How does the budget deficit affect inflation in Sri Lanka

K.P.N. Tharaka Niroshan Devapriya[*] and Masaru ICHIHASHI

Graduate School for International Development and Cooperation, Hiroshima University, 1-5-1 Kagamiyama, Higashi Hiroshima, Hiroshima 739-8529, Japan.

ABSTRACT

Macroeconomic theory assumes that budget deficits are inflationary. Therefore, policy makers and economists have long worried about the relationship between government budget deficits and inflation. Empirical studies examining the relationship between budget deficits and inflation have shown mixed results and been heavily debated in the recent past. This study investigates the relationship and causal structure between government budget deficits, deficit financing sources, and inflation in Sri Lanka, using time series data from 1950 to 2010, with particular attention to domestic deficit financing sources. For this study, we use the vector autoregressive (VAR) model. Results of this study suggest that budget deficits and inflation have a positive relationship; at the same time, causality analysis suggests a bi-directional causal structure between budget deficits and inflation in Sri Lanka. Also this analysis suggests that the main determinants of inflation rate are budget deficits, growth of money supply, interest rates and the real exchange rate of the country. Furthermore, results suggest that domestic borrowings affect inflation more positively than foreign borrowings, also suggesting a bi-directional causal structure between domestic borrowings and inflation. Sri Lanka has primarily used three domestic debt instruments for deficit financing: Treasury bills, rupee loans, and development and

*Corresponding author
  Email address: kpntharaka@yahoo.com

treasury bonds. Of these three, long-term rupee loans are currently the most inflationary debt instrument of the country.

Keywords: Budget deficit, Inflation, Financing sources, Sri Lanka

1. Introduction

Inflation is a key macroeconomic phenomenon that can play a significant role in stimulating economic development. However, government budgeting also attempts to stabilize the economy by controlling government expenditure and revenue. So, for a long time, many arguments have arisen about the relationship between government budget deficits and inflation. Accordingly, economists and policy makers have studied this relationship in order to most effectively stimulate economic development. These arguments stem from the possibility that governments might finance budget deficits by borrowing from domestic or foreign sources, or by printing money. Some countries with high inflation, especially in developing world, have large budget deficits, which suggest a link between budget deficits and inflation. Yet, for developed countries with comparatively low inflation, there is little evidence of a relationship between deficit spending and inflation.

According to the economist, Milton Friedman, inflation is anywhere and everywhere a monetary phenomenon[2]. He argued that monetary authorities should maintain a sustainable inflation rate by control of the money supply. On the other hand, some researchers and policy makers argue that government budget deficits are also inflationary, because of financing methods. Accordingly, they point out that fiscal policy can also control the inflation rate of any country. Empirical studies examining the nature of the relationship between government budget deficits

---

[2] As sited in Ahking and Miller (1985)

and inflation have produced conflicting results, and so have been heavily debated in the recent past. These mixed results in the literature suggest inconsistencies in the use of methodologies and specifications.

In recent years, many economists and policy makers have argued that government budget deficits affect macroeconomic conditions of the economy. They argue, based on theoretical background, that budget deficits have contributed to money growth expansion, inflation, and higher interest rates, and crowded out private investments. Keynesian theorists believe that budget deficits affect interest rates, private investments, and inflation through financing methods and aggregate demand and supply. Monetarists believe that government budget deficits affect money supply and inflation through the financing methods. Accordingly, most empirical studies focus on these areas, especially by analysis of budget deficits and inflation relationships both within a country, and in its relationship to other nations.

The aim of this study is to investigate the relationship and causal structure between government budget deficits and inflation, with special emphasis on financing sources, and to identify determinants of the inflation pattern in Sri Lanka. To investigate these objectives, this study has set further special objectives. First, investigate the relationship between government budget deficit and inflation in Sri Lanka, including its magnitude and causal linkage. Second, analyze which deficit financing sources, domestic or foreign, most affect inflation in Sri Lanka. Third, draw significant policy implications and suggestions in the area of monetary and fiscal policy of Sri Lanka.

This study is devoted to investigating the following questions empirically. First, does budget deficit affect inflation in Sri Lanka and what are the main determinants of inflation in Sri Lanka?

Second, are deficit financing debt sources inflationary or not in Sri Lanka? Third, which deficit financing debt instruments most affect inflation in Sri Lanka? And finally does the budget deficit to inflation relationship in Sri Lanka confirm the findings of the literature in similar developing countries? As causality hypothesis of this study, it is expected that at least one channel of causality will exist between Sri Lankan budget deficit, financing sources, deficit financing debt instruments, and inflation.

The rest of this paper is organized as follows. Section 2 presents the Sri Lankan budget deficit and inflation situation and section 3 reviews the theoretical framework for the budget deficit/inflation relationship and previous literature related to budget deficits, deficit financing, and inflation. Data and methodology are described in next section. It is then followed by empirical results and discussions. Finally, the paper ends with conclusions and policy recommendations.

2. Overview of budget deficit and inflation in Sri Lanka

Some developing countries, like Sri Lanka, have high inflation and large budget deficits, which suggest a link between budget deficit and inflation. Accordingly, Table 1 shows the average budget deficit and average inflation behavior of Sri Lanka for last 60 years.

As a per cent of GDP, in the last 50 years, Sri Lanka's average budget deficit was 8.1 percent, while the average inflation rate was 8.8 percent. Also, there was an increasing trend of budget deficits from the last 60 years to until the last 30 years, with the average inflation rate following the same trend. This suggests a relationship between these two variables in the context of Sri Lanka.

Table 1: Budget deficit and inflation during the last decades in Sri Lanka

| Period	Average Budget Deficit as a % of GDP	Average Inflation rate
Last 60 years	7.2	7.5
Last 50 years	8.1	8.8
Last 40 years	8.6	10.4
Last 30 years	9.1	11.6
Last 20 years	8.1	11.0
Last 10 years	8.1	10.8

Source: Annual Reports- CBSL

Sri Lanka is a South Asian developing country. Accordingly, Figures 1 and 2 show the behavior of budget deficits and inflation rates for South Asian countries.

Figure 1: Budget deficit in South Asian countries
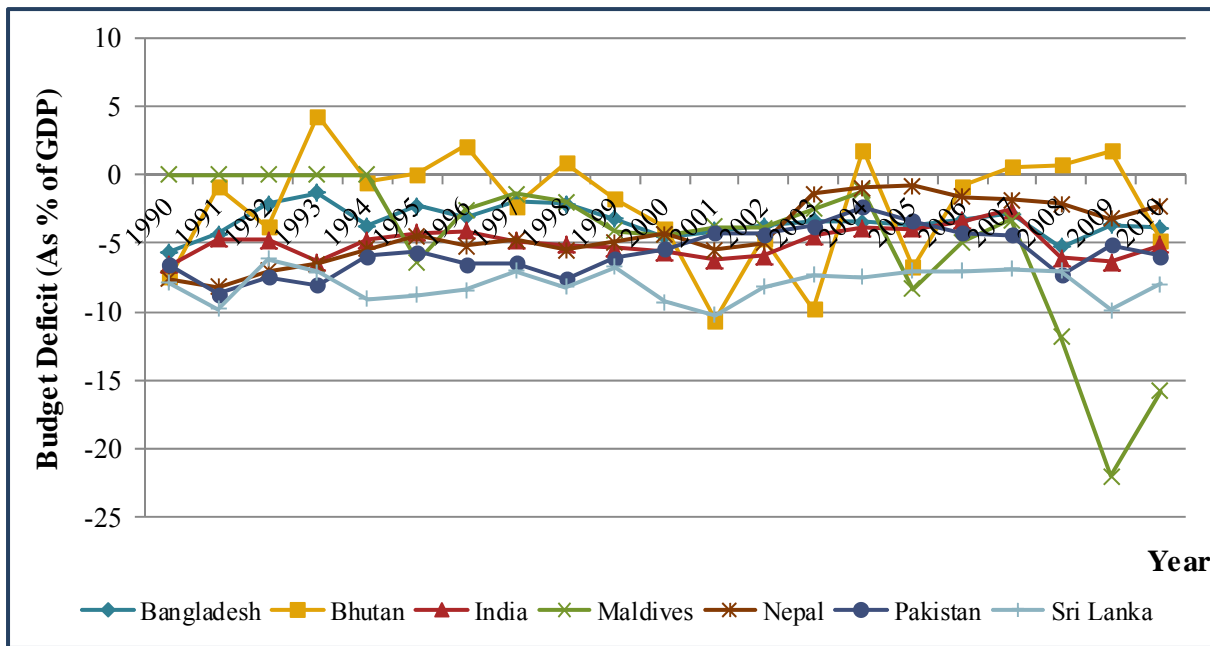
Source: World Bank

**Figure 2:** Inflation rate in South Asian countries
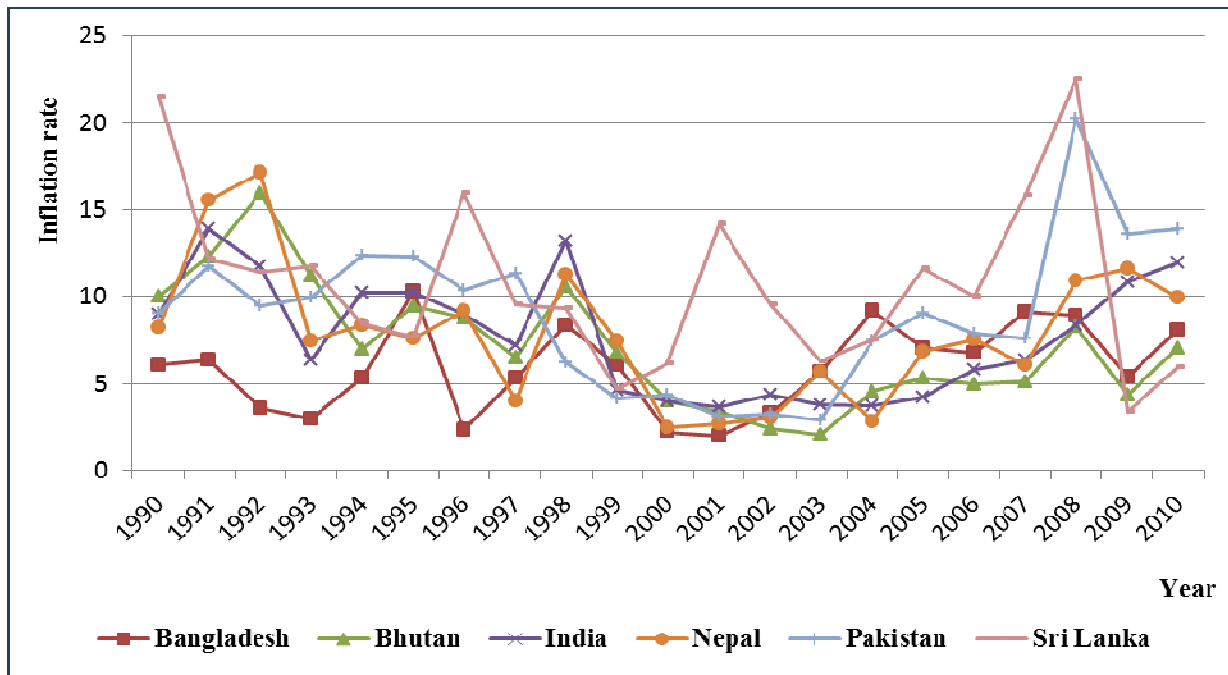
Source: World Bank

According to Figure 1, the Sri Lankan budget deficit has been comparatively high in South Asia for the last 20 years. It has a recorded average of 10% of GDP, the highest budget deficit in the region. Figure 2 explains the inflation behavior of South Asia, with many South Asian countries recording a high inflation rate during the last 20 years, fluctuating between 5 percent and 15 percent. Like its budget deficits, the Sri Lankan inflation rate is also comparatively high in the region in relation to other countries. This also suggests a budget deficit/inflation relationship. Given the country's economic situation and the South Asian situation in general, it is important to analyze this relationship in Sri Lanka.

3. Theoretical and empirical reviews

3.1 Theoretical background

Figure 3: Inflation targeting framework

Source: Sabirin (2002)
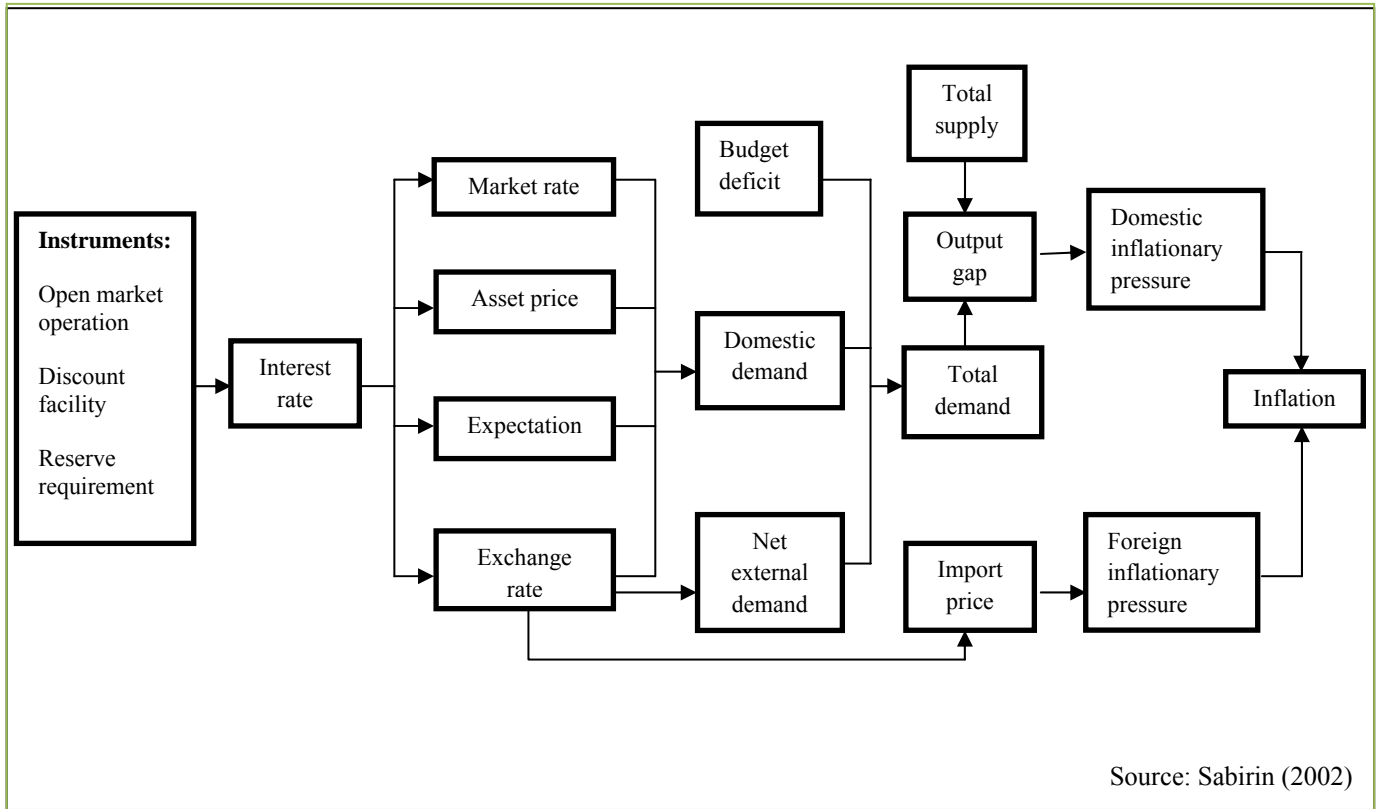
According to the inflation targeting framework (see Figure 3), first stage monetary policy tools control the money supply and interest rate through open market operation, discount facility, and reserve requirements. Domestic internal demand is controlled by the interest rate channel, but exchange rate channels control net external demand. At the same time, government fiscal policy also creates demand shocks on the domestic side. Finally, by adding those three demands, a country's total final demand will be created. However, the total supply of the country is an outside factor to this mechanism. When comparing total supply and demand, an output gap indicates domestic inflationary pressure. This framework also controls foreign inflationary

pressure through the exchange rate and import price channels. By controlling both domestic and foreign inflationary pressures, an economy can control its targeted inflation rate.

Many economic theories and economists emphasize that budget deficits affect inflation through money supply and deficit financing channels. The Keynesian view suggests that government budget deficits are inflationary because they stimulate aggregate demand. This approach is based on the deficit financing channel, through aggregate demand and supply theory. The Monetarist view suggests that government budget deficits are inflationary because they lead to higher money growth. Miller (1985) explained that budget deficits lead to inflation through two financing channels. The central bank may finance a budget deficit by money creation or by private monetization. Because private monetization, leads to higher interest rates, it tends to crowd out private investments, reduce the growth rate of real output, and increase prices. Furthermore, many researchers theorize that money printing and domestic market borrowings are positively related to inflation (Demopoulos *et.al*, 1987: Cardoso, 1992: Sowa, 1994: Agha and Khan, 2006).

This study focuses mainly on the following two theoretical approaches.

1. Keynesian view

According to Figure 4, if there is a budget deficit, the government should finance it through domestic or foreign sources, by borrowing from financial markets. Then, the government withdraws money from the domestic financial market to finance its deficit, which reduces national savings and loanable funds. It also increases the interest rate, which crowds out private investment and reduces economic growth and aggregate supply. The other channel shows aggregate demand. In the case, high government expenditure stimulates high consumption and increases aggregate demand. Accordingly, on one side, aggregate demand is increased and on the

other, aggregate supply is reduced or remains unchanged. So based on Keynesian aggregate demand and supply theory, the final result is a higher price level.

Figure 4: Keynesian view of the budget deficit and inflation relation
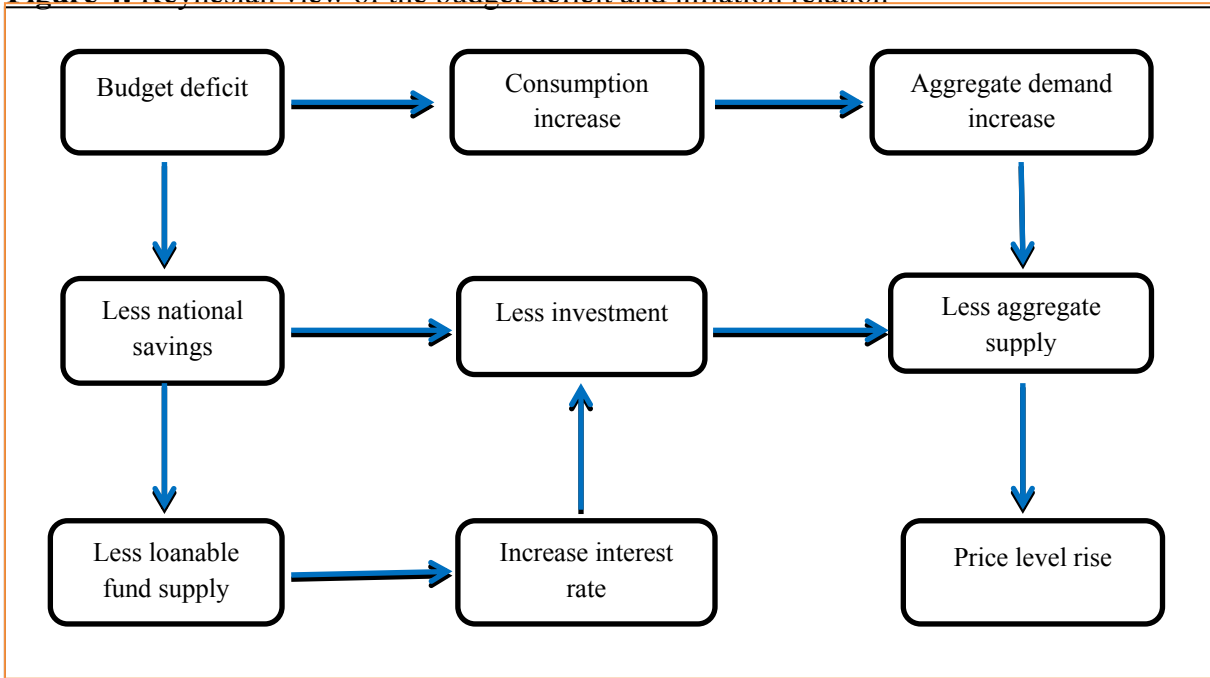
2. Monetarist view

The monetarist hypothesis is based on economist Irvin Fisher's Quantity Theory of Money and its equilibrium equation, which says that inflation is driven by money growth. This equation is: MV=PY

Where, M- Money supply, V- Velocity, P- Price level, Y- Output

It is assumed that output growth is given and money velocity is constant. So, based on the above equation, the behavior of price level is determined by money supply. Based on this approach, Sunil *et. al*. (2004) developed a theoretical model to explain the relationship between budget deficit and inflation.

Figure 5: Monetarist approach to the budget deficit and inflation relationship

Source: Sunil and Chaudhuri (2004)
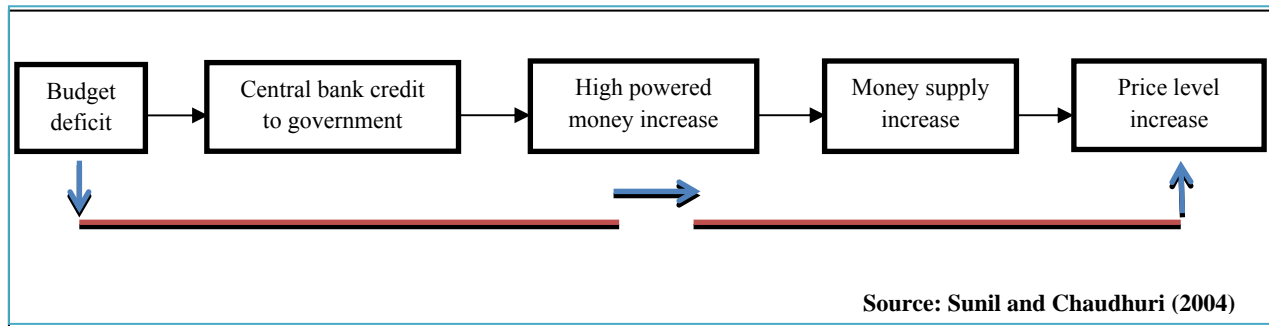
According to this approach, a higher budget deficit increases deficit financing, which allows the central bank to allocate more credit to the government through various sources to finance its deficit. It increases high-powered money and the nation's money supply, thereby increasing the price level of the economy.

3.2 Selected empirical reviews

Empirical studies examining the relationship and causal structure between government budget deficit and inflation have had conflicting results, leading to heavy debate in the recent past. Some researchers found a positive relationship between these two macro-economic variables, some found a negative correlation, and some found no significant relationship, based on their estimation methodology and country category. Then, previous literature can be categorized in to two main groups.

The first group of studies found that budget deficits positively affect, or cause inflation. Researchers followed various estimation methodologies and theoretical approaches. Most of them were mainly concerned about deficit financing and monetization of budget deficits. Ahking

and Miller (1985) found that the budget deficit caused inflation in United States. They argued that a deficit financed through domestic sources is more inflationary than financing through foreign sources. Furthermore, they emphasized that money-financed deficits are more inflationary than bond-financed deficits. Kohil and Mckibbin (1982) also found that bond-financed deficits are less inflationary than money-financed deficits in Australia.

Based on a closed economy, with the public finance approach as an economic framework, Metin (1998) showed that budget deficit has a positive relationship with inflation in Turkey because of central bank monetization of the budget deficit. Using the VAR model of Tanzania inflation, Solomon and Wet (2004) found a positive relationship between budget deficit and inflation due to monetization of deficits by monetary authorities. Agha and Khan (2006) investigated the long run relationship between budget deficit and inflation in Pakistan using VAR and VECM methodologies. They found that budget deficit has a positive relation with inflation, and further, showed that market borrowings are the most inflationary financing source in Pakistan. They used deficit financing as their main economic framework.

If any country faces budget deficits, the government may finance it by using domestic or foreign debt and money creation, which increase inflation. Based on this argument, Hoffman *et. al.* (1983) explained that newly issued debt for monetization of the budget deficit has a strong positive relationship to inflation in United States. Cardoso (1992) also emphasized that debt to finance budget deficits is one of the main determinants of inflation in Brazil and Mexico.

Kia (2006) investigated whether the determinants of inflation in Iran, as a developing country, are internal or external factors. He found that more internal factors affect inflation than external. He also emphasized that budget deficits and government expenditure act as internal

factors to cause inflation. Dharmendra *et. al.* (1994) showed determinants of the inflation rate in the United States from 1957-1991. Using VAR methodology and monetary and non-monetary explanations as their theoretical framework for causality, they found that money supply, budget deficits, wage rate, and energy prices are the primary determinants of inflation in United States. Based on their causality results, it also suggested that budget deficit cause inflation in United States.

Using OLS methodology, and the Keynesian model of price determination, Choudhary and Parai (1991) strongly suggested that the growth rate of money supply and budget deficits has a positive relationship to inflation in Peru. Catao and Terrones (2005) investigated the fiscal deficit and inflation relationship for 107 countries between 1960 and 2001, using the autoregressive distributed lag model (ARDL) with inflation nonlinearly related to fiscal deficit. They found mixed results: a strong positive relationship between fiscal deficit and inflation among developing countries with high inflation, but not in low inflation, advanced nations. Sowa (1994) found a positive relationship between government budget deficits and inflation in Ghana, and he strongly recommended control of inflation-targeting policies to keep the budget deficit as low as possible.

The second group of studies found that budget deficits do not affect or cause inflation. Barnhart and Darrat (1989) used VAR methodology to test causality among budget deficit, money growth, and inflation in United States from 1947 to 1980. They found that fiscal and monetary policies are not causally dependent. According to their findings, budget deficit did not cause inflation in the United States at during that time period. Using the same VAR methodology, Haan and Zelhorst (1990) investigated the budget deficit, money growth, and inflation

relationship for 17 developing countries from 1960 to 1985. They found that most countries' budget deficits do not affect inflation by deficit financing methods or money supply conditions. Bassetto and Butters (2010) found that a large budget deficit did not precede higher inflation in industrialized countries from 1970 to 2008, mostly because the central banks of these countries conduct sound monetary policy targeted to control of the inflation rate.

The Keynesian and Monetarist theoretical approaches explain how budget deficit affects inflation, whether by the Keynesian aggregate demand and supply model, or the - Monetarist monetary expansion of an economy. Based on these two theoretical arguments, Niskanen (1978) studied the relationship between federal deficits and inflation from 1948 to 1976 in USA, using four variables in OLS methodology. Results indicated that the Keynesian view does not correlate with budget deficit inflation relationship, but inflation is mostly dependent on money growth, in line with the monetarist view.

Karras (1994) investigated the macroeconomic effects of budget deficits in 32 countries from 1950 to 1989 using OLS methodology. As his theoretical framework, he used both the Keynesian and Monetarist views of the budget deficit and inflation relationship. He found that most of the countries in his sample were not monetized, so deficit did not affect inflation. Giannaros and Kolluri (1985) studied Monetarist propositions in ten industrialized countries from 1950 to 1981 by using two-stage least-squares methodology. They found the Monetarist theory correct in all sampled countries, because budget deficit contributed to a rapid increase in money supply. However they did not find any significant relationship between budget deficit and inflation in the greater majority of the countries examined.

If any country faces budget deficits, the government may finance it by using domestic or foreign debt, which increases inflation. Based on this argument, Protopapadakis and Siegel (1987) investigated the relationship between debt growth, money growth, and inflation for ten industrialized countries from 1952 to 1983, using OLS methodology. Their results indicated that debt growth affects money growth, but not inflation. These results seem to confirm the Monetarist view.

By causality analysis, many researchers try to capture the budget deficit and inflation relationship. Barnhart and Darrat (1988) investigated the causal linkage between budget deficit, money growth, and inflation for seven OECD countries from 1960 to 1984, using a Granger causality test. They found that budget deficit does not cause inflation, and furthermore, monetary and fiscal policies were independent in these countries. Based on the same methodology, Ashra *et. al.* (2004) studied the causal structure between budget deficit and inflation in India from 1950 to 2001. The results showed a bi-directional relationship between money and price, but not between budget deficit and inflation.

The literature in this area clearly shows mixed results on the relationship between budget deficit and inflation.

4. Data and methodology

4.1. Data

This study covers annual time series data from 1950 to 2010, or 61 observations, sufficient to analyze the relationship between government budget deficit and inflation. In the first stage, the data set contains of observations for inflation rate (IN), which is based on CPI; budget

deficit (BD); growth rate of money supply (MS); Interest rate (IR); and real exchange rate (RER). At the second stage of analysis, which captures the relationship between deficit financing sources and inflation, the data set will be expanded by adding domestic financing (DF) and foreign financing (FF). Treasury bills (TB), rupee loans (RL) and development and treasury bonds (DB) will be added in the third stage of analysis, which captures the relationship of deficit financing debt instruments and inflation. Accordingly, there are 10 variables used in this analysis, and all data variables are expressed in percentages. All data sets are taken from annual reports of the Central Bank of Sri Lanka, annual reports of Ministry of Finance and Planning of Sri Lanka, and World Bank data sources.

4.2 Methodology

This study follows the VAR models of Ahking and Miller (1985), Barnhart (1989), Dharmendra *et. al,* (1994), which have been used to capture the budget deficit and inflation relationship to identify determinants of inflation in many countries. These studies mainly focused on the fiscal and monetary policy relationship based on the money growth approach, but also found the main determinants of inflation by the use of fiscal policy variables. However, this study will only apply their methodology to more deeply analyze the budget deficit/inflation relationship with more consideration of deficit-financing sources and debt instruments.

Following the estimation methodology above, this study developed three VAR estimation models for three stages of analyses.

1. Estimation model no.01- Budget deficit and inflation

$$\begin{bmatrix} IN_t \\ BD_t \\ MS_t \\ IR_t \\ RER_t \end{bmatrix} = \begin{bmatrix} \alpha_1 \\ \alpha_2 \\ \alpha_3 \\ \alpha_4 \\ \alpha_5 \end{bmatrix} + \begin{bmatrix} A_{11} & A_{12} & A_{13} & A_{14} & A_{15} \\ A_{21} & A_{22} & A_{23} & A_{24} & A_{25} \\ A_{31} & A_{32} & A_{33} & A_{34} & A_{35} \\ A_{41} & A_{42} & A_{43} & A_{44} & A_{45} \\ A_{51} & A_{52} & A_{53} & A_{54} & A_{55} \end{bmatrix} \begin{bmatrix} IN_{t-1} \\ BD_{t-1} \\ MS_{t-1} \\ IR_{t-1} \\ RER_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{IN_t} \\ \varepsilon_{BD_t} \\ \varepsilon_{MS_t} \\ \varepsilon_{IR_t} \\ \varepsilon_{RER_t} \end{bmatrix} \quad \cdots\cdots\cdots (1)$$

Where IN is inflation rate, BD is budget deficit, MS is growth rate of money supply, IR is interest rate and RER is real exchange rate. A is estimable parameters and ε is independent and identically distributed error terms. It is expected that the budget deficit and inflation relationship will be identified at this stage.

2. Estimation model no.02- Deficit financing sources and inflation

The second stage will analyze the relationship between deficit financing sources and inflation, based on the same model with expansion as follows:

$$\begin{bmatrix} IN_t \\ DF_t \\ FF_t \\ MS_t \\ IR_t \\ RER_t \end{bmatrix} = \begin{bmatrix} \alpha_1 \\ \alpha_2 \\ \alpha_3 \\ \alpha_4 \\ \alpha_5 \\ \alpha_6 \end{bmatrix} + \begin{bmatrix} A_{11} & A_{12} & A_{13} & A_{14} & A_{15} & A_{16} \\ A_{21} & A_{22} & A_{23} & A_{24} & A_{25} & A_{26} \\ A_{31} & A_{32} & A_{33} & A_{34} & A_{35} & A_{36} \\ A_{41} & A_{42} & A_{43} & A_{44} & A_{45} & A_{46} \\ A_{51} & A_{52} & A_{53} & A_{54} & A_{55} & A_{56} \\ A_{61} & A_{62} & A_{63} & A_{64} & A_{65} & A_{66} \end{bmatrix} \begin{bmatrix} IN_{t-1} \\ DF_{t-1} \\ FF_{t-1} \\ MS_{t-1} \\ IR_{t-1} \\ RER_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{IN_t} \\ \varepsilon_{DF_t} \\ \varepsilon_{FF_t} \\ \varepsilon_{MS_t} \\ \varepsilon_{IR_t} \\ \varepsilon_{RER_t} \end{bmatrix} \quad \cdots\cdots (2)$$

Where IN is inflation rate, DF is domestic financing source, FF is foreign financing source, MS is growth rate of money supply, IR is interest rate and RER is real exchange rate. A is estimable parameters and ε is independent and identically distributed error terms.

3. Estimation model no.03- Deficit financing debt instruments and inflation

In the third stage, analysis will show the relationship between deficit-financing debt instruments and inflation, based on the same model with further expansion as follows:

$$
\begin{bmatrix} IN_t \\ TB_t \\ RL_t \\ DB_t \\ MS_t \\ IR_t \\ RER_t \end{bmatrix} = \begin{bmatrix} \alpha_1 \\ \alpha_2 \\ \alpha_3 \\ \alpha_4 \\ \alpha_5 \\ \alpha_6 \\ \alpha_7 \end{bmatrix} + \begin{bmatrix} A_{11} & A_{12} & A_{13} & A_{14} & A_{15} & A_{16} & A_{17} \\ A_{21} & A_{22} & A_{23} & A_{24} & A_{25} & A_{26} & A_{27} \\ A_{31} & A_{32} & A_{33} & A_{34} & A_{35} & A_{36} & A_{37} \\ A_{41} & A_{42} & A_{43} & A_{44} & A_{45} & A_{46} & A_{47} \\ A_{51} & A_{52} & A_{53} & A_{54} & A_{55} & A_{56} & A_{57} \\ A_{61} & A_{62} & A_{63} & A_{64} & A_{65} & A_{66} & A_{67} \\ A_{71} & A_{72} & A_{73} & A_{74} & A_{75} & A_{76} & A_{77} \end{bmatrix} \begin{bmatrix} IN_{t-1} \\ TB_{t-1} \\ RL_{t-1} \\ DB_{t-1} \\ MS_{t-1} \\ IR_{t-1} \\ RER_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{IN_t} \\ \varepsilon_{TB_t} \\ \varepsilon_{RL_t} \\ \varepsilon_{BD_t} \\ \varepsilon_{MS_t} \\ \varepsilon_{IR_t} \\ \varepsilon_{RER_t} \end{bmatrix} \quad \ldots\ldots (3)
$$

Where IN is inflation rate, TB is treasury bill, RL is rupee loan, DB is development and treasury bond, MS is growth rate of money supply, IR is interest rate and RER is real exchange rate. A is estimable parameters and ε is independent and identically distributed error terms.

Before estimating the main VAR model, it is necessary to check the stationarity of the data series. The Augmented Dickey-Fuller unit root test is employed to test the stationarity of variables. The results show all variables at a stationary level, and all are statistically significant at the 1 percent and 10 percent significance levels. Determining optimum leg of endogenous

variables in the VAR model is a critical issue. Therefore, based on the Schwarz and Akaike information criterion, the optimum lag length in this case, is 01.

5. Empirical results and discussion

5.1 Empirical results

Following VAR model no.1, equations produced these estimated results.

$$IN = -3.302\underset{(-1.67525)}{*} + 0.112IN_{t-1} + 0.021BD_{t-1}\underset{(1.68336)}{*} + 0.176MS_{t-1}\underset{(2.55054)}{**} + 0.296IR_{t-1}\underset{(1.90975)}{*} + 0.056RER_{t-1}\underset{(1.90553)}{*}..........(1)$$

$$BD = 2.430\underset{(2.77422)}{***} - 0.511IN_{t-1} + 0.555BD_{t-1}\underset{(4.97958)}{***} + 0.922MS_{t-1}\underset{(1.71854)}{*} - 0.330IR_{t-1} - 0.386RER\underset{(-1.70506)}{*}..........(2)$$

$$MS = -2.493 + 0.211IN_{t-1} + 0.050BD_{t-1}\underset{(1.99636)}{*} + 0.505MS_{t-1}\underset{(4.23569)}{***} - 0.171IR_{t-1} + 0.097RER_{t-1}\underset{(1.93023)}{*}..........(3)$$

$$IR = -2.216 - 0.099IN_{t-1} + 0.010BD_{t-1} + 0.104MS_{t-1}\underset{(1.72395)}{*} + 0.451IR_{t-1}\underset{(3.32628))}{***} + 0.088RER_{t-1}\underset{(3.42752)}{***}.......(4)$$

$$RER = -1.037 - 0.195IN_{t-1} + 0.031BD_{t-1} + 0.265MS_{t-1}\underset{(2.06961)}{**} + 0.184IR_{t-1} + 0.950RER_{t-1}\underset{(17.5814)}{***}........(5)$$

Notes: *- 10% significance level, **- 5% significant level, *** - 1% significance level
       Numbers in parentheses are value of t -statistics
       Equation number one represents the relationship between inflation and other variables.

Based on this equation, budget deficit, money supply, interest rate, and real exchange rate are statistically significant at the 10 percent significance level and 5 percent significant levels, with inflation rate and all coefficients positively correlated to inflation. The results indicate 0.02 percent, 0.18 percent, 0.29 percent, and 0.06 percent positive change in inflation rate due to a one percent change in budget deficit, growth rate of money supply, interest rate, and real exchange

rate, respectively. Meanwhile, according to Equation number 3, budget deficit affects money supply positively with its coefficient statistically significant at the 10 percent significance level, showing that deficit financing affects the growth of money supply. Based on these results, it can be concluded that there is a positive relationship between budget deficit and inflation rate.

Examination of the causal structure between government budget deficits and inflation is the primary objectives of this study, which necessitates use of Granger causality test results, summarized in Figure 6.

Figure 6: Granger causality test results
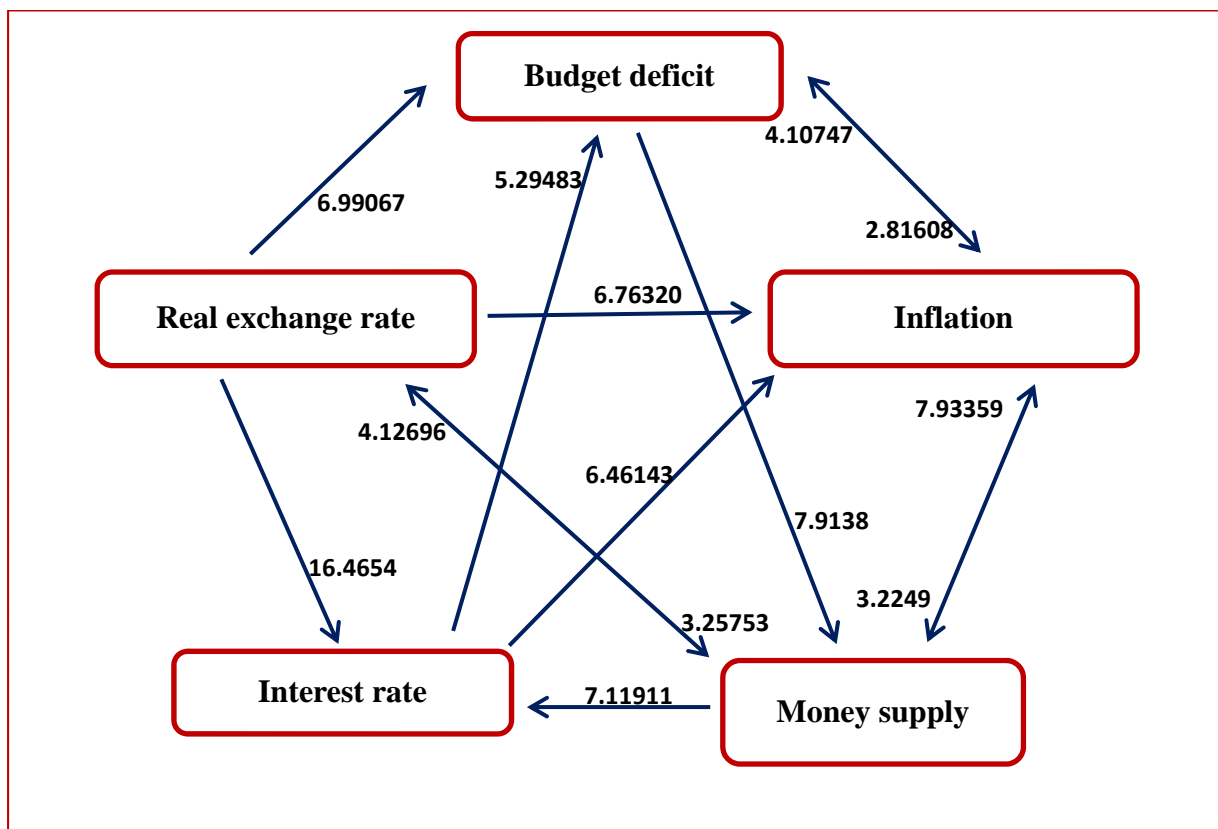
Note: Numbers are causality coefficients based on Granger Causality results.

These results indicate that three bi-directional causalities exist between inflation and budget deficit, money supply and inflation and money supply and real exchange rate. It is indicated that real exchange rate and interest rate also cause inflation. These causality results are in line with the VAR regression results above. When causality is compared between budget deficit, inflation, and money supply, budget deficits correlate positively to inflation in the first stage, due to high budget deficits and financing methods. Further, according to these results, deficits also increase money supply. From this, it can be extrapolated that the relationship between money supply and inflation is bi-directional. At the second stage, high inflation causes government expenditure to increase more rapidly than revenue, which causes budget deficit and inflation again. This explains bi-directional causality between budget deficit and inflation.

Generalized impulse response function is used to analyze relationships among estimated variables. Causality analysis can be extended by using this method, which shows how shocks to budget deficit affect inflation, and vice versa. The simulation in this function covers ten years to capture the effect of one time shock to one innovation on current and future values of endogenous variables, as presented in Figure 7.

Figure 7: Generalized impulse response function in VAR

Response of IN to Generalized One S.D. Innovations

Response of BD to Generalized One S.D. Innovations

Response of MS to Generalized One S.D. Innovations

Response of IR to Generalized One S.D. Innovations

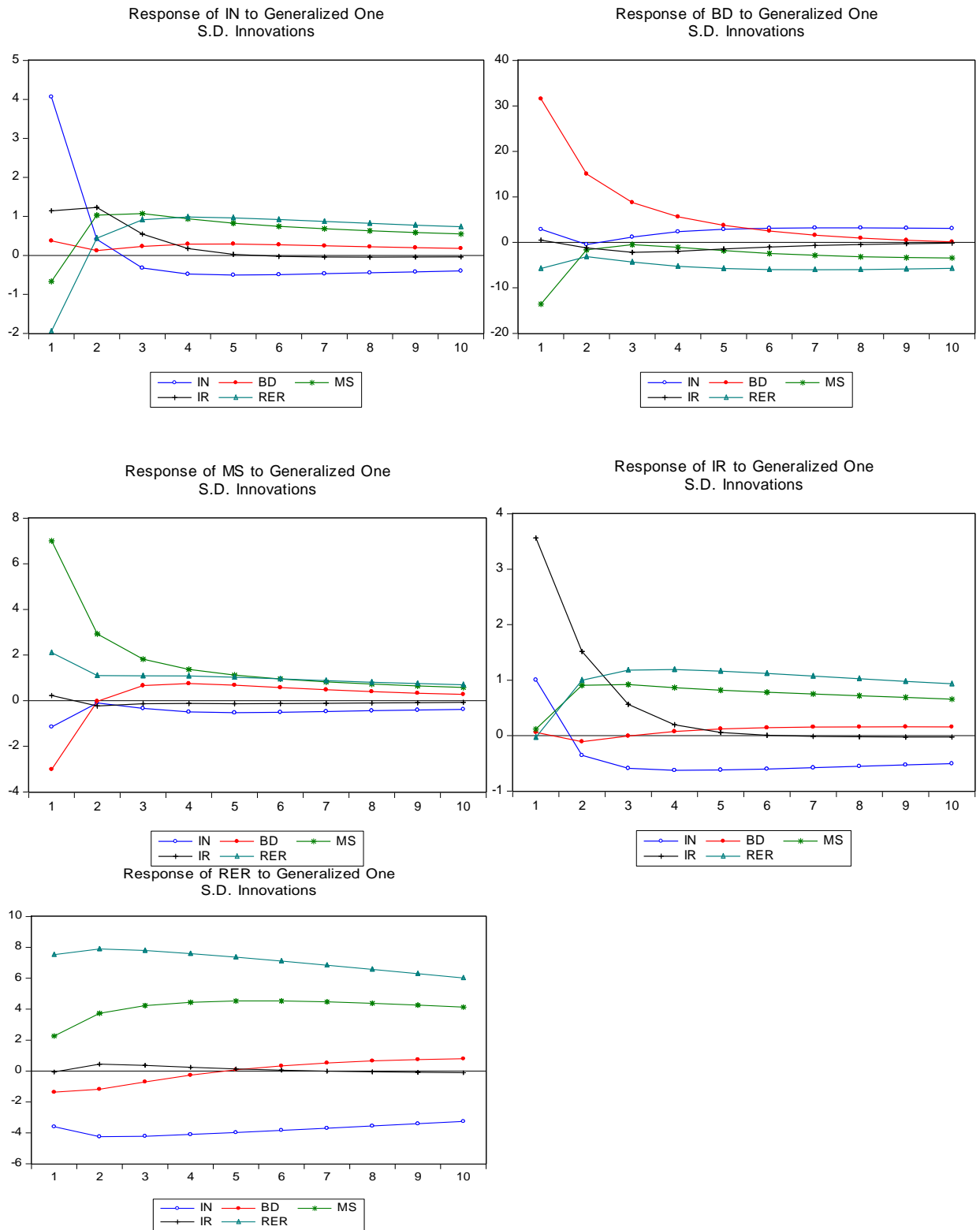Response of RER to Generalized One S.D. Innovations

Figure 7 covers five panels. The first panel explains the response of inflation, showing that a positive shock to budget deficit resulted in a positive response in inflation, and indicating that the response of inflation to a shock of budget deficit is positive throughout the period. This leads to the conclusion that there is a positive relationship between budget deficit and inflation. This panel also explains that, with other variables, inflation responds positively to shocks of money supply and real exchange rate after the second year. Meanwhile, inflation has a positive response to an interest rate shock until five years, after which it becomes neutral.

The second panel of Figure 7 shows the response of budget deficit to other variables. It demonstrates that budget deficit has a positive response to inflation shock throughout the period, except in year two, which has very small negative response. These results support earlier findings from the VAR and Granger causality test; that a positive relationship and bi-directional causality exists between inflation and budget deficit.

Panel three also provides supporting evidence of the deficit financing and money supply relation. This panel shows the response of money supply to other variables. The results indicate that money supply has an initially small negative response to budget deficit shock, which becomes positive after the second year or period, due to deficit financing affecting the growth of money supply by the end of the fiscal year.

Thus far, this study has identified a positive relationship between government budget deficits and inflation in Sri Lanka. For the sake of consistency, the relationship between domestic and foreign deficit financing sources and inflation will be analyzed in this stage. Based on Keynesian and Monetarist arguments and previous literature, budget deficit affects inflation through financing sources. Therefore, this section presents empirical results based on VAR Model no.2 in order to evaluate the relationship between deficit financing sources and inflation.

Here, domestic and foreign financing sources will be evaluated, and the estimation results presented in the next section.

$$IN = -0.549 + 0.283 IN_{t-1}** + 0.608 DF_{t-1}* + 0.456 FF_{t-1} + 0.135 MS_{t-1}* + 0.115 IR_{t-1} - 0.005 RER_{t-1} \ldots\ldots\ldots(1)$$
$$ \underset{(2.21867)}{} \underset{(1.68209)}{} \underset{(1.70107)}{}$$

$$DF = -0.514 + 0.087 IN_{t-1}* + 0.214 DF_{t-1}* + 0.091 FF_{t-1} + 0.071 MS_{t-1}** - 0.053 IR_{t-1} + 0.008 RER_{t-1} \ldots\ldots(2)$$
$$\underset{(1.94141)}{} \underset{(1.68433)}{} \underset{(2.23584)}{}$$

$$FF = 2.081** - 0.009 IN_{t-1} + 0.010 DF_{t-1} + 0.333 FF_{t-1}** + 0.025 MS_{t-1} + 0.037 IR_{t-1} + 0.011 RER_{t-1} \ldots\ldots(3)$$
$$\underset{(2.61499)}{} \underset{(2.43861)}{}$$

$$MS = 0.527 + 0.186 IN_{t-1} + 0.908 DF_{t-1}* + 0.736 FF_{t-1}* + 0.420 MS_{t-1}*** - 0.173 IR_{t-1} + 0.025 RER_{t-1} \ldots\ldots(4)$$
$$\underset{(1.70504)}{} \underset{(1.68516)}{} \underset{(3.16177)}{}$$

$$IR = -0.390 - 0.087 IN_{t-1} + 0.123 DF_{t-1} - 0.162 FF_{t-1} + 0.099 MS_{t-1} + 0.456 IR_{t-1}*** + 0.077 RER_{t-1}*** \ldots(5)$$
$$\underset{(3.52431)}{} \underset{(3.20209)}{}$$

$$RER = -1.814 - 0.026 IN_{t-1} - 0.107 DF_{t-1} + 1.186 FF_{t-1}** + 0.315 MS_{t-1}** - 0.097 IR_{t-1} + 0.906 RER_{t-1}*** \ldots(6)$$
$$\underset{(2.62040)}{} \underset{(2.28928)}{} \underset{(18.6099)}{}$$

Notes: *- 10% significance level, **- 5% significant level, *** - 1% significance level
Numbers in parentheses are value of t -statistics

Equation number one represents the relationship between inflation and other variables. Based on these results, both foreign and domestic financing sources affect inflation in positively; but only domestic financing sources are statistically significant at the 10% significance level. Accordingly, if there is a one percent increase in domestic financing or borrowing (as a percentage of GDP) to finance the budget deficit, it will increase inflation by 0.61 percent.

Equation no. 4 shows the relationship between money supply and other variables. If there is a one percent increase in domestic and foreign financing as a percentage of GDP, money

growth will increase by 0.91 and 0.74 percent, respectively. Based on these results, deficit financing sources affect money supply positively, and money supply affects inflation positively.

This section presents the causal structure between deficit financing sources and inflation. Table 2 shows the results of Granger causality test. Based on these results, all five variables domestic financing, foreign financing, money supply, interest rate, and real exchange rate cause inflation. When comparing two financing sources primary analysis, there is a bi-directional causality relationship between domestic financing sources and inflation, with 1% significance level. But foreign financing sources have only one channel of causality.

Table 2: Granger causality test results

Independent variables	Dependent variables					
	Inflation	Domestic financing	Foreign finance	Money supply	Interest rate	Real exchange rate
Inflation	-	11.1367*** (0.0015)	1.71154 (0.1960)	3.22490* (0.0778)	0.02972 (0.8637)	0.11585 (0.7348)
Domestic financing	8.89660*** (0.0042)	-	1.83774 (0.1806)	4.27267** (0.0433)	4.85792** (0.0316)	0.17536 (0.6770)
Foreign financing	5.38663** (0.0239)	2.04844 (0.1578)	-	4.50365** (0.0382)	0.23582 (0.6291)	5.38852** (0.0239)
Money supply	7.93359*** (0.0067)	12.4938*** (0.0008)	3.45173* (0.0684)	-	7.11911*** (0.0099)	4.12696** (0.0469)
Interest rate	6.46143** (0.0138)	3.97704* (0.0509)	4.52464** (0.0378)	1.67921 (0.2003)	-	0.15847 (0.6921)
Real exchange rate	6.76320** (0.0118	6.36405** (0.0145)	5.58887** (0.0215)	3.25753* (0.0764)	16.4654*** (0.0002)	-

Note: above values are F-statistics

Numbers in parentheses are value of probability

*, **, *** denotes significant at 10%, 5% and 1% level of significance, respectively.

In this section, the relationship between deficit financing sources and inflation will be analyzed further. Impulse response function shows how shocks to domestic and foreign financing sources affect inflation and vice versa. The simulation in this function covers ten years to capture the effect of one time shock to one innovation on current and future values of endogenous variables, as presented in Figure 8.

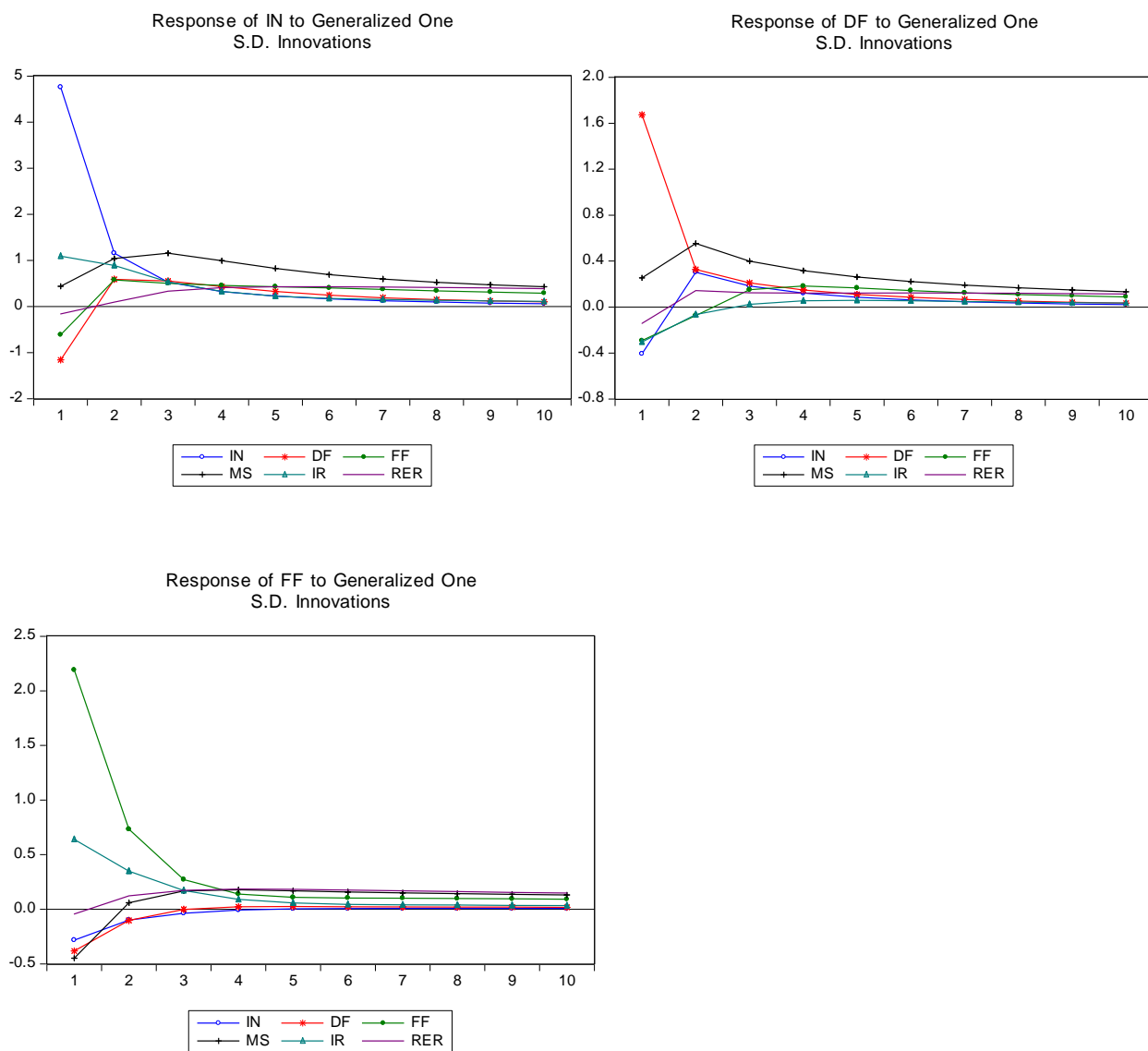**Figure 8:** Generalized impulse response function in VAR

Figure 8 covers three panels. The first shows the response of inflation, the second panel explains the response of domestic financing sources and the third panel shows the response of foreign financing sources. Panel 1 indicates that inflation has an initial small negative response to domestic and foreign financing sources, which becomes positive after the second period or year. This is due to deficit financing affecting inflation at the end of the fiscal year. The same panel shows positive shocks to money supply growth, interest rate, and real exchange rate, which resulted in the positive response of inflation throughout the period.

Panel 2 and 3 present the response of domestic and foreign financing, respectively. The results of Panel 2 indicate that domestic financing has an initial negative response to a shock of inflation, which becomes positive after the second year or period. This establishes bidirectional causality between domestic financing and inflation, in line with the VAR regression results. Panel 3 indicates that foreign financing has a negative response to a shock of inflation throughout the period. This shows one channel of causality between foreign financing and inflation, also in line with the VAR regression results.

This study has identified a positive relationship between government budget deficit and inflation in Sri Lanka, with domestic financing sources more inflationary than foreign. For the sake of consistency, this section will analyze which domestic financing debt instruments are inflationary, and evaluate the relationship between debt instruments and inflation. These empirical results are based on VAR Model no.3, which includes three deficit-financing debt instruments, Treasury bills, rupee loans, and development and Treasury bonds.

$$IN = -3.72 + 0.258 IN_{t-1}* + 0.132 TB_{t-1} + 0.200 RL_{t-1}** - 0.240 DB_{t-1} + 0.166 MS_{t-1}* + 0.179 IR_{t-1} + 0.001 RER_{t-1} \ldots\ldots\ldots(1)$$
$$ \underset{(1.96123)}{} \underset{(2.09794)}{} \underset{(1.92083)}{}$$

$$TB = 0.35 - 0.087 IN_{t-1} + 0.858 TB_{t-1}*** - 0.028 RL_{t-1} + 0.631 DB_{t-1}** - 0.032 MS_{t-1} + 0.014 IR_{t-1} + 0.029 RER_{t-1} \ldots\ldots\ldots(2)$$
$$ \underset{(15.2255)}{} \underset{(2.26191)}{}$$

$$RL = 3.07*** - 0.049 IN_{t-1} - 0.044 TB_{t-1} + 0.957 RL_{t-1}*** - 0.126 DB_{t-1} + 0.004 MS_{t-1} + 0.151 IR_{t-1}** - 0.032 RER_{t-1}**..(3)$$
$$\underset{(2.72570)}{} \underset{(24.8811)}{} \underset{(2.24488)}{} \underset{(-2.30499)}{}$$

$$DB = 0.87 - 0.011 IN_{t-1} + 0.046 TB_{t-1}* - 0.002 RL_{t-1} + 0.592 DB_{t-1}*** - 0.005 MS_{t-1} + 0.019 IR_{t-1} - 0.002 RER_{t-1} \ldots\ldots\ldots(4)$$
$$ \underset{(1.96285)}{} \underset{(5.01862)}{}$$

$$MS = -2.34 + 0.065 IN_{t-1} - 0.166 TB_{t-1} + 0.119 RL_{t-1} + 1.712 DB_{t-1}** + 0.484 MS_{t-1}*** - 0.095 IR_{t-1} + 0.063 RER_{t-1} \ldots\ldots(5)$$
$$ \underset{(2.19893)}{} \underset{(3.82344)}{}$$

$$IR = -0.679 - 0.089 IN_{t-1} - 0.055 TB_{t-1} - 0.003 RL_{t-1} + 0.027 DB_{t-1} + 0.106 MS_{t-1} + 0.428 IR_{t-1}*** + 0.088 RER_{t-1}*** \ldots(6)$$
$$ \underset{(3.43011)}{} \underset{(3.39448)}{}$$

$$RER = -4.38 - 0.135 IN_{t-1} - 0.123 TB_{t-1} + 0.298 RL_{t-1}** + 0.414 DB_{t-1} + 0.221 MS_{t-1}* + 0.123 IR_{t-1} + 0.949 RER_{t-1}*** \ldots(7)$$
$$ \underset{(2.06989)}{} \underset{(1.69323)}{} \underset{(18.2946)}{}$$

Notes: *- 10% significance level, **- 5% significant level, *** - 1% significance level
Numbers in parentheses are value of t -statistics

Equation number one shows the relationship between inflation and other variables. These results indicate that Treasury bills and rupee loans have a positive relationship with inflation, but development and Treasury bonds have a negative correlation. However, only the rupee loan variable is statistically significant at 5% significance level. According to these results, if there is a one percent increase in rupee loans (as a percentage of GDP) to finance the budget deficit, inflation will increase by 0.20 percent.

This section presents the causal structure between deficit-financing debt instruments and inflation. Table 3 shows the results of the Granger causality test. The results indicate that of the three studied debt instruments, only rupee loans cause inflation at a 10% significance level. VAR regression results and causal structure between debt instruments and inflation are similar. These

results suggest that money supply, interest rate, and real exchange rate also have a causal relationship with inflation.

Table 3: Granger causality test results

Independent variables	Inflation	Treasury bill	Rupee loan	Development and Treasury bond	Money supply	Interest rate	Real exchange rate
			Dependent variables				
Inflation	-	0.06863 (0.7943)	1.63357 (0.2064)	0.10890 (0.7426)	3.22490* (0.0778)	0.02972 (0.8637)	0.11585 (0.7348)
Treasury bill	1.95780 (0.1672)	-	11.3716*** (0.0013)	6.52491** (0.0133)	1.08133 (0.3028)	0.14390 (0.7058)	4.01316** (0.0499)
Rupee loan	3.83731* (0.0550)	0.10418 (0.7481)	-	1.24707 (0.2688)	0.24728 (0.6209)	0.06221 (0.8039)	8.62570*** (0.0048)
Development and Treasury bond	0.26213 (0.6106)	3.63218* (0.0617)	6.90045** (0.0110)	-	5.35373** (0.0243)	0.00891 (0.9251)	0.91899 (0.3418)
Money supply	7.93359*** (0.0067)	0.03529 (0.8517)	2.50306 (0.1192)	0.01063 (0.9182)	-	7.11911*** (0.0099)	4.12696** (0.0469)
Interest rate	6.46143** (0.0138)	0.98913 (0.3242)	2.07944 (0.1548)	0.66142 (0.4194)	1.67921 (0.2003)	-	0.15847 (0.6921)
Real exchange rate	6.76320** (0.0118)	1.85203 (0.1789)	10.2353*** (0.0023)	0.67772 (0.4138)	3.25753* (0.0764)	16.4654*** (0.0002)	-

Note: above values are F-statistics
        Numbers in parentheses are value of probability
        *, **, *** denotes significant at 10%, 5% and 1% level of significance, respectively.

This section will set forth further analysis of the relationship between domestic debt instruments and inflation. Impulse response function shows how shocks to Treasury bills, rupee loans, and development and Treasury bonds affect inflation, and vice versa. The simulation in this function covers ten years to capture the effect of one time shock to one innovation on current and future values of endogenous variables in the model as presented in Figure 9.

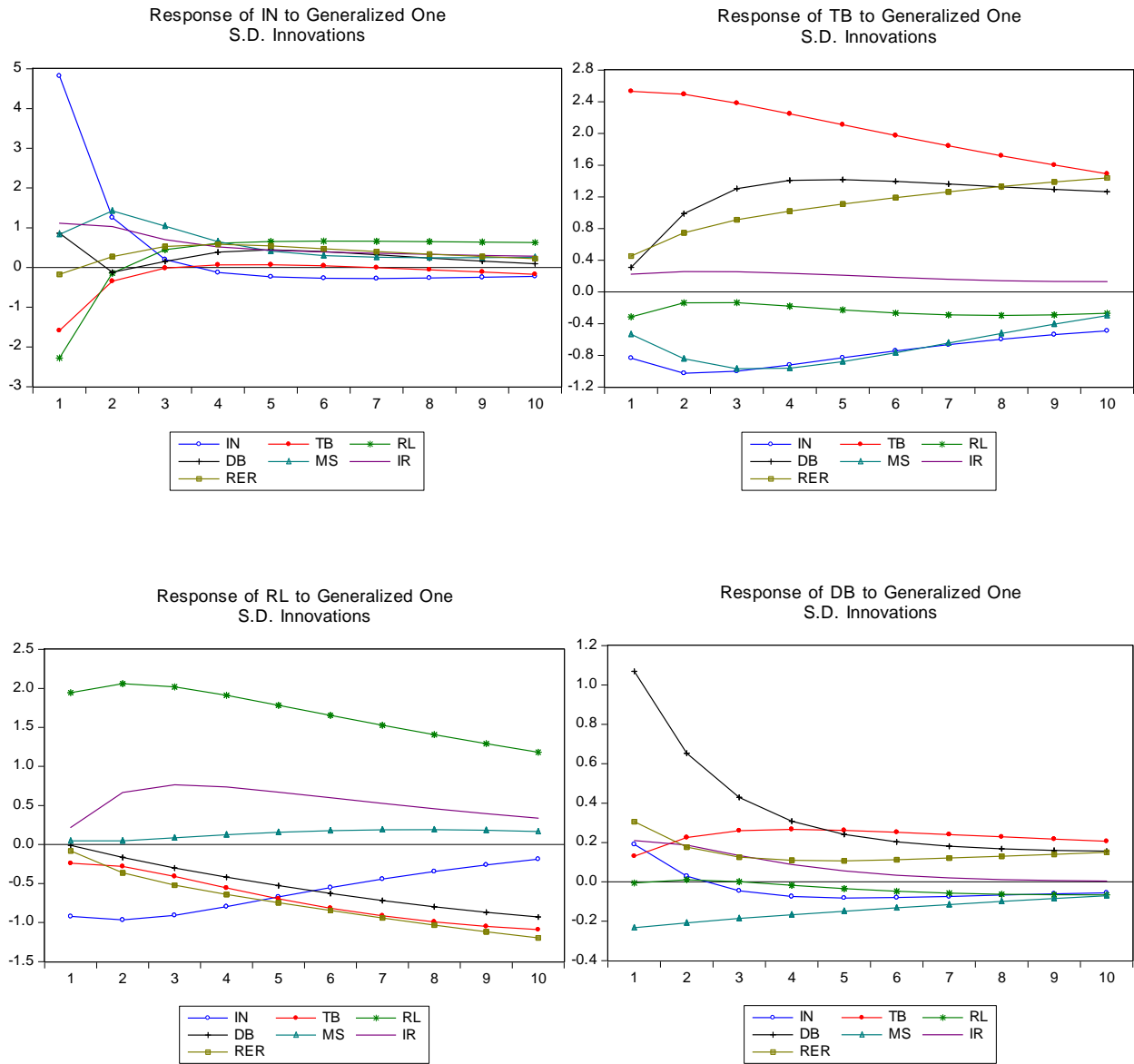**Figure 9:** Generalized impulse response function in VAR

Figure 9 covers four panels. The first explains the response of inflation, the second the response of Treasury bills, the third the response of rupee loans and the final panel the response of development and Treasury bonds. According to Panel one, inflation has a negative response to a shock of Treasury bills throughout the period. Inflation also has an initial negative response to a shock of rupee loans, which becomes positive after the second year. Also, inflation has a positive response to a shock of development and Treasury bonds. But, based on the other three

panels, all three debt instruments have a negative response to a shock of inflation. This confirms that one channel of causality exists between debt instruments and inflation.

5.4 Discussion

The Sri Lankan government budget deficit correlates positively to the country's inflation. The empirical studies of Haan and Zelhorst (1990) and Catao and Terrones (2005) also found a strong positive relationship between these two variables in high-inflation countries, into which category Sri Lanka falls, given their recorded inflation rate during the past 50 years. These results are in line with those studies. Further, in country-specific studies of Pakistan and Peru, Agha and Khan (2006), and Choudhary and Parai (1991), respectively, found that budget deficit affects inflation positively, which results are confirmed this study of the Sri Lankan situation.

This section will discuss results of the budget deficit and inflation relationship based on selected empirical studies, Tables 4 and 5 show empirical results for developed and developing countries.

Table 4: Budget deficit inflation relationship in developing countries

Study	Country	Result	Significant or not	Relationship
Choudhary (1991)	Peru	0.009	Yes	Positive
Karras (1994)	Korea	0.16	No	
	Philippines	-2.17	No	
	Thailand	-1.02	No	
	Sri Lanka	0.12	No	
Metin (1998)	Turkey	3.9	Yes	Positive
Solomon (2004)	Tanzania	0.45	Yes	Positive
Agha (2006)	Pakistan	0.0002	Yes	Positive
This study	**Sri Lanka**	**0.021**	**Yes**	**Positive**

Choudhary (1991) found that budget deficit affects inflation positively in Peru, a developing country. In 1994, Karras studied the budget deficit and inflation relationship for many developing countries, including Sri Lanka, but found no significant relationship between these variables. Metin, in 1998, found a positive significant relationship between budget deficit and inflation in Turkey, which showed Turkey's budget deficit affecting inflation with a positive coefficient of 3.9. As a country study, Solomon (2004) found a positive coefficient of 0.45 in the relationship between budget deficit and inflation in Tanzania. In Pakistan, these two variables also have a positive relationship. This study also found a positive coefficient between these two variables in Sri Lanka. Based on the results in Table 5, there is a positive relationship between budget deficit and inflation in many developing countries. However, this is not always true for developed countries. Table 5 shows this relationship for developed countries, indicating mixed results, with special attention on Burdekin and Wohar's (1990) study.

Table 5: Budget deficit inflation relationship in developed countries

Study	Country	Result	Significant or not	Relationship
Burdekin and Wohar (1990)	France	0.22	Yes	Positive
	Japan	-0.061	Yes	Negative
	Switzerland	-0.12	Yes	Negative
	UK	-0.18	Yes	Negative
	USA	0.36	Yes	Positive
	Germany	0.29	No	

Based on the causal structure of budget deficit and inflation, Ahking and Miller (1985) and Dharmendra *et.al* (1994) suggested a bi-directional relationship between budget deficit and inflation. The causality results of this study seem to bear out these findings, also showing a bi-directional relationship between budget deficit and inflation, explained by the structure of

government expenditure. First, a budget deficit causes inflation through financing methods. Then, because of high inflation, government has to increase expenditure, while revenue increases minimally, if at all. Such is the current situation in Sri Lanka. Figure 10 demonstrates this situation in Sri Lanka since the 1980s, when both recurrent and capital expenditure began to increase rapidly.

Figure 10: Government expenditure
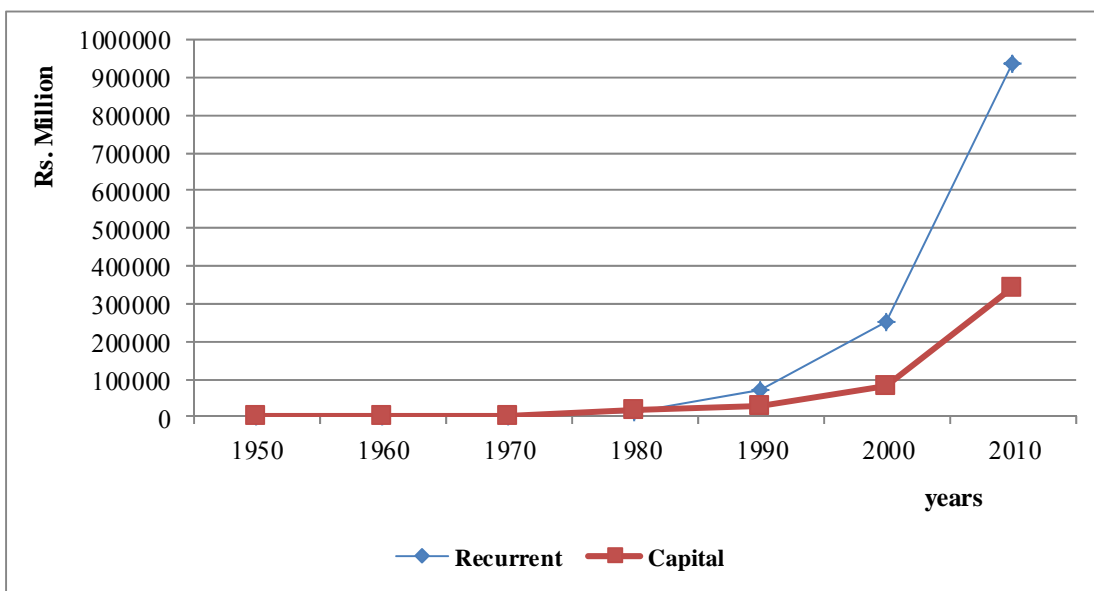
Source: Central Bank of Sri Lanka

Based on these results, there are four main determinants of inflation in Sri Lanka: budget deficit, money supply, interest rate, and real exchange rate. All are positively correlated and statistically significant to inflation. According to Rathnasiri (2009), the growth rate of money supply and real exchange rate are the primary determinants of inflation in Sri Lanka. Kia (2006) analyzed the main sources of inflation in Iran and found that both internal and external sources affect inflation. Similar results were confirmed in this study, in which real exchange rate is used

to capture external influences on the domestic price level. Caporale and Thorbecke (1993) found that interest rate positively affected the inflation rate. Similarly, this study also found that interest rate has a positive relationship to inflation in Sri Lanka. These three previous studies are supporting evidence of the main determinants of inflation discovered here.

In analysis of the theoretical view, both Keynesian and Monetarist views show that money supply and interest rate affect inflation. However, these results suggest that the Keynesian view is accordance with the interest rate/inflation relationship and the Monetarist view is accordance with the relationship between money supply growth and inflation. As discussed by Rathnasiri (2009), real exchange rate positively affects inflation in Sri Lanka, because the Sri Lankan economy depends on essential import items like crude oil, wheat, milk, and so on.

The results of this study suggest that domestic borrowing and long-term domestic debt instruments are inflationary. Monetarist economists explain that deficit financing affects the growth of money supply and thus inflation. Many economists, including Hoffman *at el* (1983), also explain that high budget deficits positively affect debt growth, and there is positive relationship between debt growth and inflation through money supply growth. These arguments are reflected in this study's results, showing that money supply significantly affects inflation in our analysis. Table 6 explains cumulative government debt as a percentage of GDP, supportive evidence of these results. In Sri Lanka, debt increased from 1950 to until 2004, at which point, it begins to slowly fall. From 2001 to 2004, the Sri Lankan cumulative debt is more than 100% of GDP.

Table 6: Cumulative government debt

Year	Debt (as % of GDP)
1950	16.9
1960	34.0
1970	63.6
1980	77.2
1990	96.6
2000	96.9
2010	81.9

Source: Central Bank of Sri Lanka

The results of Model number no.3 show the relationship between deficit-financing debt instruments and inflation. Only rupee loans are statistically significant with inflation, which indicates that the rupee loan is the most inflationary debt instrument in Sri Lanka. Solomon and Wet (2004) showed that budget deficit positively affects inflation in Tanzania, due to monetization of the budget deficit. Caporale and Thorbecke (1993) also determined that monetization causes significant inflation. Agha and Khan (2006) found that bank borrowings or government securities, like Treasury bills and bonds are inflationary in Pakistan. Metin (1998) found that bond financing is inflationary in Turkey. Kohil and Mckibbin (1982) showed that higher bond and money financing lead to price increases in Australia. These are all supportive evidences for the results in the Model no.3 analysis stage of this study.

Some researchers argued that money financing or money printing affect inflation, and some found that short and medium-term debt instruments most affect inflation. However, this study found that the rupee loan, a long-term debt instrument, is the most inflationary debt instrument in Sri Lanka, a result distinct from prior research.

6. Conclusion and policy implication

This study, investigated the relationship between government budget deficit and inflation in Sri Lanka using time series data from 1950 to 2010, with a VAR model focused on domestic deficit financing sources. The analysis also focused on causal relationships between government budget deficit, deficit financing sources, and inflation. Based on VAR regression analysis, budget deficit has a positive correlation with inflation in Sri Lanka. Accordingly, the government budget deficit is a main determinant of increasing inflation. Causality results suggested that there is bi-directional causality between government budget deficits and inflation. According to VAR analysis, the main determinants of inflation in Sri Lanka are budget deficit, money supply, interest rate, and real exchange rate.

Further, domestic deficit financing sources have a positive relationship with inflation, and causality results suggest bi-directional causality between domestic financing sources and inflation. The results herein, however, suggest that foreign borrowing is not statistically significant with inflation. Accordingly, in Sri Lanka, domestic borrowing is inflationary and foreign borrowing is not. Of the three domestic debt instruments used to finance the Sri Lankan budget deficit, the long-term debt instrument of rupee loans is the most inflationary deficit financing debt instrument in Sri Lanka.

Many empirical studies found that the budget deficit positively contributed to the inflation in developing countries. This study confirmed these findings for the budget deficit and inflation relationship in Sri Lanka, as a developing country.

This indicates that the Sri Lankan budget deficit is inflationary when financed through domestic borrowing. This is reflected in the growth rate of the money supply, which correlated positively to inflation. Therefore, the Monetarist hypothesis of budget deficit and inflation

relation is most appropriate to explain the Sri Lankan situation. To achieve sustainable economic growth, fiscal and monetary authorities should focus on this area and change monetary and fiscal policies to control inflation.

Based on this study, budget deficits and deficit-financing domestic borrowings are inflationary. Therefore, better management of the fiscal sector would help control inflation. Fiscal authority should seek to control the budget deficit by reducing unnecessary recurrent and capital expenditure and prioritizing expenditure projects, as well as improving revenue by streamlining the tax system.

Domestic borrowings are inflationary through the money supply growth of the country. Therefore, it is suggested that government should reduce reliance on domestic market borrowings to finance the budget deficit, which will reduce money supply growth, and thus, inflation. Foreign borrowing does not affect inflation, so the Sri Lankan government should improve foreign borrowing policies to stimulate concessional debt for financing future budget deficits.

Long-term deficit-financing debt instruments are inflationary. Therefore, it is suggested that fiscal and monetary authorities should shift from long-term to short-term or medium-term deficit-financing debt instruments in the future.

The main objective of government borrowing to finance budget deficits is reducing cost and risk to the financial sector. This goal aims to minimize the financial burden on the government sector. To minimize the money supply burden in the monetary sector, the government can choose from a variety of borrowings options to finance its deficit. Accordingly it is suggested that both fiscal and monetary authorities should closely coordinate to achieve their objectives.

References

1. Adam, C. S. and Bevan, D. L. (2005), Fiscal deficits and growth in developing countries, *Journal of Public Economics*, 89, 571-597.
2. Agha, A. I. and Khan, M. S. (2006), An Empirical Analysis of Fiscal Imbalances and Inflation in Pakistan, *State bank of Pakistan Research Bulletin*, 2(2), 343-362.
3. Ahking, F.W. and Miller, S. M. (1985), The Relationship Between Government Deficits, Money Growth, and Inflation, *Journal of Macroeconomics*, 7 (4), 447-467.
4. Alavirad, A and Athawale, A. (2005), the impact of the budget deficit on inflation in the Islamic Republic of Iran, *OPEC review*, 37-49.
5. Ashra, S. Chattopadhyay, S. and Chaudhuri, K. (2004), Deficit, Money and Price: the Indian experience, *Journal of Policy Modeling*, 26, 289-299.
6. Barnhart, S. W. and Darrat, A F. (1988), Budget Deficits, Money Growth and Causality: Further OECD Evidence, *Journal of International Money and Finance*, 7, 231-242.
7. Barnhart, S.W. and Darrat, A. F (1989), Federal Deficit and Money Growth in the United states, *Journal of Banking and Financing*, 13, 137-149.
8. Basco, E. Damato, L. and Garegnani, L. (2009), Understanding the money-price relationship under low and high inflation regimes: Argentina 1977-2006, *Journal of International Money and Finance*, 28, 1182-1203.
9. Bassetto, M. and Butters, R. A. (2010), What is the relationship between large deficits and inflation in industrialized countries, *Economic Perspectives*-Federal Reserve Bank of Chicago, 83-100.
10. Burdekin, R. C. K. and Wohar, M. E. (1990), Monetary Institutions, Budget Deficits and Inflation, *European Journal of Political Economy*, 6, 531-551.
11. Caporale, T. and Thorbecke, W. (1993), The budget deficit and the arbitrage pricing theory, *Economic Letters*, 41, 313-317.
12. Cardoso, E. A. (1992), Deficit finance and monetary dynamics in Brazil and Mexico, *Journal of Development Economics*, 37, 173-197.
13. Catao, L. A. V. and Terrones, M. E. (2005), Fiscal deficits and Inflation, *Journal of Monetary Economics*, 52, 529-554.
14. Central Bank of Sri Lanka. (2008-2011), *Annual Reports*.
15. Central Bank of Sri Lanka. (2009), *Public Debt Management in Sri Lanka*, Sri Lanka.
16. Choudhary, M. A. S. and Parai, A. K. (1991), Budget deficit and inflation: the Peruvian experience, *Applied Economics*, 23, 1117-1121.
17. Demopoulos, G. D. Katsimbris, G. M. and Miller,S. M. (1987), Monetary policy and central bank financing of government budget deficits, *European Economic Review*, 31, 1023-1050.
18. Dharmendra, D. Kandil, M. Sharam, S. C. Trescott, P.B. (1994), Determinants of the inflation rate in the United States: A VAR investigation, *The Quarterly Review of Economics and Finance*, 34(1), 95-112.
19. Edwards, S. and Tabellini, G. (1991), Explaining fiscal policies and inflation in developing countries, *Journal of International Money and Finance*, 10, 16-48.
20. Giannaros, D. S. and Kolluri, B. R. (1985), Deficit Spending, Money and Inflation: Some International Empirical Evidence, *Journal of Macroeconomics*, 7(3), 401-417.
21. Gujarati, D. (1995), Basic econometrics, Third edition, MacGraw-Hill International, USA.
22. Gujarati, D. (1999), *Essentials of Econometrics*, second Edition, MacGraw-Hill International, USA.
23. Haan, J. D. and Zelhorst, D (1990),The impact of government deficits on money growth in developing countries, *Journal of International Money and Finance*, 9, 455-469.
24. Hoffman, D. L. Low, S. A. and Reineberg, H. H. (1983), Recent Evidence on the Relationship between Money Growth and Budget Deficits, *Journal of Macroeconomics*, 5(2), 223-231.

25. Karras, G. (1994), Macroeconomic effects of budget deficits: further international evidence, *Journal of International Money and Finance*, 13(2), 190-210.
26. Kia, A. (2006), Deficits, debt financing, monetary policy and inflation in developing countries: Internal or external factors, Evidence from Iran, *Journal of Asian Economics*, 17, 879-903.
27. Kohil, U. R. and Mckibbin, W. J. (1982), Are Government Deficits the Prime Cause of Inflation, *Journal of Policy Modeling*, 4(3), 279-309.
28. Maddala, G.S. and Lahiri, K. (2009), *Introduction to Econometrics*, Fourth Edition, Wiley and sons ltd publication, UK.
29. Mankiw, N.G. (2008), *Principles of Macroeconomics*, United States of America.
30. Metin, K. (1998), The Relationship between Inflation and the Budget Deficit in Turkey, *Journal of Business & Economic Statistics*, 16 (4), 412-422.
31. Ministry of Finance and Planning, Sri Lanka. 2009 and 2010 *Annual Report and Budget Bulletins*.
32. Niskanen, W. A. (1978), Deficits, Government Spending, and Inflation, *Journal of Monetary Economics*, 4, 591-602.
33. Ozatay, F. (1997), Sustainability of Fiscal Deficits, Monetary Policy, and Inflation Stabilization: The Case of Turkey, *Journal of Policy Modeling*, 19(6), 661-681.
34. Pekarski, S. (2011), Budget deficits and inflation feedback, *Structural Change and Economic Dynamics,* 22, 1-11.
35. Protopapadakis, A. A. and Siegel, J. J. (1987), Are Money Growth and Inflation Related to Government Deficits: Evidence from Ten Industrialized Economies, *Journal of International Money and Finance*, 6, 31-48.
36. Ratnasiri, H. P. G. S. (2009), The Main Determinants of Inflation in Sri Lanka, *Staff studies* - Central Bank of Sri Lanka, 39, 1-14.
37. Sabirin, S. (July 2002), Kebijakan Moneter Bank Indonesia dalam Mendukung proses Pemulihan Ekonomy, General lecture at the Airlangga University, as sited Novyanto. (September-2003) Reconsidering the Money Inflation Relationship – The case of Indonesia, Graduate School for International Development and Cooperation, Hiroshima University.
38. Snowdon, B. and Vane, H.R. (2005), *Modern Macroeconomics*, UK, MPG Book Ltd.
39. Solomon, M. and Wet, W. A. D. (2004), The Effect of a Budget Deficit on Inflation: The Case of Tanzania, *South African Journal of Economic and Management Sciences*, 7(1), 100-116.
40. Sowa, N. K. (1994), Fiscal Deficits, Output Growth and Inflation Targets in Ghana, *World Development Report*, 22(8), 1105-1117.
41. Wijnbergen, S. V. and Budina, N. (2001), Inflation Stabilization, Fiscal Deficits and Public Debt Management in Poland, *Journal of Comparative Economics*, 29, 293-309.
42. Wooldridge, J. M. (2009) *Introductory Econometrics*, Southwestern cengage learning.