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GLOBAL RISK AND SUSTAINABLE INVESTMENT PERFORMANCE NEXUS IN INDONESIA: A VECTOR AUTOREGRESSIVE APPROACH

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ABSTRACT

This study investigates how global risk affects Indonesia's financial market through the Sri Kehati Index, Jakarta Composite Index, Global Economic Policy Uncertainty Index, and policy interest rate. Using monthly data from July 2009 to June 2025 and a VAR model with Granger causality and impulse responses, the findings show a bidirectional relationship between global risk and the stock market. Global risk also has a one-way effect on the policy rate. Stock indices react strongly to shocks but gradually stabilize, while interest rates remain relatively stable. These results stress the need for coordinated, data-driven policies to strengthen financial resilience.

Keywords

global risk; sustainable investment; causality test; sri kehati; jakarta composite index

JEL Classification

C22; G11; G12; E52; Q01

INTRODUCTION

The growing concern for sustainability in global investment decisions, particularly in emerging markets like Indonesia, underscores the intricate relationship between global risks and the performance of sustainable investments. This relationship is often mediated by factors such as Environmental, Social, and Governance (ESG) performance, economic policy uncertainty, and the evolving regulatory landscape (Ompusunggu et al., 2025; Gao, 2025; Zhang et al., 2024; Suriani et al., 2023).

Global risks manifest in various forms and affect overall investment stability (Amalia & Suriani, 2024). The world currently faces unprecedented uncertainty across social, political, and economic aspects, which continually evolve due to extraordinary global events. Fluctuations in foreign investment in Indonesia indicate that global uncertainty significantly influences foreign investors' decisions, alongside the country's financial development (Noviyanti et al., 2023). For instance, economic policy uncertainty can increase corporate financing constraints and lead to inefficient investment (Xin-yuan et al., 2023). However, robust ESG performance can mitigate the negative impact of economic policy uncertainty on corporate investment (Zhang et al., 2024; Xin-yuan et al., 2023).

Indonesia's investment landscape is susceptible to these global dynamics. Public investment plays a strategic role in driving sustainable economic growth in Indonesia by contributing to infrastructure development, job creation, and reducing social and economic disparities (Rahmat et al., 2025). The performance of stock investment portfolios in Indonesia is influenced by both internal and external factors, making it essential to understand these factors for informed investment decisions (Nadeak et al., 2024). From a behavioral perspective, Indonesian investors' investment decisions and beliefs in mean reversion are influenced by their investment horizons (Tandelilin, 2008).

The concept of socially responsible investment (SRI) is gaining traction globally, including in Indonesia, encompassing ethical, social, and normative views that influence investors' decisions (Vishali & M.K., 2024). The SRI-KEHATI stock index in Indonesia explicitly emphasizes sustainable and responsible investing (Sakuntala et al., 2022). Green investment and green financing are also critical for sustainable firm performance in Indonesia, especially for foreign chemical industries operating in the country (Ye & Dela, 2023). The Indonesia Stock Exchange (IDX), established in 1912 and modernized with the 2007 merger of the Jakarta and Surabaya Stock Exchanges, hosts the Indonesia Composite Index (IHSG), which reflects the overall market performance of Indonesian equities. The IHSG has shown steady growth, driven in part by increasing investor interest in sustainability and ESG (environmental, social, governance) principles, making it an important barometer for both conventional and socially responsible investments in Indonesia.

This study aims to fill these gaps by analyzing the bidirectional and unidirectional causal linkages between GEPU, SRI-KEHATI, IHSG, and Indonesia’s policy interest rate using a Vector Autoregressive (VAR) model combined with Granger causality and impulse response analysis. The results contribute empirically by identifying how global risk transmits to both sustainable and conventional stock markets, as well as its potential feedback to domestic

monetary policy. From a practical perspective, the findings provide valuable insights for financial authorities and market participants in formulating integrated strategies to enhance market resilience and sustainable investment performance amid increasing global uncertainty. Accordingly, this study enriches the growing body of literature on global risk transmission and financial sustainability in emerging markets (Broadstock et al., 2020; Katsampoxakis, 2024).

LITERATURE REVIEW

Sustainable Investment and ESG in Indonesia

Sustainable investment in Indonesia has shown notable growth over the past decade, reflecting increasing awareness of investment practices that integrate environmental, social, and governance principles. The SRI-KEHATI Index, initiated by the KEHATI Foundation in collaboration with the Indonesia Stock Exchange, functions as a key benchmark for assessing the performance of ESG-oriented equities in the domestic capital market (Hasanah, 2025). The index comprises companies that demonstrate commitment to sustainability and sound corporate governance, serving as a primary proxy for measuring the performance of sustainable investments in Indonesia (Hermansyah & Anwar, 2025).

From a theoretical standpoint, Li (2022) and Xu et al. (2022) argue that strong ESG adoption can mitigate reputational risks, enhance operational efficiency, and improve long-term firm valuation by strengthening investor trust. However, Hasanah (2025) notes that ESG implementation in Indonesia continues to face several obstacles, including inconsistent data disclosure, limited standardized evaluation frameworks, and relatively low transparency compared to developed markets. Therefore, the SRI-KEHATI Index serves not only as a barometer of sustainable corporate performance but also as a complementary reference to the IHSG in capturing how ESG integration interacts with broader market dynamics in Indonesia's transition toward sustainable finance.

The Relationship between Global Risk and Sustainable Investment Performance

Global Economic Policy Uncertainty (GEPU) is a key indicator of fluctuations in global policy-related uncertainty, initially developed by Davis (2016). Rising GEPU levels are commonly associated with reduced investment activity and increased financial market volatility (Davis, 2016; Petrova & Trunin, 2023). In emerging markets such as Indonesia, shifts in global uncertainty can influence capital flows, exchange rates, and the overall performance of domestic financial markets. This includes both sustainable investment indices, such as the SRI-KEHATI, and broader market benchmarks, such as the Jakarta Composite Index (IHSG) (Zhao, 2024).

Cross-country evidence confirms that global risks play a critical role in shaping the dynamics of sustainable investment performance. The equities with higher ESG ratings tend to exhibit greater resilience during global crises, such as the COVID-19 pandemic (Suriani et al., 2024; Hismendi et al., 2021; Broadstock et al., 2020). Similarly, Katsampoxakis (2024) observed that global ESG indices often serve as havens for investors amid elevated policy uncertainty. However, Ashena (2024) noted that the linkage between GEPU and ESG-based returns is not uniform across markets, as it depends on domestic financial depth, policy responsiveness, and institutional quality. In the Indonesian context, Robiyanto et al. (2025) reported that ESG-labeled stocks showed greater stability than conventional equities during periods of heightened uncertainty, particularly during the pandemic. Nonetheless, the extent to which the SRI-KEHATI index and the IHSG jointly respond to global risk shocks remains inconclusive.

Based on the literature review, several research gaps remain unaddressed. First, while most previous studies have focused on the effect of global economic policy uncertainty (GEPU) on conventional stock indices, limited attention has been given to its impact on sustainable investment indices such as the SRI-KEHATI (Hasanah, 2025; Zhao, 2024). Second, studies on ESG performance in Indonesia predominantly employ static or linear approaches, overlooking the dynamic nature of the relationship between global risk and investment performance that may evolve over time (Ashena, 2024; Hoang et al., 2025). Third, the interaction between global uncertainty and Indonesia's stock market, both sustainable (SRI-KEHATI) and conventional (IHSG), has not been thoroughly examined within a comprehensive causal and dynamic framework.

DATA AND METHODOLOGY

This study employed a quantitative time-series approach using monthly data from July 2009 to June 2025. The variables included Indonesia's SRI Kehati Index (SRI) and Jakarta Composite Index (IHSG) as indicators of domestic stock performance, the Global Economic Policy Uncertainty Index (GEPU) as a measure of global risk, and Indonesia's policy interest rate (IRATE) as a proxy for monetary policy stance. The stock market data were obtained from the Indonesia Stock Exchange (IDX), the interest rate data from Bank Indonesia, and the global uncertainty data from policyuncertainty.com.

Prior to model estimation, all variables were tested for stationarity using the Augmented Dickey-Fuller (ADF) test for unit roots. The optimal lag length was then determined using the Akaike Information Criterion (AIC), the Schwarz Criterion (SC), and other lag selection diagnostics. The Johansen cointegration test was applied to identify long-term relationships among variables. Since the test results confirmed no cointegration, the study proceeded with a

Vector Autoregression (VAR) framework using first-differenced data. The general equation of the VAR model is as follows:

$$\Delta Y_t = \mu_i + \sum_{i=1}^{n} A_i \Delta Y_{t-1} + \varepsilon_t \qquad (1)$$

Subsequently, the model's stability was verified through the VAR stability test, followed by Granger causality and Impulse Response Function (IRF) analyses to assess the direction and dynamic interactions among the stock market, global uncertainty, and monetary policy. These steps enabled a comprehensive evaluation of both short- and medium-term transmission mechanisms in Indonesia's green and conventional financial markets.

RESULTS AND DISCUSSION

Unit root test

The results of the test stage on autoregressive vectors based on Granger causality will be shown in the following tables. The test results presented were from the stationary test, optimal lag (length lag selection), and the cointegration test. Before arranging the results of the causality test and impulse response function, a model stability test is required.

[Insert Table 1 about here]

Table 1 reports the results of the Augmented Dickey-Fuller (ADF) unit root test. The outcomes reveal that all variables, SRI, IHSG, GEPU, and IRATE, exhibit non-stationarity in their level form [I(0)], as indicated by probability values greater than 0.05. After first differencing [I(1)], the test statistics become significant at the 1% level ($p < 0.01$), confirming that all series are stationary at the first difference. Accordingly, the causality and dynamic response analyses are conducted using first-differenced data.

Lag Selection

Table 2 presents the results of the lag length selection based on several information criteria, including the Likelihood Ratio (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Criterion (SC), and Hannan–Quinn Criterion (HQ). The minimum value across these criteria determined the optimal lag. As shown in the table, most selection criteria, particularly the FPE, AIC, and LR tests, indicated that the optimal lag length was 3 (Lag = 3). Accordingly, the VAR/VECM estimation in this study was conducted with three lags, as this specification minimized most of the information criteria and ensured that the model adequately captured short-run dynamics without over-parameterization (Lütkepohl, 2005; Enders, 2022).

[Insert Table 2 about here]

Cointegration test

Figure 1 presents the comparison between the Johansen Trace Statistic and the 5% Critical Value for each hypothesized number of cointegrating equations ($r = 0$ to $r \leq 3$). The results indicate that, for all ranks, the trace statistic values are consistently lower than their corresponding 5% critical values. This finding implies that the null hypothesis of no cointegration cannot be rejected at the 5% significance level. Therefore, the variables SRI, IHSG, GEPU, and IRATE do not share a long-run equilibrium relationship. This outcome justifies using the VAR model rather than the VECM framework in subsequent analyses, as the data exhibit no cointegrating relationships among the variables. However, the results of the cointegration test in Figure 1 indicated that the data are not cointegrated. Therefore, the model used is a VAR in first differences.

[Insert Figure 1 about here]

[Insert Figure 2 about here]

A stable VAR/VECM system requires that all inverse roots lie inside the unit circle. If this condition is met, the model's impulse response and variance decomposition analyses can be considered reliable (Lütkepohl, 2005; Enders, 2022). Figure 2 shows that the data lie within a circle, suggesting that the VAR at first differences model is stable and can be used for the next stage of estimation or testing, depending on the purpose of this study.

Granger causality test

Table 3 presents the results of the Granger causality test conducted with three lags and a 5% significance level. The results reveal no significant causal relationship between DIRATE and DSRI in either direction, with p-values of 0.7877 and 0.8391, respectively. Likewise, no causality is detected between DSRI and DIHSG ($p = 0.4556$ and 0.3944, respectively). However, a unidirectional causal effect is identified from DSRI to DGEPU ($p = 0.00004$), whereas the reverse direction is insignificant ($p = 0.0673$). DGEPU also shows significant causal effects on DIRATE ($p = 0.0414$) and DIHSG ($p = 0.0479$). Conversely, the causality from DIRATE to DGEPU ($p = 0.0981$) is not statistically significant.

[Insert Table 3 about here]

A bidirectional causality is found between DGEPU and DIHSG, with p-values of 0.0479 (DGEPU → DIHSG) and 0.0014 (DIHSG → DGEPU). These findings suggest mutual interactions between global uncertainty and domestic stock market movements.

Impulse response function

Figure 3 shows the impulse response function (IRF) analysis, which was conducted to examine the dynamic responses of the variables SRI, IHSG, IRATE, and GEPU to one-standard-deviation shocks. The responses are displayed over a ten-period horizon. The results

show that the SRI index (DSRI) responds strongly to its own shock in the first period, then rapidly declines to zero after the third period. Shocks from IHSG, IRATE, and GEPU produce only minor and short-lived effects on SRI.

The IHSG (DIHSG) exhibits a sharp initial positive response to its own innovation, peaking in the first period and decreasing steadily thereafter. It also shows minor transitory reactions to shocks originating from the other variables, which vanish after about four to five periods. For the interest rate (DIRATE), the response pattern indicates an immediate adjustment to its own shock, followed by a quick return to equilibrium. The effects of shocks from SRI, IHSG, and GEPU are relatively weak and dissipate within a few periods. Meanwhile, the global economic policy uncertainty (DGEPU) variable records a strong negative response to its own shock in the first period. However, the magnitude declines rapidly and stabilizes around zero after period five. The influence of domestic variables on GEPU appears limited and short-term. Overall, all variables display a consistent pattern of strong short-term reactions to their own innovations and weak, temporary responses to cross-variable shocks.

[Insert Figure 3 about here]

Discussion

The Granger causality results indicate no significant causal relationship between the policy interest rate and the green stock index, nor between the green stock index and the conventional composite stock market index over the short term. This suggests that movements in the green stock market have yet to directly influence the broader conventional stock market or monetary policy adjustments. One possible reason is that Indonesia's green stock market is still in its early stages and not fully integrated with the conventional market or broader macroeconomic policy frameworks.

However, the presence of a unidirectional causal link from the green stock index to global economic policy uncertainty underscores the growing role of domestic sustainable finance markets in shaping global economic sentiment. This indicates that green investment developments in emerging markets such as Indonesia have implications beyond domestic borders and contribute to international economic dynamics (Suriani et al., 2023; Hassan et al., 2023; Bitar et al., 2022).

The significant effect of global economic policy uncertainty on both domestic interest rates and the conventional stock market illustrates Indonesia's vulnerability to external shocks and the responsiveness of its market and policy environments to global economic changes. Conversely, the limited impact of domestic monetary policy on global uncertainty suggests that emerging markets have constrained influence on global risk perceptions (Balcilar et al., 2021;

Raza et al., 2020). The most notable result is that global uncertainty drives domestic market fluctuations, while Indonesia's market conditions also contribute to global uncertainty measures. This bidirectional dynamic reflects the deepening integration between Indonesia's capital market and global financial systems, supporting the view that emerging markets increasingly transmit and absorb international shocks (Pham & Tran, 2022; Mensi et al., 2024).

Overall, the Granger causality test results highlight that global economic policy uncertainty is the most influential variable within the system, serving as the primary source of external shocks transmitted to domestic financial conditions. These findings reaffirm the growing interdependence of global and domestic markets, as well as the sensitivity of Indonesia's monetary and capital market dynamics to shifts in global risk perceptions and policy expectations (Narayan et al., 2023; Akhtaruzzaman et al., 2021).

The impulse response function results revealed that Indonesia's green stock index and the Jakarta Composite Index responded sharply to their own shocks, followed by a gradual stabilization over subsequent periods. This pattern indicated that domestic investor sentiment and internal market adjustments played dominant roles in driving short-term volatility. In contrast, the market's ability to return to equilibrium reflected underlying resilience and adaptability (Kusuma et al., 2025).

The response of the green stock index to shocks from the overall market and global uncertainty appeared relatively weak and short-lived. This suggested that Indonesia's green financial assets were partly insulated from external fluctuations, reinforcing the notion that sustainability-driven investments are guided more by long-term value considerations than by temporary speculative dynamics. Similar evidence was reported by Broadstock et al. (2021), who found that environmental, social, and governance assets in emerging markets tend to show partial decoupling from conventional markets during crises.

By contrast, the IHSG displayed a stronger, more volatile response to domestic innovations, suggesting that the conventional market remained more susceptible to local macroeconomic shocks. The benchmark policy rate, however, responded mildly to both domestic and global disturbances, underscoring the effectiveness of Indonesia's monetary framework in absorbing external turbulence (Wulandari & Salim, 2025). Consistent with Narayan et al. (2022), such short-lived impacts of global uncertainty indicate that emerging economies can maintain market confidence through credible and timely policy interventions.

CONCLUSION

This study examined the dynamic relationships among Indonesia's green stock index, the Jakarta Composite Index, the interest rate, and global economic policy uncertainty using a

vector autoregressive (VAR) Granger-causality framework and impulse response analysis. The empirical findings reveal that the interactions among these variables are primarily short-term. Both SRI and IHSG exhibit strong immediate responses to their own shocks, followed by rapid convergence to equilibrium, indicating that domestic market movements and investor sentiment are key drivers of short-term volatility.

In contrast, the limited and transitory effects of global uncertainty and interest rate shocks suggest that Indonesia's financial system shows some resilience to external turbulence. The absence of long-run cointegration further confirms that the green finance segment operates somewhat independently from conventional markets, emphasizing its potential as a diversification and stabilization instrument within the broader financial ecosystem.

The main contribution of this study is to highlight the evolving role of green finance as a short-term stabilizer rather than a long-term market driver in emerging economies. Empirically, it extends the literature by demonstrating how Indonesia's sustainable investment instruments respond distinctly to domestic and global shocks. From a policy perspective, the findings underscore the importance of integrating green financial mechanisms more deeply into the national capital market to strengthen systemic stability and support the green economic transition. Future research may extend this framework by incorporating sectoral-level or cross-country comparisons to evaluate how green financial integration can enhance resilience under varying macroeconomic conditions.

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TABLES AND FIGURES

Table 1: Augmented Dickey-Fuller Test Results

Variables	I (0)	I (1)	Conclusion
SRI	.8096	.000**	Stationary at First difference
IHSG	.8882	.000**	
GEPU	.8411	.000**	
IRATE	.4824	.000**	

Note: Augmented Dickey Fuller, none. **$p < .01$

Table 2: Optimal Lag Selection Result

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-3809.145	NA	6.05e+12	40.78230	40.85141	40.81030
1	-2892.867	1783.557	3.98e+08	31.15366	31.49923*	31.29369
2	-2856.704	68.84604	3.21e+08	30.93801	31.56004	31.19005*
3	-2837.978	34.84725*	3.12e+08*	30.90886*	31.80735	31.27293
4	-2826.065	21.66048	3.26e+08	30.95257	32.12752	31.42866
5	-2818.156	14.04200	3.56e+08	31.03910	32.49051	31.62721

Note: * Optimal Lag Selection Result (for VAR/VECM Model)

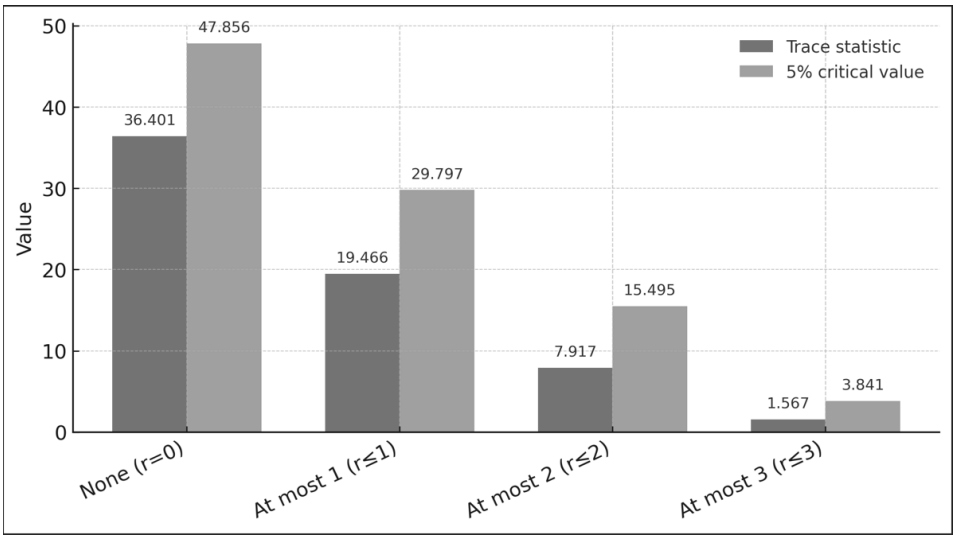


Figure 1: Johansen Cointegration Results

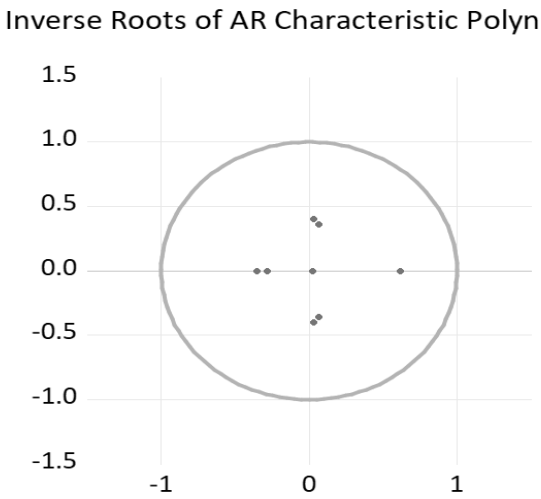


Figure 2: Model Stability Test Results

Table 3: Pairwise Granger Causality Test Results

Hypothesis	**Prob**	**Conclusion**
DIRATE → DSRI	.7877	No causality
DSRI → DIRATE	.8391	
DIHSG → DSRI	.4556	No causality
DSRI → DIHSG	.3944	
DGEPU → DSRI	.0673	Unidirectional causality
DSRI → DGEPU	.00004**	
DIHSG → DIRATE	.9533	No causality
DIRATE → DIHSG	.9073	
DGEPU → DIRATE	.0414 *	Unidirectional causality
DIRATE → DGEPU	.0981	

DGEPU → DIHSG	.0479 *	Bidirectional causality
DIHSG → DGEPU	.0014**	

Note: **$p < .01$, *$p < .05$

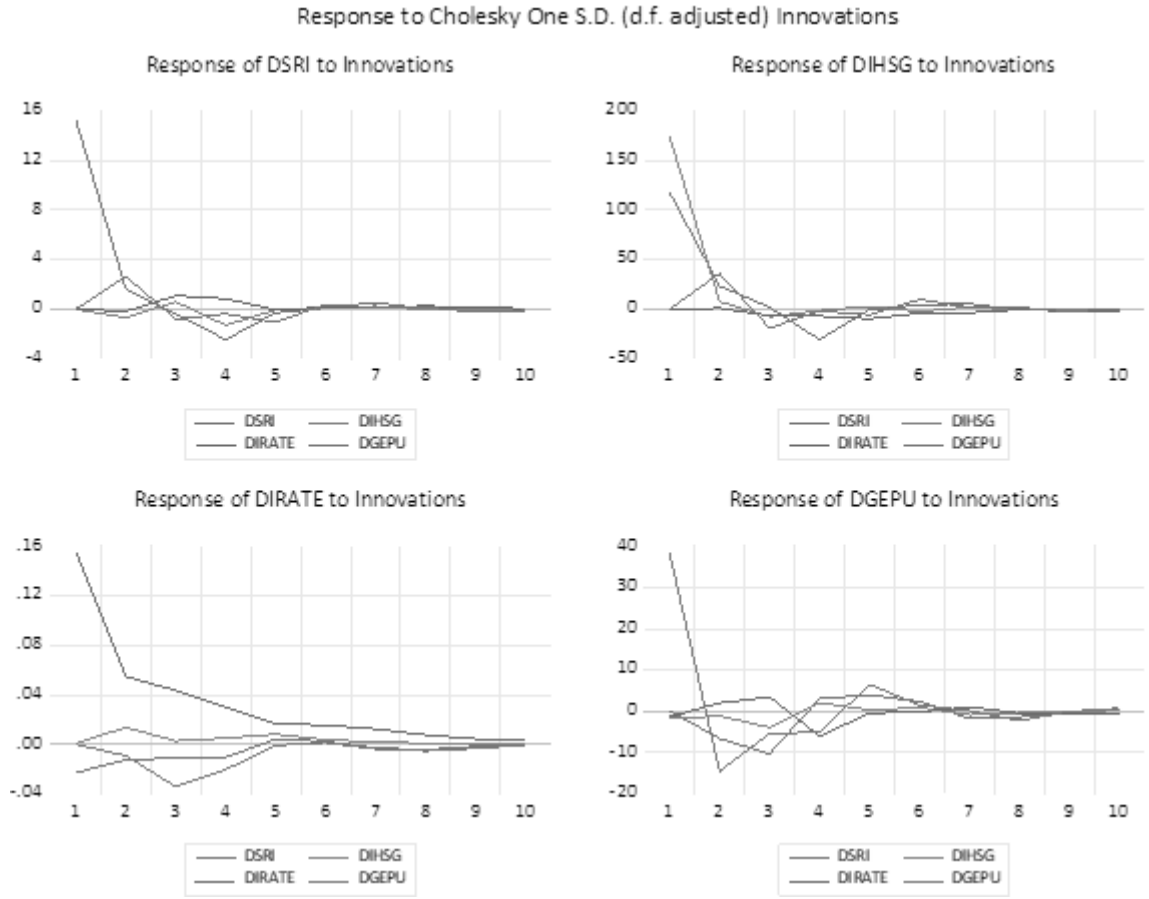


Figure 3: Result of Impulse Response Function