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A Quantitative Study of Hong Kong's Fiscal Policy

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Abstract

Given the adoption of the linked exchange rate since October 1983, fiscal policy becomes the only measurement for stabilizing the Hong Kong economy. This paper attempts to establish a framework for evaluating the fiscal effect to prevent the abuse of fiscal measures. The empirical study of Jha et al. (2010) revealed the significant negative impact of fiscal effect in Hong Kong, which violates the classical view of fiscal policy. A similar result has been found by adopting another structural vector autoregression (SVAR) model proposed by Ravn et al. (2007). An omission of control variables in the quantitative model is possible. The MSCI AC (All countries) Pacific Index has been introduced as an international block in the SVAR model proposed by Ravn et al. (2007). The fiscal effect becomes positive and standardizes with the previous fiscal studies. The replacement of investment variable in the modified model suggests that positive fiscal innovation does not encounter with the crowding out effect on investment. The estimations for the decomposition policy expenditures indicate that compositional effect exists, and it undermines the fiscal multiplier. The estimations also reveal that the innovation in recurrent expenditure contributes mainly to the fiscal effect. With the persistence and significant impact on output, concentrating on infrastructure expenditure is the recommendation on Hong Kong fiscal policy to maximize the expansionary effect in the short run.

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1. Introduction

Fiscal and monetary policies are the two measures for stabilizing the economic fluctuation during the business cycle. Nevertheless, the latter one cannot be applied in Hong Kong. The currency board system has been adopted again by the Hong Kong government since 1983, and the capital is almost freely flowed. Mundell (1963) and Fleming (1962) suggested that any independent monetary policy cannot be applied given the existence of the fixed exchange rate and capital mobility. The only measure left for the Hong Kong government is the fiscal policy.

Even though the Hong Kong government realises that it has a substantial policy implication in the fiscal policy, it does not have any scientific and sophisticated framework for evaluating the fiscal effect on the economy quantitatively. The government just intends to accumulate its reserves and restricts its expenditures. Tang (1997) pointed out that the Hong Kong government prioritizes financial stability over economic stability when making decisions on public finance. The statistics also reveal this fiscal behaviour. Figure 1 indicates that the government has fiscal surplus in recent eight years consecutively. However, Figure 2 reveals that there is a slowdown of recurrent expenditure growth in recent years. The average annual growth of the recurrent expenditure from 2003 to 2010 is 1.5 percent, which is far below average 20 years annual growth rate 7.4 percent.

The society has disapproved of this fiscal practice in recent years. Conflicts between the government and the public were therefore aroused. The Old Allowance was pressured to increase into \$1,000 in 2008. The Mandatory Provision Fund (MPF) injection scheme in the 2011–2012 Budget was “U-turned” into a cash distribution scheme, which is Scheme \$6,000. The policy on public finance tends to become populist given the huge reserves for welfare distribution. However, the fiscal suggestion from populists may not be rational or even beneficial to the whole society. Establishing a framework with scientific foundation is essential to prevent the abuse of fiscal measures.

This thesis attempts to identify the fiscal impact on the Hong Kong macro economy using the structural vector autoregressive (SVAR) model. SVAR model is a standard approach for studying the quantitative effect of fiscal policy. However it is not desirable that we adopt the model from other literatures without modification. The estimation would not be standardized with literatures as the identification is not suitable to the uniqueness of Hong Kong’s economy. Hong Kong is a small open economy which involves various trading activities while the existing SVAR models from literatures do not incorporate this economic characteristic. One of the solutions for tackling this problem is introducing some control variables which capture the trading condition in the modified SVAR model.

Further disaggregation on fiscal spending is performed to compare the effects on different policy expenditures. The result shows that each policy spending has various quantitative effects. Together with the composition of total government expenditure, it is concluded that the nature of fiscal expenditure matters on the fiscal impact. The comparison of fiscal estimations for other “Asian Dragons”, i.e. Singapore, South Korea and Taiwan, further supports this conclusion. The fiscal effect on output in Hong Kong and Singapore are much narrowed than South Korea and Taiwan, given that Hong Kong and Singapore governments have similar expenditure pattern.

The modified SVAR model established in this thesis can be an empirical framework in evaluating their fiscal impacts in Hong Kong quantitatively. It filled in the blank of empirical fiscal policy study in Hong Kong. This study also provides a direction to the government for preparing the fiscal policy. Given a limited fiscal resource, the government can determine which policy expenditure should have the largest proportion in their fiscal policy if the main objective is stimulating the output in the short run.

The remainder of the thesis is organized as follows: Section 2 presents the literature review of empirical studies on fiscal policy in Hong Kong and other economies. Section 3 discusses the identification of the SVAR model and the

estimation. Section 4 provides the analysis of the decomposition of fiscal effect by policy. Section 5 compares the quantitative fiscal effects with other three “Asian Dragons”. Section 6 presents the concluding remarks.

2. Literature Review

In the ISLM model, the increase in government expenditure is an effective measure to stimulate aggregate demand. With the extension of Mundell (1963) and Fleming (1962), the prediction suggests that the fiscal multiplier will be larger if a fixed exchange rate is present and capital is mobile. Nevertheless, the recent empirical study with the SVAR representation of the data does not have a consistent conclusion on fiscal effect. In the study of Jha et al. (2010), 10 regions of Asian economies are examined, including Hong Kong. For the estimation on Hong Kong, the impulse response to a positive public spending shock from their SVAR model is negative and significant for real output and private consumption. This finding violates the Keynesian theory prediction that expansionary fiscal policy will result in an increase in consumption and output. The possibility of obtaining contradictory results may be attributed to the misspecification of the model. Conducting a comprehensive review on the empirical literature and selecting an appropriate model for the studies of Hong Kong fiscal policy are therefore necessary.

2.1. Literature Review on Hong Kong Fiscal Policy

A standard approach or benchmark model for estimating the impact of fiscal policy in Hong Kong does not exist. Freris (1989) adopted a simple linear Keynesian aggregate demand function with the average and marginal propensity to fiscal surplus for estimating whether the budget is expansionary. The result shows that the expansionary budget positively contributes to the aggregate demand from the 1970s to the 1980s. Hong Kong Monetary Authority (2000) and Peng et al. (2003) adopted the method of decomposition of fiscal balance to gauge the multiplier effect from fiscal impulse in the late 1990s to the early 2000s. They concluded that it has an expansionary effect on output in most of the years. In short, literature proposes that fiscal impulse does have an expansionary effect on the Hong Kong economy for a long period of time. Further doubts are therefore incurred from Jha et al.'s (2010) SVAR result of the negative response on real output and private consumption from a positive fiscal innovation.

2.2. Literature Review on the SVAR Model of Fiscal Policy

Blanchard and Perotti (2002) are pioneers in adopting the SVAR approach in identifying the dynamic responses from the government spending on U.S. activities during the post-war period. The results of their research consistently show that a

positive government spending shock has an expansionary effect on U.S. output. Numerous scholars have further extended and applied their approach in different economies for fiscal effect studies. Giordano et al. (2007) employed a five-variable SVAR model to investigate the effects of fiscal policy on private GDP, inflation, and the long-term interest rate in Italy. A shock to government purchase of goods and services has a sizeable and robust effect on the Italian economy. Ilzetzki et al. (2010) examined the impact of fiscal shocks in 44 countries using the SVAR panel model. They reported that the fiscal multiplier is relatively large if the country is industrialised, low in debt, low in degree of openness for trade, or has a predetermined exchange rate. Afonso and Sousa (2009) further extended the SVAR approach to investigate the macroeconomic effects of fiscal policy and its impact on asset markets in the United States, the United Kingdom, Germany, and Italy.

The fiscal studies in a small open economy conducted by Buckle et al. (2007) and Dungey and Fry (2007) focused on the identification of the SVAR model in the economy of New Zealand. Both studies adopted a block exogeneity approach in their SVAR models. New Zealand is considered as a small open economy that has a high correlation with the world economy; hence, international blocks as control variables are necessary for the SVAR model of a small open economy. Buckle et al. (2007) included foreign real output, interest rates, real asset returns, and the foreign

currency price of New Zealand trade as international blocks. Dungey and Fry (2007) further modified the specification. Instead of including the interaction between the variables of the international blocks, they incorporated them into the SVAR model only as purely exogenous variables.

The SVAR approach has an advantage in terms of the high degree of flexibility. The approach is easily extended by introducing more macro variables with simple restrictions. Each impulse response of the endogenous variable can be identified from the hypothetical fiscal innovation through simulation. Therefore, observing the quantitative effect of fiscal policy on the macro economy is convenient. Nevertheless, weaknesses are aroused when the SVAR approach is adopted. One of the most highly criticized weaknesses is the fragile micro-foundation of the approach. For example, the SVAR model does not usually include the intertemporal budget constraints for consumers and the government.

To cope with the problem, the dynamic stochastic general equilibrium (DSGE) model is used as an alternative because it attempts to explain the behaviour of agents aggregately by analysing the interaction of microeconomic decisions. Ravn et al. (2007) first employed the SVAR model for the preliminary analysis of fiscal effect on a panel of four industrialized countries including the United States, the United Kingdom, Canada, and Australia, over the post-Bretton Woods period. They

discovered that a positive innovation in government spending causes an expansion in output and consumption, deterioration of the trade balance, and depreciation of the real exchange rate. The DSGE model on two-country model has been constructed to gauge the observed effects of government spending shocks based on the deep habit mechanism developed by Ravn et al. (2006). The impulse responses of output, consumption, trade balance, and real exchange rate predicted by the deep-habit model match remarkably with their empirical counterparts. With the support of the DSGE model and simulations, the SVAR model adopted by Ravn et al. (2007) is justified as the benchmark model for analysing fiscal impact in Hong Kong.

3. Identification of the Structural VAR Model

3.1. Original Model

3.1.1. Identification

In the study of Ravn et al. (2007), the original SVAR model is in the following form:

$$A \begin{bmatrix} \hat{g}_t \\ \hat{y}_t \\ \hat{c}_t \\ \widehat{nx}y_t \\ \hat{e}_t \end{bmatrix} = B(L) \begin{bmatrix} \hat{g}_{t-1} \\ \hat{y}_{t-1} \\ \hat{c}_{t-1} \\ \widehat{nx}y_{t-1} \\ \hat{e}_{t-1} \end{bmatrix} + \varepsilon_t \quad (1)$$

where g_t denotes real per capita government expenditure, y_t denotes real GDP per capita, and c_t denotes real per capita private consumption of nondurables and

services. All of them are deflated by the GDP deflator. nxy_t denotes the net export-to-GDP ratio, and e_t denotes the real exchange rate. A hat over a variable denotes the log deviation from trend, except for nxy_t , for which it indicates the level deviation from trend. All variables are seasonally adjusted through the moving average method. Moreover, they are detrended with a linear and quadratic trend into a stationary form. The factor $B(L) \equiv B_0 + B_1L + B_2L^2 + \dots$ denotes a lag polynomial, with L denoting the lag operator.

The SVAR model proposed by Ravn et al. (2007) follows the argument of Blanchard and Perotti (2002) that government expenditure responds with at least one quarter lag to the structure innovations other than innovations to government expenditure itself. Moreover, no other innovations of variables can affect government expenditure (i.e., government expenditure is purely exogenous in this SVAR model). Here the identification adopted is the recursive system from the Cholesky decomposition (i.e., the shock of the variable will not have contemporaneous effect on variables that are higher ranked). For example, the innovation of \hat{c}_t consists of innovations \hat{g}_t and \hat{y}_t , but not others. Hence, the innovation of \hat{g}_t is purely exogenous in the model, which follows the Blanchard and Perotti (2002) setting. It includes four quarter lags for each series; hence, the matrices of coefficients B_i and A are of size 5 by 5.

3.1.2. Data

The linked exchange rate has been adopted since October 1983. The time series data adopted in the model are between 1984 and 2010 on a quarterly basis. Instead of using per capita data as adopted by Ravn et al. (2007), aggregate real output, consumption and government expenditure are adopted in the following estimations. All of them are from the Census and Statistics Department, Hong Kong, except the real exchange rate. The latter is from the Bank of International Settlement (BIS). Based on the BIS definition, an increase in the real exchange rate means the appreciation of the domestic country.

3.1.3. Estimation

Figure 3 illustrates the estimation that follows the identification of Ravn et al. (2007). Given a positive innovation of government expenditure, an increase in private consumption and deterioration of the trade balance occur. They match with the qualitative results found by Ravn et al. (2007). However, the appreciation of domestic currency and insignificant impact on GDP diverge from their results.

One of the possible reasons for the contradictory results is the misidentification on the SVAR model. Originally the SVAR model proposed by Ravn et al. (2007) studied the fiscal effect on a panel of four industrialized countries. These four

economies are sizable compared to the Hong Kong economy. The regional or global shocks might have a less impact on the four economies, but significant on Hong Kong relatively. Based on the studies of Buckle et al. (2007) and Dungey and Fry (2007), block exogeneity approach would be required for a small open economy like Hong Kong. Therefore, at least one international block should be introduced to control the impact of the external economic environment.

3.2. Modified Model

3.2.1. Introduction of International Block

Openness of trade has been one of the main features of the Hong Kong economy since the 18th century. Figures 4 and 5 illustrate the degree of importance of trading activities to the Hong Kong economy. Among the four key industries, which consist of over half of the GDP share, the trading industry accounts for about 25 percent of the total GDP in the latest decade. Moreover, over one-fifth of the total employment is related to the trading since 2000. These results further support the argument that trading is one of the key activities in the Hong Kong economy. Therefore, introducing an international block into the SVAR model proposed by Ravn et al. (2007) to control the trading condition is justified. Moreover, an increase in trading relation between Hong Kong and Asia-Pacific countries ensues. Figure 6

illustrates the ratio of total trade volume between Hong Kong and Asia-Pacific countries. The ratio rose from about 50% in 1984 to over 70% in 2010.¹ The indicator selected for international block should be incorporated with the characteristics of the above stylized facts.

The domestic trading activities are usually correlated with the economic performance of trading partners positively. Morgan Stanley Capital International (MSCI) provides equity indexes in evaluating global and regional economic performances. In the Asia-Pacific region, the MSCI AC (All countries) Pacific Index can be a proxy for evaluating the general economic performance of Asia-Pacific countries. The index, which was started in the fourth quarter of 1987, is updated on a monthly basis. The index is a free float-adjusted market capitalization weighted index, and consists of the following 12 developed and emerging market countries.²

The stylized facts on the trading activities in Hong Kong can be incorporated by this indicator to a certain degree. Hence, selecting the MSCI AC Pacific Index as an international block to control the trading environment is justified.

After the introduction of international block, the modified SVAR model takes the following form:

¹ The figures are believed to be undermined. Only the top 10 countries in terms of trading volume are reported by the Census and Statistics Department.

² It includes Australia, China, Hong Kong, Indonesia, Japan, Korea, Malaysia, New Zealand, Philippines, Singapore, Taiwan, and Thailand.

$$A \begin{bmatrix} \widehat{ap}_t \\ \widehat{g}_t \\ \widehat{y}_t \\ \widehat{c}_t \\ \widehat{nx}_t \\ \widehat{y}_t \\ \widehat{e}_t \end{bmatrix} = B(L) \begin{bmatrix} \widehat{ap}_{t-1} \\ \widehat{g}_{t-1} \\ \widehat{y}_{t-1} \\ \widehat{c}_{t-1} \\ \widehat{nx}_{t-1} \\ \widehat{y}_{t-1} \\ \widehat{e}_{t-1} \end{bmatrix} + \varepsilon_t \quad (2)$$

where ap_t is MSCI AC Pacific Index. A hat over ap_t denotes the log deviation from trend. It is also seasonally adjusted through the moving average method and detrended with a linear and quadratic trend into a stationary form. The lag operation $B(L)$ is identical to the previous SVAR model proposed by Ravn et al. (2007). The matrices of coefficients B_i and A are of size 6 by 6 after the introduction. Nevertheless, the identification adopted as the recursive system does not strictly follow the Cholesky decomposition. According to Dungey and Fry's (2007) modification of the SVAR model for the New Zealand economy, international block variables were incorporated into the model as exogenous variables. Thus, the innovation of \widehat{g}_t does not include the innovation of \widehat{ap}_t even it is the highest ranked variable. \widehat{ap}_t and \widehat{g}_t are both considered as exogenous and without interaction in the modified SVAR model.

3.2.2. Estimation

Figure 7 illustrates the estimation from the modified SVAR model with the block. Given a positive innovation of government expenditure, an increase in private

consumption and deterioration of trade balance ensue. Quantitatively, a 1 percent increase in government expenditure will result in a 0.24 percent increase in private consumption and a 0.2 percent decrease in net export to output ratio. Moreover, the impulse response of output is positive, and the real exchange rate depreciates. A 1 percent positive impulse from government spending will raise output by 0.06 percent, and lower the real exchange rate by 0.09 percent. The qualitative results now correspond to Ravn et al.'s (2007) estimation of the fiscal effect on the four industrialized countries. The expansionary effect of fiscal impulse on output is also consistent with previous Hong Kong fiscal literatures results qualitatively.³

Nonetheless, the quantitative results from the modified model significantly differ from the estimation conducted by Ravn et al. (2007). Compared to their result of a 0.05 percent decrease in net export to output ratio, the deterioration of the trade balance is more severe in the case of Hong Kong. In addition, the real exchange rate depreciation is limited, probably due to the linked exchange rate and the stickiness of prices. An increase in government expenditure stimulates import demand. However, due to the stickiness of the real exchange rate, the increase in export demand is undermined. The severe deterioration of the trade balance can be

³ The estimation from the modified model is robust even if different time series data are adopted. Annual data has been adopted for the estimation. Given that the test consists of 22 observations of the annual data, the lagging period has to be reduced for estimation. A two-year lag is therefore selected for the lag operator. Figure 8 presents the estimation from the modified SVAR model with annual data. It is consistent with the estimation based on quarterly data qualitatively.

explained by a limited degree of depreciation.

The fiscal impact on output estimated from the modified model is also narrowed. In the estimation by Ravn et al. (2007), the government spending multiplier, $\Delta y_t / \Delta g_t$, for four industrialized countries is 0.52 based on the assumption that the government share is 19 percent.⁴ Tang (1997) stated that the Hong Kong government has restricted the size of the public sector⁵ to 20 percent since the 1960s. The government spending multiplier in Hong Kong is about 0.35 given the restriction, which is much smaller than the estimation results of Ravn et al. (2007) even though the fiscal impact on consumption is much larger. The severe deterioration of the trade balance may explain a certain degree of the reduction of the multiplier. The findings of Ilzetzki et al. (2010) also suggested that the fiscal multiplier is relatively larger in large closed economies than in small open ones. They argued that the result is consistent with the models proposed by Mundell (1963) and Fleming (1962). Part of the increase in aggregate demand would be met by a reduction in net exports rather than by an increase in domestic production, given that an economy has a higher marginal propensity to import.

Another hypothesis for the undermined fiscal impact on output is that the

⁴ It is the average of government spending over the sample period for four countries in the sample provided by Ravn et al. (2007).

⁵ The size of the public sector in Hong Kong is defined as the ratio between total public expenditure and GDP.

expansion of the public sector may crowd out the private sector. Private investment is shrinking and is therefore crowding out the fiscal effect on output. To verify such a claim, robustness testing is conducted.

3.2.3. Robustness Testing

Examining the validity of the modified SVAR model before verifying the crowding out effect is necessary. It is possible that the ordering of the recursive system from the Cholesky decomposition has a function in the SVAR estimation (i.e., the ordering of the variables matters in the estimation). A new reordering of the structural form is expressed as:

$$A \begin{bmatrix} \widehat{ap}_t \\ \widehat{g}_t \\ \widehat{c}_t \\ \widehat{y}_t \\ \widehat{e}_t \\ \widehat{nx}_t \end{bmatrix} = B(L) \begin{bmatrix} \widehat{ap}_{t-1} \\ \widehat{g}_{t-1} \\ \widehat{c}_{t-1} \\ \widehat{y}_{t-1} \\ \widehat{e}_{t-1} \\ \widehat{nx}_{t-1} \end{bmatrix} + \varepsilon_t \quad (3)$$

Given the same Cholesky decomposition and the lag operator in the SVAR model, the order of variables is interchanged between output and consumption, net export ratio, and real exchange rate. The estimation of structural form (3) is presented in Figure 9. The impulse response for each variable is almost identical to the modified model in structural form (2).

Another reordering of the structural form is subjected to the robustness check.

The order of variables is reversed completely from the output to the real exchange rate. The new ordering of the modified SVAR model is in the following form:

$$A \begin{bmatrix} \widehat{ap}_t \\ \widehat{g}_t \\ \widehat{e}_t \\ \widehat{nxy}_t \\ \widehat{c}_t \\ \widehat{y}_t \end{bmatrix} = B(L) \begin{bmatrix} \widehat{ap}_{t-1} \\ \widehat{g}_{t-1} \\ \widehat{e}_{t-1} \\ \widehat{nxy}_{t-1} \\ \widehat{c}_{t-1} \\ \widehat{y}_{t-1} \end{bmatrix} + \varepsilon_t \quad (4)$$

The estimation of structural form (4) is illustrated in Figure 10. The impulse response for each variable is similar to the modified model with structural form (2). Various specifications of the modified model do not appear to have any significant influence on the estimation. Overall, the estimation from the modified model is robust, and can be adopted for further fiscal analysis.

3.2.4. Crowding Out Effect

The most intuitive method for observing the crowding out effect is to directly introduce the investment variable into the modified model. However, due to limited observations, further expansion of the model by introducing additional variables is infeasible. The coefficients may not be identified given the quadratic expansion of the matrix in the SVAR model. The introduction of the investment variable also creates problems of exact collinearity with the existing variables. An alternative method is the replacement of the existing variables. The investment variable can

replace the output variable as follows:

$$A \begin{bmatrix} \widehat{ap}_t \\ \widehat{g}_t \\ \widehat{inv}_t \\ \widehat{c}_t \\ \widehat{nxy}_t \\ \widehat{e}_t \end{bmatrix} = B(L) \begin{bmatrix} \widehat{ap}_{t-1} \\ \widehat{g}_{t-1} \\ \widehat{inv}_{t-1} \\ \widehat{c}_{t-1} \\ \widehat{nxy}_{t-1} \\ \widehat{e}_{t-1} \end{bmatrix} + \varepsilon_t \quad (5)$$

\widehat{inv}_t denotes the investment variable with the treatment. The structural form and the lag operator are identical to the modified model. Figure 11 illustrates the impulse response of the government expenditure on investment, consumption, net export ratio, and real exchange rate. A 1 percent positive innovation in government expenditure raises the investment by 0.33 percent within a year, whereas the other impulse responses are consistent with the estimation from the modified model quantitatively. The result indicates that the hypothesis that government expenditure crowds out private investment may be inaccurate in Hong Kong.

For further verification of the fiscal effect on investment, another replacement of the investment variable is conducted. Instead of replacing the output variable as structural form (5), consumption is replaced by investment as follows:

$$A \begin{bmatrix} \widehat{ap}_t \\ \widehat{g}_t \\ \widehat{y}_t \\ \widehat{inv}_t \\ \widehat{nxy}_t \\ \widehat{e}_t \end{bmatrix} = B(L) \begin{bmatrix} \widehat{ap}_{t-1} \\ \widehat{g}_{t-1} \\ \widehat{y}_{t-1} \\ \widehat{inv}_{t-1} \\ \widehat{nxy}_{t-1} \\ \widehat{e}_{t-1} \end{bmatrix} + \varepsilon_t \quad (6)$$

Figure 12 illustrates the impulse response of the fiscal impact on output,

investment, net export ratio, and real exchange rate for structural form (6). When the results are compared to the impulse response in Figure 9, the responses are consistent with previous estimation in general. Investment is stimulated by a positive innovation in government expenditure, which contradicts the prediction of the crowding out effect. Thus, the crowding out effect does not explain the undermined fiscal effect on output in Hong Kong.

The remaining possible explanation is the compositional effect of government expenditure. Ilzetki et al. (2010) suggested that the composition of government expenditure is a crucial determinant of the fiscal multiplier. The nature of expenditure may matter in the aggregate fiscal effect. For determining the fiscal effects of specific types of policy expenditure, further disaggregation of the fiscal expenditure is necessary.

4. Fiscal Effects by Policy Category

4.1. Decomposition of Government Expenditure

According to the classifications provided in the Hong Kong government budget, nine categories of policy expenditure are disaggregated from the total government expenditure. These categories are community services⁶ (denoted as COMM),

⁶ For simplicity, the policy spending on environment and food is aggregated with the spending on community and external affairs under the community services category.

economic (denoted as ECON), education (denoted as EDU), health (denoted as HEALTH), housing (denoted as HOUSE), infrastructure (denoted as INFRA), security (denoted as SECU), social welfare (denoted as SW), and support (denoted as SUPPORT). The detailed classification of each category of spending is listed in Appendix A.

The consistent classification of policy expenditure data is indicated in the Appendix of the Hong Kong Budget since fiscal year 1989–1990. Instead of quarterly data, only annual data are available for the nine categories of expenditure. To fit with the other quarterly data in the model, the annual data are transformed into quarterly data according to the ratio of total government expenditure in each quarter. The expenditure in each policy category is assumed to follow a pattern similar to the total government expenditure within a year. The treatment of each policy expenditure variable would be identical to the total government expenditure, \hat{g}_t , in the modified model. \hat{g}_t would be replaced one by one in the estimation of a particular policy expenditure.

4.2. Estimation of Fiscal Impulse by Policy Category

4.2.1. Total Expenditure by Policy

Figures 13 to 21 present the estimations of fiscal impulse from the nine

categories of total expenditure. The results vary between each policy category. The impulse from five policies (community services, economic, education, housing, and social welfare) does not correspond to the benchmark results qualitatively. However, the remaining four policies (infrastructure, health, security, and support) have results similar to those of the estimation from the modified model qualitatively. Among all types of policy spending, security spending has the greatest fiscal impact. A 1 percent increase in security spending leads to a 0.17 percent increase in output, a 0.36 percent increase in consumption, and the reduction of the trade balance and real exchange rate by 0.19 percent and 0.25 percent, respectively. However, the impact disappears after five quarters. Meanwhile, the impact from infrastructure spending is sustained for over 10 quarters without diminishing, probably because the implementation period of an infrastructure project is usually longer than the other policies. The impact therefore persists much longer than the others.

Nevertheless, the finding that over half of the policy fiscal impulses are contrary to the benchmark result is unsatisfactory. The nature of expenditure possibly matters in determining the degree of the fiscal impulse. The Hong Kong government usually is more concern about on the growth in size of the recurrent expenditure rather than the total government expenditure. Recurrent expenditure is considered as an operational expense that includes departmental expenses,

personal emoluments, and related expenses (The Estimates, 2011). It can also be considered as government's permanent spending. Tang (1997) indicated a guideline for financial officers that the recurrent expenditure could not exceed a certain ratio of the total expenditure to attain fiscal reserve sufficiency. The special nature of recurrent expenditure may have a function in determining the fiscal effect. Thus, disaggregating the policy expenditure into recurrent expenditure for further analysis is necessary.

4.2.2. Recurrent Expenditure by Policy

Figures 22 to 30 present the estimations of fiscal impulse from the nine categories of recurrent expenditure. The short-run results are consistent with the benchmark in general. Within a four-quarter period, the impulse response of economic, health, housing, infrastructure, security, and support have corresponding results with the estimation of total government expenditure qualitatively. Even community services and education spending do not have a positive impact on output, and the impulses on other macro variables are still consistent with the benchmark results. Compared to the estimation for total expenditure by policy, the responses from the recurrent expenditure are much more persuasive in general. Given that the recurrent expenditure has over 70 percent share of the total

government expenditure,⁷ the implication is that the degree of fiscal multiplier is mainly determined by the innovation in the recurrent expenditure.

Quantitatively, the recurrent expenditure on infrastructure has the greatest fiscal impact among all of the policies. A 1 percent increase in infrastructure expenditure leads to a 0.11 percent increase in output, a 0.23 percent increase in consumption, and the reduction of the trade balance and the real exchange rate by 0.38 percent respectively. Similar to the other recurrent spending effects, those from infrastructure expenditure disappear after five quarters. Compared to the results of total expenditure by policy, infrastructure expenditure also has a significant impact on output. Aschauer (1989) and Barro (1991) concluded that productive government spending such as that on infrastructure has a positive impact on output. The estimation done by Ilzetzki et al. (2010) indicated that an increase in government investment causes an increase in output. This finding may suggest that the government should concentrate the recurrent expenditure on infrastructure to maximize the fiscal multiplier in the short run.

The only response that does not correspond to the benchmark is the recurrent social welfare expenditure. With regard to the detailed spending of the Social Welfare Department, more than half of the recurrent social welfare expenditure is

⁷ It is the average percentage share of recurrent expenditure to total government expenditure from 1989 to 2010.

contributed to the Comprehensive Social Security Assistance (CSSA) scheme in the fiscal year 2011–2012 (The Estimates, 2011). The CSSA is a welfare subsidy scheme for the elderly, the disabled, the unemployed, and the poor. The impulse response that differs from the other policies may be due to the behaviour of the group of unfortunates, who intend to control their consumption in general. They may also prefer to be protected by the CSSA scheme, and thus may not have any incentive to participate in the labour market. This condition explains why the corresponding impulse response is divergent from the standard one.

The varying degrees of fiscal impact from the categories of recurrent expenditure may be the fundamental reason for the undermined fiscal effect on output. Figure 31 indicates the percentage of recurrent expenditure by policy. Education accounts for over 20 percent of total spending, which is the largest proportion, whereas the recurrent expenditure on infrastructure only accounts for 6 percent on average. The previous estimations reveal that any innovation in education expenditure does not have a significant impact on output in the short run. Moreover, the recurrent social welfare expenditure, which has a negative impact on output, has increased continuously since the early 1990s. Therefore, the large proportion of the education and social welfare recurrent expenditure dilutes the fiscal impact on output from the other categories of policy expenditure.

4.2.3. Non-Recurrent Expenditure by Policy

Aside from recurrent expenditure, non-recurrent expenditure⁸ is also included in this study. Non-recurrent expenditure is typically regarded as spending on items in one-off nature. Any capital expenditure in the various departments is considered as non-recurrent expenditure. It is not the main component of Hong Kong fiscal spending because it accounts for only 30 percent of the total spending.⁹ Figures 32 to 40 present the estimations of fiscal impulse from nine categories of non-recurrent expenditure. Most of the results deviate from the benchmark ones. This condition is not surprising because non-recurrent expenditure is regarded as capital expenditure by nature. Devarajan et al. (1996) suggested that seemingly productive forms of spending such as capital expenditure could become unproductive if they are in excess.

Nevertheless, three non-recurrent categories of policy expenditure—infrastructure, security, and social welfare—correspond to the benchmark result. Infrastructure and security have significant effects on the previous estimations of total and recurrent expenditure, whereas for social welfare,

⁸ The definition of non-recurrent expenditure is different from that of the government. Any expenditure on items of a one-off nature and costing more \$150,000 each but not involving the acquisition or construction of a physical asset is considered as non-recurrent expenditure by the government. In this thesis, non-recurrent expenditure refers to any expenditure excluding recurrent expenditure, which includes capital expenditure and non-recurrent expenditure from the operating account.

⁹ It is the average percentage share of non-recurrent expenditure to total government expenditure from 1989 to 2010.

the results are counterintuitive. This fact may be due to the practice of one-off welfare distribution in recent years. The recipients are the majority of the public instead of specific groups. Therefore, the response of non-recurrent social welfare expenditure is similar to tax reduction or transfers, which are also similar to the conventional response of a positive innovation in government expenditure.

5. Comparison of the Fiscal Effects between “Asian Dragons”

Hong Kong, Singapore, Taiwan and South Korea are considered as advanced small open economy in Asia. They are also commonly known as “Four Asian Dragons”. Still they have many distinctive differences. For example in the monetary aspect, Hong Kong is the only economy adopting currency board system. In the fiscal aspect, only Hong Kong government do not responsible for the national defence expenses. In the economic aspect, Hong Kong and Singapore are specialised in financial services whereas South Korea and Taiwan are world leaders in manufacturing and information technology.

In order to justify whether the nature of expenditure plays a role in fiscal effect, a comparison of the fiscal effects between “Asian Dragons” has been carried out. Besides the real exchange rate data which is collected from BIS, others are collected

from CEIC database¹⁰. Figure 40 to 43 illustrate the impulse response of the fiscal impact on Singapore, South Korea and Taiwan economy respectively. A positive innovation of the government expenditure induces a reduction in real exchange rate in Singapore and Taiwan. The degree of reduction is much more significant than Hong Kong. It is due to the flexible exchange rate regime adopted in these two economies. It therefore simulates a certain degree of export demand and it can explain the reason why the deterioration of trade balance is far less than Hong Kong. However for the case of South Korea, the positive innovation of the government expenditure induces an insignificant increase in real exchange rate. The trade balance in South Korea deteriorates as serious as Hong Kong.

For the quantitative effect on output, there is a clear distinction between “Asian Dragons”. Similar to the estimation in Hong Kong, the impulse response of output in Singapore is undermined. The previous findings have suggested that a large proportion of the education expenditure dilutes the fiscal impact on output in Hong Kong. Besides the national defence, education is the largest public expenditure in Singapore. It consisted of about 22 percent of total government expenditure in 2011.¹¹ The percentage share of education expenditure is similar to the Hong Kong government. The estimation in Singapore indicates that a 1 percent increase in the

¹⁰ The time series data for Singapore and South Korea are from 1987 to 2010 while Taiwan is 1987 to 2009.

¹¹ Singapore Budget 2012

government expenditure will result in a 0.004 percent increase in output. It is much more insignificant than the estimation in Hong Kong. The previous study revealed that the fiscal effect on output is related to the nature and the composition of policy expenditure. Therefore, it is not surprising to discover that the fiscal effect on output is undermined in Singapore.

On the other hand, the education expenditure is less weighted in Taiwan and South Korea budget, compared to Hong Kong and Singapore. In 2011, the education expenditure share was about 12% in Taiwan¹² and about 15% in South Korea¹³. Compositional effect suggests that a lower weighting in some policy expenditures which have insignificant impact on output will boost the fiscal effect in general. It is expected the fiscal effect on output would be much significant in Taiwan and South Korea. Quantitatively, a 1 percent increase in government expenditure will result in a 0.1175 percent increase in Taiwan's output and 0.2958 percent increase in South Korea's output. The results of Taiwan and South Korea indicate that they have a substantial fiscal impact on output, compared with the estimation in Hong Kong and Singapore. It further suggests that the nature and the composition of policy expenditure matters for the fiscal effects.

¹² The General Budget Proposal of Central Government, Taiwan

¹³ OECD National Accounts

6. Concluding Remarks

This thesis attempts to identify the fiscal effects on the macro economy in Hong Kong by adopting the SVAR approach. The model proposed by Ravn et al. (2007) is selected as the benchmark model because it is supported by the DSGE framework that has a micro-foundation. However, the model cannot be employed without modification because it does not incorporate certain features of the Hong Kong economy, such as openness to trade. The introduction of the international block, which is the MSCI AC Pacific Index, can solve the problem; the estimations from the modified model correspond to the findings of Ravn et al. (2007) qualitatively.

For the quantitative study, the fiscal multiplier in Hong Kong is significantly less than that of the four industrialized countries. The crowding out effect on investment is considered as a reason, but it is refuted immediately by the estimation of the replacement variables. The severe deterioration of the trade balance may explain a certain degree of the reduction of the multiplier, given Hong Kong's high marginal propensity to import.

More importantly, the compositional effect of the policy expenditure is the fundamental reason for the undermined fiscal multiplier. The large proportion of education expenditure in the budget, which has an insignificant impact on output, dilutes the fiscal effects generated from the other categories of policy expenditure.

The recurrent social welfare expenditure, which increases continuously, also reduces the positive fiscal impact on output. Moreover, the decomposition of expenditure reveals that the innovation in recurrent expenditure is a crucial determinant of the fiscal effect. The comparison of the other “Asian Dragons” provides further evidence showing the compositional effect of the policy expenditure does matter on the quantitative effect of fiscal policy.

From the viewpoint of policymakers, infrastructure should be the primary expenditure during a recession. The innovation in the total infrastructure expenditure has a persistent expansionary effect on output. The recurrent expenditure on infrastructure has the strongest impact on output among all of the policies. Thus, concentrating the government expenditure on infrastructure can maximize the expansionary fiscal effect on output in the short run.

Finally, we have two remarks on the methodology and the interpretation of this study’s results. Given the transformation of annual data into quarterly data, it is assumed that the expenditure in each policy category follows a pattern similar to the total spending within a year. The non-cointegration of the pattern of policy expenditure is possible. Smoothing the quarterly data through the moving average method and including four quarters of lags in the SVAR model can address the potential problem generated by the transformation.

Furthermore, the proposed policy recommendation should be interpreted with caution. The policy recommendation is based on the impulse response, which is estimated from the modified SVAR model. The SVAR approach is particularly effective for short-run analysis, but it has limited explanatory power in estimating long-run fiscal effects. In other words, the insignificant impact from specific categories of policy expenditure should not be taken to mean that such policy expenditure is unproductive. The long-run impact from policy expenditure is not incorporated into the results of this study.

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Appendix A: Classification of Expenditure by Policy Area Group

Community Services

District and Community Relations, Recreation, Culture, Amenities and Entertainment Licensing, Agriculture, Fisheries and Food Safety, Environmental Hygiene, Environmental Protection, Conservation, Power and Sustainable Development

Economic

Air and Sea Communications and Logistics Development, Commerce and Industry, Employment and Labour, Financial Services, Information Technology and Broadcasting, Manpower Development, Posts, Competition Policy and Consumer Protection, Public Safety, Travel and Tourism

Education

Education

Health

Health

Housing

Housing

Infrastructure

Buildings, Lands, Planning, Heritage Conservation, Greening and Landscape, Land and Waterborne Transport, Water Supply, Drainage and Slope Safety

Security

Administration of Justice, Anti-corruption, Immigration Control, Internal Security, Legal Administration, Legal Aid

Social Welfare

Social Welfare, Women's Interests

Support

Central Management of the Civil Service, Complaints Against Maladministration, Constitutional and Mainland Affairs, Intra-Governmental Services, Revenue Collection and Financial Control, Support for Members of the Legislative Council

Appendix B: Estimations and Figures

Figure 1

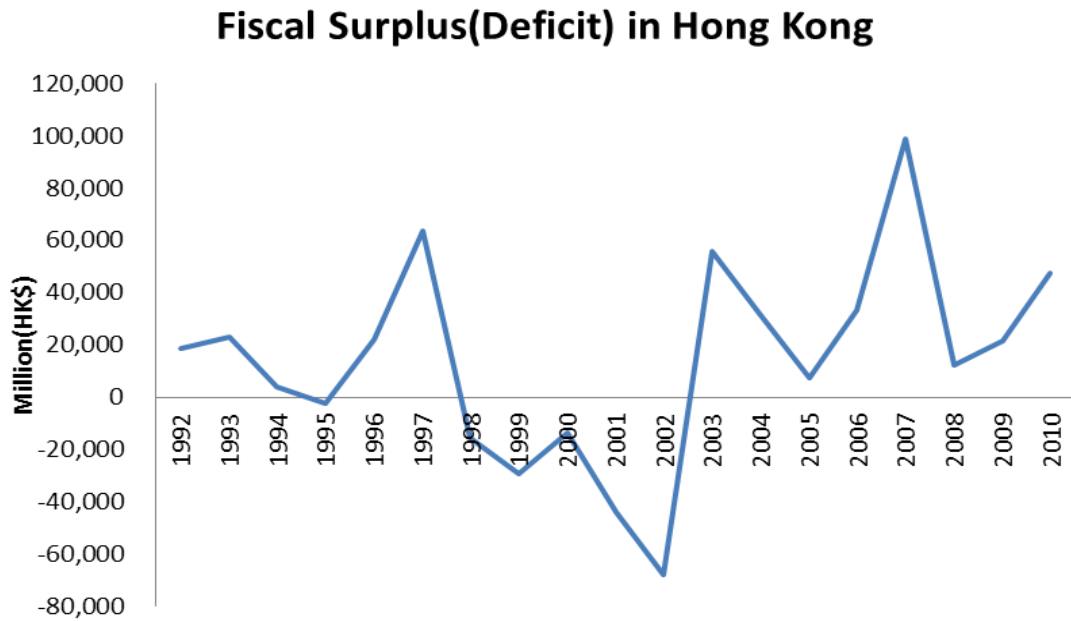


Figure 2

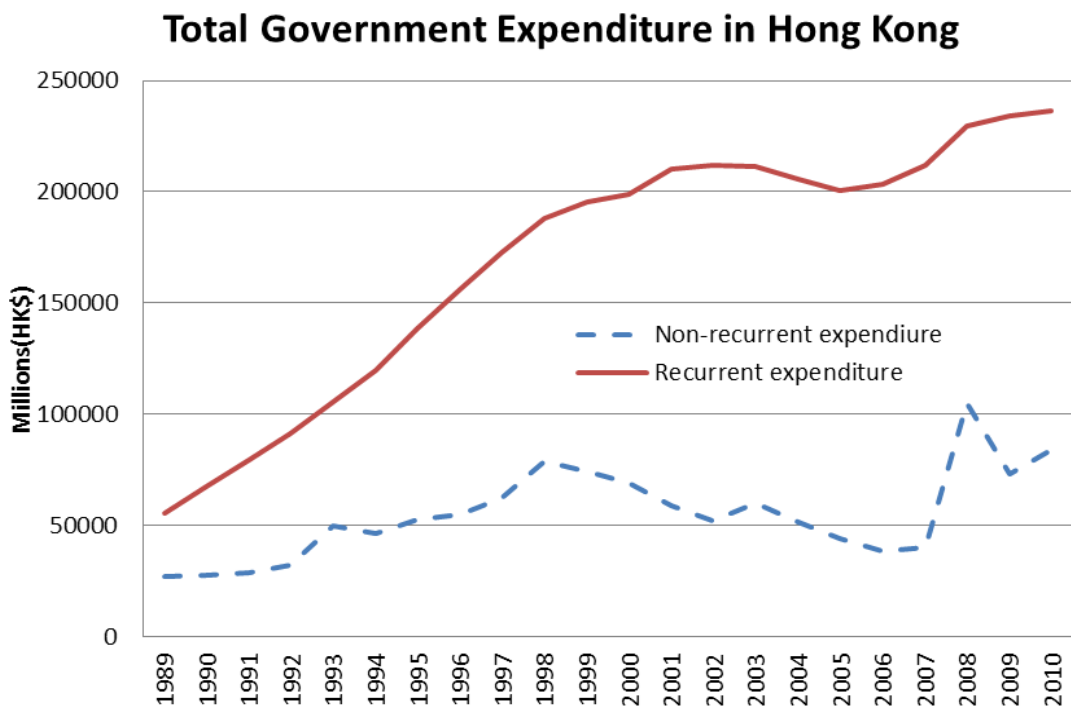


Figure 3

Impulse Response of Total Government Expenditure from the Original Model

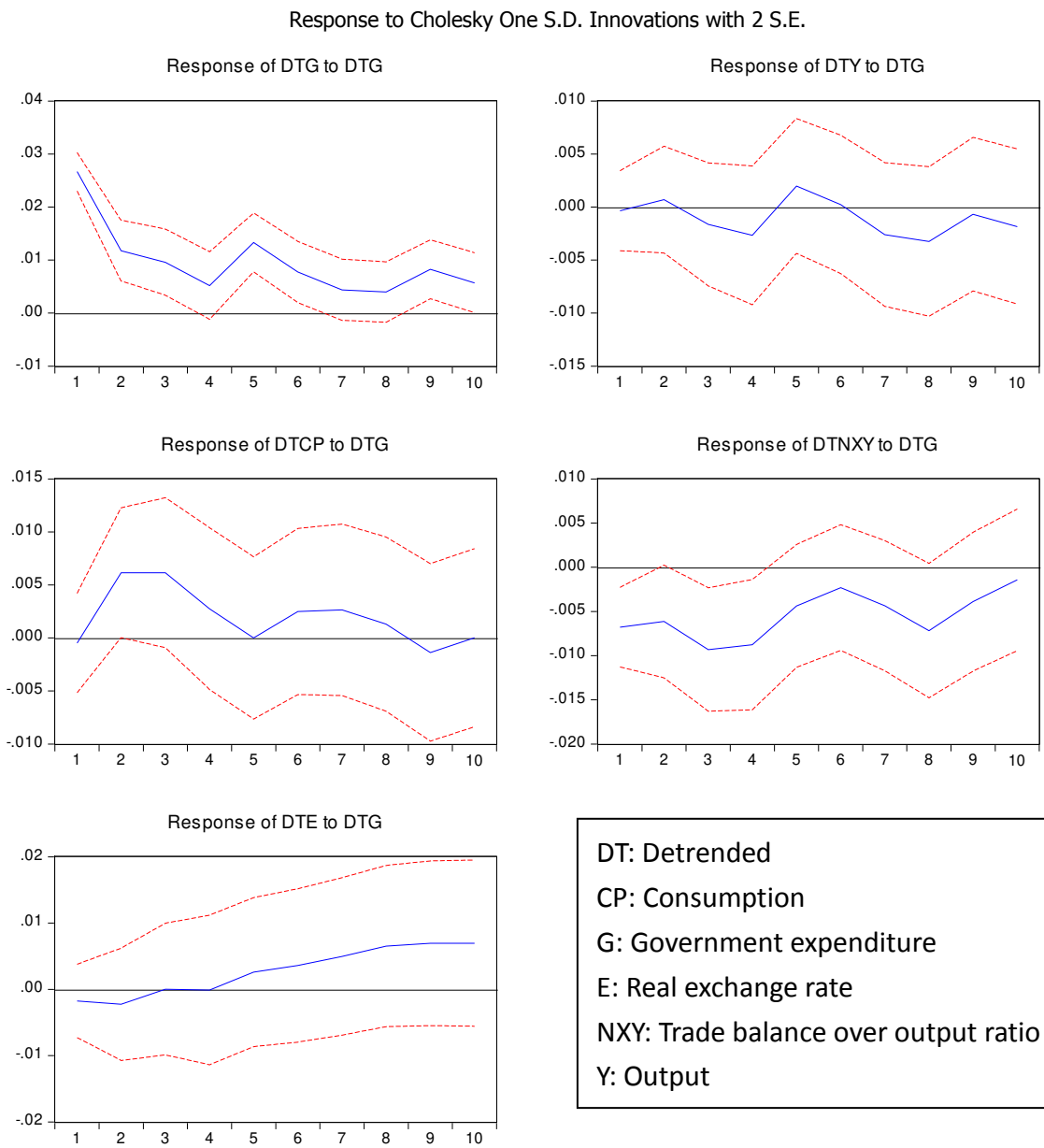


Figure 4

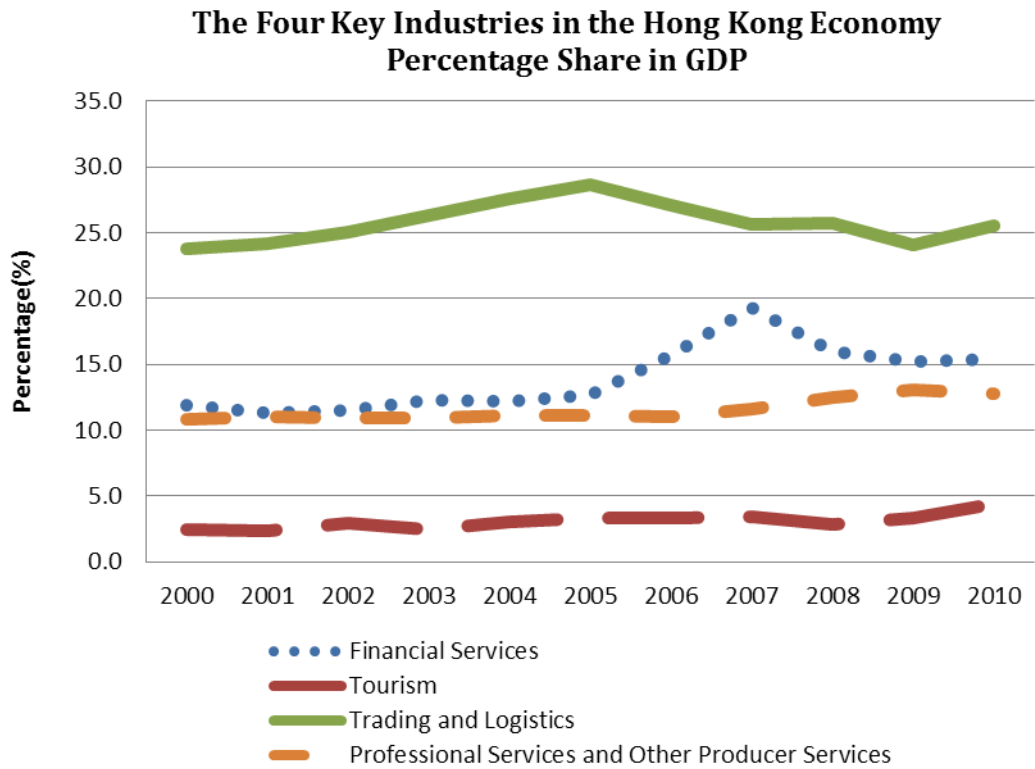


Figure 5

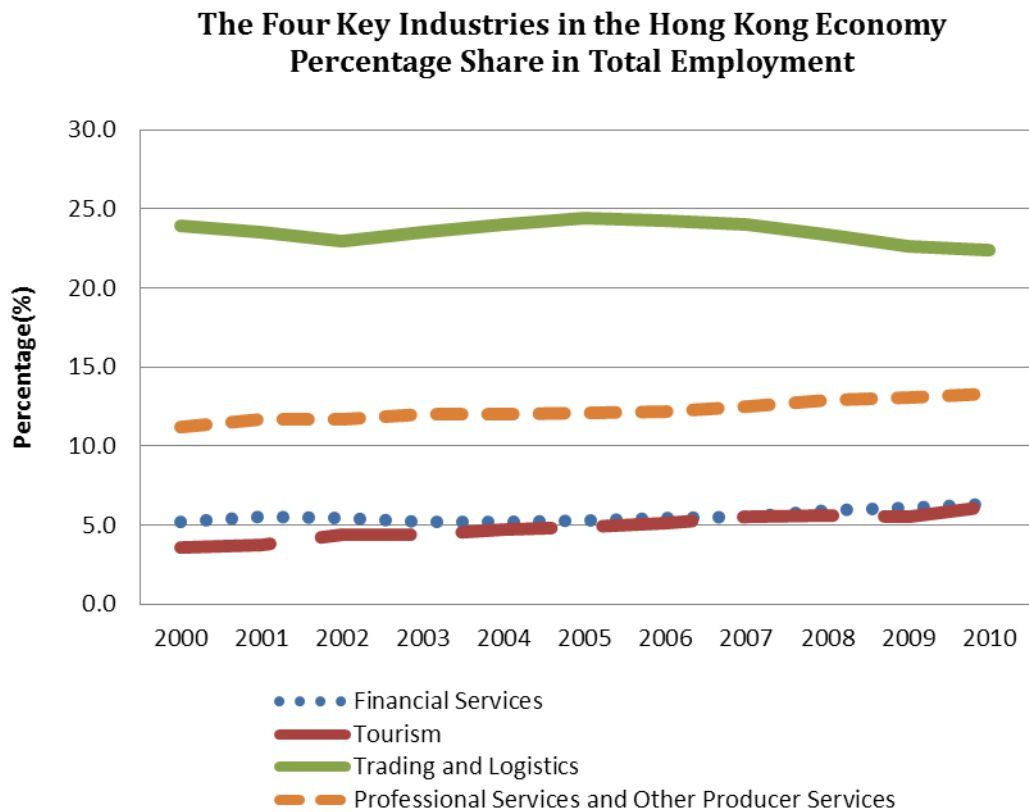


Figure 6

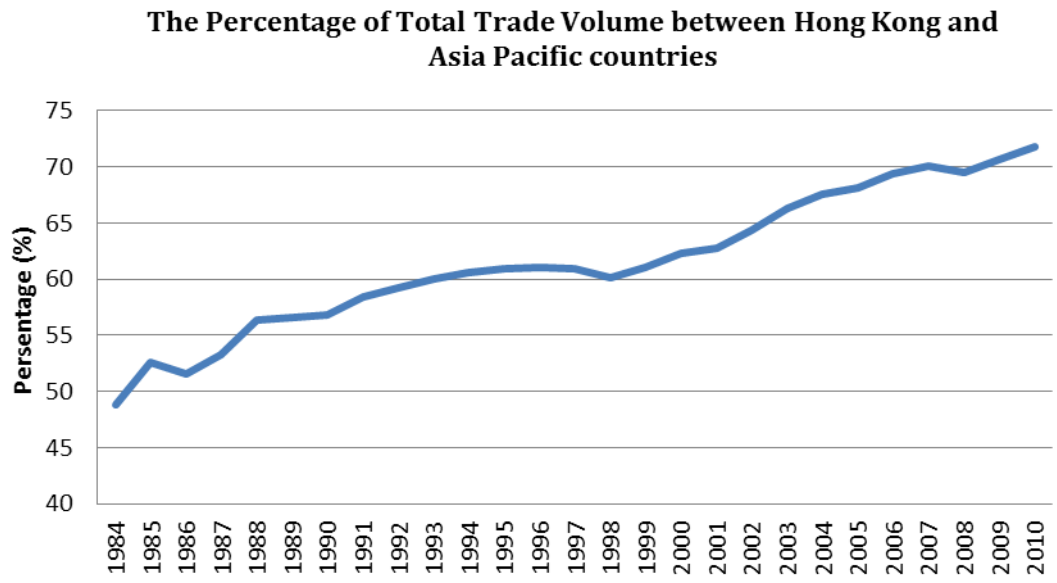


Figure 7

Impulse Response of Total Government Expenditure from the Modified Model
(Quarterly)

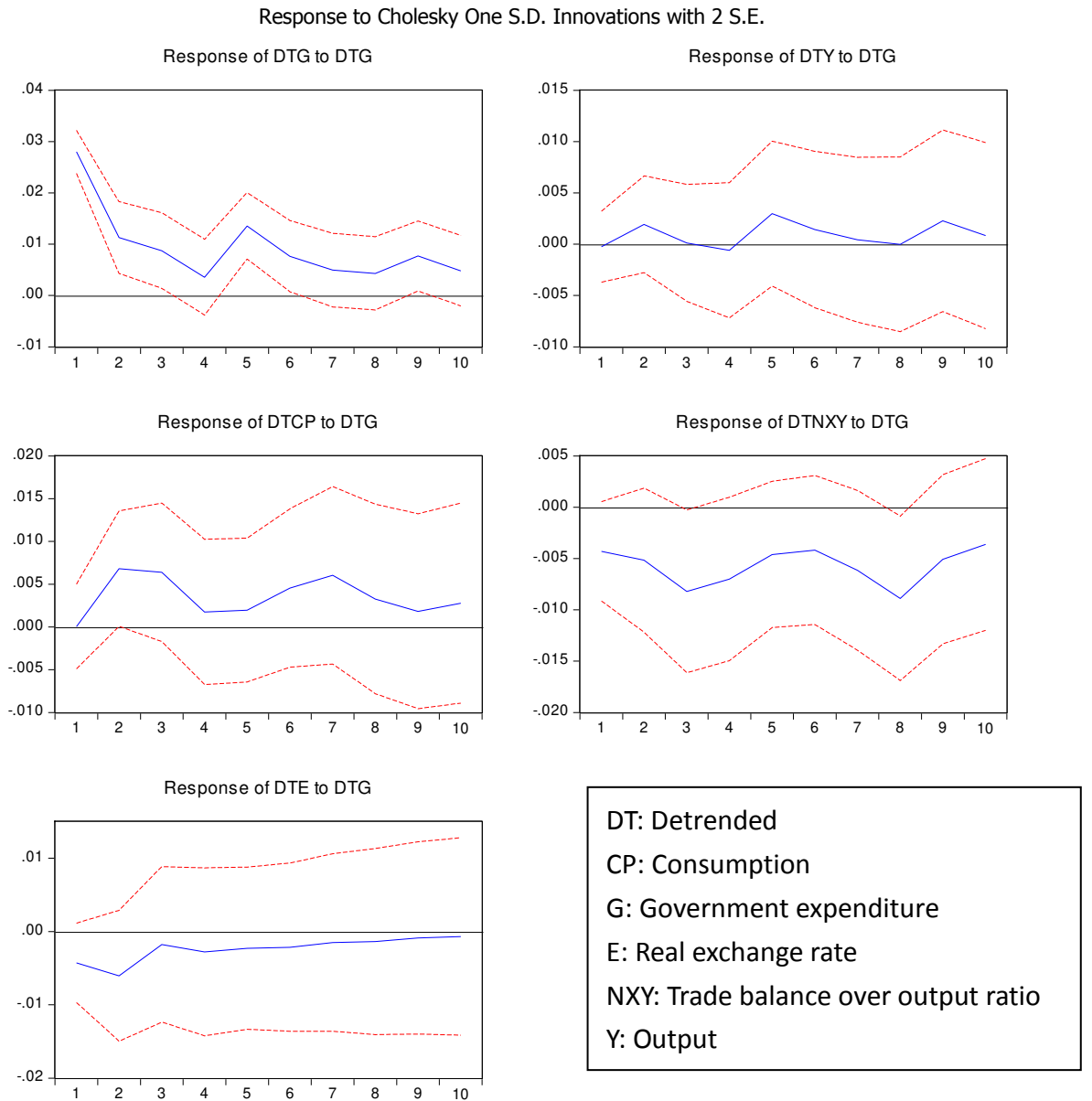


Figure 8

Impulse Response of Total Government Expenditure from the Modified Model
(Annually)

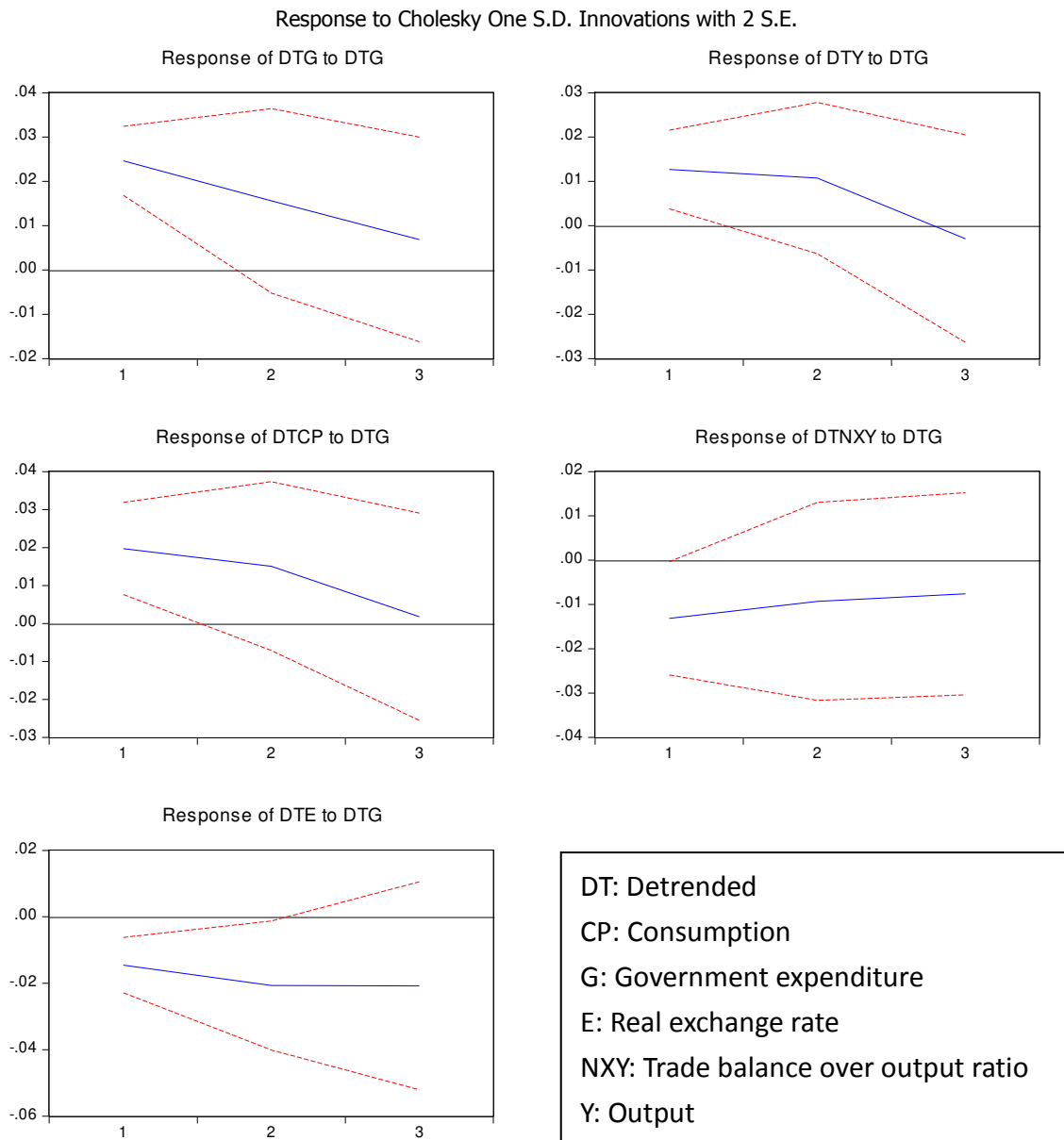


Figure 9

Impulse Response of Total Government Expenditure from the Modified Model
Reordering Structural Form (3)

Response to Cholesky One S.D. Innovations with 2 S.E.

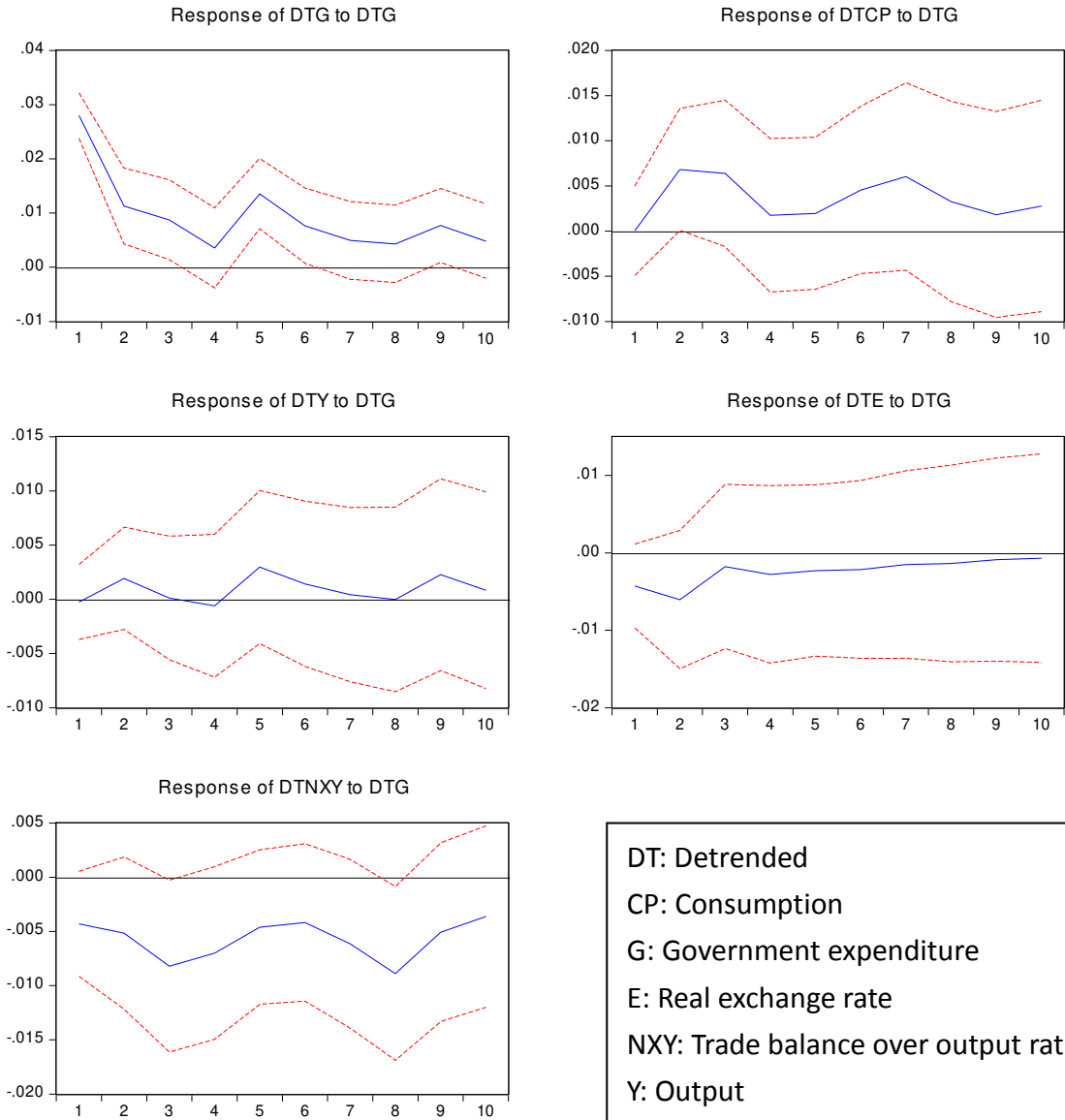


Figure 10

Impulse Response of Total Government Expenditure from the Modified Model
Reordering Structural Form (4)

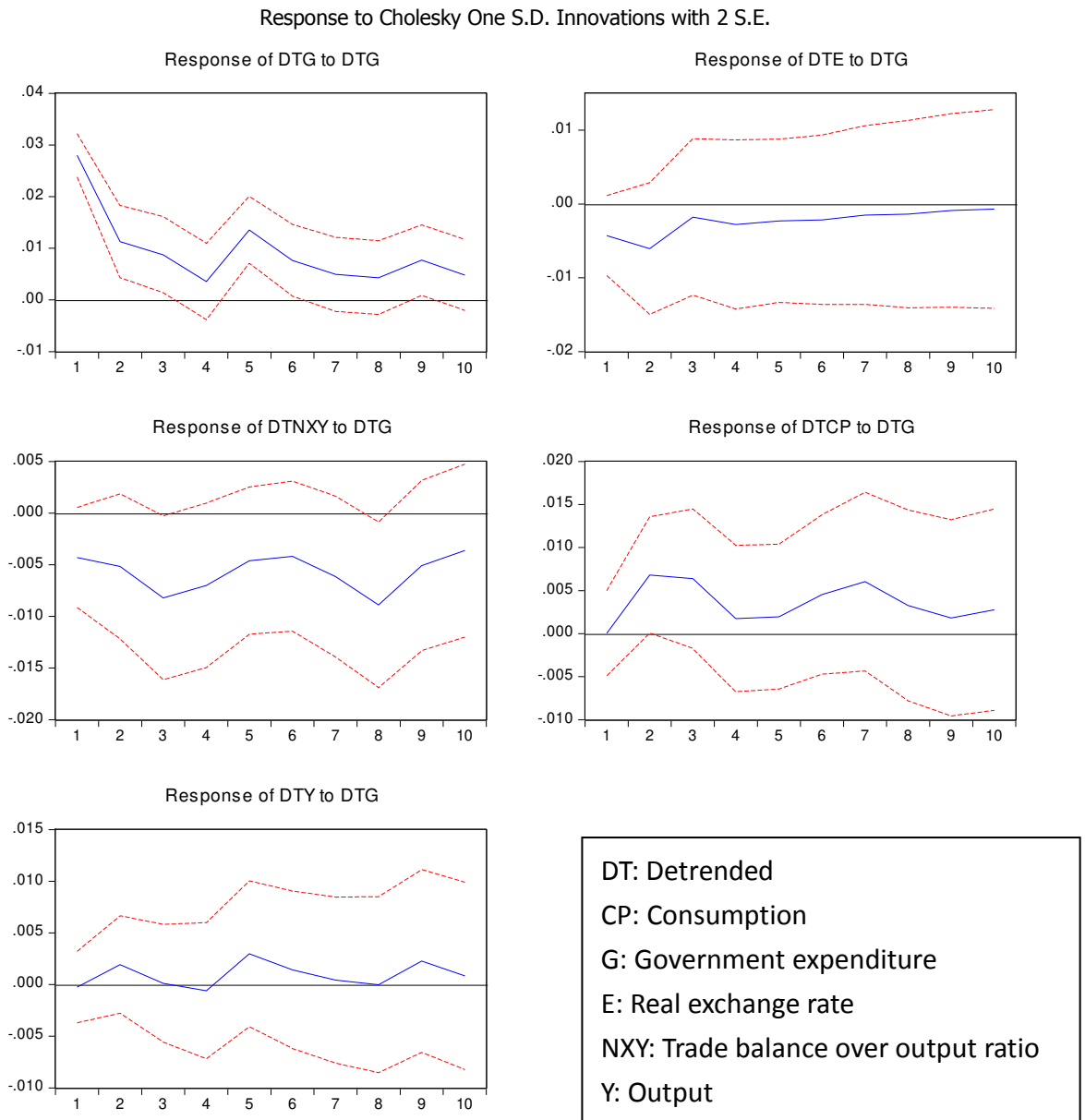


Figure 11

Impulse Response of Total Government Expenditure from the Modified Model
Replacement of Output

Response to Cholesky One S.D. Innovations with 2 S.E.

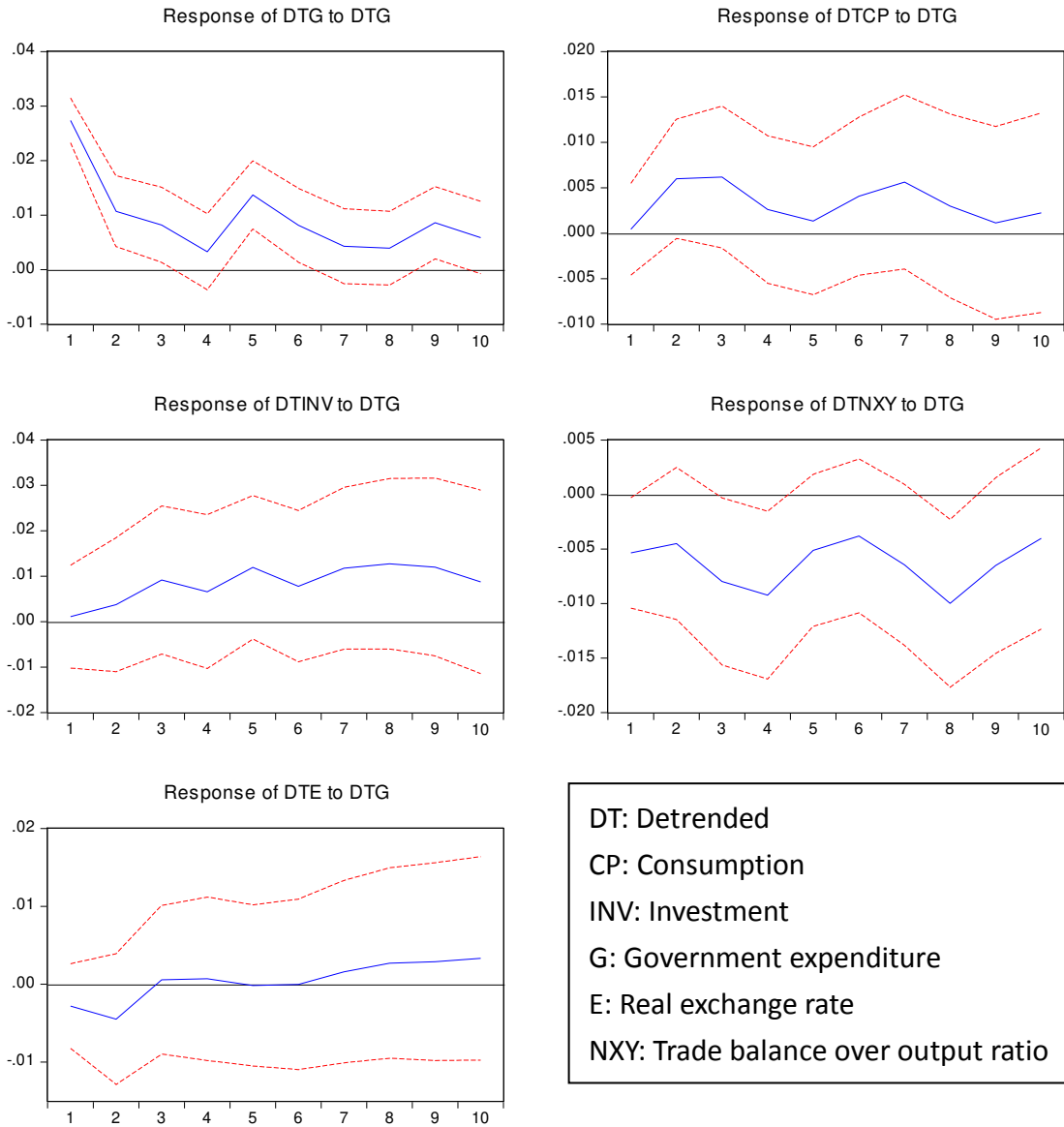


Figure 12

Impulse Response of Total Government Expenditure from the Modified Model
Replacement of Consumption

Response to Cholesky One S.D. Innovations with 2 S.E.

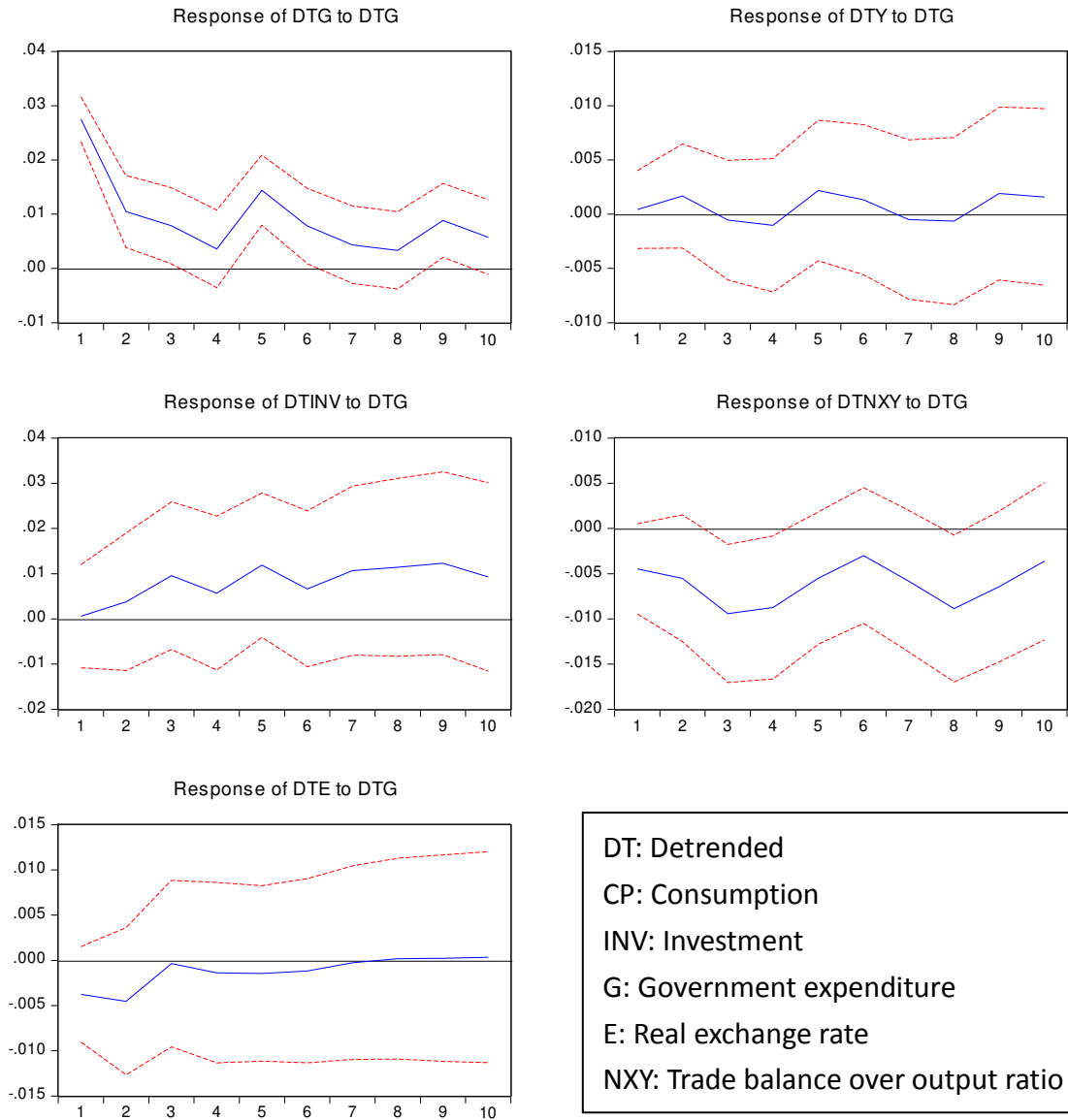


Figure 13

Impulse Response of Total Community Services Expenditure

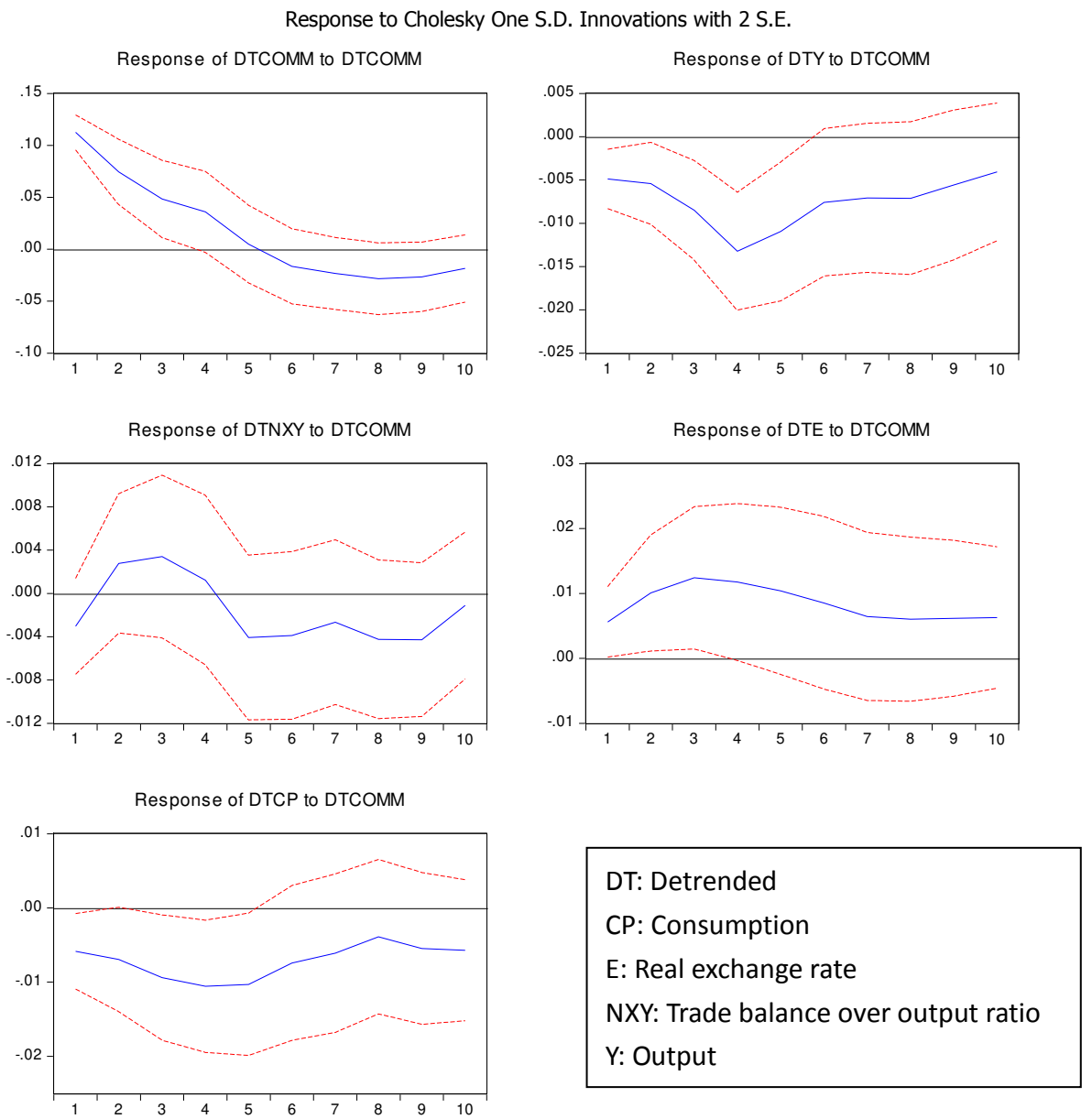


Figure 14

Impulse Response of Total Economic Expenditure

Response to Cholesky One S.D. Innovations with 2 S.E.

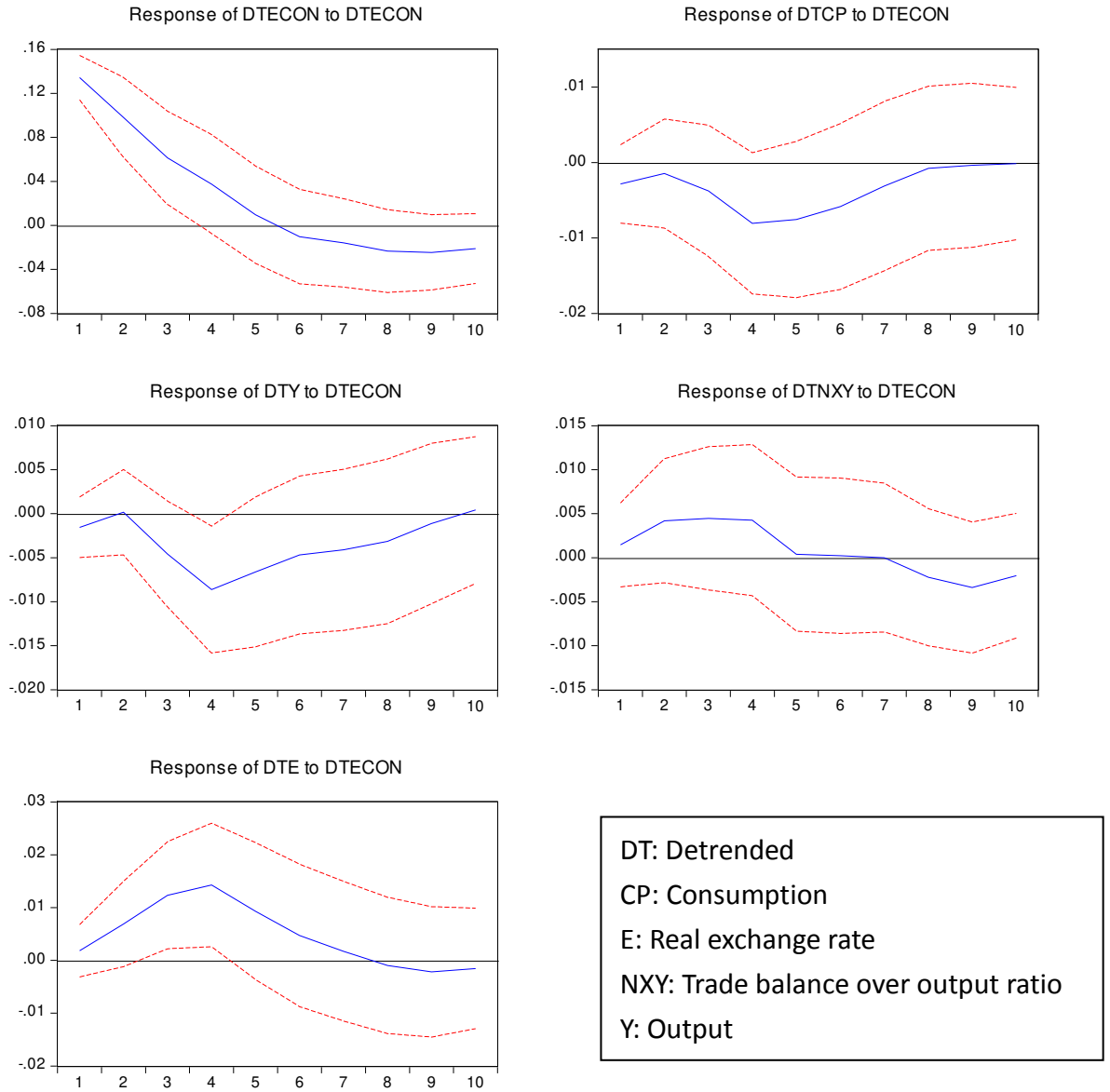


Figure 15

Impulse Response of Total Education Expenditure

Response to Cholesky One S.D. Innovations with 2 S.E.

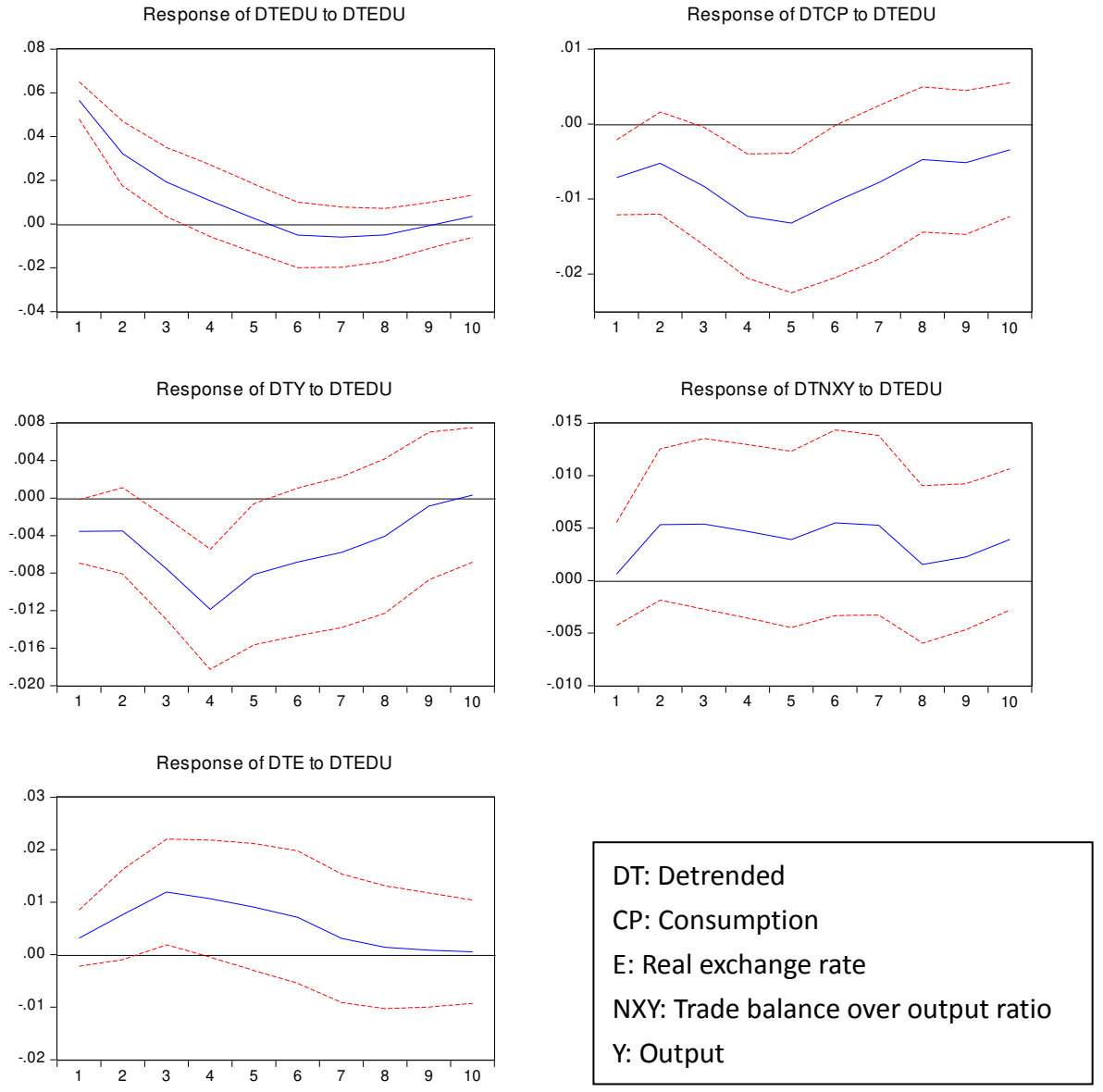


Figure 16

Impulse Response of Total Health Expenditure

Response to Cholesky One S.D. Innovations with 2 S.E.

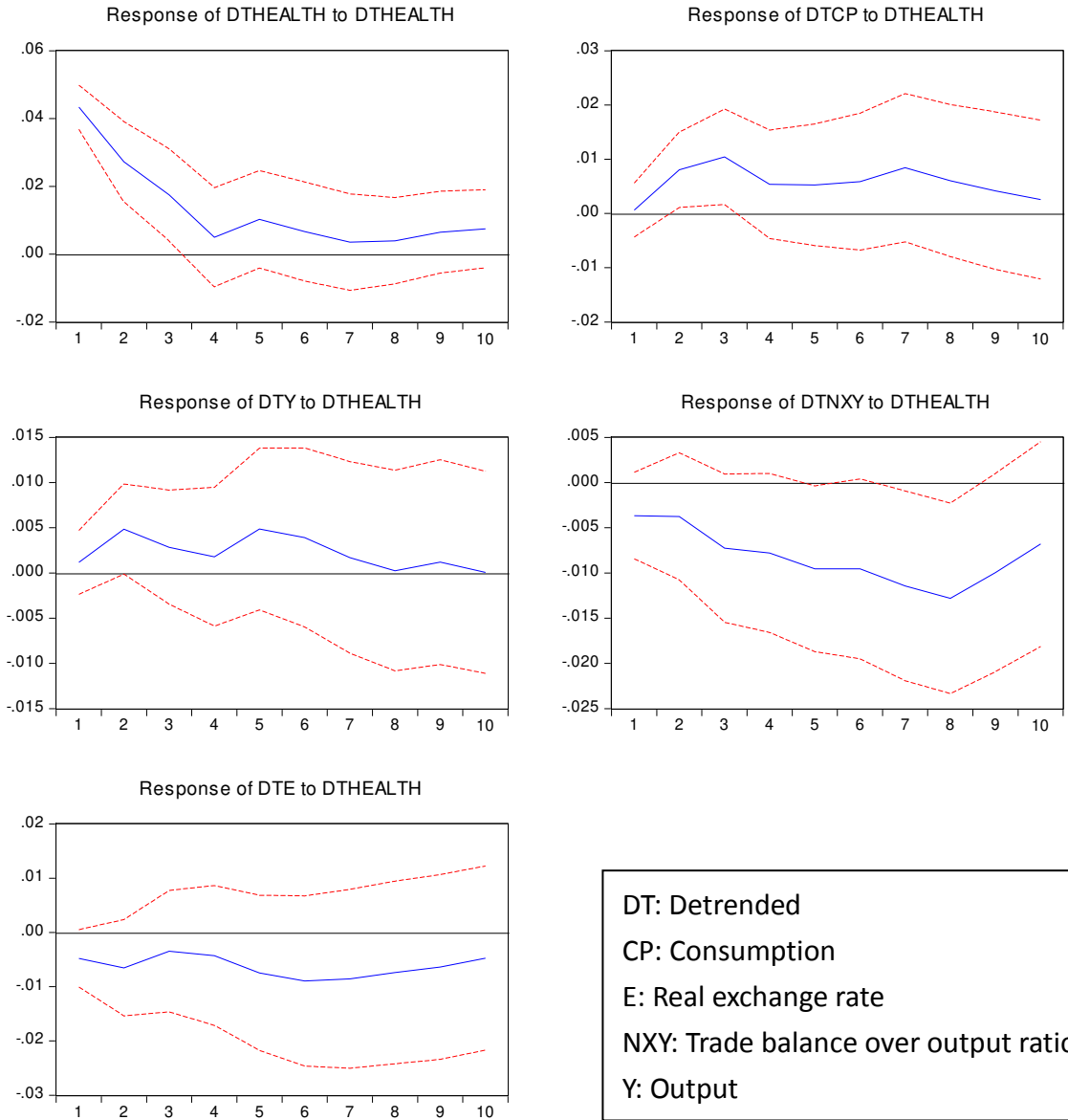


Figure 17

Impulse Response of Total Infrastructure Expenditure

Response to Cholesky One S.D. Innovations with 2 S.E.

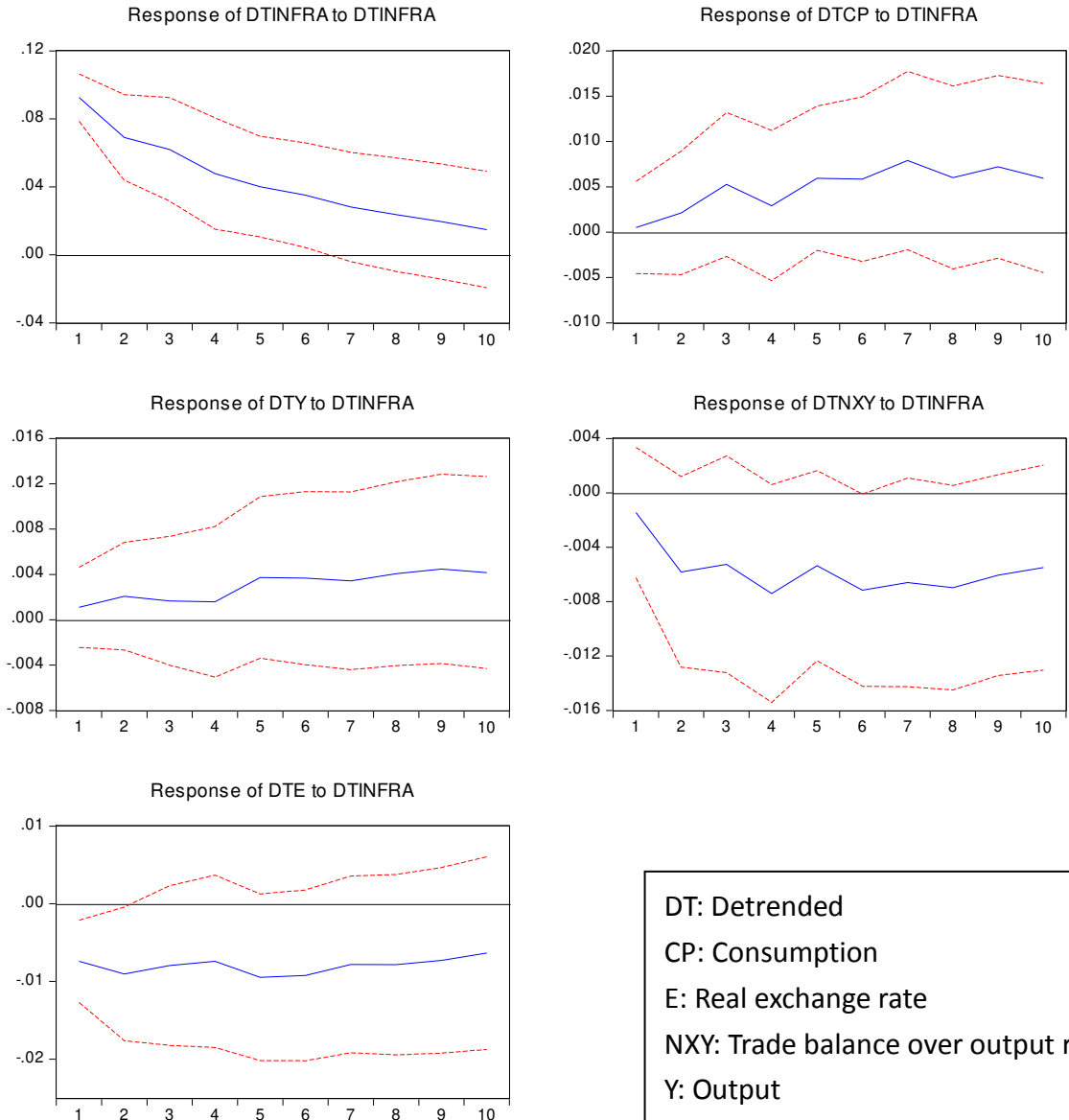


Figure 18

Impulse Response of Total Housing Expenditure

Response to Cholesky One S.D. Innovations with 2 S.E.

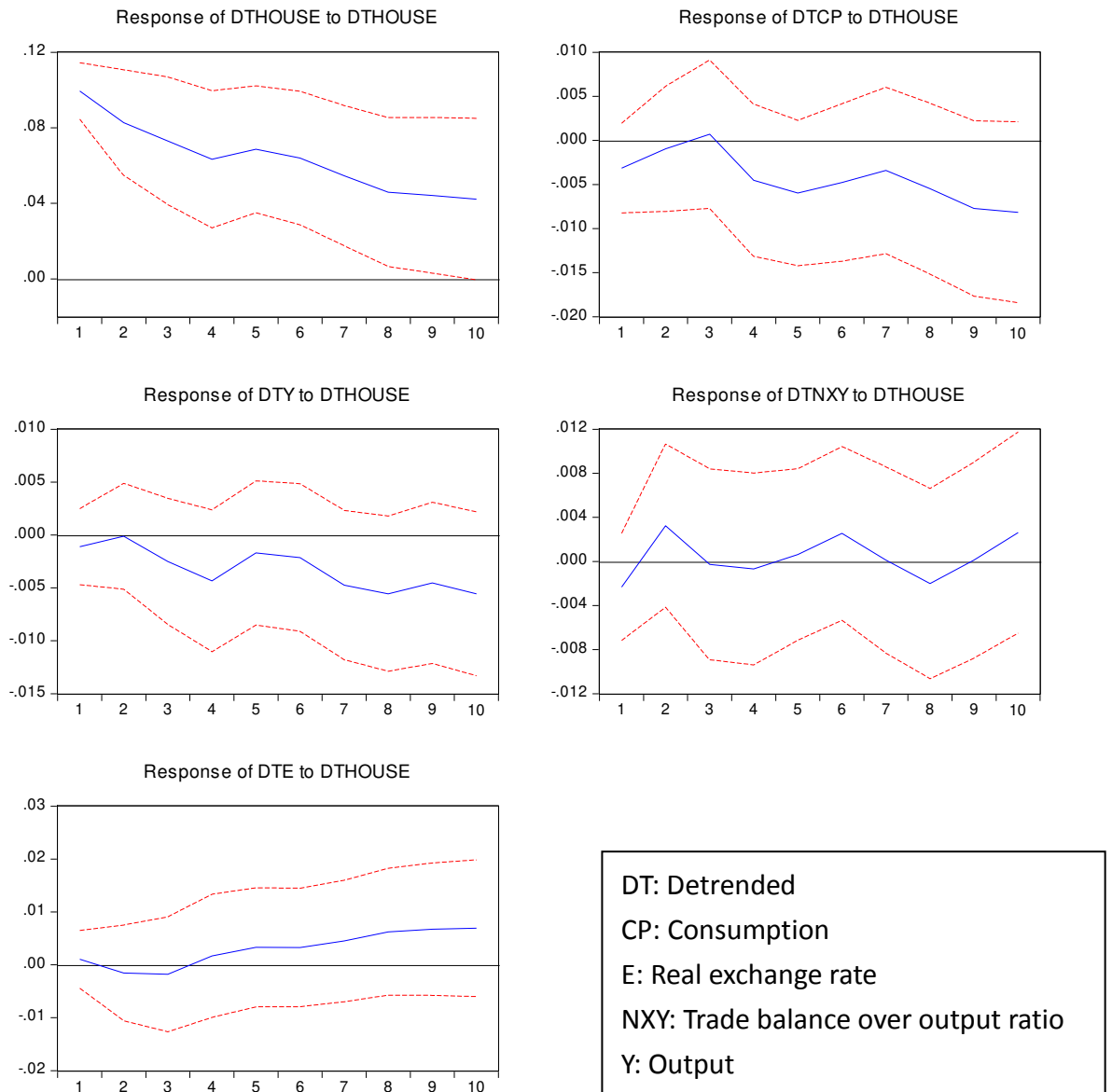


Figure 19

Impulse Response of Total Security Expenditure

Response to Cholesky One S.D. Innovations with 2 S.E.

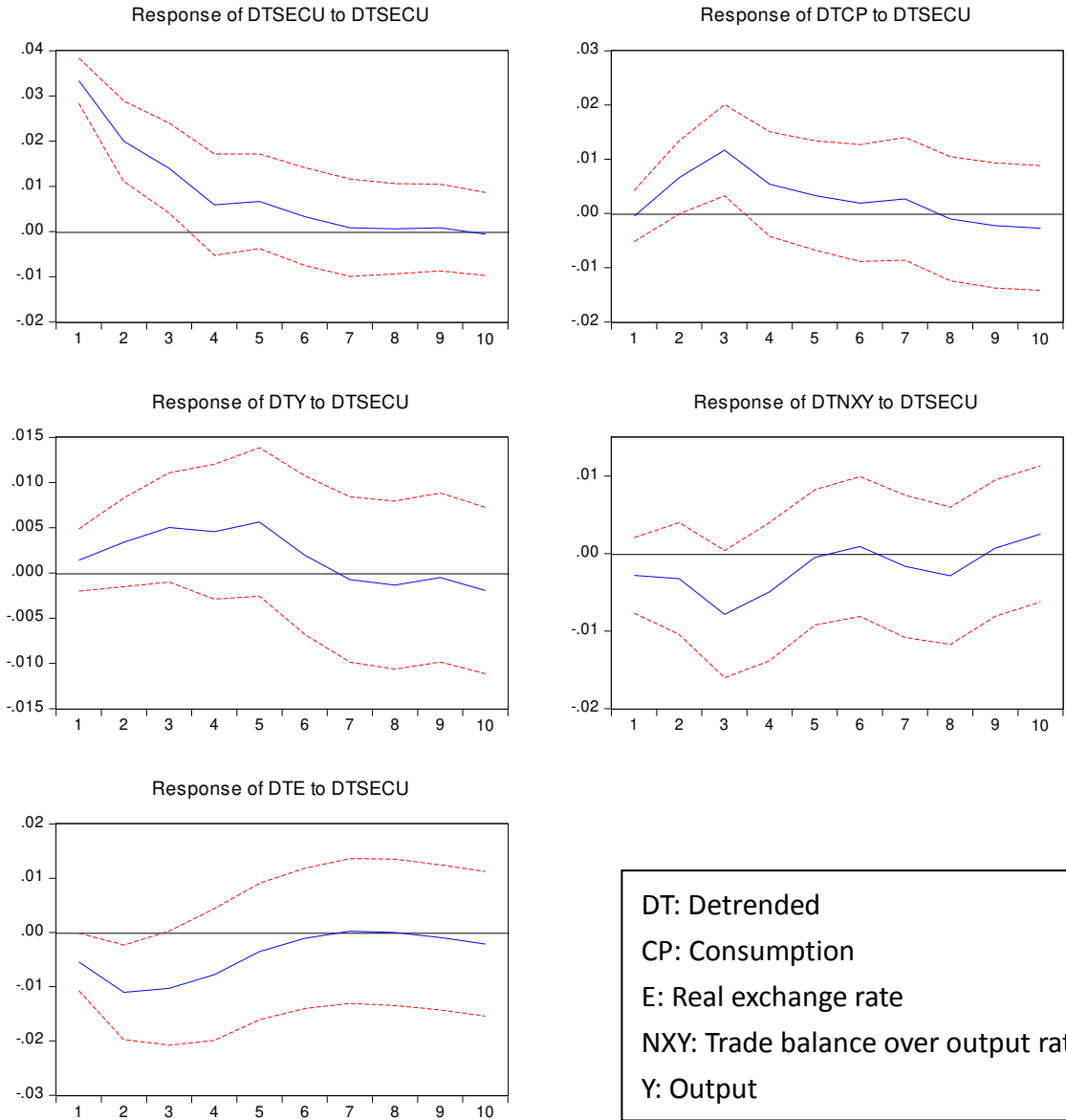


Figure 20

Impulse Response of Total Support Expenditure

Response to Cholesky One S.D. Innovations with 2 S.E.

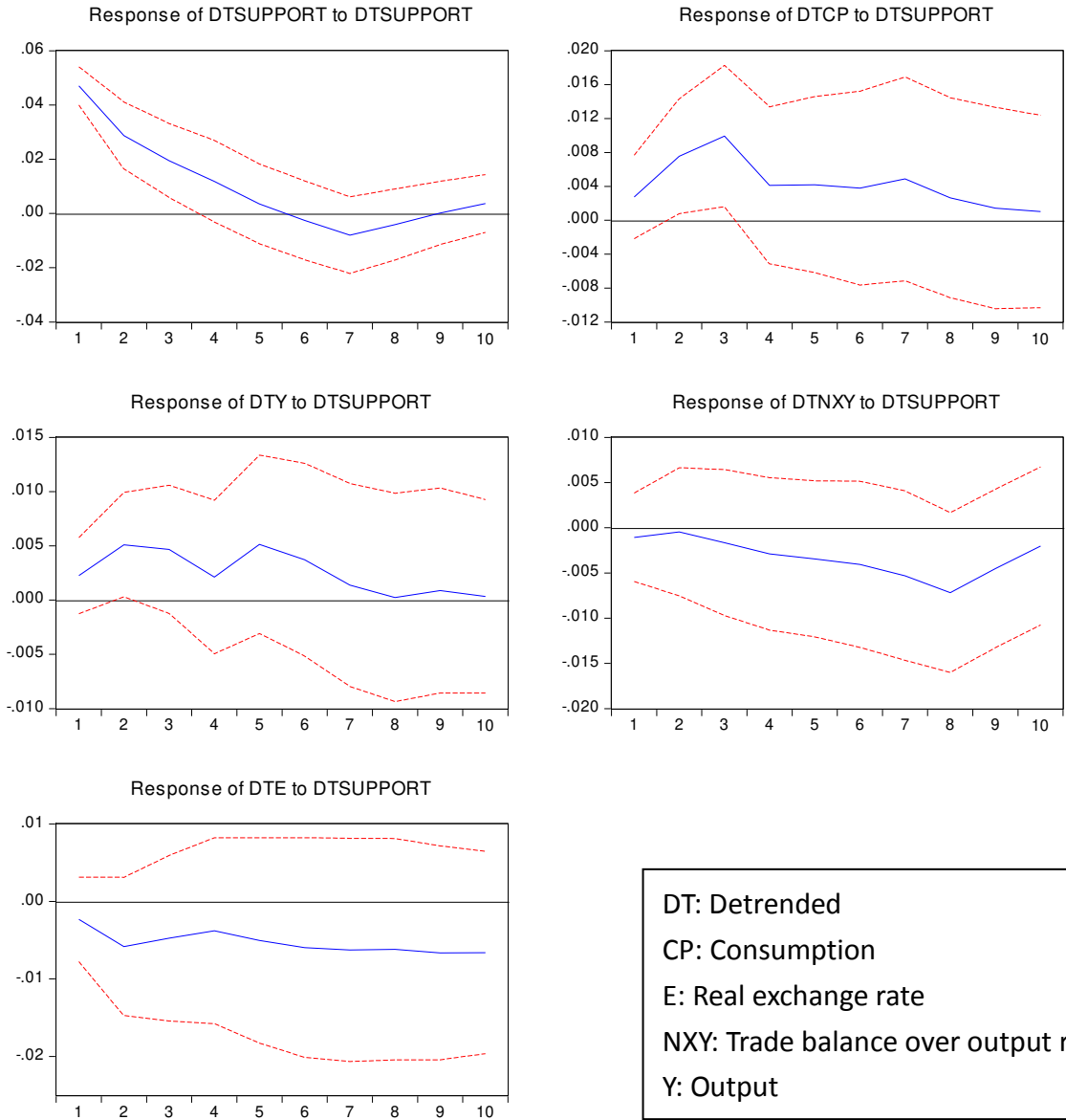


Figure 21

Impulse Response of Total Social Welfare Expenditure

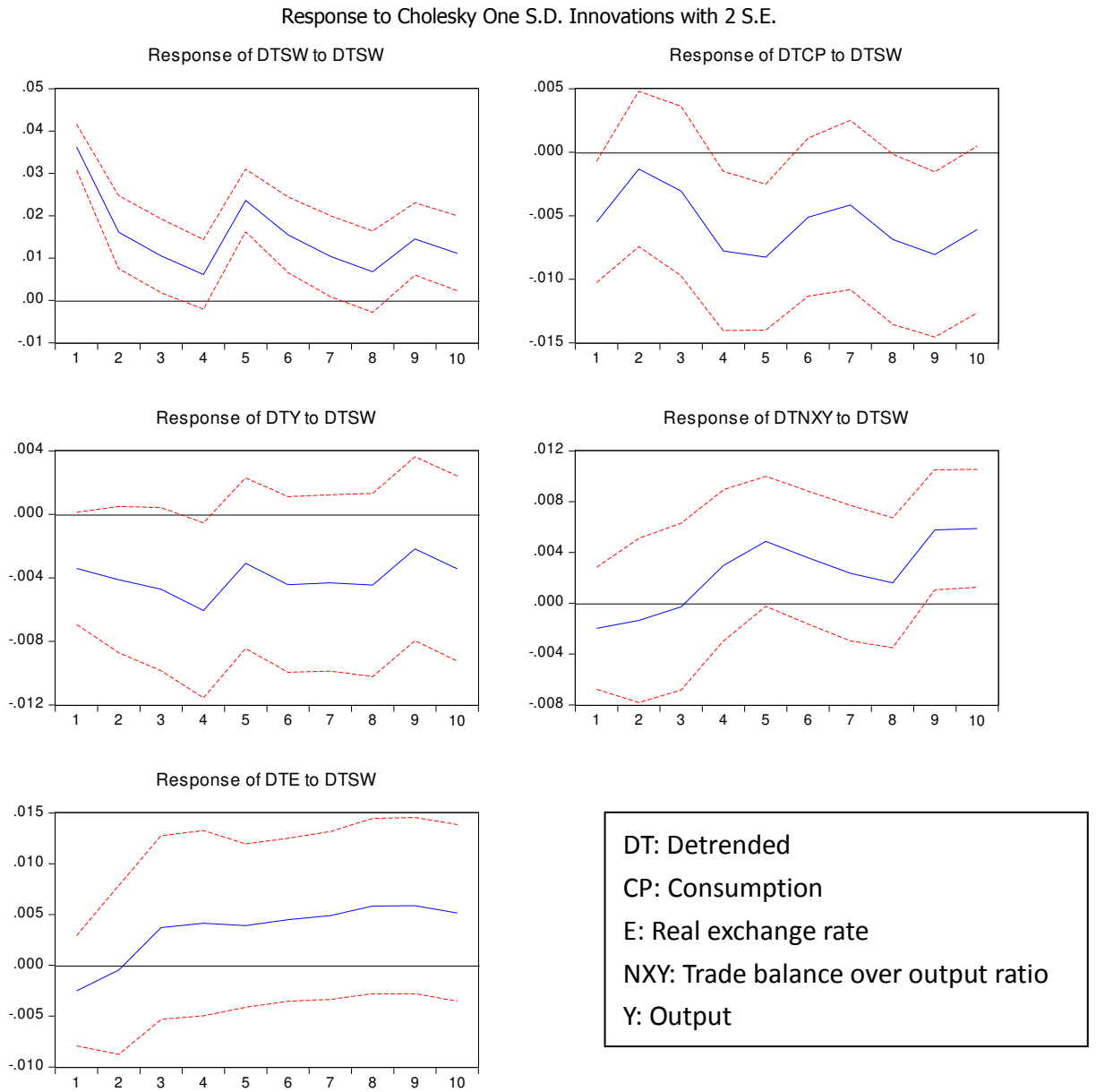


Figure 22

Impulse Response of Recurrent Community Services Expenditure

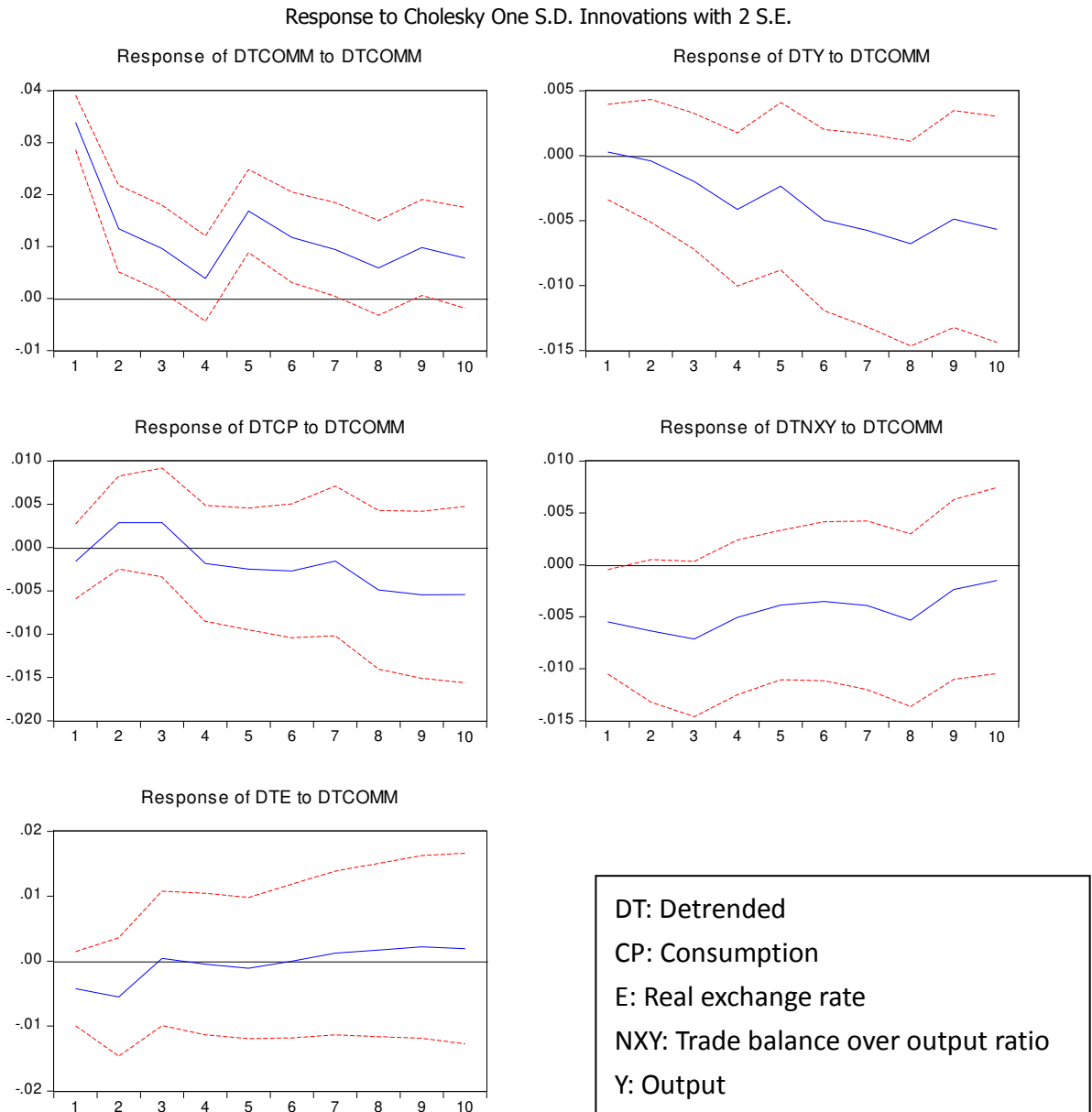


Figure 23

Impulse Response of Recurrent Economic Expenditure

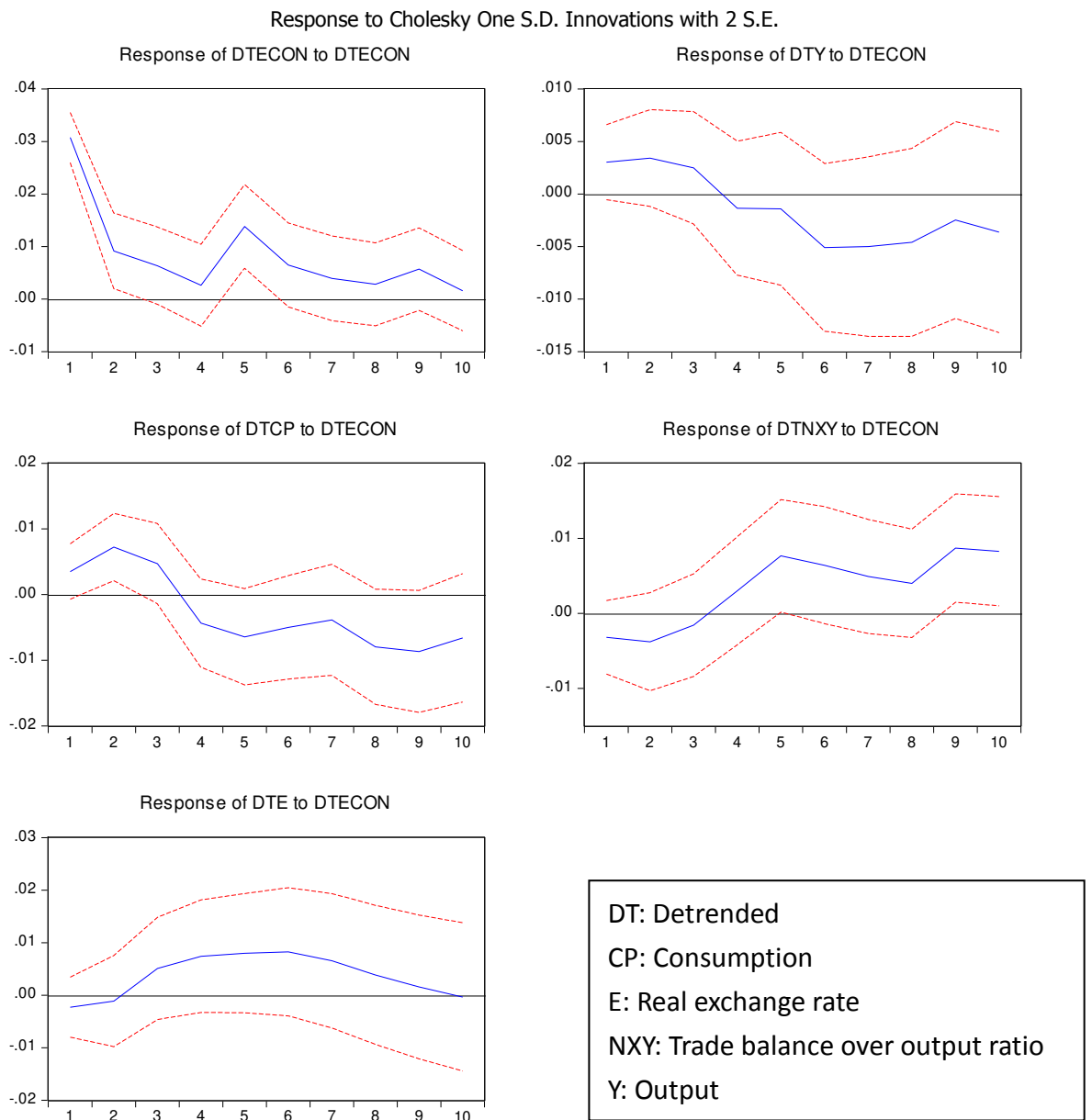


Figure 24

Impulse Response of Recurrent Education Expenditure

Response to Cholesky One S.D. Innovations with 2 S.E.

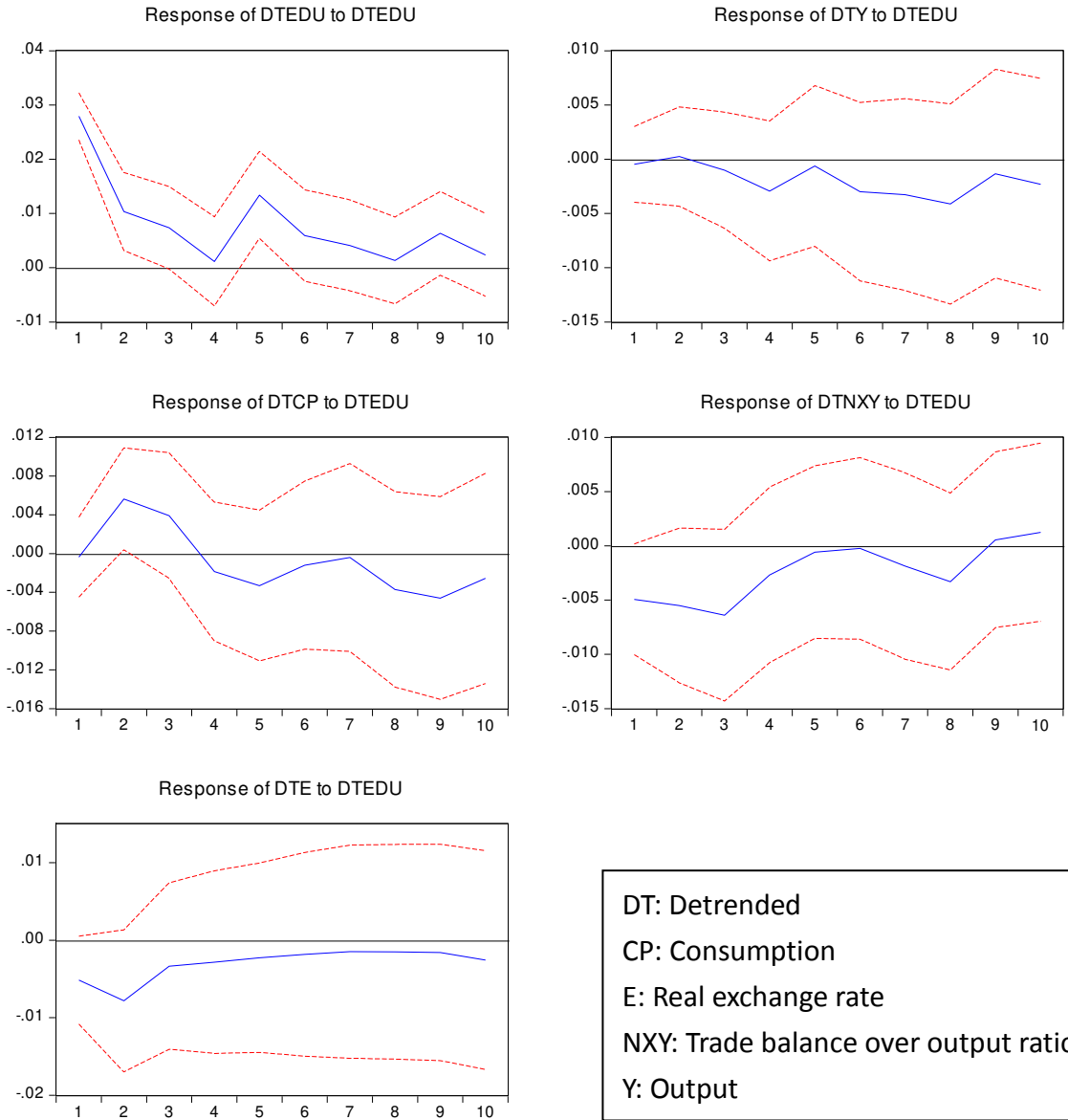


Figure 25

Impulse Response of Recurrent Health Expenditure

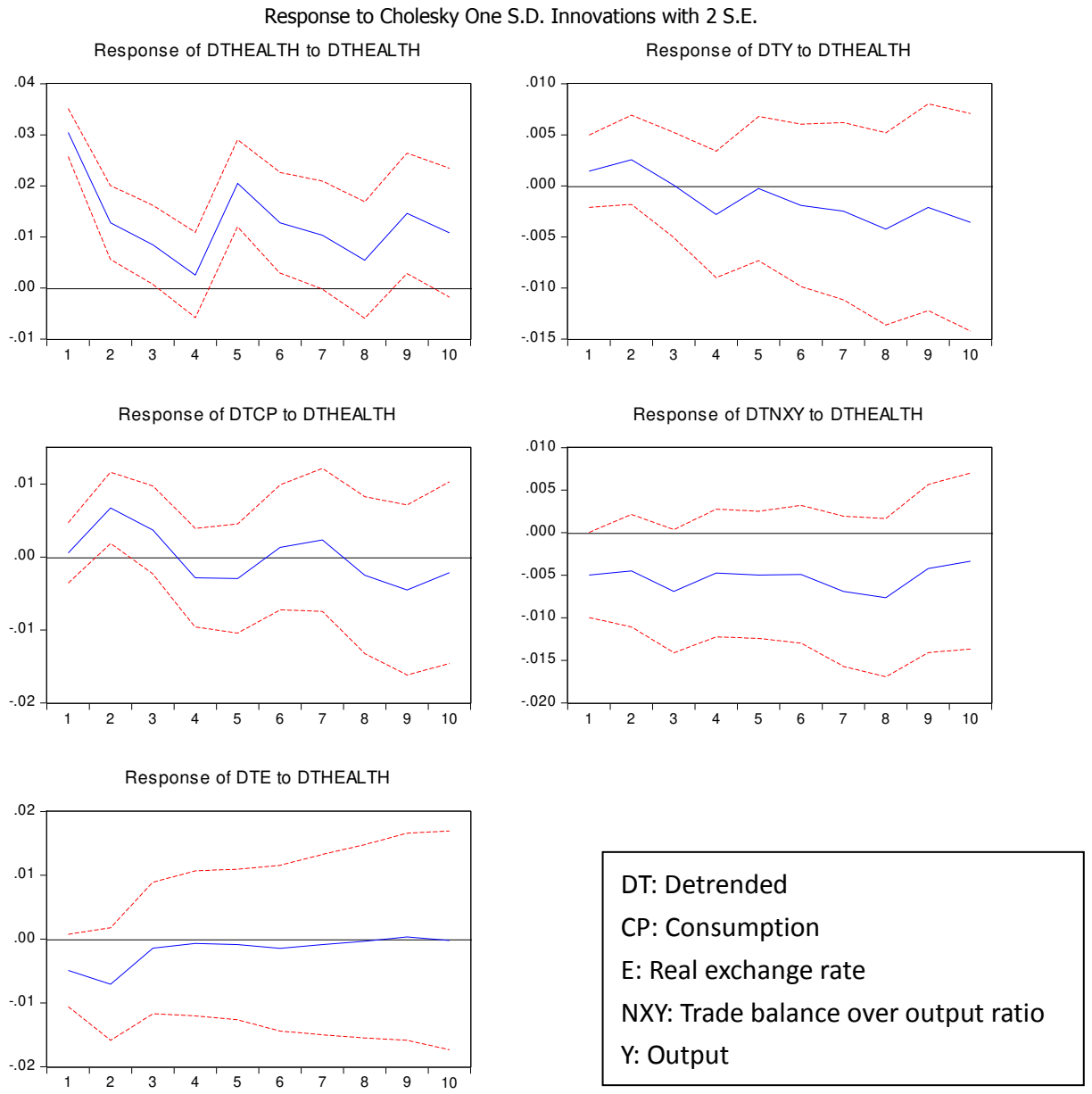


Figure 26

Impulse Response of Recurrent Housing Expenditure

Response to Cholesky One S.D. Innovations with 2 S.E.

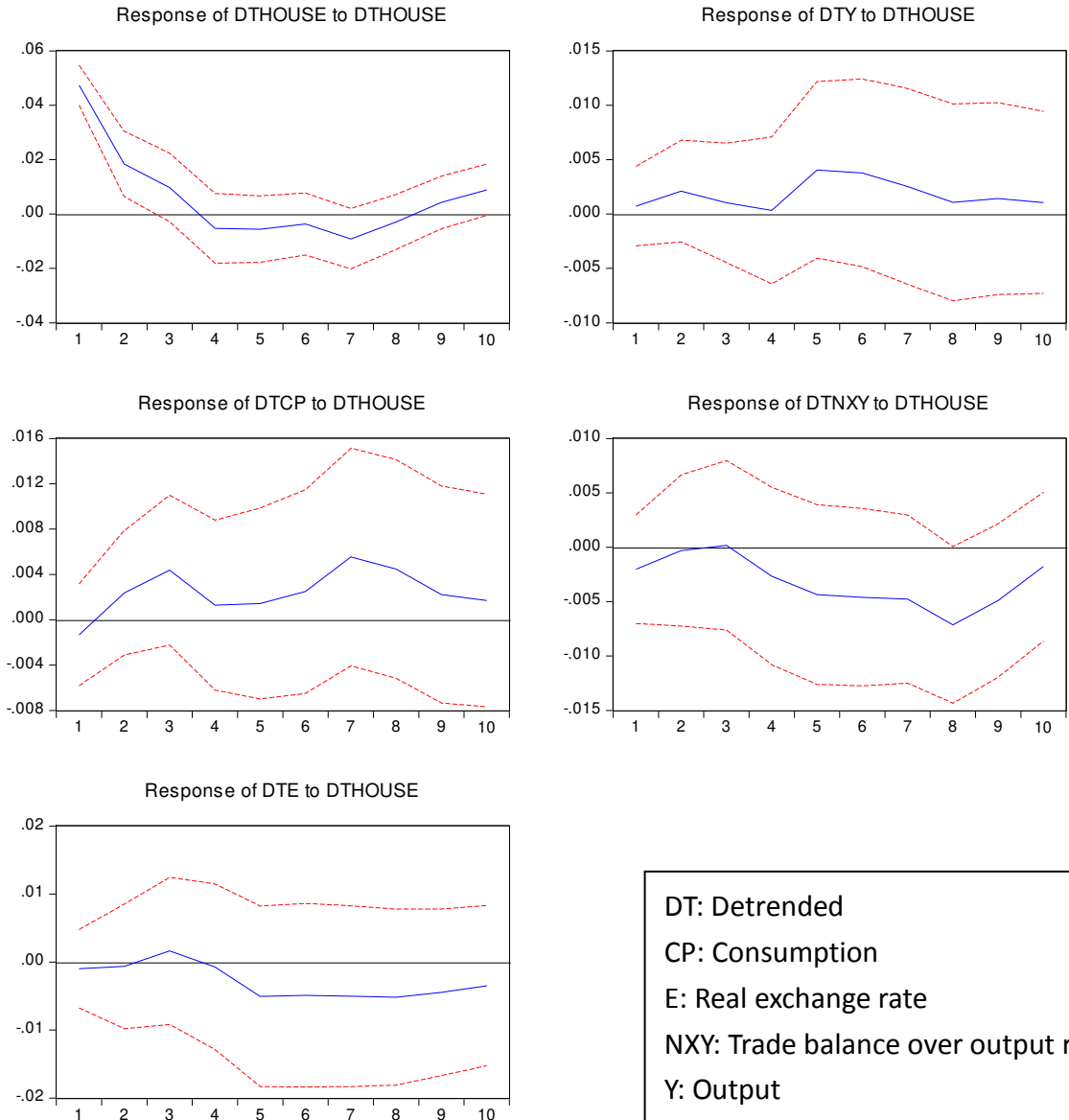


Figure 27

Impulse Response of Recurrent Infrastructure Expenditure

Response to Cholesky One S.D. Innovations with 2 S.E.

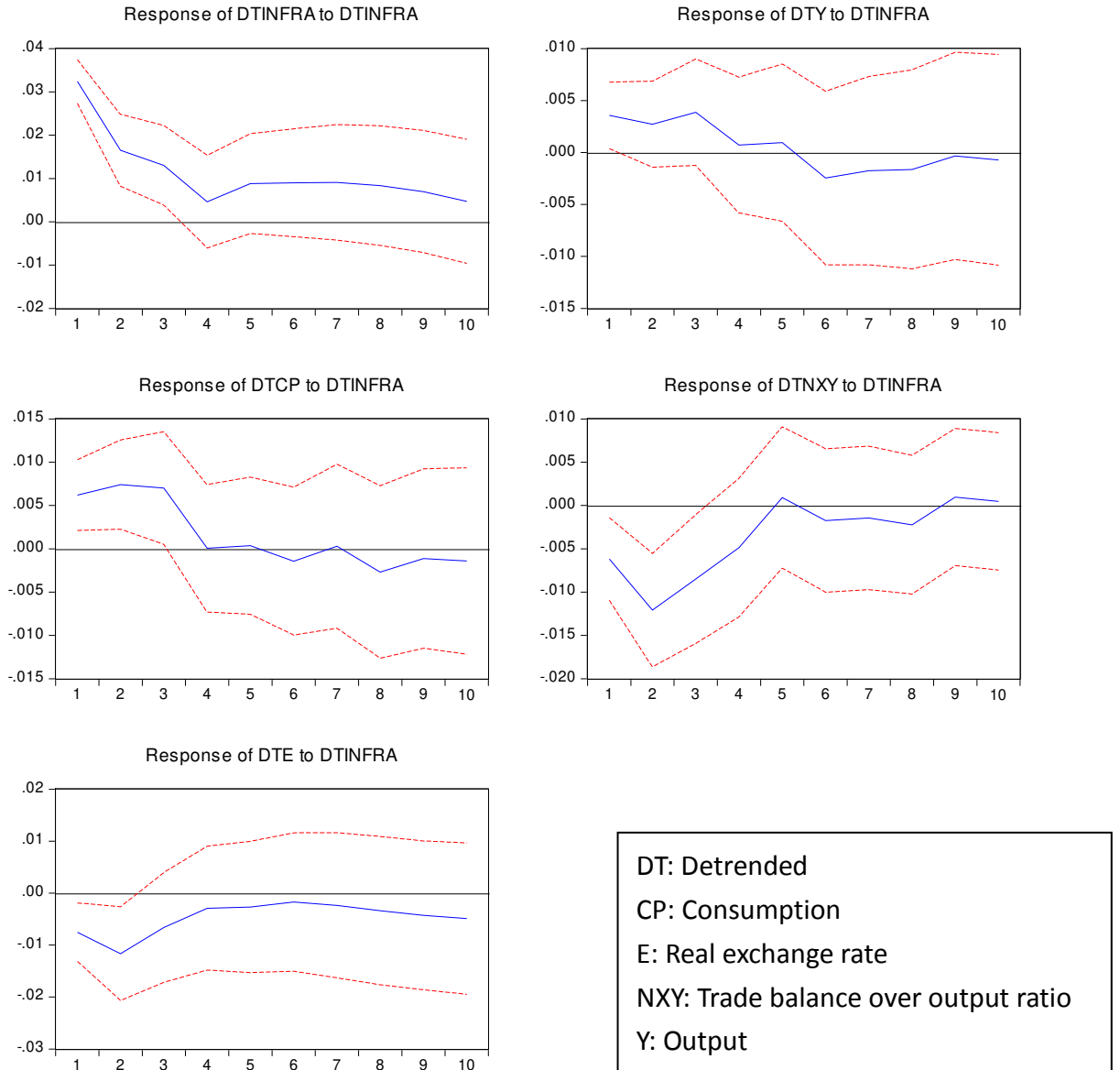


Figure 28

Impulse Response of Recurrent Security Expenditure

Response to Cholesky One S.D. Innovations with 2 S.E.

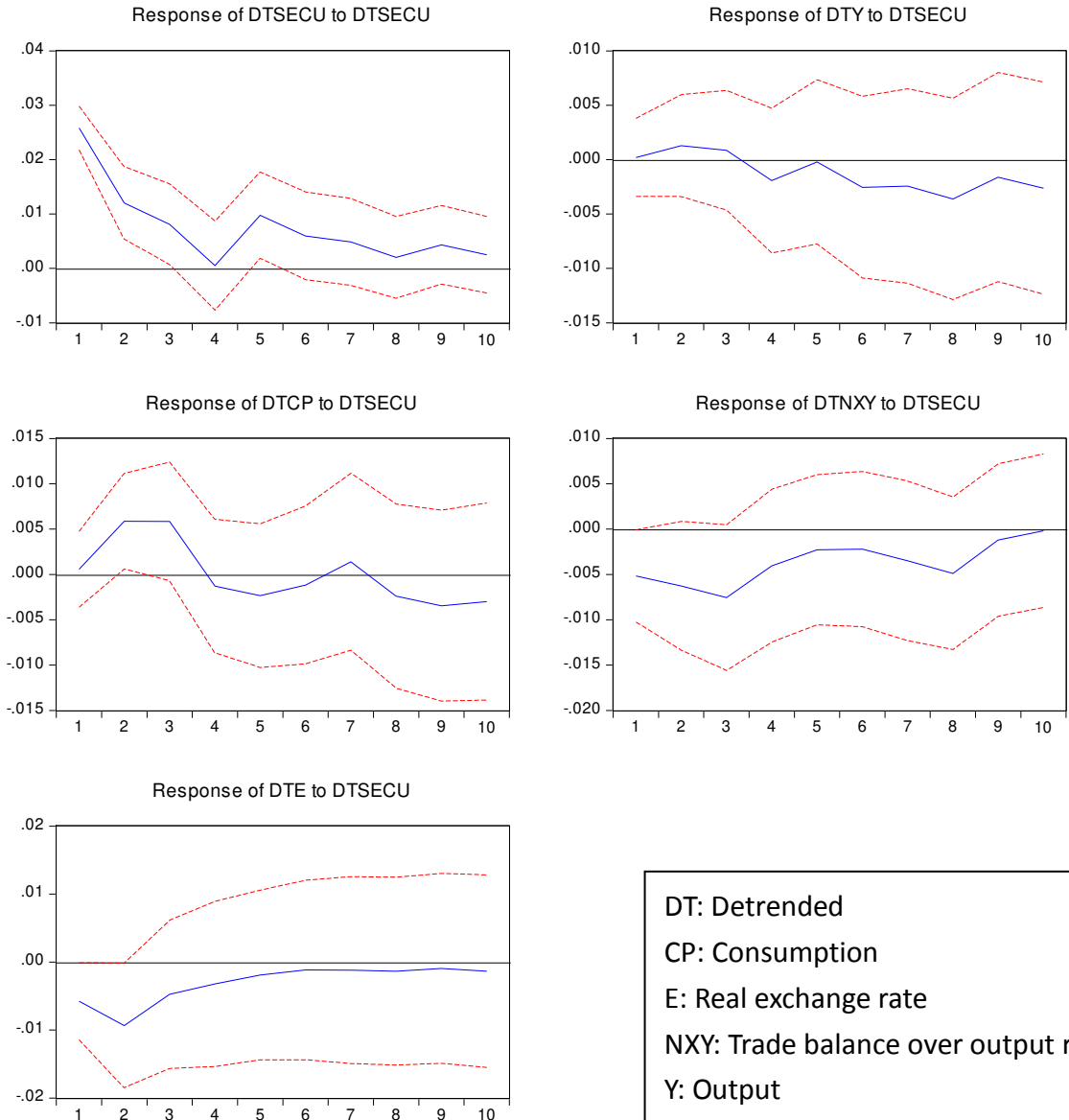


Figure 29

Impulse Response of Recurrent Support Expenditure

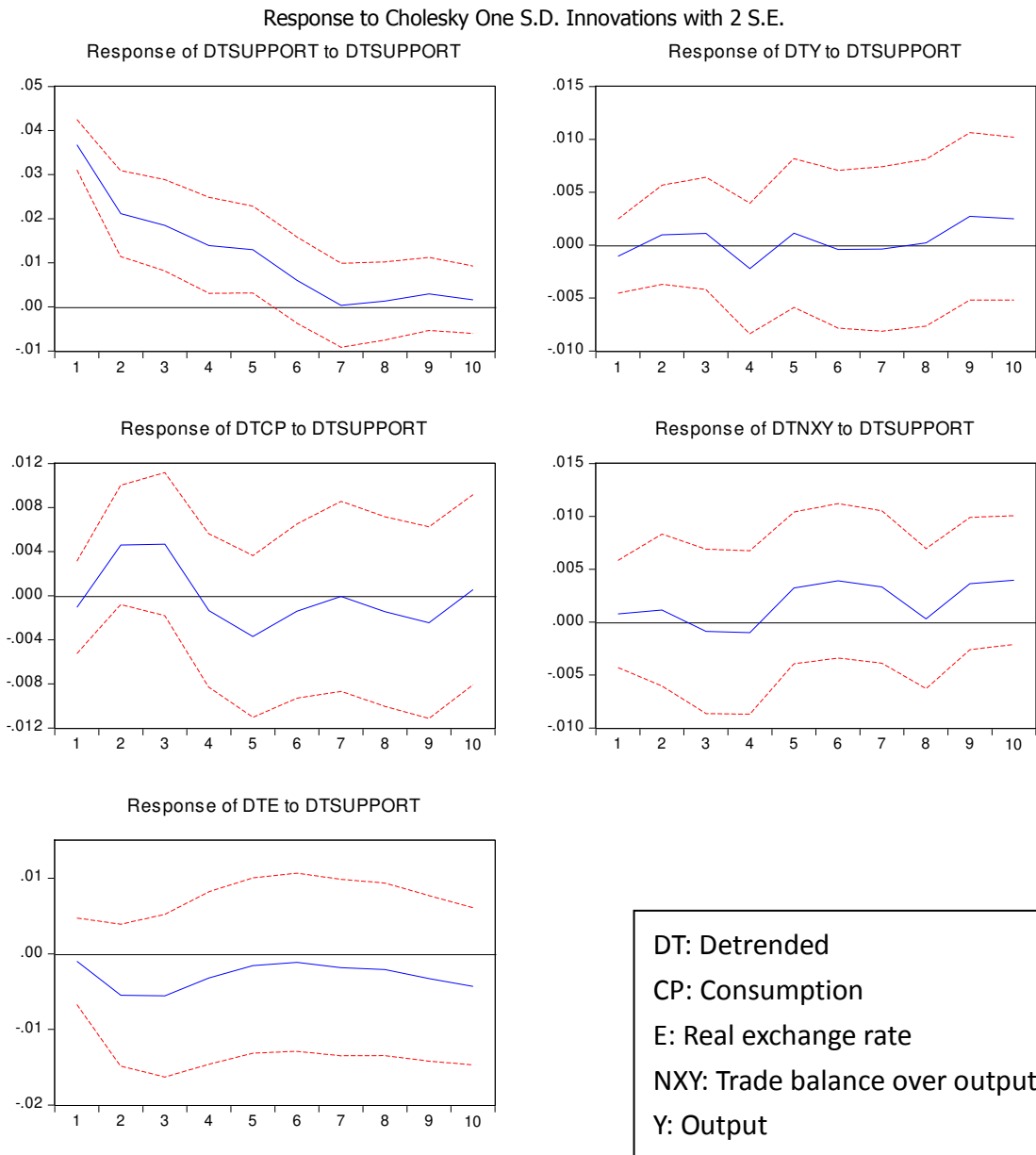


Figure 30

Impulse Response of Recurrent Social Welfare Expenditure

Response to Cholesky One S.D. Innovations with 2 S.E.

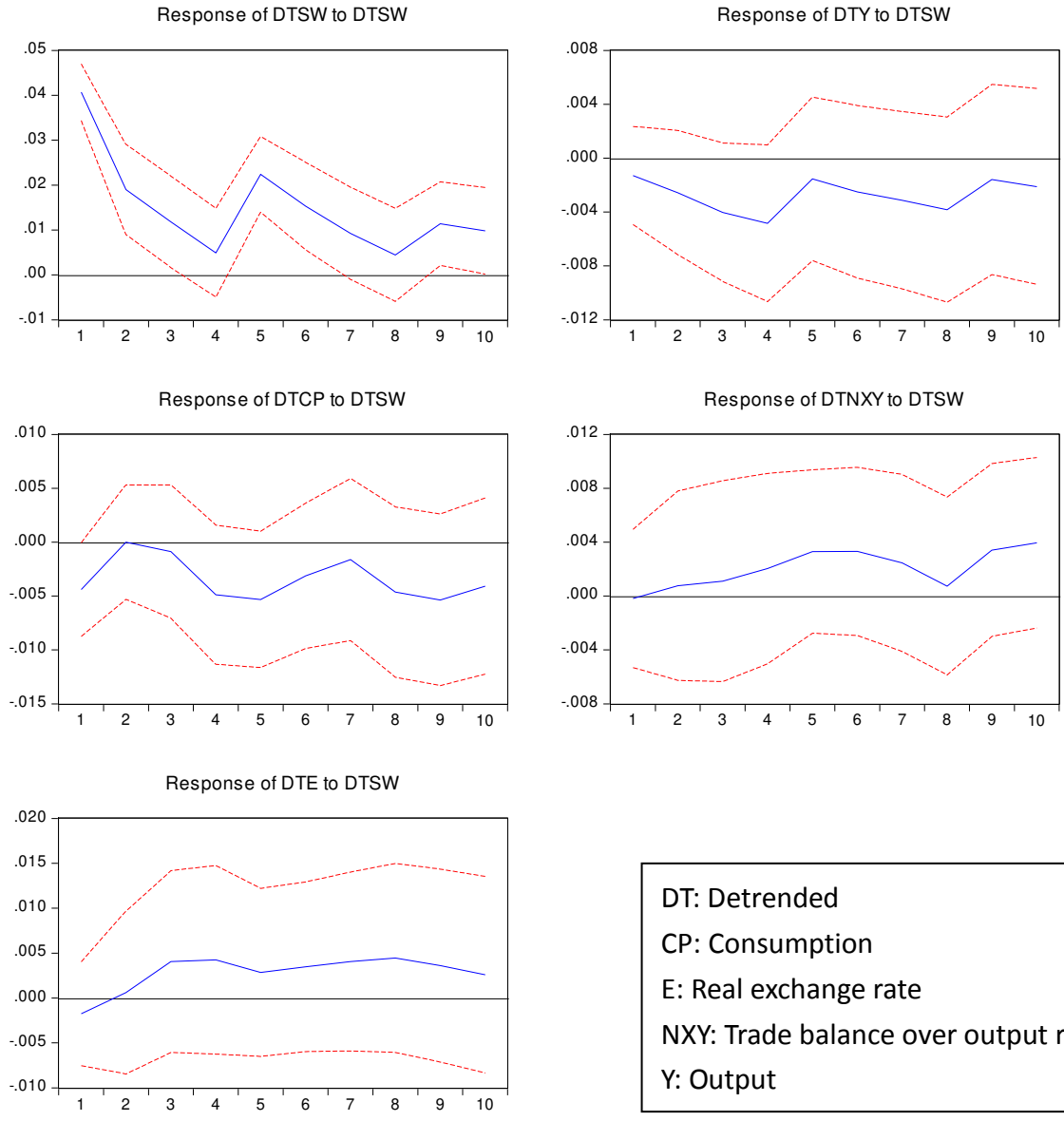


Figure 31

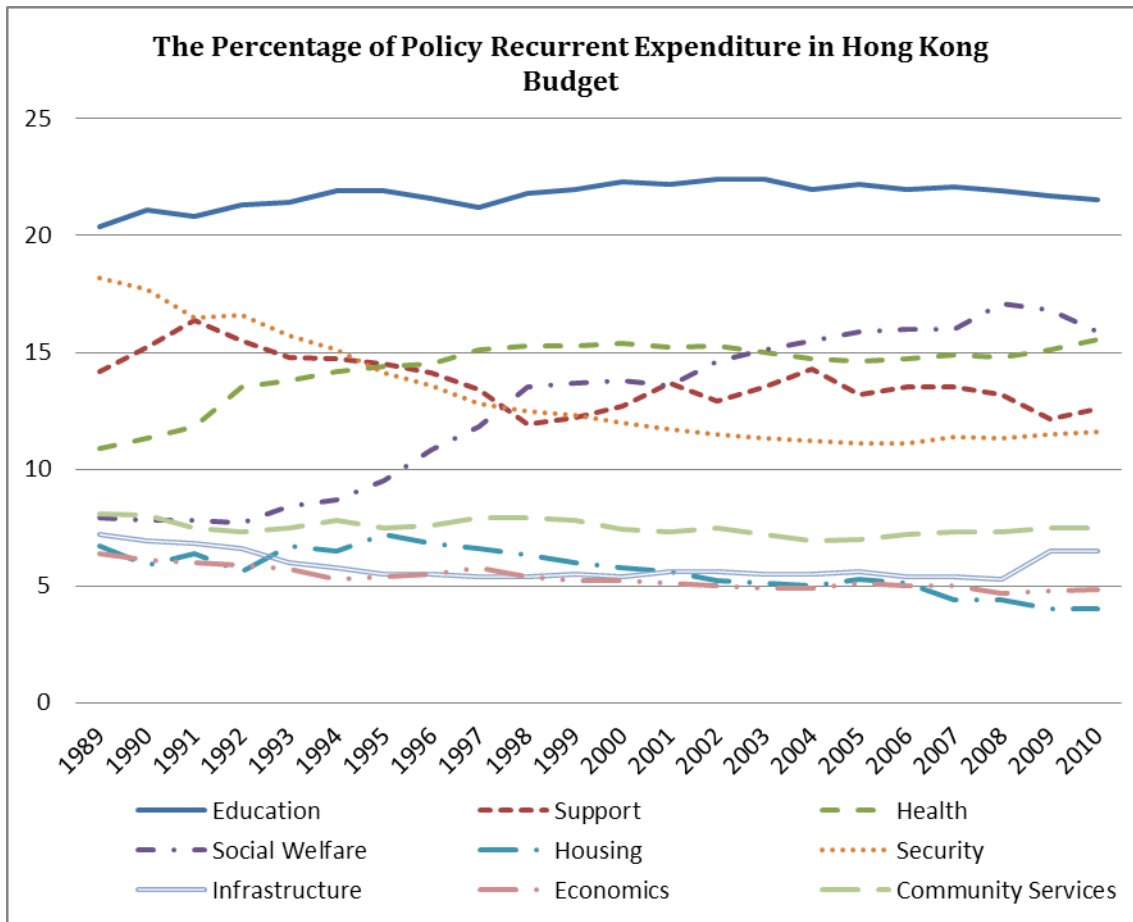


Figure 32

Impulse Response of Non-Recurrent Community Services Expenditure

Response to Cholesky One S.D. Innovations with 2 S.E.

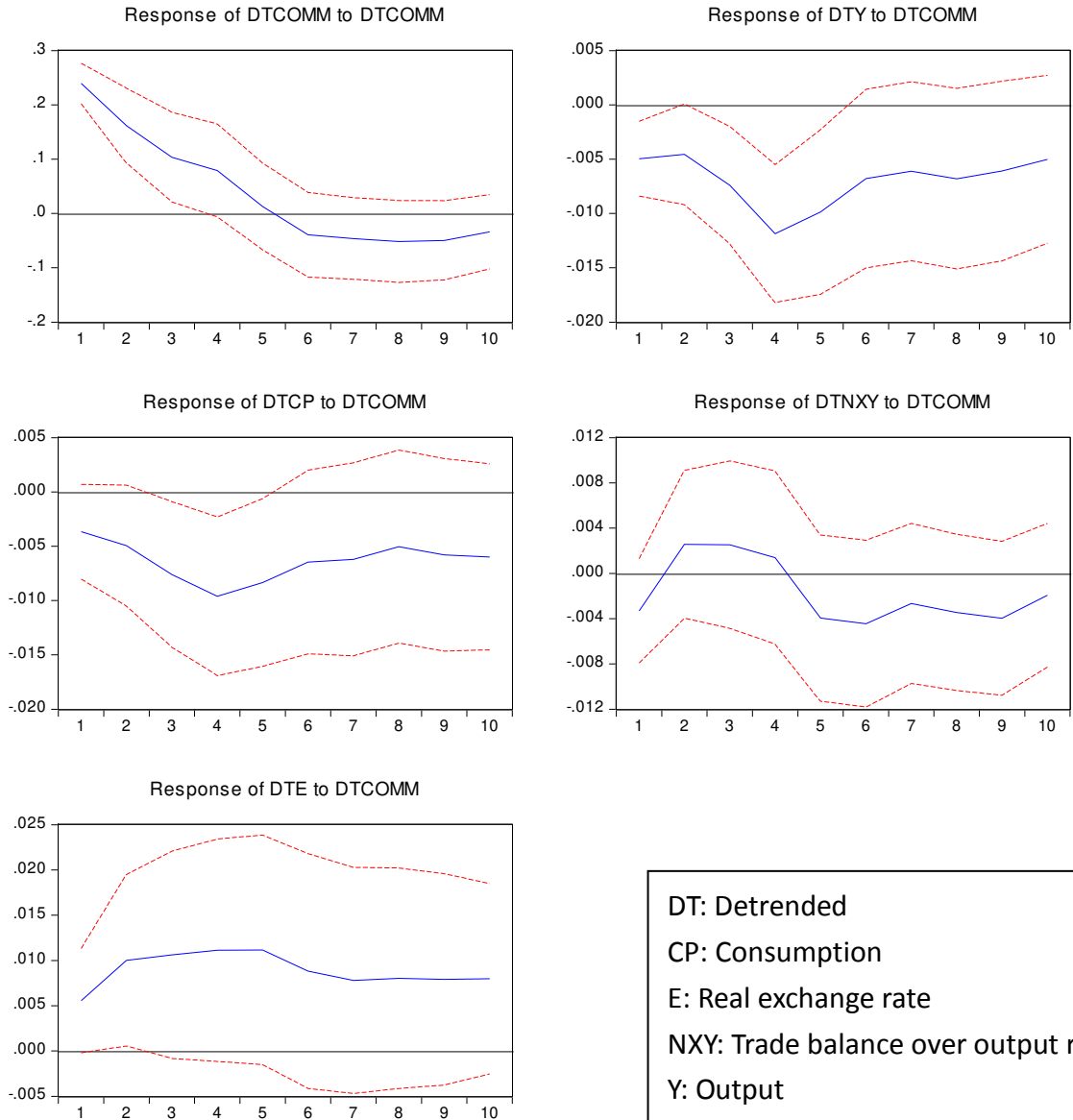


Figure 33

Impulse Response of Non-Recurrent Economics Expenditure

Response to Cholesky One S.D. Innovations with 2 S.E.

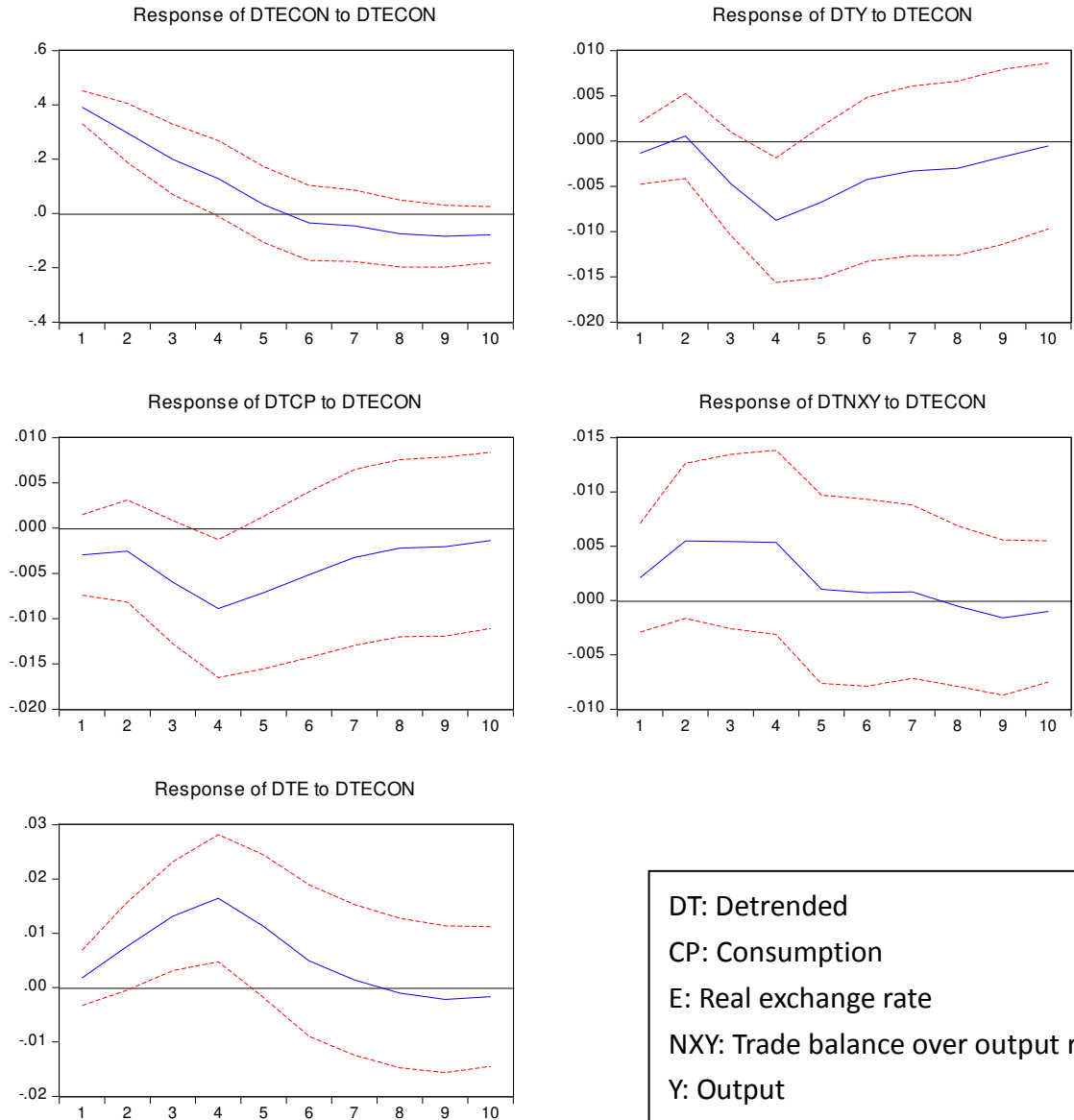


Figure 34

Impulse Response of Non-Recurrent Education Expenditure

Response to Cholesky One S.D. Innovations with 2 S.E.

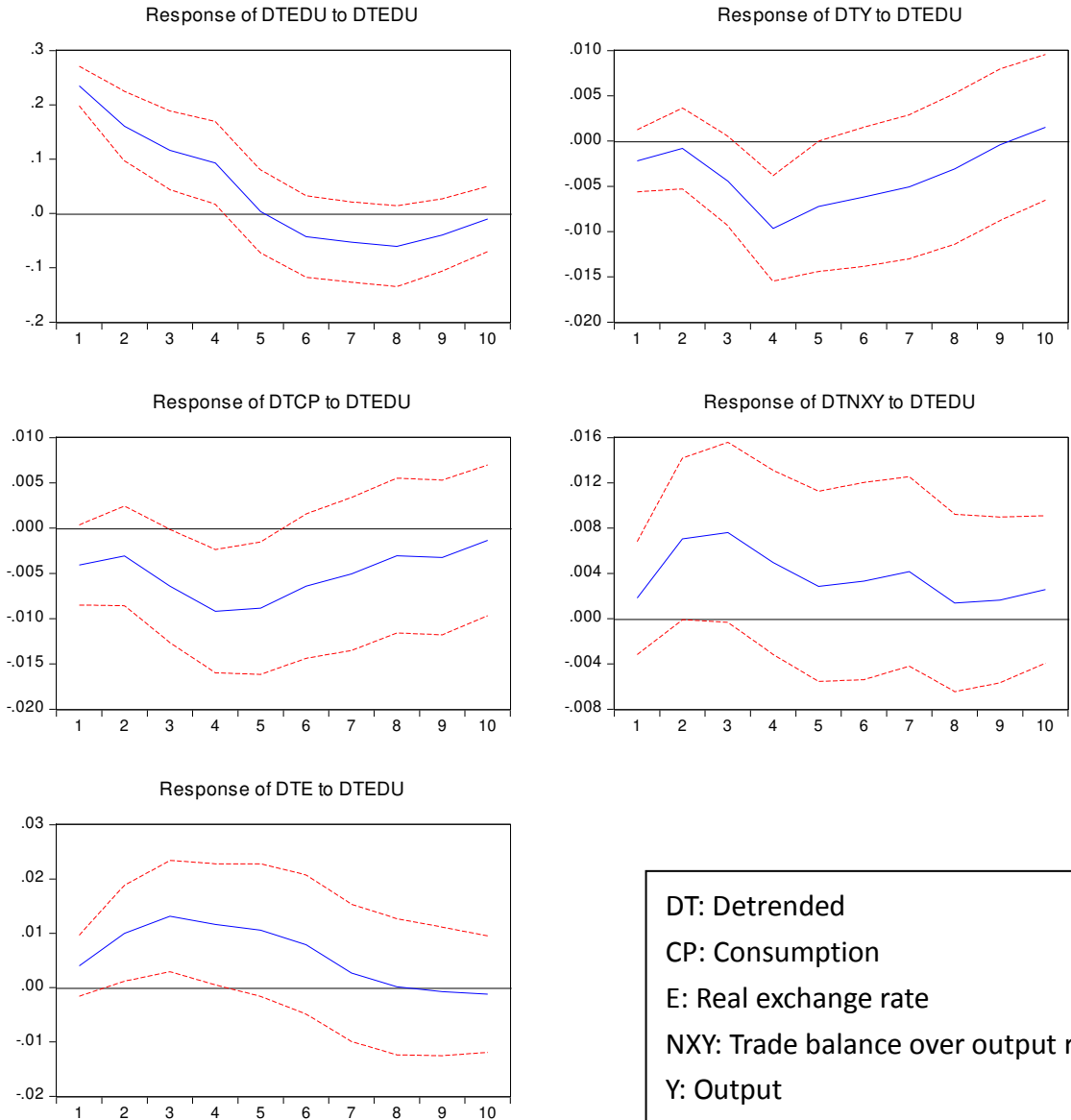


Figure 35

Impulse Response of Non-Recurrent Health Expenditure

Response to Cholesky One S.D. Innovations with 2 S.E.

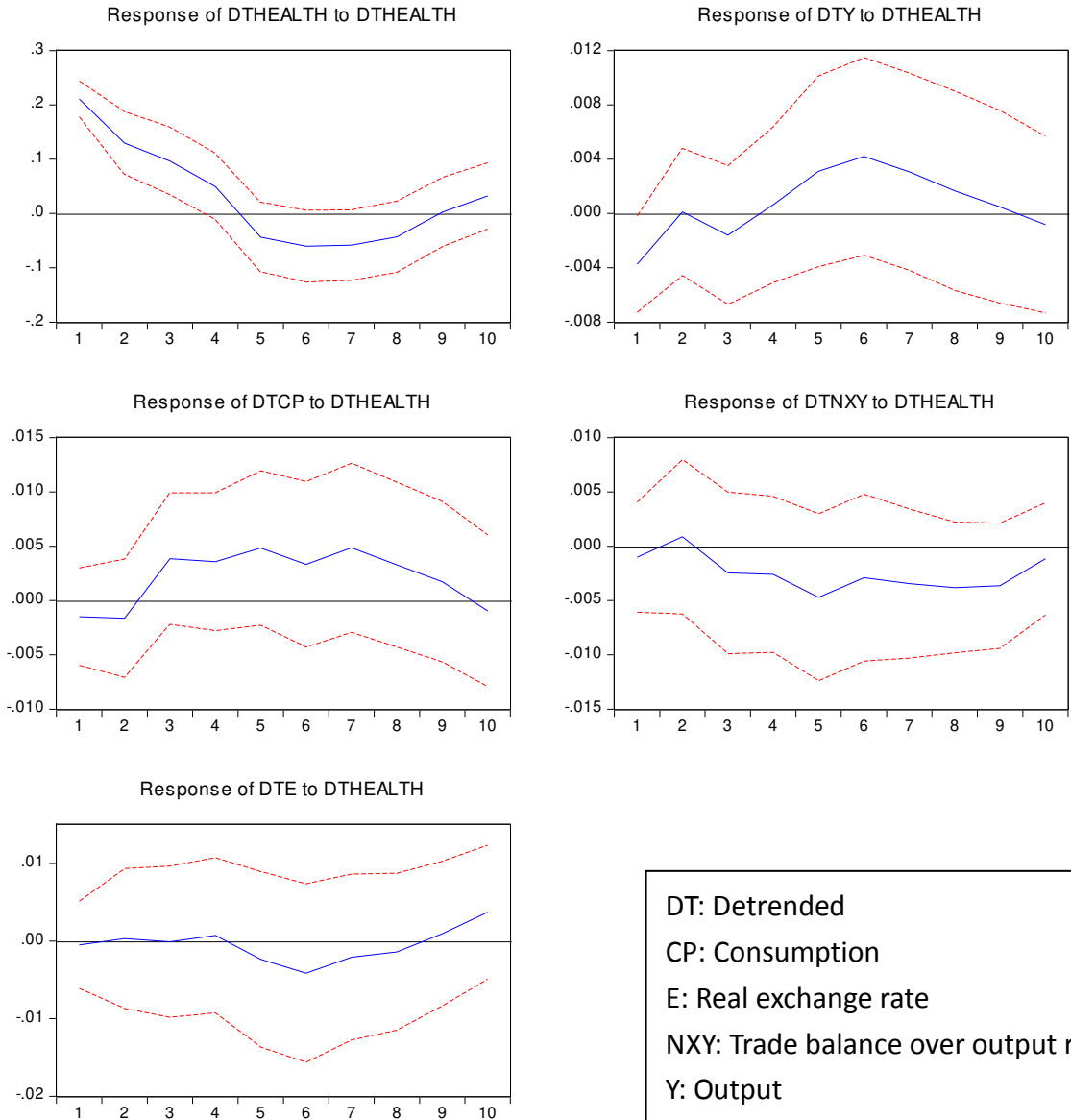


Figure 36

Impulse Response of Non-Recurrent Housing Expenditure

Response to Cholesky One S.D. Innovations with 2 S.E.

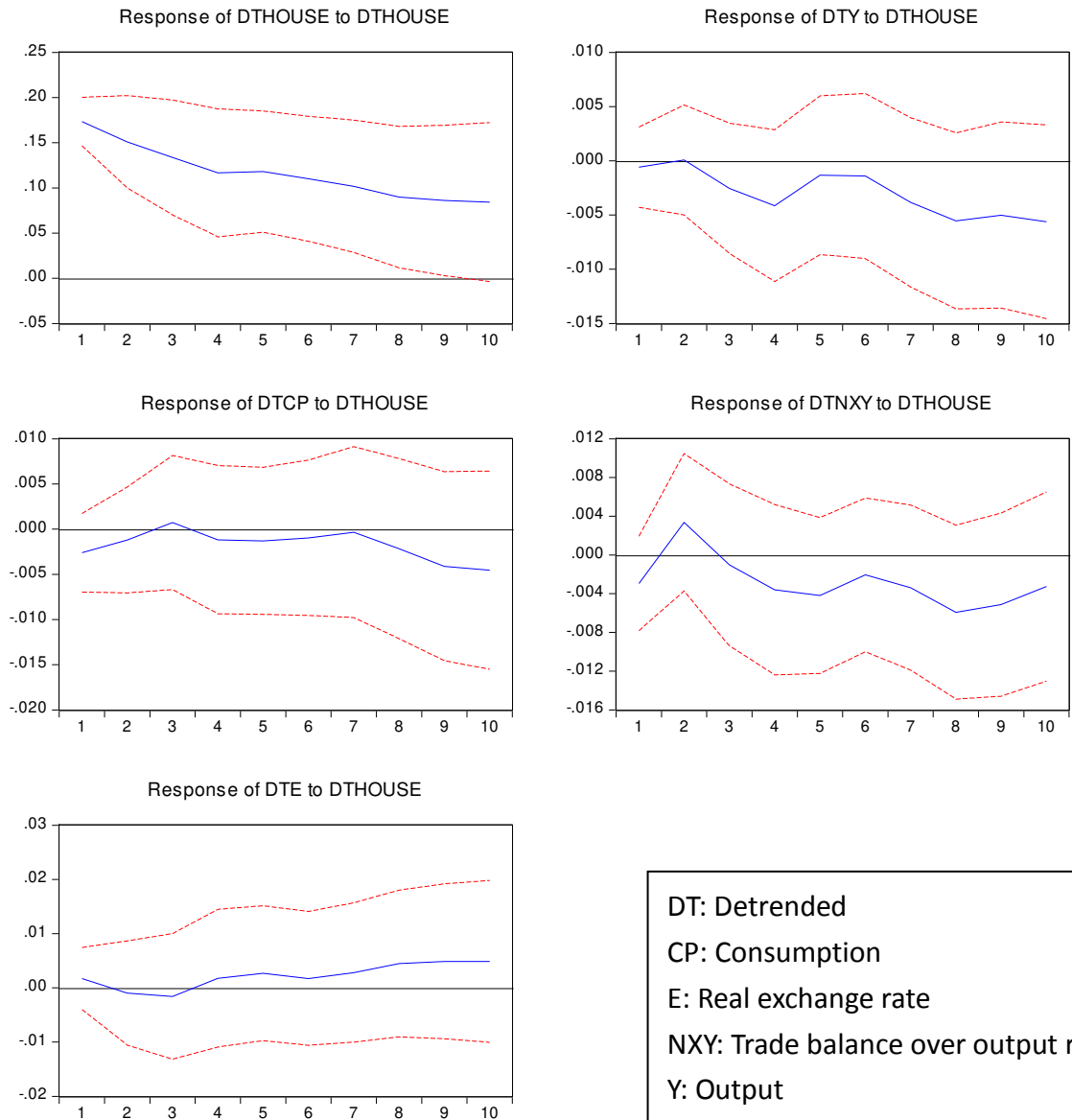


Figure 37

Impulse Response of Non-Recurrent Infrastructure Expenditure

Response to Cholesky One S.D. Innovations with 2 S.E.

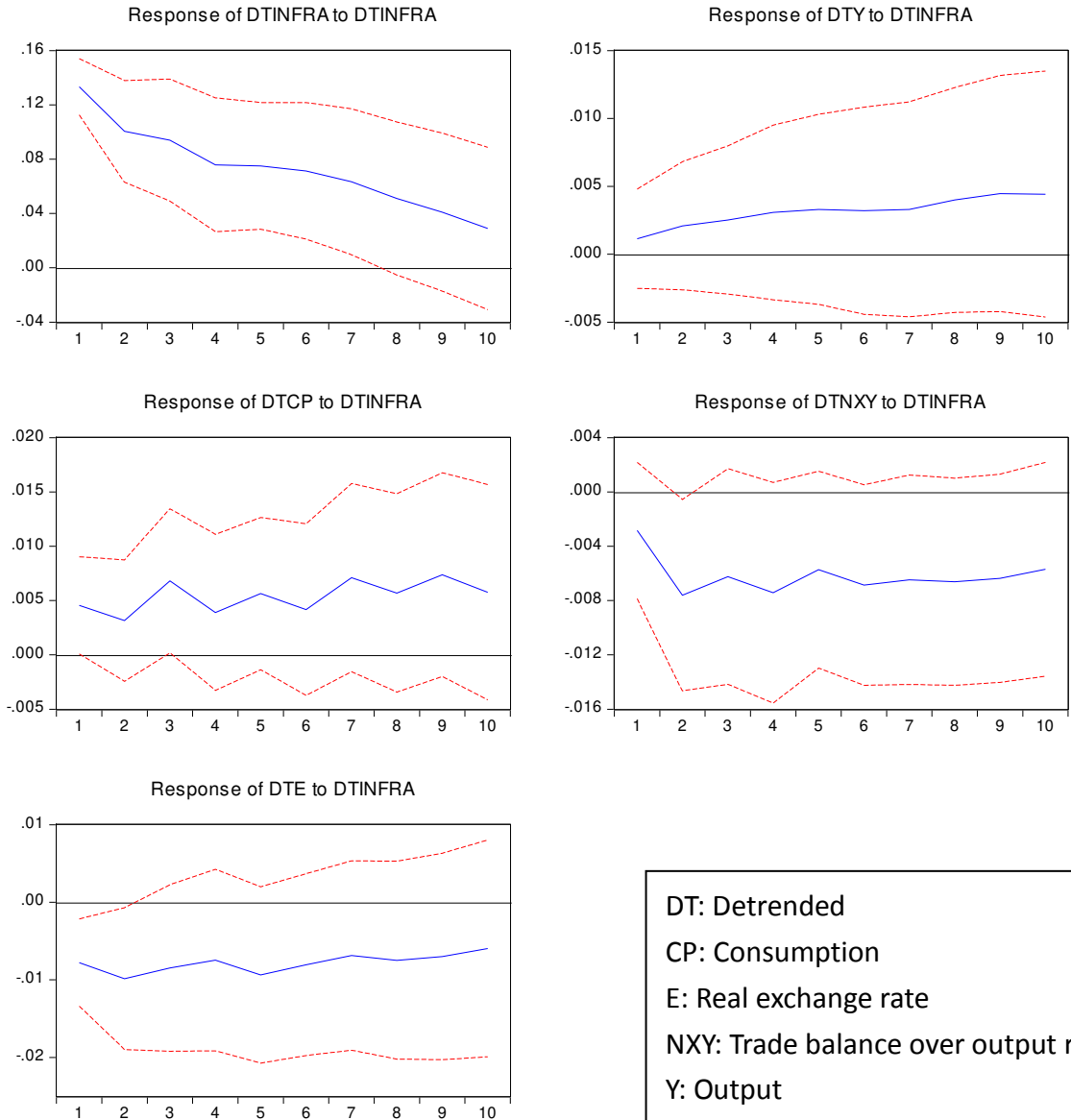


Figure 38

Impulse Response of Non-Recurrent Security Expenditure

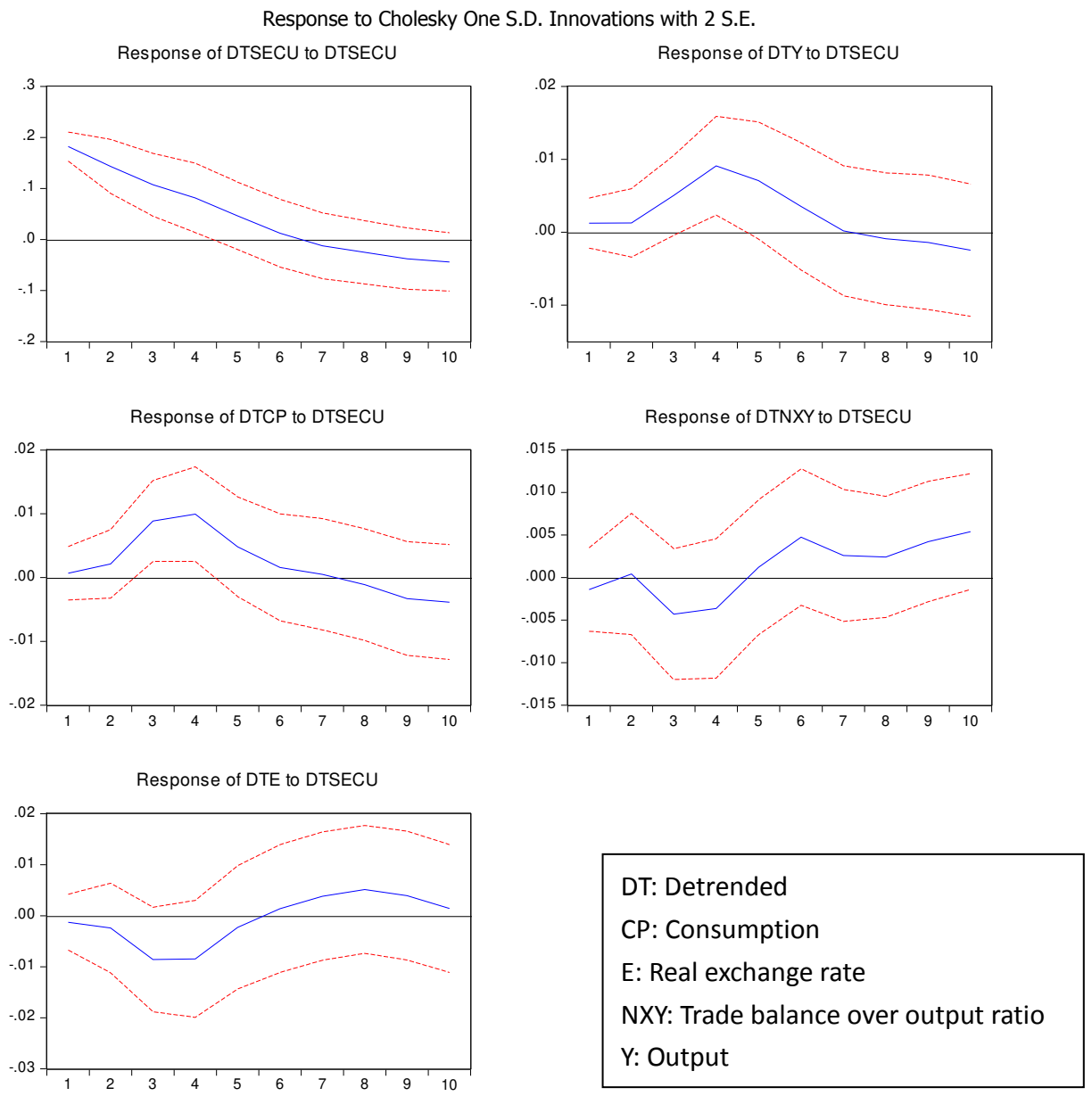


Figure 39

Impulse Response of Non-Recurrent Support Expenditure

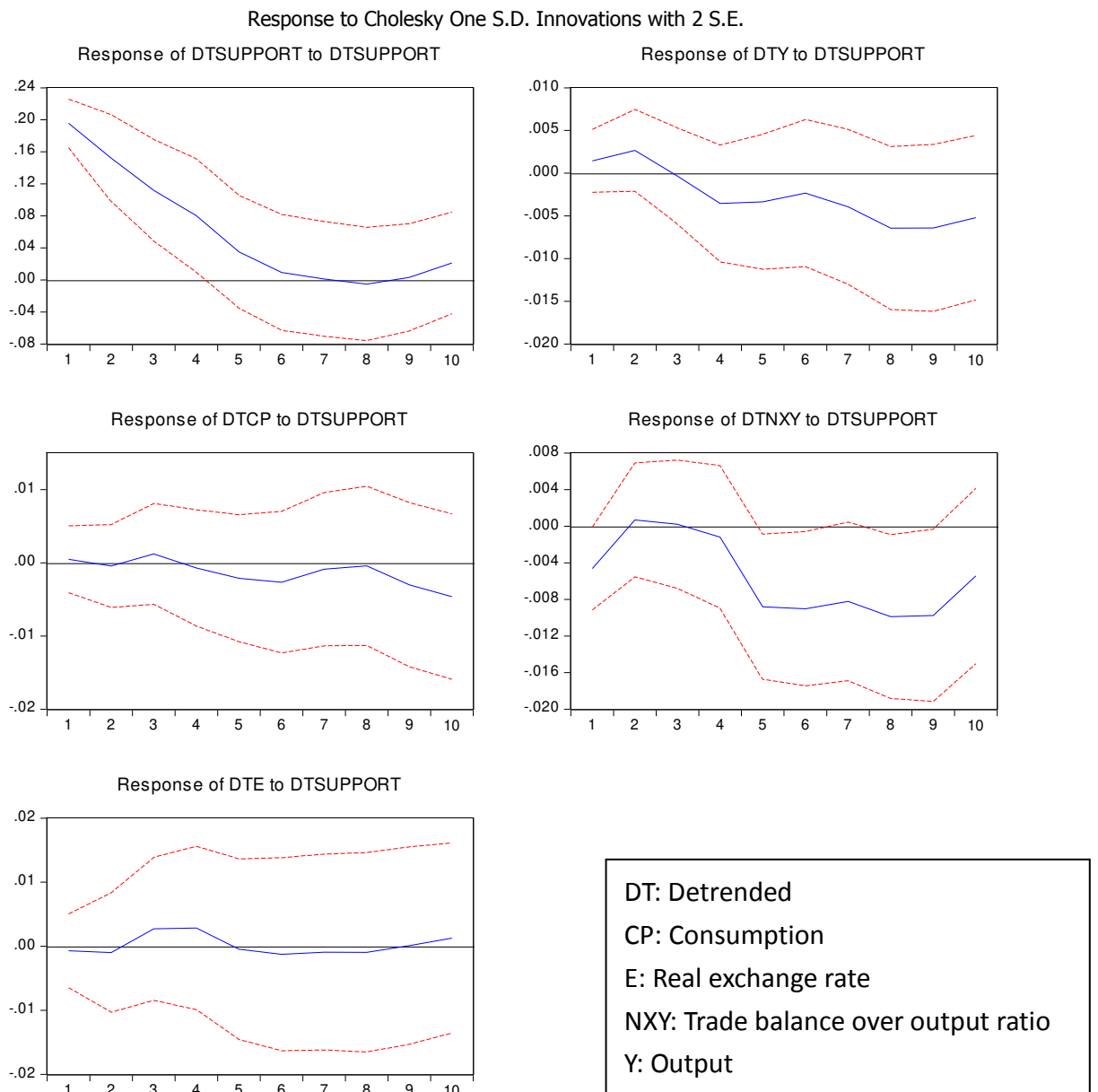


Figure 40

Impulse Response of Non-Recurrent Social Welfare Expenditure

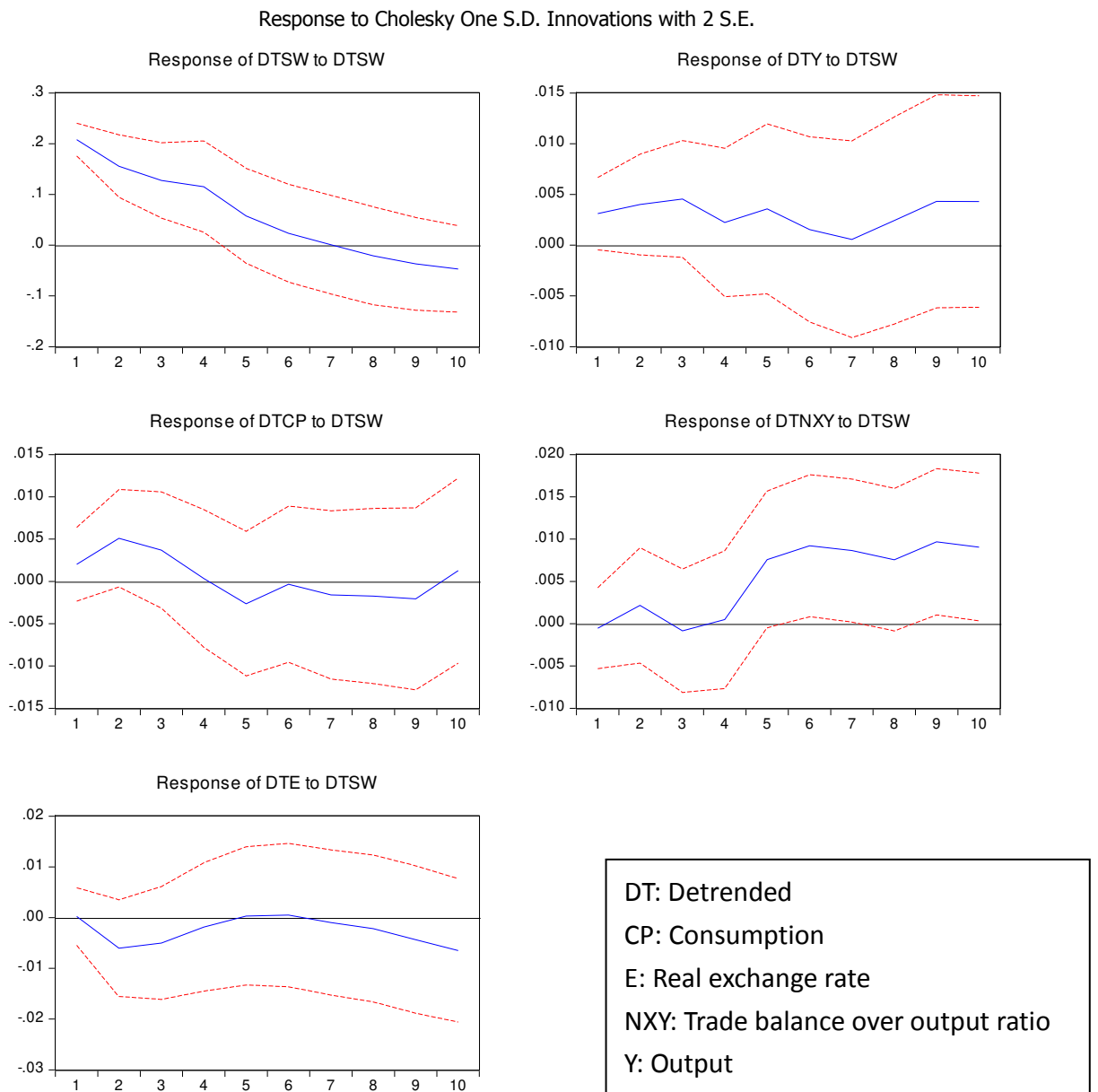
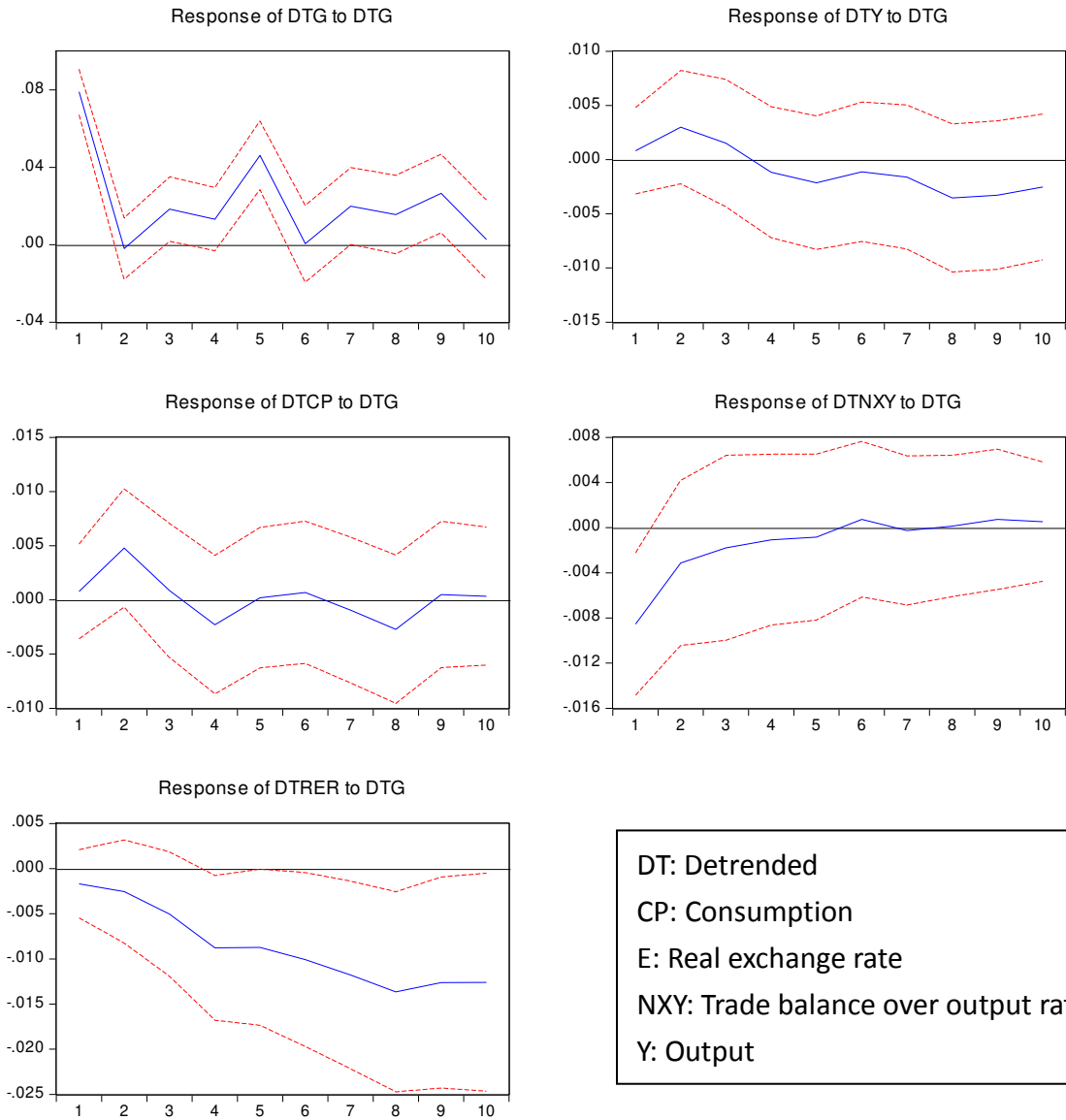


Figure 41

Impulse Response of Total Government Expenditure (Singapore)

Response to Cholesky One S.D. Innovations with 2 S.E.



DT: Detrended
 CP: Consumption
 E: Real exchange rate
 NXY: Trade balance over output ratio
 Y: Output

Figure 42

Impulse Response of Total Government Expenditure (South Korea)

Response to Cholesky One S.D. Innovations with 2 S.E.

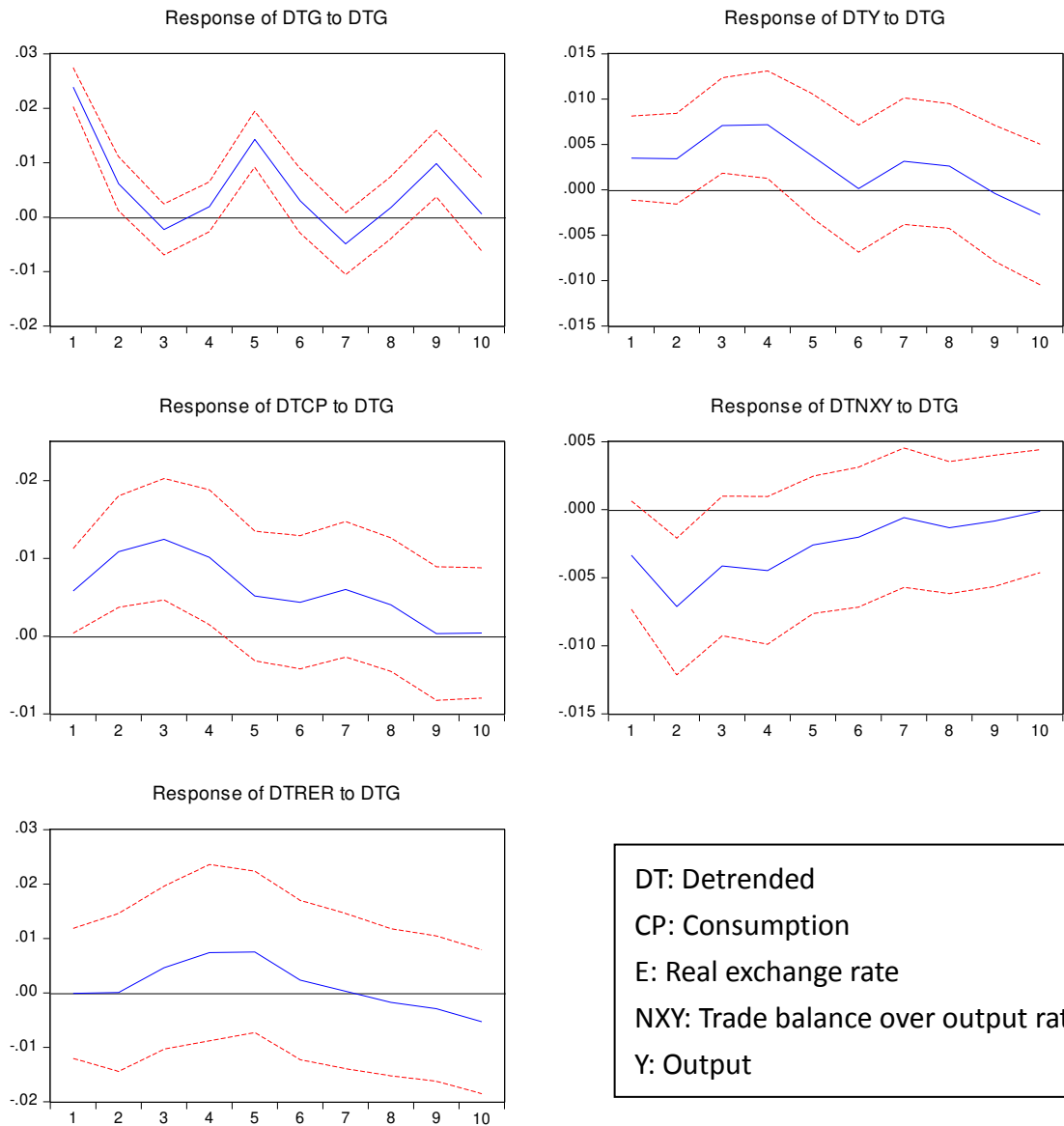


Figure 43

Impulse Response of Total Government Expenditure (Taiwan)

Response to Cholesky One S.D. Innovations with 2 S.E.

