



## OIL PRICE IMPACTS AND SECTORAL VULNERABILITY: EVIDENCE FROM A MIDDLE-INCOME COUNTRY

Shariff Umar Shariff Abd. Kadir<sup>a\*</sup>, Wong Hock Tsen<sup>a</sup>

<sup>a</sup> *Centre for Economic Development and Policy (CEPD), Universiti Malaysia Sabah, Kota Kinabalu, Sabah, Malaysia.*

*\*Corresponding author's email: sh.umar@ums.edu.my*

### ABSTRACT

The study investigates the differential exposure of Malaysia's key economic sectors such as agriculture, mining and quarrying, manufacturing, and construction to oil price shocks. Employing a Structural Vector Autoregression (SVAR) model with short-run zero restrictions, the analysis disentangles the dynamic transmission mechanisms linking global oil price fluctuations to sectoral output in a resource-dependent, middle-income economy. The findings reveal that positive oil price shocks have a statistically significant and generally beneficial impact across all sectors, with mining and quarrying showing the highest sensitivity due to its direct link to global energy markets. Manufacturing, construction, and agriculture follow in descending order of responsiveness, reflecting differing degrees of international exposure and domestic value chain integration. By modelling these asymmetric sectoral responses over a long historical period, the study contributes novel empirical insights into the macroeconomic implications of resource dependence and offers valuable guidance for policymakers in managing external commodity-driven volatility.

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### 1. INTRODUCTION

Oil plays a central role in the economies of developing countries, serving as both a primary energy source and a key contributor to government revenue (Heras, 2024). Within this broad category, middle-income countries occupy a distinct position. They combine moderate industrial diversification and emerging fiscal capacity with ongoing structural transformation, setting them apart from low-income countries, which tend to rely heavily on subsistence sectors and possess limited fiscal buffers (Sohag et al., 2017). By contrast, high-income countries typically benefit from advanced energy efficiency measures, diversified energy supplies, and well-developed stabilisation mechanisms, making them less vulnerable to the direct impacts of oil price fluctuations (Lin & Wang, 2020). In 2022, petroleum products

accounted for approximately 30% of global primary energy consumption (International Energy Agency, 2023), highlighting the continued importance of oil. Middle-income countries, which are in the midst of industrialisation and expanding their energy systems, frequently reflect these global trends, with oil representing a substantial share of both energy use and fiscal revenue, thereby heightening their exposure to international price shocks. Recent disruptions arising from geopolitical tensions, supply chain constraints, and the ongoing global energy transition have further intensified price instability, with Brent crude fluctuating between USD 70 and USD 120 per barrel from 2021 to 2023 (IMF, 2024). These developments underscore the imperative to examine how oil shocks propagate across different sectors, particularly within the context of middle-income countries.

In Malaysia, oil and gas occupy a central role in the national economic framework. Anchored by Petroliaam Nasional Berhad (Petronas), the state-owned oil company, the petroleum sector contributes significantly to both fiscal revenues and broader economic development. Petroleum-related income comprised around 20% of total government revenue in 2024, rendering fiscal policy highly sensitive to international oil price dynamics (Ministry of Finance, Malaysia, 2024). As a small, open middle-income economy, Malaysia is particularly exposed to global oil price volatility. Its dual role as an exporter of crude oil and importer of refined petroleum products amplifies the macroeconomic and sectoral transmission channels of oil shocks, creating vulnerabilities that differ from those in larger or more diversified economies. The Twelfth Malaysia Plan outlines strategic goals centred on economic diversification, industrial upgrading, and inclusive development, all of which are inextricably linked to shifts in global energy markets.

Rising energy prices often lead to increased production costs, which in turn exert upward pressure on consumer prices. These developments can significantly affect aggregate demand, output, and trade performance. For oil-exporting countries such as Malaysia, elevated oil prices typically enhance fiscal capacity and stimulate investment-led growth. Conversely, oil-importing economies tend to face inflationary pressures, diminished household purchasing power, and slower investment, thereby constraining overall economic performance (Aastveit et al., 2015). In middle-income countries, where household consumption is relatively more sensitive and industrial sectors remain energy-intensive, such dynamics can be particularly disruptive. Unlike high-income economies, which benefit from risk mitigation tools such as strategic petroleum reserves and diversified energy systems, middle-income economies generally lack fully developed protective mechanisms, heightening their exposure to external shocks.

Although a considerable body of literature has explored the macroeconomic implications of oil price shocks, notable gaps remain in understanding their sector-specific effects within middle-income, oil-exporting economies. Much of the extant research has concentrated on advanced economies (Kim & Vera, 2022; Kumari et al., 2024) or has relied heavily on aggregate macroeconomic indicators (Nguyen et al., 2024), thereby overlooking heterogeneous sectoral responses in emerging markets. This omission is particularly important because energy-intensive sectors such as manufacturing and construction are likely to experience more volatile and disproportionate impacts compared with less energy-dependent sectors such as services. In middle-income contexts, where these sectors contribute substantially to employment and often lack energy-efficient infrastructure, such asymmetries carry

significant policy implications. Broad-based fiscal and monetary interventions may therefore prove insufficient or misdirected without a nuanced understanding of sectoral vulnerabilities (Gomes et al., 2025).

This study seeks to address this gap by investigating the sectoral transmission mechanisms of oil price shocks in Malaysia, focusing on four key sectors: agriculture, mining and quarrying, manufacturing, and construction, which collectively contribute approximately half of the nation's gross domestic product (Ministry of Economy, Malaysia, 2024). As a small, open middle-income economy, Malaysia is particularly susceptible to global oil market fluctuations, with evident spillover effects across its economic structure (Husaini & Lean, 2021; World Bank Group, 2023). Moreover, the significant share of petroleum-related income in national revenue accentuates the fiscal vulnerabilities arising from global price shocks.

While existing studies have examined the macroeconomic consequences of oil price movements in Malaysia, less attention has been devoted to sectoral channels, particularly within agriculture, manufacturing, and construction (Yee Ee et al., 2024; Shaari et al., 2013). A deeper understanding of these dynamics is essential not only for short-term policy calibration but also for informing long-term strategies aimed at structural transformation and sustainable economic development. As many resource-rich middle-income countries seek to reduce commodity dependence and build economic resilience, insights into sector-specific elasticities and vulnerabilities are vital for shaping effective, evidence-based policy interventions.

The contributions of this study are threefold. First, it expands the current literature on commodity price shocks by quantifying sector-specific responses in a middle-income, oil-exporting context, a perspective largely underrepresented in existing research. Second, it provides empirically grounded insights to guide more targeted fiscal policy measures, such as sectoral subsidies or diversification incentives. Third, by bridging empirical and conceptual gaps, the study contributes to broader discussions on energy policy and macroeconomic stability in commodity-dependent middle-income economies navigating an increasingly volatile global energy landscape.

## **2. LITERATURE REVIEW**

Numerous studies have investigated the effects of oil price fluctuations on macroeconomic indicators and sectoral performance across various economies (Kim & Vera, 2022; Kumari et al., 2024; Jiménez-Rodríguez & Sánchez, 2005; Basnet & Upadhyaya, 2015). Higher oil prices typically lead to increased production costs and inflation, which, in turn, reduce overall demand, output, and trade performance (Aastveit et al., 2015; Belloumi et al., 2023). Oil price shocks are widely recognised as critical drivers of macroeconomic instability, given crude oil's role as a fundamental production input and energy source (Jiménez-Rodríguez & Sánchez, 2005). In developing economies, these shocks often exacerbate pre-existing structural weaknesses, such as limited fiscal space, narrow export bases, and high energy intensity in industrial production.

Theoretical frameworks generally distinguish between supply-side and demand-side channels through which oil prices influence economic activity. On the supply side, higher oil prices increase production costs, reduce input availability, and suppress output, leading to inflationary pressures and potential unemployment (Kilian, 2008). These effects are particularly damaging in developing economies

where a larger share of consumption is energy-dependent and where substitution or technological upgrading is limited. On the demand side, oil-exporting countries may benefit from windfall revenues that fuel public expenditure and investment, while oil-importing nations often experience reduced consumption, rising import costs, and slower economic growth (Kilian, 2009). However, in many developing oil exporters, weak governance and procyclical fiscal policies can dilute these benefits, leading to vulnerability during price downturns.

Empirical analyses support these theoretical predictions. Oil price shocks have been associated with slower GDP growth, higher unemployment, and inflationary spikes, though the magnitude of these effects varies by country, sector, and policy framework (Kilian & Vigfusson, 2017). For oil-importing developing economies, where households and firms often lack financial hedging mechanisms, rising energy costs translate into immediate consumption and investment constraints. Moreover, in contexts with weak institutional capacity, the macroeconomic consequences of oil shocks can intensify social and political instability, further complicating policy responses (Husaini & Lean, 2021). Conversely, for developing oil exporters, the impact depends heavily on how oil revenues are managed, whether channelled into productive investments or absorbed through inefficient spending.

Importantly, recent literature has begun to address the sectoral transmission of oil price shocks, recognising that different industries respond asymmetrically based on energy intensity, input structure, and trade exposure (Vandyck et al., 2018). While resource sectors like mining and oil and gas tend to benefit directly from rising prices, downstream and energy-intensive industries such as manufacturing, transport, and construction may experience adverse cost effects unless mitigated by policy interventions. For developing economies seeking industrial diversification, this poses a strategic challenge: oil windfalls can crowd out productive sectors or distort incentives in energy-intensive areas, delaying structural transformation.

In the Malaysian context, the literature presents a nuanced picture. As a net oil-exporting developing economy, Malaysia often experiences positive macroeconomic effects from rising oil prices (Ali Ahmed & Wadud, 2011). Zakaria et al. (2023) found that increases in oil prices positively affect both short- and long-term economic growth in Malaysia. Similarly, Saudi et al. (2019), using the ARDL bound testing approach, provided empirical evidence that higher crude oil and LNG prices have a statistically significant positive impact on Malaysia's GDP in both the short and long run. These findings underscore the importance of energy-linked fiscal channels in shaping Malaysia's growth trajectory during periods of elevated oil prices.

Nevertheless, most existing studies focus on aggregate-level outcomes, overlooking sectoral heterogeneity in the response to oil price shocks. While macro-level analyses confirm the procyclical relationship between oil prices and GDP, they rarely disaggregate the effects across Malaysia's key economic sectors, such as agriculture, mining, manufacturing, and construction, which differ significantly in terms of energy dependency, labour intensity, and trade exposure. This represents a critical gap, as sector-specific vulnerabilities can lead to uneven impacts on employment, productivity, and income distribution. For example, while the mining and quarrying sector may benefit from higher global energy prices, manufacturing could face significant cost pressures unless offset by increased demand or energy subsidies.

Given Malaysia's broader development goals such as reducing oil dependency and enhancing industrial competitiveness, a sectoral understanding of oil price transmission is vital. This study builds on the existing body of work by examining these heterogeneous responses and offering policy-relevant insights for managing volatility in a way that supports sustainable growth and economic diversification in oil-exporting contexts.

### **3. METHOD**

#### **3.1 Data and variables description**

This study investigates the impact of oil price shocks on economic sectors using annual data from 1987 to 2023. The selected timeframe encompasses significant economic and policy changes in Malaysia, such as a shift in monetary strategy in the early 1990s, as well as major crises including the 1997/1998 ASEAN financial crisis, the 2008 global financial crisis, and the economic downturn precipitated by the COVID-19 pandemic that emerged in December 2019. Given that the sample period covers these major economic crises, we account for their potential influence by introducing crisis dummy variables as exogenous controls in the SVAR model. Each dummy takes the value of one during the respective crisis years and zero otherwise, thereby allowing us to isolate the effects of oil price shocks from crisis-specific disturbances. In particular, three dummies were constructed to capture the following events: the 1997/98 ASEAN financial crisis, the 2008 global financial crisis, and the economic recession induced by the 2019/20 COVID-19 pandemic.

In this study, we include five key variables: world oil price, domestic national income, consumer price index, interest rate, and government expenditure. The oil price is based on the West Texas Intermediate crude oil benchmark. Real gross domestic product is employed as the measure of domestic national income. The interbank overnight rate is utilised as the domestic interest rate proxy. As the central bank of Malaysia, Bank Negara Malaysia established a new interest rate framework in April 2004, designating the Overnight Policy Rate as the primary indicator of monetary policy. Consequently, given the limited availability of OPR data prior to 2004, the overnight interbank rate is used to represent the stance of monetary policy, consistent with studies by Ibrahim (2005) and Karim and Karim (2014). All variables, except for interest rates, are transformed by taking their natural logarithms.

In terms of sectoral focus, Malaysia's economy comprises 21 economic activities as classified by the Ministry of Economy, Malaysia (2024)<sup>1</sup>. This study narrows its analysis to four key sectors: agriculture, mining and quarrying, manufacturing, and construction. These sectors were selected for their strategic economic relevance and their collective contribution of approximately 50% of Malaysia's GDP over the study period (Ministry of Economy, Malaysia, 2024). In the context of a developing oil-exporting nation, these sectors are particularly sensitive to energy costs and global demand shocks. For instance, mining directly benefits from higher oil prices, whereas manufacturing and construction tend to suffer from rising input costs unless supported by increased investment or policy interventions. Agriculture, though less energy-

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<sup>1</sup> In Malaysia, the economy comprises of 21 economic activities such as agriculture, mining and quarrying, manufacturing, construction, electricity and gas, water, sewerage and waste management, wholesale trade, retail trade, motor vehicles, food and beverages, accommodation, transport and storage, information and communication, finance, insurance, real estate, business services, private health services, private education services, other services and government services, according Ministry of Economy, Malaysia (2024).

intensive, is often affected indirectly through transportation costs and price volatility in global markets.

By examining these four sectors, the study aims to uncover heterogeneous sectoral responses to oil price shocks, an area underexplored in existing literature on developing economies. This disaggregated approach allows for more targeted insights into how resource dependency and structural composition influence economic vulnerability to oil price volatility.

### 3.2 Econometric framework

In this study, we apply a structural VAR (SVAR) model in investigating the impact of oil price shock on selected economic sectors in Malaysia. The SVAR model offers the advantage of capturing the salient characteristics of a small open economy. As Cushman and Zha (1997) argue, SVAR models not only yield reliable findings but also provide valid insights, particularly in the context of small open economies.

The relationship between oil prices and selected economic sectors can be explained using the SVAR model as follows:

$$AY_t = V + C(L)Y_{t-p} + \varepsilon_t \quad (1)$$

Where  $A$  is a rectangular matrix that captures the contemporaneous structural relationships among the variables,  $Y_t$  is the vector of variables included in the system,  $V$  is the vector of determinant variables,  $C(L)$  is  $(n \times n)$  square matrix polynomial in the lag operator  $L$ , and  $\varepsilon_t$  is  $(n \times 1)$  vector of structural errors. The vector of structured error ( $\varepsilon_t$ ) satisfies the conditions  $E(\varepsilon_t) = 0$  and  $E(\varepsilon_t \varepsilon_t') = I_n$ , where  $I_n$  is  $n \times n$  of the identity matrix.

Equation (1) cannot be estimated using ordinary least squares (OLS) due to the presence of a lag effect on the dependent variable. As a result, the  $A$  matrix appears to be problematic because the structural error and regressor are correlated. This issue, however, can be addressed by converting Equation (1) to its reduced form by multiplying  $A^{-1}$ :

$$Y_t = A^{-1}V + A^{-1}(C_1L + C_1L^2 + \dots + C_kL^k)Y_t + A^{-1}\varepsilon_t$$

Or

$$Y_t = \Pi_0 + \Pi_1 Y_t + \mu_t \quad (2)$$

Where,

$$\Pi_0 = A^{-1}V, \Pi_1 Y_t = A^{-1}(C_1L + C_1L^2 + \dots + C_kL^k)Y_t;$$

$$\mu_t = A^{-1}\varepsilon_t.$$

In Equation (2),  $\mu_t$  represents the residual from the reduced-form VAR model, which meets the conditions  $E(\mu_t) = 0$  and  $E(\mu_t \mu_t') = \Sigma_\mu$  is a positive definite and symmetric matrix that can be estimated from the data. Given that the residual vector from the reduced-form VAR ( $\mu_t$ ) and the structural error vector ( $\varepsilon_t$ ) are related through the equation  $\mu_t = A^{-1}\varepsilon_t$  or  $A\mu_t = \varepsilon_t$ , the variance-covariance matrix that captures this relationship is as follows:

$$\begin{aligned}
 E(\mu_t \mu_t') &= A^{-1} \varepsilon_t A^{-1'} \varepsilon_t' \\
 &= A^{-1} E(\varepsilon_t \varepsilon_t') A^{-1'} \\
 &= A^{-1} \Sigma_\varepsilon A^{-1'} \\
 \Sigma_\mu &= A^{-1} A^{-1'}
 \end{aligned} \tag{3}$$

The variance-covariance matrix ( $\Sigma_\mu$ ) has distinct elements with  $n(n + 1)/2$ . The number of elements in the variance-covariance matrix represents the maximum number of identifiable parameters in the matrix A, where n is the number of endogenous variables in the SVAR system. The variance-covariance matrix captures the contemporaneous relationships among the variables. However, the A matrix contains  $n^2$  parameters, which exceeds the maximum number required by the SVAR system. Consequently, the SVAR system encounters identification problems.

The identification problem in the SVAR model can be addressed by employing the order condition proposed by Rothenberg (1971). Lütkepohl and Krätzig (2004) posited that the order condition represents a standard approach for resolving identification problems within SVAR systems. Based on the order condition, the zero restrictions on the A matrix must be identified, and the sum of these restrictions is subject to the calculation  $(n^2 - n)/2$ , where n represents the number of endogenous variables in the SVAR system. Once the identification problems has been addressed, the SVAR model can then be estimated using the maximum likelihood estimation approach.

This study employs short-run zero restrictions on the elements of the A matrix, as depicted in Equation (4) in a compact matrix formulation. Christiano et al. (2006) suggest that short-run restrictions in structural vector autoregression models can produce valid impulse response functions. In the present study, the Cholesky decomposition is employed to orthogonalize the variance-covariance matrix. This approach involves ordering the variables in a particular sequence, thereby imposing a specific structure on the computation of the impulse response functions, which makes the SVAR model exactly identified.

This study estimates a separate SVAR model for each economic sector to investigate the effects of oil prices. Specifically, the SVAR model includes one economic sector to assess the impact of oil price shocks. When examining the effects of oil price shocks on a given economic sector, the national income variable is replaced by the corresponding economic sector variable. The study utilised Cholesky decomposition to orthogonalize the variance-covariance matrix, resulting in an exactly identified SVAR model for each sector.

$$A \begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ \alpha_{21} & 1 & 0 & 0 & 0 \\ \alpha_{31} & \alpha_{32} & 1 & 0 & 0 \\ \alpha_{41} & \alpha_{42} & \alpha_{43} & 1 & 0 \\ \alpha_{51} & \alpha_{52} & \alpha_{53} & \alpha_{54} & 1 \end{bmatrix} \begin{bmatrix} \mu_{LOP_t} \\ \mu_{LYM_t} \\ \mu_{LGE_t} \\ \mu_{LCPI_t} \\ \mu_{R_t} \end{bmatrix} = \begin{bmatrix} \varepsilon_{LOP_t} \\ \varepsilon_{LYM_t} \\ \varepsilon_{LGE_t} \\ \varepsilon_{LCPI_t} \\ \varepsilon_{R_t} \end{bmatrix} \tag{4}$$

Based on equation (4), the variables are ordered as follows: LOP – world oil price, LYM – domestic national income, LGE - government expenditure, LCPI – consumer price index, and R – interest rate. We note that the results could be sensitive to variable orderings, hence theoretical considerations are used in this paper (Bernanke, 1986).

World oil prices are assumed to be exogenous, indicating that oil prices do not respond to domestic variables contemporaneously. This assumption has been used in previous studies such as Karim and Karim (2014) and Kaharudin et al. (2017). Domestic national income is then ordered above government expenditure, which is a reasonable assumption as fiscal variables have a lagged effect on domestic income (Blanchard & Quah, 1989). The interest rate is arranged last, in accordance with the literature on the lag effects of monetary policy. In this analysis, all variables are treated as jointly determined, with no a priori assumptions regarding the exogeneity of any variables in the system.

#### 4. RESULTS

##### 4.1 Preliminary analysis

Table 1 presents the results of the augmented Dickey-Fuller unit root tests conducted to evaluate the stationarity properties of each variable. The findings reveal that only four variables are stationary in their level form. Domestic income and the consumer price index are found to be stationary with the inclusion of a constant term in the test specification. Similarly, the interest rate and the construction sector exhibit stationarity when both a constant and trend are incorporated in the test. Conversely, the manufacturing sector is determined to be stationary with the presence of a constant term and constant with a time trend. The remaining variables, however, are identified as non-stationary in their level form.

**Table 1: ADF test results**

Variables	Level		First difference	
	Constant	Constant & trend	Constant	Constant & trend
LOP	-1.7126(0)	-2.8487(0)	-7.7181(0)*	-7.6082(0)*
LYM	-3.1392(3)**	-2.1221(0)	N/A	-6.6231(1)*
LGE	-1.3092(0)	-1.0754(0)	-5.3620(0)*	-5.4861(0)*
LCPI	-2.6636(0)***	-1.3695(0)	N/A	-5.2002(0)*
R	-2.0477(0)	-3.2110(0)***	-5.0753(0)*	N/A
LAG	-0.7631(0)	-2.5435(0)	-5.9230(1)*	-5.8078(1)*
LMQ	-0.9226(0)	-1.7945(0)	-5.8420(0)*	-5/2636(1)*
LMA	-4.0486(2)*	-3.4418(0)***	N/A	N/A
LCO	-2.4365(1)	-3.2640(1)***	-3.2004(0)**	N/A

Note(s): LOP is the logarithm of the oil prices, LYM is the logarithm of the real GDP, LGE is the logarithm of the government expenditure, LCPI is the logarithm of the consumer price index, R is the overnight interbank rate, LAG is the logarithm of the agriculture sector, LMQ is the logarithm of the mining and quarrying sector, LMA is the logarithm of the manufacturing sector, and LCO is the logarithm of the construction sector. (\*) indicates significance at the 1% level, (\*\*) significant at the 5% level and (\*\*\*) significant at the 10% level. For the constants, the  $\tau$  (tau) -statistic values were -3.47, -2.87 and -2.57 for the 1%, 5% and 10% significance levels, respectively. The  $\tau$  (tau) -statistic values for constant with time trends were 4.01, 3.43 and 3.14 for significance levels of 1%, 5% and 10%, respectively. Figures in parentheses () represent the optimal lag as determined by the Schwarz Info Criterion (SIC). N/A means the test is not applied to the first-difference series once stationarity has been identified found in the level (Liew & Balasubramaniam, 2017).

The existence of deterministic or stochastic trends can result in non-stationary variables. This prompts the question of whether the SVAR model should be specified using first-differenced or level variables. Sims (1980) and Sims et al. (1990) asserted that the primary objective of a VAR analysis is to elucidate the interrelationships among variables, rather than to estimate the model parameters. Consequently, they advise against differencing and recommend that variables in the VAR model be specified in levels, even if the variables contain a unit root. Furthermore, they note

that a VAR model can be estimated at the level even if the variables have unit roots, thereby avoiding the need to impose potential cointegration restrictions. This approach is commonly adopted in SVAR modelling to avoid imposing too many restrictions (Lütkepohl & Krätzig, 2004). Therefore, the SVAR model in this study is specified at the levels, following their recommendation.

In determining the optimal lag length, this study employs multiple model selection criteria. When the maximum lag order is set at  $P_{max}=4$ , the LR, FPE, SBC, and HQ criteria suggest a lag length of  $p=1$ , while the AIC criterion selects  $p=4$ . This study utilizes a lag order of 1 for the VAR estimation, as this specification does not exhibit autocorrelation issues. Additionally, the eigenvalue estimates from the VAR companion matrix are found to be less than one, indicating the VAR process is stable (Lütkepohl, 2005). For the selected economic sector models, the lag length is chosen such that the lag orders up to  $h$  do not exhibit autocorrelation issues. The results show that a lag order of 1 does not suffer from autocorrelation problems across all economic sector models. Moreover, the eigenvalues estimated from the VAR companion matrix are found to be less than one.

#### **4.2 Impulse response analysis: Sectoral effects of oil price shocks**

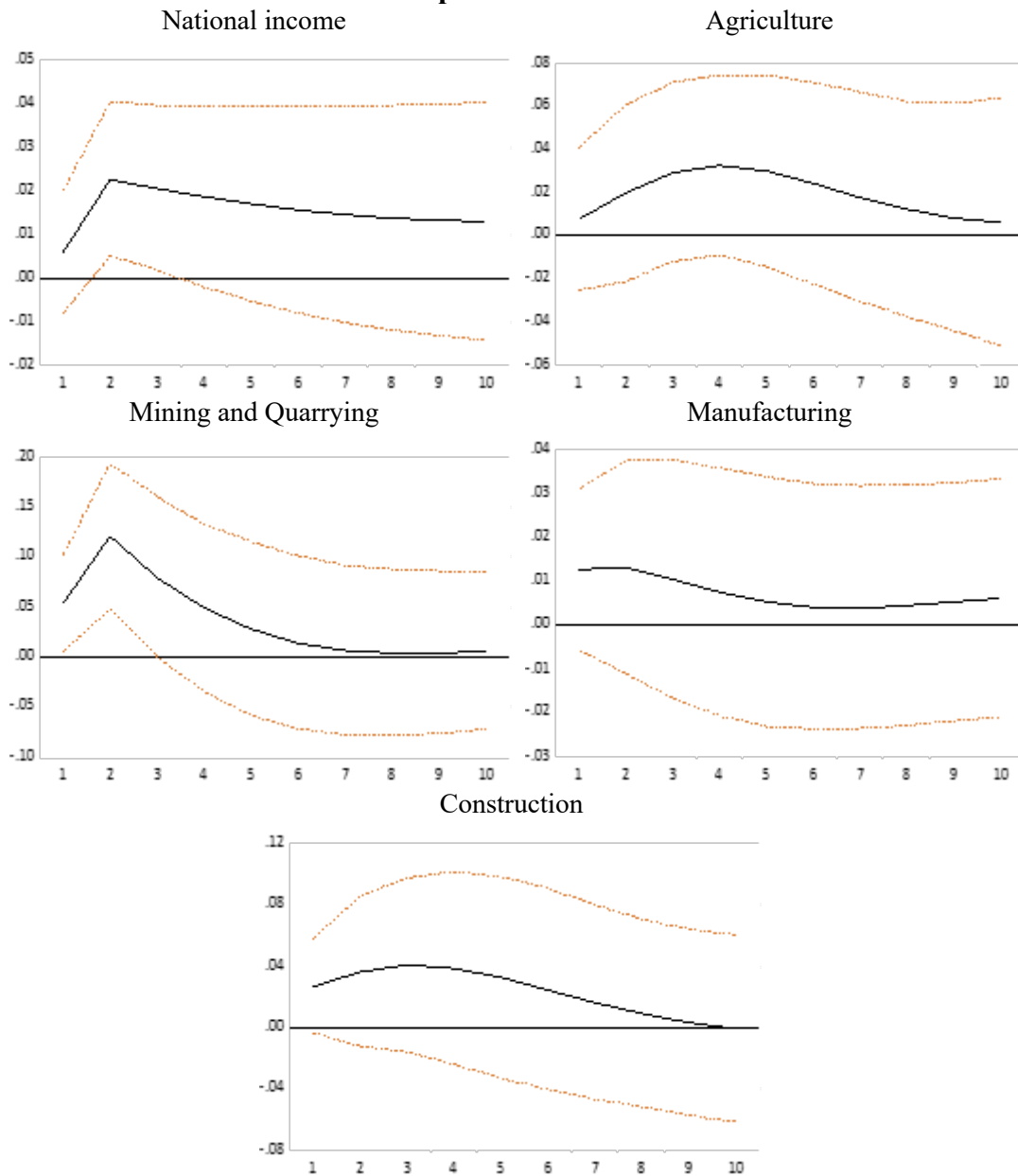
Figure 1 presents the impulse response functions (IRFs) of national income and selected economic sectors to oil price shock (measured by a one standard deviation increase). The solid lines show the estimated dynamic responses, and the dashed lines indicate the 95% confidence intervals. These intervals were obtained using Monte Carlo simulations with 1,000 bootstrap replications, a standard approach in SVAR analysis (Christiano et al., 2006). The adequacy of this number of replications can be assessed by examining the stability of the resulting confidence intervals. Specifically, if increasing the number of replications does not materially alter the confidence intervals, the chosen number is considered sufficient; otherwise, additional replications should be performed until the intervals stabilise (Lütkepohl & Krätzig, 2004). In this study, we tested 2,000 bootstrap replications and observed that the confidence intervals remained unchanged. Therefore, 1,000 replications were deemed adequate. An effect is regarded as statistically significant when its confidence interval does not include zero.

Over the past decade, national income (real GDP) has shown a positive and statistically significant response to oil price shocks. This indicates that rising oil prices tend to expand Malaysia's overall economic output. As a net oil-exporting developing economy, Malaysia benefits from oil price increases through enhanced government revenues, improved trade balances, and stimulated investment in energy-related sectors. These findings are consistent with previous research highlighting the growth-enhancing role of oil price increases in resource-rich economies (Saudi et al., 2019; Park & Yoo, 2014; Maji et al., 2017). The positive response also underscores the importance of the fiscal channel in oil-exporting economies, where energy exports significantly influence public expenditure and investment-led growth.

The agricultural sector exhibits a positive but statistically insignificant response to oil price shocks. While the effect is modest, the sector's output rises in the first year and peaks around year four before stabilising. This pattern aligns with findings by Solaymani (2022) and Saudi et al. (2019), suggesting that agriculture may benefit indirectly from rising oil prices via increased capital availability, higher public investment, and improved rural infrastructure. The positive response could also reflect

spillover effects from enhanced demand for agricultural commodities or greater access to energy-dependent inputs such as fertiliser and machinery. However, the lack of statistical significance highlights the sector's limited direct integration with the oil economy and its sensitivity to other structural constraints, such as labour productivity and land-use policies.

**Figure 1: The responses of national income and selected economic sectors to oil price shock**



The mining and quarrying sector responds positively and significantly, especially during the first two years following the oil price shock, before the effect gradually levels off. This immediate and robust response reflects the sector's strong linkage to the oil and gas industry. As oil prices rise, extraction activities and export earnings in this sector typically expand, generating short-term booms. The findings are consistent with those of Al Humssi et al. (2023), reinforcing the view that oil price increases act

as a direct stimulus for extractive industries in oil-exporting developing economies. However, the eventual convergence toward a steady state implies that the gains may be transitory unless accompanied by investment in exploration, technology, and capacity building.

The manufacturing sector displays a positive but statistically insignificant response to oil price shocks. This suggests that the sector is resilient, potentially due to adaptive production technologies, cost-pass-through strategies, or energy efficiency improvements (Huang et al., 2005; Kriskumar et al., 2022). In the Malaysian context, manufacturing includes both energy-intensive and export-oriented sub-sectors, such as electronics and petrochemicals. A neutral-to-positive response may indicate a balancing effect, where the cost increases from higher energy prices are offset by increased external demand or supportive government policies. The statistically insignificant result, however, signals the need for sector-specific policy measures to safeguard competitiveness amid global energy price fluctuations.

The construction sector exhibits a positive and gradually increasing response to oil price shocks, peaking around year three before stabilising. This pattern suggests that rising oil prices, by bolstering government fiscal capacity and the investment climate, can stimulate construction activity, especially in public infrastructure and commercial development. The results support findings by Zakaria et al. (2023) and highlight the indirect benefits of oil wealth for non-oil sectors through public spending multipliers. This delayed but persistent effect reflects the time lag in project planning and execution, which is typical in large-scale construction undertakings.

## **5. DISCUSSION**

This study applies a Structural Vector Autoregression (SVAR) model to examine how oil price shocks affect key economic sectors in Malaysia, a middle-income economy with a resource-rich profile. The model allows for a deeper understanding of how global oil market fluctuations transmit through macroeconomic and sectoral channels. This is particularly relevant for a middle-income economy, where sectoral dependencies, fiscal structures, and commodity-linked revenues often amplify the effects of external shocks (Zaidi et al., 2022; Schedelik et al., 2023).

The agricultural sector in Malaysia responds positively to oil price shocks. While agriculture is often vulnerable to oil-induced cost pressures due to its reliance on petroleum-based inputs (fertilisers, fuels), in developing economies it can also benefit indirectly from favourable terms of trade and increased rural investment during oil booms. In Malaysia's case, rising oil revenues may enhance the government's capacity to support rural infrastructure, mechanisation, and agricultural subsidies. Moreover, higher global food prices, which often move with oil prices, can improve returns to producers, offsetting rising costs (Solaymani, 2022; Liefert, 2010).

The manufacturing sector shows a mild but positive response, suggesting sectoral adaptability in the face of energy price volatility. In many developing economies, manufacturing is a vital driver of structural transformation and job creation. However, it is also energy-intensive and sensitive to global input costs. Malaysia's positive response may reflect its relatively diversified manufacturing base and access to oil-linked domestic energy supplies. As Nguyen et al. (2024) emphasize, the ability to adapt through supply chain optimization, energy efficiency, and price transfer mechanisms is crucial in mitigating negative oil shock effects.

The construction sector exhibits a strong positive response, especially in the medium term. This aligns with the pattern in developing economies, where oil windfalls translate into expanded public investment, including infrastructure and urban development. For Malaysia, increased oil revenues have enhanced fiscal space, allowing for higher capital expenditure on roads, housing, and public facilities, projects that are heavily reliant on the construction industry (Bekhet & Yusoff, 2013). This reflects a fiscal transmission channel, where oil revenues stimulate demand in non-oil sectors, contributing to broader economic development.

As expected, the mining and quarrying sector showed the strongest and most immediate positive response. Developing economies with abundant natural resources, like Malaysia, are particularly sensitive to changes in global commodity prices. Oil price booms increase export earnings, stimulate investment in extractive industries, and support related infrastructure development (Djimeu & Omgba, 2019). In this sector, oil price shocks act as both a price signal and an investment catalyst, driving growth through enhanced production and international trade.

The results highlight an asymmetric response across sectors, demonstrating that both the magnitude and timing of the impact of oil price shocks vary considerably. Mining and quarrying react most strongly and immediately, reflecting their direct exposure to global commodity prices. The construction sector exhibits a delayed but sustained response, consistent with the gradual implementation of public investment projects funded by oil revenues. In contrast, manufacturing and agriculture display weaker or statistically less pronounced reactions, suggesting that these sectors are either more insulated from or slower to adjust to external energy price fluctuations.

## **6. CONCLUSION**

This study offers compelling empirical evidence on the asymmetric sectoral responses to oil price shocks in the context of a middle-income country. By asymmetric responses, we refer to the heterogeneous patterns observed across sectors: strong and immediate in mining, moderate and lagged in construction, and relatively weak in manufacturing and agriculture. Examining the dynamic interactions between oil price fluctuations and key economic sectors, including agriculture, mining and quarrying, manufacturing and construction, highlights the broader developmental implications of commodity price volatility. The results demonstrate that positive oil price shocks not only enhance activity in oil linked industries but also stimulate growth in non-oil sectors through fiscal spillovers, increased investment, and improved economic sentiment. These findings underline the critical role of structural linkages and institutional capacity in determining the breadth and sustainability of oil windfall effects (Liew & Balasubramaniam, 2017).

The evidence further reinforces the argument that resource-rich middle-income economies can leverage oil booms as a platform for inclusive economic transformation, provided that fiscal gains are channelled into productive, forward-looking investments. Export diversification, enhanced energy efficiency, and targeted infrastructure development emerge as key policy levers for mitigating downside risks while capitalising on favourable external conditions. The sectoral heterogeneity uncovered in this study underscores the importance of integrated policy responses, spanning monetary, fiscal, and industrial strategies to support long-term resilience and structural advancement. The Malaysian experience thus reflects broader patterns observable across middle-income economies, offering instructive insights into the

management of resource-based growth amid global market volatility (Blanchard & Galí, 2010)

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