW_{t-2}$	0.33	-0.30		$\Delta Ln\ YUK_{t-2}$	0.35		-0.20
	(3.32)	(-2.79)			(2.16)		(-0.72)
$\Delta Ln\ YW_{t-3}$	0.19			$\Delta Ln\ YUK_{t-3}$	-0.24		-0.50
	(1.85)				(-1.65)		(-1.89)
Panel B:				Panel B:			
Constant	0.07	1.52	-1.04	Constant	-5.04	-9.63	-4.68
	(0.03)	(7.66)	(-0.51)		(-0.43)	(-6.20)	(-4.37)
Trend	0.006	0.005		Trend			0.01
	(3.34)	(13.50)					(23.28)
Ln NEER	-0.15	-0.21	-1.12	Ln NEER	0.57	0.52	0.45
	(-0.49)	(-8.27)	(-4.78)		(0.38)	(2.85)	(3.06)
Ln PXPXW	-0.30	-0.002	1.78	Ln PMPD	-1.95	-0.33	-0.0002
	(-1.02)	(-0.13)	(2.24)		(-1.66)	(-4.41)	(-0.001)
Ln YW	0.95	0.68	2.34	Ln YUK	1.65	2.46	1.21
	(2.12)	(13.72)	(7.29)		(0.69)	(11.31)	(4.31)
Panel C:				Panel C:			
F test	1.80	13.33	3.24	F test	2.21	4.81	4.44
ECM_{t-1}	-0.12	-2.03	-0.20	ECM_{t-1}	-0.01	-0.34	-0.30
	(-2.70)	(-7.51)	(-3.65)		(-3.00)	(-4.49)	(-4.29)
LM	4.39	11.07	5.71	LM	9.19	6.25	3.73
RESET	5.79	1.26	17.29	RESET	0.06	0.72	8.36
CUSUM	Stable	Stable	Stable	CUSUM	Stable	Stable	Stable
CUSUMSQ	Unstable	Unstable	Unstable	CUSUMSQ	Unstable	Stable	Unstable
Adj R^2	0.16	0.61	0.17	Adj R^2	0.24	0.39	0.33

Table.30 USA

	Export				Import		
Panel A:	1973-2013	1973-1990	1991-2013	Panel A:	1973-2013	1973-1990	1991-2013
ΔLn X_{t-1}	-0.33	-0.18	-0.35	ΔLn M_{t-1}	-0.30	-0.28	-0.29
	(-4.81)	(-1.79)	(-3.98)		(-4.16)	(-2.67)	(-2.85)
ΔLn X_{t-2}	-0.22	-0.24	-0.14	ΔLn M_{t-2}	-0.22		-0.34
	(-3.13)	(-2.30)	(-1.55)		(-3.14)		(-3.72)
ΔLn X_{t-3}	-0.16		-0.16	ΔLn M_{t-3}			
	(-3.33)		(-3.14)				
ΔLn $NEER_t$	-0.04	0.19	-0.14	ΔLn $NEER_t$	-0.24	-0.19	-0.07
	(-0.33)	(1.02)	(-0.91)		(-1.55)	(-1.00)	(-0.28)
ΔLn $NEER_{t-1}$	-0.15			ΔLn $NEER_{t-1}$		0.12	
	(-0.98)					(0.79)	
ΔLn $NEER_{t-2}$	-0.30			ΔLn $NEER_{t-2}$		-0.18	
	(-2.21)					(-1.20)	
ΔLn $NEER_{t-3}$				ΔLn $NEER_{t-3}$		-0.23	
						(-1.59)	
ΔLn $PXPXW_t$	-0.10	-0.14	-0.04	ΔLn $PMPD_t$	-0.11	0.02	-0.08
	(-0.70)	(-0.67)	(-0.24)		(-0.58)	(0.08)	(-0.25)
ΔLn $PXPXW_{t-1}$	0.26	0.33		ΔLn $PMPD_{t-1}$			
	(1.64)	(2.21)					
ΔLn $PXPXW_{t-2}$	0.30			ΔLn $PMPD_{t-2}$			
	(2.04)						
ΔLn $PXPXW_{t-3}$				ΔLn $PMPD_{t-3}$			
ΔLn YW_t	0.96	0.82	1.15	ΔLn YUS_t	1.13	1.08	1.38
	(13.28)	(6.80)	(13.80)		(4.76)	(4.30)	(3.02)
ΔLn YW_{t-1}	0.45	0.01	0.46	ΔLn YUS_{t-1}	0.91	1.06	1.12
	(4.69)	(0.07)	(3.53)		(3.00)	(3.48)	(2.16)
ΔLn YW_{t-2}	0.48	0.31	0.41	ΔLn YUS_{t-2}	0.41		
	(4.82)	(2.17)	(3.00)		(1.54)		
ΔLn YW_{t-3}		-0.32		ΔLn YUS_{t-3}			
		(-2.76)					
Panel B:				Panel B:			
Constant	-2.53	-3.99	0.30	Constant	-1.64	-2.49	-1.37
	(-1.23)	(-3.88)	(0.13)		(-1.70)	(-2.72)	(-0.65)
Trend	0.006		0.007	Trend	0.004		
	(3.74)		(4.88)		(3.08)		
Ln NEER	0.07	0.03	-0.51	Ln NEER	0.02	0.42	-0.50
	(0.42)	(0.20)	(-1.08)		(0.33)	(2.32)	(-1.68)
Ln PXPXW	-2.68	-1.28	-1.29	Ln PMPD	-0.93	-0.17	-1.46
	(-3.79)	(-3.71)	(-1.25)		(-2.84)	(-0.39)	(-2.14)
Ln YW	1.34	1.75	1.27	Ln YUS	1.20	1.03	1.80
	(2.30)	(4.81)	(1.96)		(4.56)	(2.75)	(4.83)
Panel C:				Panel C:			
F test	11.04	9.99	7.08	F test	7.31	4.70	2.31
ECM_{t-1}	-0.09	-0.30	-0.08	ECM_{t-1}	-0.21	-0.29	-0.19
	(-6.71)	(-6.46)	(-5.42)		(-5.46)	(-4.45)	(-3.09)
LM	2.22	3.48	3.02	LM	52.29	3.67	54.22
RESET	0.32	0.03	1.64	RESET	1.51	0.62	0.30
CUSUM	Stable	Stable	Stable	CUSUM	Stable	Stable	Stable
CUSUMSQ	Unstable	Stable	Stable	CUSUMSQ	Unstable	Stable	Unstable
Adj R^2	0.78	0.81	0.84	Adj R^2	0.45	0.57	0.42

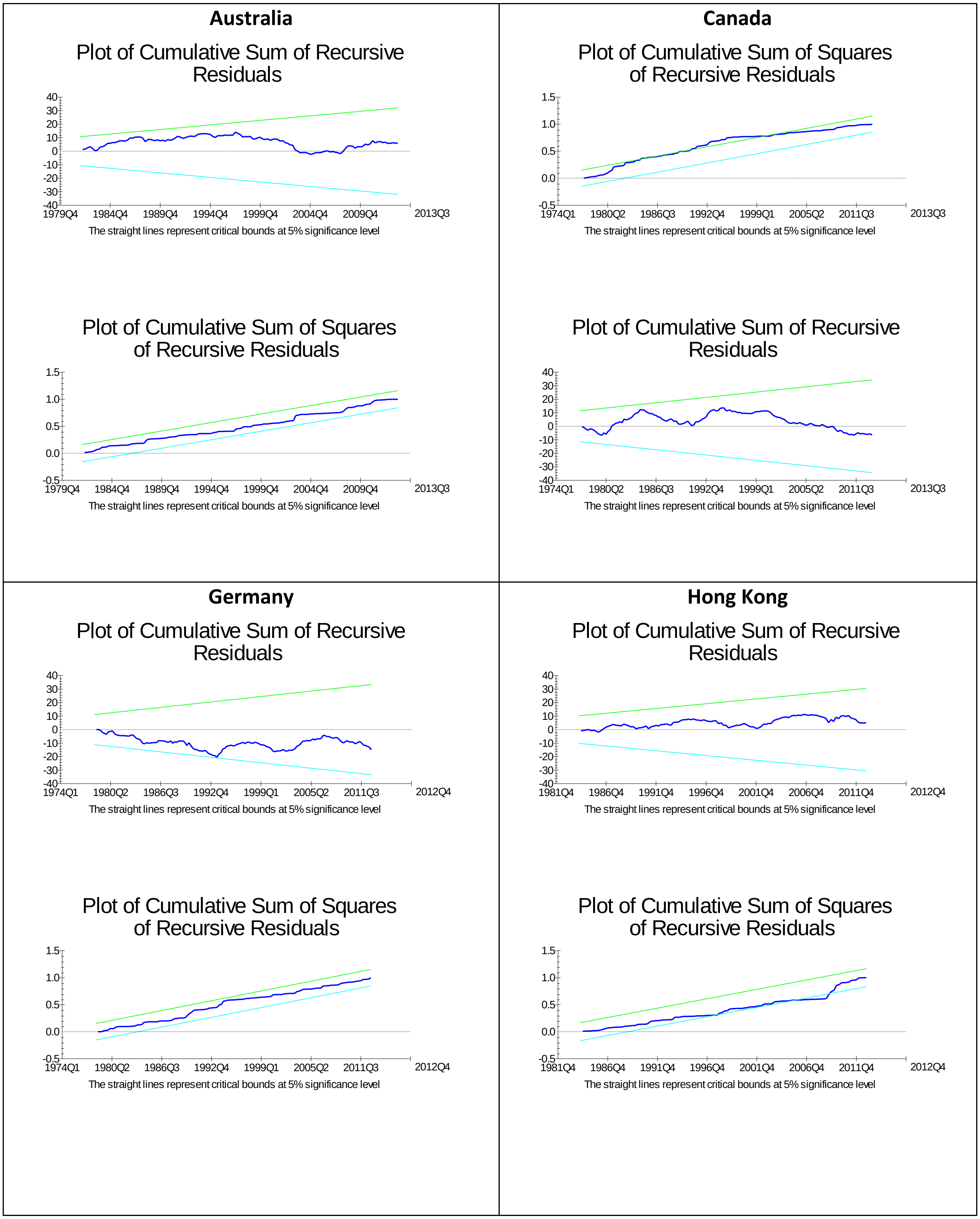
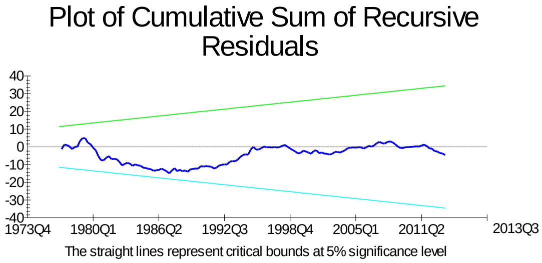
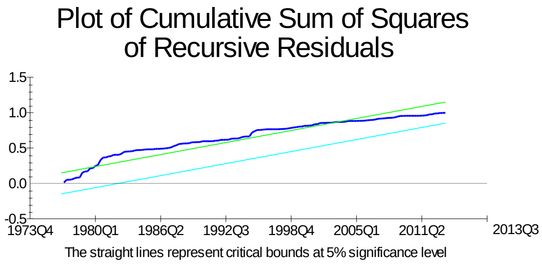


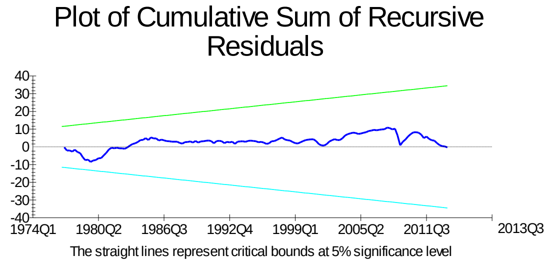
Fig. 5 Graphs of CUSUM and CUSUM Square for export of 1973-2013

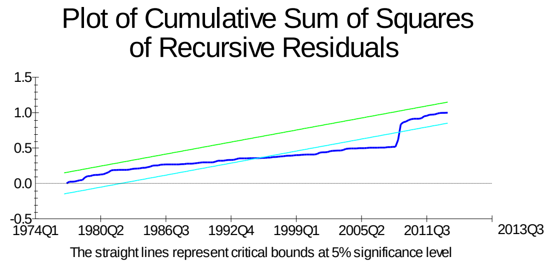
Italy



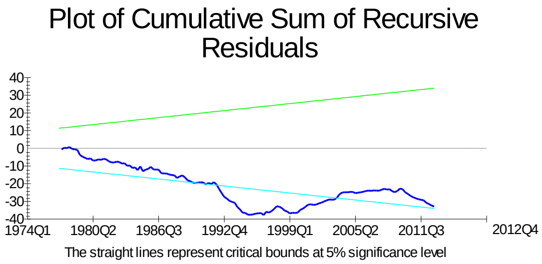


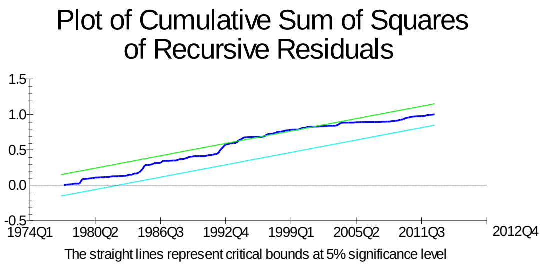
Japan



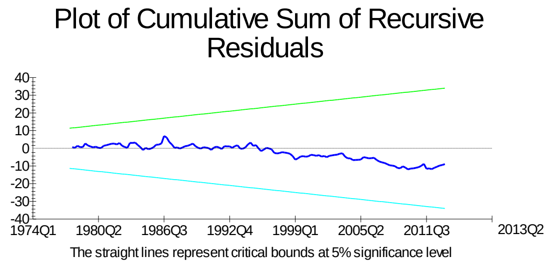


Korea





Pakistan



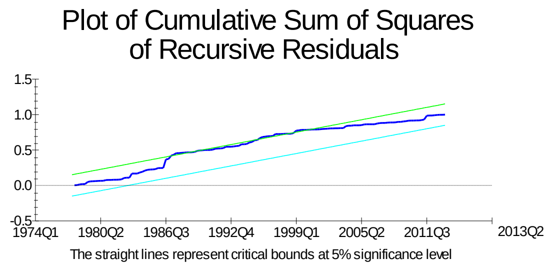
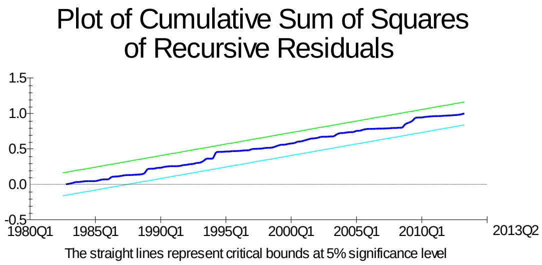
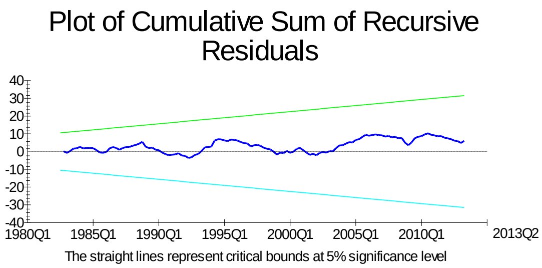


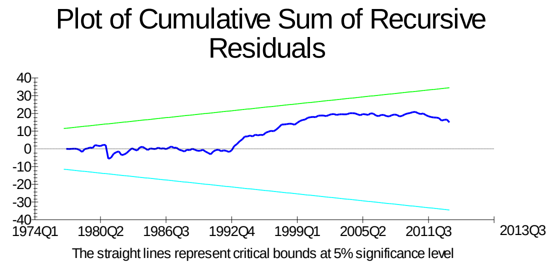
Fig.5 continued

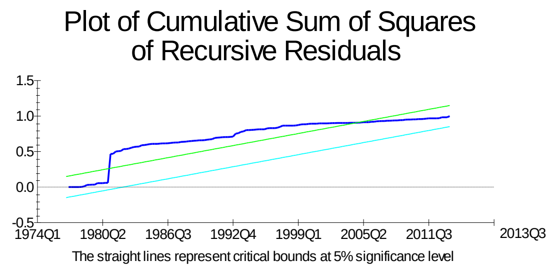
Singapore



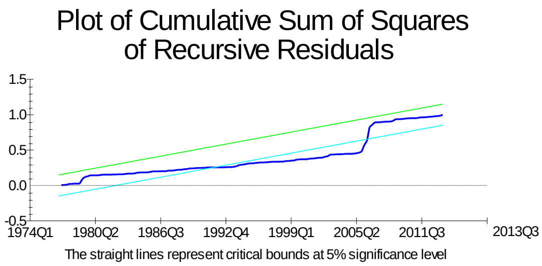


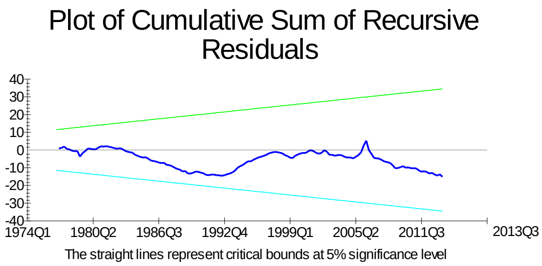
Spain



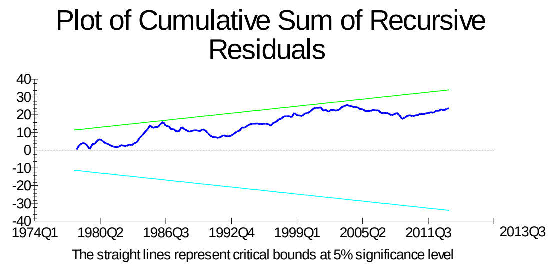


UK





USA



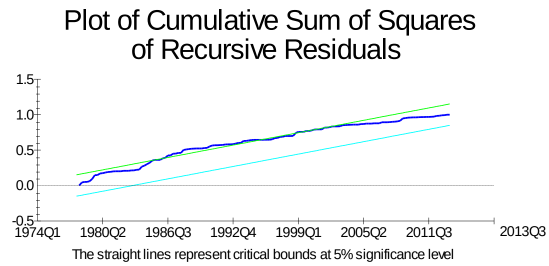


Fig.5 continued

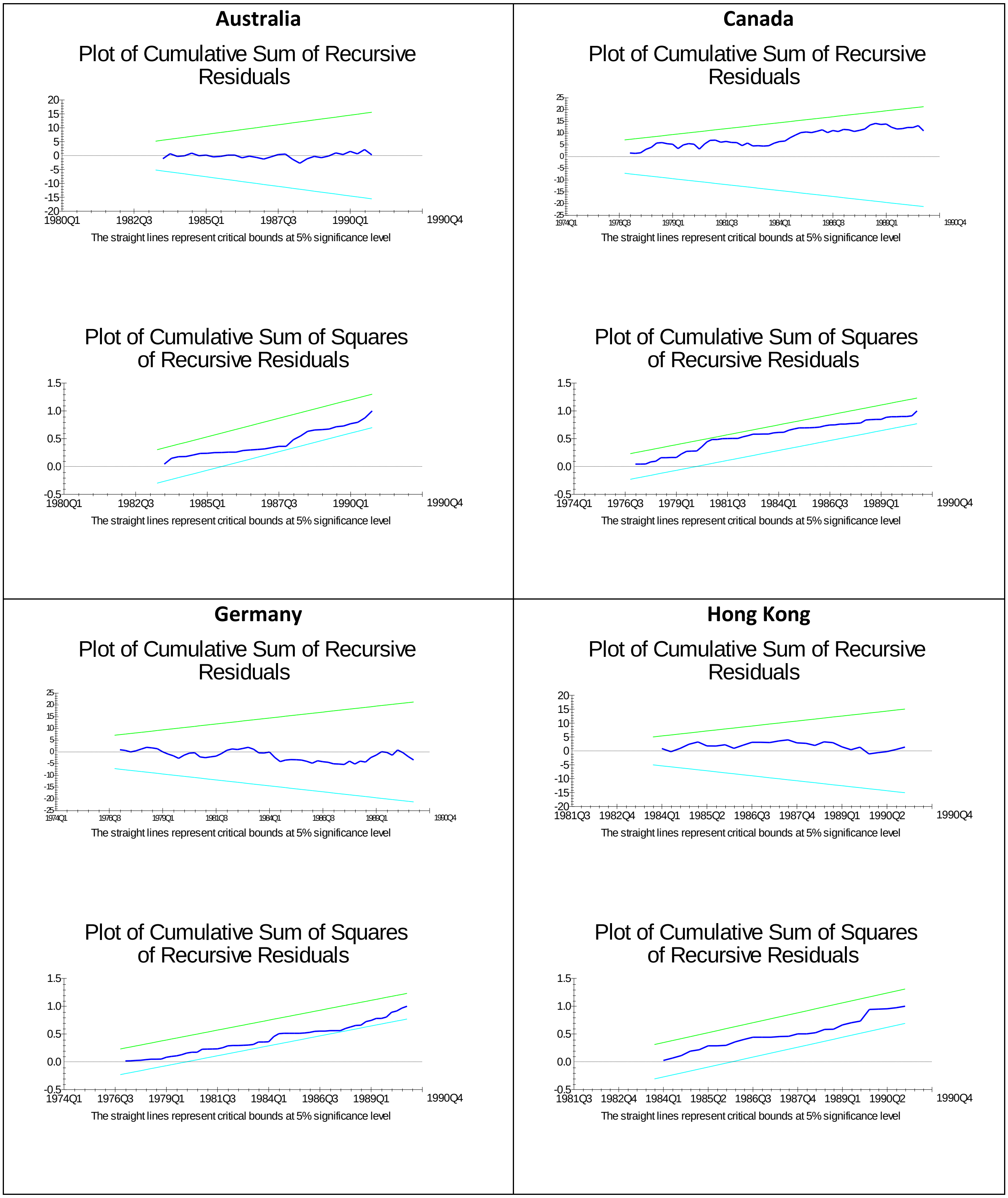
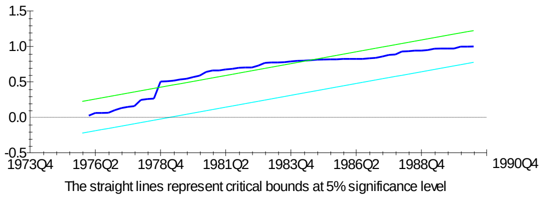


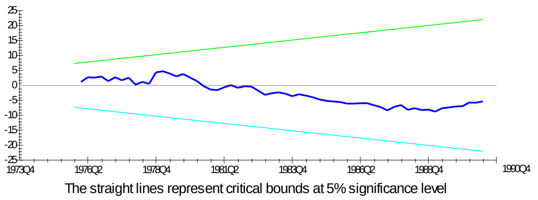
Fig.6 Graphs of CUSUM and CUSUM Square for export of 1973-1990

Italy

Plot of Cumulative Sum of Squares of Recursive Residuals

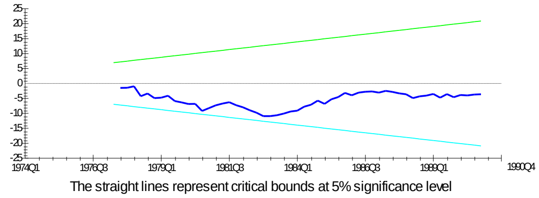


Plot of Cumulative Sum of Recursive Residuals

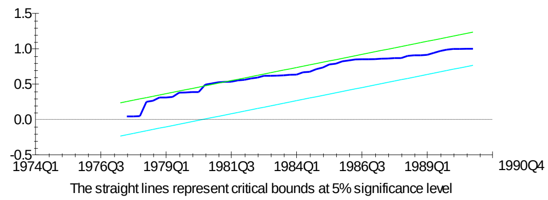


Japan

Plot of Cumulative Sum of Recursive Residuals

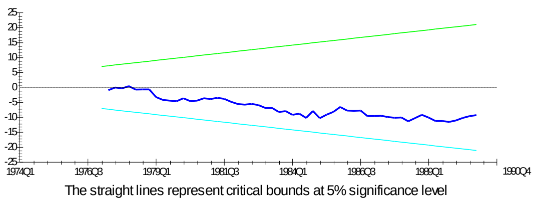


Plot of Cumulative Sum of Squares of Recursive Residuals

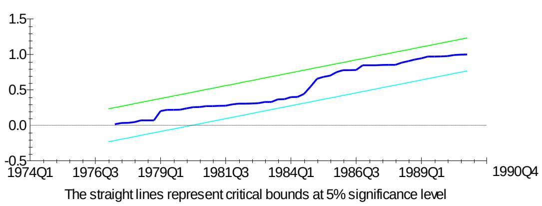


Korea

Plot of Cumulative Sum of Recursive Residuals

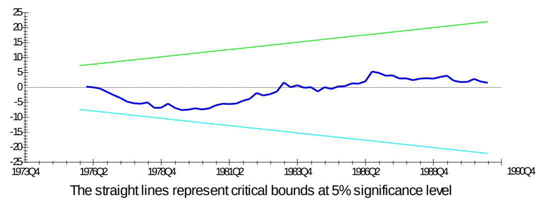


Plot of Cumulative Sum of Squares of Recursive Residuals



Pakistan

Plot of Cumulative Sum of Recursive Residuals



Plot of Cumulative Sum of Squares of Recursive Residuals

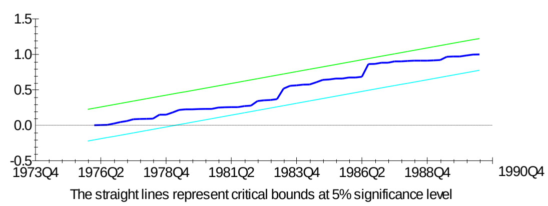
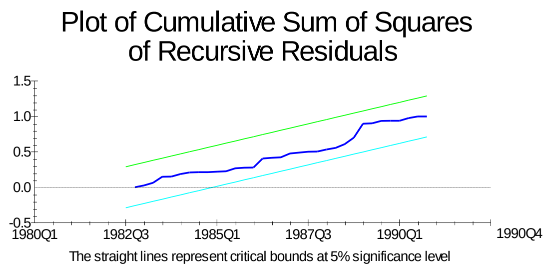
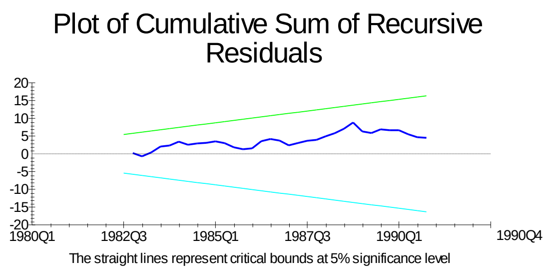


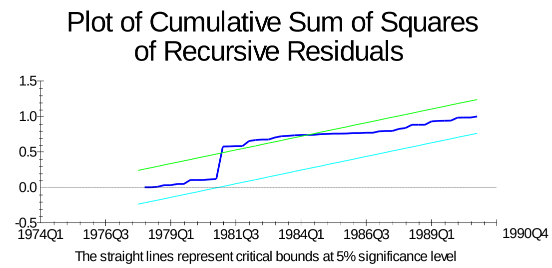
Fig.6 continued

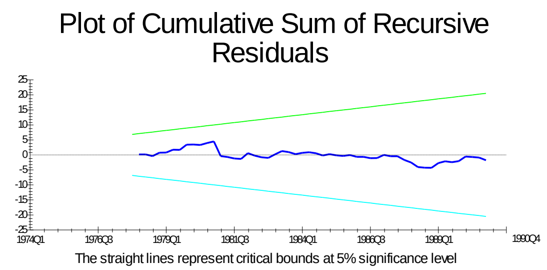
Singapore



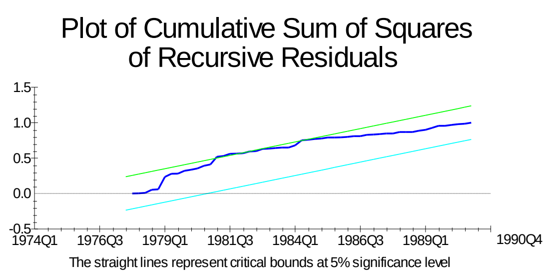


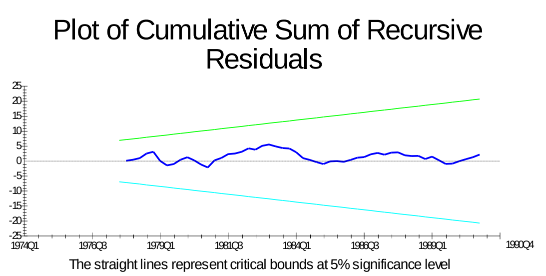
Spain



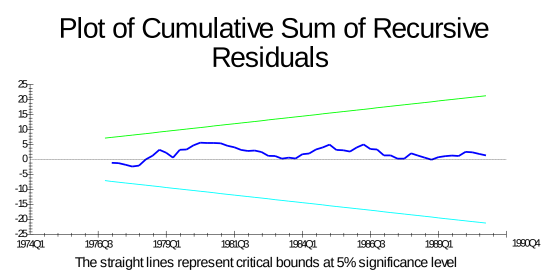


UK





USA



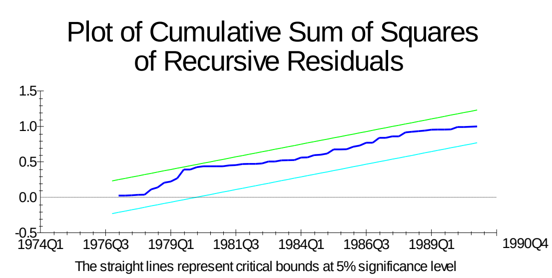


Fig.6 continued

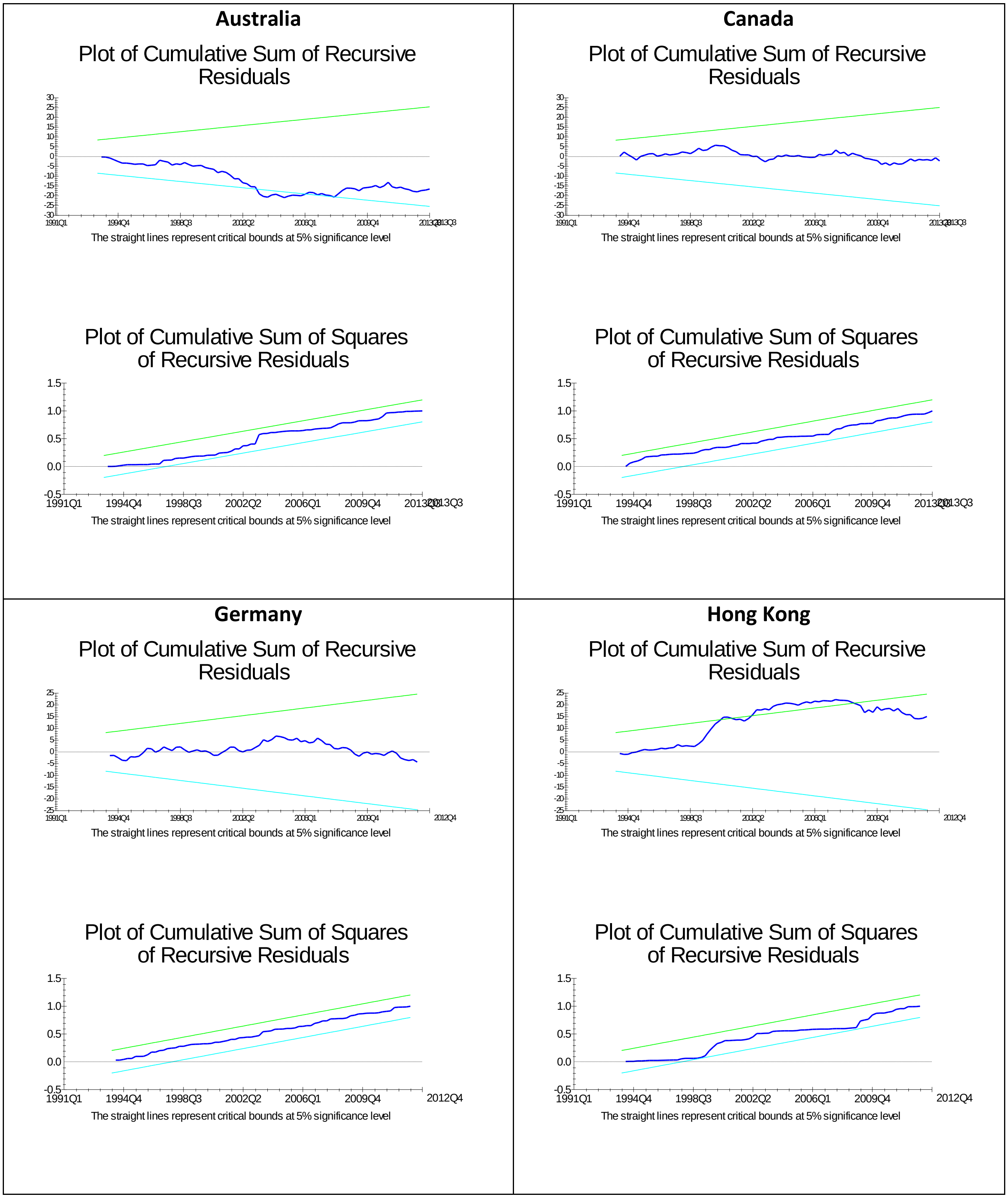
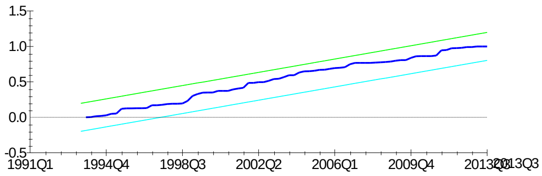


Fig.7 Graphs of CUSUM and CUSUM Square for export of 1991-2013

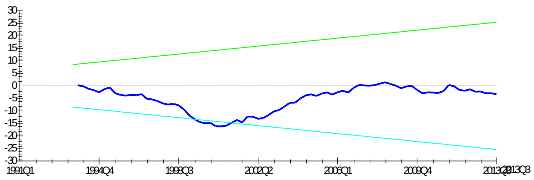
Italy

Plot of Cumulative Sum of Squares of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

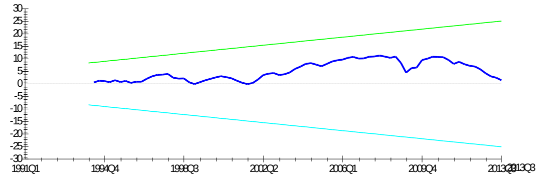
Plot of Cumulative Sum of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

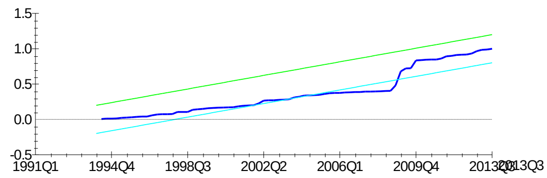
Japan

Plot of Cumulative Sum of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

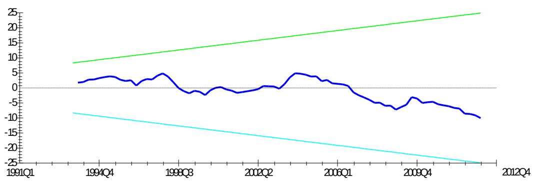
Plot of Cumulative Sum of Squares of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

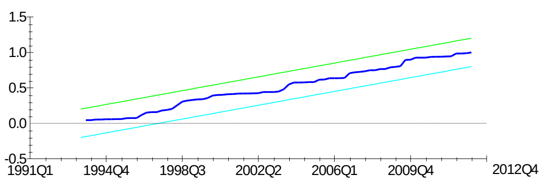
Korea

Plot of Cumulative Sum of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

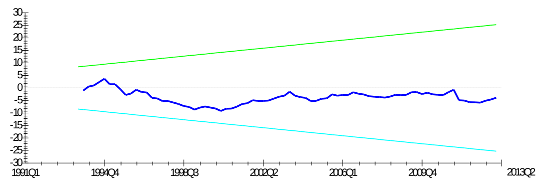
Plot of Cumulative Sum of Squares of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

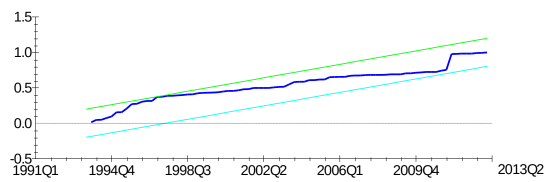
Pakistan

Plot of Cumulative Sum of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

Plot of Cumulative Sum of Squares of Recursive Residuals

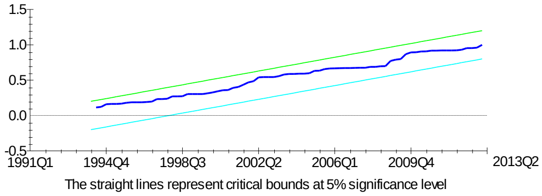


The straight lines represent critical bounds at 5% significance level

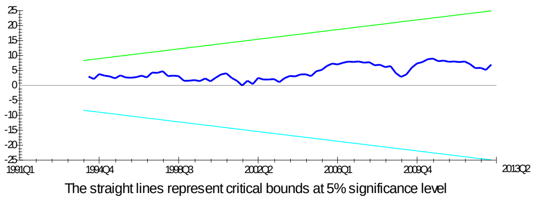
Fig.7 continued

Singapore

Plot of Cumulative Sum of Squares of Recursive Residuals

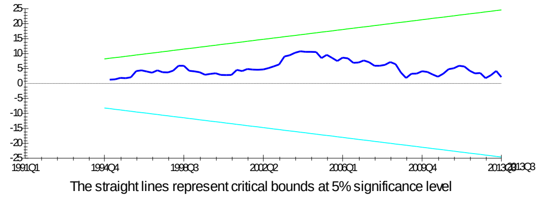


Plot of Cumulative Sum of Recursive Residuals

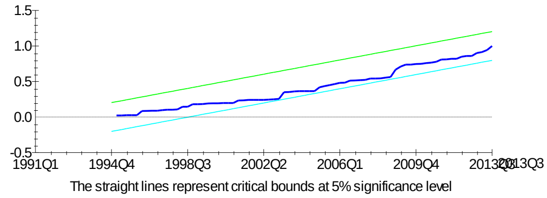


Spain

Plot of Cumulative Sum of Recursive Residuals

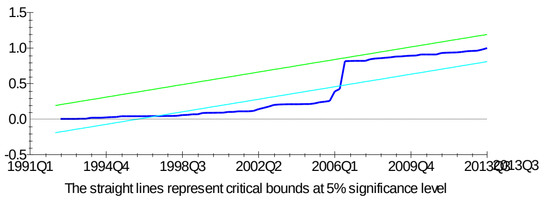


Plot of Cumulative Sum of Squares of Recursive Residuals

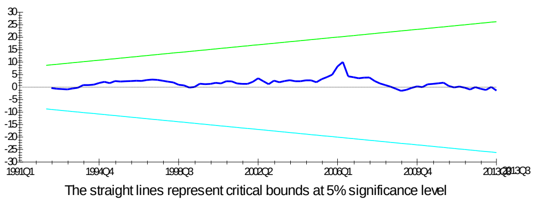


UK

Plot of Cumulative Sum of Squares of Recursive Residuals

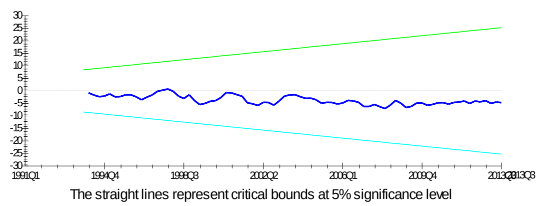


Plot of Cumulative Sum of Recursive Residuals



USA

Plot of Cumulative Sum of Recursive Residuals



Plot of Cumulative Sum of Squares of Recursive Residuals

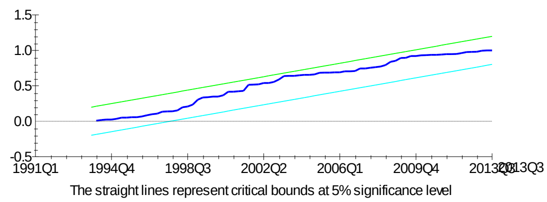


Fig.7 continued

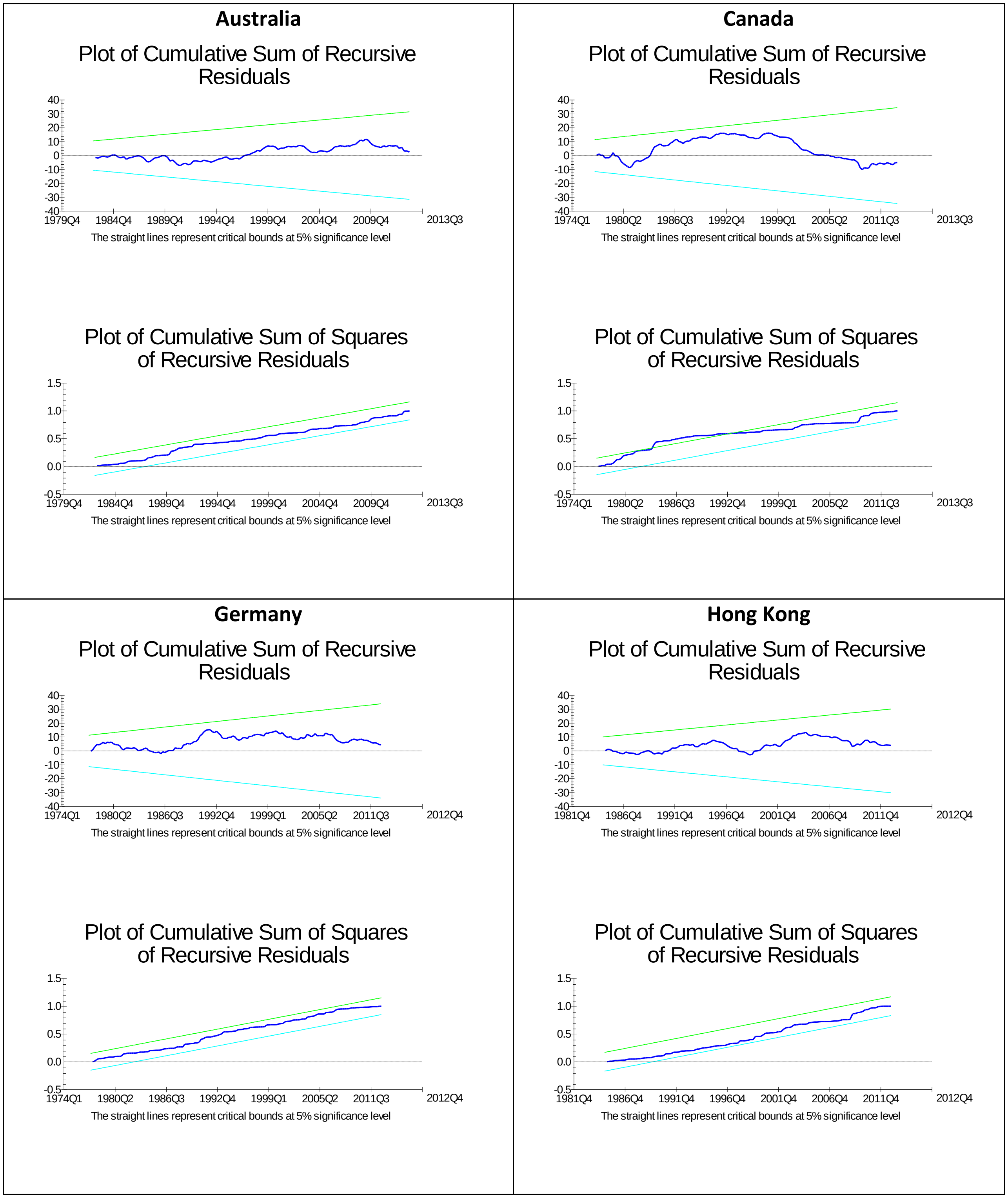
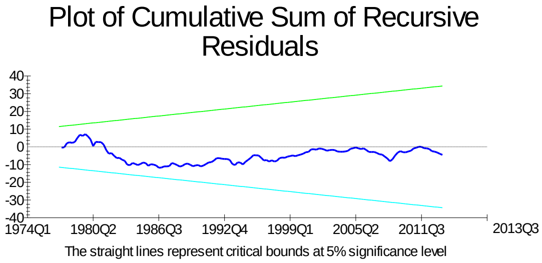
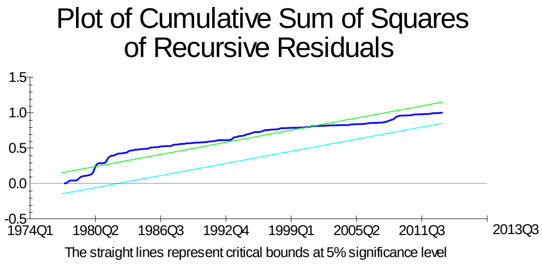


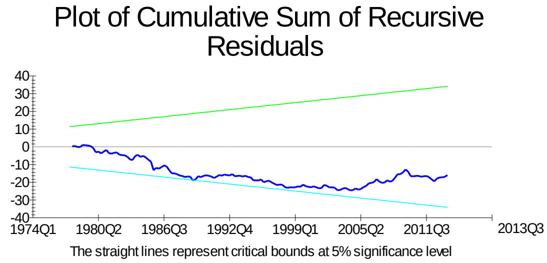
Fig.8 Graphs of CUSUM and CUSUM Square for import of 1973-2013

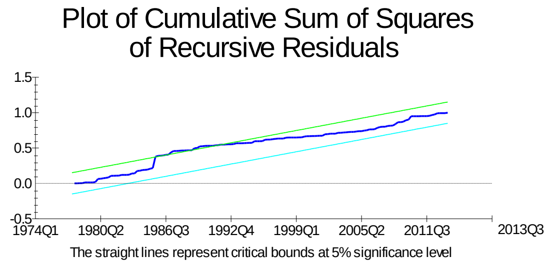
Italy



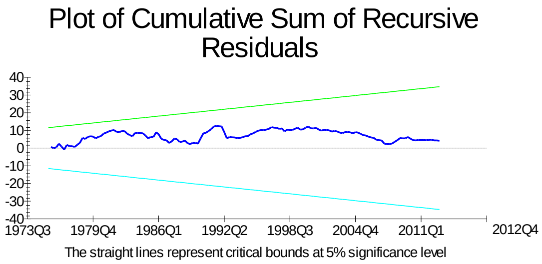


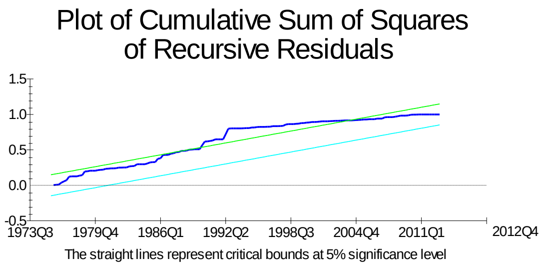
Japan



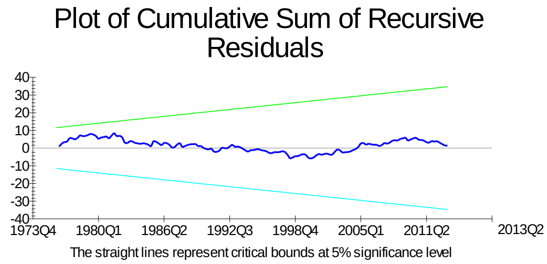


Korea





Pakistan



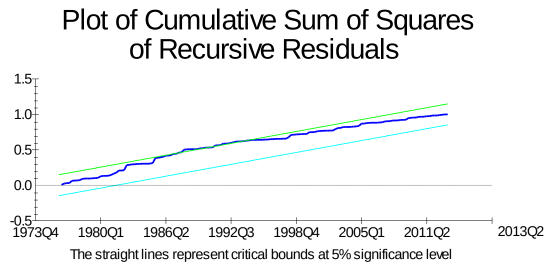
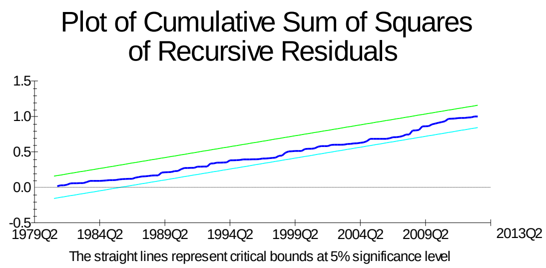
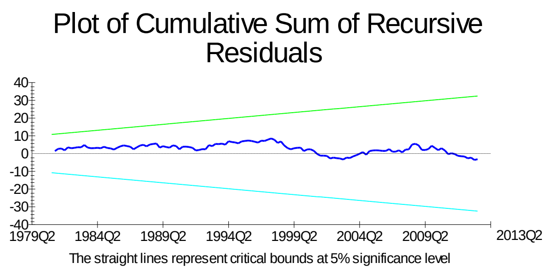


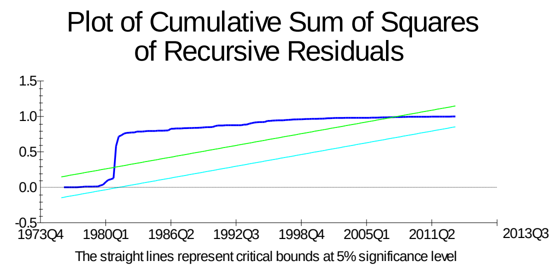
Fig.8 continued

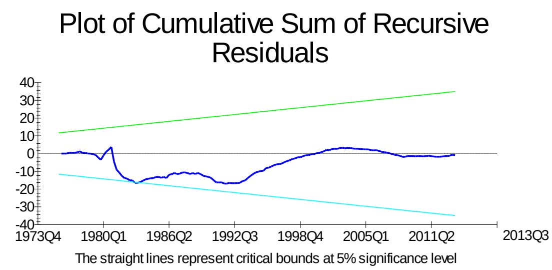
Singapore



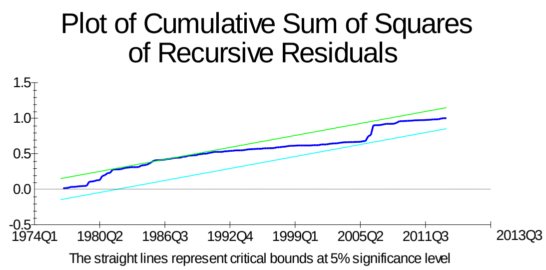


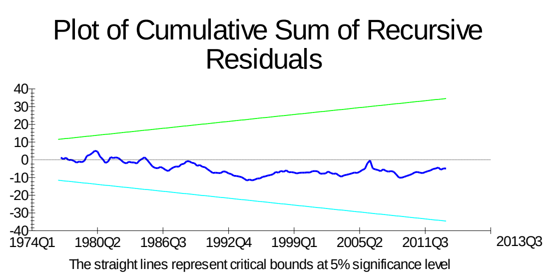
Spain



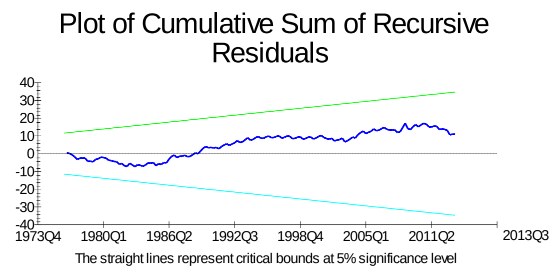


UK





USA



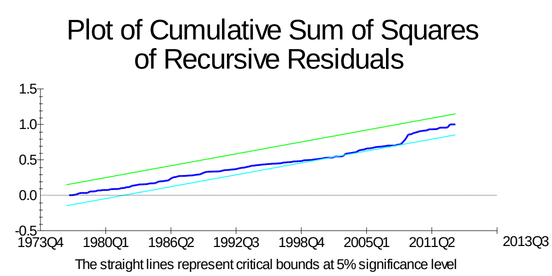


Fig.8 continued

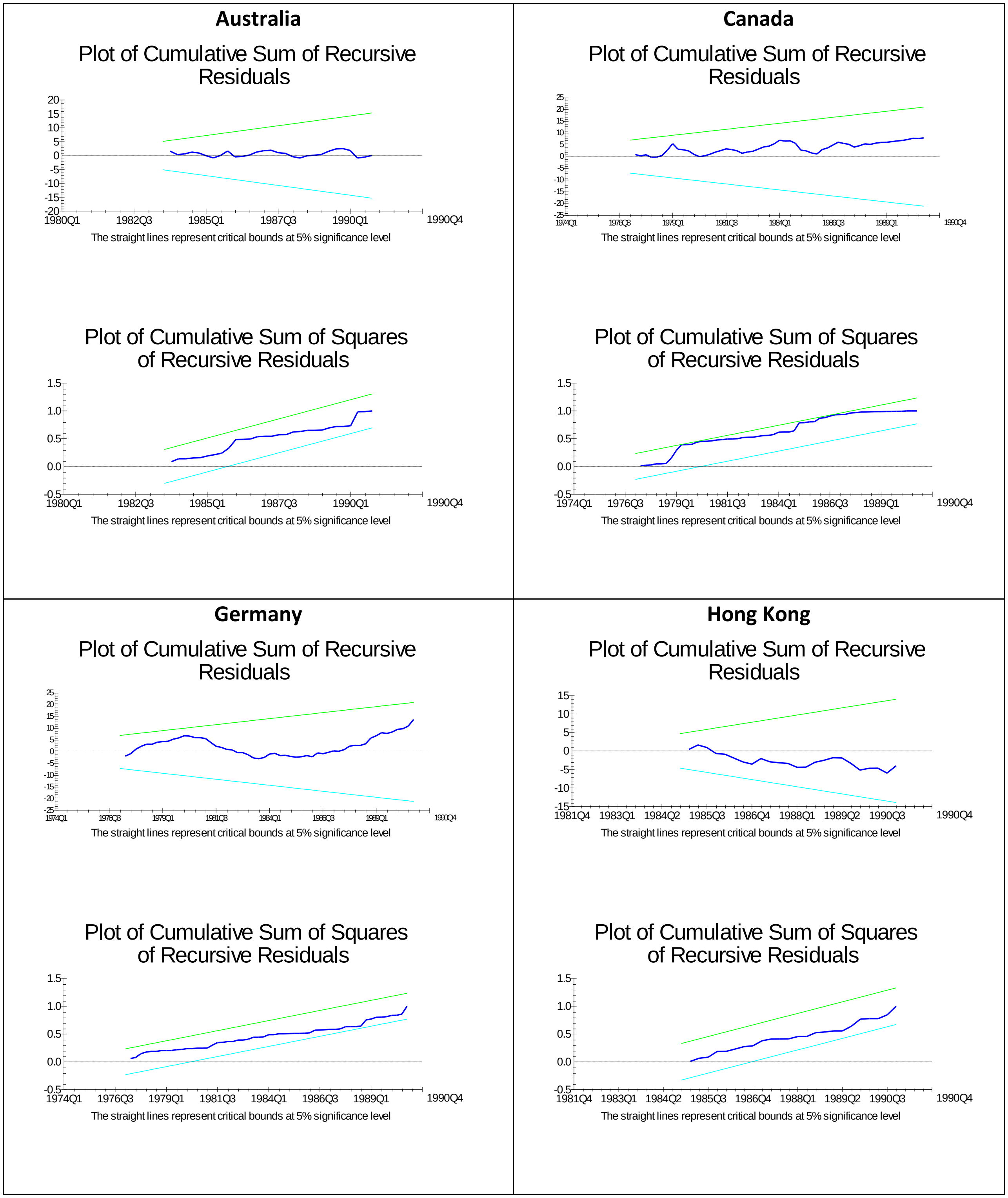
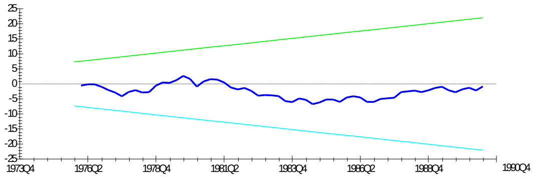


Fig.9 Graphs of CUSUM and CUSUM Square for import of 1973-1990

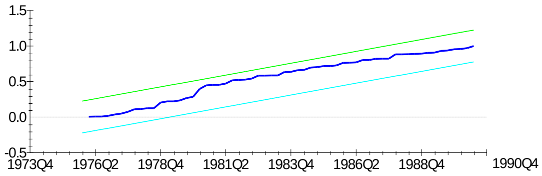
Italy

Plot of Cumulative Sum of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

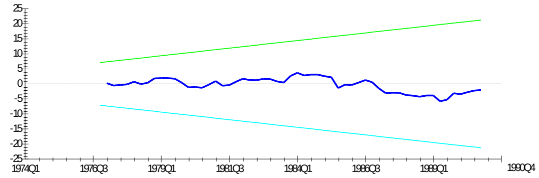
Plot of Cumulative Sum of Squares of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

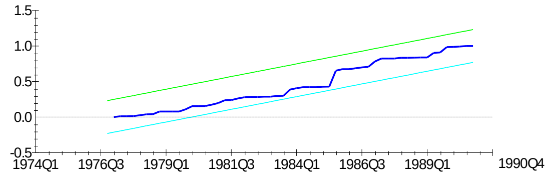
Japan

Plot of Cumulative Sum of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

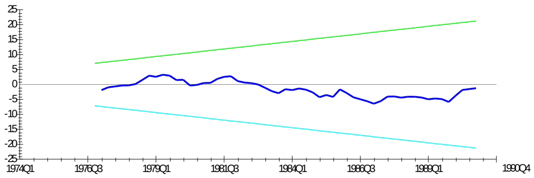
Plot of Cumulative Sum of Squares of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

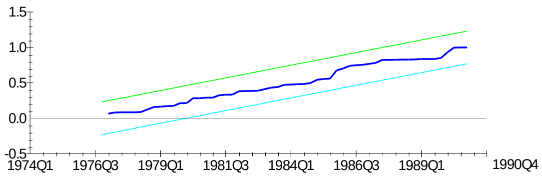
Korea

Plot of Cumulative Sum of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

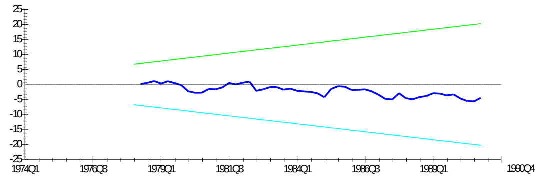
Plot of Cumulative Sum of Squares of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

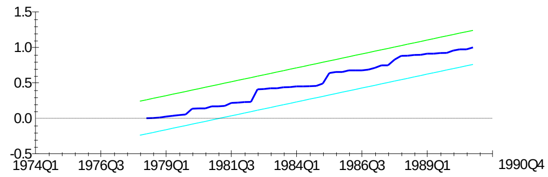
Pakistan

Plot of Cumulative Sum of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

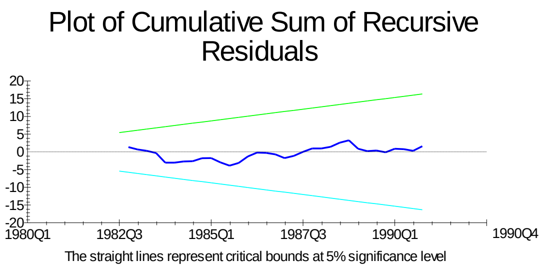
Plot of Cumulative Sum of Squares of Recursive Residuals

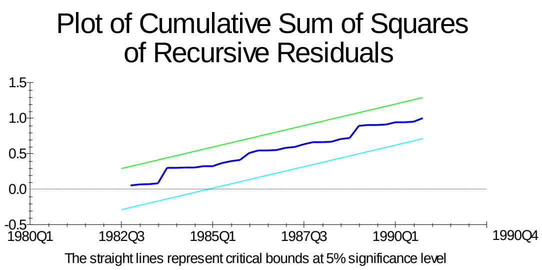


The straight lines represent critical bounds at 5% significance level

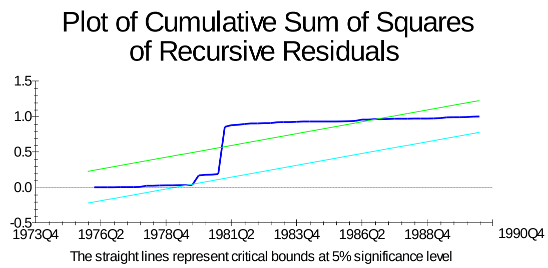
Fig.9 continued

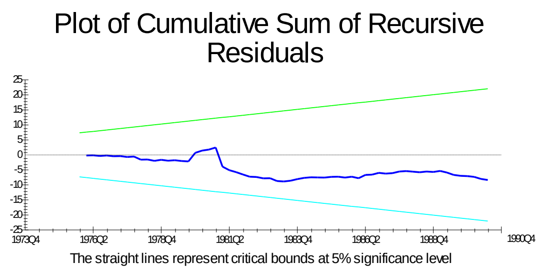
Singapore



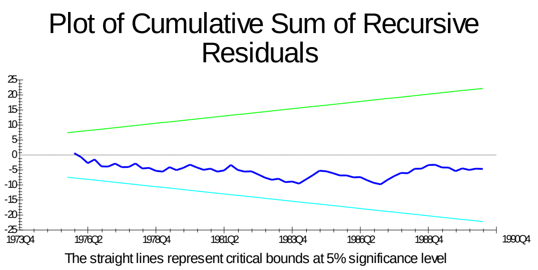


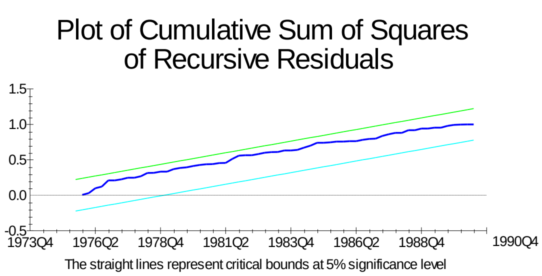
Spain



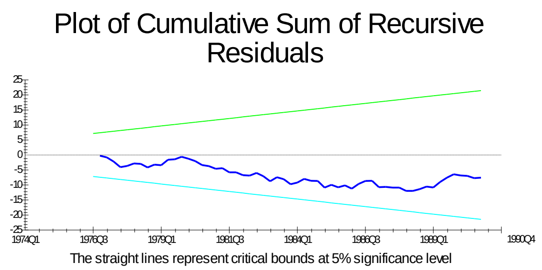


UK





USA



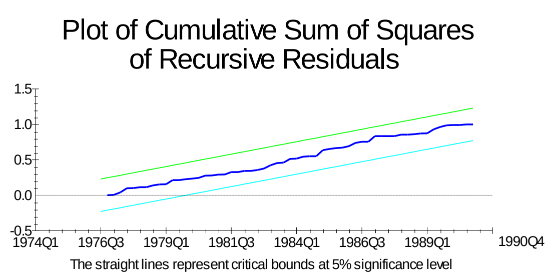


Fig.9 continued

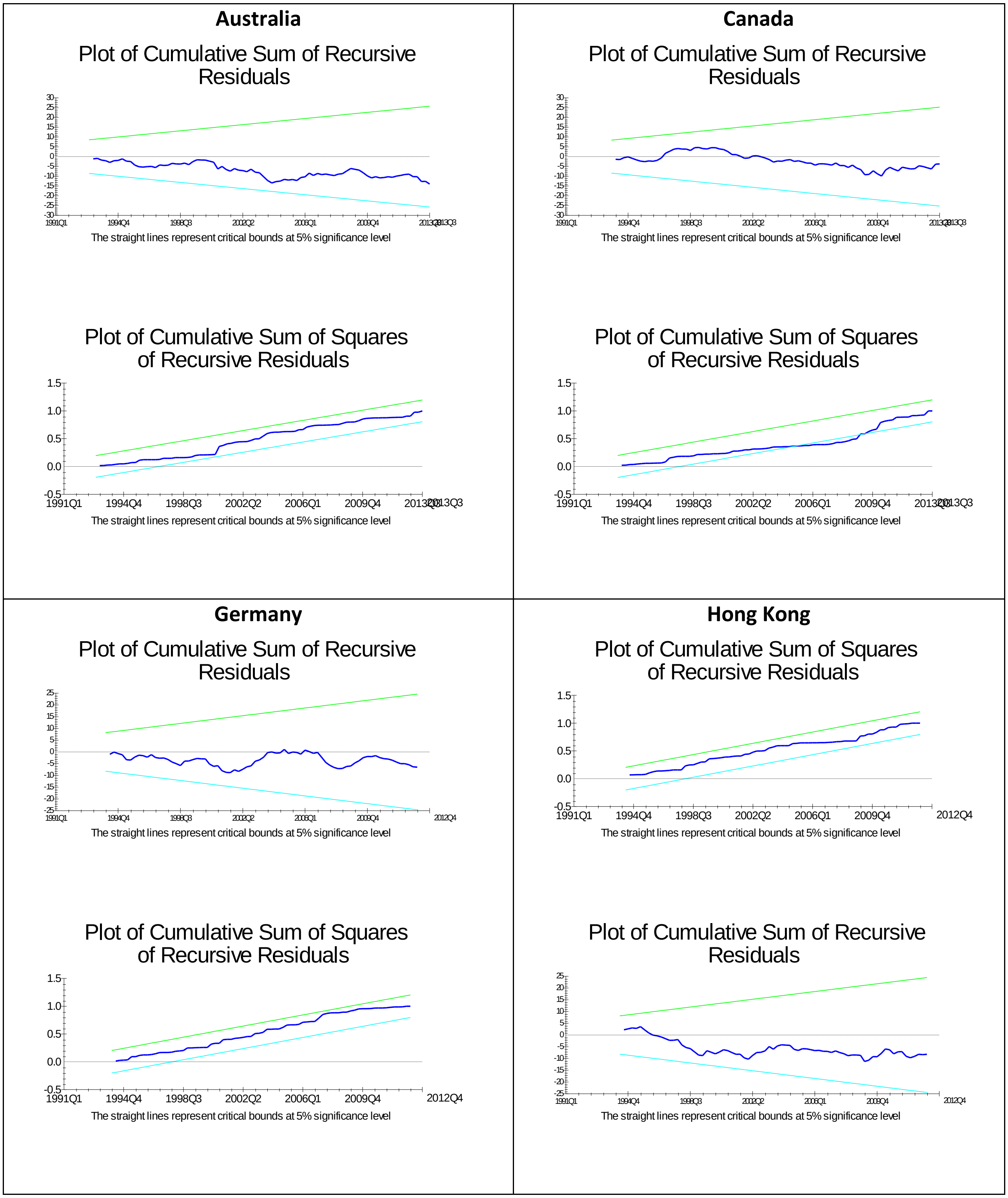
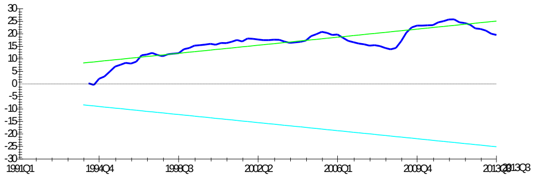


Fig.10 Graphs of CUSUM and CUSUM Square for import of 1991-2013

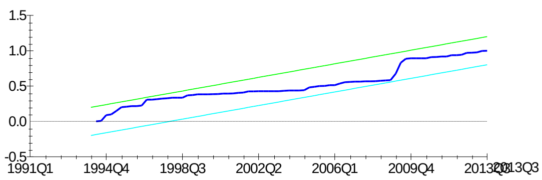
Italy

Plot of Cumulative Sum of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

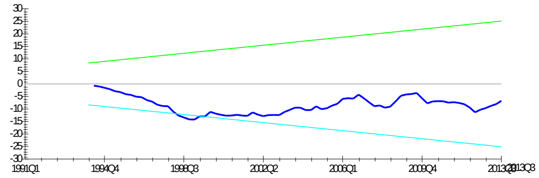
Plot of Cumulative Sum of Squares of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

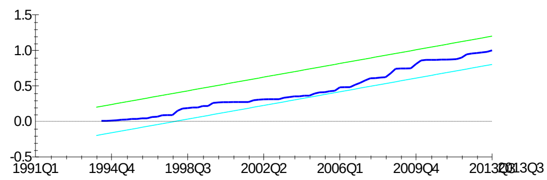
Japan

Plot of Cumulative Sum of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

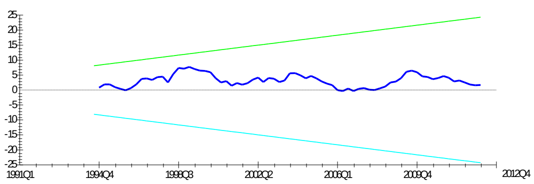
Plot of Cumulative Sum of Squares of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

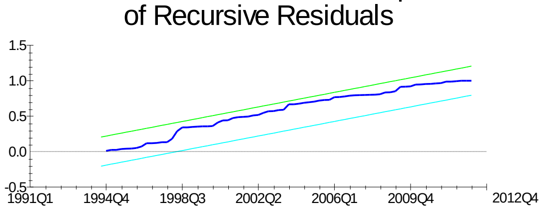
Korea

Plot of Cumulative Sum of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

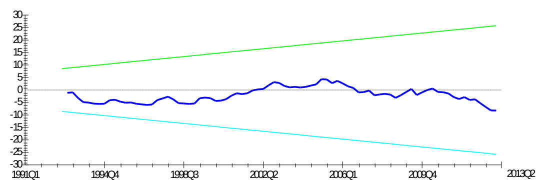
Plot of Cumulative Sum of Squares of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

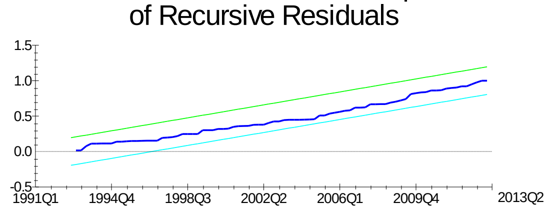
Pakistan

Plot of Cumulative Sum of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

Plot of Cumulative Sum of Squares of Recursive Residuals

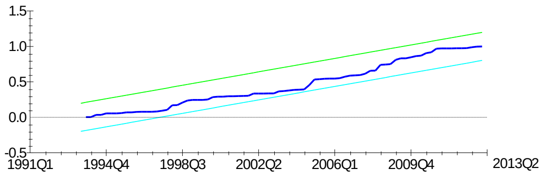


The straight lines represent critical bounds at 5% significance level

Fig.10 continued

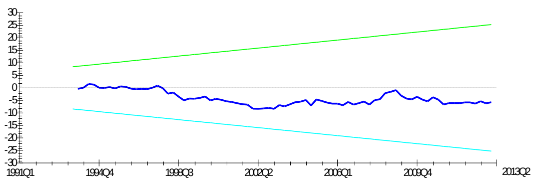
Singapore

Plot of Cumulative Sum of Squares
of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

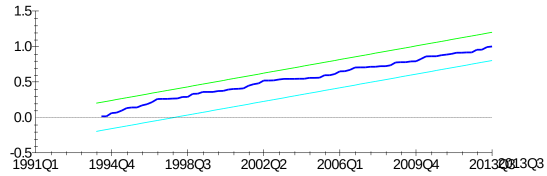
Plot of Cumulative Sum of Recursive
Residuals



The straight lines represent critical bounds at 5% significance level

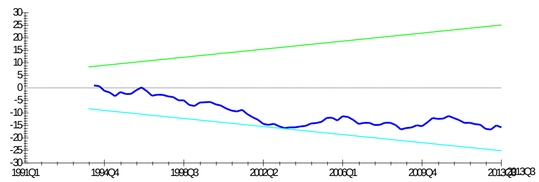
Spain

Plot of Cumulative Sum of Squares
of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

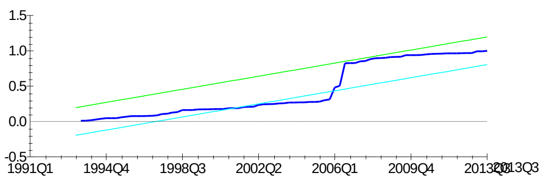
Plot of Cumulative Sum of Recursive
Residuals



The straight lines represent critical bounds at 5% significance level

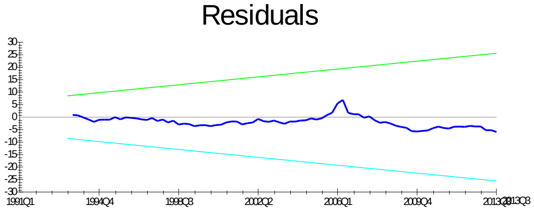
UK

Plot of Cumulative Sum of Squares
of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

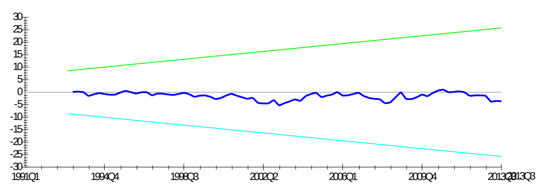
Plot of Cumulative Sum of Recursive
Residuals



The straight lines represent critical bounds at 5% significance level

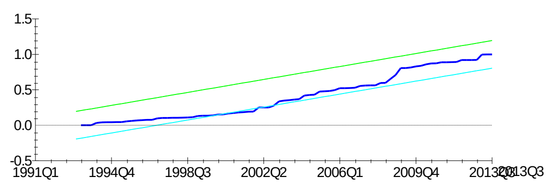
USA

Plot of Cumulative Sum of Recursive
Residuals



The straight lines represent critical bounds at 5% significance level

Plot of Cumulative Sum of Squares
of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

Fig.10 continued

CURRICULUM VITAE

Esmaeil Ebadi

Education

- Ph.D., Economics, University of Wisconsin- Milwaukee, WI, USA, December 2015 (expected)
    - Dissertation title: *Relative Responsiveness of Trade Flows to a Change in Prices and Exchange Rate*
    - Advisor: Professor Mohsen Bahmani-Oskooee
- M.A., Economics, University of Wisconsin- Milwaukee, Milwaukee, August 2011
- M.Sc., Economics, University of Tehran (UT), Tehran, Iran, April 2001
- B.A., Economics, University of Tehran, Tehran, Iran, August 1999

Certification

- Certificate in European Monetary Union & International Finance, University of Giessen, Giessen, Germany, Summer School, May 2011

Research Interests

- International Economics
- Applied Macroeconomics
- Time-series Econometrics, Forecasting

Publications

- Bahmani-Oskooee, M., Ebadi, E., (2015) "Impulse Response Analysis and Orcutt's Hypothesis in Trade", *Empirica*, Vol. 42 (2015, No. 3), pp. 673-683.
- Bahmani-Oskooee, M., Ebadi, E., (2015) "Impulse Response Analysis and Orcutt's Hypothesis in Trade: Evidence from Developing Countries", *Applied Economics*, Vol. 47(53), pp.5739-5747
- Bahmani-Oskooee, M., Ebadi, E. "Has Technological Advances Reduced Response Time of Trade Flows to Changes in the Exchange Rate and Relative Prices?", *The International Trade Journal*, forthcoming.
- Esmaeil Ebadi, "Does Government Spending Matter in Stimulating U.S. Economy?" *Economics letters*, Submitted.

Work in Progress

- "Optimal Tax Burden, Government Spending, and Economic Growth", Stage: Preliminary Draft
- "The Effect of Government Spending on the US Demand for Money", Stage: Data Analysis

Honors and Accomplishments

- Ranked 8th among 3302 participants in the nationwide Universities Entrance Exam for Master Degree in Economics, Iran, 1999
- Employed by National Iranian Gas Company as an "Elite Student", Iran, 2002

Teaching Experience

- Instructional Assistant Professor, Illinois State University, Fall 2015
  - Money and Banking
  - Using Regression and Econometric Methods
- Instructor
  - Principles of Macroeconomics, UWM, Fall 2012 to Spring 2015
- Teaching Assistant
  - Principles of Macroeconomics, UWM, Fall 2011, Spring 2012
  - Statistics, UT, Fall 2000

Teaching Interests

- International Economics, Macroeconomics, Microeconomics, Statistics.

Professional Experience

- Economist, National Iranian Gas Company, Tehran, Iran, 2002 – 2010
- Columnist, Asia Economic Newspaper, Tehran, Iran, August 2004 - May 2008
- Research Assistant, Institute of Economic Research, UT, Tehran, Iran, August 2001 - July 2002

Computation Skills

- Eviews, STATA, Microfit, GUASS

Visa Status

- United States Citizen

References

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