

Assessing The Fiscal-Monetary Policy Mix Effectiveness: Evidence from Morocco, Egypt and Saudi Arabia

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Assessing the fiscal-monetary policy mix effectiveness: evidence from Morocco, Egypt and Saudi Arabia

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Abstract

Our research paper contributes to enrich empirical literature and goes beyond a single open economy analysis by proposing a multi-country assessment of the policy mix in the Middle East/North Africa (MENA) region, under the two hypotheses of monetary and fiscal dominance. We base our study on a SVAR approach performed on secondary data from 1977-2021, for three countries from the MENA region, namely Morocco, Egypt and Saudi Arabia. Our data is sourced from World Development Indicators and includes five variables: Current account balance (% of GDP) (CA), inflation rate (INF), GDP growth (annual %) (GDP), money supply (M3) and government expenditure (GEXP).

The results show that the coordination scheme choice has no significant effect on the policy mix effectiveness in the three countries. Policy mix in Morocco is more effective in preserving price stability whereas stabilisation policies in Egypt are more effective in boosting economic activity. Because of its limited exposure to energy price risk (i.e. imported inflation), Saudi Arabia has a wider margin of manoeuvre in implementing growth-oriented policies without imperiling price stability.

Considering that previous studies gave different views on which policies, monetary or fiscal, is more effective in a single open economy analysis, to our knowledge, no relevant studies have performed a multi-country assessment of the policy mix in the MENA area. In fact, this research will provide an empirical framework for analysing the macroeconomic implications of monetary and fiscal policies in the MENA area, which will allow us to draw some interesting conclusions about the policy mix effectiveness in the sample countries.

Keywords: Monetary Policy, Fiscal Policy, Joint Analysis of Fiscal and Monetary Policy, Inflation, Economic Growth.

JEL classification : E31, E52, E62, E63, F43.

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1. Introduction

Over the last decades, the world has experienced series of economic crises with different causes (tech bubble burst, subprime meltdown, sovereign debt build-up, commodity price shock and pandemic outbreak), leading to a global economic downturn as a major consequence. In this context, monetary and fiscal authorities around the world have joined their efforts to deliver the required macroeconomic support by adopting a growth-oriented policy mix. The aim of this combination between monetary and fiscal policy is to ensure a strong and rapid economic recovery.

The question of policy mix macroeconomic effects has been the subject of a rich array of theoretical literature, which includes the contributions of Keynes (1936), Hicks (1937), Fleming (1962) and Mundell (1960, 1963). An important strand of the empirical literature has proposed an assessment of the policy mix effectiveness within the SVAR framework. It is all about analysing the response of economic growth and inflation to structural shocks emanating from fiscal and/or monetary policy.

Our research paper contributes to the SVAR based empirical literature and goes beyond a single open economy analysis by proposing an assessment of the policy mix in three MENA region countries, under the two hypotheses of monetary and fiscal dominance. Our approach takes into account the effects of the countries' economic structure as well as the implications of the stabilization policy choices.

2. Literature review

The question of policy mix macroeconomic effects has been the subject of a rich array of literature. The starting point for the theoretical framework is Keynes's General Theory (1936), which emphasizes the role of fiscal and monetary policy in tempering economic downturns and upturns. The Keynesian approach suggests a combination of monetary expansion, tax cuts and increases in government spending to boost economic activity in periods of depression. In their three research papers, Harrod (1937), Mead (1937) and Hicks (1937) gave a mathematical structure to the General Theory. Hansen (1949, 1951 and 1953) built on Hicks's work to formulate the IS-LM model, which analyses the effects of macroeconomic policies in a closed economy with a fixed price level.

Mundell (1960, 1963) and Fleming (1962) extended the IS-LM model to deal with the open economy by introducing two parameters: the balance of payments equilibrium and the exchange rate system. The authors demonstrated that monetary policy has strong effect on economic

activity under flexible exchange rates whereas fiscal policy is an effective tool for boosting growth under fixed exchange rates.

In addition to the previous models, many authors of macroeconomics textbooks (e.g. Baumol et al. (1985), Stiglitz (1993), McTaggart et al. (2003) and McConnell et al. (2018)) proposed the aggregate demand / aggregate supply framework as a simple tool for explaining real output and inflation dynamics. The model captures the effects of fiscal and monetary policy decisions in a context of flexible price level.

Since the early 1980s, the question of creating a sound macroeconomic environment for growth has become the focus of a large array of theoretical contributions. Sargent and Wallace (1981) argued that excessive public deficits arising from growth-oriented fiscal policies limit the independence of central banks and hinder their ability to preserve price stability. Under fiscal dominance, the government sets independently its expansionary fiscal policy and the central bank is constrained to finance part of the budget deficit through seigniorage, which results in additional inflation. In order to deal with this situation, Sargent and Wallace proposed a monetary dominance scheme that allows the central bank to set independently its inflation control policy and forces the government to reduce its fiscal deficit.

The fiscal theory of the price level provides another explanation of the inflationary pressures induced by loose fiscal policy. In contrast with the conventional monetarist approach, which treated inflation as a monetary phenomenon, the proponents of the fiscal theory (e.g. Leeper (1991), Sims (1994) and Woodford (1995, 1996, 2001) emphasized the direct impact of government budget deficit on price level and concluded therefore that inflation is a fiscal phenomenon. According to this view, it would be difficult for an independent central bank to achieve the goal of price stability without the government's commitment to set an appropriate fiscal policy.

A large body of literature has sought to provide an empirical framework for analysing the policy mix macroeconomic effects in small open economies. An important strand of this literature has proposed an assessment of the policy mix effectiveness within the SVAR framework. It is all about analysing the response of economic growth and inflation to structural shocks emanating from fiscal and/or monetary policy. The following table presents a brief review of the empirical literature.

Table 1. A brief literature review

| Authors | Model | Period, frequency and country | Variables | Main results |
|--|-------|---------------------------------------|--|--|
| Dungey and Fry (2009) | SVAR | 1983-2006 Quarterly New Zealand | Foreign output, export prices, import prices, real government expenditure, real taxation, real gross national expenditure, government debt to GDP, real GDP, house price inflation, consumer price inflation, short term interest rate and trade weighted exchange rate. (Climate and international interest rate are incorporated as exogenous variables) | Fiscal policy shocks have a greater impact on output than shocks emanating from monetary policy. Output behaviour is mostly explained by foreign and domestic shocks linked to non-policy variables. |
| Ravnik and Zilic (2011) | SVAR | 2001-2009 Monthly Croatia | Government expenditures, index of industrial production (proxy of output), consumer price index (first difference), government revenues, overnight interest rate on the money market | The impact of government expenditures shocks on industrial production is negative in the short term and vanishes within two years. The crowding out effect is a possible explanation of this direction of influence. The effects of fiscal policy shocks are relatively the lowest on inflation and the highest on interest rate |
| Vinayagathan (2013) | SVAR | 1978-2011 Monthly Sri Lanka | Foreign block (world oil price index and US interest rate); domestic block "non-policy variables" (output and price index); domestic block "policy variables" (exchange rate, interbank rate and reserve money) | Monetary policy shocks, through interest rate, play a significant role in explaining the variations of domestic economic indicators. These latter show no significant reaction to shocks emanating from the foreign block variables |
| Fetai (2013) | SVAR | 1997-2013 Monthly Macedonia | Real gross domestic product, manufacturing prices index, retail prices index, monetary aggregate (M1), government expenditures and government revenues | Money stock shocks exhibit a strong and persistent effect on price level (inflationary pressures), without any significant impact on real GDP. Monetary policy counteracts the effects of an increase in government expenditures. Expansionary fiscal policy seems to be ineffective unless it is based on tax-cuts |
| Coric, Simovic, and Deskar-Skrbic (2015) | SVAR | 2004-2012 Monthly Croatia | Domestic industrial production, government expenditures-to-revenues ratio, monetary aggregate (M1), nominal | Economic activity reacts positively to expansionary monetary and fiscal policies. Government expenditures shocks lead to nominal exchange rate appreciation while the effect of |

| | | | | |
|------------------------------|------|---------------------------|---|--|
| | | | effective exchange rate and net exports (included as exogenous variable) | monetary expansion is negative (depreciation). Coordinated measures of monetary and fiscal policies can provide support to growth without inducing inflationary pressures |
| Tule, Onipede and Ebu (2020) | SVAR | 2003-2017 Monthly Nigeria | Real GDP growth, government expenditure to revenue growth, changes in price level, global oil price, money supply (M1) and prime lending rate | Economic activity shows a delayed positive reaction to expansionary monetary policy, accompanied by inflationary pressures. A positive shock in government expenditure leads to real GDP contraction and brings price level up. A coordinated policy mix could help achieving the goal of economic growth and price stability. |

Source: authors

3. Methodology

This study addresses the question of policy mix effectiveness with a focus on the MENA region.

It aims to test two major hypotheses:

- Hypothesis I: the fiscal-monetary policy mix provides effective support to economic growth in the MENA region without imperiling price stability.
- Hypothesis II: the countries' economic structure and their stabilization policy choices (i.e. fiscal or monetary dominance) have an influence on the policy mix effectiveness.

In light of the World Bank's available data, we use annual series from 1977 to 2021.

The model includes five variables: Current account balance (% of GDP) (CA), inflation rate (INF), GDP growth (annual %) (GDP), money supply (M3) and government expenditure (GEXP).

We propose an assessment of the policy mix effectiveness in a sample of three countries belonging to the MENA area, which are Morocco, Egypt and Saudi Arabia. The three Arab economies have various economic development and structures (i.e. two oil-importing and one oil-exporting country), but have shown a common effort of search for the effectiveness of macroeconomic policy decisions.

In order to conduct this study, the SVAR approach is used to impose restrictions on the response of a variable to a shock on another variable, these restrictions are based on economic theory. Thus, the SVAR is appropriate for predicting the impact of macroeconomic policy decisions (Ravnik and Zilic 2011; Vinayagathan 2013; Fetai 2013; Coric et al 2015; Tule et al. 2020). In this study, we are interested in analyzing the response of economic growth and inflation to structural shocks emanating from monetary and fiscal policy.

The identification of our SVAR model requires the imposition of some short-term restrictions:

In light of Mundell (1960, 1963) and Fleming (1962) theoretical contribution, the current account is a key variable in small open economies. This variable reacts to the fluctuations of foreign prices and global economic activity (i.e. external shocks). The current account is therefore incorporated as a foreign block variable and assumed to have a contemporaneous effect on domestic prices and real output. Inflation responds contemporaneously to current account and has an immediate impact on real output.

Since fiscal and monetary authorities base their decisions on the analysis of macroeconomic data, their policy variables (i.e. government expenditure and money supply) react instantaneously to shocks in current account, inflation and real output.

In addition, by changing the policy variables ordering in the short-term restrictions matrix, we can account for the two main policy coordination schemes defined by Sargent and Wallace (1981). Indeed, monetary authorities are constrained by the government expenditure decisions under fiscal dominance and fiscal authorities are constrained by the central bank stance under monetary dominance.

The sequential order of the variables (in Cholesky factorization) will be as follows (1):

$$A \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ a_{21} & 1 & 0 & 0 & 0 \\ a_{31} & a_{32} & 1 & 0 & 0 \\ a_{41} & a_{42} & a_{43} & 1 & 0 \\ a_{51} & a_{52} & a_{53} & a_{54} & 1 \end{pmatrix} ; \quad X_t \begin{pmatrix} CA_t \\ INF_t \\ GDP_t \\ M3_t \\ GEXP_t \end{pmatrix} \quad (1)$$

4. Results and discussion

The structural VAR model provides two main outputs, the first one concerns the impulse response graphs and the second one is the decomposition of variance errors.

For this purpose, before analyzing the impulse response graphs and interpreting the decomposition of variance errors for each country, several tests were performed:

4.1. Results of unit root test

Before analyzing the response of economic growth and inflation to structural shocks emanating from monetary and fiscal policy, it is necessary to examine the stationarity of all variables included in the study.

Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests was used to examine if the variables are stationary in levels or after first difference.

According to table 2 (in appendix), all variables, for the three countries, are stationary in level.

The results of the non-stationarity tests (ADF and PP) show that the variables of our model are all stationary in level, for the three countries. Therefore, a co-integration test in the sense of Johansen is not necessary, since it assumes that the series are integrated in the same order. The SVAR approach will be our analysis method.

In fact, before giving the SVAR outputs, it is necessary to determine the VAR order, on which the SVAR restrictions will be implemented.

4.2.VAR order

The determination of the number of lags is done by estimating the VAR model for several values of the lag p , the optimal lag is the one that minimizes the Akaike (AIC) Schwarz (SC) and Hannan-Quinn (HQ) information criteria.

From table 3, we can see that the three criteria lead us to retain a VAR (1) process. We will then summarize that the method we will use throughout the estimation is that of the VAR with a delay for the three countries, for the monetary and fiscal dominance perspectives.

4.3.Diagnostic tests

The validation of the VAR (1) model will be done by performing diagnostic tests on the residuals. According to table 4, for the three countries and for both the monetary and fiscal dominance approaches, the results of the diagnostic tests show us that the residuals are normal, uncorrelated and they are homoscedastic, thus we conclude that our models are statistically valid, at a significance level of 5%.

Since all the VAR (1) models for the three countries are valid, we can now put structural restrictions to interpret the impulse responses and the variance decomposition of the errors under the two perspectives of monetary and fiscal dominance

4.4. Impulse Response Function Analysis

4.4.1. Responses to monetary and fiscal policy shocks in Morocco

- **Under monetary dominance (Table 5):**

Following a positive shock in government expense (i.e. expansionary fiscal policy), money supply shows a negative response over seven years and then moves gradually to its initial baseline. By reducing their money supply, monetary authorities attempt to alleviate the possible inflationary pressures induced by an increase in government spending, which is consistent with the monetary dominance approach (Sargent and Wallace 1981). Inflation reacts also negatively to a loose fiscal policy and edges towards its initial level by the end of the analysis period. This reaction is inconsistent with the fiscal theory of the price level (e.g. Woodford 1995, 1996, 2001) and can be explained by the restrictive stance of monetary authorities. The response of output is negative and short-lived, which seems to be the result of monetary contraction and

crowding out effect. Thus, fiscal policy fails to produce the positive Keynesian effect on growth. In addition, positive shocks emanating from government expenditure lead to an improvement in the current account balance particularly over the five first years.

Fiscal authorities reduce their spending in reaction to a positive shock in money supply. The impact of this shock vanishes within two years. Under monetary dominance, government seems to adopt a prudent stance since it cannot rely on central bank to back its stimulus policies. Furthermore, expansionary monetary policy generates inflationary pressures that last for several years and weaken by the end of the analysis period. This result is in line with the quantity theory of money (Friedman 1956). The impact of positive monetary shocks on output is positive in the short-term (i.e. the two first years), volatile in the medium-term and null in the long-term. Therefore, monetary policy produces the positive Keynesian effect on growth in the short-term. In addition, shocks induced by monetary expansion lead to a deterioration in the current account especially over the five first years.

- **Under fiscal dominance (Table 6):**

Even under fiscal dominance, monetary authorities focus on alleviating inflationary pressures by reducing their money supply in reaction to a positive shock in government expense. The reaction of the other variables (i.e. inflation, output and current account) to fiscal shocks remains the same, which means that the coordination scheme choices (i.e. fiscal or monetary dominance) do not have any impact on the fiscal policy effectiveness in Morocco.

The government raises its expenditure in reaction to a positive monetary shock. The effect of this shock becomes less important starting from the sixth year and disappears in the long-term. Indeed, the favorable monetary conditions resulting from an increase in money supply reduce the cost of financing deficits and encourage fiscal authorities to spend more. A positive monetary policy shock has a short-lived negative effect on current account and its impact on inflation and output does not change under fiscal dominance compared to monetary dominance scheme.

4.4.2. Responses to monetary and fiscal policy shocks in Egypt

- **Under monetary dominance (Table 5):**

Following a positive fiscal shock, money supply increases gradually until the sixth year and then edges towards its initial baseline. Indeed, central bank attempts to back government stimulus policy through an accommodative monetary stance, which is inconsistent with the monetary dominance approach (Sargent and Wallace 1981). An expansionary fiscal policy generates permanent inflationary pressures. This direction of influence is in line with the fiscal theory of the price level (e.g. Woodford 1995, 1996, 2001). The inflationary pressures are also

consistent with the monetarist arithmetic since the expansionary fiscal policy is accompanied by an increase in money supply (Sargent and Wallace 1981). The effect of government expense shock on output is positive and reaches its peak by the end of the second year, before starting to decline progressively, which means that fiscal policy yields the positive effects expected in the Keynesian model. Furthermore, the current account balance shows a negative response to fiscal expansion. This indicator decreases significantly over the four first years and returns gradually to its initial level.

The government reduces its expense after a positive monetary shock. The expense contraction is particularly noticeable over four years and vanishes in the long-term. This prudent fiscal authorities' stance is consistent with the monetary dominance scheme. Expansionary monetary policy is also the cause of substantial inflation pressures especially in the short-term (i.e. the four first years). This effect is consistent with the quantity theory of money (Friedman 1956). Output shows a temporary positive response that lasts for four years, which confirms the ability of monetary policy to generate the positive Keynesian effect on activity in the short-term. Finally, a positive shock in money supply produces a negative short-term impact on the current account. Starting from the sixth year, the variable returns progressively to its initial baseline.

- **Under fiscal dominance (Table 6):**

In accordance with the fiscal dominance approach, central bank maintains its accommodative monetary policy (i.e. increase in money supply) in response to expansionary fiscal stance. Overall, a positive fiscal policy shock puts upward pressure on inflation, stimulates growth and leads to a deterioration in the current account, which means that the reaction of these macroeconomic variables does not change under fiscal dominance compared to monetary dominance scheme.

Even under fiscal dominance, the government keeps its prudent stance following a monetary expansion. Indeed, government expenditure decreases in the first three years, before moving gradually to its initial level. Furthermore, including the fiscal dominance restrictions in the empirical analysis does not alter the reaction of inflation, output and current account to monetary shocks.

4.4.3. Responses to monetary and fiscal policy shocks in Saudi Arabia

- **Under monetary dominance (Table 5):**

The central bank adopts an expansionary monetary policy following a positive shock in government expense. Indeed, the money supply shows a delayed positive reaction that lasts for several years and vanishes in the long-term. This direction of response is not in line with the

monetary dominance approach (Sargent and Wallace 1981). Moreover, the fiscal theory of the price level (e.g. Woodford 1995, 1996, 2001) and the monetarist arithmetic (Sargent and Wallace 1981) do not apply in the case of Saudi Arabia. Indeed, the reaction of inflation to expansionary fiscal policy is negative and short-lived. Fiscal expansion produces the positive Keynesian effect on growth, which lasts for three years and disappears by the end of the fourth horizon. The current account reacts also positively and edges towards its initial baseline in the long-term.

Following a positive shock in money supply, the government adopts an expansionary stance for two years, before reducing its expenditure over the remaining period. This fiscal contraction is consistent with the monetary dominance scheme. In contrast to the quantity theory of money (Friedman 1956), inflation shows a delayed negative reaction to shocks induced by monetary expansion. This downward pressure on inflation lasts for several years and disappears by the end of the analysis period. Furthermore, monetary policy fails to yield the expected Keynesian effect on activity. Indeed, the impact of an increase in money supply on output is negative over the first four years and vanishes by the end of the fifth horizon. Finally, central bank accommodative policy is the cause of current account deterioration particularly in the short and medium term.

- **Under fiscal dominance (Table 6):**

Monetary authorities raise their money supply in response to a positive fiscal shock. The response becomes less important starting from the third year and disappears in the long-term. This accommodative stance is in line with the fiscal dominance system. Moreover, positive fiscal shocks put downward pressure on price level, boost economic activity in the short-term and lead to an improvement in the current account situation. The reaction of these non-policy variables remains the same under the two coordination schemes.

After a positive shock in money supply, the government increases its expense over the two first years and then adopts a restrictive stance over the remaining period. Thus, fiscal authorities maintain their prudent stance even under fiscal dominance. The introduction of this coordination scheme in the empirical study does not change the response of output and current account. The reaction of inflation remains negative and shows a moderate downward pressure.

4.5. Decomposition of variance errors Analysis

4.5.1. Decomposition of variance errors Analysis in Morocco

- **Under monetary dominance (Table 7):**

The variance of the forecast error of the inflation rate is due to 64,31% to its own innovations; 23,17% to innovations in the money supply and only 4,65% to innovations in government

spending. Regarding the GDP, the variance of its forecast error is due to 91,21% to its own innovations; 3,63% to innovations in the money supply and only 0,17% to innovations in government spending.

- **Under fiscal dominance (Table 8):**

The variance of the forecast error of the inflation rate is due to 68,69% to its own innovations; only 7,65% to innovations in government spending and 16,36% to innovations in the money supply. Regarding the GDP, the variance of its forecast error is due to 92,59% to its own innovations; only 0,42% to innovations in government spending and 2,89% to innovations in the money supply.

4.5.2. Decomposition of variance errors Analysis in Egypt

- **Under monetary dominance (Table 7):**

The variance of the forecast error of the inflation rate is due to 47,27% to its own innovations; 24,82% to innovations in the money supply and only 2,21% to innovations in government spending. Regarding the GDP, the variance of its forecast error is due to 84,59% to its own innovations; 2,56% to innovations in the money supply and only 1,7% to innovations in government spending.

- **Under fiscal dominance (Table 8):**

The variance of the forecast error of the inflation rate is due to 48,95% to its own innovations; only 5,46% to innovations in government spending and 20,89% to innovations in the money supply. Regarding the GDP, the variance of its forecast error is due to 83,33% to its own innovations; only 1,59% to innovations in government spending and 2,71% to innovations in the money supply.

4.5.3. Decomposition of variance errors Analysis in Saudi Arabia

- **Under monetary dominance (Table 7):**

The variance of the forecast error of the inflation rate is due to 71,84% to its own innovations; 0,45% to innovations in the money supply and only 1,06% to innovations in government spending. Regarding the GDP, the variance of its forecast error is due to 68,73% to its own innovations; 6,3% to innovations in the money supply and only 4,53% to innovations in government spending.

- **Under fiscal dominance (Table 8):**

The variance of the forecast error of the inflation rate is due to 62,97% to its own innovations; only 5,54% to innovations in government spending and 1,63% to innovations in the money supply. Regarding the GDP, the variance of its forecast error is due to 71,44% to its own

innovations; only 2,56% to innovations in government spending and 8,72% to innovations in the money supply.

5. Conclusion

In this paper, we used the SVAR approach to assess the policy mix effectiveness in Morocco, Egypt and Saudi Arabia. Particularly, we analysed the impact of fiscal and monetary shocks on output, inflation and current account in the three MENA region countries. Our empirical framework takes into account the countries' economic structure as well as the implications of the coordination scheme choices. In light of our results, we can draw some interesting conclusions.

In Morocco, the analysis of macroeconomic indicators response to shocks in policy variables (i.e. government spending and money supply) yields the same results under both fiscal and monetary dominance. Therefore, the coordination scheme choice has no effect on the policy mix effectiveness. A possible explanation of this result is that central bank maintains the same restrictive stance under the two coordination schemes. Indeed, Moroccan monetary authorities remain focused on alleviating inflationary pressures induced by fiscal expansion and potential commodity price shocks, since Morocco is an oil-importing country.

An expansionary fiscal policy has no destabilising effect on price level and current account in Morocco but seems to be ineffective in stimulating economic activity. Indeed, monetary authorities' restrictive stance counteracts the impact of an increase in government expenditure.

Moroccan monetary authorities manage to boost growth in the short-term through a monetary expansion. Nevertheless, this accommodative stance puts an upward pressure on inflation and leads to a deterioration in the current account.

In Egypt, the reaction of macroeconomic variables to fiscal and monetary policy decisions does not change under fiscal dominance compared to monetary dominance system. Therefore, the coordination scheme choice has no significant impact on the effectiveness of stabilization policies. This result can be explained by the central bank decision to uphold the same accommodative policy under the two coordination schemes in order to back government stimulus programs.

An expansionary fiscal policy seems to be an effective tool for stimulating economic activity in Egypt. Furthermore, the central bank provides great support for the government stimulus programs. However, these policy choices destabilise external balances and generate inflationary pressures. It is worth recalling that Egypt remains exposed to commodity price risk (i.e. imported inflation) since it is an oil-importing country.

Egyptian central bank policy manages to generate a temporary positive effect on economic activity. This expansionary stance puts upward pressure on price level and has a negative impact on current account.

In Saudi Arabia, the coordination scheme choices do not alter the response of macroeconomic variables to shocks emanating from fiscal and monetary policy. Indeed, Saudi monetary authorities maintain the same accommodative stance under fiscal and monetary dominance, which generates the same reaction from the non-policy variables under the two schemes.

In the short-term, Saudi government achieves the goal of growth stimulation through an effective fiscal policy that builds on monetary authority's support. This expansionary stance has no destabilizing effect on external balances and price level. It is worth noting the limited exposure of Saudi Arabia to energy price risk (i.e. imported inflation) since it is an oil-exporting country.

An expansionary monetary policy does not cause any inflationary pressures in Saudi Arabia but remains ineffective since it produces a negative effect on output and external balances.

In our study, the two oil-importing countries make a trade-off between growth stimulation and inflation. Morocco adopts a fiscal / monetary policy combination that is more focused on preserving price stability, which explains the negative impact of fiscal expansion on growth. Egypt chooses a fiscal / monetary policy combination that is more focused on boosting economic activity, which explains the positive impact of fiscal expansion on price level. A better coordination between fiscal and monetary policy could lead to growth stimulation in Morocco and price stability preservation in Egypt. In addition, the two countries could rely on expansionary monetary policy to generate a short-term increase in their output especially in periods of low inflationary pressures. The oil-exporting country (i.e. Saudi Arabia) has limited exposure to energy price risk (i.e. imported inflation). Thus, it has a wider margin of manoeuvre in implementing growth-oriented policy mix without imperiling price stability.

Appendixes

Table 2. Unit root tests results

| Country | Variables | Unit root test at level | | Conclusion |
|---------|-----------|-------------------------|--------------|------------|
| | | ADF | PP | |
| Morocco | CA | -3.327319** | -3.327319** | I(0) |
| | INF | -2.119304** | -2.453705** | I(0) |
| | GDP | -12.03162*** | -11.06093*** | I(0) |
| | M3 | -4.999486*** | -5.028902*** | I(0) |
| | Gexp | -3.850872** | -3.850872** | I(0) |

| | | | | |
|--------------|------|--------------|---------------|------|
| Egypt | CA | -2.402696** | -2.398849** | I(0) |
| | INF | -3.333464** | -3.274006** | I(0) |
| | GDP | -4.224393*** | -4.068890 *** | I(0) |
| | M3 | -3.360703 ** | -3.360703** | I(0) |
| | Gexp | -3.110380*** | -3.166386 *** | I(0) |
| Saudi Arabia | CA | -2.391547** | -2.322311** | I(0) |
| | INF | -2.022338** | -4.827084*** | I(0) |
| | GDP | -3.008354*** | -5.404713*** | I(0) |
| | M3 | -5.759316*** | -5.699030*** | I(0) |
| | Gexp | -3.956638*** | -3.870810*** | I(0) |

Note: ***, ** and * reveal, respectively, significance at 1% level; 5 % and 10%.

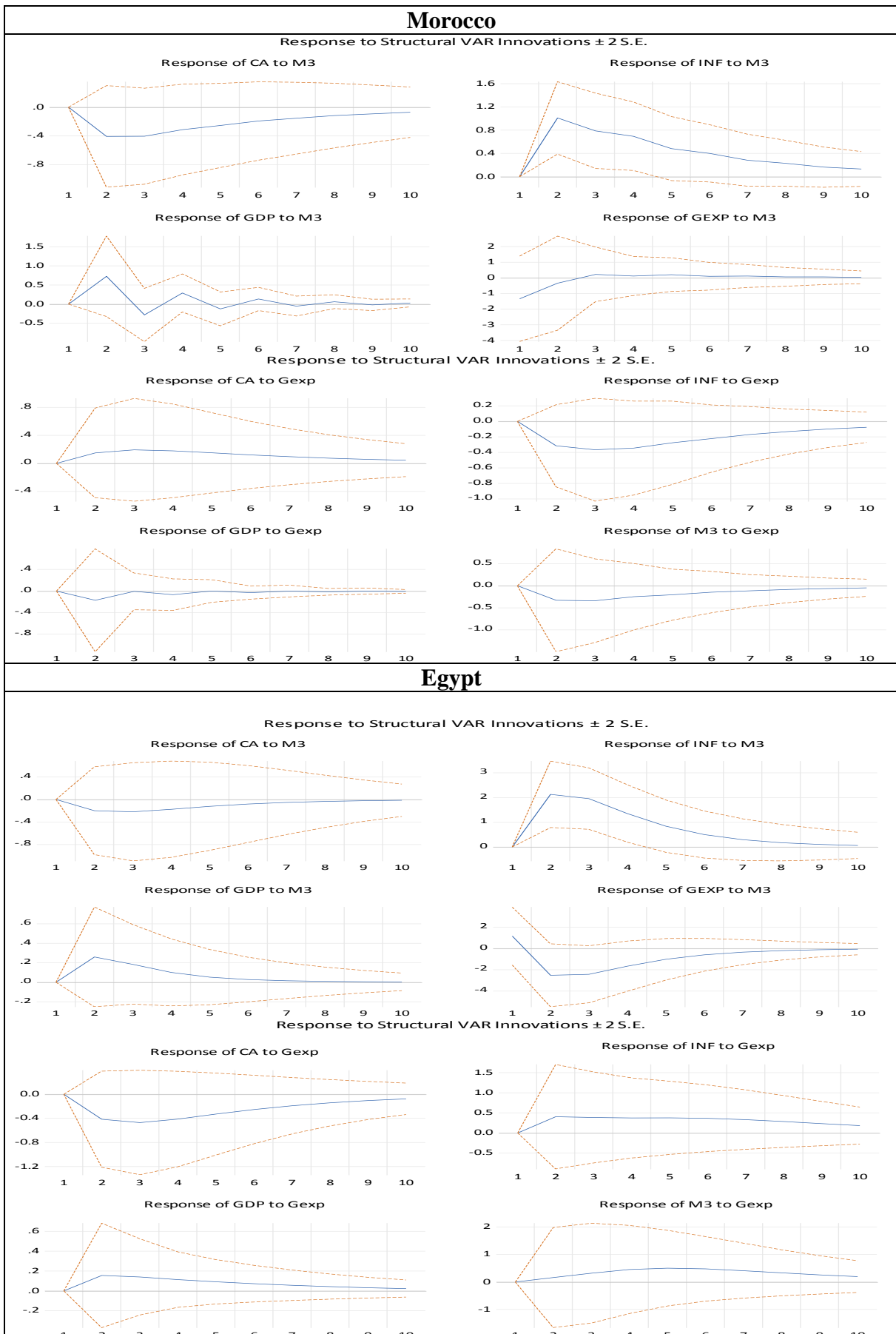
Table 3: VAR Order

| | Lag | AIC | SC | HQ |
|--------------------|-----|-----------|-----------|-----------|
| Monetary dominance | | | | |
| Morocco | 0 | 29.03468 | 29.24366 | 29.11078 |
| | 1 | 27.06822* | 28.32205* | 27.52480* |
| | 2 | 27.50699 | 29.80569 | 28.34405 |
| | 3 | 27.26021 | 30.60377 | 28.47775 |
| Egypt | 0 | 30.13027 | 30.34138 | 30.20660 |
| | 1 | 28.64453 | 29.91119* | 29.10251* |
| | 2 | 28.34122* | 30.66343 | 29.18086 |
| | 3 | 28.70038 | 32.07814 | 29.92167 |
| Saudi Arabia | 0 | 33.02223 | 33.22909 | 33.09805 |
| | 1 | 31.81655* | 33.05774* | 32.27150* |
| | 2 | 32.08258 | 34.35810 | 32.91665 |
| | 3 | 32.28762 | 35.59747 | 33.50081 |
| Fiscal dominance | | | | |
| Morocco | 0 | 29.03468 | 29.24366 | 29.11078 |
| | 1 | 27.06822* | 28.32205* | 27.52480* |
| | 2 | 27.50699 | 29.80569 | 28.34405 |
| | 3 | 27.26021 | 30.60377 | 28.47775 |
| Egypt | 0 | 30.23326 | 30.44437 | 30.30959 |
| | 1 | 28.36625* | 29.63291* | 28.82424* |
| | 2 | 28.56917 | 30.89137 | 29.40880 |
| | 3 | 28.99880 | 32.37655 | 30.22009 |
| Saudi Arabia | 0 | 33.02223 | 33.22909 | 33.09805 |
| | 1 | 31.81655* | 33.05774* | 32.27150* |
| | 2 | 32.08258 | 34.35810 | 32.91665 |
| | 3 | 32.28762 | 35.59747 | 33.50081 |

Table 4: Diagnostic tests

| | Autocorrelation LM Test | White Heteroskedasticity Test | Normality Test |
|--------------------|-------------------------|-------------------------------|----------------|
| Monetary dominance | | | |
| Morocco | 0.3702 | 0.1314 | 0.1167 |
| Egypt | 0.1119 | 0.2018 | 0.4190 |
| Saudi Arabia | 0.2945 | 0.0646 | 0.5861 |
| Fiscal dominance | | | |
| Morocco | 0.7655 | 0.0983 | 0.4376 |
| Egypt | 0.1013 | 0.1066 | 0.0877 |
| Saudi Arabia | 0.2039 | 0.0895 | 0.1424 |

Table 5: Impulse Responses of the SVAR model under monetary dominance



Saudi Arabia

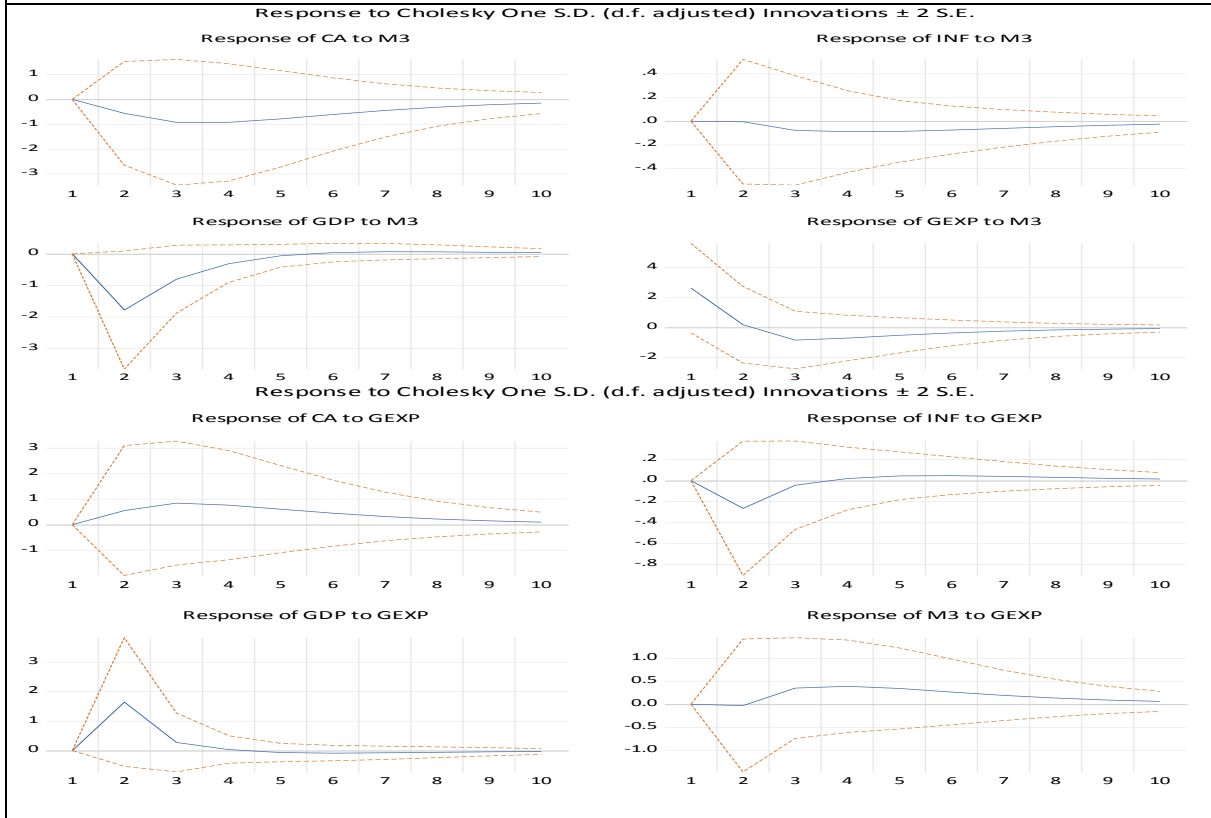
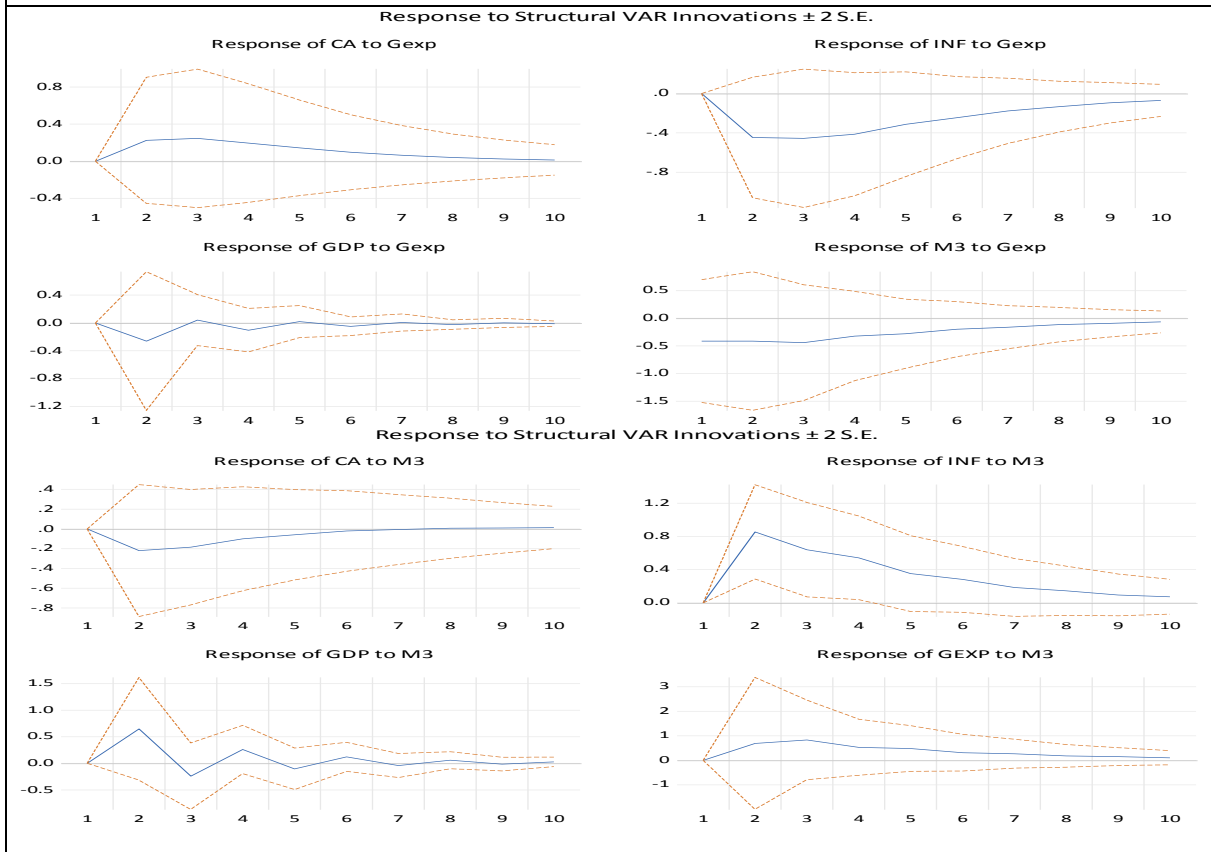


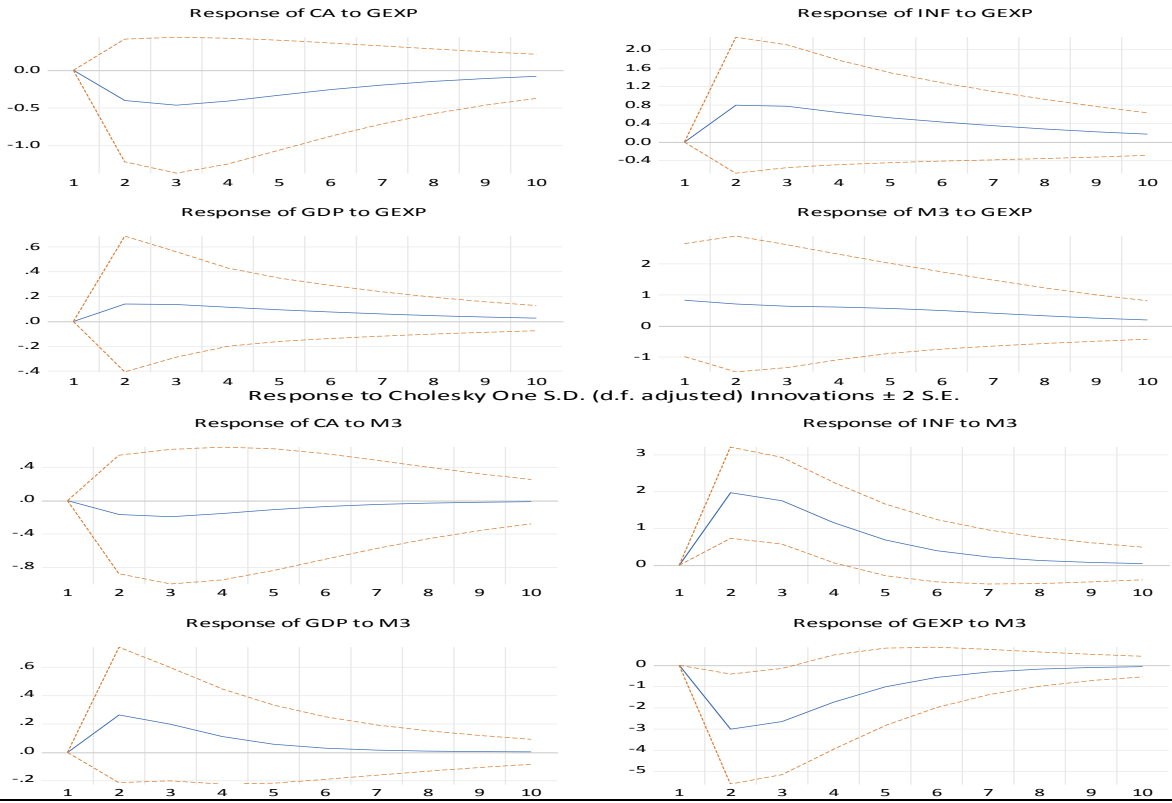
Table 6: Impulse Responses of the SVAR model under fiscal dominance

Morocco



Egypt

Response to Cholesky One S.D. (d.f. adjusted) Innovations ± 2 S.E.



Saudi Arabia

Response to Structural VAR Innovations ± 2 S.E.

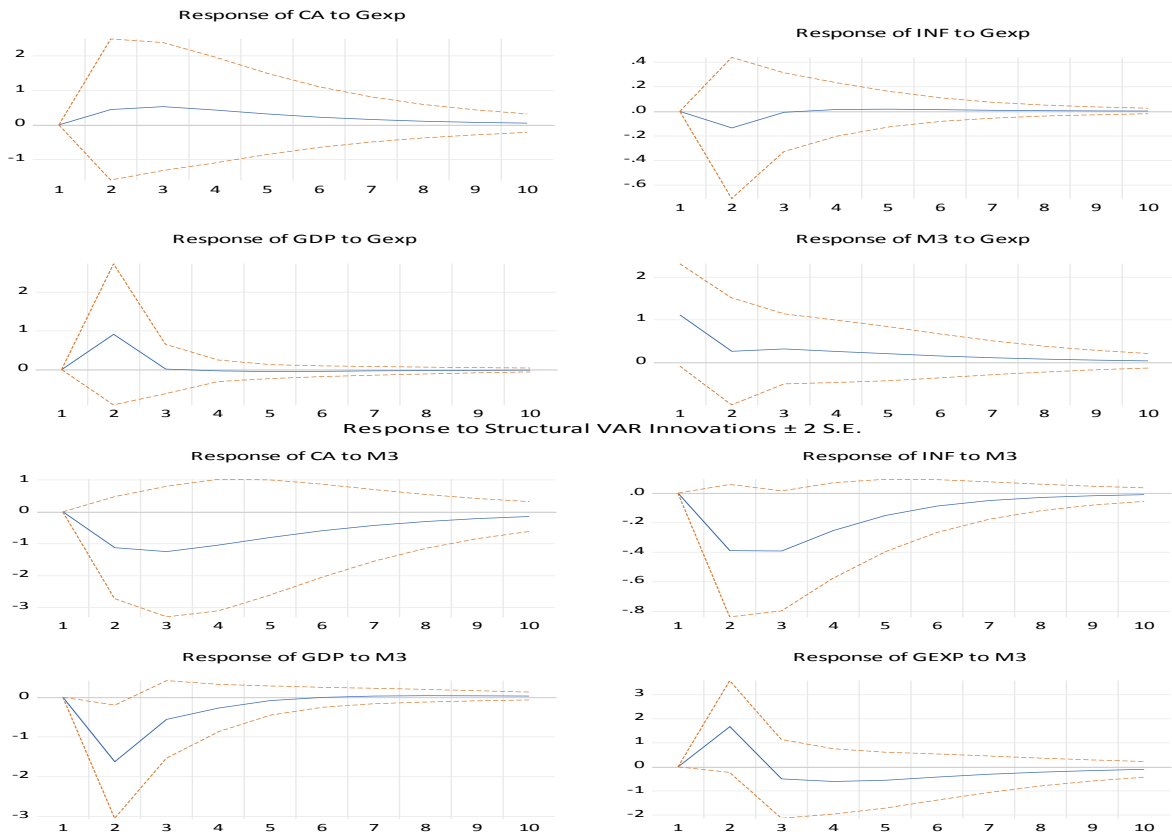


Table 7: Variance Decomposition of the SVAR model under monetary dominance

| Morocco | | | | | | |
|-------------------------------|----------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Variance Decomposition of INF | | | | | | |
| Period | S.E. | CA | INF | GDP | M3 | GEXP |
| 1 | 2.318043 | 7.054471 | 92.94553 | 0.000000 | 0.000000 | 0.000000 |
| 2 | 2.960694 | 5.802222 | 77.15709 | 0.711633 | 14.87757 | 1.451489 |
| 3 | 3.307495 | 5.529134 | 71.63233 | 1.268986 | 18.87599 | 2.693562 |
| 4 | 3.509711 | 5.637894 | 68.37973 | 1.187675 | 21.25793 | 3.536773 |
| 5 | 3.632203 | 5.838538 | 66.80796 | 1.223414 | 22.10048 | 4.029602 |
| 6 | 3.707584 | 6.077870 | 65.75311 | 1.186733 | 22.66755 | 4.314731 |
| 7 | 3.754558 | 6.282505 | 65.15005 | 1.189103 | 22.90150 | 4.476847 |
| 8 | 3.783951 | 6.459701 | 64.73687 | 1.174259 | 23.06003 | 4.569141 |
| 9 | 3.802427 | 6.593736 | 64.48278 | 1.174128 | 23.12790 | 4.621453 |
| 10 | 3.814053 | 6.697584 | 64.31035 | 1.168791 | 23.17210 | 4.651170 |
| Variance Decomposition of GDP | | | | | | |
| Period | S.E. | CA | INF | GDP | M3 | GEXP |
| 1 | 1.903072 | 2.587164 | 1.855150 | 95.55769 | 0.000000 | 0.000000 |
| 2 | 2.616291 | 1.843664 | 3.122830 | 91.69688 | 3.162662 | 0.173969 |
| 3 | 2.946315 | 1.950528 | 2.878725 | 91.73819 | 3.275897 | 0.156658 |
| 4 | 3.158471 | 1.853060 | 3.102143 | 91.32920 | 3.543787 | 0.171813 |
| 5 | 3.263685 | 1.885709 | 3.051468 | 91.33629 | 3.557924 | 0.168608 |
| 6 | 3.330687 | 1.868102 | 3.104838 | 91.24449 | 3.611188 | 0.171384 |
| 7 | 3.365901 | 1.878573 | 3.093881 | 91.24488 | 3.611910 | 0.170759 |
| 8 | 3.388194 | 1.875516 | 3.107730 | 91.22160 | 3.623706 | 0.171447 |
| 9 | 3.400515 | 1.878809 | 3.105467 | 91.22100 | 3.623391 | 0.171330 |
| 10 | 3.408291 | 1.878396 | 3.109161 | 91.21484 | 3.626084 | 0.171516 |
| Egypt | | | | | | |
| Variance decomposition of INF | | | | | | |
| Period | S.E. | CA | INF | GDP | M3 | GEXP |
| 1 | 2.852789 | 11.08985 | 88.91015 | 0.000000 | 0.000000 | 0.000000 |
| 2 | 3.493175 | 8.460766 | 73.11076 | 2.351089 | 15.51687 | 0.560515 |
| 3 | 3.819256 | 9.227064 | 62.18768 | 3.474434 | 24.20445 | 0.906375 |
| 4 | 3.997316 | 12.80381 | 56.04956 | 3.383233 | 26.58307 | 1.180330 |
| 5 | 4.095165 | 16.39697 | 52.40897 | 3.164802 | 26.58138 | 1.447888 |
| 6 | 4.148501 | 18.95074 | 50.17017 | 3.148649 | 26.03441 | 1.696028 |
| 7 | 4.177218 | 20.50234 | 48.80489 | 3.266985 | 25.52594 | 1.899854 |
| 8 | 4.192481 | 21.37050 | 47.99521 | 3.413169 | 25.17175 | 2.049367 |
| 9 | 4.200496 | 21.83440 | 47.52983 | 3.533936 | 24.95232 | 2.149510 |
| 10 | 4.204662 | 22.07574 | 47.26989 | 3.617492 | 24.82484 | 2.212031 |
| Variance Decomposition of GDP | | | | | | |
| Period | S.E. | CA | INF | GDP | M3 | GEXP |
| 1 | 4.658793 | 1.670769 | 1.008672 | 97.32056 | 0.000000 | 0.000000 |
| 2 | 5.406211 | 4.018245 | 0.896263 | 92.79738 | 1.684512 | 0.603599 |
| 3 | 5.874709 | 6.469513 | 0.883381 | 89.20895 | 2.398414 | 1.039745 |
| 4 | 6.188190 | 8.206745 | 0.868417 | 87.05418 | 2.564945 | 1.305709 |
| 5 | 6.400610 | 9.226558 | 0.855080 | 85.86047 | 2.585487 | 1.472401 |
| 6 | 6.542392 | 9.772973 | 0.847131 | 85.22430 | 2.579135 | 1.576462 |
| 7 | 6.633366 | 10.05354 | 0.843188 | 84.89253 | 2.571599 | 1.639144 |
| 8 | 6.689084 | 10.19500 | 0.841381 | 84.72169 | 2.566622 | 1.675305 |
| 9 | 6.721769 | 10.26585 | 0.840575 | 84.63442 | 2.563775 | 1.695382 |
| 10 | 6.740261 | 10.30126 | 0.840214 | 84.59008 | 2.562239 | 1.706200 |

| Saudi Arabia | | | | | | |
|-------------------------------|----------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Variance Decomposition of INF | | | | | | |
| Period | S.E. | CA | INF | GDP | M3 | GEXP |
| 1 | 8.629599 | 4.527641 | 95.47236 | 0.000000 | 0.000000 | 0.000000 |
| 2 | 11.44185 | 12.57083 | 85.91446 | 0.386391 | 0.000367 | 1.127952 |
| 3 | 12.92385 | 18.37836 | 80.03774 | 0.437751 | 0.089857 | 1.056285 |
| 4 | 13.69716 | 22.01894 | 76.28737 | 0.488299 | 0.194613 | 1.010778 |
| 5 | 14.08495 | 24.05242 | 74.12364 | 0.521538 | 0.290430 | 1.011974 |
| 6 | 14.27208 | 25.11731 | 72.95220 | 0.541403 | 0.361574 | 1.027511 |
| 7 | 14.35946 | 25.64976 | 72.34868 | 0.552150 | 0.407701 | 1.041701 |
| 8 | 14.39917 | 25.90650 | 72.05020 | 0.557595 | 0.434727 | 1.050979 |
| 9 | 14.41683 | 26.02663 | 71.90757 | 0.560223 | 0.449395 | 1.056190 |
| 10 | 14.42456 | 26.08146 | 71.84133 | 0.561447 | 0.456899 | 1.058866 |
| Variance Decomposition of GDP | | | | | | |
| Period | S.E. | CA | INF | GDP | M3 | GEXP |
| 1 | 2.160672 | 12.96231 | 7.478853 | 79.55884 | 0.000000 | 0.000000 |
| 2 | 2.477590 | 11.92699 | 6.860066 | 71.39013 | 5.284408 | 4.538397 |
| 3 | 2.594764 | 11.86299 | 6.929043 | 70.35087 | 6.262045 | 4.595052 |
| 4 | 2.660828 | 12.31262 | 6.971525 | 69.78601 | 6.369681 | 4.560166 |
| 5 | 2.699489 | 12.79424 | 6.981649 | 69.35132 | 6.334502 | 4.538282 |
| 6 | 2.721106 | 13.12749 | 6.977173 | 69.05624 | 6.309327 | 4.529767 |
| 7 | 2.732515 | 13.31786 | 6.970725 | 68.88403 | 6.300351 | 4.527039 |
| 8 | 2.738240 | 13.41576 | 6.966052 | 68.79344 | 6.298493 | 4.526259 |
| 9 | 2.740998 | 13.46289 | 6.963334 | 68.74901 | 6.298698 | 4.526064 |
| 10 | 2.742284 | 13.48462 | 6.961922 | 68.72825 | 6.299193 | 4.526024 |

Table 8: Variance Decomposition of the SVAR model under fiscal dominance

| Morocco | | | | | | |
|-------------------------------|----------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Variance Decomposition of INF | | | | | | |
| Period | S.E. | CA | INF | GDP | GEXP | M3 |
| 1 | 2.367010 | 9.107050 | 90.89295 | 0.000000 | 0.000000 | 0.000000 |
| 2 | 2.931200 | 6.718310 | 77.99942 | 1.264912 | 3.010181 | 11.00718 |
| 3 | 3.200166 | 6.090062 | 73.65886 | 1.468186 | 4.942255 | 13.84064 |
| 4 | 3.338374 | 5.828368 | 71.06001 | 1.509251 | 6.208674 | 15.39370 |
| 5 | 3.411548 | 5.776287 | 70.01393 | 1.475199 | 6.877981 | 15.85660 |
| 6 | 3.450945 | 5.769757 | 69.33920 | 1.481961 | 7.259161 | 16.14992 |
| 7 | 3.472331 | 5.789035 | 69.03606 | 1.466667 | 7.457177 | 16.25106 |
| 8 | 3.484097 | 5.807959 | 68.84164 | 1.466136 | 7.565981 | 16.31828 |
| 9 | 3.490567 | 5.824878 | 68.74892 | 1.461362 | 7.622043 | 16.34280 |
| 10 | 3.494177 | 5.837100 | 68.69116 | 1.460572 | 7.652313 | 16.35886 |
| Variance Decomposition of GDP | | | | | | |
| Period | S.E. | CA | INF | GDP | GEXP | M3 |
| 1 | 1.913382 | 2.012847 | 1.525293 | 96.46186 | 0.000000 | 0.000000 |
| 2 | 2.577716 | 1.484094 | 2.658379 | 92.87614 | 0.415911 | 2.565472 |
| 3 | 2.871885 | 1.502315 | 2.435876 | 93.06341 | 0.381876 | 2.616519 |
| 4 | 3.054152 | 1.437250 | 2.645000 | 92.66417 | 0.418900 | 2.834676 |
| 5 | 3.137180 | 1.447542 | 2.598960 | 92.70447 | 0.412893 | 2.836135 |
| 6 | 3.186955 | 1.436541 | 2.650955 | 92.60920 | 0.420566 | 2.882737 |
| 7 | 3.209951 | 1.440219 | 2.641284 | 92.61871 | 0.419198 | 2.880593 |
| 8 | 3.223377 | 1.438324 | 2.655301 | 92.59338 | 0.421243 | 2.891755 |
| 9 | 3.229667 | 1.439443 | 2.653457 | 92.59533 | 0.420941 | 2.890827 |
| 10 | 3.233259 | 1.439132 | 2.657319 | 92.58843 | 0.421527 | 2.893588 |

| Egypt | | | | | | |
|-------------------------------|----------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Variance Decomposition of INF | | | | | | |
| Period | S.E. | CA | INF | GDP | GEXP | M3 |
| 1 | 2.824527 | 11.56549 | 88.43451 | 0.000000 | 0.000000 | 0.000000 |
| 2 | 3.465627 | 8.803559 | 72.46805 | 3.298480 | 2.169731 | 13.26018 |
| 3 | 3.796307 | 9.114047 | 62.14548 | 4.976407 | 3.580907 | 20.18316 |
| 4 | 3.980012 | 12.05313 | 56.67396 | 4.962711 | 4.347481 | 21.96271 |
| 5 | 4.083225 | 15.09529 | 53.50213 | 4.685537 | 4.794485 | 21.92256 |
| 6 | 4.140948 | 17.27898 | 51.54613 | 4.608095 | 5.071501 | 21.49530 |
| 7 | 4.172911 | 18.62110 | 50.34065 | 4.679982 | 5.247238 | 21.11103 |
| 8 | 4.190414 | 19.38670 | 49.61708 | 4.791694 | 5.357965 | 20.84656 |
| 9 | 4.199900 | 19.80743 | 49.19544 | 4.888120 | 5.426109 | 20.68290 |
| 10 | 4.204997 | 20.03418 | 48.95594 | 4.955898 | 5.466852 | 20.58713 |
| Variance Decomposition of GDP | | | | | | |
| Period | S.E. | CA | INF | GDP | GEXP | M3 |
| 1 | 4.633310 | 1.984044 | 0.691750 | 97.32421 | 0.000000 | 0.000000 |
| 2 | 5.416026 | 4.394402 | 0.643076 | 92.77457 | 0.482660 | 1.705292 |
| 3 | 5.871940 | 7.062879 | 0.690566 | 88.83256 | 0.890761 | 2.523234 |
| 4 | 6.149449 | 9.064018 | 0.700739 | 86.35344 | 1.157960 | 2.723844 |
| 5 | 6.329149 | 10.29449 | 0.694298 | 84.93496 | 1.330595 | 2.745655 |
| 6 | 6.448171 | 10.98060 | 0.687283 | 84.15661 | 1.441035 | 2.734472 |
| 7 | 6.524928 | 11.34657 | 0.682878 | 83.73820 | 1.509548 | 2.722801 |
| 8 | 6.572333 | 11.53847 | 0.680501 | 83.51543 | 1.550469 | 2.715128 |
| 9 | 6.600445 | 11.63860 | 0.679279 | 83.39739 | 1.574072 | 2.710657 |
| 10 | 6.616583 | 11.69084 | 0.678659 | 83.33501 | 1.587312 | 2.708174 |
| Saudi Arabia | | | | | | |
| Variance Decomposition of INF | | | | | | |
| Period | S.E. | CA | INF | GDP | GEXP | M3 |
| 1 | 7.832494 | 2.411947 | 97.58805 | 0.000000 | 0.000000 | 0.000000 |
| 2 | 10.94501 | 5.959882 | 85.32800 | 2.102517 | 5.223866 | 1.385736 |
| 3 | 12.60432 | 7.898105 | 79.63728 | 5.824984 | 5.049431 | 1.590196 |
| 4 | 13.42356 | 12.88967 | 71.83179 | 8.516843 | 5.159694 | 1.602008 |
| 5 | 13.84873 | 15.86846 | 67.29025 | 9.938104 | 5.188518 | 1.714671 |
| 6 | 14.07461 | 17.20715 | 64.66909 | 11.05637 | 5.393464 | 1.673939 |
| 7 | 14.19901 | 17.74840 | 63.57267 | 11.51051 | 5.515337 | 1.653083 |
| 8 | 14.25071 | 17.89106 | 63.12066 | 11.79777 | 5.551965 | 1.638546 |
| 9 | 14.27044 | 17.93183 | 62.99403 | 11.89348 | 5.547084 | 1.633580 |
| 10 | 14.27964 | 17.92669 | 62.97455 | 11.92481 | 5.540020 | 1.633928 |
| Variance Decomposition of GDP | | | | | | |
| Period | S.E. | CA | INF | GDP | GEXP | M3 |
| 1 | 2.125662 | 5.969581 | 7.999101 | 86.03132 | 0.000000 | 0.000000 |
| 2 | 2.407707 | 7.268545 | 7.115048 | 75.76718 | 0.000140 | 9.849084 |
| 3 | 2.564449 | 7.207705 | 6.370024 | 75.83356 | 1.634160 | 8.954547 |
| 4 | 2.707312 | 7.928771 | 6.931286 | 73.79048 | 2.329595 | 9.019872 |
| 5 | 2.798474 | 9.814116 | 6.752952 | 72.28404 | 2.347881 | 8.801015 |
| 6 | 2.855200 | 10.23252 | 6.731400 | 71.84844 | 2.425204 | 8.762435 |
| 7 | 2.880802 | 10.39805 | 6.715992 | 71.68242 | 2.459091 | 8.744446 |
| 8 | 2.893676 | 10.47679 | 6.734037 | 71.58833 | 2.463784 | 8.737061 |
| 9 | 2.898924 | 10.56328 | 6.750420 | 71.50115 | 2.460492 | 8.724658 |
| 10 | 2.901280 | 10.60735 | 6.774696 | 71.44370 | 2.457610 | 8.716647 |

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