



Revisiting the Impact of Financial Crisis on the ASEAN- 5 Countries: Shock Amplification Perspective

Muhammad Zakir Abdullah

School of Economics, Universiti Utara Malaysia, Malaysia.

*Nor Ermawati Hussain**

School of Economics, Universiti Utara Malaysia, Malaysia.

Muhammad Baqir Abdullah

School of Economics, Universiti Utara Malaysia, Malaysia.

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Abstract

This study aims to revisit the impact of the Asian Financial Crisis (AFC) and Global Financial Crisis (GFC) in the ASEAN-5 countries from 1990 to 2020. By addressing the long-run economic trajectory, the size of shock amplification is manifested by the divergence of aggregate output from potential output in the business cycle due to an economic shock. This study utilizes Fully Modified Ordinary Least Squares (FMOLS), where the results indicate that both crises generated negative output gaps at the group level, with the Global Financial Crisis producing a substantially larger long-run deviation from potential output than the Asian Financial Crisis. The interaction analysis further shows that while monetary policy acted as a shock absorber during the Asian Financial Crisis, key macroeconomic variables, particularly trade openness and financial development, served as important channels of shock amplification during the Global Financial Crisis. At the individual country level, the results reveal pronounced heterogeneity in shock amplification across the ASEAN-5 economies. Indonesia experienced the largest amplification during the Asian Financial Crisis, whereas Singapore recorded the strongest amplification during the Global Financial Crisis. The results highlight that the differences in economic structure, financial exposure, and external integration shape the transmission and amplification of crises across countries and periods. Strengthening financial sector resilience and managing exposure to external trade shocks are crucial for reducing long-run output losses during future global financial disruptions.

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* **Corresponding author:** Email: nor.ermawati.hussain@uum.edu.my

1. Introduction

The ASEAN-5 countries, namely, Singapore, Malaysia, Indonesia, Thailand, and the Philippines, have undergone two major economic shock crises: the AFC and GFC since 1990. The region represents a significant economic bloc in Southeast Asia. These countries have witnessed rapid economic growth and increasing trade and financial linkages with other regions, particularly China and the United States. As a result, global trade integration in this region captured about 76 percent of total trade to regional GDP, higher than the average in advanced countries and other Asian countries (Corbacho & Peiris, 2018). The economic uncertainty from major economies such as the United States' and China's markets has become a significant risk transmitter to ASEAN countries, affecting their economic stability (Gunay & Can, 2022; Wang et al., 2023). For example, a dynamic co-movement between China and Southeast Asia stock markets was found to be very strong, particularly during Asian financial crisis and the U.S. subprime mortgage crisis, suggesting ASEAN economies were highly driven by external market changes (Zhong & Liu, 2021). In brief, changes in the external shocks can have substantial impacts on their exchange rates, financial markets, and overall ASEAN economic performance.

In this respect, the reassessment of the impact of the Asian Financial Crisis (AFC) and the Global Financial Crisis (GFC) is crucial for three reasons. First, this large scale of crises could be persistent and contribute to prolonged changes in output levels, where further examination on how the long-run impact of the crisis on output levels is required (Cerra & Saxena, 2008; Cerra et al., 2023). Second, trade tensions, geopolitical uncertainties, and climate change impacts are attributed to a changing economic landscape that could shape the course of the output level trajectory (Dellink et al., 2014; Mittenzwei et al., 2017; Ebeke et al., 2018; Xia et al., 2019). Third, the characteristics of the economy such as economic openness (di Giovanni & Levchenko, 2009; Balavac & Pugh, 2016; Mireku et al., 2017; Kong et al., 2021; Ma et al., 2022; Yu & Meng, 2023); financial deepening or financial development (Mallick, 2014; Raheem et al., 2016; Sghaier, 2022; Singh et al., 2023; Dada et al., 2025); monetary policy (Mishkin, 2002; Fritsche & Kuzin, 2005; Duncan, 2014; Creal & Wu, 2017; Irandoust, 2020); and automatic government size (Iseringhausen & Vierke, 2019; Şen & Kaya, 2021; Afonso, 2025; Mokoena & Tweneboah, 2025) have a significant effect on output fluctuation, thereby, potentially being either a catalyst or shock absorber for these crises to be prolonged in long-run. By addressing long-term economic trajectory or potential output, this paper offers a valuable insight on how these crises could affect the economy by causing a deviation in the aggregate output level from its trajectory.

Previous literature explored the impact of financial crises on macroeconomic indicators in various cross-country economies. These studies discussed how this crisis impacted on economic growth, output and employment levels (Barro 2001; Becker & Mauro, 2006; Reinhart & Rogoff, 2009; Chletsos & Sintos, 2020; Mina & Santoleri, 2021) and output losses (Kapp & Vega, 2014; Cerra & Saxena, 2014; Wan & Jin, 2014; Yazdani & Nikzad, 2021). To our knowledge, there is still a lack of empirical studies that explore how an economy is thrown off from its potential output in the business cycle during the crises, specifically in the ASEAN-5 countries.

Thus, this paper attempts to revisit the impact of two major economic crises in the ASEAN- 5 countries in the last two decades. This is because a long time series of aggregate output is required to establish economic trajectory or potential output in a business cycle (Quast & Wolters, 2020). By means of economic trajectory, we can

understand how these crises could drift the economy from its trajectory, reflecting the size of shock amplification during the crises. This phenomenon has been closely related to Engineering Economic Resilience (EER), conceptualizing that economic resilience can be pronounced into the stability of an economy to exogenous shock (Simmie & Martin, 2010). The severity of exogenous shocks is perceived in how much an economy deviates from its pre-existing path and increases its instability. Therefore, the larger the diversion from its pre-existing path, the lower the resiliency toward exogenous shock is.

There are two main contributions of this study. First, this study contributes to existing empirical works on the impact of economic crises from the perspective of the shock amplification in the business cycle. This study determines the magnitude of shock amplifications for each country and arranges them in order from the most severe to the least severe case. Gaining insight on the countries that experienced the most and least severe impacts from the crises is beneficial for understanding the fundamental weaknesses and strengths in each economy. Second, this study addresses diverse economic structural or policy settings for each country that could shape different reactions to shocks. In this respect, diverse economic settings such as government size, financial development, trade openness, and monetary policy influence output fluctuation in the business cycle. Thereby, these factors could magnify or reduce shock amplification during economic crises. The finding could be useful insight on country-specific policy measures that tailor economic structures that can mitigate the effect of crisis.

2. Literature Review

2.1. Shock Amplification

Shock amplification can be measured by output fluctuation. Such a shock in the Aggregate Demand (AD) component could affect aggregate production and amplify output fluctuations from its potential output. Low-resilient economies have large output fluctuations (Duval et al., 2007; Sutherland & Hoeller, 2013; Ziemann, 2013). Shock amplification can be determined by two forces, which are the size of the shock and shock resistance. The vulnerability to external shock determined the size of received shock. Countries dependent on global variables are vulnerable to currency rate volatility, export demand collapse, and capital influx reversal (Guillaumont, 2009; Löscher & Kaltenbrunner, 2022). These factors will shape the size of shock. On the other hand, shock resistance reduces output divergence by minimizing shock-induced output and employment losses (Hill et al., 2008; Briguglio et al., 2009). For example, diversification helps economic sectors respond and move from the most to the least affected production, reducing output, job losses, and output variation (Xiao & Drucker, 2013).

In addition, shock amplification can be persistent over time. Such policies or institutions create wage or price stickiness and prolong production responsiveness to shocks, according to Duval et al. (2007) and Briguglio & Piccinino (2012). Unemployment benefits, strict employment protection, product market regulation, and collective bargaining coverage rigidity, pay, and price levels, discourage work. Policies and institutions prolong unemployment and output downturns during economic crises. Easterly et al. (2000) argued that Neo-Keynesian pricing and wage rigidity do not explain shock persistence. Park (2010) and Hall (2011, 2015) stated that persistent unperformed consumption (saving more for prevention and spending less) and investment during economic crises may delay and hinder rebalancing the economy.

2.2 Shock Amplification and Economic Crisis

Shock amplification occurs when an economic crisis affects macroeconomic

variables such as aggregate output, employment, and economic growth. Several studies have shown how economic shocks affect economic growth and employment during economic crises. For instance, research has been done on the impact of financial crisis shocks on economic growth or employment, such as the impact of economic crisis in East Asian countries in 1997 (Barro, 2001); on the global economy from the post-1970 era (Becker & Mauro, 2006); on selected countries from the 1900s to 2010s (Reinhart & Rogoff, 2009); on OECD in 1960-2007 (Furceri & Mourougene, 2012); on East Asian in 1990 -2010 (Raz et al., 2012); on selected countries from 1980 to 2010 (Ksantini & Boujelbène, 2014); on advanced countries in 1990 to 2014 (Romer & Romer, 2017); in the Eurozone during the Great Recession (Mina & Santoleri, 2021); on developed and developing countries in 1990 to 2017 (Wahidin et al., 2021); and on developing and developed countries from 1998 to 2017 (Chletsos & Sintos, 2020). These studies provide evidence an economic crisis shock could amplify economics from the pre-shock state. During the shock, a country with economic growth that is significantly affected by an economic crisis may have significant shock amplification.

From another perspective, shock amplification can also be manifested by output losses. It means the economy experiences a cumulative output drop or loss during an economic shock period. Previous studies have examined output losses or GDP growth losses during financial crisis periods (Cecchetti et al., 2009; Furceri & Zdzienicka, 2010; Kapp & Vega, 2014; Cerra & Saxena, 2014; Wan & Jin, 2014). Drawing from a recent study conducted by Cerra et al. (2021), the study provides insights into the economic crisis factors contributing to lower investment and leading to output losses and total factor productivity. One of the main reasons for the decrease in investment during financial crises is the uncertainty and increased risk aversion among investors. During economic instability, investors become more cautious about allocating their resources toward long-term projects or capital expenditures. This careful behavior is driven by the fear of potential losses and the lack of confidence in future economic conditions. In addition, a study by Yazdani & Nikzad (2021) found that the output performance will return to the level before the currency crisis. However, the economy faces output loss if the central bank does not actively intervene in monetary policy. The studies provide evidence of cumulative output drop due to a shock, which, in turn, reflects the size of economic divergence during the period of shock. Thus, these studies explain the size of shock amplification during a shock.

2.3 Factors Influencing the Magnitude of Shock Amplification

Previous studies have largely focused on the occurrence of economic shocks during crisis periods, while giving relatively limited attention to factors that may influence the magnitude of these shocks. Such a financial development factor was found to reduce output growth volatility in a worldwide study (Raheem et al., 2016). Similarly, Mallick (2014) suggested financial development stabilizes short-term economic fluctuations; at the same time, economic shocks generate more persistent volatility that affects both short-term cycles and long-term growth in Sub-Saharan Africa (SSA). On the other hand, Singh et al. (2023) showed that financial deepening through expanding the money supply is associated with higher GDP volatility over time, whereas greater access to credit helps stabilize economic activity and reduce economic volatility in the long run for SSA countries. The second factor, trade openness, may also act as a push factor that amplifies the magnitude of economic shocks during periods of crisis. di Giovanni & Levchenko (2009) revealed trade openness increases aggregate volatility because it raises sector-level volatility and specialization. Although trade openness reduces co-movement across sectors, this stabilizing effect is not strong enough to offset the overall increase in volatility. The result aligned with Ma et al. (2022) found

macroeconomic volatility increases at higher levels of trade openness under a demand shock. The impacts on macroeconomic volatility of trade openness depend on the nature of the underlying shocks and a moderate degree of trade openness in China. In contrast, Yu & Meng (2023) found trade openness tends to stabilize output fluctuations by promoting economic growth and giving industries better access to a wide variety of intermediate inputs, allowing input-diversified sectors to grow significantly faster. In a similar vein, Kong et al. (2021) showed a stable long-run relationship between trade openness and growth quality in China, with trade openness exerting a significant stabilizing impact on the economy in both the short- and long-run.

Third factor, government size or known automatic stabilizers help to reduce output volatility. Şen & Kaya (2021) suggested government size decreases output volatility in selected Economic and Monetary Union (EMU) countries. Also, Afonso et al. (2025) focused on how government size relates to the severity of major economic crises in the EU. Government size can stabilize the economy; particularly, current spending, public wages, and interest payments have a stabilizing effect on economic fluctuations. These expenditures likely help smooth income and demand during downturns. Instead, Iseringhausen & Vierke (2019) found that larger governments may amplify, rather than dampen, output volatility (fluctuations in GDP) in 22 OECD countries. Notably, Mokoena & Tweneboah (2025) revealed that the relationship between government size and output volatility differs depending on whether government size is below or above a certain threshold in SSA countries. Small governments increase output fluctuation; as government size is below the threshold, it amplifies output volatility more strongly. On the other hand, when government size is above the threshold, the volatility-increasing effect is weaker.

Finally, monetary policy is a factor that influences output fluctuations. Mishkin (2002) suggested that monetary policy explicitly target output fluctuations by adjusting interest rates to smooth short-term ups and downs. This approach would lead to suboptimal policy decisions, increase volatility in both output and inflation, and weaken central bank credibility, as the public may doubt its commitment to price stability. Similarly, Fritsche & Kuzin (2005) found that a change in monetary policy regime in Germany has altered how shocks are transmitted through the economy, leading to less persistent output fluctuation. Moreover, Duncan (2014) showed countries with lower institutional quality tend to have more procyclical monetary policy, higher output volatility, and higher interest-rate volatility in emerging market economies (EMEs). On the other hand, Creal & Wu (2017) investigated the relationship between monetary policy uncertainty and its transmission mechanism and economic fluctuations. Monetary policy uncertainty has a direct and negative effect on economic activity and operates through multiple distinct output fluctuation channels. In the same vein, Irandoust (2020) monetary policy affects economic output differently in the long run depending on whether conditions are positive or negative output fluctuations in several OECD countries.

2.4 Gap of Study

In conclusion, there is a lack of information regarding the extent to which an economy is thrown off from its potential due to an economic crisis. Alternatively, shock amplification should be pronounced in terms of the aggregate output divergence from the output trajectory in the business cycle, which is consistent with EER theory. Thus, this study examines shock amplification, which measures output divergence from the output potential in the business cycle during the AFC and GFC. Shock amplification can also be examined in the long run because insufficient AD (Park, 2010 & Hall, 2015; Jordà et al., 2013) prevents economic recovery in the short term. Additionally, the existing literature has largely overlooked these important determinants of output fluctuations, which may

act either as catalysts or mitigators of shock amplification. By incorporating interaction terms between these determinants and economic crisis periods, this study identifies which factors amplify or dampen output fluctuations during crises, thereby highlighting the transmission mechanisms of economic crises to the real economy.

3. Data and Methodology

This study employs time series analysis to measure the size of shock amplification during the AFC and GFC. The study sample includes the ASEAN-5 countries, consisting of Malaysia, Singapore, Thailand, Indonesia, and the Philippines, for the 1990–2020 period. Time series data such as GDP, lending rate, total trade (export and import), and total domestic credit are retrieved from the World Bank website. Meanwhile, fiscal policy data such as government expenditure, tax revenue, and fiscal balances are obtained from the annual publications of Key Indicators for Asia by the ASEAN Development Bank (ADB).

The measurement of shock amplification can be derived by examining the impact of AFC and GFC on the output gap, written as the following output fluctuation model:

$$GAP_t = f(CRISIS_t, X_t) \quad (1)$$

where t is the time suffix, and GAP_t , $CRISIS_t$, and X_t are the output gap to the potential output, economic crisis dummy, and another independent variable at time t , respectively. The output gap measures the cyclical movement from aggregate production to potential output, demonstrating output fluctuation in the business cycle. The output gap is calculated using equation (2).

$$GAP_t = GDP_t - GDP_t^* \quad (2)$$

where GDP_t is the gross domestic product at the time t , and GDP_t^* is the potential GDP at time t . In this respect, GDP_t^* is unobserved where the Hodrick–Prescott (HP) filter technique estimates the data series of the potential output. This filter extracts a smoothed trend from the GDP series, which makes the trend move to approximate the path of the potential output (Murray, 2014). The value of the smoothing parameter, λ , in this filter, is set at 100, commonly used to estimate annual data series (Grigoli et al., 2015).

The output gap is estimated using the Hodrick–Prescott (HP) filter applied to annual real output, with the smoothing parameter set to $\lambda = 100$, which is the conventional choice for annual data in the macroeconomic literature (Casey, 2019). This parameter choice ensures a sufficiently smooth estimate of potential output while preserving medium-term cyclical fluctuations relevant for long-run analysis. Nevertheless, the use of the HP filter may introduce smoothing bias, primarily through sensitivity to the smoothing parameter and end-point bias. The value of λ governs the trade-off between trend smoothness and cyclical variability; a higher λ may over-smooth the trend and attribute persistent structural changes to the cyclical component, while a lower λ may allow short-term fluctuations to contaminate the trend. Although $\lambda = 100$ is not derived from economic theory, it remains a widely accepted benchmark for annual data, facilitating comparability with existing empirical studies.

By considering important determinants of the output gap, the model of this study can be constructed based on Debrun et al. (2008), Debrun & Kapoor (2010), Eller et al. (2016), and Munir & Riaz (2019), where it pertains to the effect of fiscal tools on output

fluctuation. In order to reflect the fluctuation of output in the business cycle, the output gap is utilized as a dependent variable, where it can be written as

$$LGAP_{it} = \gamma_i + \beta_2 AFC_t + \beta_3 LGSZ_t + \beta_4 LINT_t + \beta_5 LCRDT_t + \beta_6 LOPN_t + \varepsilon_t \quad (3)$$

$$LGAP_{it} = \varphi_i + \alpha_2 GFC_t + \alpha_3 LGSZ_t + \alpha_4 LINT_t + \alpha_5 LCRDT_t + \alpha_6 LOPN_t + \varepsilon_t \quad (4)$$

where $LGSZ_t$, $LINT_t$, $LCRDT_t$ and $LOPN_t$ are logarithm of total government expenditure to GDP (%), real interest rate (%), total domestic credit to GDP (%) and total trade to GDP (%) at time t , respectively. In models (3) and (4), the β_2 and α_2 coefficients capture the percentage of output gap to potential output change during the AFC and GFC, respectively. The values of these coefficients capture the amplitudes of shock during the AFC and GFC, representing the sizes of shock amplification.

In terms of methodological issues, the endogeneity problem is likely to be arise from a reverse causality between the output gap and regressors; thereby, it would cause bias in OLS regression (Heimberger, 2023). Previous studies on output fluctuation or cyclical behavior addressed this issue by using instrumental variables techniques such as Two Stage Least Square (2SLS) and Generalized Method of Moment (GMM) estimation, incorporating a large number of countries and a small time period in analysis. FMOLS is a more appropriate analysis to solve this problem for a large time dimension and small number of countries. To perform FMOLS, a unit root test incorporating Im, Pesaran & Shin (IPS) and Levin, Lin & Chu (LLC) acts as a preliminary test to evaluate the stationarity level of these panel data variables. A cointegration test was carried out to determine the long-term relationship between the variables. The Pedroni and Kao tests are used. Pedroni's test has five key steps: panel variance ratio static, panel rho static, panel t static, group rho static, and group t static. The cointegration panel's equation is as follows:

$$\text{panel rho static: } Z_{\hat{v}_{NT}} = L_{11}^2 (\sum_{i=1}^N \sum_{t=1}^T \hat{e}_{it-1}^2)^{-1} \quad (5)$$

$$\text{panel rho static: } Z_{\hat{p}_{NT-1}} = (\sum_{i=1}^N \sum_{t=1}^T \hat{e}_{it-1}^2)^{-1} \sum_{i=1}^N \sum_{t=1}^T (\hat{e}_{it-1} \Delta \hat{e}_{it-1} - \lambda_i) \quad (6)$$

$$\text{panel t static: } Z_t \sigma_{NT-1}^2 = (\sigma_{NT}^2 \sum_{i=1}^N \sum_{t=1}^T \hat{e}_{it-1}^2)^{-1/2} \sum_{i=1}^N \sum_{t=1}^T (\hat{e}_{it-1} \Delta \hat{e}_{it-1} - \lambda_i) \quad (7)$$

$$\text{group rho static: } \check{z}_{tNT} = \sum_{i=1}^N (\sum_{t=1}^T \hat{e}_{it-1}^2)^{-1} \sum_{t=1}^T (\hat{e}_{it-1} \Delta \hat{e}_{it-1} - \lambda_i) \quad (8)$$

$$\text{group t static: } \check{z}_{tNT} = \sum_{i=1}^N (\sum_{t=1}^T \sigma_i^2 \hat{e}_{it-1}^2)^{-1/2} \sum_{t=1}^T (\hat{e}_{it-1} \Delta \hat{e}_{it-1} - \lambda_i) \quad (9)$$

Full modified ordinary least squares (FMOLS), which were derived from ordinary least squares (OLS), were also developed by Pedroni (2000, 2001). The FMOLS was chosen in this study because there is an endogeneity problem, arising from reversal causality within the output gap and its determinant. Previous studies use estimation that solves this problem, such as the Generalized Method of Moments (GMM), two-stage least squares regression, and fixed-effect-random-effect. But from our sample size, it can use this method because the time dimension is larger than the (contradiction with GMM, etc.), where the period (t) is larger than the number of countries (n). Unlike the GMM approach, the required t value is smaller than the number of n . Therefore, GMM solves the endogeneity problem and at the same time can see long-term relationships. The FMOLS equation is as follows:

$$Y_{it} = \alpha_i + \beta X_{it} + \mu_{it} \quad (10)$$

$$X_{it} = X_{it-1} + e_{it} \quad (11)$$

Y refers to the dependent variable (output gap), and X refers to the independent variables. The FMOLS estimation indicates a significant long-run relationship between the output

gap and government size, credit development, interest rate, openness, AFC, and GFC. The estimation result is presented individually (by country) and in groups.

4. Finding and Discussion

Table 1 presents a descriptive analysis of the economic variables across the ASEAN-5 countries, highlighting some key patterns. Overall, the mean values for government size, openness, interest rate, credit development, and output gap are relatively close, ranging from 0.5 to 2.54, with standard deviations between 0.03 and 0.35. This low variation suggests that the economic conditions among these countries are relatively stable.

Table 1: Descriptive Analysis of Variables

Country	Variable	Mean	Standard Deviation	Minimum	Maximum
Malaysia	LGAP	0.9068	0.1663	0.5906	1.2627
	LGSZ	1.3863	0.0517	1.2775	1.4895
	LCRDT	2.0624	0.0775	1.8414	2.2000
	LOPN	2.2266	0.0783	2.0900	2.3432
	LINT	1.4779	0.0878	1.2000	1.6043
Singapore	LGAP	0.9328	0.1977	0.3993	1.2231
	LGSZ	1.2279	0.0648	1.1051	1.3424
	LCRDT	2.0017	0.0677	1.8984	2.1170
	LOPN	2.5453	0.0434	2.4816	2.6408
	LINT	0.8038	0.2822	0.0500	1.1955
Thailand	LGAP	0.9957	0.1972	0.4792	1.3259
	LGSZ	1.2682	0.0613	1.1444	1.3784
	LCRDT	2.0734	0.0887	1.9210	2.2214
	LOPN	2.0446	0.0882	1.8796	2.1475
	LINT	0.5009	0.2810	-0.0900	0.9677
Philippines	LGAP	0.9475	0.1202	0.7113	1.2207
	LGSZ	1.2646	0.0468	1.1952	1.3805
	LCRDT	1.5304	0.1185	1.2514	1.7517
	LOPN	1.8181	0.0913	1.6327	1.9424
	LINT	0.5654	0.3527	-0.3000	1.0869
Indonesia	LGAP	0.7126	0.2652	0.2380	1.2918
	LGSZ	1.2461	0.0371	1.1813	1.3240
	LCRDT	1.5375	0.1519	1.2990	1.7843
	LOPN	1.7251	0.0857	1.5731	1.9831
	LINT	0.6331	0.2201	0.1000	1.0112

Note: Countries is equal to five, and time series is 30 years

Source: Author's estimation

For Malaysia, the output gap displays a narrow range (0.59 to 1.26), indicating relatively steady economic output compared to other variables. In contrast, government size, credit development, and openness show more substantial ranges, implying varying fiscal policies and financial openness over time. As a comparison, Singapore exhibits

stability in its interest rates, as reflected in the narrow range (0.05 to 1.19). The broader range for openness (2.48 to 2.64) suggests that trade and financial flows play a significant and consistent role in Singapore's economy.

Meanwhile, Thailand and the Philippines both show low ranges for interest rates, implying more stability in monetary policy. However, Thailand's output gap and government size show wider fluctuations, suggesting periods of economic expansion and contraction, while the Philippines' credit development indicates considerable variation, reflecting changes in lending practices or financial regulations over time. In Indonesia, the narrowest range is observed in interest rates, indicating a relatively consistent monetary policy. However, fluctuations in the output gap and credit development suggest Indonesia has experienced varying economic conditions and credit market dynamics. Overall, the small standard deviations across most variables imply a level of economic stability, with differences in ranges indicating unique economic behaviors within each country.

Table 2: The Result of LLC and IPS Panel Unit Root Test

Test	Variable	Constant		Constant + Trend	
		Level	First Difference	Level	First Difference
LLC	LGAP	-2.6851	-7.1265***	-1.2039	-2.6481***
		(0.3942)	(0.0000)	(0.1143)	(0.0040)
	LGSZ	-1.0613	-14.9978***	-0.3213	-11.7043***
		(0.1443)	(0.0000)	(0.3740)	(0.0000)
	LCRDT	-1.3179*	-8.0468***	0.2635	-6.2820***
		(0.0938)	(0.0000)	(0.6639)	(0.0000)
	LOPN	-0.4675	-10.8017***	-1.7463**	-5.7314***
		(0.3201)	(0.0000)	(0.0404)	(0.0000)
	LINT	-1.0220	-3.9095***	2.6136	-2.3528***
		(0.1534)	(0.0000)	(0.9955)	(0.0093)
IPS	LGAP	1.9130	-1.6072*	-2.1741*	-5.6063***
		(0.9721)	(0.0540)	(0.0148)	(0.0000)
	LGSZ	-1.3414*	-14.4801***	-0.8124	-11.4037***
		(0.0899)	(0.0000)	(0.2083)	(0.0000)
	LCRDT	-1.1049	-8.4891***	0.1881	-4.2551***
		(0.1346)	(0.0000)	(0.5746)	(0.0000)
	LOPN	-0.2645	-9.8293***	-1.3764*	-7.6080***
		(0.3957)	(0.0000)	(0.0844)	(0.0000)
	LINT	-0.1544	-8.8433***	0.2410	-8.6385***
		(0.4387)	(0.0000)	(0.5952)	(0.0000)

Note: a) * and *** indicate rejection of the null hypothesis at 10% and 1% significant level

Source: Author's estimation

The results of the unit root tests for Im, Pesaran and Shin (IPS) and Levin, Lin and Chu (LLC) are shown in Table 2. The study's findings indicate that none of the variables are significant at the level based on the LLC test for constant and constant with trend conditions. The result turns out to be significant at five and 10 percent for all variables at the first difference. Similarly, the IPS unit root test suggests that none of the variables are significant at the level either at a constant state or at a constant with a trend state. After the first difference, all variables are significant at the first difference at five and 10 percent.

Next, Table 3 presents the cointegration test results for Pedroni and Kao. In the Pedroni cointegration test, panel *t*-statistics, panel ADF -statistics, group *t*-statistics and group ADF- statistics are significant at the one percent level, indicating the existence of a cointegration relationship among the variables for both AFC and GFC models. Similarly, Kao cointegration also revealed a significant result at one percent, which confirms the cointegration among the variables for both AFC and GFC models.

Table 3: The Result of the Pedroni and Kao Cointegration Test

Pedroni Cointegration Test	Asian Financial Crisis		Global Financial Crisis	
	Statistic	Prob.	Statistic	Prob.
Panel <i>v</i> - statistics	-0.8140	0.7911	-0.5404	0.7055
Panel <i>ρ</i> – statistics	-0.7606	0.2234	-0.8936	0.1858
Panel <i>t</i> – statistics	-7.3005***	0.0000	-5.1471***	0.0000
Panel ADF – statistics	-4.1393***	0.0000	-3.0817***	0.0010
Group <i>ρ</i> – statistics	-0.1587	0.4370	0.1428	0.5568
Group <i>t</i> – statistics	-12.3108***	0.0000	-10.6733***	0.0000
Group ADF – statistics	-3.8009***	0.0001	-3.8792***	0.0001
Kao Cointegration Test	ASEAN Financial Crisis		Global Financial Crisis	
	Statistic	Prob.	Statistic	Prob.
ADF	-3.1128***	0.0009	-3.6620***	0.0001

*Note: *** indicates rejection of the null hypothesis at a 1 percent significant level*

Source: Author's estimation

Table 4 presents the result of FMOLS estimation at the group level, where the estimated coefficient ranges from 0.21 to 0.22. These coefficients signify that AFC contributed a long-run negative deviation of aggregate output from potential output across the panel of ASEAN-5 countries. As a comparison, GFC contributed a stronger negative output gap with an estimated coefficient between 0.31 and 0.35. The interaction term between economic the crisis dummies and other explanatory variables reveal further how these variables influence the magnitude of the financial crisis shocks. The interaction was found to be significant only for interest rate and positively associated with the output gap. This implies that monetary policy acts as a shock absorber during the AFC. However, interaction for all regressors turns out to be found to be negative and significant. This suggests that these regressors could be channels to increase shock amplification during the GFC, particularly trade openness and financial development (represented by domestic credit to GDP). At the individual country level, the estimated coefficient during AFC and GFC at the individual country is presented in Table 4 and Table 5, respectively. For the purpose of simplicity, the comparison estimated coefficient among individual countries is exhibited in Figure 1.

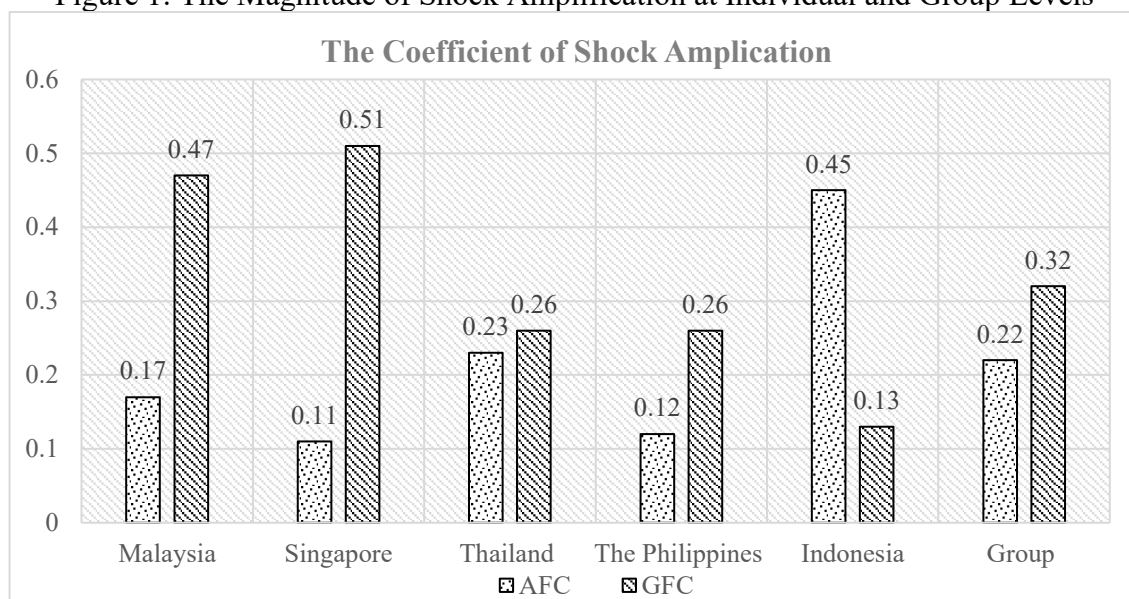
Table 4: The Result of FMOLS at Group Level during AFC and GFC
(Dependent variable: LGAP)

Crisis	Variable	1	2	3	4	5
AFC	LGSZ	0.03 (1.2)	0.01 (-0.9)	0.13 (0.1)	0.13 (0.4)	0.25 (0.3)
	LCRDT	-0.15*** (4.3)	-0.28*** (-7.4)	-0.40*** (-5.8)	-0.28*** (-6.4)	-0.27*** (-6.6)
	LOPN	0.11** (2.3)	0.03 (0.9)	0.06* (1.9)	-0.04 (0.7)	0.00 (0.6)
	LINT	0.27*** (6.5)	0.31*** (9.5)	0.30*** (8.3)	0.30*** (9.1)	0.11*** (5.7)
	AFC	-0.22*** (22.3)	-0.21*** (-26.2)	-0.23*** (-19.7)	-0.18*** (-20.4)	-0.22*** (-27.0)
	AFC*LGSZ	-	0.05 (-0.7)	-	-	-
	AFC*LCRDT	-	-	0.12 (0.9)	-	-
	AFC*LOPN	-	-	-	0.10 (1.4)	-
	AFC*LINT	-	-	-	-	0.16* (-1.8)
GFC	LGSZ	-0.28*** (-4.9)	0.42*** (3.1)	-0.38*** (-5.7)	-0.41*** (-5.3)	-0.41*** (-6.8)
	LCRDT	-0.12 (-0.6)	-0.32*** (7.0)	0.28*** (3.7)	-0.32*** (-4.5)	-0.32*** (-13.9)
	LOPN	0.09 (1.9)	-0.18*** (-4.6)	-0.16*** (-6.1)	0.40*** (6.6)	-0.19*** (-6.7)
	LINT	0.13*** (30.5)	0.22*** (3.1)	0.22*** (3.2)	0.23 (1.4)	0.39*** (7.2)
	GFC	-0.32*** (-34.9)	-0.34*** (-34.4)	-0.31*** (-22.5)	-0.33*** (-27.9)	-0.35*** (-41.8)
	GFC*LGSZ	-	-0.11*** (-8.1)	-	-	-
	GFC*LCRDT	-	-	-0.58*** (-7.7)	-	-
	GFC*LOPN	-	-	-	-0.53*** (-6.4)	-
	GFC*LINT	-	-	-	-	-0.15*** (-9.3)

Note: *, **, and *** indicate rejection of the null hypothesis at 10, 5, and 1 percent significant levels; () refer to t-statistic.

Source: Author's estimation

Figure 1: The Magnitude of Shock Amplification at Individual and Group Levels



Source: Author's estimation

Table 5: The Result of FMOLS for Individual Countries during the AFC
(Dependent variable: LGAP)

Country	Variable	1	2	3	4	5
Malaysia	LGSZ	0.28* (1.9)	-0.17*** (-3.5)	-0.06 (-0.9)	-0.06 (-0.9)	0.02 (0.4)
	LCRDT	-0.11 (- 1.1)	-0.27*** (-3.4)	-0.67*** (-7.9)	-0.27*** (-3.7)	-0.17*** (-2.6)
	LOPN	0.24*** (3.2)	0.33*** (5.2)	0.33*** (6.1)	-0.03 (-0.4)	0.22*** (4.2)
	LINT	0.49*** (7.4)	0.51*** (7.5)	0.51*** (8.8)	0.51*** (8.1)	1.10*** (15.9)
	AFC	-0.17*** (-8.7)	-0.11*** (-5.9)	-0.11*** (-7.4)	-0.11*** (-7.0)	-0.13*** (-8.3)
	AFC*LGSZ	-	0.66*** (3.2)	-	-	-
	AFC*LCRDT	-	-	0.39*** (3.7)	-	-
	AFC*LOPN	-	-	-	0.36*** (3.4)	-
	AFC*LINT	-	-	-	-	-0.30*** (-13.7)
Singapore	LGSZ	0.45** (2.6)	0.19** (2.1)	0.01 (0.1)	0.001 (-0.1)	0.01 (0.1)
	LCRDT	0.11 (0.7)	-0.12 (-1.2)	-0.05 (-0.2)	-0.1 (-0.9)	-0.13 (-0.5)
	LOPN	0.29 (1.4)	-0.1 (-0.7)	0.07 (0.4)	0.11 (1.3)	-0.15 (-0.4)
	LINT	-0.12* (-1.7)	-0.06 (-1.3)	-0.10* (-1.8)	-0.10* (-1.9)	-0.19** (-2.3)
	AFC	-0.11*** (-3.1)	-0.09*** (-4.1)	-0.07** (-2.6)	-0.07*** (-2.9)	-0.06** (-2.1)

Country	Variable	1	2	3	4	5
	AFC*LGSZ	-	0.51*** (-4.9)	-	-	-
	AFC*LCRDT	-	-	-0.06 (-0.2)	-	-
	AFC*LOPN	-	-	-	-0.05 (-0.2)	-
	AFC*LINT	-	-	-	-	0.05 (0.5)
Thailand	LGSZ	-0.59*** (-3.9)	0.25*** (4.8)	0.37** (2.5)	0.37** (2.4)	0.36*** (3.2)
	LCRDT	-0.38*** (-4.2)	-0.79*** (-8.3)	-0.26** (-2.1)	-0.79*** (-7.7)	-0.88*** (-11.4)
	LOPN	0.05 (0.5)	0.02 (0.2)	0.02 (0.2)	0.57*** (7.3)	0.07 (0.8)
	LINT	0.01 (-0.1)	0.08** (2.0)	0.08** (2.0)	0.08* (1.9)	0.08*** (2.6)
	AFC	-0.23*** (-11.9)	-0.30*** (-13)	-0.26*** (-11.8)	-0.24*** (-10.3)	-0.26*** (-14.9)
	AFC*LGSZ	-	-0.88*** (-4.5)	-	-	-
	AFC*LCRDT	-	-	-0.54*** (-4.5)	-	-
	AFC*LOPN	-	-	-	-0.55*** (-4.2)	-
	AFC*LINT	-	-	-	-	0.07*** (2.8)
Philippines	LGSZ	0.35*** (4.5)	-0.25*** (-2.9)	-0.18*** (-3.0)	-0.18*** (-3.1)	0.39*** (5.1)
	LCRDT	0.06** (2.4)	0.12*** (5.0)	0.06 (0.7)	0.12*** (5.6)	0.22*** (9.1)
	LOPN	0.03 (0.7)	-0.10*** (-2.6)	-0.10*** (-2.8)	-0.15*** (-2.9)	-0.11*** (-3.1)
	LINT	0.14** (2.2)	0.25*** (3.9)	0.25*** (4.2)	0.25*** (4.3)	-0.45*** (-4.6)
	AFC	-0.12*** (-13.2)	-0.12*** (-12.4)	-0.11*** (-13.0)	-0.11*** (-12.6)	-0.11*** (-13.6)
	AFC*LGSZ	-	0.08 (0.7)	-	-	-
	AFC*LCRDT	-	-	0.06 (0.8)	-	-
	AFC*LOPN	-	-	-	0.05 (0.8)	-
	AFC*LINT	-	-	-	-	0.20** (2.1)
Indonesia	LGSZ	-0.37** (-2.4)	-0.40** (-2.5)	0.52 (1.6)	0.52** (2.4)	0.52*** (3.0)
	LCRDT	-0.45*** (-7.5)	-0.36*** (-8.7)	-1.10*** (-3.6)	-0.36*** (-7.5)	-0.36*** (-9.4)
	LOPN	-0.05 (-0.5)	-0.01 (-0.2)	-0.01 (-0.1)	-0.68*** (-3.9)	-0.01 (-0.2)

Country	Variable	1	2	3	4	5
	LINT	0.83*** (6.7)	0.76*** (9.2)	0.76*** (5.3)	0.76*** (7.9)	-0.01 (-0.1)
	AFC	-0.45*** (-13.1)	-0.45*** (-23.4)	-0.58*** (-9.2)	-0.39*** (-12.7)	-0.52*** (-22.5)
	AFC*LGSZ	-	-0.92*** (3.9)	-	-	-
	AFC*LCRDT	-	-	-0.73** (2.2)	-	-
	AFC*LOPN	-	-	-	-0.67*** (3.3)	-
	AFC*LINT	-	-	-	-	0.77*** (4.2)

Note: *, **, and *** indicate rejection of the null hypothesis at 10, 5, and 1 percent significant levels; () refer to t-statistic.

Source: Author's estimation

Table 6: The Result of FMOLS for Individual Countries during the GFC
(Dependent variable: LGAP)

Country	Variable	1	2	3	4	5
Malaysia	LGSZ	-0.13 (-1.6)	0.16 (0.9)	-0.17 (-1.5)	-0.17 (-1.6)	-0.07 (-1.1)
	LCRDT	-0.21** (-4.0)	-0.62*** (-9.3)	-0.43*** (-2.8)	-0.61*** (-4.9)	-0.47*** (-6.5)
	LOPN	0.33*** (7.9)	0.14** (2.5)	0.14 (1.4)	0.30** (2.3)	0.13** (2.4)
	LINT	0.40 (-0.2)	0.57*** (9.4)	0.56*** (5.1)	0.58*** (5.2)	0.88*** (11.5)
	GFC	-0.47*** (-29.3)	-0.48*** (-20.5)	-0.47*** (-11.2)	-0.46*** (-10.9)	-0.47*** (-20.1)
	GFC*LGSZ	-	-0.32** (-1.9)	-	-	-
	GFC*LCRDT	-	-	-0.18 (-1.0)	-	-
	GFC*LOPN	-	-	-	-0.15 (-0.9)	-
	GFC*LINT	-	-	-	-	-0.17*** (-6.9)
Singapore	LGSZ	-0.25* (-2.5)	-0.09 (-1.5)	-0.15 (-1.3)	-0.12* (-1.7)	-0.15*** (-2.9)
	LCRDT	0.05 (0.5)	-0.02 (-0.3)	0.04 (0.2)	0.01 (-0.1)	-0.03 (-0.5)
	LOPN	0.05 (0.3)	0.05 (0.5)	0.13 (0.6)	0.14** (2.2)	0.15 (1.6)
	LINT	-0.25*** (-4.7)	-0.23*** (-7.4)	-0.26*** (-4.2)	-0.26*** (-7.0)	-0.24*** (-8.8)
	GFC	-0.51*** (-15.1)	-0.53*** (-24.6)	-0.55*** (-12.1)	-0.53*** (19.9)	-0.53*** (-26.9)
	GFC*LGSZ	-	-0.16** (-2.3)	-	-	-
	GFC*LCRDT	-	-	0.01	-	-

Country	Variable	1	2	3	4	5
				(0.1)		
	GFC*LOPN	-	-	-	-0.04 (-0.3)	-
	GFC*LINT	-	-	-		0.07*** (2.6)
Thailand	LGSZ	-0.06 (-0.3)	0.29*** (3.6)	-0.08 (-0.6)	-0.05 (-0.3)	-0.08* (-1.8)
	LCRDT	-0.60*** (0.6)	-0.59*** (-5.9)	0.06 (0.6)	-0.60*** (-5.7)	-0.66*** (-20.4)
	LOPN	-0.04 (-0.3)	0.01 (0.1)	0.01 (0.1)	0.66*** (8.1)	-0.17*** (-4.3)
	LINT	-0.05 (-1.0)	-0.04 (-1.1)	-0.04 (-1.2)	-0.04 (-1.0)	0.03** (2.3)
	GFC	-0.26*** (-5.6)	-0.27*** (-7.7)	-0.22*** (-7.1)	-0.27*** (-7.4)	-0.26*** (-23.2)
	GFC*LGSZ	-	-0.46*** (-5.1)	-	-	-
	GFC*LCRDT	-	-	-0.64*** (-5.7)	-	-
	GFC*LOPN	-	-	-	-0.67*** (-4.9)	-
	GFC*LINT	-	-	-		-0.14*** (-11.8)
Philippines	LGSZ	0.14* (2.1)	0.15** (2.1)	-0.34*** (-6.1)	-0.34*** (-6.5)	-0.34*** (-5.0)
	LCRDT	0.15*** (6.9)	0.06*** (2.9)	0.46*** (6.3)	0.06*** (3.1)	0.06** (2.4)
	LOPN	-0.30*** (-10.2)	-0.29*** (-9.7)	-0.29*** (9.5)	0.04 (0.9)	-0.29*** (-7.9)
	LINT	-0.22** (-3.4)	0.21*** (3.9)	0.21*** (3.8)	0.21*** (4.1)	0.67*** (7.2)
	GFC	-0.26*** (-22.6)	-0.27*** (-22.4)	-0.25*** (-19.3)	-0.27*** (-23.4)	-0.29*** (-19.1)
	GFC*LGSZ		-0.48*** (-5.6)	-	-	-
	GFC*LCRDT	-	-	-0.40*** (5.5)	-	-
	GFC*LOPN	-	-		-0.34*** (-5.9)	-
	GFC*LINT	-	-			-0.46*** (-4.6)
Indonesia	LGSZ	-0.13*** (8.6)	0.019* (1.8)	-0.15*** (-3.2)	-0.13* (-1.8)	-0.19*** (-4.4)
	LCRDT	0.01 (-0.1)	-0.44*** (-3.1)	1.24*** (4.0)	-0.47** (-2.5)	-0.49*** (-6.2)
	LOPN	0.39*** (6.7)	-0.79*** (-3.7)	-0.80*** (-6.1)	0.83 (1.3)	-0.77*** (-6.72)
	LINT	0.73*** (39.3)	0.61** (2.2)	0.60*** (3.6)	0.69* (1.9)	0.59*** (3.9)
	GFC	-0.13***	-0.16*	-0.14	-0.13*	-0.11***

Country	Variable	1	2	3	4	5
		(5.6)	(-1.8)	(-0.6)	(-1.9)	(-4.1)
	GFC*LGSZ	-	-0.10*** (-3.0)	-	-	-
	GFC*LCRDT	-	-	-0.69*** (-5.0)	-	-
	GFC*LOPN	-	-	-	-0.14** (-2.3)	-
	GFC*LINT	-	-	-	-	-0.03 (-0.2)

*Note: *, **, and *** indicate rejection of the null hypothesis at 10, 5, and 1 percent significant levels; () refer to t-statistic.*

Source: Author's estimation

At the country level, the estimated coefficient during the AFC for Indonesia is the highest, showing the largest shock amplification among the ASEAN-5 countries. This figure is followed by Thailand, Singapore, the Philippines, and Malaysia. On the other hand, the size of shock amplification during GFC from highest to lowest can be ranked as Singapore, Malaysia, Thailand, the Philippines, and Indonesia. These results clearly indicate that shock amplifications during the AFC and the GFC differ across countries, highlighting differences in economic structure, financial exposure, and crisis transmission mechanisms. Specifically, during AFC, the interaction term for all regressors except monetary policy (represented by interest rate) significantly and positively influences the output gap in Malaysia. Thus, government size, financial development, and trade openness serve as mechanisms to contain shock amplification. In contrast, these regressors are found to be negative in Thailand and Indonesia, which could heighten the size of shock amplification. Furthermore, the result implies that government size and interest rate could reduce shock amplification during AFC for Singapore and Indonesia, respectively. Among these variables, financial development and government size contribute the largest amplitude to the size of the shock, particularly for Indonesia and Thailand.

During the GFC, the interaction term for government size and interest rate is negative, exhibiting the source of shock amplification in Malaysia. Specifically in Thailand, Indonesia, and the Philippines, the interaction for all regressors negatively associates with the output gap. It suggests that government size, financial development, trade openness, and interest rate induce more shock to the economies. Meanwhile, the interaction term of interest rate is negative and significant in Singapore, acting as a mitigator of shock amplification during the GFC. Overall, the interaction term coefficient for trade openness is considerably large, particularly in Thailand, the Philippines, and Indonesia. This factor clearly plays a dominant role as a catalyst to shock during the GFC.

5. Discussion

The size of shock amplification during GFC is more profound than during AFC in the long run. This is because GFC's scale is more widespread than AFC's scale, which affects major economies globally. The severity and depth of the GFC could have had more profound and lasting effects on the global economy (Reinhart & Rogoff, 2009; Raj & Roy, 2014). This is consistent with Rasiah et al. (2014) who found that the effect of GFC became stronger via the declining export in demand during the post-crisis period. This is because GFC was accompanied by global oil prices and food price shocks that

adversely affected the global market. Oil price shocks negatively increase the cost of production and put more pressure on the inflationary rate, hindering the growth in aggregate output (Iyke, 2019). Compared to the GFC, the source of the AFC was coming from the ASEAN region itself, where the other regions were less likely to be affected by the crisis. Although the ASEAN-5 countries underwent adverse capital inflow reversals during the AFC, the crisis's amplitude was mitigated by strong growth in export demand from other regions (Thangavelu & Chongvilaivan, 2007). Countries that are heavily reliant on international trade, such as Singapore and Malaysia, benefited from this strong export performance during the crisis.

Moreover, interest rates are the only significant factor that could mitigate adverse effects, as they induce more positive output during the AFC. This result is supported by Dekle et al. (2001), an increase in interest rate could appreciate the nominal exchange rate, preventing further adverse effects from the AFC. In contrast, during the GFC, government size, trade openness, credit development, and interest rate were significant and negative, suggesting these factors could amplify the negative output gap. For instance, governments tend to focus on fixing impaired financial markets during crises. Thereby, government responses in the financial market could expand the market further, causing the economy to be more prone to economic crises (Crotty, 2009). This would rather contribute to a larger government size and financial development, hence increasing the effect of crisis. Meanwhile, a decrease in policy interest rate cannot fully translate into a lower lending rate, as it heightens bank funding costs, weakening the effectiveness of monetary policy that exacerbates the effect of the crisis (Illes et al., 2019). The shock was also compounded by high trade openness, which exposed the ASEAN-5 economies to the U.S. subprime mortgage crisis and weakened global demand and magnified the effect of export demand contractions (Bianco et al., 2016).

Additionally, the size of shock amplification is significant across all countries, with varying degrees of impact. During the AFC, Thailand and Indonesia showed the highest shock amplification, meaning that this crisis greatly threw these countries from their long trajectory. This is aligned with Samsi et al. (2019) where AFC has a stronger effect on Indonesia and Thailand by affecting their stock market compared to other ASEAN countries. Meanwhile, capital control measures taken by Malaysia mitigate the impact of the crisis by restricting short-term capital flows (Doraisami, 2004). The capital controls were successful in preventing further capital flight that reduced the amplitude of the negative output gap.

Interestingly, this size of shock amplification has affected each ASEAN- 5 countries according to their degree of economic openness and export dependency. Singapore, with the largest economic openness in the region, followed by Malaysia is the most severely affected by this crisis. This finding is consistent with Armstrong & Read (2020), where small countries are typically specialized in export-driven sectors and tend to experience a greater persistent fluctuation and are more adversely affected by the GFC. Rather than heavily relying on external demand in the global market, Indonesia's and the Philippines' economies are fueled by domestic demand (Isnawangsih et al., 2013). As a result, these countries were less affected by persistent downfall in export during GFC compared to export-oriented economies.

During the GFC, the interaction term of government size exacerbates the impact of GFC, highlighting a potential crowding-out effect on fiscal policy response (Marimuthu et al., 2021). Meanwhile, the interest rate was found to be positive in Malaysia, Thailand, and the Philippines, revealing monetary policy could promote a more positive output gap that mitigates the adverse impact of the GFC. In contrast, the result suggested a negative impact of financial development and trade openness on output in Thailand, the Philippines, and Indonesia which leads to amplifying the adverse effect.

More credit amplifies adverse impacts on growth during a crisis via non-performing loans, where banking crises elevate NPLs, impair bank balance sheets, and banks lend more cautiously reducing credit availability, amplifying credit contraction, and delaying recovery (Asteriou & Spanos, 2021; Ari et al., 2021; Hor & Lim, 2025). Meanwhile, total trade could add more vulnerability to Southeast Asian countries during the GFC, as weakened global demand reduces the momentum of growth (Rasiah et al., 2014).

6. Conclusion and Policy Implication

In summary, the results from each country indicate that both crises had adverse impacts on the output gap with varied sizes of shock amplification. The Global Financial Crisis (GFC) had a greater impact in comparison to the Asian Financial Crisis (AFC). The findings from the panel analysis confirm that both crises had a considerable negative impact on the ASEAN-5 countries. The order of shock amplification for AFC can be arranged from the largest to the lowest: Indonesia, Thailand, Singapore, the Philippines, and Malaysia. Meanwhile, for GFC, Singapore is the largest shock amplification, followed by Malaysia, Thailand, the Philippines, and Indonesia. These findings suggest that each country has a different degree of resiliency toward economic crisis. The heterogeneity of crisis response suggested that the level of financial development, trade openness, government size, and interest rate contribute a direct effect on the output gap that can mitigate or amplify the output gap from the potential output.

The heterogeneous shock amplification effects observed across ASEAN-5 countries reflect important differences in institutional arrangements and macroeconomic policy frameworks. During the Asian Financial Crisis, countries such as Indonesia and Thailand, which operated under more constrained fiscal frameworks and less developed financial systems at the time, experienced larger shock amplification. This suggests that limited fiscal space and weaker financial supervision reduced the ability of policy interventions to cushion long-run output losses. In contrast, Malaysia's more active fiscal stance and capital control measures helped moderate shock amplification, consistent with the positive role of government size observed during the AFC. Exchange rate regimes also play a crucial role in shaping crisis transmission. Economies with more flexible exchange rate arrangements, such as Indonesia after the AFC, were better able to absorb external shocks through currency adjustment, whereas economies with higher financial openness and exposure to global capital markets, notably Singapore, experienced stronger shock amplification during the Global Financial Crisis. This highlights the vulnerability of highly open financial systems to global financial disturbances.

During the Global Financial Crisis, the results indicate that trade openness and financial development acted as key amplification channels, particularly in Thailand, Indonesia, and the Philippines, where export dependence and cross-border financial linkages intensified the transmission of global shocks. In this context, policies aimed at diversifying export markets, strengthening macroprudential regulation, and managing credit growth become especially important. Meanwhile, the mitigating role of monetary policy observed in Singapore underscores the importance of credible and well-coordinated monetary frameworks in stabilizing output during global downturns. Overall, these findings suggest that effective crisis mitigation requires country-specific policy responses that account for institutional constraints, fiscal capacity, exchange rate regimes, and degrees of financial and trade openness. A uniform policy approach is therefore unlikely to be effective across ASEAN-5 economies.

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