Do fiscal deficits cause inflation? Evidence from Suriname

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Article**
JEL: E31, E62, E51
https://doi.org/10.3326/pse.49.1.6

* The author would like to thank two anonymous reviewers for their valuable help in the completion of this article. The views expressed in this paper are solely those of the author and do not necessarily represent those of organizations to which he is affiliated.
** Received: February 6, 2024
Accepted: June 17, 2024

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PUBLIC SECTOR ECONOMICS
49 (1) 153–179 (2025)

Abstract

This study examines the impact of the fiscal balance on headline inflation in Suriname. Historically, Suriname coped with multiple episodes of high inflation. A structural vector autoregression (SVAR) framework with annual data from 1961 to 2022 is used to assess the transmission of fiscal shocks to consumer prices. In addition, the analysis takes into account commodity prices, money supply, the exchange rate, and output growth. The empirical analysis reveals that exchange-rate shocks are the primary driver of inflation. Energy commodity price shocks also induce price pressures, in contrast to non-energy commodity price shocks. Fiscal shocks do not affect inflation directly. Nonetheless, there is evidence that these shocks do affect the exchange rate substantively. The results of this study emphasize the importance of exchange-rate stability, while fiscal discipline can alleviate exchange-rate and inflationary pressures.

Keywords: inflation, fiscal balance, money supply, SVAR

1 INTRODUCTION

Inflation is known to cause more harm than good. Excessive and persistent price increases are known to impair economic growth, increase the costs of borrowing and discourage investments. Inflation is widely deemed a monetary phenomenon, often accompanied by changes in monetary aggregates. While monetarists have ascribed inflation primarily to changes in the money supply, some studies posit that fiscal policy is also decisive for inflation outcomes. Sargent and Wallace (1981) show that excessive government spending causes demand-pull pressures, overheating the economy. When excessive government expenses are not balanced by tax income, fiscal deficits need to be financed by some form of debt. Woodford (1995) argues that the way in which debt is financed instigates price pressures. Catao and Terronnes (2005) provide empirical evidence that fiscal deficits induce price pressures, particularly in developing countries. Banerjee et al. (2022) add to this that the degree to which fiscal deficits induce inflationary pressures depends on the degree of fiscal dominance – a regime characterized by a government that does not adjust the primary balance to stabilize public debt and a central bank with a low degree of independence.

This paper aims to assess empirically the transmission of fiscal balance shocks to inflation in Suriname, a small open, resource-rich economy. The country is situated on the northern coast of South America. It has been heavily dependent on the production and export of alumina, oil, and gold, making it susceptible to global commodity-price cycles. Since its independence in 1975, Suriname has experienced multiple episodes of high inflation. Between 1993 and 1995, inflation even cumulated to over 1,000 percent. The Surinamese fiscal sector – around 10 percent of GDP and employing 30 percent of the labour force – seems to be dominant in and often deemed the culprit for inflation (Braumann and Shah, 1999; Ooft, 2024). Historically, public debt averaged 40 percent of GDP. However, in recent years, this figure ballooned beyond 60 percent of GDP on the back of widening

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fiscal deficits. These deficits resulted from expansionary policy amidst dwindling fiscal revenues (Ooft, 2024).

The present research uses an SVAR framework, impulse response functions, and variance decomposition to derive the relationship between fiscal deficits, money, the exchange rate, real GDP growth, and inflation in this country. The model also incorporates commodity-price shocks, accounting for imported price pressures arising from energy and non-energy commodity prices. As far as can be ascertained, this study is the first in recent history to model the transmission of fiscal shocks to inflation in Suriname using econometric models.

The remainder of this paper is structured as follows. Section 2 presents a review of the literature on fiscal deficits and inflation. Section 3 presents the proposed SVAR methodology and the expectations, while section 4 presents the main results and residual diagnostics. Section 5 concludes and presents policy recommendations.

2 FISCAL DEFICITS AND INFLATION: A BRIEF LITERATURE REVIEW

Economic theory often ascribes inflation to monetary factors or output gaps. Nonetheless, some studies suggest that fiscal deficits are a critical factor in shaping inflation dynamics, particularly in developing countries (see for instance Woodford, 1995; Catao and Terronnes, 2005; Fakher, 2016; Olubiyi and Bolarinwa, 2018).

For instance, Woodford's (1995) fiscal theory of price level (FTPL) claims that it is not only monetary policy but also fiscal policy that affects the price level. Moreover, choices in the governments' debt financing – factored into the government's intertemporal budget constraint – have a significant effect on inflation. Leeper and Leith (2016) suggest that both monetary and fiscal factors determine the price level. A regime-switching framework highlights the interaction between monetary and fiscal policy. Particularly after the 2007-2008 financial crisis, many economies saw their sovereign debt mount due to fiscal stimuli. The authors suggest that rising interest rates can exacerbate sovereign debt issues even further, pushing countries to fiscal limits.

Cochrane (2023) presents a comprehensive analysis of the FTPL. The author explains that the FTPL refers to the price level adjusting so that the nominal value of government debt equals the present value of actual primary surpluses. Hence, taming inflation can be cumbersome when governments face high borrowing costs. A pivotal element of the FTPL is the society's perception of the government's ability to service its debt, depending on future fiscal surpluses. The author demonstrates that sovereign rates can raise interest costs and lower the present value of surpluses. To guarantee price stability, the FTPL suggests that governments establish institutions and exhibit policy credibility.

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Some studies have questioned the FTPL. Kocherlakota and Phelan (1999) show that the FTPL only applies in cases where the government is able to implement non-Ricardian[1] policies. Buiter (2002), however, argues that the FTPL fails to provide a clear distinction between budget restrictions and equilibrium conditions. The author demonstrates that equilibria are either inconsistent or impacted by irregularities, such as the ability to value money in a cashless system. In the presence of government defaults, governments resort to Ricardian regimes, obscuring the validity of the FTPL, given the assumption that governments set nominal interest rates.

2.1 EMPIRICAL STUDIES

Catao and Terronnes (2005) investigate the relationship between fiscal deficits and inflation using an autoregressive distributed lag (ARDL) framework. The study provides evidence that fiscal deficits induce inflation, a one percent decrease in the fiscal balance causing prices to accelerate by half a percentage point. On the other hand, fiscal spending is found to spur economic growth in the short run, although in the long run, public expenditures bring about inflation. The study samples 107 countries[2] – both industrialized and developing countries – from 1960 to 2001. Corroborating Catao and Terronnes' findings, Lin and Chu (2013) come across an inflationary effect of fiscal deficits. The study samples 91 countries over a period of 40 years. Employing dynamic panel quantile regression, the findings of the study show that in high-to-medium-inflation episodes, fiscal deficits translate into inflation, particularly via unexpected monetary shocks. Also, the exchange rate is found to have a statistically significant effect on inflation.

There is a vast amount of evidence showing that fiscal deficits cause inflation in developing countries. Braumann and Shah (1999) is one of the few studies that discuss this phenomenon in Suriname. Using an analytical model, the authors suggest that high inflation in Suriname during the nineties resulted from large fiscal deficits. Ezeabasili, Mojekwu and Herbert (2012) show that inflation in Nigeria is caused by monetary rather than fiscal factors. Increases in the money supply disproportionally affect inflation. The impact of the fiscal deficit on inflation is positive, though not statistically significant. The study employs a two-staged Engle-Granger approach using annual data from 1970-2006. Nguyen (2015) assesses the relationship between fiscal deficits, money supply, and inflation in Asian economies, using the general method of moments technique with annual data from 1985-2012. Fiscal deficits unanimously induce inflation in the selected economies, while broad money supply affects prices in most of the countries. Government expenditures and interest rates are also found to trigger price pressures in the selected Asian economies. Using ARDL models, Olubiyi and Bolarinwa (2018) show that fiscal deficits induced inflation in the short run in Nigeria and South

[1] Non-Ricardian fiscal policies refer to policies where the government is not committed to finance its debt. The government may even opt to default upon its debt obligations, or the central bank may deflate the debt by printing money, inducing inflation.

[2] The sample does not include Suriname.

Africa within the period 1994-2015. In the long run, fiscal deficits also affected inflation in Egypt, Kenya, and Mali. Eita et al. (2021) find empirical evidence that fiscal deficits caused inflation in Namibia, using quarterly data between 2002 and 2017 in an ARDL framework. Particularly over the long run, the impact of fiscal deficits on inflation is evident.

Bordo and Levy (2021) review the effect of expansionary fiscal policies on inflation in advanced countries, using data from the past two centuries. The authors have evidence that monetary financing of fiscal deficits reflected in fiscal dominance can be considered one of the root causes of price pressures. Particularly during periods of war, this link became clear. Historically, countries that resorted to monetary financing of military spending, i.e. printing money, during wartime experienced elevated inflation. Moreover, the study suggests that central bank independence is one of the key ingredients in the taming of inflation.

De Alwis, Dewasiri and Sood (2023) examine the impact of fiscal deficits on inflation in Sri Lanka. The study uses an ARDL framework with annual data from 1977 to 2019. The research provides evidence that fiscal deficits are a statistically significant driver of Sri Lanka's inflation in the short and in the long run. In addition, nominal wages and imports also seem to induce inflationary pressures.

Banerjee et al. (2022) study the inflationary effects of fiscal deficits in 21 advanced economies. In contrast to Catao and Terrones (2005), this paper focuses on the short-term impact of inflation and its dependence on the fiscal-monetary policy regime. The study also accounts for the unexpected inflation surge in advanced economies following the COVID-19 pandemic. The authors establish that under fiscal dominance, elevated fiscal deficits have a five-fold more substantial impact on present and future inflation, in contrast to regimes that exhibit monetary dominance. The fiscal-inflation relationship varies across the conditional inflation distribution, with more pronounced effects at the right tail. Moreover, inflation risks also seem to erupt from elevated public debt levels. The findings also suggest that post-COVID inflation has been consistently evident in fiscal dominant regimes. Hence, countries with a prudent fiscal authority and an independent central bank have a lower inflation risk, while the opposite holds for countries where fiscal dominance prevails.

Kwon, McFarlane and Robinson (2009) use panel VARs, GMM, and FMOLS to ascertain the impact of fiscal policy on inflation using a sample of 71 countries over 43 years. The study provides evidence that increases in public debt are inflationary in heavily indebted countries with substantial public debt ratios of over 54 percent of GDP. The study also shows that money growth is a statistically significant driver of inflation, while real GDP growth eases inflation. Furthermore, the empirical results suggest that fiscal shocks transition to inflation via the money supply. Enhancing the study's granularity, the research subsamples Latin American and Caribbean countries. In these countries, lagged inflation, money growth,

and debt growth are among the main drivers of inflation as well. The study provides evidence that floating exchange-rate regimes are associated with higher inflation rates than fixed exchange-rate regimes.

3 METHODOLOGY AND VARIABLES

This study uses an SVAR model to assess the impact of various shocks on inflation. While some studies use the ARDL approach, a multi-equation (e.g. VAR) framework offers the possibility to assess interrelationships between economic variables, accounting for structural relationships.

Stock and Watson (2001) point out that VAR frameworks are particularly useful for modelling multivariate time series. VAR models regress each variable on lags of other endogenous variables considered in the model. Therefore, each variable is a linear combination of all variables, estimated by OLS. VAR models also offer the possibility of determining the impact of shocks through impulse response functions and forecast error variance decomposition. The standard VAR model is of the following form:

$$y_t = \Gamma + A_1 y_{t-1} + A_2 y_{t-2} \ldots\ldots + A_q y_{t-q} + \epsilon_t \quad (1)$$

where $y = (y_1, y_2, ..., y_k)$, a vector of "k" endogenous variables, Γ represents the vector of constants, A_1 up to A_q are the matrices of coefficients to be estimated for a particular lag of the endogenous variables, and ϵ_t is the vector of unobserved residuals.

3.1 THE SVAR MODEL

The standard or reduced-form VAR model has limitations. For instance, shocks to equations in the VAR model have no economic implication embedded. Hence, impulse responses in reduced form VAR models could either emanate from contemporaneous relationships or arise from fundamental shocks. SVAR models are relatively easy to interpret, compared to conventional large-scale macro-econometric models. SVAR permits the imposition of either short-run or long-run restrictions on the coefficient matrix and the residual covariance matrix. The SVAR framework enables one to set structural constraints based on economic theory while permitting contemporaneous feedback between variables. Usually, SVARs are estimated using least squares or maximum likelihood methods (Lütkepohl, 2013).

An SVAR model can be specified as follows:

$$Ay_t = A_1^s y_{t-1} + \ldots + A_p^s y_{t-p} + \Gamma^s x_t + Bu_t \quad (2)$$

where the structural coefficients are Γ, A^s and A. Moreover, u_t is a matrix of orthonormal unobserved structural errors with $E(u_t, u_t') = I_k$. Rearranging the SVAR as a VAR, based on the assumption that A is invertible, yields:

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$$y_t = A^{-1} * \left(A_1^s y_{t-1} + \ldots + A_p^s y_{t-p} + \Gamma^s x_t + B u_t \right) = A_1 y_{t-1} + \ldots + A_p y_{t+p} + \Gamma x_t + \epsilon_t \quad (3)$$

Now, the lag matrices in reduced form become $\Gamma = A^{-1}\Gamma^s$ and $A_i = A^{-1}A_i^s$, while the errors in reduced form become:

$$\epsilon_t = A^{-1} B u_t = S_{ut}$$

$$\text{with } E\left(\epsilon_t \epsilon_t^{'}\right) = \Sigma_\epsilon = A^{-1} B B^{'} A^{-1'} = SS' \qquad \text{and } S = A^{-1}B \quad (4)$$

Rearranging the terms yields:

$$A\epsilon_t = Bu_t \quad (5)$$

The SVAR also presents the possibility of imposing long-run restrictions. These are the restrictions on the cumulated impulse responses.

To identify an SVAR, one needs to impose at least $\frac{k(k-1)}{2} = \frac{k^2 - k}{2}$ restrictions to estimate k^2 coefficients (Killian, 2013). Restrictions can be imposed either on the short-run or the long-run model, while the estimation $\hat{\Sigma}_\epsilon$ is obtained from the short-run covariance relationships and the long-run restrictions imposed.

3.2 VARIABLES AND SVAR RESTRICTIONS

The variables used in the empirical analyses are commodity price indices, the fiscal balance scaled to GDP, the narrow money supply scaled to GDP, the nominal market USD/SRD exchange rate, real GDP growth, and the headline inflation rate[3]. As the analysis entails six variables, at least 15 restrictions need to be imposed to be able to estimate the SVAR model. Commodity prices are measured by the Energy Price Index as calculated by the World Bank[4]. A robustness check is conducted with non-energy prices, as Suriname has been a net exporter of non-energy commodities for decades already[5]. Table A1 presents the measurements and sources of used variables.

In the SVAR, the ordering of the variables defines the model's causal structure. Ordering is usually conducted based on economic theory and expert judgment. The variables used are a commodity price index, the fiscal balance, the money supply, the foreign exchange rate, output growth, and inflation, ordered from most exogenous to most endogenous.

The empirical analysis uses a unit triangular A matrix. In the estimated SVAR, contemporaneous shocks are denoted by $\left[u^{XE}, u^{FBGDP}, u^{M1GDP}, u^{ER}, u^{GR}, u^{INFL}\right]^{'}$,

[3] As Suriname has no policy interest rate, this variable is omitted from the empirical analysis.
[4] The Energy Price Index contains prices of coal, crude oil, natural gas, and liquefied natural gas.
[5] Non-Energy Price index contains prices of agricultural products, fertilizers, metals, and minerals.

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while structural shocks become $\left[\varepsilon^{XE}, \varepsilon^{FBGDP}, \varepsilon^{M1GDP}, \varepsilon^{ER}, \varepsilon^{GR}, e^{INFL}\right]$ based on the identified restrictions. The relationship between u_t and ε_t can be stated as follows:

$$\begin{bmatrix} u^{XE} \\ u^{FBGDP} \\ u^{M1GDP} \\ u^{ER} \\ u^{GR} \\ u^{INFL} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ a_{21} & 1 & 0 & 0 & 0 & 0 \\ a_{31} & a_{32} & 1 & 0 & 0 & 0 \\ a_{41} & a_{42} & a_{43} & 1 & 0 & 0 \\ a_{51} & a_{52} & a_{53} & a_{54} & 1 & 0 \\ a_{61} & a_{62} & a_{63} & a_{64} & a_{65} & 1 \end{bmatrix} * \begin{bmatrix} \varepsilon^{XE} \\ \varepsilon^{FBGDP} \\ \varepsilon^{M1GDP} \\ \varepsilon^{ER} \\ \varepsilon^{GR} \\ \varepsilon^{INFL} \end{bmatrix} \quad (6)$$

These restrictions imply that commodity price shocks are mostly exogenous since surprises in local macroeconomic variables on global commodity prices are negated. Inflation is the most endogenous variable. The fiscal balance is ordered as the second most exogenous variable to enable this variable to exert an impact on other local macroeconomic variables in the model. As Suriname can be characterized as a country with fiscal dominance (Braumann and Shah, 1999) the fiscal balance is ordered as the second most exogenous variable followed by the money supply. The central bank started targeting the money supply as of 2021. Moreover, external commodity price movements, fiscal deficits, money supply, exchange-rate movements, and output growth are potential drivers of inflation within this framework. As outlined by Ooft, Bhaghoe and Franses (2024), changes in the money supply induce exchange-rate shocks, justifying the order of the exchange rate. Consequently, output growth is ordered before inflation rate, which is in line with the rationale behind the Phillips curve.

3.3 EXPECTATIONS

This section explains the potential channels through which shocks in the variables used may pass through to other variables used in the SVAR framework (table 1). One of the main hypotheses of this study is the inflationary consequences of fiscal deficits. As presented in section two, there is a broad consensus in the literature, particularly for developing countries, that fiscal deficits may induce inflation. For instance, unsound or expansionary fiscal policies can elevate inflation expectations. On the other hand, fiscal policy may affect the availability of loanable funds (e.g., crowding out), leading to credit crunches. Mungroo and Tjon Kie Sim-Balker (2020) present evidence that budget deficits in Suriname are often financed by debt. This finding supports our expectation that fiscal deficits in Suriname are inflationary.

The SVAR model exhibits both Keynesian and monetarist characteristics. According to Keynesian theory, government expenses fuel economic growth, which in turn could lead to demand-pull pressures. Particularly during periods of recession, increased fiscal expenditures could expedite an economic recovery (Huidrom, Kose and Ohnsorge, 2018; Banerjee et al., 2022). Monetarists, on the other hand, deny the role of fiscal policy in economic stability. Monetarists argue that

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government spending could trigger money growth, inducing inflation. This view emphasizes the importance of controlling the money supply.

Table 1

Expectation matrix

	Commodity-price shock	Fiscal shock	Money shock	Exchange rate shock	Output shock	Inflation shock
Fiscal balance	+/-	+	0	0	0	0
Money supply	+/-	–	+	0	0	0
Exchange rate	+/-	–	+	+	0	0
Output growth	+/-	+	-	–	+	0
Inflation	+/-	–	+	+	+	+

Note: The expectation matrix presents the expected effects of upward shocks in column variables on variables used in the SVAR.

Source: Author's elaboration.

The impact of commodity-price shocks depends on whether the shock emanates from energy prices or non-energy prices. During the sample period, the country was mostly a net energy importer. Therefore, an energy-price shock is expected to aggravate the fiscal balance, increase the money supply, depreciate the exchange rate, hamper output, and induce inflationary pressures. On the other hand, non-energy price shocks, which include alumina and gold prices, are expected to affect the fiscal balance positively due to improved government revenues. The money supply is expected to diminish while economic growth will decelerate. Moreover, the exchange rate is expected to appreciate while inflation is expected to slow down due to non-energy price shocks.

An upward fiscal shock should be interpreted as an improvement in the budget balance, either through increased income or lower public expenditure. Hence, these shocks are expected to appreciate the exchange rate, spur economic growth, and dampen inflation; see for instance Nguyen (2015), Olubiyi and Bolarinwa (2018), and Eita et al. (2021). Money shocks are expected to cause an upward pressure on the exchange rate, which is aligned with the findings of Ooft, Franses and Bhaghoe (2023), but also induce demand-pull inflation as outlined in monetarism (Ooft, Bhaghoe and Franses, 2024). Both money shocks and exchange rate shocks are presumed to hamper economic growth and trigger inflation. Output shocks are assumed to trigger demand-pull inflation as found in Ooft, Fraser and Harangi-Narain (2022).

4 DATA ANALYSIS AND RESULTS

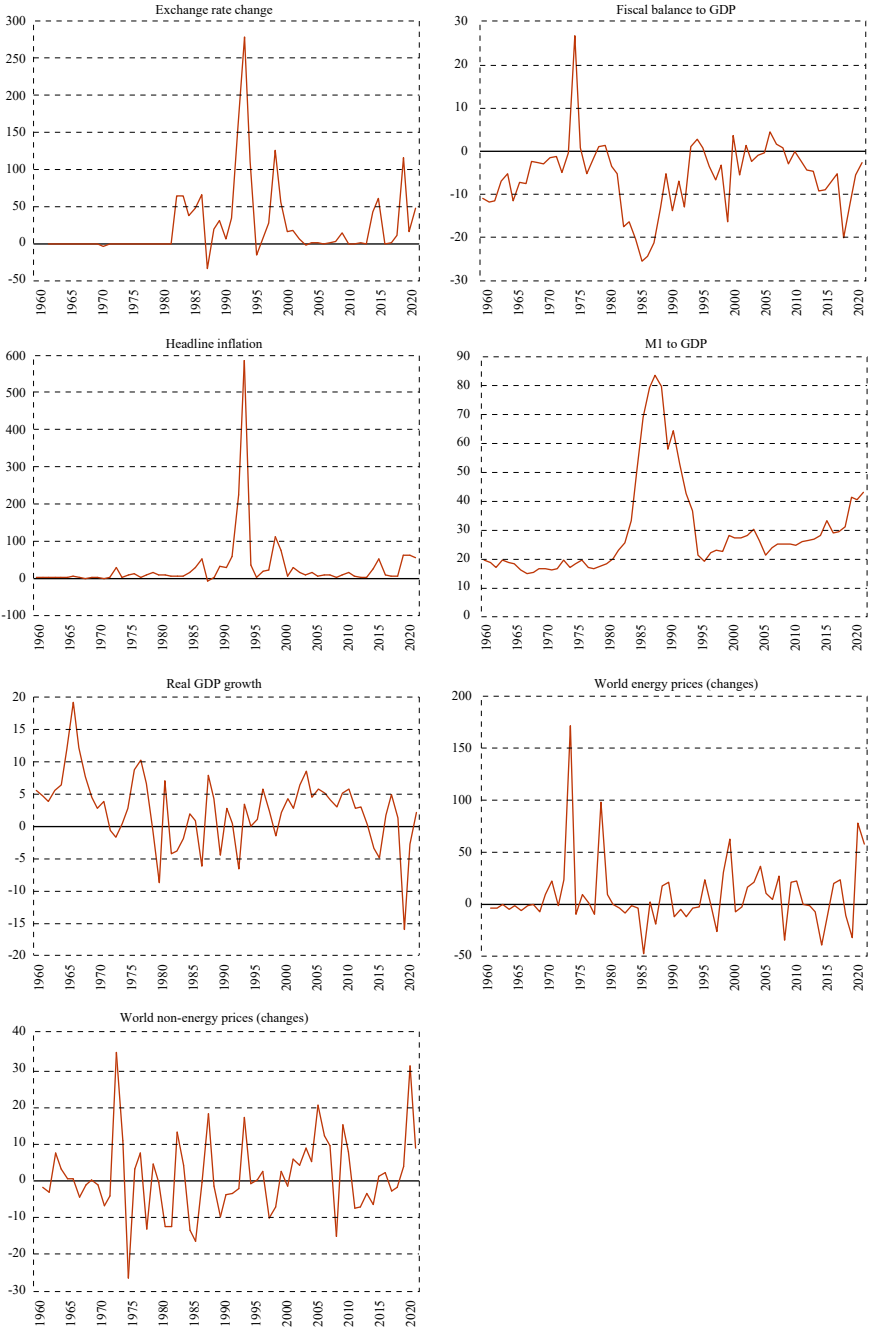
The empirical analysis is conducted with annual data between 1961 and 2022, primarily retrieved from the General Bureau of Statistics Suriname (GBS) and the Centrale Bank van Suriname (CBvS). I considered quarterly data, but an extensive time series of quarterly data is unavailable for some of the indicators used in the model, such as the fiscal balance and GDP. Figure 1 graphically presents the used indicators, while tables A1 and A2 in the appendix present the metadata and the descriptive statistics.

Suriname experienced three periods of high inflation. The first occurred from 1993 to 1995, resulting from the build-up of macro-fiscal imbalances and political instability during the 80s. Downturns in export earnings and fiscal revenues caused substantive budget deficits during the late 80s (Ooft, 2019). As a result, deficits were monetarily financed, inducing monetary overhang and, ultimately, exchange-rate depreciation and inflation. The second episode of high inflation occurred from 1999 to 2001 when fiscal deficit and exchange-rate pressures re-emerged. As of 2015, exchange-rate depreciations and price pressures re-emerged amidst a global commodity price downturn and expansionary fiscal measures. Moreover, the COVID-19 crisis exacerbated the already precarious macroeconomic environment (Ooft, 2024).

Effectively, the (S)VAR models are estimated with 58 observations. Following standard procedures, the variables are tested for unit roots. The study employs an augmented Dicky-Fuller test (Dickey and Fuller, 1979) and the Phillips-Perron test for unit roots (Phillips and Perron, 1988). The fiscal balance to GDP, inflation and growth seemed to be integrated of the order zero I(0). However, since the variables M1 to GDP, the exchange rate and commodity prices are integrated of the order one, I(1), these are transformed into first differences. Tables A3 and A4 present the unit root test results. Only stationary variables are used in the regression model to avoid serial correlation.

FIGURE 1

Graphs of variables (in %)



Note: Changes reflect year-on-year changes. The market exchange rate entails the USD/SRD exchange rate on the parallel market. This data is gathered from the CBvS, foreign exchange bureaus, and local newspapers. In the years before the parallel market emerged, the market exchange rate equalled the official exchange rate.

Sources: Author using data from the CBvS, GBS, Ministry of Finance Suriname, World Bank.

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Dummy variables are added to the model in periods with extreme outliers in inflation, accounting for structural adjustments or political instability. The lag length of the VAR models is determined by the lag order selection criteria. The lag order criteria results reveal that a VAR with two lags is appropriate. The estimated SVAR models are just identified and achieve convergence.

4.1 IMPULSE RESPONSES

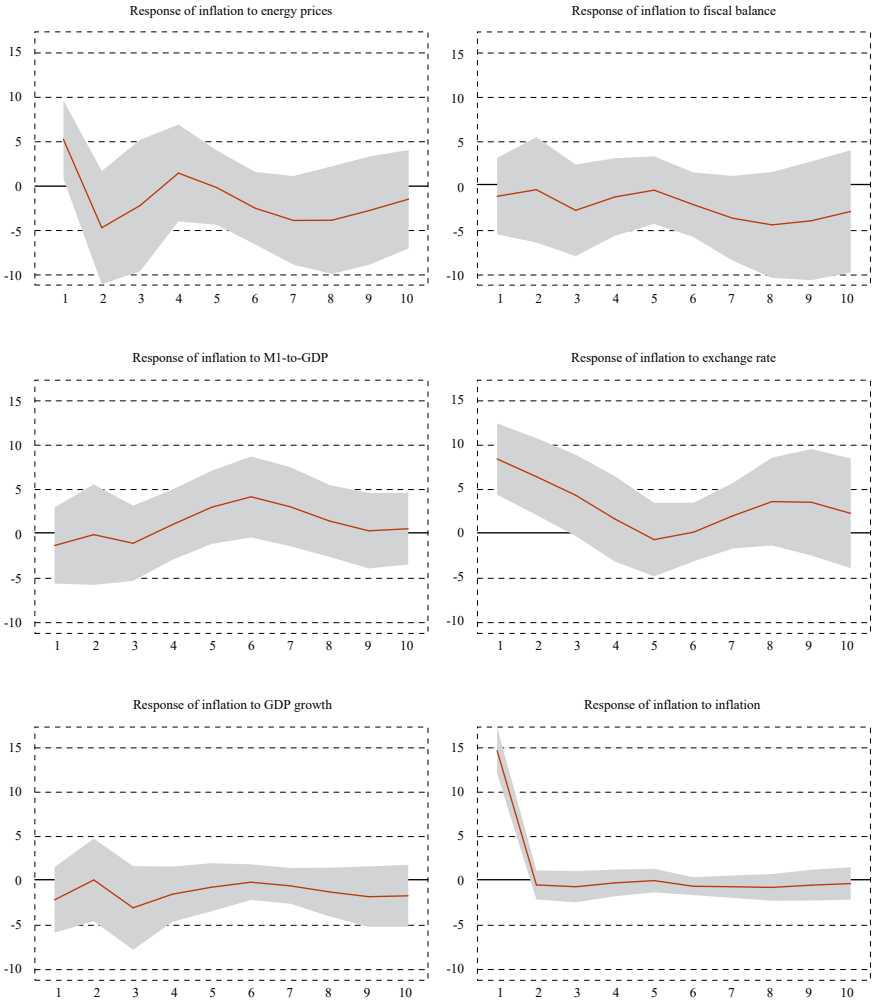
Impulse response functions are widely used to determine the impact of structural shocks in SVAR models. Primarily, this investigation focuses on the responses of inflation to shocks in the variables that entered the SVAR. The present impulse response analysis features one model that includes energy prices and one that includes non-energy prices as most exogenous variables. Figures 2 and 3 present the impulse responses of inflation[6].

Fiscal shocks are not observed to affect inflation directly. However, looking more closely at the transmission of these shocks, fiscal deficits are found to induce exchange-rate depreciations (appendix, figure A1). This is particularly relevant to Suriname, as the exchange-rate passthrough is close to one (Ooft, Fraser and Harangi-Narain, 2022). Moreover, a negative sign of a fiscal shock on money supply implies that a deterioration in the budget balance is associated with money overhang. This result is in line with the monetarists' view. In addition, the study finds no statistically significant impact of fiscal shocks on GDP growth – though the coefficient is positive, as presumed.

[6] Some mean impulse responses seem to oscillate and not approach the steady state in the medium term. This could result from outliers. Nonetheless, the models are just specified and free from serial correlation.

FIGURE 2

Responses of inflation: model with energy prices (in %)



Note: The impulse responses depict responses to SVAR innovations with 95% confidence intervals using analytical asymptotic standard errors.

Source: Author's calculations.

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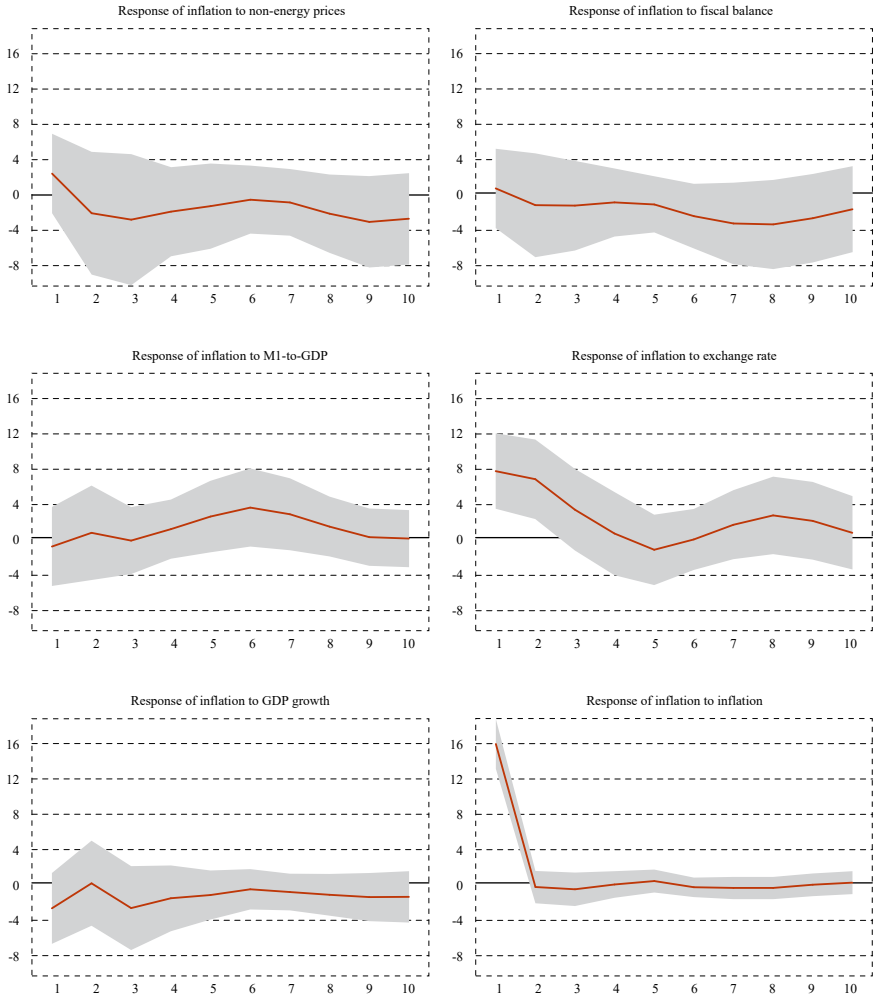
FIGURE 3

Responses of inflation: model with non-energy prices (in %)



Note: The impulse responses depict responses to SVAR innovations with 95% confidence intervals using analytical asymptotic standard errors.

Source: Author's calculations.

In both models, exchange-rate shocks are found to be the main driver of inflation in Suriname. This result aligns with Ooft, Fraser and Harangi-Narain (2022). The impact of an exchange-rate shock seems to persist for up to three periods ahead in the model with energy prices and two periods ahead in the model with non-energy prices. Output shocks are not found to determine the path of inflation.

There is evidence that energy-price shocks induce price pressures, though only in the contemporaneous period. Non-energy price shocks are found to dampen inflation over the medium run. This is as expected, since during the sampling period

Suriname's economy relied on the production and export of non-energy commodities – bauxite, alumina, gold, rice, and bananas. Moreover, commodity-price shocks are associated with periods of fiscal booms, causing the fiscal balance to improve significantly. However, the effect is not statistically significant.

4.2 BIAS-ADJUSTED IMPULSE RESPONSES

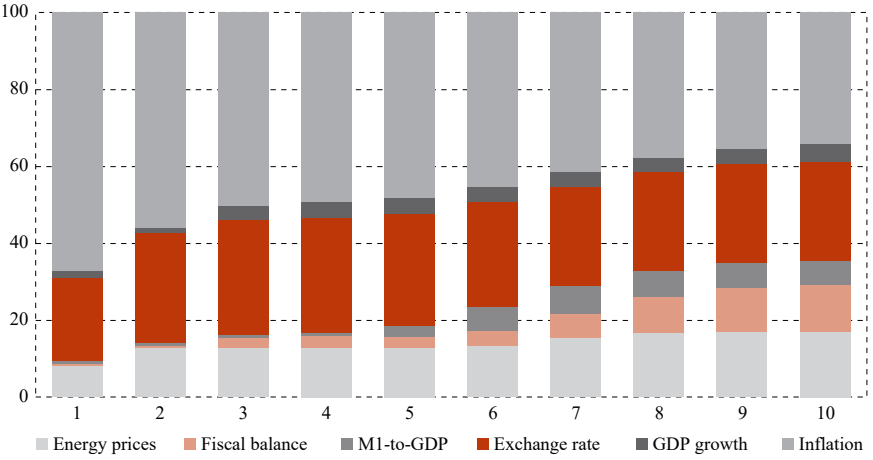
Bootstrap confidence intervals as proposed by Kilian (1998) could provide more reliable impulse response functions in the case of small sample sizes or when residuals are not normally distributed. These bias-corrected bootstrap confidence intervals explicitly take into account the bias and skewness of the impulse response estimators in small sample distribution. The bias-corrected confidence intervals (appendix, figures A2 and A3) point to a statistically significant impact of the exchange rate on inflation, in line with the results of the unadjusted confidence intervals. In contrast to the unadjusted confidence intervals, the bias-adjusted confidence intervals provide evidence that money supply shocks induce inflation, while commodity-price shocks lower inflation in the short run.

4.3 VARIANCE DECOMPOSITION

The variance decomposition analysis reveals that inflation persistence is prominent for explaining contemporaneous inflation (figures 4 and 5). However, as of t+1, the effect of the exchange rate and energy prices becomes more profound. In line with the findings of the impulse responses, variations in energy prices are more pronounced for variations in inflation compared to non-energy prices. The variation in inflation brought about by economic growth and the fiscal balance increases steadily over the medium run.

Figure 4

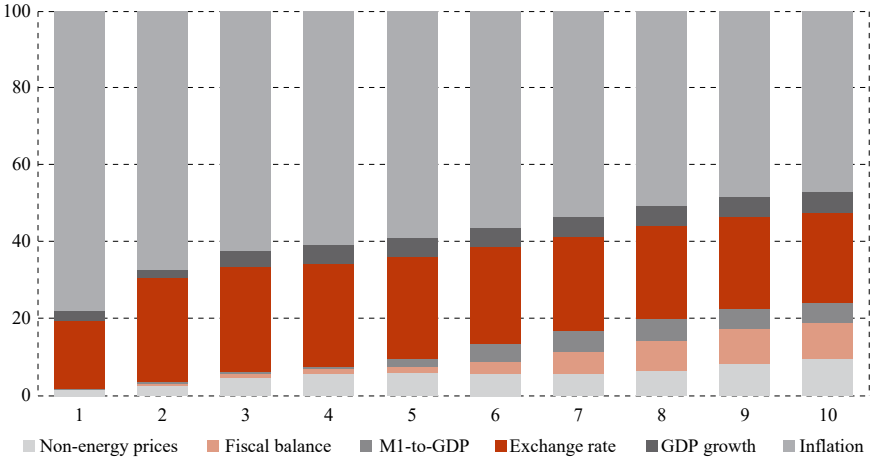
Variance decomposition of inflation: model with energy prices (in %)



Source: Author's calculations.

FIGURE 5

Variance decomposition of inflation: model with non-energy prices (in %)



Source: Author's calculations.

4.4 DIAGNOSTICS TESTS

Lütkepohl (2013) explains that the residuals of reduced VAR models that underlie the SVAR model should pass autocorrelation and heteroskedasticity tests. The Portmanteau and Breusch-Godfrey-LM tests are often employed to assess for residual serial correlation in VAR models. The normality of residuals is not a prerequisite for the validity of results in VAR models. However, if non-normality of residuals is encountered, this may point to possible structural changes or non-linearities in the underlying data (Lütkepohl, 2013). The residuals of the estimated VAR models pass the tests for serial correlation and heteroskedasticity. Although non-normality of residuals is not uncommon in VAR distributions, nonnormal distributed residuals may cause potential bias in impulse response functions' confidence intervals (Lanne and Lütkepohl, 2010).

As the residuals do not follow a normal distribution (table A5) due to several periods of high macroeconomic instability, the empirical analysis addresses this issue by employing bias-adjusted impulse response functions. The residual diagnostics are presented in table A5 and figure A6. Moreover, to account for variable selection bias, I estimated the models with fiscal expenditures[7] instead of the fiscal balance. Estimating the models with fiscal expenses yielded comparable results, as these expenses exhibit a correlation of around -60 percent with the fiscal balance.

[7] Wages, goods & services, subsidies & transfers, interest expenses, and public investments.

5 CONCLUSIONS

This study primarily examines the passthrough of fiscal deficits to inflation in Suriname. It also sheds light on other drivers of inflation, namely global commodity prices, money supply, the exchange rate, and economic growth. Whereas macroeconomic literature attributes inflation primarily to monetary factors, there is empirical evidence that the fiscal balance may affect the inflation rate. For instance, fiscal deficits may cause price pressures via monetary financing by the central bank or by increasing demand beyond the economy's production capacity. Fiscal deficits are also associated with elevated uncertainty.

The present empirical research uses annual data between 1961 and 2022 in an SVAR framework. To ascertain the impact of fiscal deficits on inflation in Suriname, the empirical investigation tests whether the responses of inflation to the various shocks are statistically significant. Though the estimates reveal a negative relationship between the fiscal balance and inflation, this effect is not statistically significant. This result corresponds to the findings of Ezeabasili, Mojekwu and Herbert (2012). While the fiscal balance does not directly induce inflation, this analysis has found evidence that fiscal deficits do cause exchange rate depreciations and money supply expansions. The latter is in line with the monetarists' view.

The exchange rate is found to have the most pronounced impact on inflation in Suriname, as in the findings of Ooft, Fraser and Harangi-Narain (2022). Another finding is the statistically significant effect of energy-price shocks on inflation. However, these shocks seem to occur only contemporaneously. Moreover, money overhang induces price pressures in the medium run.

5.1 POLICY RECOMMENDATIONS

The findings of this study highlight the importance of exchange-rate stability, as exchange-rate shocks are mostly responsible for inflation in Suriname. Hence, policy measures to lower the exchange-rate passthrough could be considered. Lowering exchange-rate passthrough can be achieved by advancing trade openness, promoting macroeconomic stability, and furthering central bank independence. Furthermore, the results of this research suggest the importance of taming fiscal dominance in Suriname, as to keep exchange-rate depreciations and money overhang in check. They also suggest maintaining a healthy level of public debt. If fiscal deficits assume prominence, monetary policy itself is not sufficient to avoid inflationary pressures.

As Kwon, McFarlane and Robinson (2009) suggest, fiscal policy can override monetary endeavours in heavily indebted countries even with a high degree of central bank credibility. Hence, the results of the present research imply that price stability should be achieved by implementing institutional reforms that pursue fiscal consolidation and foster monetary policy independence.

Disclosure statement

The author has no conflict of interest to report.

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APPENDIX

Table A1

Definitions and sources of variables

Indicator	Definition	Source(s)
ER	Year-on-year change in the market exchange rate (in %)	Newspapers, CBvS
FBGDP	Fiscal balance scaled to nominal GDP (in %)	Ministry of Finance Suriname, CBvS
GR	Volume growth of GDP (in %)	GBS, CBvS
INFL	Year-on-year change in the CPI (in %)	GBS, CBvS
M1GDP	Money supply scaled to nominal GDP (in %)	CBvS
XE	Energy commodity prices (year-on-year change, in %)	World Bank Prospects Group
XNE	Non-energy commodity prices (year-on-year change, in %)	World Bank Prospects Group

Source: Author's elaboration.

Table A2

Descriptive statistics

	ER	FBGDP	GR	INFL	M1GDP	XE	XNE
Mean	-2.58	-5.77	2.54	29.15	29.61	3.62	4.40
Median	-4.02	-5.00	2.80	8.40	25.05	3.61	4.44
Maximum	3.46	26.60	19.20	586.50	83.78	5.01	4.84
Minimum	-6.32	-25.50	-16.00	-7.60	14.88	2.12	4.01
Std. dev.	3.56	8.10	5.39	79.15	16.58	0.84	0.22
Skewness	0.19	0.29	-0.34	5.93	1.87	-0.39	-0.28
Kurtosis	1.31	6.17	5.13	40.95	5.84	2.03	1.97
Jarque-Bera	7.83	27.32	13.09	4148.86	57.90	4.05	3.58
Probability	0.02	0.00	0.00	0.00	0.00	0.13	0.17
Observations	63	63	63	63	63	63	63

Source: Author's calculations.

Table A3
ADF unit root test results

Levels	ADF	FBGDP	M1GDP	ER	GR	INFL	XE	XNE
With constant	t-Stat	-4.18***	-2.77*	0.43	-4.95***	-5.39***	-1.07	-1.51
	Prob.	0.00	0.07	0.98	0.00	0.00	0.72	0.52
With constant & trend	t-Stat	-4.15***	-2.89	-2.16	-5.35***	-5.42***	-2.10	-0.72
	Prob.	0.01	0.17	0.50	0.00	0.00	0.54	0.97
First difference	**ADF**	**d(FBGDP)**	**d(M1GDP)**	**d(ER)**	**d(GR)**	**d(INFL)**	**d(XE)**	**d(XNE)**
With constant	t-Stat	-11.47***	-5.24***	-4.55***	-9.26***	-8.38***	-7.20***	-7.47***
	Prob.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
With constant & trend	t-Stat	-11.38***	-5.20***	-4.73***	-9.17***	-8.31***	-7.13***	-7.63***
	Prob.	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Notes: ADF denotes the Augmented Dickey-Fuller unit root test. (*) Significant at the 10%; (**) Significant at the 5%; (***) Significant at the 1%.
Source: Author's calculations.

TABLE A4

PP unit root test results

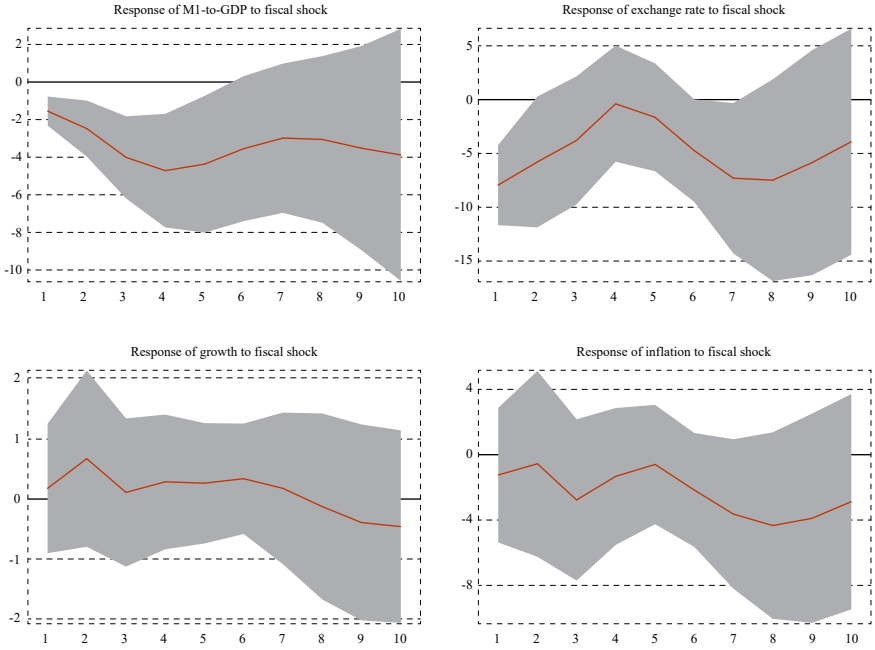
Levels	**PP**	**FBGDP**	**M1GDP**	**ER**	**GR**	**INFL**	**XE**	**XNE**
With constant	t-Stat	-4.12***	-2.05	0.81	-4.88***	-5.33***	-1.07	-1.48
	Prob.	0.00	0.27	0.99	0.00	0.00	0.72	0.54
With constant & trend	t-Stat	-4.09**	-2.19	-1.95	-5.30***	-5.36***	-2.18	-1.09
	Prob.	0.01	0.49	0.62	0.00	0.00	0.49	0.92
First difference	**PP**	**d(FBGDP)**	**d(M1GDP)**	**d(ER)**	**d(GR)**	**d(INFL)**	**d(XE)**	**d(XNE)**
With constant	t-Stat	-14.83***	-5.37***	-4.48***	-17.43***	-35.37***	-7.20***	-6.97***
	Prob.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
With constant & trend	t-Stat	-14.08***	-5.33***	-4.66***	-17.24***	-34.90***	-7.13***	-7.11***
	Prob.	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Notes: PP denotes the Phillips-Perron unit root test. (*) Significant at the 10%; (**) Significant at the 5%; (***) Significant at the 1%.

Source: Author's calculations.

FIGURE A1

Impulse responses to fiscal shocks (in %)

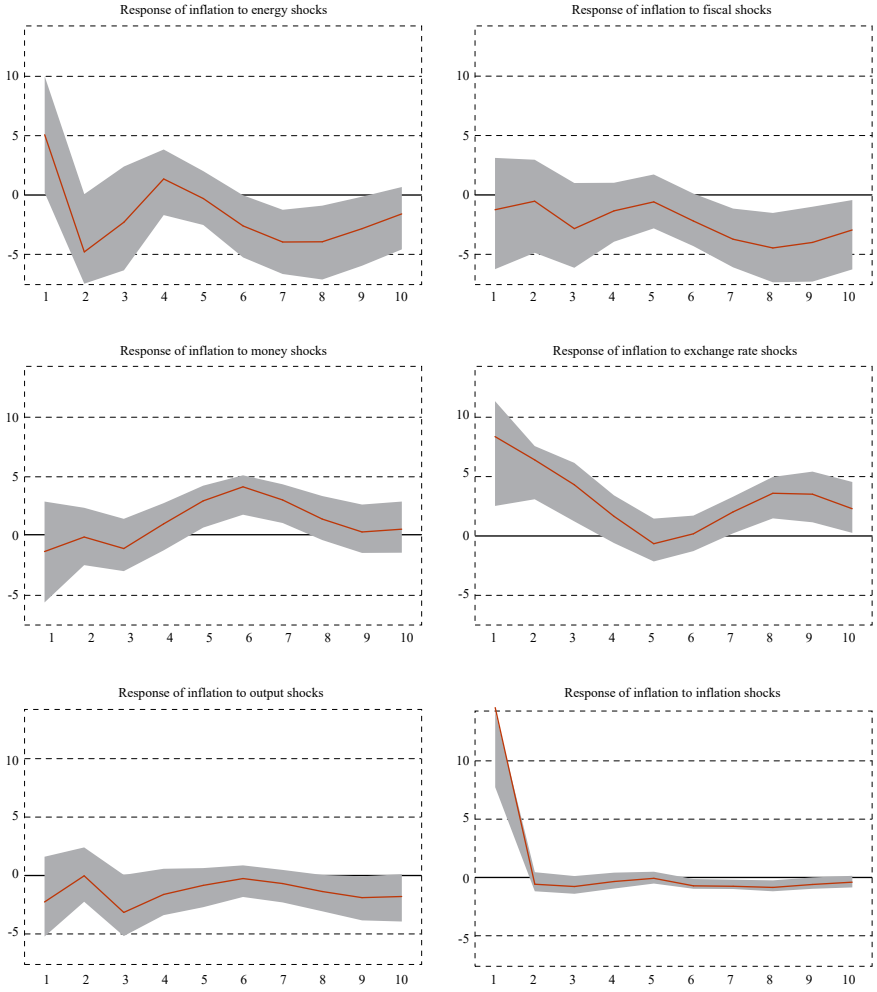


Note: The impulse responses depict responses to SVAR innovations with 95% confidence intervals using analytical asymptotic standard errors.

Source: Author's calculations.

FIGURE A2

Bias-adjusted impulse responses with energy prices (in %)



Note: The bias-adjusted impulse response functions present the responses of inflation to various shocks using Kilian's unbiased bootstrap with 500 bootstrap repetitions and 500 double bootstrap repetitions. The shaded area corresponds to a 95% confidence interval.

Source: Author's calculations.

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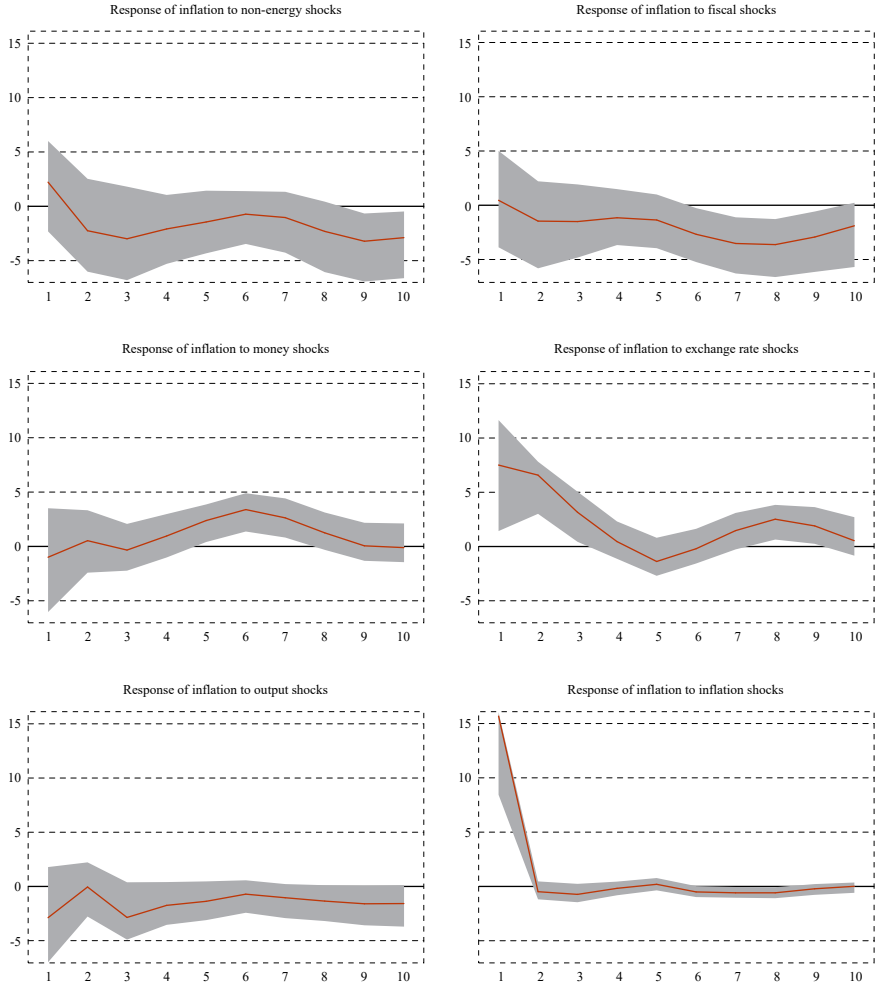
FIGURE A3

Bias-adjusted impulse responses with non-energy prices (in %)

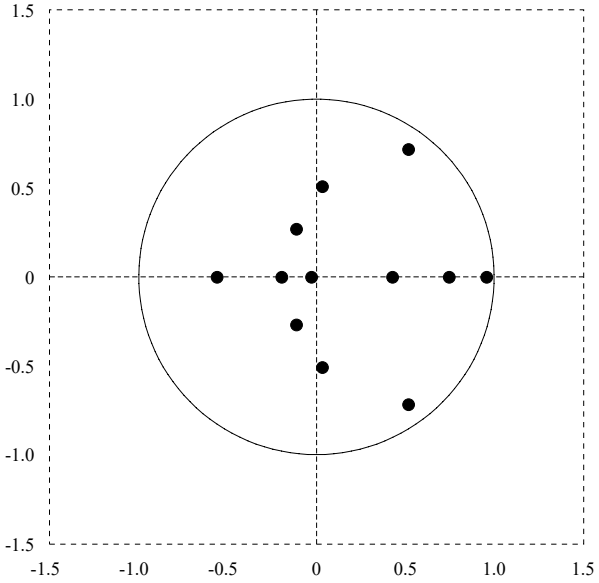


Note: The bias-adjusted impulse response functions present the responses of inflation to various shocks using Kilian's unbiased bootstrap with 500 bootstrap repetitions and 500 double bootstrap repetitions. The shaded area corresponds to a 95% confidence interval.

Source: Author's calculations.

FIGURE A4

Inverse roots of autoregressive characteristics polynomial



Source: Author's calculations.

TABLE A5

VAR residual normality tests

Null hypothesis: Residuals are multivariate normal

Equation	Jarque-Bera	df	Prob.
1	9.88	2	0.01
2	19.21	2	0.00
3	1.77	2	0.41
4	1.32	2	0.52
5	3.83	2	0.15
6	3.24	2	0.20
Joint	39.27	12	0.00

Source: Author's calculations.