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The ASEAN Export Paradox: Endogenous Resilience and Structural Transformation in Southeast Asian Trade Dynamics

ABSTRACT

This study analyzes the dynamic relationships between ASEAN exports and key macroeconomic variables: imports, GDP, GDP per capita, inflation and FDI, over 2013–2022 using VECM framework. Results reveal that ASEAN exports are highly endogenous, with 98.21% of variability explained by internal dynamics. A temporal dichotomy is identified: imports positively affect exports in the short run through supply chain complementarity, but negatively in the long run. An "Economic Development Paradox" is observed whereby rising GDP reduces export orientation as domestic markets expand. Granger causality analysis shows exports temporally precede GDP, consistent with the export-led growth hypothesis. FDI exhibits a positive directional long-run relationship with exports, functioning as a structural catalyst. Findings carry policy implications for strategic FDI attraction, balanced development, and regional value chain integration. Mixed integration orders in the data are acknowledged and ARDL Bounds Testing is recommended as a robustness check for future research.

Keywords: International trade, Economic integration, Export, VECM, ASEAN
JEL Classification: F14, F15, F43, C33, F21

INTRODUCTION

International trade development in the Association of Southeast Asian Nations (ASEAN) region has shown significant dynamics over the last decade (2013-2022). This region has experienced progressive economic transformation, characterized by consistent increases in export and import volumes, despite facing various global challenges such as commodity price fluctuations and supply chain disruptions due to the COVID-19 pandemic (Dergiades, Milas and Panagiotidis, 2022; Quaralia, 2022). As a regional economic entity, ASEAN holds a strategic position in the global trade architecture, making it the fifth largest trading bloc in the world (ASEAN Secretariat, 2023; Wang *et al.*, 2024). This significant improvement demonstrates the importance of understanding export determinants and their interactions with other macroeconomic variables in the context of regional economic development.

Exports have become the main driving force of economic growth in ASEAN

countries, progressing beyond ASEAN+1 FTA, and can be mutually beneficial for ASEAN and East Asian countries. Through the RCEP agreement, it is expected to become a gradual driving force to overcome the economies of ASEAN countries in the post-pandemic period through jointly established rules or regulations (Adila, Ip and Ipol, 2023). The complex linkages between exports and imports, GDP, GDP per capita, inflation rates, and Foreign Direct Investment (FDI) illustrate multidimensional economic dynamics. Previous empirical studies have indicated that export activities not only drive market expansion and production efficiency but also facilitate technology and knowledge transfer essential for productivity improvement (Ahn, 2005; Sultanuzzaman *et al.*, 2019). However, the causal relationships and transmission mechanisms between these variables have not been comprehensively understood, especially in the current post-pandemic context marked by fundamental changes in global trade patterns.

The phenomenon of increasing intra-ASEAN and extra-ASEAN trade during the 2013-2022 period shows interesting patterns to study. Total ASEAN trade increased from approximately 2,500 billion USD in 2013 to 3,846.2 billion USD in 2022. Extra-ASEAN trade dominated with a value of 2,989.7 billion USD, while intra-ASEAN trade reached 856.5 billion USD in 2022. The impact of the COVID-19 pandemic was evident in the decline in trade in 2020, followed by a significant recovery in 2021. Meanwhile, ASEAN's trade balance recorded a surplus of 92.7 billion USD in 2021 before declining to 78.1 billion USD in 2022, reflecting global trade dynamics and the adaptation of ASEAN countries to changes in the international economy (ASEAN Secretariat, 2023). This volatility emphasizes the importance of comprehensive analysis of long-term relationships and short-term adjustment mechanisms among key economic variables, especially in facing external shocks and global trade trends.

Despite the existence of various studies on ASEAN trade determinants, the

current understanding remains fragmented and inadequate to explain the complexity of relationships between exports and other macroeconomic variables. The majority of previous research has focused on bilateral or sector-specific analysis (Habibi and Sishidayanti, 2023). Limitations include static approaches in econometric models and identification of structural dynamics (Afriyanti and Putri, 2021; Endang and Susilo, 2022). Additionally, the integration of pandemic disruptions and digital transformation remains minimal. Methodological challenges include the lack of dynamic analysis for causality between variables..

Against this background, this research aims to analyze the dynamic relationship between ASEAN exports and key macroeconomic variables (imports, current price GDP, GDP per capita, inflation rates, and FDI) during the 2013-2022 period. Specifically, this research addresses the following research questions: (1) Do long-run cointegration relationships exist between ASEAN exports and the selected macroeconomic variables? (2) What are the short-run adjustment dynamics and error correction mechanisms governing ASEAN export behavior? (3) As a complementary exploratory analysis, what directional temporal patterns exist between exports and macroeconomic variables? (4) How do ASEAN exports respond to structural shocks in other macroeconomic variables, and which variables contribute most to export variability? These questions are addressed through a Vector Error Correction Model (VECM) framework, which is specifically designed to capture both long-run equilibrium relationships and short-run adjustment dynamics simultaneously. The Granger causality analysis serves as a supplementary tool to explore directional patterns beyond what VECM coefficients reveal, and is not used as the primary basis for hypothesis testing given the established theoretical foundation of the study.

The contribution of this research lies in two key aspects. First, it provides a comprehensive analysis of ASEAN export determinants across the pre-

pandemic, pandemic, and recovery phases (2013–2022), offering a holistic perspective on regional trade dynamics. Second, the combination of VECM, IRF, and FEVD offers an integrated analytical framework to simultaneously evaluate long-run equilibrium relationships, short-run adjustment mechanisms, export sensitivity to shocks, and the dominant factors driving export variability.

METHOD

This study adopts a quantitative approach with panel data econometric methods to analyze the intertemporal relationship between ASEAN exports and macroeconomic factors. The data encompasses 10 ASEAN member countries (Indonesia, Malaysia, Singapore, Thailand, Philippines, Vietnam, Brunei Darussalam, Laos, Myanmar, Cambodia) during the 2013-2022 period. While the raw data originates from a panel structure (10 countries × 10 years), this study pools the observations into a regional time series of 100 observations and analyzes them at the ASEAN aggregate level. This approach treats ASEAN as a single integrated economic entity rather than a collection of competing national economies, which is consistent with the study's research questions that concern regional-level export dynamics rather than cross-country variation. This pooled approach is preferred over static panel regression (CEM/FEM/REM) because: (1) the research questions require dynamic cointegration and short-run adjustment analysis that static panel models cannot capture (Lütkepohl, 2005); (2) T=10 per country is too short for cointegration estimation, pooling to T=100 provides sufficient degrees of freedom (Enders, 1995); and (3) all ASEAN members share common structural drivers, the same major trading partners, global commodity cycles, and AEC institutional framework, generating the common stochastic trends that underpin regional cointegration analysis.

Data Types and Sources

This research uses annual secondary data from official sources such as ASEAN Statistics, World Bank, and IMF. The analyzed variables include ASEAN Exports (dependent variable), ASEAN Imports, current prices GDP , GDP per capita, inflation rate, and FDI inward flows as independent variables.

Model Specification

The Vector Error Correction Model (VECM) is the primary analytical framework of this study. The VECM is selected for two primary substantive reasons. First, it simultaneously captures long-run equilibrium relationships and short-run adjustment dynamics within a single unified framework, which directly corresponds to the research questions of this study. Second, VECM is particularly suited for multivariate time series involving multiple interdependent macroeconomic variables where cointegration is theoretically expected (Lütkepohl, 2005). It must be acknowledged, however, that the standard Johansen VECM procedure requires all variables in the system to be integrated of order one I(1), a condition that is not fully satisfied in this study. The unit root tests reveal that the system contains variables of mixed integration orders: EXPORT, IMPORT, and INFL are stationary at level (I(0)); DGDP_CAP and DFDI are I(1); and GDP_CP requires second differencing (I(2)). To address this, variables of higher integration order were pre-transformed prior to estimation GDP_CP was entered as its second difference (D2GDP_CP), so that all inputs to the VECM are rendered stationary. This pre-transformation mitigates the risk of spurious regression but introduces an important interpretive limitation: the long-run coefficients associated with D2GDP_CP reflect the relationship between exports and the acceleration of GDP rather than its level, which requires careful economic interpretation. Furthermore, the inclusion of I(0) variables alongside pre-differenced series in a Johansen framework is technically non-standard, as the cointegrating relationships identified are defined over the transformed rather than original variables. Researchers should interpret the cointegration results as reflecting

equilibrium relationships among the pre-transformed variables, not among the original economic levels. The theoretically preferred approach for a system with mixed I(0), I(1), and I(2) variables is the Autoregressive Distributed Lag (ARDL) Bounds Testing procedure of Pesaran and Shin (1998), which is robust to mixed orders of integration and does not require pre-differencing. The VECM estimation reported here is thus best understood as an exploratory framework that identifies dynamic adjustment patterns in the transformed system; the ARDL Bounds Test is recommended as a robustness check and is proposed as an extension for future research. VECM selection follows the standard sequential decision path: static panel regression was rejected as it cannot capture dynamic cointegration and adjustment mechanisms; unit root tests confirmed non-stationarity; and the Johansen test confirmed 6 cointegrating equations (Table 3), justifying VECM. Cointegration at the ASEAN aggregate level is economically meaningful because all member economies face common structural shocks and the AEC institutional framework, generating common stochastic trends, not convergence of individual export levels, but stability of the regional system as a whole, a distinction that is both theoretically defensible and empirically confirmed by the Johansen test results.

The mathematical specification of the VECM model is as follows:

$$\mathbf{\Delta Yt = \alpha + \Pi Yt - 1 + i = 1 \sum p - 1 \Gamma i \Delta Yt - i + \epsilon t} \quad \mathbf{(1)}$$

Explanation:

(1) $\mathbf{\Delta Yt}$: vector of changes from variables in the model.
(2) α : vector of constants.
(3) $\mathbf{\Pi Yt - 1}$: error correction term (ECT) that captures the long-term relationship.
(4) $\sum i = 1p - 1\Gamma i\Delta Yt - i$: reflects short term dynamics.
(5) $\boldsymbol{\epsilon t}$: vector of residuals assumed to be white noise.

Data Analysis Stages

Data analysis is conducted through several systematic stages:

(1) Unit root test: Uses Augmented Dickey-Fuller (ADF), Phillips-Perron

(PP), and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) to avoid spurious regression (Enders, 1995).

(2) Optimal Lag Determination: Uses Akaike information criterion (AIC), Schwarz (SC), and Hannan-Quinn (HQ) to ensure the model has the appropriate dynamic structure (Lütkepohl, 2005).

(3) Johansen Cointegration Test: Identifies the existence of long-term equilibrium relationships among research variables.

(4) VECM Model Estimation: Based on cointegration test results, estimation is performed to obtain long-term parameters and short-term adjustment coefficients.

(5) Granger Causality Test: Applied as a complementary exploratory analysis to identify the direction of temporal precedence between exports and macroeconomic variables. It is important to note that Granger causality does not establish structural causation; rather, it examines whether past values of one variable improve the prediction of another. Given that the theoretical foundation of this study is grounded in international trade theory, the VECM coefficients serve as the primary basis for evaluating hypothesized relationships. The Granger test is employed additionally to detect directional patterns in the data that may not be fully visible from VECM coefficients alone (Granger, 1969).

(6) Impulse Response Function (IRF) Analysis: Analyzes export responses to shocks in macroeconomic variables.

(7) Forecast Error Variance Decomposition (FEVD): Measures the relative contribution of each variable to ASEAN export variability (Pesaran and Shin, 1998).

All statistical analyses are conducted using EViews 13 software, which is capable of handling the complexity of multivariate time series models and panel data (IHS Global Inc., 2021). This methodological approach aligns with previous studies in international trade and (Rana, 2007; Narayan and Smyth, 2009).

RESULTS AND DISCUSSION

RESULTS

Unit Root Test

Based on the test results (Table 1), the variables exhibit different integration orders. EXPORT, IMPORT, and INFL are stationary at level I(0) at 5% significance across ADF, PP, and KPSS tests. DGDP_CAP and FDI achieve stationarity after first differencing (I(1)) at 1% significance. GDP_CP requires second differencing (I(2)) at 1% significance and is therefore entered into the model as D2GDP_CP to ensure stationarity prior to estimation. This mixed-order outcome is an important methodological finding: the presence of I(0), I(1), and I(2) variables in the same system means that the strict assumptions of the Johansen VECM, which requires all variables to be I(1), are not fully met. As noted in the Method section, this limitation implies that the ARDL Bounds Testing approach (Pesaran, Shin, and Smith, 2001) would be the theoretically preferred estimator for this system. The pre-differencing of GDP_CP (to D2GDP_CP) is applied to prevent spurious regression, but researchers should note that the resulting long-run coefficients describe relationships in the transformed rather than the original variable space, requiring careful interpretation. The presence of non-stationary components in the system, particularly GDP_CP (I(2)) and GDP_CAP and FDI (I(1)), confirms that a static panel regression such as CEM, FEM, or REM would be susceptible to spurious regression. This supports the decision to apply a dynamic time series framework rather than static panel estimation. However, as noted in the Method section, the mixed integration orders (I(0), I(1), I(2)) simultaneously present in the system mean that VECM's strict I(1) requirement is not fully met, and ARDL Bounds Testing would be the preferred approach for a system of this composition.

This diversity of integration orders implies the possibility of cointegration relationships among variables.

Table 1: Unit root tests: ADF, PP and KPSS.

Variable	Prob.	ADF Test	PP Test	KPSS Test
		Intercept & Trend	Intercept & Trend	Intercept & Trend
EXPORT	0.0477	-3.475459**	-3.475459**	0.052762
IMPORT	0.0472	-3.479397**	-3.511878**	0.056818
D2GDP CP	0.0000	-11.41374***	-90.45036***	0.063178
DGDP CAP	0.0000	-10.34651***	-66.64074***	0.451026 ***
INFL	0.0000	-7.236590***	-7.322224***	0.162824 **
DFDI	0.0000	-9.60048***	-74.24469***	0.035388

Notes: (1) ***,**, and * respectively indicate significance at the 1%, 5% and 10% levels; (2) D represents the first difference

Source: Data processed with Eviews 13

Selection of Optimal Lag Order

Based on the minimum Akaike information criterion (AIC), Schwarz (SC), and Hannan-Quinn (HQ) values in Table 2, **lag 1** is identified as the optimal specification. This suggests that transmission dynamics within the ASEAN export system occur rapidly within a single observation period. Consequently, lag 1 serves as the foundation for the VECM estimation, as longer lags do not provide significant additional information.

Table 2 : Selection of optimal lag order

LogL	LR	FPE	AIC	SC	HQ
-6036.511	NA	5.16e+46	124.5879	124.7471	124.6523
-5848.013	349.7904*	2.23e+45*	121.4436*	122.5584*	121.8943*

* denotes the optimal lag order

Data processed with Eviews 13

Johansen Cointegration Test

In the Unrestricted Cointegration Rank Test (Trace), 6 cointegrating relationships are identified at the 5%

significance level (Table 3), as indicated by trace statistics exceeding critical values for the first 6 cointegrations. This confirms that variables including exports, imports, FDI, inflation, and economic growth share stable long-run linkages and do not move independently within the economic system.

These relationships operate at the aggregate regional level, driven by common structural forces across ASEAN economies — shared dependence on global demand (China, US, EU), exposure to commodity price cycles, and AEC institutional harmonization. Importantly, this does not imply convergence of individual countries' export levels, but rather that pooled regional macroeconomic variables move together in long-run equilibrium.

This finding completes the sequential justification for the VECM: unit root tests confirmed non-stationarity, cointegration tests confirmed long-run equilibrium among pre-transformed variables, and VECM is thus employed as the appropriate estimator — with integration-order limitations acknowledged in the methodology.

Table 3: Results of Johansen co-integration test.

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.** Critical Value
None *	0.659045	278.8024	95.75366	0.0000
At most 1 *	0.519398	175.5059	69.81889	0.0000
At most 2 *	0.443025	105.1652	47.85613	0.0000
At most 3 *	0.254373	48.98258	29.79707	0.0001
At most 4 *	0.158005	20.80367	15.49471	0.0072
At most 5 *	0.043739	4.293499	3.841465	0.0382

Trace test indicates 6 cointegrating equation(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values
Source: Data processed with Eviews 13

VECM

The VECM estimation results as shown in Table 4 and Table 5 reveal complex dynamics in the ASEAN export ecosystem. Table 4 shows the long-term cointegration relationship, where ASEAN exports are negatively and significantly influenced by imports (coefficient -1.491) and economic growth indicators (D2GDP_CP: -5.819; DGDP_CAP: -19.405) at the 1% significance level.

Table 4: VECM long-term co-integration relationships

	EXPORT	IMPORT	D2GDP_CP	DGDP_CAP	INFL	DFDI	Cons
ecm1	1	-1491***	-5.819***	-19.405***	-1844.861	17.402	59409.21
		[-3.32011]	[-12.2056]	[-1.39293]	[-0.10874]	[1.89865]	

Denotes:
***, **, and * respectively indicate significance at the 1%, 5%, and 10% levels.
T-statistics are in square brackets [ ].
Source: Data processed with Eviews 13

Table 5 : VECM short-term co-integration relationships

	D(EXPORT)	*D(IMPORT)*	*D(D2GDP_CP)*	*D(DGDP_CAP)*	*D(INFL)*	*D(DFDI)*
ecm1	-0.00578	-0.00360	0.013278	-0.010443	-7.40E-08	-0.00775**
(CointEq1)	[-0.46219]	[-0.30350]	[0.40355]	[1.98134]	[-0.087]	[-2.38215]
D(EXPORT-1)	-0.39596	0.42702	-0.32978**	-1.56645***	1.08645***	0.28434*
	[-1.05433]	[1.19548]	[-2.06259]	[-3.09781]	[2.90519]	[1.87465]
D(IMPORT-1)	0.64873**	-0.70422***	0.10306	1.68045	1.58405***	0.21028
	[2.16025]	[-5.50131]	[0.50751]	[1.21928]	[4.35387]	[1.2053]
D(D2GDP_CP-1)	-0.00263	0.004379	0.316740	-0.007813	-7.12E-07	-0.12083
	[0.05771]	[1.00762]	[3.81846]	[1.21928]	[-0.35387]	[1.2053]
D(DGDP_CAP-1)	0.19375	-0.21666	4.65012**	-0.34072	-2.68E-05	0.48567
	[0.22825]	[-0.70034]	[2.21951]	[-1.8431]	[-4.0657]	[2.1982]
D(INFL-1)	1234.24	497.00***	1200.98**	1045.75	-3.10E-09	476.29
	[1.579.83]	[3.159.41]	[2.480.26]	[1.308.75]	[-1.41472]	[3.069.48]
D(DFDI-1)	-0.56347	-1.39346	[2.480.26]	1.08010	2.56E-05	-0.47206
	[1.27591]	[1.47548]	[1.37581]	[1.14371]	[0.32102]	[2.31026]
Cons	4752.15	3905.21	215.45	-406.21	0.01324	3.10268
	[6.130.78]	[4.429.72]	[15.379.84]	[8.417.72]	[0.40878]	[23.112.62]

Denotes:
***, **, and * respectively indicate significance at the 1%, 5%, and 10% levels.
T-statistics are in square brackets [ ].

Source: Data processed with Eviews 13

This phenomenon indicates an "Economic Development Paradox" where domestic economic growth tends to reduce export orientation as domestic markets strengthen. Conversely, Table 4 also reveals that FDI shows a positive relationship with exports (coefficient 17.402) although not statistically significant, confirming the role of FDI as a structural catalyst in export capability.

Based on Table 5, the error correction mechanism analysis reveals that only FDI has significant adjustment to long-term disequilibrium (coefficient -0.00775) at the 5% significance level. Exports and other variables show insignificant ECM coefficients, indicating structural rigidity in adjustment toward equilibrium. In the short-term dynamics also shown in Table 5, lagged first-differenced imports (D(IMPORT−1), coefficient 0.64873, significant at 5%), reflecting supply chain complementarity whereby import activity in the preceding period supports subsequent export expansion. Separately, lagged export changes (D(EXPORT−1)) positively and significantly influence inflation (D(INFL), coefficient 1.08645, significant at 1%), indicating that export-driven demand pressures transmit into domestic price levels with a one-period lag. These results indicate that in the long run, ASEAN export dynamics are governed by the cointegrating long-run equilibrium relationship, while in the short run they are shaped by the momentum of trade flows from the preceding period. These findings are consistent with the identified endogenous characteristics of ASEAN exports and carry substantial implications for regional trade policy strategies.

Granger Causality Test

As a complementary exploratory analysis, the Granger causality test results in Table 6 reveal that imports have a causal relationship with exports (p=0.0843) at the 10% significance level.

Table 6: Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.
IMPORT does not Granger Cause EXPORT	99	3.04236	0.0843
EXPORT does not Granger Cause IMPORT		1.77867	0.1855
D2GDP_CP does not Granger Cause EXPORT	97	0.06944	0.7927
EXPORT does not Granger Cause D2GDP_CP		6.72680	0.0110
DGDP_CAP does not Granger Cause EXPORT	98	0.09135	0.7631
EXPORT does not Granger Cause DGDP_CAP		3.10412	0.0813
INFL does not Granger Cause EXPORT	99	0.42445	0.5163
EXPORT does not Granger Cause INFL		2.38061	0.1261
DFDI does not Granger Cause EXPORT	98	0.01630	0.8987
EXPORT does not Granger Cause DFDI		2.92260	0.0906

Source: Data processed with Eviews 13

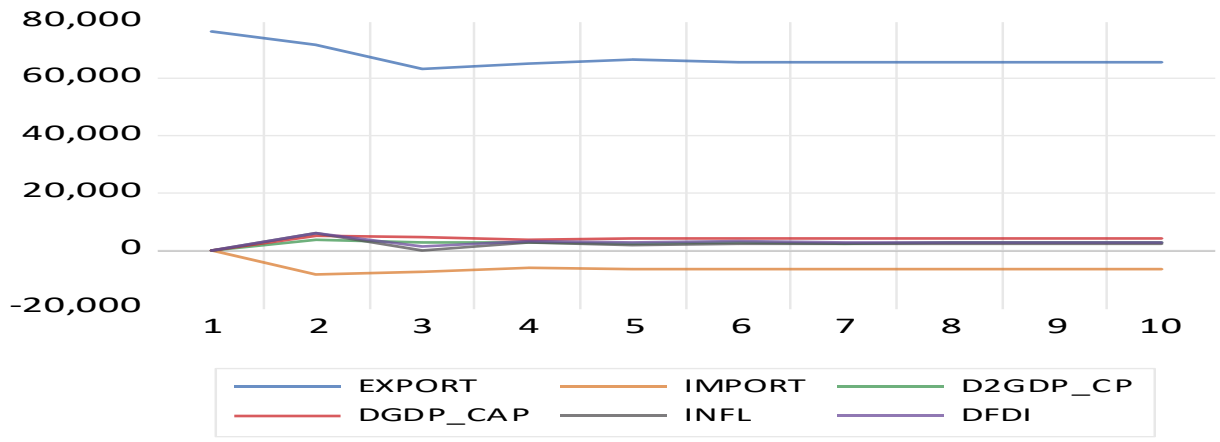
The most noteworthy directional pattern is that exports temporally precede GDP (p=0.0110, significant at 5%), while the reverse direction is not supported. This directional pattern is consistent with the export-led growth thesis (noting that Granger identifies temporal precedence, not structural causality). However, as Ben-Salha, Abid and El Montasser (2023) demonstrate through analysis of eleven emerging economies, the ELG relationship is not universal — it exhibits nonlinearity and country-specific heterogeneity, suggesting that the directional temporal pattern observed here should be interpreted as region-specific rather than a general law of trade dynamics. Additional directional patterns observed include exports temporally preceding GDP per capita (p=0.0813, 10% level) and FDI (p=0.0906, 10% level), while imports temporally precede exports (p=0.0843, 10% level). These patterns suggest that ASEAN export dynamics tend to lead other macroeconomic variables, with imports as the main exception that temporally precedes exports — complementing the VECM findings with a short-run sequencing perspective.

Impulse Response Analysis

The Impulse Response Function (IRF) test results show the dynamic response of macroeconomic variables to innovations or shocks in the system. Based on the presented graphs, several significant relationship patterns can be

identified. Exports show a fairly sharp decline in the initial period after a shock, reaching the lowest point in periods 2 to 3, before then stabilizing at a lower value than the initial position. This indicates that innovation shocks provide a negative short-term effect that then stabilizes the system at a new equilibrium

Figure 1: Response of EXPORT to innovations



Source: Processed with Eviews 13

The response of variables to import shocks shows a different pattern, where an initial decline is followed by gradual adjustment leading to a relatively stable negative value. Meanwhile, the DGDP_CP, DGDP_CAP, INFL, and DFDI variables show positive responses in the initial period after shocks, albeit with smaller magnitudes compared to export and import variables.

It is important to note that most variables reach new equilibrium conditions after period 5, which shows that the effects of innovation shocks tend to persist in the medium to long term in the analyzed economic system. These findings imply that policies focusing on increasing innovation can have a sustainable impact on export performance and other macroeconomic components.

Variance Decomposition

The variance decomposition analysis on the EXPORT variable reveals interesting

findings regarding the resilience of the export sector to external shocks. Export dynamics are dominated by endogenous factors, with a contribution of 100% in the initial period that only slightly decreases to 98.21% by period 10.

Table 7: Variance Decomposition of EXPORT

Period	S.E.	EXPORT	IMPORT	D2GDP_CP	DGDP_CAP	INFL	DFDI
1	76606.84	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	105916.1	98.37172	0.642734	0.122662	0.237645	0.311442	0.313799
3	123826.4	98.22883	0.849594	0.133424	0.317776	0.227883	0.242499
4	140142.1	98.24336	0.847928	0.134301	0.310337	0.219189	0.244885
5	155370.8	98.23939	0.885471	0.130435	0.324622	0.191988	0.228099
6	168972.7	98.22445	0.904995	0.136261	0.330054	0.180362	0.223876
7	181538.0	98.22047	0.922372	0.135624	0.336322	0.168345	0.216870
8	193301.7	98.21709	0.932977	0.136213	0.339264	0.160774	0.213682
9	204419.4	98.21445	0.942312	0.136835	0.342422	0.154075	0.209903
10	214936.7	98.21156	0.949813	0.137237	0.344792	0.149023	0.207576

Source:

This phenomenon reflects the characteristics of exports that tend to be "self-driven" with high resistance to fluctuations in other macroeconomic variables. What is interesting is that the IMPORT variable shows the greatest influence among external variables, yet its contribution remains minimal (only 0.95% in period 10). This breaks the common assumption about high dependence between exports and imports in open economies. Meanwhile, the DGDP_CAP, D2GDP_CP, INFL, and DFDI variables each provide only marginal contributions below 0.35%.

The crucial implication of these findings is that policy interventions aimed at stimulating exports through manipulation of traditional macroeconomic variables are likely to produce limited effects. Policymakers instead need to focus efforts on export-specific factors such as production capacity, product competitiveness, and

access to international markets to drive sustainable export growth.

DISCUSSION

Endogenous Nature of ASEAN Exports: Revisiting the Export-Led Growth Paradigm

Variance decomposition analysis reveals a fundamental characteristic of ASEAN exports: their highly endogenous nature. Approximately 98.21% of export variability is explained by its own internal dynamics, with external macroeconomic variables (imports, GDP, inflation, and FDI) collectively contributing less than 2% across all ten forecast periods. This finding suggests that ASEAN export performance is primarily driven by structural and institutional factors embedded within the regional economy itself — including intra-regional production networks, established trade infrastructure, and region-specific industrial capabilities — rather than being responsive to short-term fluctuations in macroeconomic aggregates. The conventional view that export performance in developing economies is externally driven therefore requires qualification in the ASEAN context, where decades of integration have cultivated an increasingly self-sustaining export ecosystem. Sermcheep (2019) supports this interpretation by demonstrating that both goods and services exports significantly contribute to GDP growth across ASEAN member states, reinforcing the view that export activity is deeply embedded in the region's structural economic architecture rather than merely reactive to external conditions.

This endogenous characteristic correlates with the region's strategic focus on enhancing intra-ASEAN trade and developing regional value chains over the past decade. The presence of the ASEAN Economic Community (AEC), established in 2015, has deepened internal trade relationships through tariff elimination, regulatory harmonization, and the facilitation of factor mobility, collectively reducing export vulnerability to external macroeconomic shocks. The low variance contribution of FDI, inflation, and GDP (each below 0.35% by period

10) confirms that ASEAN's export base operates with considerable autonomy from short-run macroeconomic fluctuations, consistent with Prasetyo and Susandika (2022), who documented the self-reinforcing export-growth nexus in ASEAN and emphasized that export capacity has become structurally embedded in the regional economic architecture. Interestingly, Tonsakunthaweeteam (2024) reinforces this perspective through research on the effects of the ASEAN-China Free Trade Agreement, which demonstrates trade creation as part of the increasingly self-reliant complexity of regional trade relationships.

The complementary Granger causality analysis adds a directional dimension by revealing that exports temporally precede economic growth (p-value 0.0110), while the reverse pattern is not observed. This directional pattern is consistent with the export-led growth thesis from international trade theory and reinforces the interpretation that, in the ASEAN regional context, export dynamics tend to lead macroeconomic outcomes rather than merely respond to them. In a parallel study, Prasetyo and Susandika (2022) identified a unidirectional causal relationship where exports significantly influence economic growth and emphasized export expansion as a key factor for long-term economic growth in ASEAN.

Temporal Dichotomy: Short-term Adaptability vs. Long-term Structural Constraints

The results detect an interesting temporal dichotomy in ASEAN export dynamics. In the short term, imports positively affect exports (coefficient 0.64873, significant at 5%), indicating complementarity through regional supply chain integration. On the other hand, in the long term, imports negatively impact exports (coefficient -1.491, significant at 1%), suggesting possible crowding-out effects or competitive import substitution. An empirical study by Yuliadi, Basuki and Ayuningtyaswati (2024) reinforces these findings by demonstrating the positive effects of imports on export performance in ASEAN countries and emphasizing

the importance of monitoring economic indicators to stabilize export capabilities.

A complementary short-run dynamic is also observed: lagged export changes (D(EXPORT−1)) positively and significantly influence inflation (D(INFL), coefficient 1.08645), indicating that export-driven demand pressures transmit into domestic price levels with a one-period lag. These opposing temporal patterns highlight what might be called a "temporal economic paradox" in ASEAN trade relationships.

Significantly, the error correction mechanism for exports (ECM coefficient -0.00578, t-statistic -0.46219) is statistically insignificant, indicating that ASEAN exports do not exhibit a statistically meaningful tendency to self-correct toward long-run equilibrium following short-term deviations. This structural rigidity indicates that ASEAN exports persist primarily along their own historical trajectory, not pulled back by macroeconomic equilibrating forces. Only FDI demonstrates a significant error correction mechanism (coefficient -0.00775, significant at 5%), suggesting that foreign investment activity is more responsive to long-run disequilibrium signals than exports themselves. This differential adjustment speed is consistent with the broader literature on structural adjustment in developing economies, where trade volumes tend to exhibit persistence and inertia relative to capital flows (Lütkepohl, 2005; Enders, 1995).

FDI as a Catalyst: Direct and Indirect Effects on Export Performance

Long-term VECM results indicate that FDI has a positive but statistically insignificant long-run relationship with exports (coefficient 17.402, t-statistic 1.899), suggesting a directional rather than conclusive effect. While the coefficient sign is consistent with the theoretical expectation that FDI enhances export capacity through technology transfer and integration into global value chains, the absence of statistical significance at conventional levels warrants caution in interpretation, a relationship supported across a large cross-country sample by Iamsiraroj (2016), whose meta-analysis of 140

countries confirms a robust positive FDI-growth link operating primarily through export and productivity channels . This result may reflect the heterogeneity of FDI types across ASEAN economies — with some FDI oriented toward domestic market consumption rather than export production — which could dilute the aggregate export-enhancing effect. Notwithstanding the lack of individual significance in the **long-run equation,** the data also shows a significant error correction mechanism for FDI (coefficient -0.00775), signaling its active role in restoring long-term equilibrium in the export system. A study by Lee and Huruta (2020) reinforces this directional finding by demonstrating a positive association between FDI and exports, affirming the theoretical role of FDI in developing export capabilities (Sunde, 2017). Similarly, Ahmad, Draz and Yang (2018) demonstrate a bidirectional causality between FDI, exports, and economic growth across ASEAN5 economies, further affirming the mutually reinforcing dynamic between foreign investment and export performance at the regional level. Collectively, the significant ECM coefficient for FDI and its positive long-run direction are consistent with the interpretation of FDI as a "structural catalyst" — one whose influence on exports operates through slower-moving channels such as technology transfer, knowledge spillovers, and value chain integration — rather than through short-run price or volume mechanisms. Future research with sector-disaggregated FDI data may be needed to resolve the question of statistical significance at the aggregate level.

The complementary Granger analysis also reveals that exports temporally precede FDI (p-value 0.0906, significant at 10%), suggesting a directional pattern where export performance attracts subsequent investment flows. This bidirectional relationship — FDI supporting exports in the long run through technology transfer, while exports attract FDI in the temporal sequence — creates a mutually reinforcing dynamic that strengthens ASEAN's long-term export capacity.

Economic Development Paradox: Growth versus Export Orientation

Perhaps the most contradictory aspect of the statistical analysis is the negative long-term relationship between economic growth indicators (GDP current price and GDP per capita) and exports. The coefficient calculations (-5.819 for D2GDP_CP and -19.405 for DGDP_CAP, both significant at 1%) indicate that as ASEAN economies grow and domestic incomes increase, their export orientation tends to decrease.

This phenomenon, which might be called the "Economic Development Paradox," likely reflects the natural evolution of ASEAN economies toward more consumption-driven growth models as development increases. As domestic markets expand and consumer purchasing power increases, the relative importance of export markets may decline, reflecting patterns also observed in more advanced economies. This trajectory is consistent with the structural transformation literature, which documents that as per capita income rises, economies shift their growth drivers from external demand toward domestic consumption and services — a pattern increasingly visible across upper-middle-income ASEAN members such as Malaysia, Thailand, and Indonesia (Adila, Ip and Ipol, 2023). The strongly negative coefficient on DGDP_CAP (-19.405, significant at 1%) suggests that rising household incomes in particular are associated with a reorientation of productive capacity toward domestic markets. This may partly reflect the so-called "flying geese" dynamic, wherein maturing ASEAN economies gradually cede labor-intensive export production to lower-income neighbors while transitioning toward higher-value domestic activities**.** The intensity of this negative relationship indicates that ASEAN economies may be experiencing a "premature deindustrialization" phenomenon, where economies shift to service sectors before manufacturing exports reach full maturity. This pattern poses strategic challenges for ASEAN's long-term development model, especially given the region's historically export-oriented growth strategy. Faroh

(2019) further reinforces this interpretation by documenting how economic structure and sector composition shape development outcomes across different stages of growth, underscoring the need for strategic management of the transition from export-led to consumption-led growth in ASEAN. Vogiatzoglou (2019) provides corroborating evidence from ASEAN latecomer economies, showing through cointegration analysis that the composition of exports — rather than export volume alone — determines long-run growth impact, implying that the negative export-GDP relationship observed here may reflect structural shifts in the type rather than the quantity of trade activity.

Synthesis: Implications for ASEAN Trade Policy

Exports represent a major factor in ASEAN economic growth, yet the analysis results show that export performance in this region is influenced more by internal factors than external variables. Taken together, the four analytical dimensions of this study — long-run cointegration, short-run adjustment dynamics, directional temporal patterns, and variance decomposition, converge on a coherent picture of ASEAN export dynamics. ASEAN exports are structurally self-reinforcing, governed primarily by their own historical trajectory and shielded from short-run macroeconomic fluctuations. The temporal dichotomy between imports and exports, the Economic Development Paradox in the GDP relationship, and the structural catalyst role of FDI all point to the same policy implication: sustaining ASEAN export competitiveness requires strengthening the structural foundations of the export base — through targeted FDI attraction, regional value chain deepening, and institutional coordination under the AEC framework — rather than relying on conventional macroeconomic levers alone. These findings provide a unified empirical foundation for the policy recommendations presented in the conclusion (Nguyen-Van and Chang, 2021).

CONCLUSION

This study finds that ASEAN exports are characterized by high endogeneity (98.21% of variability explained by internal dynamics), structural self-reinforcement, and limited short-run responsiveness to external macroeconomic variables. The temporal directional pattern from exports to GDP is consistent with the export-led growth thesis, interpreted as indicative given the exploratory nature of the Granger analysis.

The "Economic Development Paradox" — a negative long-run GDP–export relationship as domestic markets strengthen — and the structural catalyst role of FDI are the study's two most policy-relevant findings, informing the recommendations below.

Based on these findings, we propose the following key policy recommendations:

1. **Strategic FDI Enhancement Framework**: ASEAN governments should attract FDI in export-enhancing sectors with technology transfer potential, using targeted incentives to strengthen export infrastructure and production capabilities.
2. **Balanced Development Strategy**: Policymakers should maintain export incentives alongside domestic market development to prevent premature deindustrialization as ASEAN economies grow.
3. **Regional Value Chain Integration**: ASEAN should deepen intra-regional value chains by reducing non-tariff barriers, harmonizing standards, and coordinating logistics infrastructure across member states.

This study has three methodological limitations. First, mixed integration orders (I(0), I(1), I(2)) mean the strict Johansen I(1) assumption is not fully met; results hold among pre-transformed variables rather than original levels. ARDL Bounds Testing Pesaran and Shin (1998) is recommended as a robustness check, as demonstrated by Saleem, Sial and Cheema (2023), who demonstrate that a nonlinear ARDL framework successfully captures

asymmetric export-growth dynamics that linear cointegration models may mask — a consideration directly applicable to the ASEAN context analyzed here. Second, the pooled approach does not capture country-level heterogeneity; Panel VECM methods are recommended for future research. Third, annual data over 2013–2022 limits observation count; higher-frequency or longer-horizon data would strengthen estimation.

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