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DISENTANGLING THE EFFECTS OF MACROECONOMIC POLICIES IN MOROCCO: A SVAR APPROACH

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Abstract:
Objective: in this research, we disentangled the effects of macroeconomic policies in Morocco under the assumption of monetary dominance.
Method: to conduct the empirical analysis, we identified a SVAR framework in which fiscal authorities are constrained by the monetary conditions stemming from central bank's inflation-targeting policy.
Results: in light of our findings, output responds positively to expansionary fiscal policies, which tend to exert upward pressure on prices. Furthermore, the central bank seems unable to impose full monetary dominance and fails to alleviate inflationary pressures through interest rate hikes, which calls into question the effectiveness of inflation-targeting policies in Morocco. Such policies appear to constrain the growth prospects without delivering the expected effects on prices.
Conclusion: these results highlight the need for closer coordination of monetary and fiscal authorities' actions, backing interest rate-based monetary policy with effective money supply management and avoiding any fiscal measures that support economic growth at the expense of price stability.

Keywords: Monetary policy, fiscal policy, monetary dominance, Inflation targeting, SVAR

1. Introduction

Periods of high inflationary pressures put central banks under considerable pressure. They face the challenge of stabilizing the price level and supporting the growth boosting efforts of the government by alleviating its budget constraint - especially when fiscal deficits are large. In this context, reaching central bank's inflation target becomes harder, as monetary authorities are required to cover the financial needs of the government. The trade-off between inflation control and growth stimulation is at the heart of modern monetary policy making.

In practice, central banks adopt a flexible monetary policy stance by adjusting their position to economic outlook. Indeed, monetary authorities concentrate their efforts on easing inflationary pressures in presence of domestic imbalances or external shocks that threaten the stability of price level. Conversely, they focus on mitigating output losses by backing the government's stimulus programmes in times of economic downturn. The management of this trade-off between inflation and growth is largely influenced by central banks' institutional mandates as well as the coordination scheme that defines how monetary and fiscal policies are synchronized. As a matter of illustration, the European Central Bank prioritizes the maintain of price stability by implementing a pure inflation targeting policy and excluding the government's budget constraint from its decision-making process. By contrast, the Federal Reserve's approach is less restrictive, in that it combines the preservation of price stability with concerns for growth and employment. These two illustrations provide a starting point for building a reliable framework that incorporates the coordination scheme into the analysis of the macroeconomic implications of monetary and fiscal policy.

Assessing the impact of monetary and fiscal policy decisions on inflation and economic activity has been at the heart of a rich array of empirical studies covering both developing and emerging economies. However, the assessment proposed by most of these studies does not take into account the key role played by the coordination scheme as a major determinant of macroeconomic policies effectiveness. Indeed, the outcomes of central bank and government policy decisions depend critically on the way they coordinate their actions as emphasized by Sargent and Wallace (1981). Targeting inflation effectively, requires a monetary dominance regime in which monetary policy endeavours to maintain price stability without being constrained to accommodate fiscal imbalances. Conversely, fiscal dominance regimes prioritize the support of loose fiscal policy through monetary expansion. Despite their potential impact on macroeconomic policies effectiveness, the coordination scheme choices are rarely

considered by empirical studies that addressed the question in the context of developing and emerging economies.

Analysing the macroeconomic implications of monetary and fiscal policies in these economies without accounting for the coordination framework that governs the interaction between central bank and government decisions, may lead to an incomplete understanding of inflation and growth dynamics.

Against this background, the present study addresses the Moroccan case and incorporates the coordination scheme into the analysis of inflation and growth implications of macroeconomic policies under the explicit assumption of monetary dominance. By including this assumption in our identification strategy, we develop a framework that assesses the response of price level and economic activity to structural shocks in interbank rate and government expenditure which respectively reflect fiscal and monetary policy decisions. Our ultimate goal is to provide new evidence on the macroeconomic effects of monetary and fiscal policies in developing countries.

2. Literature review

The response of key macroeconomic variables (i.e. inflation and growth rate) to fiscal and monetary policy has long been at the centre of scholarly debates. The theoretical foundations of this research question can be traced back to Keynes (1936), who emphasized the growth effects of an increase in government spending and shed the light on the decisive role played by accommodative monetary policies in supporting fiscal stimulus programmes. An analytical and mathematical translation of Keynes's argument was provided by Harrod (1937), Hicks (1937, and Meade (1937), while Hansen (1949, 1951, 1953) explores the short-run effects of monetary and fiscal expansion through a series of intuitive graphical representations.

Subsequent theoretical contributions incorporated external factors into macroeconomic analysis. Mundel (1960, 1963) and Fleming (1962) proposed a relevant assessment of monetary and fiscal policy implications in a small open economy, showing that the effectiveness of central bank and government actions depends on the exchange rate regime. The authors demonstrated that exchange rate flexibility enhances the effectiveness of monetary policy, whereas the ability of fiscal authorities to achieve their growth objectives is strengthened under a fixed exchange rate regime. These insights provided the foundations for standard aggregate supply – aggregate demand frameworks (e.g. McTaggart et al., 2003) used to explain the impact of macroeconomic policies on price level and output dynamics.

The interaction between central bank and government's decisions lies at the core of the analysis conducted by Sargent and Wallace (1981) who introduced the concepts of fiscal dominance and monetary dominance and showed that macroeconomic policies cannot operate in isolation. Their contribution advocates the preservation of sound macroeconomic foundations through effective inflation control backed by monetary dominance as a relevant coordination scheme. Under this regime, the major focus of the central bank is on price stability, whereas fiscal authorities adjust their policy to ensure debt sustainability, consistent with the principle of monetary authorities' independence. In line with Sargent and Wallace's stance, Rogoff (1985) argued that maintaining low inflation should be the primary concern of central bankers. Challenging the monetarist approach in which money supply is the key determinant of inflation, Leeper (1991), Sims (1994) and Woodford (1995, 1996, 2001) highlighted the inflationary effects of loose fiscal policies. The proponent of this theory presented inflation as a fiscal phenomenon, showing that a deteriorating fiscal balance can exert upward pressure on prices.

A reach array of research papers has attempted to disentangle the effects of macroeconomic policies, leading to mixed results. Indeed, empirical findings depend on the sample and the context of the study. The overall conclusions of early studies, such as Sims (1992) and Uhlig (2005), confirm the contractionary impact of restrictive monetary policies on output in advanced economies and highlight their relatively weaker, delayed or uncertain effects on the price level. The results become even more heterogeneous when it comes to emerging and transition economies. Starr (2005), for instance, showed that the influence of central bank's decisions on economic activity varies considerably across post-soviet economies. Transmission mechanisms and institutional structures are the two major factors that explain these differences. Conversely, the impact of monetary policy on inflation is clear and evident across all countries in the sample.

The findings of subsequent empirical works support the view that the effects of macroeconomic policies are country-specific. Sousa & Zaghini (2008) investigated the exposure of the Euro area to global monetary policy shocks. Their conclusions indicate that an increase in global liquidity – reflecting an accommodative stance adopted by major central banks – exerts a permanent upward pressure on prices in the Euro area while generating short-term effects on output. The empirical study by Fetai (2013) showed that monetary expansion in Macedonia fails to produce the expected Keynesian effect on growth and instead drives prices up. Furthermore, the government's stimulus measures do not have any substantial impact on economic activity. In their assessment of the implications of central bank's actions in Ghana, Chiaraah & Nkegbe (2014) uncover a significant long-term relationship between inflation and money supply.

Ćorić et al. (2015) examined the effectiveness of fiscal and monetary policy in Croatia and demonstrated their key role in boosting economic activity. Indeed, a combination of expansionary fiscal measures (i.e. increased government expenditure) and accommodative monetary actions (i.e. an expansion of the money supply) stimulates industrial production in Croatia. Moreover, the authors stated that alleviating inflationary pressures induced by growth-boosting policies necessitates a closer coordination of fiscal and monetary policy actions. Wauk & Adjorlolo (2019) proposed an empirical analysis of the nexus between central bank policy variables and economic growth in Ghana. The study's conclusions confirmed that an interest rate hike induced by restrictive monetary policy has a contractionary impact on output. The research work of Tule et al. (2020) is another interesting contribution to the literature on the implications of macroeconomic policies in developing countries. The paper disentangles the effects of fiscal and monetary shocks on growth and price level in Nigeria. The analysis of impulse-response functions reveals that monetary expansion provides an effective support to economic activity. In addition, an increase in government expenditure, coupled with a rise in liquidity injections in the money market, pushes prices up.

Examining the outcomes of monetary policy decisions in Pakistan, Gillani & Abdin (2021) found that inflation is positively linked to aggregate M2 in the long term. Their results suggest that achieving price stability requires better management of the money supply. Deb et al. (2023) broadened the scope of their analysis by including 33 countries in the study of monetary policy transmission. They report a negative and immediate response of output to tight monetary policy actions. Such a restrictive stance brings prices down, albeit at a slower pace. In addition, the authors identify central bank credibility, exchange rate flexibility and financial sector development as key determinants of monetary policy effectiveness. Another multi-country study was conducted by Checo et al. (2024) with the primary objective of analysing the mechanisms of monetary policy transmission in 18 emerging economies. The conclusions indicated that inflation and output tend to decrease following an upward adjustment in central bank's policy rate. Furthermore, an interest rate hike has a positive impact on yields in the bond market.

The rich body of literature that examined the implications of macroeconomic policies in developing countries have overlooked the potential impact of the interaction between fiscal and monetary policy decisions. This interaction is mainly influenced by the coordination scheme choices of the country. To fill this research gap, our research paper focuses on the Moroccan case and incorporates the coordination scheme into the analysis of inflation and growth implications of macroeconomic policies under the explicit assumption of monetary dominance.

By including this assumption in our identification strategy, we develop a framework that assesses the response of price level and economic activity to structural shocks in interbank rate and government expenditure which respectively reflect fiscal and monetary policy decisions. Our ultimate goal is to provide new evidence on the macroeconomic effects of monetary and fiscal policies in Morocco.

3. Methodology

This research paper provides an empirical analysis of the effects of macroeconomic policies in Morocco using a SVAR framework. It seeks to test the following hypotheses:

- Hypothesis I: monetary policy is effective in stabilizing inflation in Morocco.
- Hypothesis II: expansionary fiscal policy exerts a positive impact on economic activity.
- Hypothesis III: monetary authorities are capable of mitigating the inflationary pressures arising from fiscal expansion.

The empirical analysis spans the period 1980–2023. Annual time series data were collected from the High Commission for Planning, Bank Al-Maghrib, and the Ministry of Economy and Finance. The model includes four key variables: inflation (IF), the real GDP growth rate (GR), change in interbank rate (ΔR) - assumed to respond instantaneously to monetary policy decisions - and government expenditure (EX), expressed as a percentage of GDP and used as fiscal policy instrument.

The SVAR approach is appropriate for assessing the impact of macroeconomic implications of monetary and fiscal policy decisions. Based on this framework, we study the response of inflation and economic growth to structural shocks in two major impulse variables (i.e. interbank rate and government expenditure).

The general structural form of a p-lagged VAR is:

$$AY_t = \alpha + \sum_{i=1}^{p} B_i \, Y_{t-p} + u_t$$

- A: matrix of contemporaneous interactions
- Y_t: vector of endogenous variables, (IF ; GR ; ΔR ; EX)
- B_i: matrices of coefficients
- α: vector of intercept terms
- u_t: vector of structural shock

Short-term restrictions are imposed in order to identify the SVAR model. The restrictions take into account the central bank's inflation-targeting framework under the assumption of monetary dominance as defined by Sargent & Wallace (1981). In this framework monetary authorities adjust interest rates in light of macroeconomic data, which mean that interbank rate reacts instantaneously to the fluctuations of inflation and growth. Since the government cannot rely on central bank to support its stimulus programmes under a monetary dominance regime, fiscal authorities are constrained by the monetary conditions stemming from inflation-targeting policy. Thus, interest rate shocks induced by monetary policy exert an immediate effect on government expenditure.

The sequential order of the variables (in Cholesky factorization) are as follows:

$$Y_t = \begin{pmatrix} IF \\ GR \\ \Delta R \\ EX \end{pmatrix} \quad ; \quad A = \begin{pmatrix} 1 & 0 & 0 & 0 \\ a_{11} & 1 & 0 & 0 \\ a_{21} & a_{22} & 1 & 0 \\ a_{31} & a_{32} & a_{33} & 1 \end{pmatrix}$$

4. Results and discussion

Prior to analysing the dynamic responses of output growth and inflation to structural monetary and fiscal shocks, the time-series properties of the variables are examined. Stationarity is assessed using the Augmented Dickey–Fuller (ADF) tests to determine whether the series are stationary in levels. The results reported in Table 1 indicate that all variables are stationary in level. As a result, Johansen cointegration testing is unnecessary, since it applies to non-stationary series integrated of the same order. Accordingly, the SVAR methodology is adopted to investigate the macroeconomic policy effects in the country under study.

Table 1. Unit root test results

Variable	ADF Level	Conclusion
IF	-2.152753 (-1.948886)	I(0)
GR	-9.090557 (-3.518090)	I(0)
ΔR	-5.740984 (-3.523623)	I(0)
EX	-3.870768 (-3.520787)	I(0)

( ): critical values for the 5% significance level.

Source: Author

The Akaike Information Criterion (AIC) and the Final Prediction Error (FPE) criterion both identify three lags (p=3) as the optimal VAR lag length, as reported in Table 2.

Table 2. VAR lag order selection criteria

Lag	LR	FPE	AIC	SC	HQ
0	NA	1.33e-13	-18.29973	-18.13084	-18.23867
1	76.38779	3.35e-14	-19.68224	-18.83780*	-19.37692
2	32.44431*	2.68e-14	-19.92883	-18.40884	-19.37925*
3	25.80427	2.45e-14*	-20.08455*	-17.88900	-19.29071

Source: Author

The results of the normality, autocorrelation, and heteroscedasticity tests confirm the adequacy of the estimated VAR model.

Table 3. VAR residual tests

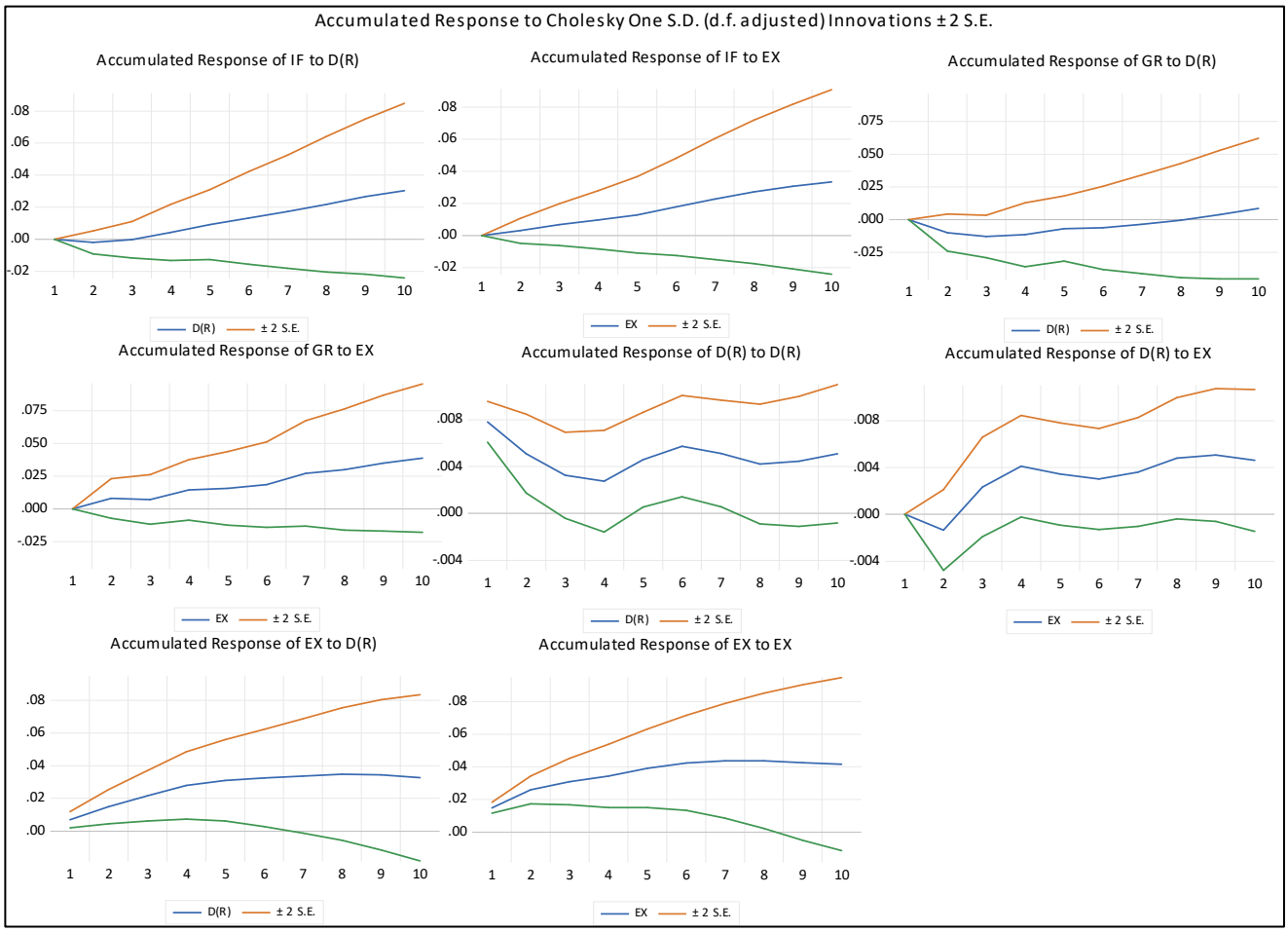
Autocorrelation LM test	White heteroskedasticity test	Normality test
1.159689 (0.3250)	260.2765 (0.1760)	12.78077 (0.1196)

( ) P-value.

Source: Author

The identification of the SVAR model relies on the short-run restrictions outlined in the methodology section. Within this framework, we examine the macroeconomic effects of monetary and fiscal policies in Morocco by analysing the impulse response functions under the assumption of monetary dominance. In particular, the focus is on assessing the effects of structural shocks to the interbank rate and government expenditure on inflation and economic growth.

Figure 1. Response of macroeconomic variables to structural shocks in interbank rate and government expenditure.



Source: Author

Central bank loosens temporarily its monetary policy in response to a positive shock in government expenses. Starting from the second year, monetary authorities adopt a tougher stance by exerting an upward pressure on interest rates in order to limit the destabilizing effects of an increase in government spending (i.e. inflationary pressures), which aligns with the monetary dominance framework proposed by Sargent and Wallace (1981). Inflation reacts positively to an expansionary fiscal policy. This response is consistent with the fiscal theory of the price level (e.g. Woodford, 1995, 1996, 2001). Indeed, the adverse inflationary effects of growth-promoting fiscal policies remain pronounced in Morocco, despite the central bank's restrictive stance. Output responds positively to an increase in government expenditure throughout the analysed period, confirming the positive growth effect predicted by the Keynesian approach.

Government expenses show a permanent positive response to interest rate hike. Thus, Moroccan central bank seems unable to drive fiscal authorities' spending decisions in line with its own

price stability goals. In other words, the monetary dominance approach fails to alleviate the potential inflationary pressures induced by fiscal expansion in Morocco. This finding is also confirmed by the positive reaction of the price level to an increase in interest rates, which calls into question the effectiveness of inflation-targeting policies in Morocco and highlights the need to complement interest rate adjustments with permanent liquidity withdrawal during periods of high inflationary pressure. In addition, a restrictive monetary policy driven by interest rate hike exerts prolonged downward pressure on economic growth for up to eight years after the shock.

5. Conclusion

In this research, we disentangled the effects of macroeconomic policies in Morocco under the assumption of monetary dominance. To conduct the empirical analysis, we identified a SVAR framework in which fiscal authorities are constrained by the monetary conditions stemming from central bank's inflation-targeting policy. In light of our findings, output responds positively to fiscal expansion, confirming the positive growth effect predicted by the Keynesian approach. However, government's growth-promoting policies tend to exert upward pressure on prices, which is consistent with the fiscal theory of the price level (e.g. Woodford, 1995, 1996, 2001). Although monetary authorities adopt a tougher stance to limit the inflationary effects of fiscal expansion, the government keeps raising its expenditure. Thus, Moroccan central bank seems unable to impose full monetary dominance that would drive fiscal authorities' spending decisions in line with its price stability goals. Moreover, monetary authorities fail to alleviate inflationary pressures through interest rate hikes, which calls into question the effectiveness of inflation-targeting policies in Morocco. Such policies appear to constraint the growth prospects in Morocco without delivering the expected effect on prices.

The empirical findings are broadly consistent with the literature, confirming that fiscal expansion stimulates output while exerting upward pressure on prices, as highlighted by Tule et al. (2020). Similarly, the limited effectiveness of monetary policy in controlling inflation aligns with Gillani & Abdin (2021), who stress the importance of money supply management. However, unlike Deb et al. (2023) and Checo et al. (2024), where tight monetary policy reduces inflation, the Moroccan case shows weaker transmission mechanisms. This suggests structural constraints that reduce monetary policy effectiveness despite inflation-targeting efforts.

Overall, our results highlight the need to back interest rate-based monetary policy with effective money supply management, especially during periods of high inflationary pressures. This entails combining permanent withdrawal of surplus liquidity with interest rate adjustments to ensure

price stability. At the institutional level, achieving full monetary dominance requires closer coordination of central bank and government's actions. Indeed, monetary authorities should prioritize inflation control when price stability is threatened by an overheating economy, while alleviating pressure on interest rates to support growth in a context of economic slowdown. Furthermore, the government should adhere to the central bank's monetary dominance framework by maintaining public debt at a sustainable level and avoiding any fiscal measures that support economic growth at the expense of price stability. This implies that the government should focus on boosting investment rather than supporting households' purchasing power.

Appendixes

Table A1. The Estimation results of the VAR(3) model

	IF	GR	D(R)	EX
IF(-1)	0.534423	0.730543	0.037344	-0.297418
	(0.21703)	(0.42013)	(0.09615)	(0.17440)
	[2.46249]	[1.73885]	[0.38841]	[-1.70538]
IF(-2)	0.485555	0.298060	-0.111828	0.045468
	(0.24674)	(0.47766)	(0.10931)	(0.19828)
	[1.96787]	[0.62400]	[-1.02302]	[0.22931]
IF(-3)	-0.107414	-0.732050	-0.118468	0.113163
	(0.21976)	(0.42543)	(0.09736)	(0.17660)
	[-0.48877]	[-1.72072]	[-1.21681]	[0.64079]
GR(-1)	0.010325	-0.355645	0.106822	0.013313
	(0.09830)	(0.19030)	(0.04355)	(0.07899)
	[0.10503]	[-1.86888]	[2.45288]	[0.16853]
GR(-2)	-0.033627	0.513563	0.128690	-0.160183
	(0.11373)	(0.22017)	(0.05039)	(0.09139)
	[-0.29567]	[2.33257]	[2.55409]	[-1.75265]
GR(-3)	-0.048388	0.706148	0.004421	-0.019316
	(0.11653)	(0.22559)	(0.05163)	(0.09365)
	[-0.41523]	[3.13019]	[0.08563]	[-0.20626]
D(R(-1))	-0.419756	-1.749381	-0.267975	0.385081
	(0.47934)	(0.92794)	(0.21236)	(0.38520)
	[-0.87569]	[-1.88523]	[-1.26190]	[0.99969]
D(R(-2))	0.057475	-1.318389	-0.288049	0.267660
	(0.35010)	(0.67775)	(0.15510)	(0.28134)
	[0.16416]	[-1.94523]	[-1.85714]	[0.95137]
D(R(-3))	0.264769	-0.570220	-0.193047	0.235934
	(0.37862)	(0.73295)	(0.16773)	(0.30425)
	[0.69931]	[-0.77798]	[-1.15091]	[0.77546]
EX(-1)	0.197173	0.544587	-0.090408	0.736748
	(0.26165)	(0.50652)	(0.11592)	(0.21026)
	[0.75357]	[1.07515]	[-0.77993]	[3.50395]
EX(-2)	-0.037501	-0.569213	0.225106	-0.110960
	(0.37167)	(0.71951)	(0.16466)	(0.29867)
	[-0.10090]	[-0.79112]	[1.36711]	[-0.37151]
EX(-3)	0.058321	0.497761	-0.025709	0.146640
	(0.26776)	(0.51835)	(0.11862)	(0.21517)
	[0.21781]	[0.96028]	[-0.21672]	[0.68150]
C	-0.047875	-0.130869	-0.039209	0.075271
	(0.04419)	(0.08554)	(0.01957)	(0.03551)
	[-1.08351]	[-1.52998]	[-2.00302]	[2.11990]
R-squared	0.615169	0.518200	0.525683	0.771614

Source: Author

Table A2. Structural VAR estimates

1	0	0	0	
C(1)	1	0	0	
C(2)	C(4)	1	0	
C(3)	C(5)	C(6)	1	
	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	0.825998	7.545804	0.109465	0.9128
C(2)	0.170144	7.580050	0.022446	0.9821
C(3)	-0.053653	10.07047	-0.005328	0.9957
C(4)	-0.095339	4.309929	-0.022121	0.9824
C(5)	-0.105677	5.733806	-0.018431	0.9853
C(6)	0.877434	20.20610	0.043424	0.9654

Source: Author

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