Global Value Chain Integration and Export Performance in ASEAN

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Abstract

This study examines the impact of Global Value Chain (GVC) participation on export performance in ASEAN economies from 2000 to 2020 using panel data analysis. GVC participation reflects the extent to which countries are integrated into international production networks, either by importing intermediate goods for export production (backward participation) or by exporting intermediate goods used in other countries' exports (forward participation). The empirical analysis employs fixed effects estimation using OECD TiVA indicators and macroeconomic controls from the World Bank. The results show that overall GVC participation is positively and significantly associated with export performance. This implies that greater integration into global production networks—through any form of value-added contribution—is linked to stronger export outcomes in the region. When disaggregated, only backward participation exhibits a statistically significant and positive relationship with exports. This suggests that ASEAN countries derive greater export gains by integrating into downstream stages of global production, where foreign inputs are used to produce goods destined for international markets.

Keywords: GVCs, ASEAN, Export Performance.

JEL Classifications: C23, F14, F15, F61

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1. Introduction

Global Value Chains (GVCs) have become a cornerstone of modern international trade and production, representing complex, cross-border networks through which goods and services are produced, traded, and consumed. Unlike traditional trade that focus on the exchange of final goods, GVCs emphasize the significance of intermediate goods and services that flow between countries at different stages of the production process (Johnson, 2018; Meng et al., 2020). GVCs enable countries to specialize in specific tasks rather than entire products, adding incremental value at each stage and enhancing overall production efficiency (De Backer and Miroudot, 2016)

The emergence and rapid expansion of GVCs have been largely driven by technological advancements in transport and communication infrastructure, which allow firms to fragment production geographically and access regional advantages, such as lower labor costs or specialized expertise (Meng et al., 2020). Over the past three decades, these chains have become more prominent, especially as developing countries have leveraged comparative advantages to integrate into global production networks (Davis et al., 2011).

In this context, export performance emerges as a crucial component of economic growth and development in ASEAN countries. As outward-oriented economies, ASEAN member states rely heavily on exports to fuel industrialization, employment, and income generation (Goh et al., 2018; Prasetyo and Susandika, 2022; Shirazi et al., 2021). Exports contribute not only to foreign exchange earnings but also facilitate access to imported inputs essential for domestic consumption and production.

The strategic importance of exports in ASEAN is further supported by regional economic integration initiatives such as the ASEAN Free Trade Area (AFTA) and the ASEAN Economic Community (AEC), which aim to reduce intra-regional trade barriers and foster competitiveness (Vogiatzoglou, 2019). Empirical studies have validated the export-led growth hypothesis in the region, showing that increased trade openness and foreign direct investment (FDI) inflows have positively influenced economic growth (Haryadi et al., 2021; Kato, 2022; Ngah Mohamad et al., 2024).

ASEAN's role in GVCs is also reflected in its diversified export structure, which spans industries such as electronics, apparel, automotive parts, and agro-based products. The region's geographical advantages and comparative strengths in labor and resources make it an attractive hub for regional and global production (Situmorang and Agustina, 2021). As ASEAN economies move toward higher value-added production, their ability to maintain export competitiveness becomes increasingly linked to their participation in GVCs (Lee, 2024; Mei-Zhi et al., 2023).

While the importance of Global Value Chain (GVC) participation for trade and development has been widely acknowledged, much of the existing literature either adopts a global or single-country focus, leaving regional dynamics—particularly within ASEAN—underexplored (Cheng et al., 2023; Jangam et al., 2019; Kummritz et al., 2017; Ndubuisi and Owusu, 2021). These studies, while

valuable in highlighting the broader implications of GVC integration for productivity, export upgrading, and economic performance, often lack a comparative ASEAN-wide perspective and do not fully differentiate between the distinct roles of forward and backward participation. Consequently, they overlook how intra-regional structural differences, trade openness, and sectoral positioning within the GVCs affect export outcomes in ASEAN countries.

This study addresses that gap by analyzing panel data for eight ASEAN countries from 2000 to 2020. It combines OECD TiVA indicators with World Bank macroeconomic variables to estimate the export effects of both aggregate and disaggregated GVC participation, focusing on forward and backward linkages. By distinguishing the roles of upstream and downstream integration within a unified framework, the study offers region-specific evidence on how ASEAN economies connect to global production networks. The findings aim to inform trade and industrial policies that enhance export competitiveness through more strategic GVC engagement.

The rest of the paper is organized as follows. Section 2 reviews the related literature on GVC participation and export performance. Section 3 presents the data sources, variable definitions, and econometric methodology. Section 4 reports and discusses the empirical. Finally, Section 5 concludes with policy implications.

2. Related Literature

Global Value Chains (GVCs) have become a central framework for understanding international trade and production. At the core is the "fragmentation of production," where manufacturing tasks are spread across regions to exploit local advantages (Feenstra, 2017; Siregar et al., 2020). This fragmentation allows multinational firms to lower costs and improve efficiency across borders (Los et al., 2015). Advances in transport, communication, and trade liberalization have fueled this trend, creating a world where countries increasingly trade in tasks rather than finished goods (Brakman et al., 2015; Johnson and Noguera, 2012).

This fragmented production system has reshaped global trade, with intermediate goods crossing borders multiple times before becoming final products. These shifts affect how trade is measured and how national performance is assessed. Regional production networks and specialized hubs have also emerged, fostering local development and regional integration (Fontagné and Santoni, 2017; Knez et al., 2021).

Measuring GVC participation has therefore become critical. Koopman, Wang, and Wei (2014) proposed decomposing gross exports into domestic value added (DVA) and foreign value added (FVA), distinguishing between forward and backward participation. Forward participation reflects domestic value added embodied in other countries' exports, while backward participation captures foreign inputs used in domestic exports. Other measures include the GVC Participation Index, vertical specialization indices, and OECD–WTO TiVA statistics. These measures provide clearer insights into GVCs' role in productivity, export upgrading, and structural transformation (Amador et al., 2018; Pahl & Timmer, 2020).

Empirical studies confirm the benefits of GVC integration for developing and emerging economies. Backward and forward linkages support export diversification and upgrading (Ndubuisi and Owusu, 2021), while firms gain access to technologies and practices that enhance product quality. For example, Indonesia's pulp and paper industry benefited from strong ties with China (Ahmed et al., 2017), and Indonesia's fisheries sector experienced gains in exports and GDP (Sulistijowati et al., 2023). Other studies highlight nonlinear effects, showing that benefits appear once participation passes a certain threshold (Ali and Munir, 2022). In China, deeper GVC integration has improved technology, environmental standards, and export quality (Zhang et al., 2023). Cross-regional evidence also suggests GVC participation stabilizes exports and cushions trade shocks (Díaz-Mora et al., 2018).

ASEAN-specific studies reinforce these findings. Forward linkages expand market access and export intensity in Indonesian firms (Ahmed et al., 2017), while backward linkages foster product innovation and diversification across the region (Ndubuisi and Owusu, 2021). Firms in Vietnam integrated into GVCs report higher export survival and resilience (Doan and Le, 2024). Evidence from resource-based sectors, such as Indonesia's fisheries, confirms positive contributions to exports and growth (Sulistijowati et al., 2023). Comparative work from Central and Eastern Europe further shows how exposure to global standards improves export quality and competitiveness (Kiyota et al., 2017). Still, outcomes depend on sectoral characteristics, national institutions, and firms' capacity to absorb knowledge.

Despite these contributions, several gaps remain in the literature. Many studies are limited to specific industries or single countries, making it difficult to draw general conclusions about ASEAN as a whole. Cross-country panel studies encompassing multiple ASEAN economies remain scarce. In conclusion, the literature demonstrates a strong theoretical and empirical basis for the assertion that GVC participation significantly affects export performance. However, the heterogeneity of effects across countries, industries, and firm types necessitates a more granular and comparative approach. By addressing the gaps in cross-sectoral and macro-level analysis, future research can offer deeper insights into how ASEAN economies can optimize their engagement in GVCs to achieve sustainable export growth.

3. Methodology

This study adopts a quantitative empirical approach using panel data to examine the relationship between participation in Global Value Chains (GVCs) and export performance across selected ASEAN countries. The empirical analysis covers eight ASEAN member countries—Brunei Darussalam, Cambodia, Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Vietnam—over the period 2000 to 2020.

The baseline econometric model is specified as follows:

$$Export_{it} = \beta_0 + \beta_1 GVC_{it} + \beta_2 X_{it} + \mu_i + \theta_t + \varepsilon_{it} \quad (1)$$

Where $Export_{it}$ presents the natural logarithm of exports as a percentage of GDP for country i in year t; GVC_{it} is the overall GVC participation index; X_{it} is a vector of control variables; μ_i captures unobserved country-specific effects; θ_t captures time-specific effects; and ε_{it} is the error term.

To further examine the differentiated effects of GVC components, the baseline model is extended to separately account for forward and backward GVC participation. The extended model is specified as:

$$Export_{it} = \beta_0 + \beta_1 Forward_{it} + \beta_2 Backward_{it} + \beta_3 X_{it} + \mu_i + \theta_t + \varepsilon_{it} \quad (2)$$

This specification allows for a clearer distinction between the effects of upstream ($Forward_{it}$) and downstream ($Backward_{it}$) GVC participation on export performance in ASEAN economies, thereby highlighting the specific channels through which international production linkages influence trade outcomes.

The dependent variable is export performance, measured as exports as a share of GDP, which reflects a country's integration into international markets and its competitiveness in global trade. The main explanatory variable is GVC participation, based on the Koopman, Wang, and Wei (2014) decomposition, and represented by two indicators: backward and forward participation. Backward participation is defined as the share of foreign value added (FVA) in a country's exports, calculated as the ratio of FVA to total gross exports (OECD, 2019). A higher index indicates greater reliance on imported inputs and is typical of economies engaged in downstream activities such as assembly. Forward participation, by contrast, measures the share of domestic value added (DVA) embodied in other countries' exports, calculated as the ratio of DVA in intermediate exports re-exported abroad to total gross exports. A higher index reflects an upstream role, where countries supply raw materials or components for further processing. Both measures are derived from the OECD Trade in Value Added (TiVA) database.

In addition to the main explanatory variables, a set of control variables is included to account for other factors that may influence export performance. These controls include GDP_{it}, GDP of each ASEAN country (constant 2015 US$), which captures the overall economic scale of a country; imports of goods and services as a percentage of GDP (IMP_{it}), indicating economic openness and integration; inflation (INF_{it}), which serves as a proxy for macroeconomic stability; and total population (POP_{it}), which captures the size of the domestic market and labor force. All control variables are retrieved from the World Bank's World Development Indicators (WDI) database.

To account for unobserved heterogeneity, the model includes country fixed effects, which control for time-invariant characteristics such as institutional quality or geography. Time effects are added to capture global shocks and period-specific influences like financial crises, trade fluctuations, or technological change. The error term represents variation not explained by the model.

4. Empirical Results and Discussion

This section presents and interprets the empirical results of the panel data analysis examining the relationship between GVC participation and export performance across ASEAN countries from 2000 to 2020. The analysis is divided into two sub-sections: section 4.1 evaluates the impact of overall GVC participation, while section 4.2 separately assesses the roles of forward and backward participation. The dependent variable is the natural logarithm of exports, and the explanatory variables include GVC participation and a set of macroeconomic controls. All estimations were conducted using pooled OLS, fixed effects (FE), and fixed effects with robust standard errors. The Hausman test is applied to justify the choice of model.

4.1 GVC Participation and Export Performance

Section 4.1 estimates the baseline specification in equation (1), where the overall GVC participation index serves as the key explanatory variable. Table 1 presents the results using pooled OLS, fixed effects (FE), and FE with robust standard errors. Across all specifications, the coefficient on GVC participation is positive and statistically significant at the 1% level. In the preferred FE model with robust standard errors, the coefficient is about 0.0244, implying that a 1% increase in GVC participation raises export performance by roughly 0.024%, holding other factors constant. The consistency of this result across estimators highlights a robust link between GVC integration and export expansion in ASEAN countries.

Table 1. Estimation Results Using GVC Participation (Baseline Specification)

Dependent Variable: $Export_{it}$				
	Pooled OLS	Fixed Effects	Random Effects	Fixed Effects (Robust SE)
GVC_{it}	0.0258 ***	0.0244***	0.0070**	0.0244***
	(0.0029)	(0.0035)	(0.0031)	(0.0057)
GDP_{it}	-0.0197	0.2218 ***	-0.0579*	0.2218*
	(0.0178)	(0.0544)	(0.0349)	(0.1103)
POP_{it}	-0.0715***	-1.7575***	-0.0998	-1.7575***
	(0.0135)	(0.2270)	(0.0420)	(0.3119)
INF_{it}	-0.0061	0.00066	0.0035	0.0006
	0.0040	(0.0026)	(0.0030)	(0.0051)
IMP_{it}	0.0074***	0.0016	0.0083***	0.0016
	0.0005	(0.0012)	(0.0010)	(0.00189)
Constant	4.1210***	27.0153***	6.3970***	27.0153***
	(0.2869)	(2.7483)	(0.7428)	(3.7807)
R-squared	0.9137	0.6148	0.4732	0.6148
Observations	168	168	168	168

Standard errors in parentheses. ***, **, * denote 1%, 5%, and 10% significance.

The model also includes controls for GDP, population, inflation, and imports as a share of GDP. GDP is positively and significantly associated with exports in the FE model, with a coefficient of about 0.222, showing that larger economies export more. However, the relationship is not significant in pooled OLS, reflecting biases from ignoring country heterogeneity. Population enters with a large negative and significant coefficient across all models, suggesting that, after accounting for economic size, more populous countries tend to export less per capita. This may reflect stronger domestic absorption or structural features that reduce export dependence. Inflation is insignificant in all specifications, indicating that price instability does not directly influence export volumes in this sample. Imports are positively and significantly associated with exports under pooled OLS but lose significance in the FE specification, suggesting that while trade openness correlates with exports across countries, it does not drive within-country export variation once unobserved effects are controlled.

The Hausman test in table 2 strongly supports the fixed effects model over the random effects model. This justifies the use of the fixed effects estimator for interpreting the causal impact of GVC participation on exports, as it controls for unobserved, time-invariant country characteristics.

Table 2. Estimation Results Using GVC Participation (Baseline Specification)

Test Summary		
Chi-squared (χ^2)	Degrees of freedom (df)	P-value (Prob > χ^2)
73.00	5	0.0000

Overall, the results provide strong evidence that greater participation in global value chains is positively associated with export performance among ASEAN countries. The significance and magnitude of this relationship reinforce the importance of continued integration into global production networks as a policy lever for enhancing trade outcomes. The findings are consistent with theoretical expectations and align with previous literature that emphasizes the trade-enhancing role of GVC participation in developing and emerging economies.

4.2 Forward and Backward Participation and Export Performance

To further examine the channels through which GVC participation affects export performance, Table 3 presents estimates from the extended model in equation (2), which includes forward and backward participation as separate explanatory variables. In the fixed effects specification with robust standard errors, chosen based on the Hausman test, the coefficient on forward participation is positive (0.0065) but not statistically significant. In contrast, the coefficient on backward participation is positive and significant at the 1% level, with a value of 0.0356. This indicates that backward participation, or the use of foreign value added in exports, is a stronger and more reliable driver of export performance in ASEAN countries than forward participation.

Table 3. Estimation Results Using Forward and Backward GVC Participation (Extended Specification)

Dependent Variable: $Export_{it}$				
	Pooled OLS	Fixed Effects	Random Effects	Fixed Effects (Robust SE)
$Forward_{it}$	-0.0041	0.0065*	-0.0078*	0.0065
	(0.0036)	(0.0039)	(0.0031)	(0.0034)
$Backward_{it}$	0.0251***	0.0356***	0.0239***	0.0356
	(0.0022)	(0.0034)	(0.0032)	(0.0067)
GDP_{it}	0.1306***	0.0624	-0.0746**	0.0624
	(0.0199)	(0.0517)	(0.029)	(0.0951)
POP_{it}	-0.2272***	-1.198***	-0.1466***	-1.198
	(0.0182)	(0.2102)	(0.0341)	(0.1382)
INF_{it}	0.0025	-0.0005	0.0015	-0.0005
	(0.0032)	(0.0022)	(0.0025)	(0.0039)
IMP_{it}	0.0037***	-0.0005	0.0041***	-0.0005
	(0.0005)	(0.0011)	(0.0009)	(0.0018)
Constant	3.7084***	21.7469***	7.6836***	21.7469
	(0.2257)	(2.4785)	(0.6263)	(2.1236)
R-squared	0.9485	0.7148	0.6492	0.7148
Observations	168	168	168	168

Standard errors in parentheses. ***, **, * denote 1%, 5%, and 10% significance

The strong effect of backward participation reflects the structural position of many ASEAN economies, which are typically located downstream in global value chains. These economies often specialize in assembly and processing activities that rely on imported intermediates, later re-exported as part of final products. The results suggest that dependence on foreign inputs enhances trade integration by providing access to higher-quality materials, embedded technologies, and established global production networks.

By contrast, forward participation is statistically insignificant, indicating the limited role of ASEAN countries in supplying upstream inputs that are further processed and exported elsewhere. This may stem from technological constraints in upstream industries or from reliance on raw material exports that contribute little to value-added trade. Forward linkages may instead influence broader upgrading processes—such as innovation or diversification—that are not directly captured in export values.

Control variables behave largely as expected. GDP shows a positive but insignificant association with exports under the fixed effects model, while population continues to exert a strong negative effect, suggesting structural absorption or scale constraints. Inflation remains insignificant, and

imports are positive and significant only in pooled OLS, losing significance once country heterogeneity is controlled. The Hausman test reported in Table 4 confirms the appropriateness of the fixed effects model, underscoring the importance of accounting for unobserved country-level characteristics.

Table 4. Hausman Test Results for Model with Forward and Backward GVC Participation

Test Summary		
Chi-squared (χ^2)	Degrees of freedom (df)	P-value (Prob > χ^2)
323.22	6	0.0000

The findings show that backward participation, measured as foreign value added in export production, is a stronger and more consistent driver of export performance in ASEAN than forward participation. This suggests that ASEAN economies currently gain more from integration into downstream stages of global production, where imported intermediates are processed and re-exported. Access to competitively priced, high-quality foreign inputs enables firms to raise productivity, comply with international standards, and link more effectively to multinational supply chains.

4.3 Discussion

The empirical results of this study align well with a broad body of literature that highlights the positive role of Global Value Chain (GVC) integration in enhancing export performance in ASEAN economies. In particular, the estimated coefficient for the overall GVC participation index (GVC_{it}) is positive and statistically significant across all model specifications. This finding reinforces conclusions from earlier studies such as Ndubuisi and Owusu (2021), who reported that increased GVC engagement is positively associated with export upgrading and deeper trade integration in developing countries. The robust effect observed in the fixed effects model suggests that participation in international production networks continues to serve as an important channel for trade expansion within ASEAN, consistent with the theoretical expectation that GVC involvement allows countries to leverage foreign inputs, access new markets, and climb the value-added ladder.

When GVC participation is separated into forward and backward components, the study finds that backward participation, defined as the share of foreign value added in a country's exports, is statistically significant and positively associated with export performance, while forward participation is not. This result is consistent with much of the recent empirical literature. Jangam and Rath (2021) highlight that backward participation contributes more directly to export performance by connecting domestic firms to later stages of production that are closely tied to global demand and final goods trade. Likewise, Purwono et al. (2022) argue that stronger backward linkages are more likely to promote export diversification and scale among ASEAN firms. These findings suggest that for ASEAN countries, many of which act as intermediate or final assemblers in regional and global supply chains, the ability to import high quality intermediate goods is central to boosting export volumes and competitiveness.

The insignificant effect of forward participation in the present analysis is also consistent with earlier studies reporting mixed or weak outcomes for this dimension. It may reflect structural characteristics of ASEAN economies, where relatively few firms occupy upstream positions in global production networks, or where domestic value added is exported as raw materials or low-complexity components. These upstream exports may not yield the same intensity or sophistication in export performance metrics as backward-linked activities, particularly when value added is minimal or when further transformation occurs abroad.

Another point of convergence with the literature lies in the importance of macroeconomic controls. Although not the primary focus of this discussion, the inclusion of variables such as GDP, population, inflation, and imports enhances the robustness of the fixed effects estimations. While these factors did not significantly alter the coefficient on GVC_{it}, their inclusion aligns with recommendations in prior research (e.g., Veeramani and Dhir (2022)) to control for economic scale and openness when estimating the export effects of GVC integration.

Taken together, the results of this study affirm the consensus view in the literature that backward participation serves as a more effective and consistent channel for enhancing export performance in ASEAN countries compared to forward participation. This has important policy implications. To strengthen export capacity, ASEAN economies should focus on lowering barriers to importing intermediate goods, improving customs efficiency, and supporting logistics infrastructure that facilitates access to upstream production inputs. Doing so would not only enhance participation in downstream value-added activities but also sustain competitiveness in increasingly fragmented global production networks.

5. Conclusion and Policy Implications

This study examined the effect of Global Value Chain (GVC) participation on export performance in eight ASEAN countries from 2000 to 2020 using panel data methods. The analysis considered both overall GVC participation and its two components, forward and backward linkages, while controlling for macroeconomic variables including GDP, population, inflation, and imports.

The results show that overall GVC participation is positively and significantly linked to export performance, indicating that deeper integration into global production networks contributes to export growth in ASEAN. When disaggregated, backward participation, measured as the share of foreign value added in exports, is positive and significant, while forward participation is not. This suggests that export gains are concentrated in later stages of production that depend on imported intermediates rather than in earlier supply contributions.

The policy implications are clear. Governments should facilitate access to imported intermediate goods by reducing tariffs and easing restrictions on essential inputs. Lower costs and greater availability of high-quality components can raise productivity, improve product quality, and help firms meet international standards. Reliable access to global inputs also supports integration into

supply chains and strengthens competitiveness in world markets.

Beyond trade liberalization, targeted facilitation policies are needed to support sectors with strong potential for backward integration and export growth. These measures could include incentives for firms in strategic industries, investments in modern production technologies, and capacity building programs that prepare enterprises to meet global requirements. Improved customs systems, logistics infrastructure, and regional cooperation would further reinforce ASEAN's role in global production.

Taken together, the findings highlight that while overall GVC participation benefits ASEAN exports, backward participation is the more effective driver. Strengthening participation in later stages of production, while gradually building capacity for earlier contributions, will allow ASEAN economies to capture greater export benefits and ensure resilience in a changing global trade environment.

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