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Inflation in Egypt: A fiscal or monetary phenomenon?

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Abstract:

Fiscal and monetary policy are characterized by mutual interdependence. In particular, the levels of budget deficit and public debt affect interest rates and prices. Hence, fiscal policy status affect the conduct and targets of monetary policy, and can undermine its effectiveness in curbing inflation. This paper utilizes a Structural Vector Auto-regression (SVAR) approach to investigate the impact of fiscal shocks on monetary policy and overall price level in Egypt. This is particularly relevant for the Egyptian economy since it currently witnesses unprecedented inflation rates and high levels of public debt as well. Hence, it is crucial to understand how the high levels of public debt affect prices, interest rates and other variables. Empirical model results found evidence supporting the application of fiscal theory of prices in Egypt. The main findings of this work is that inflation in Egypt is primarily a fiscal phenomenon, rather than a monetary one, as the impulse response functions have shown that a positive shock to fiscal deficit leads to a significant increase in consumer price index. Although the Central bank reacts to high prices by increasing the discount rate, the effect of this instrument on the price level is not significant, given the high level of budget deficit and public debt. Furthermore, variance decomposition showed that budget deficit proceeds the discount rate in explaining changes in prices, implying that monetary policy alone has limited effectiveness in targeting inflation.

JEL Classifications: E31, E52, E62, E63

Keywords: Fiscal policy, monetary policy, fiscal-monetary interaction, inflation, SVAR

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1. Introduction

Fiscal and monetary policy represent the main policy instruments utilized by governments to achieve macroeconomic stability. These policies are characterized by mutual interdependence. For example, fiscal discipline enhances the credibility of monetary policy and its ability to achieve price stability. Meanwhile, large levels of budget deficit and public debt affect the money supply and interest rates, and undermines the effectiveness of monetary policy. In this regard, it is significantly crucial for policy makers to consider how fiscal and monetary shocks affect each other, and influence macroeconomic variables. This paper utilizes a structural vector auto regression model (SVAR) of the Egyptian economy to analyze the effect of fiscal and monetary policy shocks on prices and output which are the main targets of macroeconomic policy. In addition, it analyzes the mutual effect of fiscal and monetary shocks on each other, in an attempt to demonstrate empirically whether the current high level of inflation in Egypt is caused by fiscal or monetary decisions.

This seems to be particularly relevant for the Egyptian economy since it witnesses a high level of budget deficit and public debt. Moreover, in addition to the escalating budget deficit and government debt, the Egyptian economy is currently facing additional macroeconomic challenges represented in rising inflation, high unemployment rates, and

slow down of economic growth. During the first quarter of 2017 (Jan-March) the growth rate of real GDP reached 4.3%, while the inflation rate reached 29.8%, unemployment rate amounted to 12%. Moreover, the ratio of total government debt to GDP reached 107.9% during the same period (MOF, 2017).

In this regard, it is crucial to mention that the Egyptian Government is undergoing a serious adjustment and structural program to reform the economy and restore investments in order to promote economic growth and sustainable development. This program entails a set of policies and procedures aiming at reforming the exchange rate market to foster a more flexible exchange rate regime, increase in government revenues through reform in the tax system and tax rates, removing unnecessary subsidies and directing subsidies to lower-income classes and other accompanying policies. The formulation of fiscal and monetary policy, within this challenging macroeconomic context, is constrained by many obstacles and is subject to wide debates among economists and policy makers. To achieve its objectives and overcome the current challenges, the government must design the appropriate fiscal and monetary policies to stimulate economic growth.

Hence, within this framework, it is important for policy makers to analyze and understand how any change of fiscal or monetary policy would affect the other twin policy. To analyze this mutual interdependence, this paper is divided into four sections. Section two provides a review of the theoretical and empirical studies that analyzed the interaction between fiscal and monetary policy. Section three discusses the methodology utilized in this work and proceeds with the necessary steps to estimate the structural VAR model for the Egyptian economy. Section four presents the results of the model, along with their theoretical and empirical implications. In addition, some robustness checks are conducted to test the sensitivity of the model results. Finally, section five concludes with the main findings of this work.

2. Literature review

This section provides a review of the theoretical channels through which fiscal policy affects monetary policy. It also presents the results of empirical studies conducted to test this interdependence.

2.1. Theoretical background

The ultimate objectives of economic policy are represented in price stability, high growth rates, and low unemployment rates. Fiscal and monetary policies are used jointly to achieve these objectives. However, the available body of literature and country experiences have shown that monetary policy is more concerned with curbing inflation and maintaining price stability, while fiscal policy is more concerned with stimulating aggregate demand, achieving low unemployment rates, and smoothing business cycle downturns (Blinder (1998); Anyanwu (1993) and Sheffrin (2003). In this regard, it is crucial to note that the two policies are characterized by mutual interdependence and tend to interact in their operations and targets. For example, when fiscal authorities pursue an expansionary policy to boost aggregate demand, this leads to an increase in the overall price level, and thus the central bank tends to respond by tightening monetary policy to curb inflation. Meanwhile, the expansionary fiscal policy can be associated with high levels of budget deficit and public debt, which tends to push interest rates upwards due to the increase in the level of risks associated with the solvency of the state and fiscal sustainability.

Hence, according to the literature that tackled the interaction between fiscal and monetary policy (see for example: Zoli, 2005; Kuncoro & Sebayang, 2013), economic systems can be

classified into two regimes: fiscal dominant regime and monetary dominant regime, or as Sargent (1982) and Aiyagari & Gertler (1985) name it, a Ricardian regime. A regime is said to be monetary dominant regime when monetary policy is set independently regardless the level of public debt, and in this case, the government adjusts its primary budget balance and attempts to limit public debt in order to allow the monetary authority to perform its functions and avoid the inflationary repercussions resulting from the increase in debt levels. On the other hand, under a fiscal dominant regime (as first pointed out by Sargent & Wallace, 1981), the fiscal authority sets its policies and targeted levels of spending and deficit - including revenues raised through T-bills and T-bonds sales -without considering the expected outcomes on inflation and price levels.

One of the prominent theories that explain this phenomenon is the fiscal theory of the price level (see, for example, Woodford (1995) and Cochrane (1998, 2001). Under this theory, inflation is a fiscal phenomenon, not a monetary one. This theory argues that a fiscal dominant regime undermines the central bank's capacity to control inflation, even if the central bank is committed to inflation targeting and does not monetize the debt through creating new money. This implies that prices are determined by the level of public debt, as well as the current and future levels of taxes and government expenditure, with a limited role of monetary policy. Hence, inflation becomes a fiscal phenomenon and the effectiveness of monetary policy can be challenged by imprudent fiscal policy, even if the central bank is characterized by a high level of independence (Christiano & Fitzgerald, 2000; Kuncoro & Zebayang, 2013).

This can be explained as follows: When public debt is high, and is mainly composed of short-term debt, raising interest rates to maintain inflation within the target range, leads to an increase in debt service, and hence the level of debt. This poses risks to the fiscal sustainability of the state, hence increases risk premium and default probability causing capital outflows and depreciation of the currency, rather than appreciation. If a large fraction of the exchange rate is denominated in foreign currency, this depreciation increases the level of public debt. It also poses inflationary pressures on the economy causing the central bank to pursue more increases in the interest rates to curb inflation, leading to further increases in public debt and so on. This vicious cycle symbolizes a fiscal dominant regime, even if monetary policy does not relax in response to fiscal policy. This is a fiscal dominant regime in the sense that fiscal decisions, rather than monetary ones, have a significant impact on inflation, interest rates and exchange rates.

2.2. Empirical evidence

Numerous empirical studies attempted to investigate the validity of these theories and whether fiscal dominant or monetary dominant regime is more prevalent in advanced economies, as well as emerging markets. The findings of Tanner and Ramos (2002) showed that there is some evidence for a fiscal dominant regime in Brazil after the Asian financial crisis in 1997. Other studies (for example, Blanchard (2004) and Favero & Giavazzi (2004)) further analyzed the implications of fiscal dominance and showed that high levels of public debt can lead the economy to a bad equilibrium. In this case, a contractionary monetary policy has effects that contradict theoretical expectations. Their analysis showed that an increase in interest rates led to currency depreciation and inflation in Brazil due to high levels of public debt, thus undermining the effectiveness of monetary policy.

Zoli (2005) used the VAR methodology to assess fiscal/monetary dominance in emerging markets, and also estimated the monetary policy reaction function of these countries after adding fiscal policy variables. The results provided evidence for fiscal dominance in emerging markets like Argentina and Brazil during the late 1990s and early 2000s. Consistent with these findings, De Resende (2007) conducted cross-country comparisons

among developing and developed economies. He found that developing countries have more fiscal dominant regimes. On the other hand, monetary dominant regimes are more prevalent in developed economies. For most OECD countries, monetary policy sets its targets first and imposes discipline on the fiscal authorities, which determines the amount of debt that is consistent with the monetary targets set by the monetary authorities.

As for the tools utilized to analyze this strategic interaction between fiscal and monetary policy, the structural VAR approach developed by Sims (1986) is widely used in literature. The main advantage of this model is that it enables policy analysts to observe how a shock in any macroeconomic variable affects other variables in the system, and how it is dispersed throughout the economy. Some studies such as Favero (2002) stressed the importance of including fiscal variables while studying the impact of monetary policy on macroeconomic variables to avoid biased estimators. Wilson and Regine (2015) applied the SVAR methodology to explore the channels through which fiscal policy affects monetary policy. They found that budget deficit exerts pressures on the overall price level in Rwanda. Similarly, Trenovski, & Tashevska (2015) applied it in Macedonia and found evidence that fiscal policy undermines the goals of monetary policy as the level and repercussions of public debt are not taken into account while setting fiscal policy, indicating fiscal dominance.

3. Methodological framework

3.1. Data and trends of selected variables

As mentioned before, the SVAR methodology has been recently used as a policy tool to analyze the interaction of fiscal and monetary policy in a macroeconomic framework. The SVAR approach is used to examine the impact of structural shocks on the variables under study. This paper estimates a SVAR with four variables: RGDP (in logs), Consumer price index (CPI) (in logs), central bank discount rate (CBR) and budgetary balance (deficit/surplus as percent of GDP) for identification of the effect of monetary and fiscal policies shocks on output and prices, and the impact of fiscal shocks on the conduct of monetary policy. The model uses quarterly data from 2005 to 2015.

Before proceeding with model estimation, it is useful to examine the trend of the selected variables in the data set. Figure 1 shows the trend and developments of budget deficit to GDP ratio as a proxy for fiscal policy, and the discount rate as an instrument that represents the conduct of monetary policy in addition to the inflation rate over the period 2007 to 2015. It is evident from the figure that budget deficit and inflation are moving in the same direction most of the time. Whenever the fiscal deficit is increasing, this results in higher inflation rates causing the central bank to react by raising the discount rate to curb inflation. This provides some evidence for the fiscal theory of prices in Egypt, that is, inflation is greatly caused by high levels of budget deficit and public debt, and the monetary policy alone is not effective in curbing high inflation rates. Although the central bank reacts to its primary macroeconomic objective, which is inflation targeting, by raising interest rates when inflation is high, this tool does not achieve its intended objectives as long as the budget deficit is high. Moreover, this supports the general trend in literature that claims that higher levels of fiscal deficit leads to higher risk premium, and hence pushes interest rates upwards.

FIGURE 1. TREND OF FISCAL DEFICIT/GDP, INFLATION RATE AND DISCOUNT RATE FROM 2007-2015

Source: Author's construction based on MOF data.

3.2. Structure of the model and imposing restrictions

Two steps are involved to implement the SVAR approach. First, we run traditional unrestricted VAR. Then, the analysis proceeds to estimate structural factorization by imposing restrictions based on economic theory and previous empirical literature in fiscal and monetary policy.

A reduced form VAR, excluding the deterministic trend can be shown by equation (1).

$$Y_t = A_1 Y_{t-1} + A_2 Y_{t-2} + \dots + A_p Y_{t-p} + E_t \quad (1)$$

Where Y_t is a (nx1) vector of endogenous variables, A_i is a (n x n) vector of parameters, p denotes the number of lags in the VAR model, and finally E_t is (nx1) vector of error terms with expected value of 0. The Lag length selection in unrestricted VAR model is determined based on information criteria.

Following this step, the SVAR model is estimated through imposing restrictions. The general form of the SVAR model can be written in the form shown in equation (2).

$$AY_t = A_1 Y_{t-1} + A_2 Y_{t-2} + \dots + A_p Y_{t-p} + B E_t \quad (2)$$

This model has been generalized by Amisano & Giannini (1997) in the form of matrices, and called AB model as shown in equation (3).

$$A\varepsilon_t = Bu_t \quad (3)$$

The identification of restrictions in SVAR model is based on putting some restrictions on contemporaneous relationships among variables. Following the approach adopted by Cazacu (2015), these restrictions are shown in equation 4, which represents the left-hand side of the standard SVAR representation. The non-zero coefficients A_{ij} in matrix A show the effect of variable j on variable i instantaneously. The Coefficients on the diagonals are normalized to one, while the 0 entries indicate that there is no contemporaneous relationship between the two variables. The system proposed in this model is exactly identified as the number of restrictions imposed on matrix A coefficients is equal to $(n^2 - n)/2$, where n is the number of variables. Thus, a total of 6 restrictions are imposed on the model. The structure of the contemporaneous relationship among the variables is presented below:

$$\begin{bmatrix} 1 & 0 & 0 & a_{14} \\ a_{21} & 1 & 0 & a_{24} \\ a_{31} & a_{32} & 1 & a_{34} \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} u_{gdp} \\ u_{cpi} \\ u_{cbr} \\ u_{def} \end{bmatrix} = \begin{bmatrix} b_{11} & 0 & 0 & 0 \\ 0 & b_{22} & 0 & 0 \\ 0 & 0 & b_{33} & 0 \\ 0 & 0 & 0 & b_{44} \end{bmatrix} \begin{bmatrix} E_{gdp} \\ E_{cpi} \\ E_{cbr} \\ E_{def} \end{bmatrix} \quad (4)$$

The main assumptions behind this restrictions matrix are formulated based on Cazacu's approach (2015), and are discussed below:

- A shock in the fiscal deficit will affect output, prices and interest rates contemporaneously since any shock to the budget deficit affects output directly through its effect on aggregate demand, it also affects prices through its impact on money supply and aggregate demand. As for interest rates, since a shock affects prices instantaneously, the central bank responds by changing the interest rates to curb inflation. Also, the central bank responds to expectations of inflation, so if the government adopts an expansionary fiscal policy, the central bank expects an increase in prices, and hence reacts instantaneously to stabilize prices.
- The budget deficit variable does not respond contemporaneously to changes in output, prices, or interest rates since it takes more than one quarter to accommodate changes in the proposed revenues and expenditure in the budget. In addition, it requires the approval of legislative bodies (De Castro & De Cos, 2006; Krusec, 2004).

- It is also assumed that interest rates shocks do not affect output and prices contemporaneously since any change in the central bank rate is transmitted first to money markets through affecting deposit and lending rates, which in turn affect spending decisions by individuals and firms, affecting Aggregate demand and hence output and prices. This process takes more than one quarter (in line with Leeper & Gordon, 1994; Leeper, Sims, & Zha, 1996).
- Finally, a shock to CPI doesn't affect GDP in the same quarter.

3.3. Model estimation

First, stationarity tests were used to determine the stationarity of time-series data using the Augmented Dickey Fuller test in order to avoid spurious results resulting from using non-stationary time series in the model. The results of the ADF test showed that all variables except the discount rate are non-stationary and integrated of order 1. Thus, we used the first difference of GDP series, CPI and fiscal deficit/GDP. The lag length criteria (Akaike, Schwartz, & Hannan-Quinn) recommends a lag length of 2, so this lag structure is used in the model estimation.

Before running the impulse response function, the stability of the VAR model was tested using the inverse roots graph. The model was found to be stable since all inverse roots of the estimated VAR coefficients lie inside the circle as shown in Figure 2. This implies that the impact of shocks on variables fades away after a certain period of time.

FIGURE 2. INVERSE ROOTS OF AR CHARACTERISTIC POLYNOMIAL

Source: E-views output based on SVAR analysis.

4. Results and discussion

This section presents the results of the SVAR model, showing the impact of shocks on the system variables using Impulse Response functions (IRFs) and Variance decomposition of all variables. Then, some robustness tests are conducted to check the sensitivity of model results.

4.1. IRFs and Variance decomposition

The IRFs for 12 quarters are presented in Figure 3. The first column shows the impact of GDP shocks on the selected variables in the model (GDP, CPI, discount rate and budget deficit/GDP). Since supply shocks require a long-time frame to observe their impact, the response of other variables to these shocks is not clear in the short-run period studied here.

FIGURE 3. IMPULSE RESPONSE FUNCTIONS OF BASELINE MODEL

Source: E-views output based on SVAR analysis.

Column 2 analyzes the effect of price shocks on the variables in the model. It is clear that a positive shock in inflation leads the central bank to react by conducting a contractionary monetary policy by raising the discount rate. The central bank's response starts immediately and begins to fade away after 4 quarters. The budget deficit also increases starting the second quarter as a result of the increase in government expenditures due to rising prices, and also the increase in interest payments on domestic debt as a result of the contractionary policy adopted by the central bank. However, this impact soon fades away as there are more fundamental elements that affect the budget deficit like tax composition, revenue and expenditure structure, economic growth, etc.

Column 3 shows the effect of positive interest rate shocks on other variables. In line with theoretical expectations, an increase in the discount rates does not have a significant impact on CPI, which shows that prices are more affected by the conduct of fiscal policy in Egypt, and hence monetary policy instruments have limited effectiveness in targeting inflation. The budget deficit also increases as a result of the positive shock in interest rates due to the increase in debt service.

Column 4 shows the effect of a positive shock in fiscal deficit, and hence enables us to explore the interaction between fiscal and monetary policy in a macroeconomic setting. A positive shock in the fiscal deficit results in a significant increase in CPI, that persists until Quarter 12 and does not fade away. Also, an increase in the fiscal deficit leads central bank to increase the discount rates in an effort to combat inflation, though not effective as denoted earlier and shown by the IRF in column 3. Thus, there is evidence that the Egyptian economy is more of a fiscal dominant regime, in the sense that a higher budget deficit is associated with higher prices and higher interest rates.

TABLE 1. VARIANCE DECOMPOSITION OF RGDP

Quarter	%Δ due to RGDP shocks	%Δ due to CPI shocks	%Δ due to CBR shocks	%Δ due to BUDDEF/GDP shocks
1	98.84908	0.000000	0.000000	1.150923
2	95.17960	0.045041	3.226940	1.548415
3	89.93522	0.468334	5.471075	4.125376
4	90.46487	0.420249	5.463167	3.651717
5	90.39086	0.855541	4.559973	4.193622
6	88.50658	2.049576	4.157659	5.286190
7	86.50082	3.174960	3.856378	6.467839
8	85.64788	3.837302	3.571968	6.942852
9	85.28780	4.116905	3.329145	7.266145
10	85.13761	4.245318	3.131091	7.485977
11	84.98593	4.350356	2.970747	7.692964
12	84.84612	4.466949	2.839358	7.847572

Source: E-views output based on SVAR analysis.

TABLE 2. VARIANCE DECOMPOSITION OF CPI

Quarter	%Δ due to RGDP shocks	%Δ due to CPI shocks	%Δ due to CBR shocks	%Δ due to BUDDEF/GDP shocks
1	3.202298	91.67502	0.000000	5.122684
2	5.212806	87.65269	2.507389	4.627110
3	5.032789	86.48122	3.116016	5.369971
4	4.883688	86.57404	3.363181	5.179090
5	4.828610	84.93874	4.513540	5.719113
6	4.944272	84.37106	4.719258	5.965408
7	5.199872	84.16176	4.683736	5.954632
8	5.336877	83.98717	4.738491	5.937460
9	5.407117	83.92812	4.742280	5.922484
10	5.500699	83.83012	4.739721	5.929465
11	5.615854	83.70188	4.737823	5.944447
12	5.734412	83.58042	4.730729	5.954434

Source: E-views output based on SVAR analysis.

The variance decomposition of CPI shows that CPI mostly responds to its own shocks. During the first period, the change in inflation comes mainly from its own shock, with a percentage of 91.7%, followed by the fiscal deficit contributing to around 5.1% to the changes in inflation. However, the relative importance of other variables starts to increase until in quarter twelve, 6% in the changes in CPI are due to changes in the fiscal deficit, 5.7% due to changes in output and 4.7% due to changes in the discount rate. This goes in line with previous findings from the IRF that support the application of the fiscal theory of prices in Egypt as the budget deficit proceeds the discount rate in explaining changes in prices, implying that monetary policy alone is insufficient in targeting inflation.

TABLE 3. VARIANCE DECOMPOSITION OF CBR

Quarter	%Δ due to RGDP shocks	%Δ due to CPI shocks	%Δ due to CBR shocks	%Δ due to BUDDEF/GDP shocks
1	0.359479	24.75064	67.20647	7.683410
2	0.445757	34.23564	55.40209	9.916509
3	0.384862	38.81634	49.01298	11.78581
4	0.451175	39.62003	48.12632	11.80247
5	0.580918	39.54424	48.02590	11.84894
6	0.731410	39.87786	47.46219	11.92853
7	0.844526	40.00206	47.22213	11.93128
8	0.922075	39.97075	47.17335	11.93382
9	0.966125	39.95457	47.14846	11.93085
10	1.007696	39.93601	47.12641	11.92989
11	1.053067	39.91834	47.10040	11.92820
12	1.100939	39.90016	47.07255	11.92636

Source: E-views output based on SVAR analysis.

TABLE 4. VARIANCE DECOMPOSITION OF BUDGET DEFICIT
TO GDP RATIO

Quarter	%Δ due to RGDP shocks	%Δ due to CPI shocks	%Δ due to CBR shocks	%Δ due to BUDDEF/GDP shocks
1	0.000000	0.000000	0.000000	100.0000
2	9.680737	0.154702	4.236398	85.92816
3	14.38577	0.408022	5.284153	79.92206
4	14.39765	0.526722	5.266625	79.80900
5	14.22629	0.532398	5.279879	79.96144
6	14.32302	0.575725	5.274501	79.82675
7	14.43813	0.639901	5.291817	79.63015
8	14.43282	0.640695	5.302170	79.62431
9	14.43846	0.651106	5.299576	79.61086
10	14.43769	0.652314	5.300609	79.60939
11	14.44534	0.654583	5.301814	79.59826
12	14.44609	0.656382	5.301651	79.59588

Source: E-views output based on SVAR analysis.

On the other hand, the variance decomposition of the discount rate shows that starting the first quarter, the central bank responds immediately to changes in the consumer price index as about 25% of the changes in the discount rate are due to changes in CPI in period 1. This ratio continues to increase until it reaches 40% of the changes in discount

rate in quarter 12. Also, the fiscal deficit contributes to around 12% of the changes in the discount rate in quarter 12. This implies that the central bank considers first inflation as a primary target of monetary policy; meanwhile, it takes into account the trends in the fiscal policy and budget deficit while setting its targets, though with a small percentage. However, despite the central bank acting independently and using its tools to react to price increases, the lack of fiscal prudence renders this policy ineffective.

Finally, the variance decomposition of the budget deficit shows that by quarter 12, 79.6% of the changes in the budget deficit are due to its own shocks, 14.4% are due to GDP shocks, 5.3% are due to discount rate shocks, and 0.7% are due to CPI shocks. This implies that the formulation of fiscal policy depends mainly on output shocks as it responds to any change in economic activity as its primary target consistent with the presented literature in section two, while it responds by a lower percentage to inflation and changes in monetary policy.

4.2 Robustness tests

To test the sensitivity of model results, two robustness checks have been conducted. The first one uses government debt as a proxy for fiscal policy instead of budget deficit/GDP ratio. The results of the model and the Impulse response functions did not change much and witness the same pattern of response. IRFS are shown in Figure 4.

FIGURE 4. IRFS OF MODEL 2 USING GOVERNMENT DEBT INSTEAD OF BUDGET DEFICIT

Source: E-views output based on SVAR analysis.

The second robustness check attempts to explore the sensitivity of the results if a long-run restrictions matrix is used instead of short-run contemporaneous restrictions. The structure of the long-run restrictions matrix is set in line with previous empirical studies as a lower triangular matrix and is shown below:

$$\begin{bmatrix} a_{11} & 0 & 0 & 0 \\ a_{21} & a_{22} & 0 & 0 \\ a_{31} & a_{32} & a_{33} & 0 \\ a_{41} & a_{42} & a_{43} & a_{44} \end{bmatrix}$$

FIGURE 5. IRFS OF LONG-TERM RESTRICTIONS MODEL SPECIFICATION

Source: E-views output based on SVAR analysis.

Figure 5 shows the IRF results after imposing long-run restrictions. The figure shows the same pattern in terms of central bank response to rising inflation by raising the interest rate. Also, the response of CPI to the positive shock in interest rates is not significant. However, unlike the short-term restrictions, there is no clear response of CPI or discount rate to a positive shock in budget deficit. This can be explained by the fact that short term restrictions are more suitable in explaining the impact of fiscal and monetary shocks since the response of prices and interest rates mainly occurs shortly after any shock. This also

goes in line with the majority of empirical literature that utilized short term restrictions matrix, rather than long term ones.

5. Conclusion

This paper utilized a structural VAR approach to study the fiscal-monetary interaction in the Egyptian economy. The main findings of this work is that inflation is a fiscal phenomenon, that is, the empirical model results found evidence for the fiscal theory of prices in the Egyptian economy. The impulse response functions have shown that a positive shock to fiscal deficit leads to a significant increase in consumer price index. This implies that the recent waves of inflation witnessed in the Egyptian economy can largely be attributed to the high levels of budget deficit and public debt. Although the Central bank reacts to high prices by increasing the discount rate, the effect of this instrument on the price level is not significant, due to the repercussions of the high level of budget deficit and public debt. Furthermore, variance decomposition showed that budget deficit proceeds the discount rate in explaining changes in prices, implying that monetary policy alone has limited effectiveness in targeting inflation.

This provides some insight to policy makers that monetary policy alone wouldn't be effective in curbing inflation and stabilizing the overall price level. Sustainable Fiscal reforms are necessary to decrease budget deficit, limit public debt and control prices.

References

- Amisano, G., & Giannini, C. (1997). *Topics in structural VAR econometrics*. Springer-Verlag, Berlin.
- Aiyagari, S. R., & Gertler, M. (1985). The backing of government bonds and monetarism, *Journal of Monetary Economics*, 16(1), 19-44.
- Anyanwu, J. C. (1993). *Monetary economics: theory, policy and institutions*. Onitsha, Nigeria: Hybrid publishers.
- Blanchard, O. (2004). *Fiscal dominance and inflation targeting: lessons from Brazil* (NBER Working Paper No. 10389). Cambridge, MA.
- Blinder, A. S. (1998). *Central banking in theory and practice*. Massachusetts London, England: MIT Press.
- Cazacu, A-M. (2015). Fiscal-monetary policy interaction: SVAR evidence from a CEE Country. *European Scientific Journal*, Special Edition, April 2015, 12-23
- Christiano, L.J., & Fitzgerald, T.J. (2000). Understanding the fiscal theory of the price level. *Economic Review*, 36(2), Quarter 2, Federal Reserve Bank of Cleveland.
- Cochrane, J. H. (1998). A frictionless view of U.S. Inflation. In *NBER Macroeconomics Annual 1998*, 13 (pp. 323-421), Cambridge, MA: National Bureau of Economic Research.
- Cochrane, J. H. 2001. Long-term debt and optimal policy in the fiscal theory of the price level, *Econometrica*, 69(1), 69-116.
- De Castro, F., & De Cos, P.H. (2006). *The economic effects of exogenous fiscal shocks in Spain: a SVAR approach* (European Central Bank Working Paper No. 647).
- De Resende, C. (2007). *Cross-country estimates of the degree of fiscal dominance and Central Bank Independence* (Bank of Canada Working Paper No. 2007-36).
- Favero, C. (2002). *How do European and fiscal authorities behave?* (Working paper series, No. 214), Bocconi University, IGIER (Innocenzo Gasparini Institute for Economic Research).
- Favero, C., & Giavazzi, F. (2004). *Inflation targeting and debt: lessons from Brazil*. (NBER Working Paper No. 10390). Cambridge, MA.

- Krusec, D. (2004). *The effects of fiscal policy on output in a structural VEC model framework: The case of four EMU and four non-EMU OECD countries*. Paper presented in 8th International Conference on Macroeconomic Analysis and International Finance, May 27-29, Rethym, Crete.
- Kuncoro, H., & Sebayang, K. D. (2013). The dynamic interaction between monetary and fiscal policies in Indonesia. *Romanian Journal of Fiscal Policy*, 4(1-6), 47-66
- Leeper, E.M., & Gordon, D.B. (1994). The dynamic impacts of monetary policy: an exercise in tentative identification. *Journal of political economy*, 102(6), 1228-1247.
- Leeper, E.M., Sims, C.A., & Zha, T. (1996). What does monetary policy do? *Brookings Papers on Economic Activity*, 2, 1-78.
- Ministry of Finance (MOF). 2017. *The financial monthly report - July 2017*. MOF Publications retrieved from http://www.mof.gov.eg/English/publications/MOF_Publications/
- Sargent, T.J., & Wallace, N. (1981). Some unpleasant monetarist arithmetic. *Quarterly Review of the Federal Reserve Bank of Minneapolis*, 5, 1-17.
- Sargent, T. J. 1982. Beyond demand and supply curves in macroeconomics, *American Economic Review*, 72(2), 382-89.
- Sims, C.A. 1986. Are forecasting models usable for policy analysis? *Quarterly Review of the Federal Reserve Bank of Minneapolis*, 10(Winter), 2-16.
- Sheffrin, S. M. (2003). *Economic principles in action*. Upper Saddle River, New Jersey: Pearson Prince Hall.
- Tanner, E., & Ramos, A. (2002). *Fiscal sustainability and monetary versus fiscal dominance: evidence from Brazil, 1991-2000* (IMF working paper WP/02/5).
- Wilson, K., & Regine, N. (2015). *Effects of fiscal policy on conduct and transmission mechanism of monetary policy in Rwanda* (COMESA Monetary Institute Working Paper series).
- Woodford, M. 1995. *Price-level determinacy without control of a monetary aggregate*, Carnegie-Rochester Conference Series on Public Policy, 43(December), 1-46.
- Zoli, E. (2005). *How does fiscal policy affect monetary policy in emerging market countries?* (Monetary and Economic Department, Bank for International Settlements Working Paper No. 174).