

The Analysis of Fiscal Policy Shocks' Transmission in Morocco

Hicham BADDI*, Kamal LAHLOU*

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ABSTRACT

The issue of assessing the effects of fiscal shocks on macroeconomic variables, in particular on GDP has been the subject of many theoretical and empirical studies in the last decade. All these studies have used three approaches to analyze this question. The first is narrative, the second is based on the structural VAR and the third is based on DSGE models. Indeed, their results confirm the hypothesis that fiscal policy has a positive effect on economic activity. The purpose of this paper is to analyze the impact of fiscal shocks on economic activity in Morocco. The results of this assessment have found a positive impact of expansionary fiscal policy on economic growth and consumer spending in Morocco.

1- Introduction

Could Fiscal policy stimulate economic activity without deteriorating macroeconomic stability? The answer to this question has led to the emergence of two theoretical frameworks epistemologically opposite. On the one hand and following the 1929 crisis, Keynes perception considered the state as a major actor in the creation of growth and redistribution of wealth. In contrast, the liberal movement, reinforced by 1970s oil crisis, challenged the Keynesian certainties by restricting the state to single regulator.

Nevertheless, and after the recession caused by the recent economic crisis, a consensus seems to be emerging on the importance of the budget deficit as a tool in the hands of the State to continue to honor its commitments, namely the stimulation of economic activity and the implementation of programs in order to improve the social welfare.

That said, a substantial budget deficit is likely to affect the economic activity as evidenced by the difficult phase characterizing the European public finances in recent years, as it can also be a debt burden for future generations who would see their imposition rates grow profusely.

On the other side and beyond the theoretical and institutional debates, discussions on this issue for an emerging country like Morocco contain another dimension. Indeed, how can we minimize the role of fiscal policy in the presence of significant deficits in basic socioeconomic infrastructures?

The purpose of this paper is to analyze the impact of fiscal shocks on economic activity in Morocco. To do this, the first section will briefly return to the theoretical debates around this topic. In a second section, the different empirical approaches developed to identify delays of transmission and persistence of these shocks will be presented. A final section will review the results of the SVAR model used for this object.

2- Theoretical discussions

Theoretical researches on the theme of fiscal policy shocks transmission to macroeconomic aggregates are usually attached to describe the weight and signs of fiscal multipliers. The aim is to assess how expansionary fiscal policy can stimulate or restrict economic activity. Overall, the theoretical literature distinguishes two types of approaches: The first focuses on fiscal policies aimed to influencing the aggregate demand, while the second approach is focuses particularly on the impact of widening public deficit on the aggregate supply.

¹ *PhD researchers, Department of economics, University Mohammed V, Rabat-Agdal, Morocco.

2-1. Fiscal policies focused on demand

Considered the cure for the economic depression that impacted global production in the 1930s, the researches of Keynes (1936) were definitely the benchmarks of demand-driven public policies, thus, assuming price rigidity and underemployment of productive capacity. The classic Keynesian model assumes that the level of total output of an economy is largely determined by the aggregate demand. In this framework, the fiscal multiplier is equal to one when increased spending is tempered by higher taxes. However, this multiplier exceeds one in a context of significant reactivity of consumption to current income and when increased spending is more important than increasing taxation.

Similarly, extensions of basic Keynesian model have shed light on the eviction caused by movements in interest rates and exchange rates which can ultimately impact the intensity multiplier effects. Nevertheless, the authors of these extensions have not completely put into question the effectiveness of fiscal policy in that even if the eviction effects may affect the multipliers their signs remain unchanged.

Thus, in the standard IS / LM model, private investment depends negatively on interest rates, therefore, an expansionary fiscal policy can lead to higher interest rates, in conjunction with the pressure of the public treasure in the banking market, and thereby reduce private investment.

Moreover, in an open economy (IS/LM /BP), rising interest rates, which generally follows an expansionary fiscal policy encouraging capital inflows and thus promotes the emergence of exchange rate appreciation. In such contexts, the deterioration of the current account may offset the increase in domestic private demand. It should be noted that the evictions caused by the movements of interest rates and exchange rate effects are influenced by certain mechanisms of the IS/LM:

The determinants of private investment: Crowding out effect is greater if private investment is very sensitive to interest rates. However, when the investment is an increasing function of the current income, fiscal multiplier can be very important despite the crowding caused by rising interest rates.

The money demand and the public deficit: The evictions related to rising interest rates effects depend mainly on the relation between money demand, interest rates and incomes. Thus, less the sensitivity of money demand to changes in interest rates are significant, more it is for the income and is more important the effect of eviction. However, rising interest rates may be offset by accommodative monetary policy.

Openness and exchange rate regime: the weight of fiscal multipliers depends to a large extent on the nature of the exchange rate regime (fixed vs. flexible). Indeed, in an open economy with flexible exchange rate, increased government spending will lead to higher interest rates and therefore an appreciation of the exchange rate and suggesting virtually no fiscal multiplier. In contrast, fiscal policy remains effective in an open economy with a fixed exchange rate regime, as the increase in government spending causes a slight increase in interest rates. This increase in interest rates is generally moderated by the rise of money supply.

Price flexibility: according to neo-Keynesian models, price flexibility, even very limited in short-term, tends to weaken the multiplier and reduce the influence of the exchange rate regime. Indeed, in a closed economy, a fiscal expansion can lead to a significant increase in inflation and restricting the increase in aggregate demand.

In an open economy with flexible exchange rate, the effect will depend on the sensitivity of local prices due to changes in exchange rate. Thus, the crowding-out effect will be less than in an economy with sticky prices because the appreciation of the exchange rate will be accompanied by a fall in prices.

Finally, under a fixed exchange rate, the current account may witness a deterioration in response to rising prices. This acceleration of inflation is usually caused by a real appreciation of the exchange rate. In such contexts, crowding out effects are more pronounced compared to an economy with sticky prices.

Wealth effects: changes in interest rates, exchange rates and prices may also encourage the manifestation of the effects of eviction through the channel of wealth, especially if consumption depends heavily on the current wealth. Indeed, a rise in interest rates followed by an appreciation of the exchange rate could compete to reduce the nominal value of financial assets and foreign currency assets.

Overall, the transmission of fiscal shocks should be analyzed taking into account the time required for the effects of eviction to be affirmed. Thus, more these effects occur with time lags in fiscal policy is effective particularly in the short term. This reasoning gives the wage price spiral, influencing factor in the rapid rise in prices, and the sensitivity of the trade balance in response to changes in the price of imports and exports, a major role in determining the weight of tax multipliers.

Despite the remarkable success experienced by the recommendations of Keynes and the models that have inspired it, an alternating (or complementary) current emerged in the 1970s under the hegemony of the new classics. The proponents of this current have focused primarily on the non-Keynesian effects of fiscal policy, especially the lack of microeconomic foundations in Keynesian models.

Rational expectations: unlike Keynesian models that assume that economic agents behave according to adaptive expectations; the models developed by the new classics include a forward-looking vision that assumes adjustments by economic agents to future expectations (rational). In this framework, the long-term effects of fiscal policy become decisive even in the short term; implying that the distinction between temporary and permanent fiscal policy is important. In other words, if the temporary fiscal policies cannot influence the expectations of economic agents, the long-term fiscal policies encourage them to speculate an increase in interest rates.

The Ricardian equivalence: the Keynesian models are generally based on a strong positive correlation between consumption and current income. However, in a context where economic agents are Ricardian, they adopt a forward-looking behavior and therefore they are conscientious of the government intertemporal constraint. Thus, expansionary fiscal policies encourage them to anticipate a future tax increase which suggests that consumption will remain stable due to the smoothing phenomenon.

Risk premiums, credibility and uncertainty: risk premiums on interest rates are an important channel through which the accumulation of public debt could affect the effectiveness of fiscal policies. Indeed, knowing that risk premiums on interest rates provide information on the probability default of the government and rising inflation. Also, the economic agents' confidence in the government's ability to safeguard the sustainability of public debt will tend to decrease promoting therefore the emergence of interest rates crowding effects. Similarly, if fiscal policies are accompanied by an increase in uncertainty, economic agents will tend to increase their savings and postpone investments.

In sum, the behavior of economic agents for consumption and investment is conditioned to a large extent by the economic environment and confidence in the credibility of economic policies.

2-2. Fiscal policies focused on supply

For neoclassical approach, the effects of fiscal policy on demand are low when the economy is in full employment. They argue that expansionary fiscal policy could lead to crowding out effects and therefore would not have a positive impact on economic growth. These assumptions could be justified by the fact that government deficits are the cause of the rise in interest that lead to negative pressures on the private aggregate demand.

After having emphasized the limits of fiscal policy demand effects, the neoclassics postulate that supply effects are significant only in the long term. They argue that constraints on productive capacity can be moderated only through the stimulation of aggregate supply. The latter may also have an impact on aggregate demand in the short term because of expectations suggesting an increase in long-term growth.

Some attention has also been given to the factors that affect the effectiveness of fiscal policy in the short term. These factors include the effects of changes in the income tax, labor supply and the effects of changes in capital taxes, savings and investment. This issue of supply has also taken an important place in the theoretical model of the new classics. Overall, this model shows that the fluctuations in economic activity are due to supply shocks and not to changes in aggregate demand. Lucas (1975), Sargent and Wallace (1975) argued that only unanticipated policy could have an impact on economic growth through the supply, while anticipated policies are ineffective in the short and the long terms.

The effectiveness of fiscal policy is also related to political economy factors. The reaction of fiscal policy requires transmission delays. These times are defined as the lag required between budget decisions and the

choice of appropriate instruments to achieve them. These times can be long in the case of discretionary decisions or short in the case of counter-reaction of the automatic stabilizers. They may also depend on the institutional process and budget management.

Alesina and perroti (1995) showed that persistent budget deficits could be due to some political economy factors that they identified as follows:

- Some governments prefer to keep budget deficits even in case they realized surpluses;
- Some policymakers may decide to transfer the debt burden to future generations;
- The accumulation of debt would be for some policy makers a measure that could weaken the capacities of future governments;
- Lobby groups could delay fiscal adjustment;
- Some governments may dismiss the idea of fiscal austerity and leave their spending increased.

3- Empirical literature

The empirical literature on the identification of the effects of fiscal policy on economic activity reveals the emergence of three approaches. The first is commonly known as narrative. The second approach is econometric, due to the estimation the SVAR model. While the third, is based on the structural macroeconomic models (DSGE).

As regards the first approach, it aims at isolating the fiscal shocks through the historical identification of changes in fiscal policy (tax reforms, changes announced in programs spending). Once these impacts are identified, their effects will be estimated in a univariate dynamic model (Ramey and Shapiro, 1998, Romer and Romer, 2007), or in a multivariate model (Burnside et al, 2004, and Ramey, 2007). By adopting this approach, Romer and Romer (2010) tried to examine the impact of tax changes on economic activity in the United States².

Their analysis shows that there are three forms of variations: the variations related to legislative changes, those related to economic conditions and the variation that are exogenous. In addition, they show that increases in taxes due to exogenous changes have a very restrictive effect. It is, in this regard, shown that increasing taxes by 1% leads to a 3% decline in real GDP.

Other studies have also been conducted using econometric models. Blanchard and Perotti (2002) refer to the SVAR models to examine the dynamic effects of changes in government spending and taxes on GDP in the United States. Their results indicate that the spending multiplier is close to unity (0.9), while the tax multiplier is about 0.7. However, Mountford and Uhlig (2009) noted that these multipliers are respectively about 0.6 and 0.3. They subsequently concluded that the most effective fiscal policy is the one based on the financing of deficits by cutting taxes³. However, perotti (2004) argued that there is no certainty as to the more pronounced impact of tax cuts over increased spending. He also found that the spending multiplier was greater than unity in the United States during the 1970s.

Moreover, Ilzetzki, Mendoza and Vegh (2009) focused on the relationship between the size of the multiplier and the characteristics of the studied economy. In their study, which included 44 countries, they found that in the short term, the effect of public consumption on the economic activity is weak. In the medium and long term, this effect becomes both more important and more dependent on the characteristics of the economy. In addition, they showed that the effect of the increase in public spending is more important in the long term in a closed economy with a fixed exchange rate regime. However, this effect is not significant in open economy with flexible exchange rate regime. Moreover, they point that this effect could be counterproductive in the case of heavily indebted countries.

² Valerie A. Ramey and Matthew D. Shapiro (1998) and Ramey (2008) used the narrative approach to evaluate the effects of changes in government spending on economic activity.

³ In this study, Mountford and Uhlig (2009) have not imposed restrictions on the responses of GDP, of private consumption and of investment to shocks of fiscal policy.

Other recent studies suggest that a time varying parameter model can be more appropriate for studying the variation over time of the effects of fiscal shocks on economic activity⁴. By applying this new approach, Manuel and Artur (2010) found that the effectiveness of fiscal policy in the United States declined over the period 1965:2 to 2009:2, particularly as far as net taxes. On the expenditure side, it declined only marginally. Furthermore, Markus, Jacopo and Sebastian (2010) show that the effects of government spending shock on economic activity in the Euro area increased until the late 80s and then declined thereafter. They also emphasize that in the long-term, public spending multipliers tend to fall sharply.

Regarding the third approach based on DSGE models, the study conducted by Coenen and Straub (2004) is one of pioneering works which analyzed the impact of fiscal shocks on macroeconomic aggregates using these models. Thus, based on the model developed by Smets and Wouters (2003) and integrated into the structure of the model of non-Ricardian households, the authors demonstrated through simulations of the countries of the Euro area that a 1 per cent rise in government spending (to GDP in the stationary state) generates almost instantaneous decrease in consumption, it reaches its trough after 10 quarters before starting to display a growing tendency. Investment exhibits the same trend for it observes an immediate drop following the fiscal expansion. Like consumption, investment experienced a gradual recovery from the 10th quarter before reaching its steady state after 40 quarters.

However, the reactions displayed by the real wage and hours worked do not fall into the same trend. Indeed, the real wage experienced an ascending progression during the first 10 quarters before returning to its steady state in the 20th quarter. Similarly, hours worked observe an instant increase although it remains moderate compared to the real wage.

Furthermore, after the increase in government spending, the eviction effects were identified, since nominal interest rates observed an immediate increase that lasted five quarters. Prices and the real marginal cost also experienced positive progression for the fiscal shock produced in these simulations resulted in an immediate increase in inflation and the real marginal cost. This increase reaches its peak for both variables around the fifth quarter.

Finally, the output gap is naturally widened under these conditions, although increasing unused capacity lasted only three quarters, thus emphasizing those expansionary fiscal policies in the euro area may have contractionary medium-term effects on economic activity.

After the crisis that rocked the global economy in 2008, the transmission of fiscal shocks started to occupy an important place in the economic literature. Thus, by using a DSGE model with endogenous Treasury Bills, Furceri and Mourougane (2010) demonstrated that a temporary increase in government spending (equal to 1% of GDP) results in an instantaneous increase of the global production. Thereafter, it begins to decline over the 10 quarters following before gradually returning to its equilibrium level. Consumption, meanwhile, observe an immediate increase following a fiscal shock, however, the effect wears off after a few quarters (between 1 and 3) to make way for a relatively unfavorable evolution.

Although this study has shown that expansionary fiscal policy may have a positive effect on economic activity, the effects of eviction are still very present. Inflation is also experiencing an increase in the first three quarters after the increase in public spending and a resulting decline in real wages in the economy.

Finally, this review of empirical literature on work using DSGE models will conclude with the presentation of the results of a study conducted by Stähler and Thomas (2011). Thus, compared to previously developed models for the Euro area, it offers such an advanced level of disaggregation of government spending through the explicit distinction between public investment, public procurement and wage developments in the public service.

In terms of results, the authors showed that following a permanent reduction in the production of public procurement, investment, nominal interest rates and inflation experience an immediate drop that persists during the three quarters following the shock. Also, consumption appears to have low reactivity, while the unemployment rate is in a significant increase.

⁴ This model has been used in a relatively large number of studies on monetary policy (e.g. Cogley and Sargent, 2001, Cogley and Sargent, 2005, Primiceri, 2005). While studies on fiscal policy are not abundant (e.g. Kirchner et al. 2010).

A permanent decline in labor demand in the public sector impacts, in turn, positively the production, private consumption, the unemployment rate (increase in the number of job seekers) and interest rates. By cons, it affects negatively investment and inflation.

Similarly, a permanent reduction of wages in the public has little effect on the production and private consumption. However, it has a negative impact on investment, unemployment, inflation and nominal interest rates.

Recent simulations have focused on the analysis of the consequences of a permanent reduction in public investment on some macroeconomic aggregates. Therefore, if private consumption seems to show, again, a low reactivity, production, private investment, inflation and nominal interest rates show an almost instantaneous drop that lasts almost three quarters. Unemployment meanwhile exhibits a dramatic increase so much so that the peak is reached after three quarters.

4- Empirical Strategy

The aforementioned literature show that the evaluation of the effects of fiscal shocks and other macroeconomic variables has been investigated in developed countries. However, studies dealing with this issue in developing countries remain limited in scope and number. For this reason, we will examine this question for the case of a developing country as Morocco.

4-1. The model

In order to examine the effects of fiscal shocks on economic activity and consumption in Morocco, we adopt an approach that is based on estimating a SVAR model. Indeed, the VARS model allows us to identify the structural shocks that affect the reduced form model (VAR) due to restrictions imposed on the long-term shocks⁵.

The identification of these structural shocks can be realized only through the estimation of a VAR model in a structural form which is written as follows:

$$AY_t = B_1Y_{t-1} + \dots + B_pY_{t-p} + U_t \quad (1)$$

Where Y_t is the vector of endogenous variables, including real GDP, private consumption, government revenue and total expenditure. A is a matrix of size (n, n) representing the relations of simultaneity between variables in Y_t . U_t is the vector of structural shocks, which are assumed to be normally and independently and identically distributed. They are also orthogonal.

The presentation of this model in a reduced form is given by:

$$Y_t = A^{-1}B_1Y_{t-1} + \dots + A^{-1}B_pY_{t-p} + A^{-1}U_t \quad (2)$$

$$Y_t = C_1Y_{t-1} + \dots + C_pY_{t-p} + A^{-1}U_t \quad (3)$$

Thus, the VAR model has a standard form that can be written as follows:

$$Y_t = \phi_1Y_{t-1} + \dots + \phi_pY_{t-p} + \varepsilon_t \quad (4)$$

With $var(\varepsilon_t) = \Sigma$

From equations (3) and (4) we have:

$$\hat{\phi}_i = C_i = A^{-1}B_p \text{ with } i=1, \dots, p \quad (5)$$

and $\hat{\varepsilon} = A^{-1}U_t$

⁵ The restrictions are derived from economic theory and the specifics of the field examined.

The variance covariance matrix is given by:

$$\begin{aligned} \text{var}(\hat{\varepsilon}) &= A^{-1} \text{var}(U_t)(A^{-1}) \\ \hat{\Sigma} &= A^{-1} \Omega (A^{-1})' \\ \tilde{A} \Sigma A' &= \Omega \end{aligned}$$

From equation (5), the vector of innovations of the VAR model is a linear combination of structural innovations. Thus, the specification of the matrix A identifies the structural shocks and the matrix B.

4-2. Identification of restrictions

Based on economic theory and some empirical studies, including those of Blanchard and Perotti (1999), Hoepfner (2001) and Matthiass Mohr (2003), the following restrictions will be introduced as:

$$\begin{bmatrix} 1 & C_{12} & C_{13} & C_{14} \\ 0 & 1 & C_{23} & C_{24} \\ -0.9 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} e_Y \\ e_C \\ e_R \\ e_D \end{bmatrix} = \begin{bmatrix} U_Y \\ U_C \\ U_R \\ U_D \end{bmatrix}$$

The first row of the matrix A reflects the response of GDP on impact of consumption, income and final consumption expenditure of households. On this line we do not impose any restrictions. However, on the second line, reflecting the reaction of the final consumption expenditure of households, it does not react instantly face to a shock to GDP. On the third line, the elasticity of tax revenue to GDP in Morocco is assumed to be close to unity, it is about 0.9⁶. Then we retain that tax revenues do not instantly react following a shock on public spending. Finally, we consider that the reaction of public spending due to a shock of GDP is not instantaneous, and their reactions to various macroeconomic shocks are not realized in the same period.

4-3. Data

Based on annual data for GDP, private consumption, tax revenue and total expenditure over the period 1970-2010, the SVAR approach has been adopted to examine the effects of fiscal shocks on economic activity and the final consumption expenditure of households in Morocco⁷.

The results of unit root tests (ADF and PP) indicate that the model variables are stationary in first differences but once Detrending with the Hodrick-Prescott filter, they appear in a stationary level.

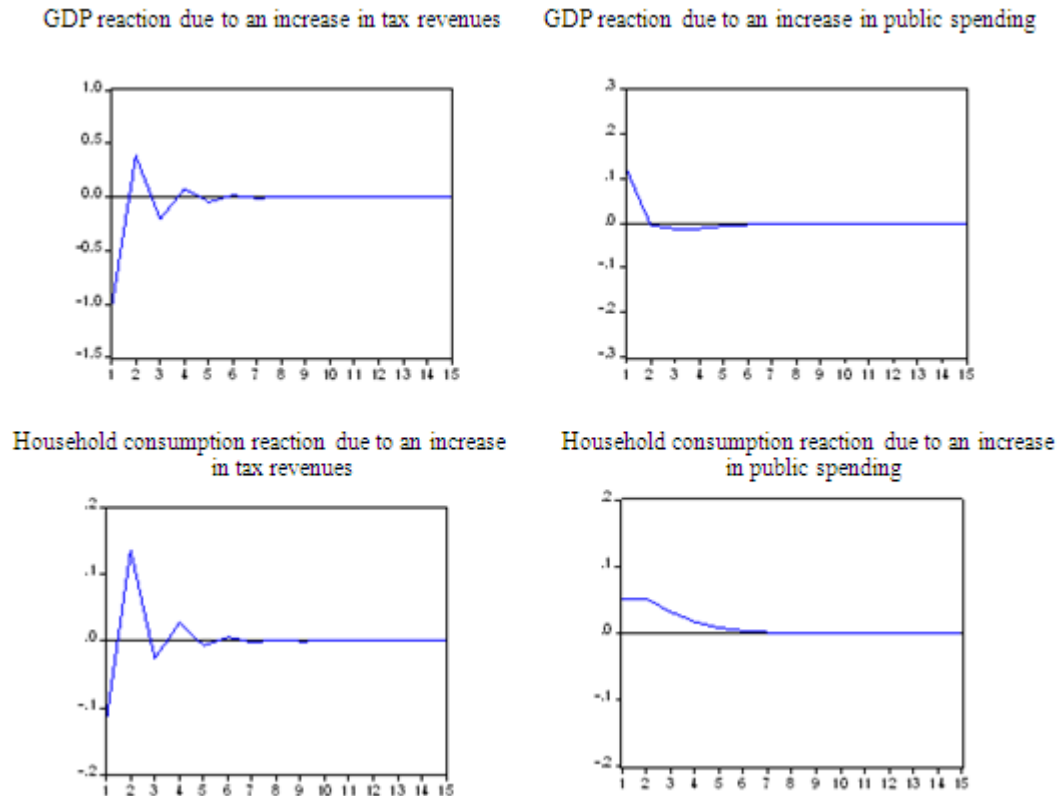
5. Results

Under the theoretical framework presented in this study, two scenarios may arise from the econometric estimations using the SVAR model. Indeed, a positive response of GDP and final consumption of households, following an increase in government spending, augur well for presence of a positive and significant elasticity between fiscal policy and economic activity. In contrast, a negative response from the aggregate production and consumption suggests that the Moroccan economic agents are characterized by Ricardian behavior where the fiscal policy turns out to be almost ineffective.

⁶ This elasticity is from a report published in December 2006 by the Ministry of Finance and Privatization. In this report we find that the elasticity of tax revenue to GDP ratio was about 0.9 in the period from 1990 to 1995 and 1.1 from 1996 to 2005. We made simulations with an elasticity of 0.9, 1 and 1.1. The best results were found with 0.9.

⁷ The variables should be expressed in real terms.

Figure 1: Impulse responses



Thus, the impulse response functions (see Figure 1) show that, following a positive shock of a standard deviation on public spending, GDP increases instantly during the first year. If the impacts on the GDP print completely from the second year, the final household consumption exhibits a positive progression during the first two years and the shock vanishes after six years.

However, an increase in overall revenue to induce a contraction in economic activity for the GDP and final consumption of households observe a decrease (steeper on GDP than consumption) during the first two years following the impact on revenue. Despite the increase in GDP and consumption in the third year, the return to the steady state is observed after five years.

Conclusion

The purpose of this paper has been to analyze the impact of fiscal shocks on economic activity in Morocco. To do this, the first section has attempted to briefly present the theoretical debates around the issue of the effectiveness of fiscal policy. Thus, it appears that the effectiveness of fiscal policy is closely linked to the behavior and expectations of economic agents about the medium-term implications of a widening of the deficit on interest rates, prices and rates tax.

Subsequently, some empirical works whose concerns are similar to the present study have been exposed. Overall, the results show a mixed transmission depending on the period studied, savings and sophistication of the method used.

Finally, the results proposed in this study SVAR model have found a positive impact of expansionary fiscal policy on growth and consumption in Morocco. Indeed, following a positive shock of a standard deviation on public spending, GDP increases during the first instant. If the impact on the GDP is completely tarnished from the second year, the final household consumption exhibits a positive progression during the first two years and the shock vanishes after six years.

However, an increase in overall revenue to induce a contraction in economic activity since the GDP and final consumption of households observe a decrease (steeper on GDP than consumption) during the first two years following the impact on revenue.

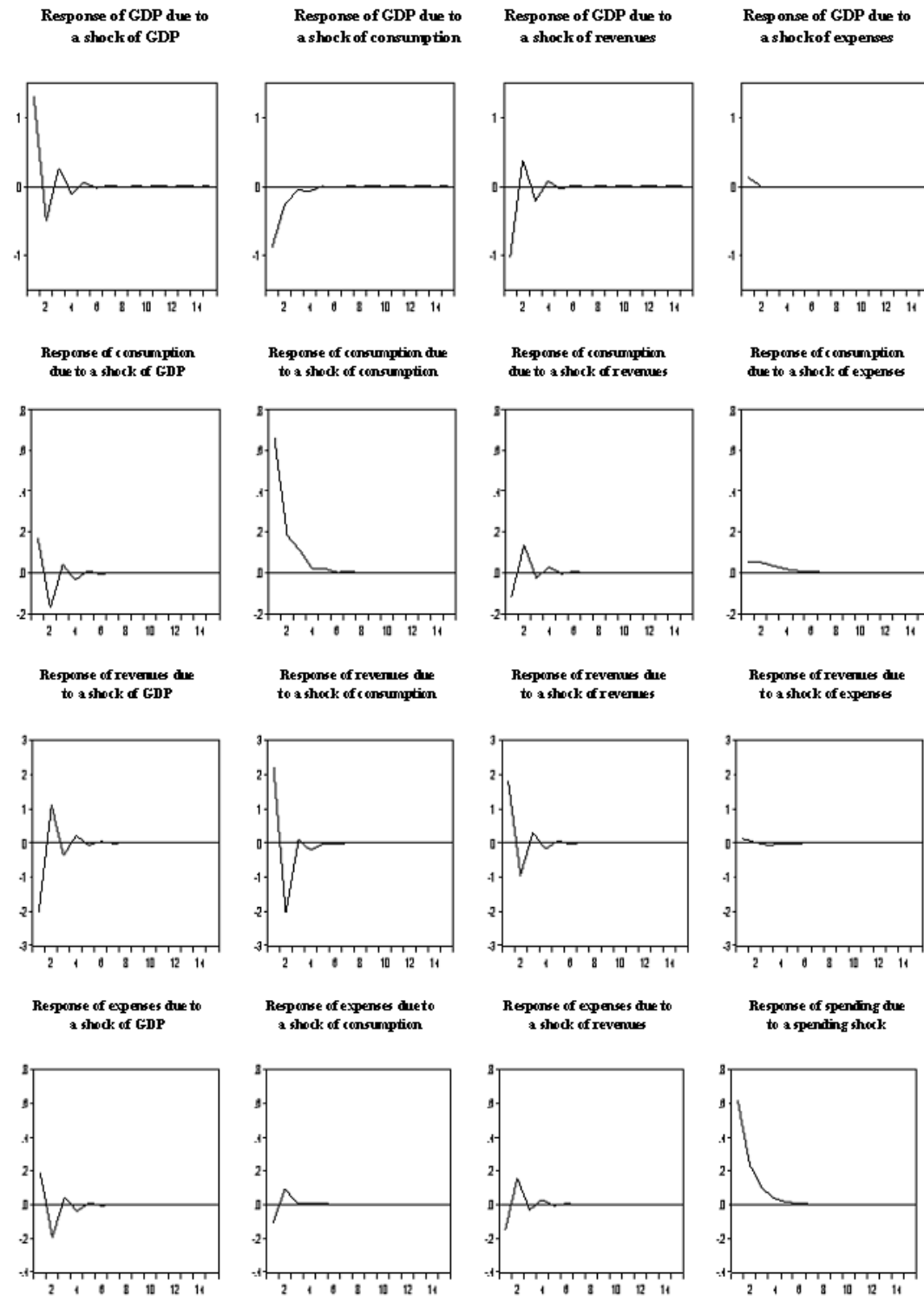
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Appendix

1. Impulse response functions
 Response to structural shocks of one standard deviation



2. Portmanteau test results

Lags	Q-Stat	Prob.	Adj Q-Stat	Prob.	df
1	10.48741	NA*	10.76339	NA*	NA*
2	28.48986	0.0276	29.73895	0.0194	16
3	40.09841	0.1540	42.31488	0.1050	32

3. Normality tests results

Component	Skewness	Chi-sq	df	Prob.
1	-0.841015	4.597487	1	0.0320
2	0.085118	0.047093	1	0.8282
3	0.851074	4.708127	1	0.0300
4	0.051126	0.016990	1	0.8963
Joint		9.369698	4	0.0525

Component	Kurtosis	Chi-sq	df	Prob.
1	3.466108	0.353042	1	0.5524
2	3.548509	0.488900	1	0.4844
3	3.916802	1.365854	1	0.2425
4	3.512482	0.426787	1	0.5136
Joint		2.634583	4	0.6207

Component	Jarque-Bera	df	Prob.
1	4.950529	2	0.0841
2	0.535994	2	0.7649
3	6.073981	2	0.0480
4	0.443777	2	0.8010
Joint	12.00428	8	0.1510