THE RMB EXCHANGE RATE AND ITS IMPACT ON THE TRADE BALANCE

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Abstract:

In recent years, the Renminbi (RMB) exchange rate issue has been at the centre of ongoing debate over the source of global current account imbalance, especially with the United States. The objective of this study is to contribute to the current discussion by providing some new evidence on China's exchange rate policy and the impacts of RMB devaluation/revaluation on China's trade balance using a structural VAR approach. The results indicate that, the dynamic effect of exchange rate on China's trade balance is still very limited, and China's balance of trade is mainly determined by the world demand and its trade performance, with the latter being a result of its successfully maintained comparative advantage.

Keywords: Chinese Exchange Rate Policy; Trade Balance; Structural Vector Autoregression; Variance Decompositions; East Asia

JEL classification: F14; F31; P21

1. INTRODUCTION

China's path-breaking initiatives of reforms have successfully transformed itself from a poor, closed nation to an important trading nation and manufacturing centre in the world (see Lardy, 1998; Naughton, 1996). The rapid rise of the Chinese economy is creating opportunities for many but also causing increasingly trade disputes with its major trading partners. During the recent years, the Renminbi (RMB) exchange rate issue has been at the centre of ongoing debate over the source of global current account imbalance, especially with the United States. The US and other countries have expressed, with considerable concern, the view that China's national currency was seriously undervalued.[1] Some analysts also indicate that the RMB needs to rise by as much as 40 per cent in order to reflect its true value (see Zhang and Pan, 2004; Chang and Shao, 2004; Cheung et al., 2009; Goldstein and Lardy, 2009) and others argue that further revaluation of the RMB will serve China's own interest (see Tung and Baker, 2004)[2]. Critics say that, by undervaluing its currency, China gains unfair trade advantage and has seriously injured the manufacturing sector in the United States. Moreover, some even attribute the 1997 East Asian financial crisis to the 50 per cent devaluation of the Chinese currency in 1994. By far not many OECD

[1] According to the US Census Bureau, China has surpassed Japan and become the largest contributor to the US trade deficit since 2001. Out of its record-high trade deficits of $816 billion in 2008, China accounted for 33 per cent, and this share rose again to 45 per cent in 2009 before fell to about 36 per cent by April 2010. This has led to calls for political action against China and criticizing China for manipulating its exchange rate. The US Treasury Department has urged China strongly in recent years to adopt procedures that would allow the RMB to rise in value. US Congress has even been considering legislation that would place a 27.5 per cent tariff on Chinese imports to the United States if the RMB is not revalued.

[2] Cline and Williamson (2008) provide a literature review of the recent studies on the equilibrium exchange rate of the Chinese currency, and find that most of the studies report an average undervaluation of 19 per cent to 40 per cent for the Chinese currency measured either in the real effective exchange rate (REER) or by the bilateral real exchange rate against the US dollar. Some studies (Cline and Williamson, 2008 and 2011; Goldstein and Lardy, 2008 and 2009) have recommended that the RMB should appreciate for at least 25 per cent from its 2008 level to reduce the share of its trade surplus over GDP by half, and by 45 per cent to remove the surplus completely.

countries have recognized China's market economy status when dealing with trade issues after its three decades long market-oriented economic reforms.

In contrast, Corden (2009) argues that exchange rate regimes are not really connected with global current account imbalances. As a matter of fact, global current account imbalances have been associated with all kinds of exchange rate regimes. MacKinnon (2010) also maintains that under financial globalisation, forcing China to appreciate its currency is neither necessary, nor sufficient for reducing its trade surplus. Figure 1 presents the evolution of the RMB exchange rates and China's trade account balance against the US and the rest of the world during the period in 1994-2010. One may easily find that there is a diverse relation between the change of the exchange rate and China's trade balance both with the US and the rest of the world.

[**Insert Figure 1 about here**]

Throughout recent decades, especially since 1994, China has endeavoured to reform its exchange rate regime towards a market-based unified floating exchange regime and RMB convertibility.[3] The most recent reform includes the switch from the dollar-peg to a managed floating exchange rate regime based on market supply and demand with reference to a basket of currencies on 21 July 2005. The Chinese

[3] To accommodate reforms in the foreign trade sectors, early experiments include the introduction of the dual exchange rate system first in 1979-1985 and re-emerged in 1986 when the foreign exchange adjustment centres (FEACs) or swap centres were set up. The rationale for adopting a dual rate system was to set prices of imported goods via the internal settlement rate at the same (similar) level as comparable domestically produced goods, implying the traditional import substitution character of China's foreign trade regime. Since 1986, the official RMB exchange rate was in effect crawling pegged to the US dollar. By 1988, the swap markets had come to dominate China's foreign-currency transactions, representing an estimated 80-85 per cent of all such activities at over 100 swap location. The year 1994 marked a significant change in China's exchange rate policy, as China unified the various exchange rates still in use, and devalued the official rate by 50 per cent to 8.7 RMB to the US dollar, a rate quite close to that in the black market. Since the unification the exchange value of the RMB has been remained stable. From 1994 to July 2005, the official rate of the RMB against the US dollar was kept very stable, despite of the pressures caused by the 1997 Asian financial crisis. See Zhang (1997, 1999), Lardy (1992), Roberts and Tyers (2001), and more recently Goldstein and Lardy (2009) for an extensive overview of the debate on China's current exchange rate policy.

authority also announced that it would allow the RMB to trade within a wide band of 0.3 per cent per business day for the first time. [4] Since then the RMB has appreciated in nominal terms by over 25 per cent against the US dollar between 2005 and 2011. According to the Bank for International Settlements, over the past two years, the RMB has appreciated by 9.4 per cent against the U.S. dollar, and the real effective exchange rate of the RMB has appreciated by 6.3 per cent. Recently, China has decided to proceed further with reform of the RMB exchange rate regime and to enhance the RMB exchange rate flexibility.

There are a number of existing studies on the effect of the Chinese RMB devaluation on its trade balance, but the results are mixed. Stiglitz (2005) has argued that revaluation and eliminating China's trade surplus will have little effect on the more important problem of global trade imbalances, and particularly on the US trade deficit. McKinnon (2006) has similar argument that a RMB appreciation would not address the imbalances of concern to the US. Mann and Plück (2005), using a dynamic panel specification and disaggregated trade flows, report that price elasticities for US imports from China are wrong-signed and that price elasticities for US exports to China are not statistically significant. Thorbecke (2006), employing Johansen MLE and dynamic OLS techniques, finds that the long-run real exchange rate coefficients for exports and imports between China and the US equal approximately unity. Cheung et al. (2007), using dynamic OLS methods, find that an

[4] The new exchange rate system since the unification has contributed to the rapid increase of China's international reserves, rising from US$22 billion at the end of 1993 to over US$53 billion by the end of 1994, and further to US$107 billion in 1996. Since then China's foreign exchange reserves rose rapidly, exceeded US$1 trillion for the first time in October 2006, and US$2 trillion by June 2009. By the end of September 2010, China's foreign-exchange reserves surged by a record to USS2.65 trillion. On the other hand, China's foreign trade has been expanding, with export surpassed Germany and became the world's No. one exporter in 2009. Because of the global economic turmoil, China's trade surplus in 2010 is expected to shrank to US$180 billion, down from US$196 billion in 2009 and the historic peak of US$300 billion in 2008. Data were adapted from China's MOFERT and the State Administration of Foreign Exchange.

appreciation of the RMB increases US exports to China but does not affect China's exports to the US. Marquez and Schindler (2007), using an autoregressive distributed lag model and China's shares in world trade, report that a 10 per cent appreciation of the RMB would reduce China's share of world exports by half a percentage point and China's share of world imports by a tenth of a percentage point.

The objective of this study is to construct a vector autoregression (VAR) model and employ the most recent econometric techniques to identify if the Chinese economic system has become responsive to the changes in the exchange rates after about three decades reform. In particular, we construct a structural VAR model to estimate the impulse response functions and variance decompositions for China's output and trade balance, and to determine how China's trade balance responds to the RMB exchange rate and how the RMB is affected by the China's trade position as well as external demand. Thus, this study will contribute to the current discussion on the RMB exchange rates by providing new evidence on China's exchange rate policy and the impacts of RMB devaluation/revaluation on China's output and trade balance. This would also help explain why China was largely immune to the recent financial crisis in 1997 and how China could keep its currency value unchanged during the crisis. Apparently this would have important policy implications for the rest of the East Asian economies. This study implies three major contributions. First, it applies a VAR model to the transition economy of China to determine the exchange value of the RMB and how the system responds to changes in the market signals. It contributes to our better understanding of how far and how fast China's reforms have transformed this formerly central-planning economy to a market-oriented. It also contributes to the recent discussion on China's exchange rate policy. Then, it provides policy-makers both within and outside China with robust empirical evidence towards

how effective the RMB devaluation/revaluation would be on the economy and its trade balance, and what policy implications to others. Finally, it helps explain why China could be largely immune to the recent East Asian financial crisis in 1997 and if China's RMB devaluation in 1994 is one of the causes to the crisis in 1997.

The remainder of this paper is organized as follows. In section 2, we discuss the analytical framework and methodology employed in the paper. Section 3 discusses the data issue and presents the results of empirical estimation. Section 4 provides some concluding remarks.

2. METHODOLOGY AND MODEL

To study if the Chinese economic system has become responsive to the changes in the exchange rates since reform, we extend the Lee and Chinn (2006) and Blanchard and Quah (1989) models to construct a 3-variable VAR model, including real output, real exchange rates, and trade balance. We use the US real GDP and world real GDP respectively as a proxy for the income effect of the rest of the world that will possibly affect the trade balance. The structural model can be specified as follows:

$$X_t = \left(\Delta y_t^*, \Delta rer_t, (TB/y)_t\right)', \qquad \varepsilon_t = \left(\varepsilon_{y,t}, \varepsilon_{e,t}, \varepsilon_{b,t}\right)',$$

and

$$X_t = A(L)\cdot\varepsilon_t = \begin{pmatrix} A_{11}(L) & A_{12}(L) & A_{13}(L) \\ A_{21}(L) & A_{22}(L) & A_{23}(L) \\ A_{31}(L) & A_{32}(L) & A_{33}(L) \end{pmatrix}\cdot\varepsilon_t, \qquad (1)$$

where $A_{ij}(L) = a_{ij}^0 + a_{ij}^1 L + a_{ij}^2 L^2 + \cdots$, and it is assumed that the structural shocks, ε_t, are serially uncorrelated and the covariance matrix are normalized to the identity matrix. y^* denotes US or world real GDP; *rer* the bilateral real exchange rate of the RMB vis-à-vis the US dollar or the RMB's real effective exchange rate; *TB* the (nominal) trade balance against the United States or the world; and *y* the China's nominal GDP. Δ is the first-difference operator. ε_y is the US or world output shock, ε_e the real (effective) exchange rate shock, and ε_b the transitory (trade balance) shock.

In order to identify the structural A_i matrices, we follow the method developed by Blanchard and Quah (1989) and impose the following long-run restrictions. First, we assume that Δy^* is affected only by the US or the world output shock (ε_y) in the long-run. Second, Δrer is affected by both the US or world output shocks and the real (effective) exchange rate shock (ε_e) in the long-run, but not affected by the transitory (trade balance) shock (ε_b). Finally, (TB/y) is influenced by all the three shocks in the long-run. Thus, the long-run restrictions require $A_{12}(1) = A_{13}(1) = A_{23}(1) = 0$ that is sufficient to identify the structural A_i matrices and the time series of structural shocks, $\varepsilon_t = \left(\varepsilon_{y,t}, \varepsilon_{e,t}, \varepsilon_{b,t}\right)'$. We estimate a reduced-form VAR as:

$$X_t = B(L)X_{t-1} + u_t, \qquad (2)$$

where u_t is a vector reduced form disturbance and $B(L)$ is a 3×3 matrix of lag polynomials. An MA representation of equation (2) is given as:

$$X_t = C(L)u_t, \qquad (3)$$

where $C(L) = (1 - B(L)L)^{-1}$ and the lead matrix of $C(L)$ is, by construction, $C_0 = I$. By comparing equations (1) and (3), we obtain the relationship between the structural and reduced form disturbances: $u_t = A_0 \varepsilon_t$. As the shocks are mutually orthogonal and each shock has unit variance, $C(1)\Sigma C(1)' = A(1)A(1)'$ where $\Sigma = Eu_t u_t' = EA_0 \varepsilon_t \varepsilon_t' A_0' = A_0 A_0'$. Letting H denote the lower triangular Choleski decomposition of $C(1)\Sigma C(1)'$, we obtain $A(1) = H$ since our long-run restrictions imply that $A(1)$ is also lower triangular. Consequently, we obtain $A_0 = C(1)^{-1} A(1) = C(1)^{-1} H$. Given an estimate of A_0, we can recover the time series of structural shocks.

3. EMPIRICAL ANALYSIS

a. Data Description

We use quarterly series of data spanning from 1987Q1 to 2009Q4 in this study. To assess the changing sensitivity of the economic system to the market signal during the reform period, we divide the whole sample period into three: the first period covers the prior-exchange rate unification years from 1987 to 1993, the second spans from 1994 to 2005 to reflect the impact of the dollar-peg policy, and finally the third sub-sample period ranges from 1994 to 2009 to allow for the effect of relinquishing the dollar-peg policy. Our choice of the sub-sample periods is to capture the effect of the most recent changes in China's exchange rate system reform and the increasing trend of its trade surplus since the late 1990s. Since China's exchange rate regime has changed several times during the whole sample period in 1987-2009, we will run the estimations for the whole sample for comparison purpose but not report the results

(we will make the results available upon request). Instead, we focus our analysis on the dynamic effects of the exchange rate changes across the three sub-periods. Furthermore, as China's dual exchange rate system was abandoned in January 1994, the second sub-sample period will then begin from the second quarter of 1994. Finally, to deal with the impact of the global financial crisis, we have tried to test for structural break and also estimated the model for different sub-periods by including and excluding the crisis period. The results are found very similar to those using the third sub-sample period from 1994Q2 to 2009Q4. We will not estimate the model for the period from 2005 to 2009 to assess the effect of abandoning the dollar peg separately due to a short sample period.

We use the real GDP series of either the US or OECD countries as a proxy for the world income variable. The bilateral real exchange rate (RER) of the RMB vis-à-vis the US dollar and the real effective exchange rate (REER) of the RMB are used in this study. An increase in RER and REER is defined as a depreciation of RMB. Bilateral RER is constructed based on relative consumer price index (CPI) between China and the US. China's bilateral trade surplus with both the United States and the rest of the world is denominated in US dollars. China's nominal GDP is constructed using the real GDP and CPI and also converted into US dollar terms. All data are obtained from the Chinese State Bureau of Statistics; IMF, *International Financial Statistics*, CD-ROM; CEIC Database; and the NUS Databank[5]. Figures 2 and 3 present these series.

[Please insert Figures 2 and 3 about here]

[5] China's real GDP series before 4th quarter of 1991 are obtained from Abeysinghe and Gulasekaran (2004).

We have checked the time-series properties of the endogenous variables and the results of unit-root test show that both y^* and *rer* are non-stationary in level but stationary in first-differences, while there is a conflict in the results of stationarity in (TB/y). To be consistent with the existing studies as well as due to the low power problem of unit-root tests, we chose to include the level of (TB/y) in a VAR model. As we attempt to analyse the results for sub-samples where the sample size is small, we do not conduct cointegration tests.

b. Empirical Results

We use two lags in each estimation of the VAR model based on the Schwartz information criterion (SIC) and the Akaike information criterion (AIC). The estimation results of our VAR model are not reported due to space limitation but available upon request.

[Please insert Figures 4 and 5 about here]

Figure 4 reports the results of impulse responses of each endogenous variable to the structural shocks when China's trade balance is defined against that of the US during the three different sub-sample periods. The black line indicates the impulse response, while the blue dotted line shows the 16 per cent and 84 per cent fractiles that correspond to one standard deviation if symmetrical error bands were set based on estimates of the variance.[6] Each panel, from the left to the right, reports respectively the response of the US output, real exchange rate and China's trade balance with the US to the US real shock, RER shock, and TB (trade balance) shock. It is interesting to note that in general China's balance of trade is affected largely by

[6] This follows Sims and Zha (1999) and conducts the Monte Carlo integration of 2,500 replications.

the US output shock as well as the TB shock, while the RER shock affects the trade balance with an undetermined pattern. It must be noted that, in contrast to a positive response pattern for the period up to the end of the dollar-peg regime, the response of China's trade balance to the US output shock turns to significantly negative when we include the post dollar- peg period. Such different response patterns are likely due to the slowdown of the US imports from China (TB/y) from around 2006.

When the RER shock occurs, the effect on the TB becomes negative and statistically significant during the dollar-peg period from 1994Q2 to 2005Q2. When using the third sub-sample including the post dollar-peg period, the effect of the RER shock on the trade balance becomes negligible. Although not reported in the paper, the same negative response pattern is observed when the whole sample period from 1987 to 2009 is used. Thus, it is not conclusively clear whether the change of the RMB exchange rate would firmly affect China's balance of trade. This finding casts doubt on the effect of the 50 per cent devaluation of the Chinese currency in 1994 on its trade balance, and to some extent explains why China could have kept its currency value unchanged during the last Asian financial crisis in 1997.[7] Moreover, the response of the exchange rates to all the three structural shocks is short-lived, mostly lasting for only one quarter and then immediately back to a zero-level effect. One may interpret this response pattern as the rigidity of China's exchange rate regime even though efforts have been given in the recent years to let the market play a bigger role in determining the RMB exchange rates.

[7] Most of the existing studies cite the non-convertibility of the RMB and capital controls as the major reasons why China remained largely immune to the 1997 East Asian crisis. Our results suggest one more reason, i.e., the ineffective exchange rate shock on China's trade balance, which explains why China could still have managed a growth rate of 8.8 per cent in 1997 and 7.8 per cent in 1998 and offered not to devalue its currency while its neighbouring countries had devalued their currencies and felt into recession.

Figure 5 reports the results of impulse responses of each endogenous variable to the structural shocks when China's trade balance is defined against that of the rest of the world. As it can be seen from Figure 5, the response patterns of these variables to the structural shocks are very similar to that reported in Figure 4. In particular, the impact of the exchange rate shock on China's trade balance with the rest of the world is basically negligible with undetermined sign for all the three sample periods.

To identify the relative contribution of each shock to the three variables, a variance decomposition (VD) analysis is conducted to decompose the variation in the percentage change of the forecast error variance of changes in the world output, exchange rates and trade balance that are due to each shock at the 1 through 20 quarter horizons. Tables 1 and 2 report the results of VD test with respect to the US and the world output, respectively.

[Please insert Tables 1 and 2 about here]

As it can be seen in Table 1, the fluctuations in real exchange rates were predominantly caused by the RER shocks at all horizons with a clear increasing trend of the shock impact during the post-unification period, especially during the most recent years. The TB shock with the US accounts for only a small percentage of the variation in the real exchange rate when the recent sample period is used in analysis. When we use China's trade balance with the rest of the world in the analysis, the TB shock tends to account for a bigger percentage of the variation in REER, but still less than 17 per cent (Table 2). This finding is consistent with our early observation that changes of the RMB exchange rate in the last decade exhibit a diverse relation with China's trade balance both with the US and the rest of the world.

The movement of China's trade balance with the US is found to be largely attributed to the US output shock and the TB shock, while the exchange rate effect does not have much contribution, especially for the sample period including the post dollar-peg years. As it can be seen in Table 1, the variance of China's trade balance with the US is mainly explained by the US output shock and its own (TB) shock, with the former accounting for over 80 per cent at the initial stage and the latter for about 20-46 per cent through the 20 quarters horizons during the period from 1994 to 2009. The variance of China's trade balance with the rest of the world exhibits a similar pattern though the REER shock shows a sign of being increasingly effective. This finding lends support to MacKinnon's (2010) assertion that appreciation of the RMB is neither necessary, nor sufficient for reducing its trade surplus. Bergsten (2009) also points out that the only healthy way to reduce the United States' external deficits to a sustainable level is to raise the rate of national saving and reduce the federal budget deficit. Our results inspire one's expectation that, the dynamic effect of exchange rate on China's trade balance is still very limited, and the variation of China's balance of trade is mainly determined by the world demand and its trade performance, with the latter being a result of its successfully maintained comparative advantage.[8]

4. CONCLUDING REMARKS

In this paper we have constructed a vector autoregression (VAR) model to assess if the Chinese economic system has become more responsive to changes in the

[8] According to China's Ministry of Commerce, processing trade accounts for more than 60 per cent of China's total exports, which normally does not have much value added. On average the Chinese exporters earn a profit margin of only 1.8 per cent (*the Washington Post*, 22 March, 2010). For this type of trade, the exchange effect is basically neutral. As a matter of fact, over half of China's total exports and 85 per cent of Chinese high-tech exports were produced by foreign-invested firms in China. Moreover, according to the International Labour Organization, labour costs in China are less than 3 per cent of those in the United States. The cost advantages count. Finally, the FOB prices of Chinese export commodities account for only about 25 per cent of the final sale price or retail price. So neither currency appreciation nor depreciation will have a great impact on price competitiveness of Chinese goods.

exchange rates after about three decades reform. The results from the VAR estimations indicate that the dynamic effect of exchange rate on China's trade balance is still very limited, and China's balance of trade is mainly determined by the world demand and its trade performance, with the latter being a result of its successfully maintained comparative advantage. In particular, the results from the impulse analysis show that China's trade balance is found to be affected largely by the world demand shock and trade balance shock, while the exchange rate shock affects the trade balance with an undetermined pattern. The results from the variance decomposition analysis further confirm that the movement of China's trade balance against the US is attributed largely to the US output shock during the post unification period and even before, while the exchange rate effect does not contribute much. These findings seem to suggest that, after about three-decade reform, the Chinese economic system has been gradually transformed towards a market-originated system under which economic agents have become responsive to market signals to allow changes in exchange rates to influence the trade balance. However, the exchange rate effect on China's balance of trade is still limited.

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Table 1: Results of the Variance Decomposition Test

a) VAR Model of Bilateral Trade with US (1987Q1-1993Q4; Lag order is 2)

Horizon	Std Error	DYUS	DRER	TB_US
Decomposition of Variance for Series DYUS				
1	0.49	17.65	18.01	64.34
4	0.56	18.70	14.12	67.18
8	0.61	30.58	11.91	57.51
12	0.66	38.88	10.38	50.74
16	0.68	43.80	9.52	46.67
20	0.71	47.14	8.94	43.92
Decomposition of Variance for Series DRER				
1	4.18	6.34	77.32	16.34
4	5.19	12.42	52.94	34.64
8	5.42	18.11	48.48	33.40
12	5.58	22.42	45.81	31.76
16	5.69	25.26	44.10	30.64
20	5.77	27.38	42.81	29.81
Decomposition of Variance for Series TB				
1	0.13	51.41	12.99	35.60
4	0.32	64.35	2.65	32.99
8	0.40	75.29	1.71	23.00
12	0.44	79.70	1.41	18.89
16	0.47	82.05	1.24	16.71
20	0.50	83.53	1.13	15.34

b) VAR Model of Bilateral Trade with US (1994Q2-2005Q2; Lag order is 2)

Horizon	Std Error	DYUS	DRER	TB_US
Decomposition of Variance for Series DYUS				
1	0.46	77.17	12.71	10.11
4	0.49	75.19	13.48	11.33
8	0.50	74.50	13.86	11.64
12	0.50	74.06	14.12	11.82
16	0.51	73.44	14.48	12.08
20	0.51	72.48	15.03	12.48
Decomposition of Variance for Series DRER				
1	2.38	1.32	71.88	26.80
4	2.47	5.73	68.51	25.77
8	2.49	6.69	67.68	25.63
12	2.52	7.50	66.87	25.63
16	2.57	8.69	65.67	25.64
20	2.64	10.43	63.90	25.67
Decomposition of Variance for Series TB				
1	0.25	54.08	24.64	21.28
4	0.51	50.96	26.99	22.05
8	0.80	44.87	30.85	24.28
12	1.11	42.55	32.30	25.16
16	1.49	41.46	32.97	25.57
20	1.94	40.88	33.33	25.78

c) VAR Model of Bilateral Trade with US (1994Q2-2009Q4; Lag order is 2)

Horizon	Std Error	DYUS	DRER	TB_US
Decomposition of Variance for Series DYUS				
1	0.54	1.16	0.18	98.67
4	0.60	1.37	0.47	98.16
8	0.60	2.68	0.48	96.84
12	0.61	3.93	0.48	95.60
16	0.61	4.86	0.48	94.66
20	0.62	5.53	0.47	93.99
Decomposition of Variance for Series DRER				
1	2.55	0.53	96.57	2.90
4	2.63	2.73	92.59	4.68
8	2.63	2.75	92.53	4.72
12	2.63	2.76	92.52	4.73
16	2.63	2.76	92.50	4.73
20	2.63	2.77	92.49	4.74
Decomposition of Variance for Series TB				
1	0.28	80.69	0.64	18.66
4	0.66	64.61	0.42	34.97
8	0.94	58.49	0.39	41.12
12	1.11	56.00	0.39	43.61
16	1.22	54.78	0.39	44.82
20	1.30	54.11	0.39	45.50

Table 2: Results of the Variance Decomposition Test

a) VAR Model of Trade with the World (1987Q1-1993Q4; Lag order is 2)

Horizon	Std Error	DYWOR	DREER	TBWOR
Decomposition of Variance for Series DYWOR				
1	0.30	2.42	31.19	66.39
4	0.36	19.14	25.25	55.61
8	0.43	40.63	18.47	40.90
12	0.47	45.69	16.78	37.54
16	0.48	46.15	16.52	37.33
20	0.48	46.06	16.51	37.43
Decomposition of Variance for Series DREER				
1	5.76	33.84	44.58	21.58
4	6.52	45.17	35.24	19.59
8	6.63	45.48	34.52	20.00
12	6.65	45.43	34.40	20.17
16	6.66	45.41	34.39	20.20
20	6.66	45.41	34.39	20.20
Decomposition of Variance for Series TBWOR				
1	0.50	98.47	1.32	0.21
4	1.06	95.80	1.50	2.70
8	1.40	88.40	3.44	8.16
12	1.51	84.47	4.37	11.16
16	1.53	83.27	4.64	12.10
20	1.53	83.06	4.68	12.26

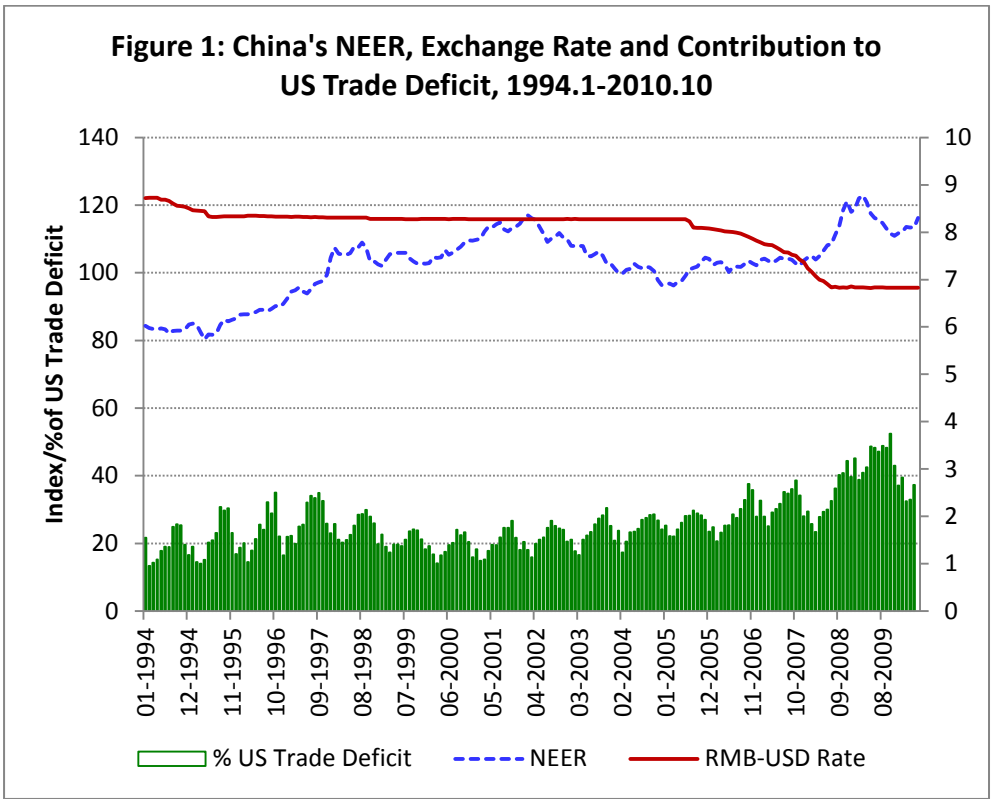
b) VAR Model of Trade with the World (1994Q2-2005Q2; Lag order is 2)

Horizon	Std Error	DYWOR	DREER	TBWOR
Decomposition of Variance for Series DYWOR				
1	0.26	98.85	0.10	1.05
4	0.31	98.93	0.16	0.91
8	0.31	98.90	0.17	0.93
12	0.31	98.90	0.17	0.93
16	0.31	98.90	0.17	0.93
20	0.31	98.90	0.17	0.93
Decomposition of Variance for Series DREER				
1	2.21	2.84	85.65	11.51
4	2.30	7.34	79.11	13.55
8	2.31	7.39	78.96	13.65
12	2.31	7.40	78.95	13.65
16	2.31	7.40	78.95	13.65
20	2.31	7.40	78.95	13.65
Decomposition of Variance for Series TBWOR				
1	1.25	1.48	6.96	91.56
4	1.56	6.06	5.11	88.83
8	1.60	10.42	4.85	84.73
12	1.60	10.47	4.85	84.68
16	1.60	10.47	4.85	84.68
20	1.60	10.47	4.85	84.68

c) VAR Model of Trade with the World (1994Q2-2009Q4; Lag order is 2)

Horizon	Std Error	DYWOR	DREER	TBWOR
Decomposition of Variance for Series DYWOR				
1	0.41	53.74	5.32	40.94
4	0.57	70.18	3.34	26.48
8	0.58	67.91	3.55	28.54
12	0.58	67.36	3.58	29.06
16	0.59	67.23	3.59	29.18
20	0.59	67.20	3.59	29.21
Decomposition of Variance for Series DREER				
1	2.11	9.18	79.99	10.82
4	2.21	11.04	73.03	15.93
8	2.22	11.67	72.13	16.20
12	2.22	11.67	72.13	16.20
16	2.22	11.67	72.12	16.21
20	2.22	11.67	72.12	16.21
Decomposition of Variance for Series TBWOR				
1	1.39	59.94	2.28	37.77
4	2.31	43.99	4.50	51.51
8	2.71	32.06	5.49	62.45
12	2.80	29.97	5.63	64.41
16	2.83	29.47	5.66	64.86
20	2.83	29.34	5.67	64.98

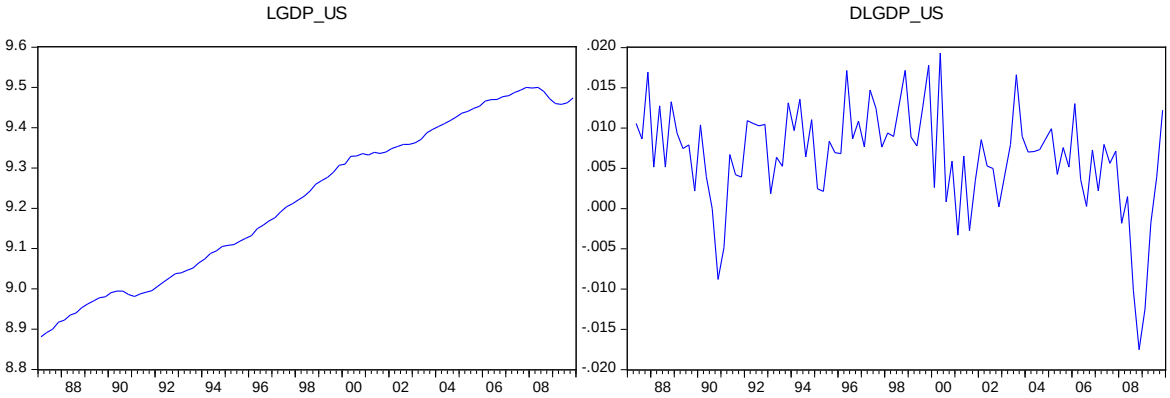
Figures:



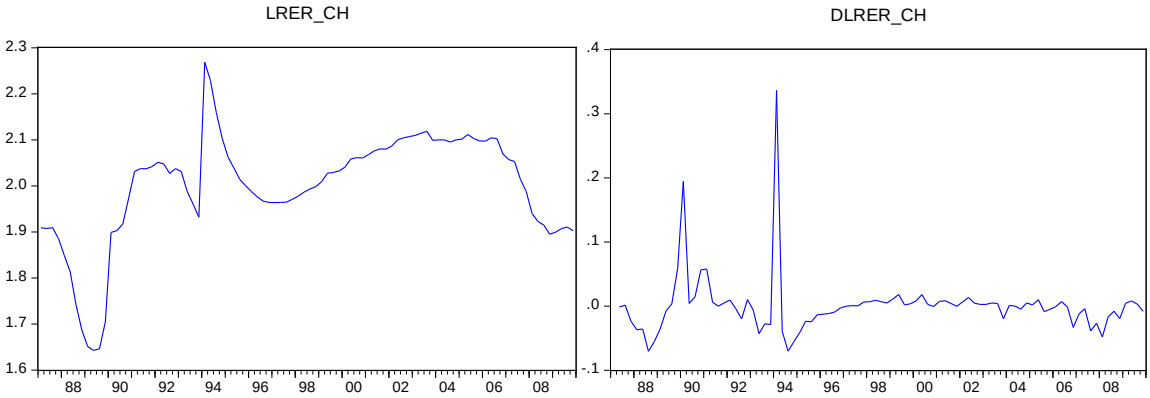
Sources: Data were obtained from the Bank for International Settlements and the U.S. Census Bureau. Authors' own calculation.

Figure 2: Graphical Analysis of the Data (1987Q1-2009Q4)

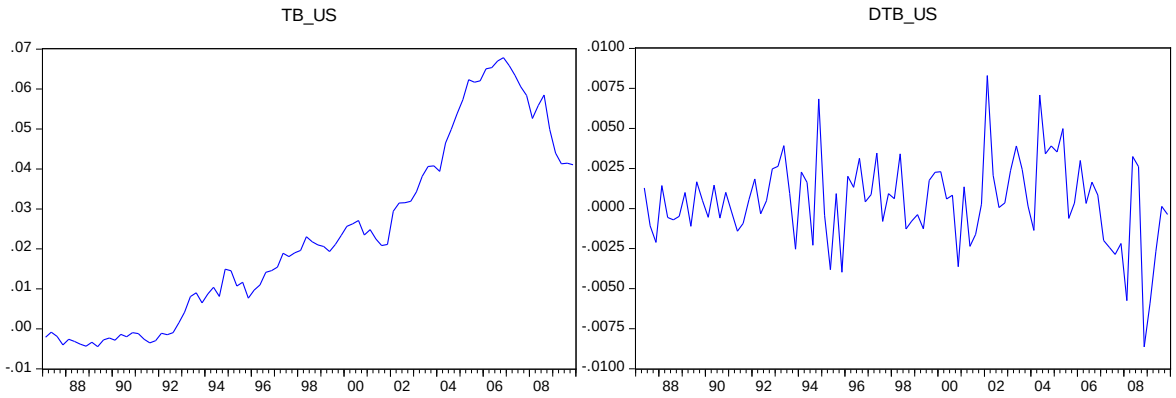
(a) US GDP (real) in log level and 1st-difference:



(b) Bilateral Real Exchange Rate of Chinese Yuan vis-à-vis the US Dollar in log level and 1st-difference:



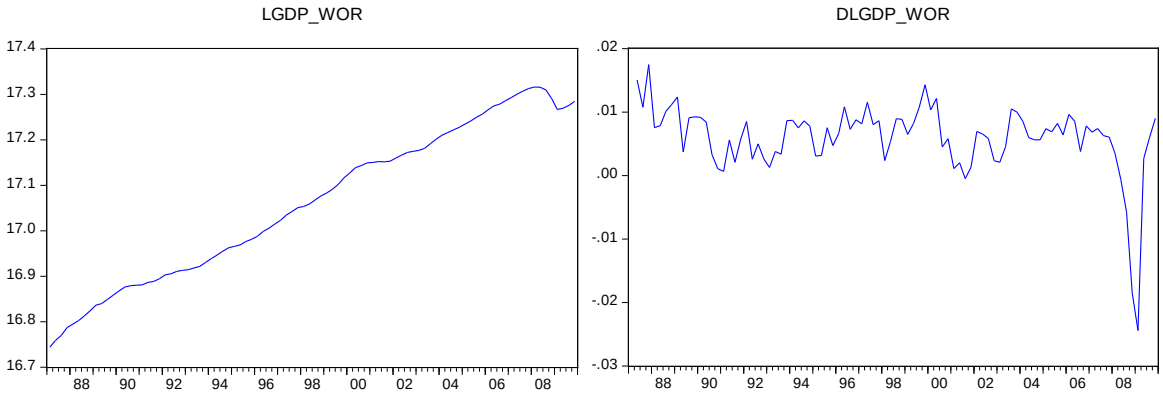
(c) Ratio of Bilateral Trade Balance with US to China's GDP in level and 1st-difference



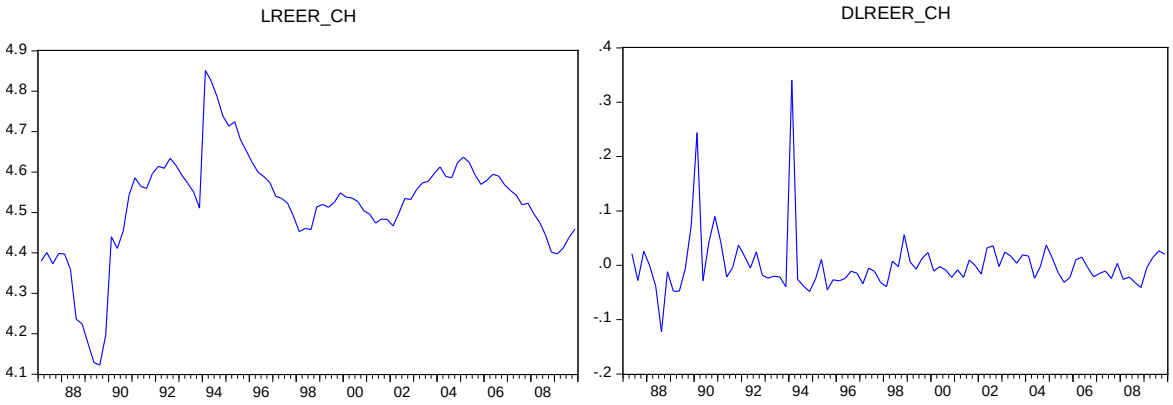
Source: IMF, *International Financial Statistics* (IFS), CD-ROM; IMF *Direction of Trade Statistics*, CD-ROM; OECD Database; CEIC Database; Abeysinghe and Gulasekaran (2004); and authors' calculation.

Figure 3: Graphical Analysis (1987Q1-2009Q4)

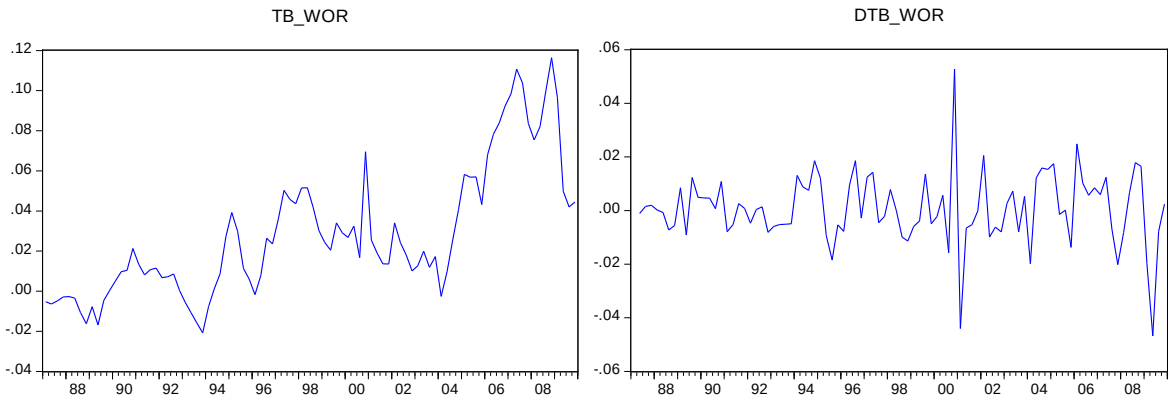
(a) World (OECD) GDP (real) in log level and 1st-difference:



(b) Real Effective Exchange Rate of Chinese Yuan in log level and 1st-difference:



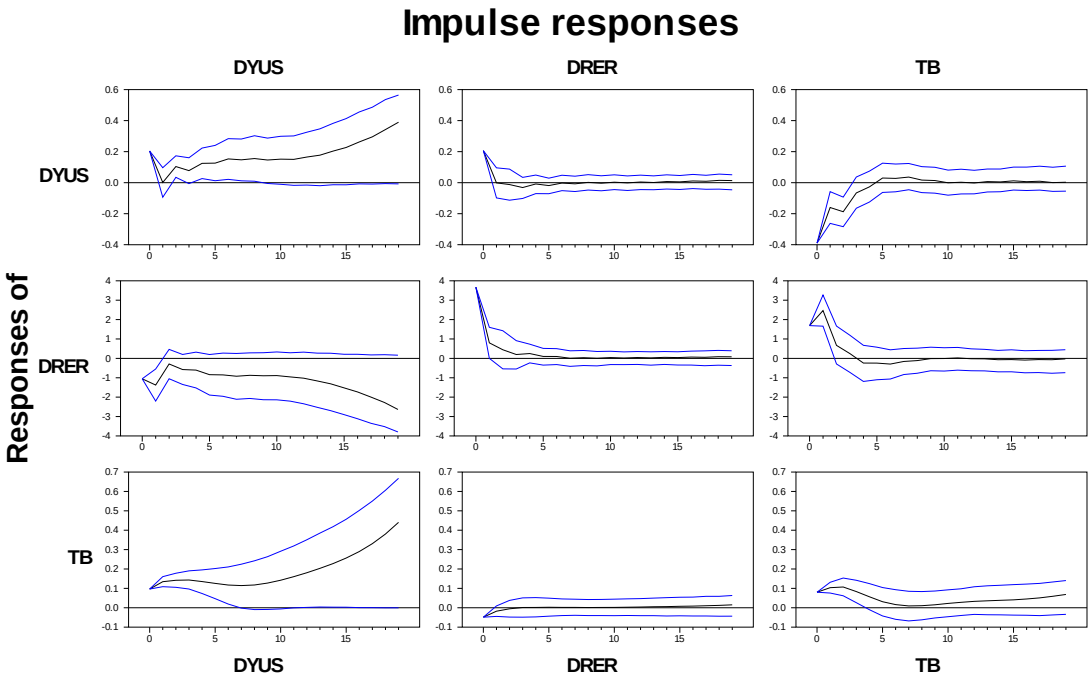
(c) Trade Balance with World to China's GDP in level and 1st-difference:



Source: IMF, *International Financial Statistics* (IFS), CD-ROM; IMF *Direction of Trade Statistics*, CD-ROM; OECD Database; CEIC Database; Abeysinghe and Gulasekaran (2004); and author's calculation.

Figure 4: Impulse Response Function Analysis

a) VAR Model of Bilateral Trade with US (1987Q1-1993Q4; Lag order is 2)



b) VAR Model of Bilateral Trade with US (1994Q2-2005Q2; Lag order is 2)

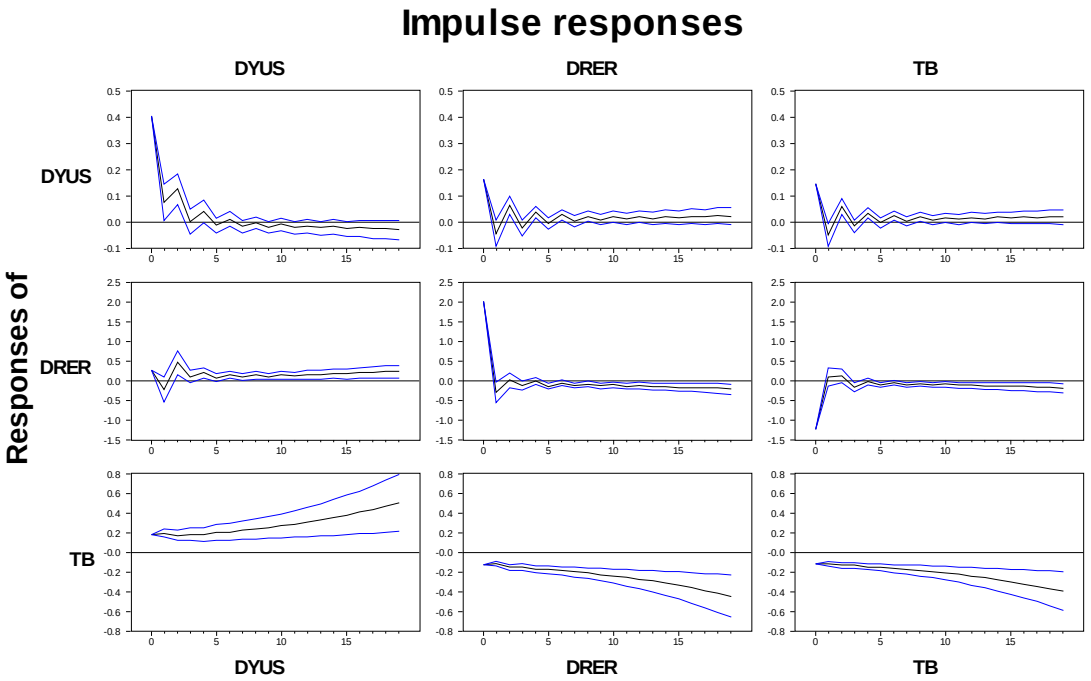


Figure 4: Impulse Response Function Analysis (cont'd)

c) VAR Model of Bilateral Trade with US (1994Q2-2009Q4; Lag order is 2)

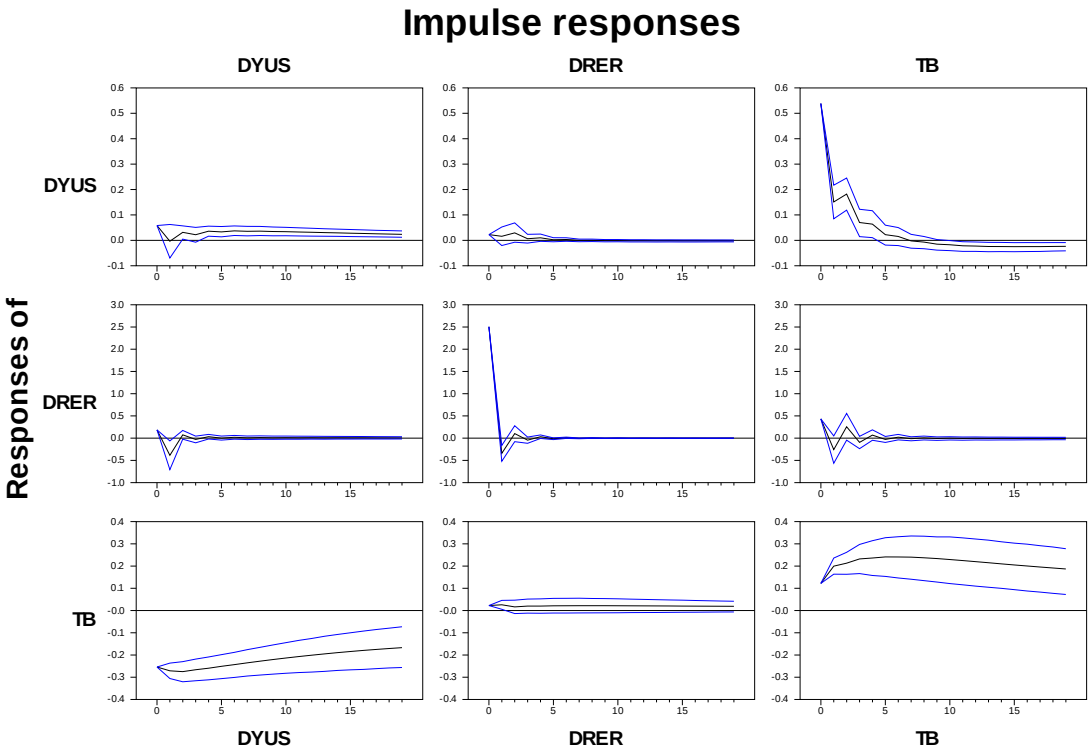
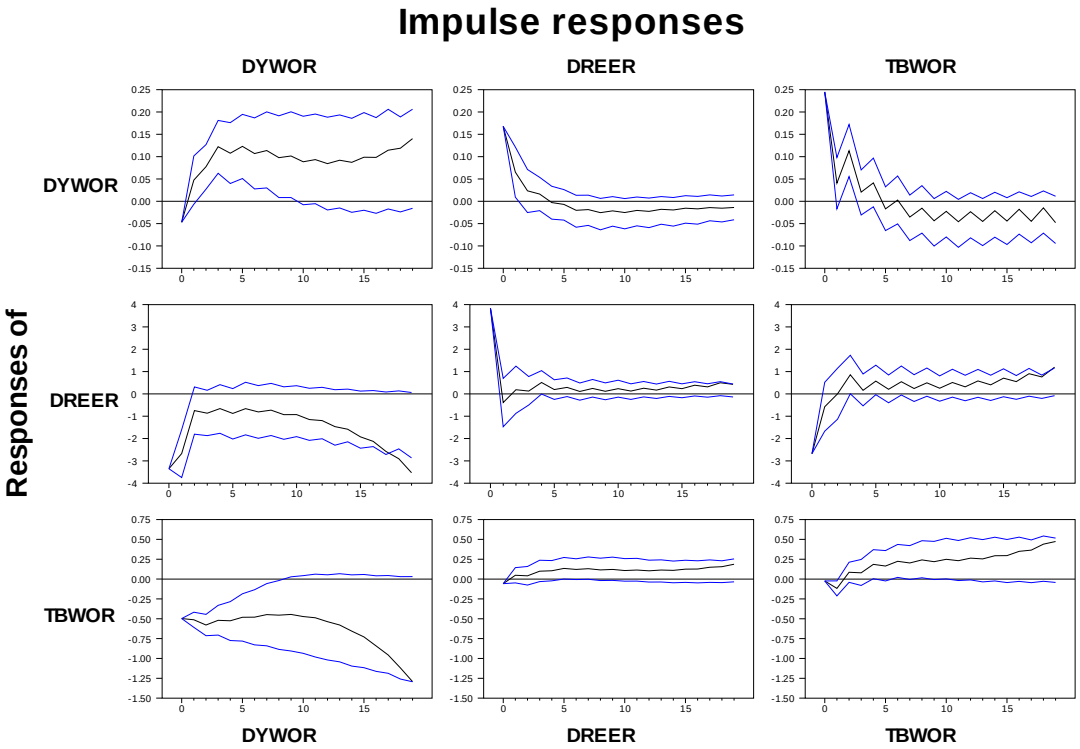


Figure 5: Impulse Response Function Analysis

a) VAR Model of Trade with the World (1987Q1-1993Q4; Lag order is 2)



b) VAR Model of Trade with the World (1994Q2-2005Q2; Lag order is 2)

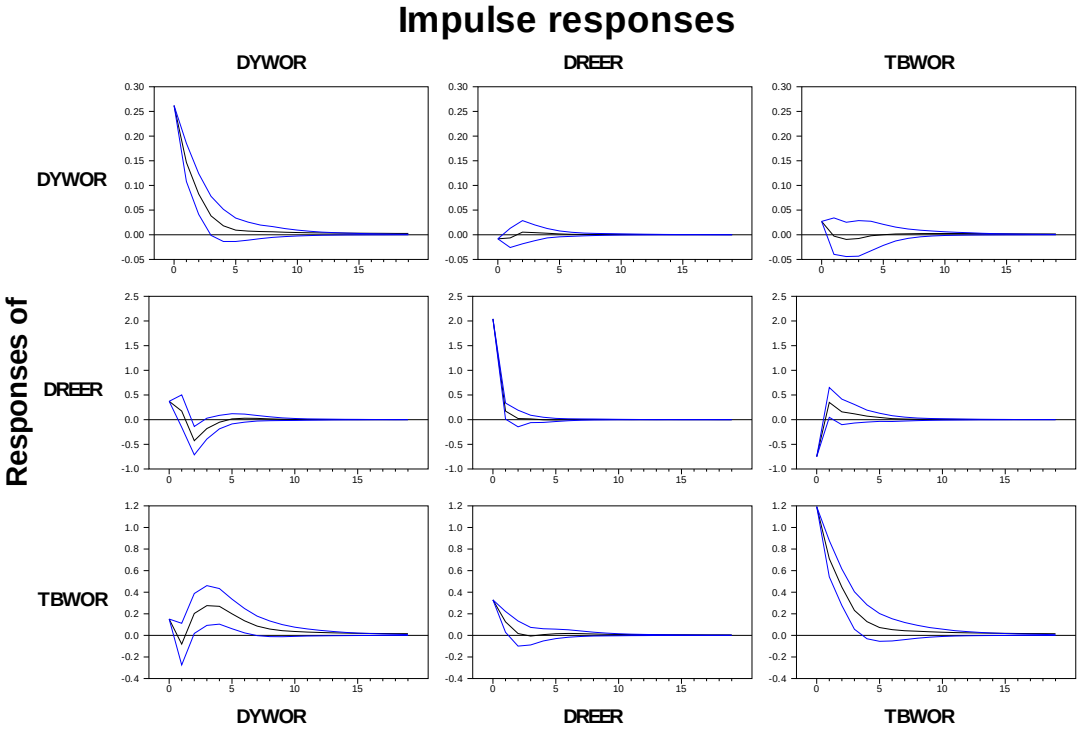


Figure 5: Impulse Response Function Analysis (cont'd)

c) VAR Model of Trade with the World (1994Q2-2009Q4; Lag order is 2)