International Journal of Energy Economics and Policy

ISSN: 2146-4553

available at http: www.econjournals.com

International Journal of Energy Economics and Policy, 2025, 15(5), 136-145.

Inflation without a Central Bank: The Role of Oil and Fiscal Shocks in Ecuador

Freddy Ronalde Camacho-Villagomez*

Faculty of Economics and Business, Catholic University of Santiago de Guayaquil, Guayaquil, Ecuador.
*Email: freddy.camacho@cu.ucsg.edu.ec

Received: 02 April 2025 **Accepted:** 11 July 2025 **DOI:** https://doi.org/10.32479/ijeep.20070

ABSTRACT

This paper analyzes the inflationary effects of public spending and oil revenues in Ecuador, a small dollarized and oil-exporting economy. Using a structural vector autoregression (SVAR) model identified through institutional restrictions, we disentangle the dynamic impact of government investment, government consumption, and oil revenues on inflation. Our findings reveal that both oil revenues and government investment have statistically significant and persistent effects on the price level, whereas government consumption shows no significant impact. These results suggest that fiscal policy, particularly public investment financed by oil revenues, is a key transmission channel of external shocks to inflation in the absence of monetary policy autonomy. Robustness checks confirm the validity of our conclusions across alternative specifications.

Keywords: Structural Vector Autoregression, Ecuador, Inflation, Oil Price, Fiscal Policy
JEL Classifications: H50, C54, E62, E31.

1. INTRODUCTION

Ecuador is a small, open, oil-exporting economy that adopted full dollarization in 2000, following one of the most severe financial crises in its history. The crisis, triggered by a collapse in oil prices, the devastating effects of the 1997-1998 El Niño phenomenon, and a major banking meltdown, led to fiscal and balance of payments turmoil. In response, the government replaced the domestic currency with the U.S. dollar in an effort to stabilize prices and restore macroeconomic credibility. This transition proved effective in curbing inflation, which declined from over 90% in 2000 to single digits by 2003. However, dollarization also eliminated the possibility of conducting independent monetary policy, thereby placing greater reliance on fiscal policy as the main tool for macroeconomic management.

Within this institutional framework, oil revenues have become a cornerstone of Ecuador's fiscal policy. Oil remains one of the government's primary sources of funding, and the economy's exposure to fluctuations in global commodity prices is considerable. In 2022, for instance, oil exports accounted for 35.5% of total exports. Previous research has documented the strong linkages between oil shocks, fiscal performance, and macroeconomic outcomes in Ecuador (e.g., García-Albán et al., 2021; Camacho-Villagomez et al., 2024).

One of the main channels through which oil shocks affect the broader economy is public expenditure. In Ecuador, increases in oil revenues are often followed by expansions in government spending, thereby amplifying the transmission of external shocks to domestic inflation. This dynamic is particularly relevant in a dollarized setting, where the conventional tools of monetary policy are no longer available, and fiscal dynamics play a central role in shaping inflationary pressures.

Since the implementation of dollarization, Ecuador has experienced a marked shift in its inflation dynamics. While year-on-year inflation reached over 11% in the early 2000s, it gradually declined over the subsequent two decades. By the end of 2024, inflation had stabilized at historically low levels, with annual rates below 0.2%. This disinflationary trend underscores both the initial success of the dollarization regime in restoring price stability and the importance of identifying the remaining domestic and external drivers of inflation under such a regime. Figure 1 displays the evolution of annual inflation in Ecuador alongside the annual percentage change in the WTI oil price. It is evident that during some periods of higher inflation, there were simultaneous increases in oil prices, particularly during the oil price boom between 2008 and 2012.

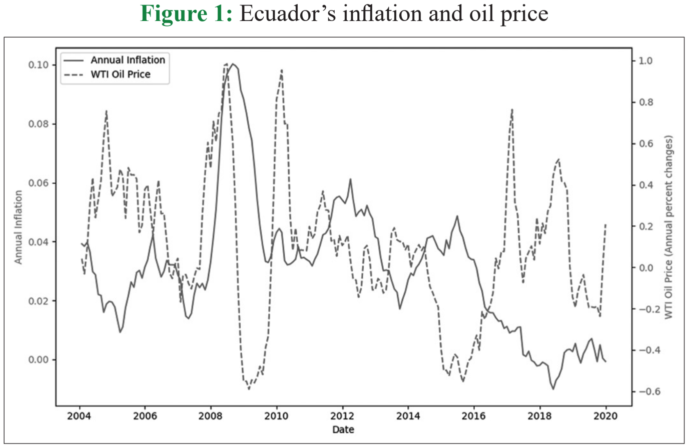
This paper estimates the dynamic effects of public spending and oil revenues on inflation in Ecuador. The analysis is conducted using a structural vector autoregression (SVAR) model, identified through a strategy inspired by Blanchard and Perotti (2002) and García-Albán et al. (2021). This approach allows for the identification of exogenous shocks and the tracing of their effects on inflation, providing new evidence on the transmission mechanisms of fiscal and external disturbances in a dollarized economy.

We disaggregate public spending into government investment and government consumption. Our results show that oil prices have a direct impact on the price level, and consequently on inflation. Moreover, the impact propagates not only directly but also indirectly through fiscal policy, specifically via government investment. Government consumption, on the other hand, does not exhibit a significant effect on inflation. The rest of this paper is structured as follows: Section 2 reviews the relevant literature, section 3 describes the econometric methodology and data. Section 4 presents the results and section 5 discuss alternative model specification. Finally, in section 6 we present the conclusions and policy implications.

2. LITERATURE REVIEW

The relationship between oil prices and inflation is complex and multifaceted, particularly in economies that are highly dependent on oil. The literature highlights important differences in this relationship depending on whether a country is a net oil exporter or importer.

Figure 1: Ecuador's inflation and oil price



Source: National Institute of Statistics and Censuses (INEC), U.S. Energy Information Administration and authors' computations

On the side of net importers, for example, Zakaria et al. (2021) analyze the impact of global oil prices on inflation in South Asian countries using monthly data from 1980 to 2018. Applying both linear and nonlinear methods, they find evidence of a long-run relationship where oil prices Granger-cause inflation. Impulse response functions suggest that positive oil price shocks have a persistent inflationary effect, while variance decomposition shows that this influence becomes more pronounced over the long run. Their nonlinear analysis reveals asymmetric effects: positive oil price shocks significantly increase inflation, whereas negative shocks have limited impact.

Zhao et al. (2016) highlight that fluctuations in oil prices can lead to significant inflationary pressures within China, primarily due to the country's substantial import reliance. Their findings indicate that oil price shocks, especially those triggered by geopolitical events, can produce both short-term and long-term effects on inflation rates. This call for comprehensive energy policies that not only address immediate responses to oil price shocks but also strategically reduce dependency on imported oil in order to safeguard the domestic economy against such external shocks.

Regarding oil exporters, Salisu (2017) investigates asymmetries in the oil price–inflation nexus using quarterly data from 2000 to 2014 for both net oil-exporting and oil-importing countries. Employing a dynamic panel model and decomposing oil prices into positive and negative shocks, the study finds a significant long-run positive relationship between oil prices and inflation across both groups. Notably, the long-run effect is stronger in net oil-importing countries, while asymmetries are more relevant in oil-exporting economies. The relationship is also found to be time-varying and robust to alternative oil price proxies and income levels.

Lescaroux and Mignon (2008) examine the short- and long-run relationships between oil prices and a range of macroeconomic and financial variables across both oil-importing and oil-exporting countries. Using Granger-causality tests, cross-correlation analysis, and cointegration techniques, they find that oil prices significantly influence other macroeconomic indicators, particularly over the long run. Notably, they report that oil prices and the Consumer Price Index are cointegrated across all countries in their sample.

Sakashita and Yoshizaki (2016) analyze the effects of oil price shocks on industrial production and consumer prices in five emerging economies, comparing them with the United States using a two-block structural VAR model of the global oil market. Their findings show that the impact of oil price shocks depends on the underlying source of the shock, a pattern observed in both emerging economies and the U.S. Additionally, they document that some emerging countries exhibit distinct impulse response patterns, highlighting heterogeneity in how oil shocks affect inflation and output across different contexts. Previous studies, such as Kilian and Park (2009), have also highlighted the importance of the origin of the shock in determining its effects throughout the economy.

Seka et al. (2015) examine the inflationary effects of oil price changes across countries with varying degrees of oil dependency.

Using an autoregressive distributed lag (ARDL) model estimated via the pooled mean group method, they find that in low oil dependency countries, oil price changes have a direct impact on domestic inflation. In contrast, in high oil dependency countries, the effect is indirect and operates through changes in exporters' production costs. Additionally, they identify the main inflation drivers as the real exchange rate and production costs in high-dependency countries, and domestic output and production costs in low-dependency countries. These findings highlight the importance of considering structural characteristics when designing monetary policy responses to external shocks.

When focusing on the interaction of oil prices and fiscal policy and their implication for inflation, the evidence is less focalized. Research usually study the impact of oil price and fiscal policy on a broad set of variables focusing on GDP. For example, Pieschacon (2012) in the context of examination of fiscal rules in oil exporting country, although she uses price indirectly trough the inclusion of relative prices of non-tradables in the model. Other recent study is Al Jabri et al. (2021) who examine the impact of oil price shocks on fiscal policy and real GDP and inflation in Oman using previously unexplored data. While both petroleum and non-petroleum GDP respond positively to oil shocks, government spending is influenced indirectly, responding to changes in revenue rather than oil prices themselves. Notably, oil price shocks have no significant effect on inflation, a result the authors attribute to Oman's fuel subsidy system, which cushions domestic prices from global oil market fluctuations.

When focusing on Ecuador, the literature about the relationship between oil price and inflation considering fiscal policy is even more restricted. García-Albán et al. (2021) is the more recent study that examine and test a rich set of hypotheses about the relationship among oil revenues, economic growth, and fiscal policy in Ecuador. They propose a procedure to clarify the mechanism of propagation of oil price shocks in a price taker oil-exporting country using Ecuador as example. However, in that model, inflation does not play any role. Camacho-Villagómez and García-Albán (2025) also study the effect of oil in the context of the twin deficits hypothesis. Their study includes the real exchange rate, which in a dollarized economy maintains a close relationship with domestic inflation. However, it is difficult to extrapolate results applied to the real exchange rate directly to inflation, even in such a setting. Other studies that deal with oil prices in Ecuador, but not inflation are Cevallos-Mina et al. (2024) and Camacho-Villagomez et al. (2024).

This gap in the literature underscores the relevance of the present study, which explicitly examines the inflationary effects of oil price shocks in a dollarized, oil-exporting economy, while accounting for the transmission role of fiscal policy. By focusing on Ecuador, this paper contributes to a more nuanced understanding of how external shocks and fiscal dynamics jointly influence inflation.

3. METHODOLOGY AND DATA

3.1. The SVAR Model

García-Albán et al. (2021) propose a structural vector autoregression (SVAR) framework to estimate the effects of fiscal policy and oil revenues in an oil-exporting country. The present study adopts a similar model specification but differs in the estimation strategy and identification approach. While García-Albán et al. (2021) employ a Bayesian estimation method and rely on a combination of sign and zero restrictions for structural identification, this paper adopts a frequentist approach. Specifically, the identification strategy follows the methodology developed by Blanchard and Perotti (2002), which exploits institutional information about the timing of fiscal policy responses to disentangle structural shocks. The oil price shock is identified by imposing a strict exogeneity assumption.

Specifically, we set a quarterly VAR model in which the oil revenues variable is strictly exogenous, while the remaining variables are determined endogenously. Hence, the model is represented by the following set of equations:

$$X_t = C(L)o_{t-1} + D(L)X_{t-1} + V_t$$

$$o_t = F(L)o_{t-1} + u_t^o$$

Where $X_t = [\tau_t, k_t, g_t, y_t, p_t]$ and $V_t = [u_t^\tau, u_t^k, u_t^g, u_t^y, u_t^p]$.

$\tau_t, k_t, g_t, y_t, p_t$ and o_t are taxes, government investment, government consumption spending, GDP, prices and oil revenues, respectively. We also include a constant and a linear time trend in each of the equations of the system. We rely on the results of Sims et al. (1990) and estimate the VAR with all the variables in levels even when some of them could be evidence unit roots. By explicitly including a linear time trend and an enough number of lags, the inference is valid.

3.2. Identification of Structural Shocks

The identification strategy corresponds to the methodology in Blanchard and Perotti (2002). The relationship between the reduced-form VAR residuals,, and the structural shocks, denoted ε_t, is given by the following system of equations:

$$AU_t = B\varepsilon_t \quad (1)$$

where we assume that the structural shocks are independent and identically distributed with identity variance-covariance matrix. It is important to remember that the assumption of strict exogeneity of oil revenues implies that the corresponding structural shock is already identified. That is, the residual of the oil revenues equation is proportional to the structural shock of said variable, as follows:

$$u_t^o = b_{o,o}\varepsilon_t^o \quad (2)$$

Where $b_{o,o}$ is the standard deviation of u_t^o.

Following Perotti (2002), the residuals u_t^τ, u_t^k, u_t^g are linear combinations of three types of shocks:

1. The automatic response of taxes and government spending to changes in GDP, prices, and oil revenues, under current policy rules.
2. Whatever discretionary adjustment is done to fiscal policy in response to unexpected movements in GDP, prices, and oil revenues within the quarter.

3. Random shocks to fiscal policy. These are the structural shocks, ε_t, which we need to identify in order to obtain the impulse-response functions.

Formally, the fiscal policy variables residuals can be written as:

$$u_t^{\tau} = a_{\tau,y}u_t^y + a_{\tau,p}u_t^p + a_{\tau,o}u_t^o + b_{\tau,k}\varepsilon_t^k + b_{\tau,g}\varepsilon_t^g + \varepsilon_t^{\tau} \quad (3)$$

$$u_t^{k} = a_{k,y}u_t^y + a_{k,p}u_t^p + a_{k,o}u_t^o + b_{k,\tau}\varepsilon_t^{\tau} + b_{k,g}\varepsilon_t^g + \varepsilon_t^{k} \quad (4)$$

$$u_t^{g} = a_{g,y}u_t^y + a_{g,p}u_t^p + a_{g,o}u_t^o + b_{g,\tau}\varepsilon_t^{\tau} + b_{g,k}\varepsilon_t^k + \varepsilon_t^{g} \quad (5)$$

The coefficients $a_{\tau,y}, a_{\tau,p}, a_{\tau,o}, a_{k,y}, a_{k,p}, a_{k,o}, a_{g,y}, a_{g,}$ and $a_{g,o}$ incorporate the effects of the first two types of shocks described above. As is standard in the literature, we assume that policymakers take more than a quarter to implement changes to fiscal policy in response to unexpected movements in GDP and oil revenues. Policymakers have to decide which policies to undertake, get approval from congress, and then implement such policies. Hence, the use of data with quarterly frequency eliminates the effect of the second type of shocks. Consequently, the parameters mentioned before only the automatic response of the fiscal variables. That is, these parameters are interpreted as contemporaneous output, price and oil revenue elasticities. The elasticities of the fiscal variables with respect to GDP and prices cannot be estimated consistently within the system due to the contemporaneous correlation of both the GDP and price equation residuals with the structural shocks. Given this situation, the elasticities with respect to GDP and price need to be obtained from estimations outside the model. There does not exist a sufficiently rich set of microeconomic data to estimate tax elasticities in a robust manner for Ecuador. Studies at macroeconomic level, like Machado and Zuloeta (2012), estimate the elasticity of tax revenue with respect to GDP at 2.23. However, their analysis is based on a sample period that precedes several major tax policy reforms, which may have altered the responsiveness of tax revenues to economic activity. Consequently, this study adopts a more conservative value of 1.5 for the tax-to-output elasticity. Moreover, our analysis is based on net tax revenues, which typically exhibit lower elasticities than gross tax collections. the main results are not sensitive to the specific value chosen for the elasticity parameter. Regarding the elasticity of net taxes with respect to prices we use an elasticity of 1, which is a value closely to the values used in the literature, for example Perotti (2002). As in Perotti (2002), we assume that both $a_{k,p}$ and $a_{g,p}$ are equal to −0.5. The reasoning behind this assumption is that, with quarterly data, some components of nominal government spending are likely to increase contemporaneously.

Blanchard and Perotti (2002) assume that the elasticity of government spending is zero. Other papers that make the same assumption are García-Albán et al. (2021), Perotti (2002), Perotti (2004), Heppke-Falk et al. (2006), Giordano et al. (2007), and De Castro and De Cos (2008). In our case, this is equivalent to assume that the parameters $a_{k,y}$ and $a_{g,y}$ in equations (4) and (5) are both equal to zero. Perotti (2002) argues that it is difficult to imagine a mechanism in which there is a significant contemporaneous effect of GDP on government spending. Note that this assumption implies that procyclical behavior of government spending is explained by lagged GDP variations as well as by current and lagged variations in oil revenues.

The elasticity of the fiscal variables with respect to oil revenues can be estimated consistently within the VAR model due to the assumption of strict exogeneity. However, we assume that $a_{\tau,o}$ is equal to zero because it is difficult to imagine a mechanism by which tax revenues respond contemporaneously to changes in oil revenues, once the effect of changes in GDP is accounted for.

Empirical evidence suggests that in many resource-rich countries, the bulk of the windfall generated by commodity price booms is allocated to public investment rather than to other components of government spending. For instance, Villafuerte et al. (2013) document that in non-renewable resource-exporting countries in Latin America and the Caribbean, capital expenditures were the fastest-growing component of government spending during the 2003-2008 period, a time marked by a significant surge in commodity prices. Based on this evidence, the present study assumes that public investment responds contemporaneously to the economic cycle, whereas government consumption does not. It means we assume $a_{g,o}$ is equal to zero while $a_{k,o}$ is estimated by OLS within the model.

Once we have estimated the contemporaneus elasticities, it is possible to define the cyclically adjusted fiscal shocks as:

$$u_t^{\tau,CA} = u_t^{\tau} - \left(a_{\tau,y}u_t^y + a_{\tau,p}u_t^p + a_{\tau,o}u_t^o\right) = b_{\tau,k}\varepsilon_t^k + b_{\tau,g}\varepsilon_t^g + \varepsilon_t^{\tau} \quad (6)$$

$$u_t^{k,CA} = u_t^{k} - \left(a_{k,y}u_t^y + a_{k,p}u_t^p + a_{k,o}u_t^o\right) = b_{k,\tau}\varepsilon_t^{\tau} + b_{k,g}\varepsilon_t^g + \varepsilon_t^{k} \quad (7)$$

$$u_t^{g,CA} = u_t^{g} - \left(a_{g,y}u_t^y + a_{g,p}u_t^p + a_{g,o}u_t^o\right) = b_{g,\tau}\varepsilon_t^{\tau} + b_{g,k}\varepsilon_t^k + \varepsilon_t^{g} \quad (8)$$

It is not possible to identify all the remaining structural parameters without imposing additional restrictions. Therefore, it becomes necessary to assume a recursive ordering of the fiscal variables. However, as Perotti (2004) argues, there is little theoretical justification for preferring one particular ordering over another. Among the six possible permutations for ordering the fiscal shocks, this study considers the following ordering as in Perotti (2004): each of the two spending variables is placed first in turn, while tax revenues is ordered last. That is, ε_t^k, ε_t^g and ε_t^{τ}. So the system of equations (6), (7) and (8) could be expressed as:

$$u_t^{\tau,CA} = b_{\tau,k}\varepsilon_t^k + b_{\tau,g}\varepsilon_t^g + \varepsilon_t^{\tau} \quad (9)$$

$$u_t^{k,CA} = \varepsilon_t^k \quad (10)$$

$$u_t^{g,CA} = b_{g,k}\varepsilon_t^k + \varepsilon_t^g \quad (11)$$

Once this restriction is imposed, the shock ε_t^k is identified and can be used to estimate $b_{g,k}$ through a regression of $u_t^{g,CA}$ on ε_t^k. Subsequently, the estimated value of ε_t^g is used to identify $b_{\tau,k}$ and $b_{\tau,g}$ by regressing $u_t^{\tau,CA}$ on ε_t^k and ε_t^g.

Since the main objective of this study is to estimate the effects of fiscal policy and oil revenues on inflation, the ordering of the remaining variables, GDP and prices, is not relevant for identification. As is standard in the literature, GDP is placed first.

The parameters in the GDP equation can then be estimated using the identified structural shocks $\widehat{\varepsilon_t^{\tau}}$, $\widehat{\varepsilon_t^{k}}$ and $\widehat{\varepsilon_t^{g}}$ as instruments in an instrumental variables regression.

$$u_t^y = a_{y,\tau} u_t^{\tau} + a_{y,k} u_t^k + a_{y,g} u_t^g + a_{y,o} u_t^o + \varepsilon_t^y \quad (12)$$

However, the fact that $a_{k,y}$ and $a_{g,y}$ are equal to zero implies that only u_t^{τ} is endogenous in equation (12). Consequently, equation (12) can be estimated using instrumental variables, with $\widehat{\varepsilon_t^{\tau}}$ serving as the instrument. Finally, the parameters of the price equation are estimated in a similar manner, using $\widehat{\varepsilon_t^{y}}$ as an additional instrument.

$$u_t^p = a_{p,y} u_t^y + a_{p,\tau} u_t^{\tau} + a_{p,k} u_t^k + a_{p,g} u_t^g + a_{p,o} u_t^o + \varepsilon_t^p \quad (13)$$

After estimating the structural coefficients, impulse response functions are computed over a 20 quarter horizon to assess the effects of fiscal variables and oil revenues on inflation. In addition, confidence intervals are constructed using 2,000 bootstrap replications.

We use tax revenues, government investment, government consumption, GDP, prices and oil revenues. Data about GDP, government spending and tax revenues are obtained from the Central Bank of Ecuador. To ensure comparability across the sample, fiscal variables are constructed following the methodology of García-Albán et al. (2021). Our measure of taxes is net tax revenues. Oil revenues are also in net terms since we remove an approximation of the fuel subsidies. We use variables in real terms and logs. See García-Albán et al. (2021) appendix for a detailed description of the fiscal and oil revenues dataset.

Regarding the inflation variable, we use the log of Consumer Price index which is obtained from the National Institute of Statistics and Censuses (INEC). Note that we don't use inflation directly. Although there are studies that use inflation instead of the price index, it is more common to use the latter. Also, it is more natural to understand its relationship with fiscal variables.

The data run from 2004q1 to 2019q3, which represents the longest period for which official data are consistent and comparable. Observations prior to 2004 are excluded due to instabilities in several time series, stemming from the structural adjustments and transitional dynamics associated with the adoption of dollarization in 2000.

4. EMPIRICAL RESULTS

Table 1 presents the values of three information criteria, AIC (Akaike, 1973), BIC (Schwarz, 1978), and HQ (Hannan and Quinn, 1979), for different lag lengths. While the criteria suggest selecting a single lag, we follow García-Albán et al. (2021) and use two lags in the estimation. As previously discussed, including additional lags helps mitigate potential issues arising from unit roots and ensures valid inference within the VAR framework.

Table 1: Information criteria for different lags

Lag	AIC	BIC	HQ
1	−34.80782	−33.54017	−34.31298
2	−34.45194	−31.91664	−33.46226
3	−34.03195	−30.229	−32.54743
4	−34.114	−29.0434	−32.13465

Source: Authors' computations

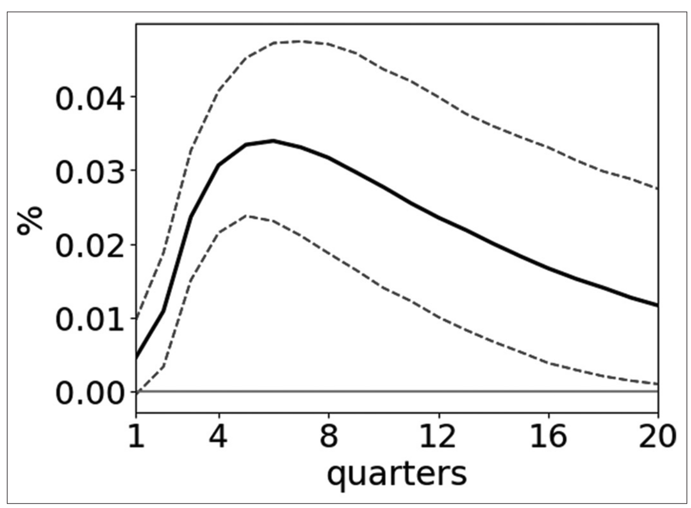
Below are the matrices A and B with the assumed and estimated coefficients. An important thing to note is that contemporaneous impact of net taxes on GPD is positive (the negative of −0.009). This is the result of a relatively low tax-to-output elasticity. However, the magnitude of the coefficient is low, and the impulse-response function display coherent results in line with the literature.

$$A = \begin{bmatrix} 1 & 0 & 0 & -1.5 & -1 & 0 \\ 0 & 1 & 0 & 0 & 0.5 & -0.037 \\ 0 & 0 & 1 & 0 & 0.5 & 0 \\ -0.009 & -0.002 & 0.03 & 1 & 0 & -0.03 \\ 0.011 & -0.007 & 0 & -0.037 & 1 & -0.02 \\ 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$

$$B = \begin{bmatrix} 1 & 0.185 & 0.57 & 0 & -1 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & -0.006 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$

Figures 2 and 3 present the impulse response functions corresponding to the response of prices to different components of government spending. Instead of using the point estimator for the impulse response functions, the median of the bootstrap distribution is employed, while the confidence intervals correspond to the 16th and 84th percentiles of that distribution. Sims and Zha (1999) argue that confidence bands corresponding to 50% or 68% probability levels are often more informative than 95% or 99% bands, as they provide a more accurate description of true coverage

Figure 2: Response of price index to a shock on government investment

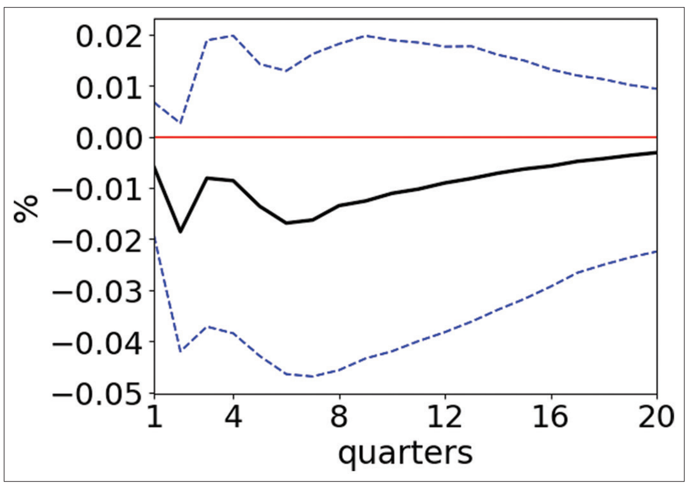


Source: Authors' computations

probabilities. Following standard practice in the literature, an impulse response is considered statistically significant if the confidence interval does not include zero.

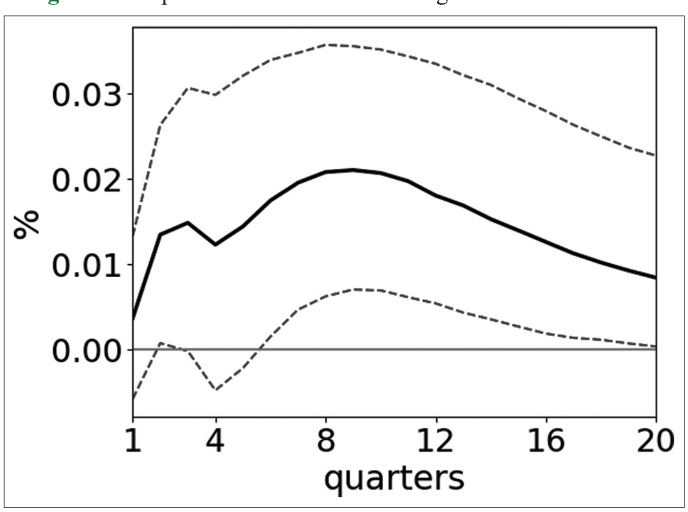
Prices respond positively to a government investment shock. Following a 1% shock to government investment, the price index increases by approximately 0.03% in the fifth quarter. Since the price index is introduced in levels in the model, the response can be interpreted as quarterly inflation. Thus, a 1% government investment shock implies a 0.03% increase in inflation by the fifth quarter. On the other hand, government consumption appears to have no significant effect on the level of prices. Although the estimated response is negative, the confidence interval includes zero throughout the entire horizon. These results suggest that only government investment generates inflationary pressures by boosting aggregate demand. This finding is consistent with the behavior of output, as shown in Figures 4 and 5. GDP responds positively to a government investment shock, whereas it exhibits a negative response following a government consumption shock. In both cases, the responses are statistically significant at several points along the horizon.

Figure 3: Response of price index to a shock on government consumption



Source: Authors' computations

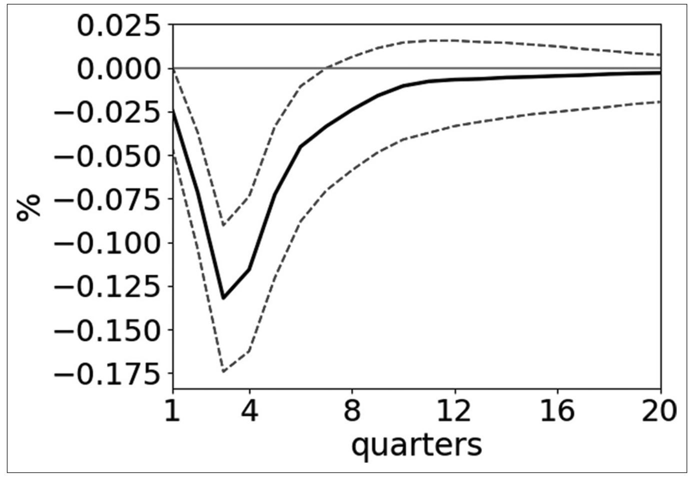
Figure 4: Response of GDP to a shock on government investment



Source: Authors' computations

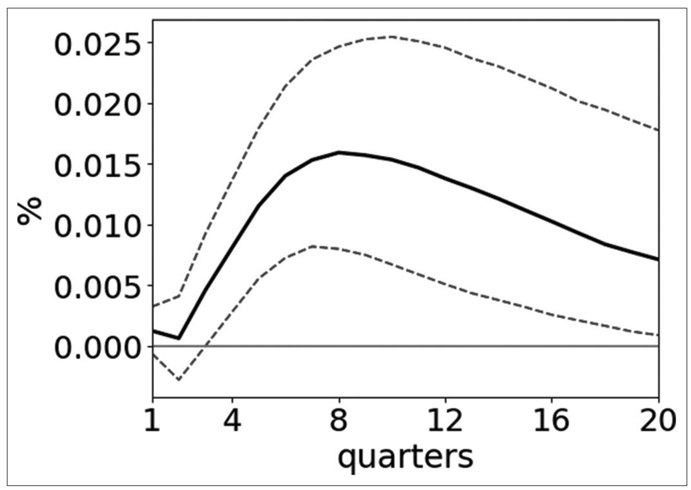
Figures 6 and 7 display the impulse response functions showing the responses of prices and GDP to net oil revenue shocks. Prices react positively to an oil revenue shock, reaching their peak at around

Figure 5: Response of GDP to a shock on government consumption



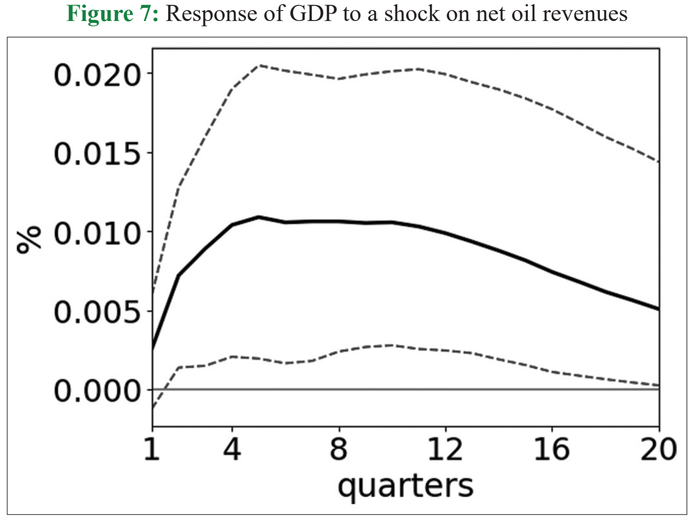
Source: Authors' computations

Figure 6: Response of price index to a shock on net oil revenues



Source: Authors' computations

Figure 7: Response of GDP to a shock on net oil revenues



Source: Authors' computations

the eighth quarter with an increase of approximately 0.015%. This behavior is again consistent with the reaction of GDP, whose impulse response function shows that oil revenues have a positive and persistent impact on output. Moreover, the impact on GDP is statistically significant over almost the entire horizon.

The fact that prices react to government investment and oil revenues, but not to government consumption, is not coincidental. As explained by García-Albán et al. (2021), fiscal rules in Ecuador establish a strong link between oil prices and government investment. These rules lead to a situation where government investment is primarily financed by oil revenues, while government consumption is mainly financed through tax revenues.

These results highlight both the procyclical behavior of fiscal policy in Ecuador and the country's exposure to fluctuations in oil revenues or oil prices. As García-Albán et al. (2021) explain, the economy of an oil-exporting country does not necessarily have to be highly exposed to oil price fluctuations. For instance, Norway's economy is to some extent shielded from oil price volatility because oil revenues are transferred to a sovereign wealth fund, the Government Pension Fund Global, and only the expected real return on the fund is used to finance public spending (Pieschacón, 2012). Indeed, Pieschacón (2012) shows that in a small oil-exporting country, fiscal policy constitutes a key transmission mechanism for oil price shocks.

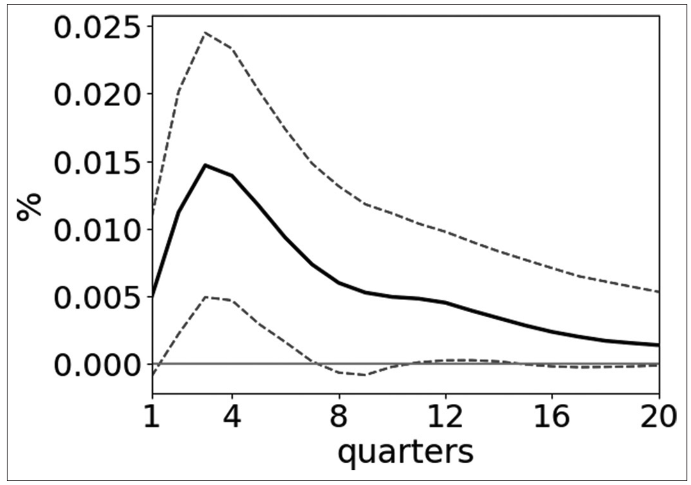
Overall, the effects of government investment and oil revenues on inflation are not only statistically significant but also highly persistent. In both cases, the impulse responses exhibit a similar shape: a gradual and sustained increase in prices following the initial shock. This pattern underscores the role of fiscal policy, particularly public investment fueled by oil revenues, as a key transmission channel for inflationary pressures in Ecuador's dollarized economy.

5. ALTERNATIVE SPECIFICATIONS AND MODEL DISCUSSION

We verify the validity of our results through several robustness exercises. First, we assess whether the results are sensitive to using inflation directly instead of the price level. Second, we replace oil revenues with oil prices to examine the sensitivity of the findings to the external variable specification. Third, we re-estimate the benchmark model using alternative values for the elasticity coefficients to ensure that the conclusions are not driven by specific parameter choices.

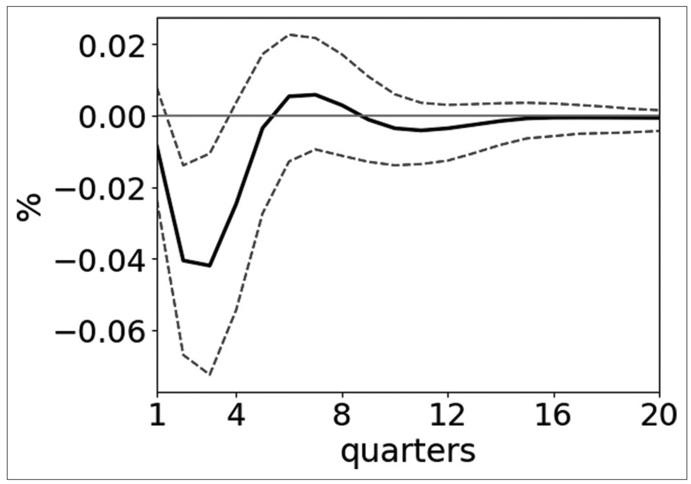
In the first robustness exercise, we use annual inflation instead of the price level. Annual inflation exhibits a more stationary behavior compared to the price level. The results are presented in Figures 8-10. The impulse responses of inflation are qualitatively similar to those obtained using the price level, although they display a more pronounced tendency to revert to the origin. This behavior is consistent with the stationarity properties of inflation. Also, the impact of government consumption on inflation is significant and negative at the second and third quarter.

Figure 8: Response of inflation to a shock on government investment



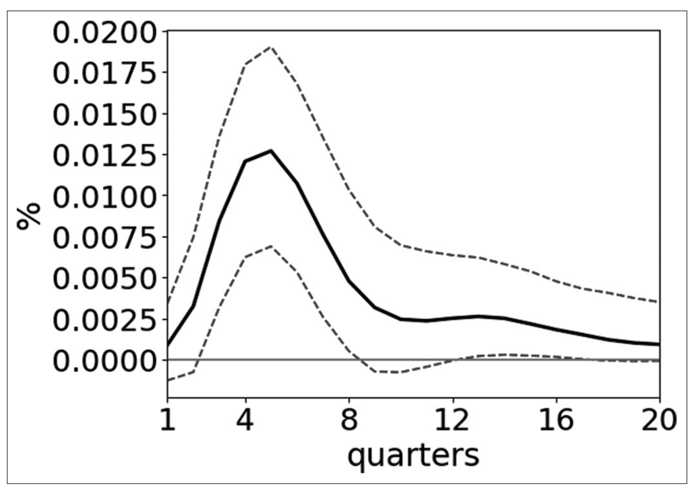
Source: Authors' computations

Figure 9: Response of inflation to a shock on government consumption



Source: Authors' computations

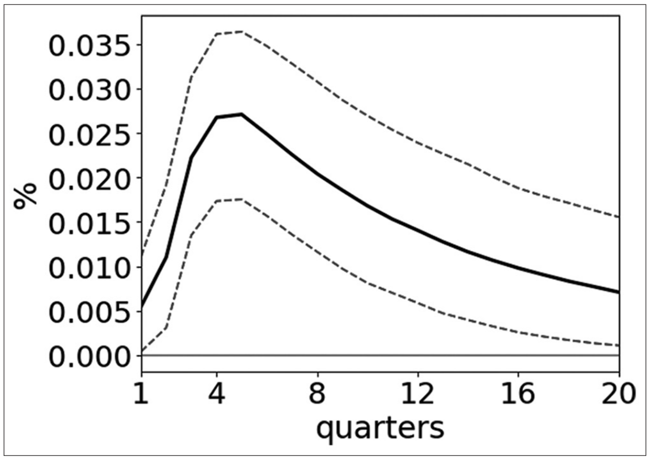
Figure 10: Response of inflation to a shock on oil revenues



Source: Authors' computations

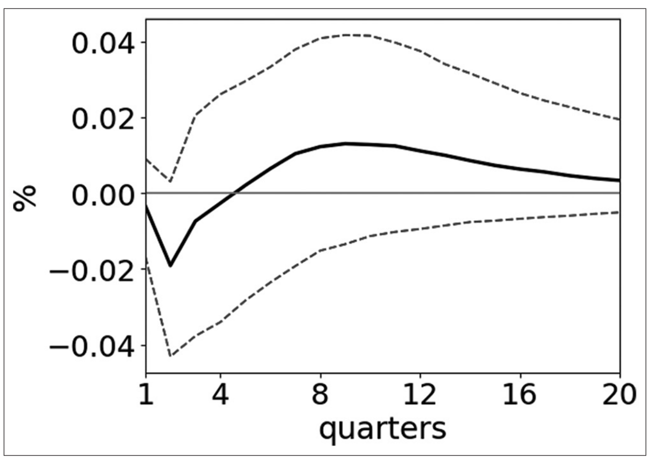
In the second robustness exercise, we use the nominal oil price instead of oil revenues. The results are virtually identical to those obtained in the benchmark case. The shape of all impulse responses remains the same, while only the magnitude varies in response to an oil price shock (Figures 11-13).

Figure 11: Response of price index to a shock on government investment using nominal oil price



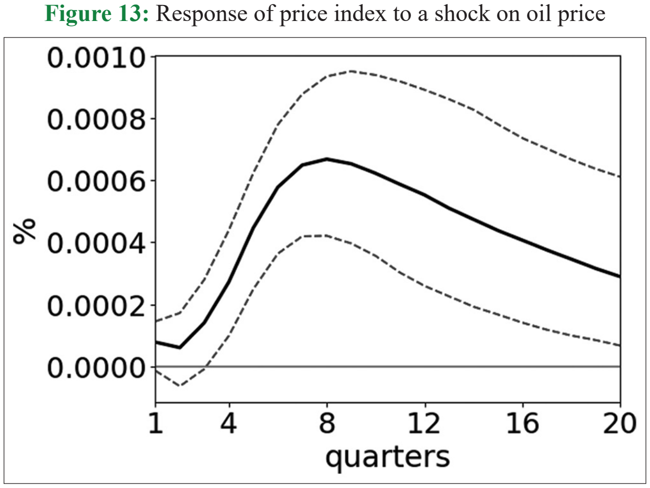
Source: Authors' computations

Figure 12: Response of price index to a shock on government consumption using nominal oil price



Source: Authors' computations

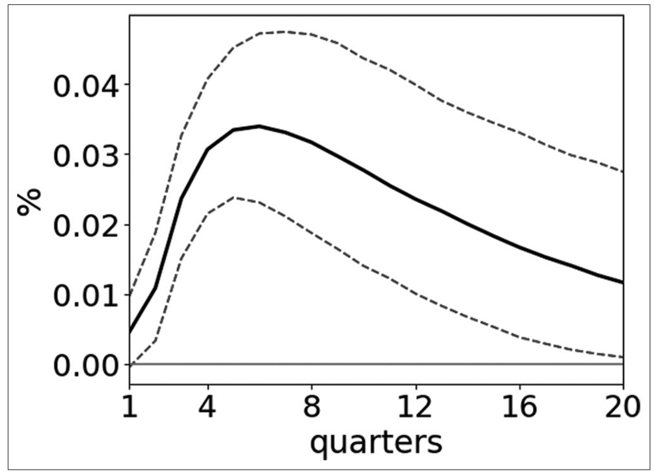
Figure 13: Response of price index to a shock on oil price



Source: Authors' computations

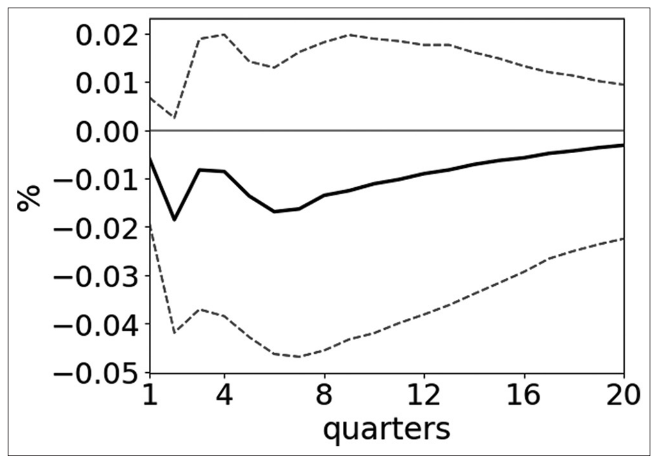
Finally, we modify the assumptions regarding the elasticities of tax revenues with respect to GDP and prices by increasing both

Figure 14: Response of price index to a shock on government investment under different elasticities



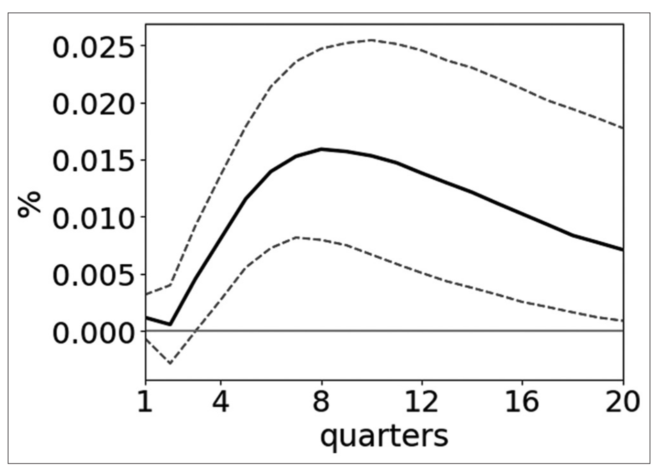
Source: Authors' computations

Figure 15: Response of price index to a shock on government consumption under different elasticities



Source: Authors' computations

Figure 16: Response of price index to a shock on oil revenues under different elasticities



Source: Authors' computations

values by 0.5. Figures 14-16 display impulse responses that are similar to those obtained in the benchmark case.

6. CONCLUSION AND POLICY IMPLICATIONS

This paper investigates the inflationary effects of public spending and oil revenues in a dollarized, oil-exporting economy using the case of Ecuador. By employing a structural vector autoregression (SVAR) model identified through institutional information, we estimate the dynamic impact of fiscal variables and external shocks on inflation, disentangling the effects of government investment, government consumption, and oil revenues.

Our results reveal three key findings. First, government investment exerts a statistically significant and persistent impact on the price level. This suggests that public investment, often financed through oil windfalls, serves as a main transmission channel through which fiscal policy generates inflationary pressures. Second, oil revenues also have a direct and persistent effect on inflation, reinforcing the idea that oil price fluctuations, common in resource-exporting economies, can affect domestic inflation both directly and through fiscal linkages. Third, government consumption does not exhibit a statistically significant impact on inflation, highlighting important heterogeneity in the inflationary consequences of different types of public spending.

These findings have several policy implications. In a dollarized context like Ecuador, where monetary policy is constrained, inflation control relies heavily on fiscal discipline. Our results underscore the importance of adopting countercyclical fiscal frameworks that can smooth expenditure dynamics across the commodity price cycle. In particular, insulating public investment from short-term oil revenue volatility—through mechanisms such as stabilization funds or multi-year budgeting rules—could help reduce inflationary pressures during commodity booms. The experience of countries like Norway, where oil revenues are delinked from fiscal expenditure through institutional arrangements, offers a relevant benchmark.

Moreover, the fact that government consumption appears to be inflation-neutral suggests that not all forms of public spending carry the same macroeconomic risks. This opens the door to more nuanced fiscal planning, where the composition of spending is carefully considered alongside its macroeconomic effects.

Finally, our robustness exercises confirm that the main conclusions are not sensitive to alternative model specifications, variable definitions, or parameter assumptions. This strengthens the credibility of our findings and reinforces the need for structural reforms that reduce the Ecuadorian economy's exposure to oil-driven fiscal dynamics.

Future research could explore additional transmission mechanisms, such as wage indexation, exchange rate pass-through via imports, or credit channels, to develop a more comprehensive understanding of inflation dynamics in dollarized economies with high resource dependence.

REFERENCES

Akaike, H. (1973), Maximum likelihood identification of Gaussian autoregressive moving average models. Biometrika, 60(2), 255-265.

Al Jabri, S., Raghavan, M., Vespignani, J. (2022), Oil prices and fiscal policy in an oil-exporter country: Empirical evidence from Oman. Energy Economics, 111, 106103.

Blanchard, O., Perotti, R. (2002), An empirical characterization of the dynamic effects of changes in government spending and taxes on output. The Quarterly Journal of Economics, 117(4), 1329-1368.

Camacho-Villagomez, F.R., Bajaña-Villagomez, Y.S., Rodríguez-Bustos, A.J. (2024), Estimating the impact of oil price volatility on the Ecuadorian economy: A MIDAS approach. International Journal of Energy Economics and Policy, 14(4), 371-376.

Camacho-Villagómez, F., García-Albán, F. (2025). Looking for the twin deficits in a dollarized oil-exporting economy. Available at SSRN 5297795.

Cevallos-Mina, M.G., Lara-Tambaco, R.M., Reyes-Vera, C.H., Mosquera-Quiñonez, E.F., Castillo-Gámez, J.L. (2024), The effects of oil price on energy production and the Ecuadorian economy. International Journal of Energy Economics and Policy, 14(3), 38-50.

De Castro, F., De Cos, P.H. (2008), The economic effects of fiscal policy: The case of Spain. Journal of Macroeconomics, 30(3), 1005-1028.

García-Albán, F., González-Astudillo, M., Vera-Avellán, C. (2021), Good policy or good luck? Analyzing the effects of fiscal policy and oil revenue shocks in Ecuador. Energy Economics, 100, 105321.

Giordano, R., Momigliano, S., Neri, S., Perotti, R. (2007), The effects of fiscal policy in Italy: Evidence from a VAR model. European Journal of Political Economy, 23(3), 707-733.

Hannan, E.J., Quinn, B.G. (1979), The determination of the order of an autoregression. Journal of the Royal Statistical Society: Series B (Methodological), 41(2), 190-195.

Heppke-Falk, K.H., Tenhofen, J., Wolff, G.B. (2006), The Macroeconomic Effects of Exogenous Fiscal Policy Shocks in Germany: A disaggregated SVAR analysis Discussion Paper No. 41/2006. Germany: Deutsche Bundesbank.

Kilian, L., Park, C. (2009), The impact of oil price shocks on the U.S. Stock market. International Economic Review, 50(4), 1267-1287.

Lescaroux, F., Mignon, V. (2008), On the influence of oil prices on economic activity and other macroeconomic and financial variables. OPEC Energy Review, 32, 343-380.

Machado, R., Zuloeta, J. (2012), The Impact of the Business cycle on Elasticities of Tax Revenue in Latin America (No. IDB-WP-340). United States: IDB.

Murphy, P.L., Ossowsky, R., Villafuerte, M. (2013), Riding the Roller Coaster: Fiscal Policies of Nonrenewable Resource Exporters in Latin America and the Caribbean. Fiscal Policy and Macroeconomic Performance. Santiago, Chile: Central Bank of Chile. p117-173.

Perotti, R. (2002), Estimating the Effects of Fiscal Policy in OECD Countries Working Paper Series No. 168. European: Central Bank.

Perotti, R. (2004), Public Investment: Another (Different) Look Working Paper No. 277. Saint Helier: IGIER.

Pieschacón, A. (2012), The value of fiscal discipline for oil-exporting countries. Journal of Monetary Economics, 59(3), 250-268.

Sakashita, Y., Yoshizaki, Y. (2016), The effects of oil price shocks on IIP and CPI in Emerging Countries. Economies, 4(4), 20.

Salisu, A.A., Isah, K.O., Oyewole, O.J., Akanni, L.O. (2017), Modelling oil price-inflation nexus: The role of asymmetries. Energy, 125, 97-106.

Schwarz, G. (1978), Estimating the dimension of a model. The Annals of Statistics, 6, 461-464.

Sek, S.K., Teo, X.Q., Wong, Y.N. (2015), A comparative study on the effects of oil price changes on inflation. Procedia Economics and Finance, 26, 630-636.

Sims, C.A., Stock, J.H., Watson, M.W. (1990), Inference in linear time series models with some unit roots. Econometrica, 58, 113-144.

Sims, C.A., Zha, T. (1999), Error bands for impulse responses. Econometrica, 67(5), 1113-1155.

Zakaria, M., Khiam, S., Mahmood, H. (2021), Influence of oil prices on inflation in South Asia: Some new evidence. Resources Policy, 71, 102014.

Zhao, L., Zhang, X., Wang, S., Xu, S. (2016), The effects of oil price shocks on output and inflation in China. Energy Economics, 53, 101-110.