Asian Economic and Financial Review
ISSN(e): 2222-6737
ISSN(p): 2305-2147
DOI: 10.55493/5002.v14i11.5228
Vol. 14, No. 11, 834-851.

URL: www.aessweb.com

Analysing Malaysian exports, capital, exchange rate, and income growth through the balance of payments constrained growth model

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Article History
Received: 28 May 2024
Revised: 3 October 2024
Accepted: 21 October 2024
Published: 15 November 2024

Keywords
ARDL
Capital
Exchange rate
Export
GDP
Malaysia.

JEL Classification:
F14; E32; F43.

ABSTRACT

This research examines Malaysian exports, capital, exchange rate, and income growth through the balance of payments constrained growth model. Malaysia's economy has grown slower in the last several years, as seen by the country's dropping goods exports, weaker ringgit, and decreased influx of foreign capital. This study examines potential economic constraints on Malaysia using the extended Balance of Payments Constrained Growth (BPCG) model, which calculates GDP growth by adding exports, foreign capital positions (FDI and FPI), and exchange rates using quarterly data from 2011 to 2022. The Autoregressive Distributed Lag (ARDL) method is used to estimate the model, and Fully Modified Ordinary Least Squares (FMOLS) and Dynamic Ordinary Least Squares (DOLS) are used to assess the model's robustness. The BPCG model places Malaysia's growth rate at 7.3%, which is higher than the country's actual growth rate of 4.6% for the research period. Policymakers should accelerate the New Industrial Master Plan and National Investment Master Plan 2030 to optimise this potential. These efforts aim to boost economic growth by sustaining foreign capital inflows and exports. Through comprehensive trade agreements, authorities should boost exports, market access, and global economic development.

Contribution/ Originality: This study is the first in Malaysia to utilise export and import data from Balance of Payments that exclude goods for processing and storage, as recommended by the Balance of Payments 6th edition manual. Additionally, it provides a novel viewpoint on the analysis by employing capital positions rather than capital flows.

1. INTRODUCTION

In order to broaden its economic base and foster its development, Malaysia implemented an export-driven growth strategy and pursued diversification in sectors including palm oil, forestry, petroleum, and manufacturing during the 1980s. From 1990 to 1997, the nation experienced a substantial increase in its annual Gross Domestic Product (GDP) growth rate, which surpassed 9.2%, as a result of this diversified approach (Reinhardt, 2000; Yusof, 2013). Despite showing economic resilience, Malaysia experienced economic slowdowns, particularly during the Asian Financial Crisis of 1997-1998 and the Global Financial Crisis of 2008-2009.

The COVID-19 pandemic of 2020 precipitated a significant economic downturn in Malaysia, leading to a 5.6% decline in GDP (DOSM, 2024b). Concurrently, the country faced substantial setbacks, including a 59% decrease in

Foreign Direct Investment (FDI), huge outflows of Foreign Portfolio Investment (FPI) totaling RM23.9 billion (DOSM, 2024a) and a 1.1% decrease in exports (Department of Statistics Malaysia (DOSM), 2023). Post-pandemic economic challenges continued into 2023, with a slower economic growth rate of 3.7%, below the government's target of 4.0%. This period also saw a 47.1% decrease in FDI, an 8.0% reduction in goods exports, and a 4.6% depreciation of the Ringgit Malaysia. These developments underscore the necessity to study the impact of capital flows and export dynamics on Malaysia's economic growth.

According to the Thirlwall (1979) an economy's growth rate is constrained by its balance of payments performance. This demand-side model suggests that the economic development potential of an open economy is determined by the ratio of export growth to the income elasticity of import demand (Ersoy, 2016). Looking at the Malaysia's recent economic performances, this study utilises the extended BPCG model (Thirlwall & Hussain, 1982) to investigate the role of capital, exchange rates, and exports to Malaysia's economy and to detect whether the country is facing any growth constraints. This would assist policymakers in developing effective ways to address the declining patterns in capital, exchange rates, and exports.

The extended BPCG model emphasises the critical impact of capital and relative prices on economic growth (Akalpler & Shingil, 2023; Civcir & Yücel, 2020; Darku, 2012, 2019; Felipe, McCombie, & Naqvi, 2009; Shingil, Ozdeser, & Saliminezhad, 2022). Capital flows and trade statistics have been the sole focus of prior research. Nevertheless, the objective of this research is to address this lacuna by providing a more comprehensive evaluation of the economy's potential, with a particular emphasis on analysing capital positions, including FDI and FPI. Additionally, in order to offer a more accurate depiction of the economic landscape, this study utilises goods exports and imports from BOP compilations rather than conventional trade statistics, which exclude goods that are sent abroad without ownership changes.

The paper is organised as follows: The literature evaluation and identifying research gaps are presented in Section 2. Section 3 delineates the model specification. The empirical model, methodology, and data description are all addressed in Section 4. Section 5 provides a summary of the investigation's results. Finally, Section 6 offers policy recommendations and conclusions.

2. LITERATURE REVIEW

2.1. Original Balance of Payments Constrained Growth (BPCG)

Felipe and Lanzafame (2019) examined Kalman filtering methods for state-space model estimation, concentrating on changing income elasticities and how they contributed to the economic growth of Indonesia. Their conclusions reflect that the BPCG model inferred a lower growth rate than the actual rate. Indonesia's exports primarily consist of natural resources and manufactured goods with low added value, thereby limiting the country's competitive advantage. The study thus underscores the necessity of developing a comprehensive industrial plan that focuses on reforming the manufacturing sector and improving Indonesia's export competitiveness to resolve this issue.

The study conducted by Ybrayev (2022) revealed one of the factors affecting the long-term economic growth of Kazakhstan using the BPCG model, in which the results showed the dominance of the production structure with imported intermediate and capital goods. Meanwhile, Fasanya and Olayemi (2018) applied the ARDL method to evaluate the economic trajectory of Nigeria between 1980 and 2012 and found that the high-income elasticity of imports brought a severe issue to the economy as it was overly dependent on imported commodities. Both of these studies have suggested that the country should review the imports by using more local products.

Bagnai, Dial, and Annunzio (2015) used the BPCG model through the Engle-Granger method to study Vietnam's economy from 1985 to 2010. Analysis of this study has shown that Vietnam's economic growth is mainly hindered by its import dependence, which brings to light the necessary diversification of the export sector, which may be required to sustainably finance the import of staple goods. Likewise, Gökçe and Cankal (2013) studied the long-run equilibrium characteristics of the Turkish economy by employing the Johansen cointegration test for 1968 to

2011. Their results are consistent with the BPCG model of Thirlwall, depicting that import dependence occupies a constructive part in controlling Turkey's economic progression. The study thus urges for a stronger domestically guided production process that will alleviate the import burden for not only the locals but also the government itself.

Lélis, da Silveira, Cunha, and Haines (2018) specifically concentrated on the Brazilian economy for the period 1995 and 2013, taking into account the vector error correction model and the structural state space model for estimating the demand functions for exports and imports. The research shows that the growth of commodity prices has a greater impact on the increase of exports than the fall of the real exchange rate. As a result of this situation, the economy becomes vulnerable to such factors as commodity price fluctuations. The study reiterates the need to expand the country's export base and to diversify the export portfolio of Brazil. In addition, the study also proves that the income elasticity for imports (2.79) is greater than that of exports (2.59), thus providing support for Thirlwall's Law in the Brazilian context.

Ansari, Hashemzadeh, and Xi (2000) checked the applicability of Thirlwall's Law in the four Southeast Asian countries: Indonesia, Malaysia, Thailand, and the Philippines. They verified Thirlwall estimations for these countries. The study also mentioned that Malaysia has had an average economic growth rate of 7.4% from 1970 to 1996, while the BPCG rate was only 6.4%, and thus it caused the current account deficit. The research puts a spotlight on the issue of the necessity of export-oriented strategies to ensure long-term growth of open economies. Besides, Thirlwall's Law was also the focus of a study conducted by Perraton (2003) in Argentina, South Korea, Brazil, Malaysia, and the Philippines with data from 1973 to 1995, and this served as further evidence that was consistent with Thirlwall's theoretical approach.

Podkaminer (2015) challenges the Thirlwall's Law, contending that although it may be important, it alone is not enough to attain fast economic growth. The study utilised the BPCG model with Dynamic Ordinary Least Squares (DOLS) to analyse a sample of 59 countries, including Malaysia, from 1960 to 2012. The findings indicate that Thirlwall's Law is not applicable to the majority of these nations. This implies that there are other elements that impact national growth rates that go outside the scope of Thirlwall's model. Tang (2005) conducted a study using the BPCG model to evaluate Malaysia's economic performance between 1960 and 2000. The findings of the study did not provide any evidence to support the application of the model to Malaysia. Aricioglu, Ucan, and Sarac (2013) conducted a study to assess the empirical accuracy of Thirlwall's Law for the Turkish economy. They utilised quarterly data from 1987 to 2001, and using the ARDL approach. According to their statistics, the BPCG model is not applicable to Turkey.

2.2. Balance of Payments Constrained Growth (BPCG) with Relative Prices and Capital

This research centers on the relationship between Thirlwall's Law and capital flows. Thirlwall and Hussain (1982) first tested the extended version of Thirlwall's Law with data from 20 developing nations, finding that including capital flows provided a more accurate estimation of economic growth.

Hussain (1999) expanded the BPCG framework among 29 African-based studies and 11 East Asian nations from 1980 to 1990. The results show that Malaysia's economy grew 7.08% under the basic BPCG model growth, while the extended model was 8.12%. This suggests that the extended model has a more significant impact on Malaysia's economy than expected. Meanwhile, in their study, Shingil et al. (2022) investigated the influence of exports on the economic performance of the United Kingdom. They discovered that higher levels of exports had a substantial positive effect on economic growth and led to an improvement in the trade balance. Furthermore, the study underscored the significance of FDI and FPI in overcoming current constraints and the impact of exchange rates. Shingil, Panshak, and Ibrahim (2021) conducted comparable research on Singapore from 1980 to 2020. The study concluded that the extended BPCG model, which includes capital flows, more accurately represents Singapore's economic performance. The findings underscore the significance of continuous foreign investments and export promotions in the pursuit of long-term economic growth.

Akalpler and Shingil (2023) employed the ARDL methodology to analyse the economic performance of Denmark during the period spanning from 1980 to 2017. They discovered that incorporating capital and relative prices into the BPCG model closely matched Denmark's average growth rate. This underscores the necessity for Denmark to enhance its worldwide export market standing and attract further foreign investments. Darku (2012) and Darku (2019) who applied the similar ARDL method also emphasised the importance of capital flows in boosting growth in Ghana and South Korea and deliberated for policies that attract international investments.

Yılmaz and Özçam (2023) analysed the Turkish economy from 1998 to 2019 using the ARDL approach to estimate import demand for intermediate, consumer, and capital goods. Their findings emphasised the importance of capital flows in funding trade deficits and sustaining growth. However, the study discovered that rising domestic income and real exchange rate appreciation boost demand for imports, which has considerable consequences for Turkey's economic growth.

Khasawneh, Magableh, Khrisat, and Massadeh (2012) employed the generalized method of moments (GMM) to investigate the relationship between real exports and growth in the MENA[1] region. They discovered a strong relationship between exports and growth in all nations, with the exception of oil producers. The research recommends for MENA countries to diversify their economies and exports and to leverage capital inflows.

Atesoglu (1993) offered an alternative viewpoint by analysing Canada's economic growth through the model that took into account changes in real income, relative prices, and capital flows. However, he discovered that capital inflows had an insignificant impact, despite the fact that relative price fluctuations and export expansion were essential for growth.

Previous research in Malaysia has yielded an inconsistent results on the BPCG model. In spite of this, while Hussain (1999) discovered data that supported the model, Tang (2005) and Podkaminer (2015) couldn't. Through analysing the validity of the BPCG model in Malaysia, the research aims to reconcile this disparity by considering both FPI and FDI positions in the study.

3. THEORY AND MODEL SPECIFICATION

Following the research of Thirlwall and Hussain (1982); Shingil et al. (2022) and Darku (2019) the extended BPCG model with capital and relative prices[2] will be applied in this study. The capital for this study will encompass the positions of both FDI and FPI. The study will begin with the original model of BPCG as presented in Equations 1 and 2.

$$X = \left[\frac{P_f E}{P_d}\right]^{\alpha_1} Y^{*\alpha_2} \qquad \text{Export Demand Function} \qquad (1)$$

$$M = \left[\frac{P_f E}{P_d}\right]^{\delta_1} Y^{\delta_2} \qquad \text{Import Demand Function} \qquad (2)$$

Where X represents the goods exports from the current account balance (CAB) of Balance of Payments, P_f represents foreign price level of imports, P_d is the domestic price level of exports, E represents the nominal rate of exchange, Y^* represents the real-world income proxied by Organisation for Economic Co-operation and Development (OECD) countries and major trading partners of Malaysia which are Singapore, China, India, and Indonesia, α_1 captures the price elasticity of demand for exports and α_2 represents the income elasticity of export

[1] In this paper, the term "MENA" (Middle East and North Africa) refers to a group of countries including Algeria, Bahrain, Comoros, Djibouti, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Qatar, Saudi Arabia, Somalia, Sudan, Syria, Tunisia, Turkey, United Arab Emirates (UAE), and Yemen.

[2] Relative prices is the relationship between the prices of two goods or services, typically denoted as Pxy = Px/Py, comparing one (X) to another (Y). This ratio represents the amount of Y required to obtain one more unit of X, serving as a measure of opportunity cost. Short-term stability in relative pricing typically supports the trade balance (Zamora-Ortiz & Angeles-Castro-Gerardo, 2015).

demand. Meanwhile, M represents goods imports from CAB, Y is the real GDP of Malaysia, δ_1 captures the price elasticity of demand for imports and δ_2 represents the income elasticity of demand for imports.

Equations 3 and 4 are the logarithmic result of the first difference between the variables in Equations 1 and 2.

$$x = \alpha_1(P_f + e - P_d) + \alpha_2 Y^* \quad \text{export function} \qquad (3)$$

$$m = \delta_1(P_f + e - P_d) + \delta_2 Y \quad \text{import function} \qquad (4)$$

Where $(P_f + e - P_d)$ is the rate of real depreciation of the currency of the domestic economy. Assuming that real exchange rate and capital are insignificant, BPCG model will be represented by Equations 5 and 6:

$$y_1 = \frac{x}{\delta_2} \qquad (5)$$

or

$$y_2 = \frac{\alpha_2(Y^*)}{\delta_2} \qquad (6)$$

Meanwhile, the extended BPCG growth framework which incorporates the relative prices and capital (K), as follows:

$$P_d X + K = P_f ME \qquad (7)$$

Where the Equation 7 be expressed in growth rate:

$$\lambda(p_d + x) + \emptyset k = p_f + e + m \qquad (8)$$

The lowercase variables in Equation 8 reflect growth rates expressed in logarithmic terms. In Equation 9, λ and $\emptyset$ represent the proportions of total imports financed by export earnings and capital, respectively.

The equations as follows:

$$\lambda = \frac{P_d X}{(P_d X + K)} \text{ and } \emptyset = \frac{K}{(P_d X + K)} \qquad (9)$$

The estimated BPCG extended growth rate for the domestic economy (y_3) is obtained at Equation 10 by taking this difference between the log of the exports and imports equations and entering it into Equation 8.

$$y_3 = \frac{[-(1+\lambda\alpha_1+\delta_1)(p_f + e - p_d) + \lambda\alpha_2 Y^* + \emptyset(k - p_d)]}{\delta_2} \qquad (10)$$

Where:

y_3 is the estimated GDP growth from the extended BP

CG model,

$\lambda = \frac{P_d X}{(P_d X + K)}$ The domestic price level of exports is multiplied by the volume of exports, and then divided by the sum of the domestic price level of exports multiplied by the volume of exports and the capital position,

α_1 captures the price elasticity for exports,

δ_1 is the price elasticity for imports,

p_f represents foreign price of imports growth,

e is the nominal exchange rate growth,

p_d is the domestic price of exports growth,

α_2 represents the income elasticity for export,

y^* represents the real-world income growth proxied by world GDP,

$\emptyset = \frac{K}{(P_d X + K)}$ which represents the ratio of the capital position level divided by the domestic price level, multiplied by the volume of exports, added to the capital position,

k represents capital position growth, and

δ_2 represents the income elasticity for imports.

The equation 10 provides five important explanations for countries involved in international trade:

i. The higher the income elasticity demand for imports (δ_2), the slower domestic growth will be achieved by a country, assuming all other factors remain constant.
ii. To prevent further harm to economic growth, the country must reduce its reliance on imports when exports and capital remain constant.
iii. The increase in capital will ease the constraints faced by BPCG, allowing it to counter deficit situations.
iv. Any depreciation of currency will support economic growth, provided that the price elasticity of exports (weighted by the proportion of the total import bill financed by export earnings) and the price elasticity of demand for imports are both greater than one ($\lambda\alpha_1 + \delta_1) > 1$.
v. The main idea behind the simple BPCG extended framework is that if a country grows faster than the estimated rate of BPCG ($y > y_e$), it needs to adjust its income to avoid current account deficits. These deficits can restrict growth and may lead to macroeconomic instability, such as currency depreciation, inflationary pressures, and higher borrowing costs. Additionally, relying on foreign capital to finance deficits can make the economy vulnerable to external shocks and increase the risk of financial crises. It is therefore crucial for policymakers to carefully manage economic growth to ensure sustainable balance and long-term stability.

4. EMPIRICAL METHODOLOGY AND DATA

Based on the outlined framework, the study developed its export and import equations in the following manner:

$$X = f(WY, REER, K) \quad (11)$$

$$M = f(Y, REER) \quad (12)$$

In this study, X represents the goods exported from the current account balance (CAB) of Balance of Payments. WY refers to the world income, which includes Organisation for Economic Co-operation and Development (OECD) countries and major trading partners of Malaysia, which are Singapore, China, India, and Indonesia. Real effective exchange rate *(REER)*, while K represents the combination of capital, which includes positions in FDI and FPI. The dependent variable is X, whereas WY, $REER$, and K serve as the independent variables. Meanwhile, for import Equation 12, M represents goods imports from CAB, Y is the GDP of Malaysia, and REER.

The time series utilized in this study spans the quarterly period from 2011 to 2022. Data regarding goods exports, imports, FDI and FPI positions, as well as GDP, were sourced from DOSM. The REER was obtained from Bruegel's database (Darvas, 2021) and the world income was from OECD and the relevant national statistical offices. All variables are presented in logarithmic form (Equations 13 and 14) and are measured in Ringgit Malaysia (RM) except for the world income, which is measured in US dollars. This study measures all variables in real prices.

$$LX_t = \beta_0 + \beta_1 LWY_t + \beta_2 LREER_t + \beta_3 LK_t + \varepsilon_t \quad (13)$$

$$LM_t = \beta_0 + \beta_1 LY_t + \beta_2 LREER_t + \varepsilon_t \quad (14)$$

Where $t = 1, 2, \ldots, t$ refers to the period, and ε_t represents the error term. Before using the ARDL model for cointegration testing, a unit root test is required to resolve stationarity concerns, as nonstationary series might produce deceptive findings (Gujarati & Porter, 2009). To determine stationarity, this study uses the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests (Dickey & Fuller, 1979; Phillips & Perron, 1989).

The Zivot and Andrews (2002) test is used to identify probable structural breakdowns (Waheed, Alam, & Ghauri, 2006). The ARDL bounds test by Pesaran, Shin, and Smith (2001) is suitable for analysing both long and short-run relationships, regardless of whether the series are integrated of order I(1) or I(0).

Based on the research conducted by Shingil et al. (2022) and Darku (2019) the ARDL model (Pesaran et al., 2001) is used to derive the equations for export and import, as presented by e and 16. These equations will determine the income and price elasticities for both exports and imports.

$$\Delta LX_t = \lambda_0 + \lambda_1 LX_{t-i} + \lambda_2 LWY_{t-i} + \lambda_3 LREER_{t-i} + \lambda_4 LK_{t-i} + \Sigma_{i=1}^{p} \beta_1 \Delta LX_{t-i}$$
$$+\Sigma_{i=1}^{p} \beta_2 \Delta LWY_{t-i} + \Sigma_{i=1}^{p} \beta_3 \Delta LREER_{t-i} + \Sigma_{i=1}^{p} \beta_4 \Delta LK_{t-i} + D_t + \varepsilon_t \quad (15)$$

$$\Delta LM_t = \lambda_0 + \lambda_1 LM_{t-i} + \lambda_2 LY_{t-i} + \lambda_3 LREER_{t-i} + \Sigma_{i=1}^{p} \beta_1 \Delta LM_{t-i} + \Sigma_{i=1}^{p} \beta_2 \Delta LY_{t-i} + \Sigma_{i=1}^{p} \beta_3 \Delta LREER_{t-i} + D_t + \varepsilon_t \quad (16)$$

The export Equation 15 comprises *LX, LWY, LREER, and LK*, while the import model Equation 16 includes *LM, LY, and LREER*. Short-run and long-run coefficients are denoted by β and λ, respectively. The white noise error term is represented by ε_t. Additionally, the study incorporates a dummy variable D_t for the structural break, which has been verified using the method proposed by Zivot and Andrews (2002).

This study also applies the Fully Modified Ordinary Least Squares (FMOLS) technique by Phillips and Hansen (1990) and the Dynamic Ordinary Least Squares (DOLS) method by Stock and Watson (1993) to ensure robust estimates.

5. RESULTS AND DISCUSSIONS

5.1. Zivot and Andrews Test

A unit root test was conducted prior to the application of the Zivot-Andrews test. The findings indicated that LK and LREER were stationary at the level, whereas the other variables were stationary at the first difference.

The Zivot-Andrews test, which includes both intercept and trend adjustments to account for a structural break, shows that, except for valuable LK (Table 1), the variables being looked at show a mix of stationarity at level I(0) and first-difference stationarity I(1). However, the variable LK exhibits stationarity in relation to a trend, with a significance level of 10%.

After confirming the presence of structural breaks, the study utilizes a dummy variable in regression analysis to differentiate between periods prior to and following the occurrence of these breaks. The export equation assigns the dummy variable at zero (0) from Q1 2011 to Q2 2017, and at one (1) from Q3 2017 onward. The chosen break period aligns with empirical evidence of noteworthy economic changes, such as a significant 22.1% increase in exports, a robust 6.2% GDP growth, and a currency appreciation of 2.8% (Bank Negara Malaysia, 2017).

In the import equation, the dummy variable is assigned a value of zero (0) from Q1 2011 to Q1 2020, and a value of one (1) from Q2 2020 onwards. This adjustment is made to account for the influence of the global health crisis in 2020, which resulted in a structural break.

Table 1. Zivot Andrews unit root test.

Variable	LX	LM	LGDP	LWY	LREER	LK
Both trend and intercept						
Break date	2020Q1	2020Q1	2020Q2	2020Q2	2017Q3	2014Q4
t-statistics	-5.43***	-5.96***	-6.14***	-9.04***	-3.51***	-3.78
Critical value	0.00	0.00	0.00	0.00	0.00	0.16
1%	-5.57	-5.57	-5.57	-5.57	-5.57	-5.57
5%	-5.08	-5.08	-5.08	-5.08	-5.08	-5.08
10%	-4.82	-4.82	-4.82	-4.82	-4.82	-4.82

Note: The asterisks (***) indicate significant at 10%, respectively.

5.2. Lag Selection Criteria

Tables 2 and 3 display the selection criteria used to determine the appropriate lag length for the export demand function and final import demand function. According to the Akaike information criterion (AIC) criteria, lag five is identified as the optimal number for export function, while for import function, it is six.

Table 2. ARDL lag order selection criteria result for export.

Lag	LogL	AIC	SC	HQ
0	160.426	-7.229	-7.024	-7.154
1	276.537	-11.467	-10.238*	-11.014*
2	298.901	-11.344	-9.092	-10.514
3	317.480	-11.046	-7.769	-9.837
4	342.677	-11.055	-6.754	-9.469
5	377.731	-11.522*	-6.198	-9.559

Note: *indicates lag order selected by the criterion.

Table 3. ARDL lag order selection criteria result for import.

Lag	LogL	AIC	SC	HQ
0	85.075	-3.861	-3.695	-3.800
1	212.712	-9.177	-8.349*	-8.873
2	237.381	-9.590	-8.100	-9.044
3	249.942	-9.426	-7.274	-8.637
4	275.575	-9.885	-7.071	-8.853
5	317.734	-11.130	-7.655	-9.856
6	341.325	-11.492*	-7.354	-9.975*

Note: *indicates lag order selected by the criterion.

5.3. Estimation of Export Demand Function

This section examines the long-run relationship between exports, world income, REER, and capital. Table 4 presents the results of the ARDL bounds test. The F-statistic of 5.8534 exceeds the upper critical bounds at both the 1% and 5% significance levels, demonstrating a statistically significant relationship between the variables in the model.

Table 4. ARDL bounds test.

Test statistic		
F-statistics 5.8534		
Critical value bounds	**Bounds**	
Significance	I (0)	I (1)
10%	2.2	3.09
5%	2.56	3.49
2.5%	2.88	3.87
1%	3.29	4.37

Note: The critical values are selected from 1% significance level.

The analysis in Table 5 reveals a statistically significant and positive correlation between exports and world income elasticity in the long run. Specifically, a 1% increase in WY is associated with a 1.286% increase in Malaysia's exports. This finding aligns with previous studies by Akalpler and Shingil (2023); Shingil et al. (2022); Civcir, Panshak, and Ozdeser (2021); Civcir and Yücel (2020); Darku (2019) and Darku (2012). For example, Shingil et al. (2022) demonstrated that a 1% increase in foreign income leads to a 0.67% increase in UK exports, indicating that export earnings rise as world income increases. Similarly, Akalpler and Shingil (2023) discovered that the export is positively correlated with world income, which explains the high balance of payments in the Danish economy.

The export industry of Malaysia is highly susceptible to global economic conditions, as evidenced by the substantial positive elasticity of exports in response to global income. This supports the notion that economic policies aimed at enhancing global trade relationships could significantly boost Malaysia's export growth. These results are essential because they offer empirical evidence that Malaysia's export performance is positively impacted by increases in global income. This study not only validates existing theories but also provides new insights into long-term

economic strategies that could enhance Malaysia's trade balance and overall economic stability by corroborating and extending previous research.

Table 5. Long-run and short-run ARDL test for export.

Variable	Coefficient	t-statistics	Prob.
Long-run estimates			
Constant	-10.329	-2.272**	0.032
LWY	1.286	5.420***	0.000
LREER	-0.424	-3.593***	0.001
LK	0.161	3.692***	0.001
DUM	0.079	1.895*	0.070
Short-run estimates			
LWY	2.080	10.038***	0.000
LREER	-0.060	-1.189	0.246
LK	0.016	0.507	0.617
DUM	0.014	0.438	0.665
ECM(-1)	-0.932	-6.492	0.000
R-squared	0.838		
Adjusted R-squared	0.774		
Durbin Watson	2.162		

Note: The asterisks (***), (**) and (*) indicate significant at 1%, 5% and 10%, respectively.

The regression analysis indicates that the REER coefficient is statistically significant and negatively correlated with Malaysia's export performance. This implies that Malaysia's export competitiveness in the global market is reduced as a consequence of an increase in REER, which leads to a negative external performance. Based on the empirical research conducted over the observed sample period, it was shown that a 1% rise in the REER results in a 0.424% decline in export performance. This conclusion is consistent with the research conducted by Akalpler and Shingil (2023); Shingil et al. (2022); Civcir and Yücel (2020); Darku (2019); and Darku (2012) which also illustrate the adverse effect of exchange rate hikes on exports. Nevertheless, Vidal Alejandro (2016) and Felipe et al. (2009) contend that exchange rates have an insignificant impact on export levels.

Furthermore, the analysis reveals that the degree of sensitivity to changes in relative prices is lower than the degree of sensitivity to changes in income. This aligns with previous research, which indicates that any changes in relative prices have a lesser effect on exports compared to changes in income (Civcir & Yücel, 2020).

The study's findings contribute to the research on Malaysia's export performance by demonstrating a direct correlation between REER and exports. The results suggest that the Malaysian export industry is highly susceptible to fluctuations in exchange rates, which has significant implications for policymakers who are interested in enhancing Malaysia's global market competitiveness. Subsequently, it is imperative to implement an effective exchange rate policy in order to preserve export competitiveness.

Furthermore, the research establishes a direct correlation between the volume of exports and the level of capital, demonstrating that a 1% increase in capital leads to a 0.161% improvement in export performance. This evidence bolsters the idea that Malaysia's export performance is significantly improved by capital investment. The results are also consistent with those of previous investigations conducted by Akalpler and Shingil (2023); Shingil et al. (2021); Darku (2019) and Darku (2012).

Policymakers should prioritise the allocation of resources to infrastructure development, technological advancements, and financial support in order to fortify export-oriented enterprises. This would significantly enhance Malaysia's competitiveness in the global market and fortify its manufacturing capabilities. Fostering partnerships between the public and private sectors could promote economic resilience and maintain export growth, potentially enhancing the impact of these investments.

The study indicates that Malaysia's exports are significantly influenced by the coefficient of world income in comparison to fluctuations in capital levels. This suggests that fluctuations in global income have a greater impact on Malaysia's exports than variations in capital.

Table 5 contains a comprehensive list of the coefficients for the short-term analysis. The REER and capital position (LK) coefficients are found to be insignificant in the short-run, while the coefficient for world income demonstrates statistical significance. Given that other variables remain constant, it is anticipated that a 1% increase in world income will result in a 2.080% increase in exports. Another significant aspect of this analysis is that the estimated coefficient for world income in the short-run model is of a greater magnitude than the coefficient in the long-run model.

This differential impact highlights the heightened sensitivity of exports to short-term fluctuations in the global economy, including shifts in demand or unforeseen economic developments. Developing a comprehensive understanding of the divergent effects of global income on exports in the short term versus the long term is essential for effective policy formulation.

Policies aimed at short-term implementation may necessitate greater flexibility in order to respond promptly to global economic shifts. Conversely, long-term strategies should prioritize the enhancement of domestic resilience, competitiveness, and the pursuit of sustainable growth objectives.

The error correction model (ECM) is -0.932 and significant at the 1% level, indicating a swift return to equilibrium, with almost 93% of the shock-induced disequilibrium rectified within the current year.

5.4. Diagnostic and Stability Test

All the diagnostic test results show statistical insignificance, indicating an accurate specification of the ARDL model for the export demand function.

Moreover, the findings in Table 6 indicate that there is no observed correlation between the errors and the export model over the specified time period.

Additionally, there is no evidence of heteroscedasticity. In summary, the equation estimated in this study appears to be free from any specification errors or biases.

Table 6. Diagnostic test.

Types of tests	F-statistics	Prob.
Breusch-Godfrey serial correlation LM	0.990	0.448
Heteroskedasticity test: Breusch-Pagan_Godfrey	0.832	0.647

Furthermore, the stability of the parameters is assessed using the CUSUM and CUSUMSQ methods, along with their corresponding 95% confidence intervals, as shown in Figure 1. The export demand function model successfully passes all statistical diagnostic tests, except for the CUSUMSQ test. The blue line remains within the range of CUSUM of Squares, only slightly exceeding the red bounds. Based on Lee, Hsiao, Bui, and Nguyen (2021) and Abdlaziz, Rahim, and Adamu (2016) studies, the experimental models continue to be statistically significant and reliable.

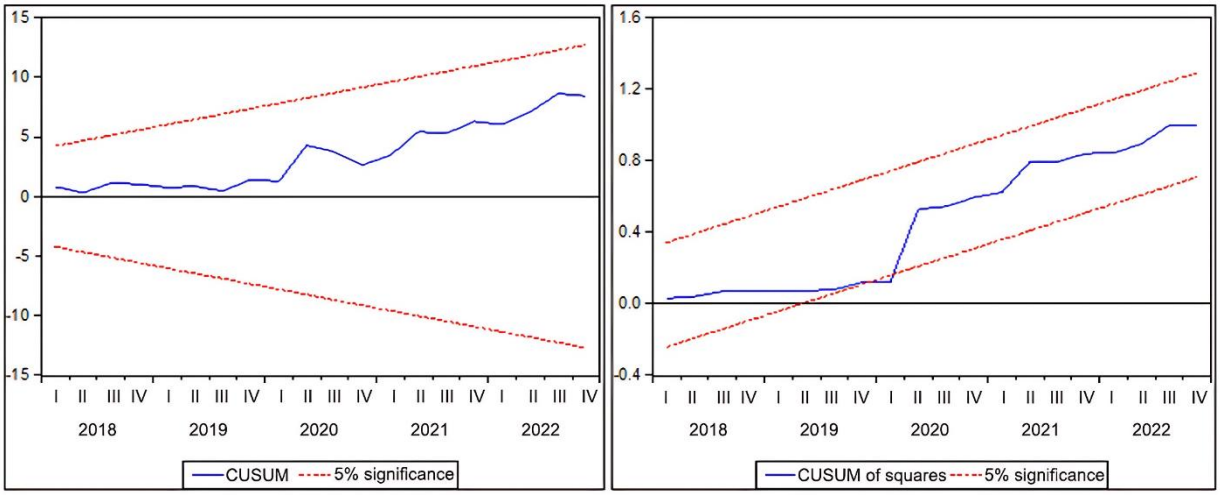

Figure 1. CUSUM and CUSUM square test.

5.5. Robustness Check

Before drawing definitive conclusions on the long-run coefficients obtained from the ARDL bounds testing approach, this study ensures the robustness of these parameters by reestimating them using FMOLS and DOLS methodologies. Results presented in Table 7 show that the long-run elasticities from both FMOLS and DOLS are consistent with ARDL findings for export demand function in terms of signs and magnitudes.

Diagnostic tests in the lower section of Table 7 confirm the reliability of the models. High R-squared and adjusted R-squared values, around 90%, indicate substantial variance explanation in exports. Moreover, low standard errors and near-zero long-run variances suggest model efficiency. Thus, the empirical evidence strongly supports the positive and statistically significant impact of world income and capital on Malaysia's exports, while revealing an inverse relationship with the exchange rate.

Table 7. FMOLS and DOLS results for export equation.

	FMOLS			DOLS		
Variable	**Coefficient**	**t-statistics**	**Prob.**	**Coefficient**	**t-statistics**	**Prob.**
Constant	-19.580	-5.749***	0.000	-14.996	-3.832***	0.001
LWY	1.738	9.408***	0.000	1.517	7.383***	0.000
LREER	-0.053	-0.927	0.359	-0.273	-3.175***	0.004
LK	0.133	3.329***	0.002	0.162	4.433***	0.000
DUM	-0.028	-0.926	0.360	0.033	0.943	0.355
R-squared	0.895			0.966		
Adjusted R-squared	0.885			0.936		
S.E. of regression	0.044			0.032		
Long-run variance	0.003			0.001		

Note: The asterisks (***) indicate significant at 10%, respectively.

5.6. Estimation of Final Import Demand Function

We look at the long-run relationship between real imports, domestic income, and the real effective exchange rate (REER) across the research period. Table 8 shows that the ARDL F-statistic of 11.2022 surpasses the upper critical criteria at both the 1% and 5% significance levels. This allows us to reject the null hypothesis of no co-integration among the variables.

Table 8. ARDL bounds test.

Test statistic		
F-statistics 11.2022		
Critical value bounds	**Bounds**	
Significance	I (0)	I (1)
10%	2.37	3.20
5%	2.79	3.67
2.5%	3.15	4.08
1%	3.65	4.66

Note: The critical values are selected from 1% significance level

Table 9 analysis reveals a significant positive correlation between imports and domestic income (GDP) in both the long and short term. This finding suggests that as domestic income increases, import expenses will also rise. In the long run, a 1% increase in domestic income corresponds to a 0.63% increase in imports for Malaysia. In the short term, the impact is even more pronounced, with a 1% increase in domestic income leading to a 1.687% increase in the demand for imports. These findings align with the research conducted by Shingil et al. (2022); Civcir et al. (2021) and Fasanya and Olayemi (2018).

Table 9. Long-run and short-run ARDL test for import.

Variable	**Coefficient**	**t-statistics**	**Prob.**
Long-run estimates			
Constant	3.857	8.642***	0.000
LY	0.626	18.676***	0.000
LREER	0.017	0.485	0.633
DUM	0.203	16.134***	0.000
Short-run estimates			
LY	1.687	10.745***	0.000
LREER	0.019	0.626	0.538
DUM	0.155	4.303***	0.000
ECM (-1)	-0.959	-8.198***	0.000
R-squared	0.939		
Adjusted R-squared	0.896		
Durbin Watson	2.007		

Note: The asterisks (***) indicate significant at 10%, respectively.

The close relationship between GDP growth and imports is particularly evident in the electrical and electronics (E&E) industry, which is a key driver of Malaysia's economic growth. The intrinsic link between GDP growth and imports underscores the reliance of Malaysia's economic expansion on the inputs and components required by the E&E sector. As this sector thrives and significantly contributes to the nation's GDP, the demand for specialized imports necessary for manufacturing processes correspondingly escalates, illustrating the direct relationship between economic growth and increased importation to support industrial demands.

According to Malaysia's Input-Output report (DOSM, 2022) approximately 40% of the imported intermediate inputs are used by the local E&E industry. The report also highlights that 26.5% of the imported intermediate goods are utilized in overall production activities in Malaysia. The findings in Table 9 support the Input-Output report's indication that there is a high reliance on imports to expand production activities in Malaysia.

The significant positive correlation between imports and domestic income indicates that as Malaysia's economy grows, the demand for imports, particularly intermediate goods used in production, will also increase. The reliance on imports for the E&E sector highlights the need for strategic industrial policies that enhance domestic production capabilities and reduce dependency on imported inputs. This could include investments in local manufacturing capacity and technology to produce more intermediate goods domestically.

The findings of the study in Table 9 show that the coefficient of the REER has no significant relationship with imports. This means that the level of the REER does not impact the imports of Malaysia, whether in the short-term or the long-term. Vidal Alejandro (2016) study also found no noticeable connection between exchange rates and imports. This analysis suggests that domestic income plays a crucial role in determining the magnitude of imports. Additionally, in the case of Malaysia, it can be argued that regardless of whether the currency appreciates or depreciates, the country's economy, which relies on imported intermediates and capital as mentioned earlier, still needs to engage in imports regardless of the exchange rate level.

5.7. Diagnostic and Stability Tests

The Breusch-Godfrey autocorrelation and heteroskedasticity tests indicate that the estimated coefficients are unbiased and the model is free from any specification issues Table 10.

Table 10. Diagnostic test.

Types of tests	F-statistics	Prob.
Breusch-Godfrey serial correlation LM	0.885	0.531
Heteroskedasticity test: Breusch-Pagan_Godfrey	0.839	0.654

The results obtained from the CUSUM and CUSUM of square tests confirm that the blue lines fall within the crucial region, as depicted in Figure 2. Therefore, it can be concluded that the parameters of the ARDL models exhibit stability.

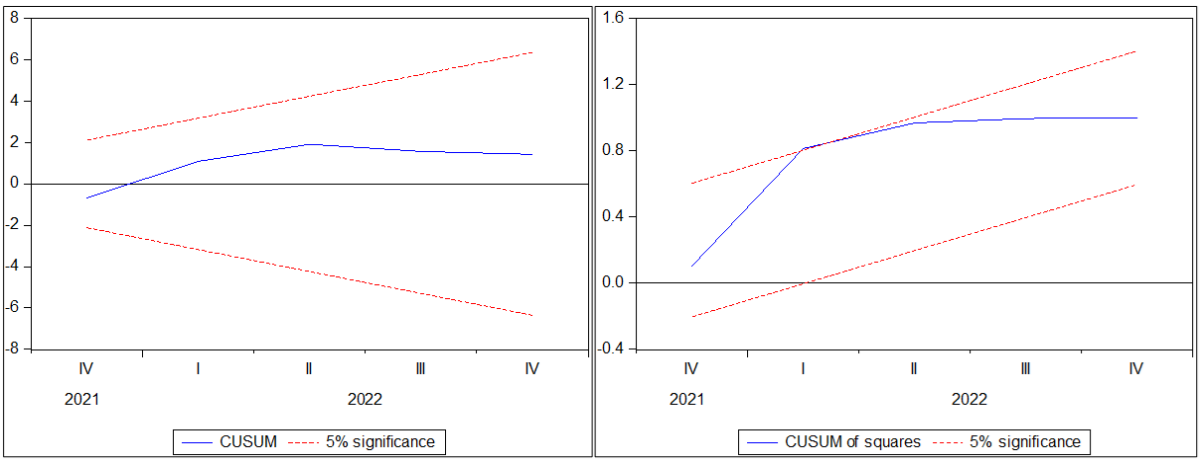

Figure 2. CUSUM and CUSUM square test.

5.8. Robustness Check

The study examines the long-run parameters' robustness by re-estimating the coefficients with FMOLS and DOLS methods. Table 11 shows that the results are aligned with the ARDL findings for the import demand function, with the coefficients having consistent signs and magnitudes.

Additionally, the diagnostic tests presented in the lower section of Table 11 reinforce the reliability of the models used in this analysis. The R-squared and adjusted R-squared values for all models indicate strong explanatory power regarding changes in imports. Moreover, the standard errors for the DOLS test are below 5%, and the long-run variances are close to zero, while the standard errors for FMOLS are below 10%. These goodness-of-fit indicators demonstrate that the estimated long-run elasticities are both accurate and appropriate.

Table 11. FMOLS and DOLS results for import equation.

Variable	FMOLS			DOLS		
	Coefficient	t-statistics	Prob.	Coefficient	t-statistics	Prob.
Constant	3.581	3.249***	0.002	3.843	3.649***	0.001
LY	0.625	7.305***	0.000	0.603	7.596***	0.000
LREER	0.104	1.466	0.150	0.110	1.392	0.173
DUM	0.167	5.712***	0.000	0.186	6.684***	0.000
R-squared	0.805			0.928		
Adjusted R-squared	0.791			0.901		
S.E. of regression	0.067			0.044		
Long-run variance	0.005			0.003		

Note: The asterisks (***) indicate significant at 10%, respectively.

Overall, the results from the study underscore the pivotal roles of exports, relative prices, and capital in bolstering Malaysia's economic growth and contributing to a current account surplus. However, they also indicate a significant challenge: an increase in domestic income leads to higher imports, which are unaffected by relative prices. This suggests that, despite potential expansions in exports or capital, the persistent rise in imports could impede overall economic growth. Notably, the coefficient of world income on the export demand function is 1.286, reflecting strong external demand, while the import demand function coefficient is 0.626, indicating a substantial domestic propensity to import. The relatively low capital coefficient of 0.161 points to a lesser impact of capital on the growth dynamic. These insights highlight a critical need for policy measures that manage import growth and enhance the productivity and competitiveness of domestic industries to sustain long-term economic expansion. Additionally, efforts should focus on leveraging global income growth by diversifying export markets and increasing the domestically produced value-added content of exports to maximize their contribution to economic growth.

5.9. The Balance of Payments Constrained Growth (BPCG) Model

Malaysia's average GDP growth rate from 2011Q1 to 2022Q4 was 4.6%, as shown in Table 12. According to Equation 5, which divides exports by the income elasticity of demand for imports, the estimated growth rate by the BPCG model is 6.9%. Equation 6, which considers world income, estimates growth at 5.5%. Both equations yield results significantly higher than Malaysia's average economic growth. Furthermore, when Equation 10 incorporates relative prices and capital, the BPCG growth rate expands to 7.3%, which is considerably higher than Malaysia's observed average annual growth rate of 4.6%.

Based on both the basic and extended versions of the BPCG model, it can be definitively concluded that Malaysia has no constraints in its growth by balance of payment issues. This result aligns with the study findings of Tang (2005) and Podkaminer (2015) who also emphasised that Malaysia does not face the BPCG constraints. However, these findings contradict the findings of Ansari et al. (2000); Perraton (2003); Gouvea and Lima (2010) and Hussain (1999) for Malaysia, which indicate that Malaysia does face BPCG constraints.

The results underscore the critical role of capital, relative prices, and exports in Malaysia's economic growth and the generation of a current account surplus. Nevertheless, the results indicate that Malaysia's actual economic growth is substantially lower than its potential, despite these positive indicators. This discrepancy suggests that Malaysia has not yet completely leveraged its available capacities to achieve higher economic growth rates. The fact that this underutilisation exists highlights the urgent need for strategic reforms in order to maximise Malaysia's growth path and effectively utilise its economic resources.

The estimation findings show that the growth outcome from Equation 5 is greater than that of Equation 6, indicating that Malaysia's economic growth is considerably subject to world income changes. A collapse in world economic conditions might pose significant challenges to Malaysia's economy. However, including capital and relative prices in Equation 10 appears to provide a strong buffer against the negative effects of world economic slowdown on Malaysia's economic performance.

Table 12. Balance of payment growth rate framework.

Results by equations		y_e	y
Equation 5	$y_1 = \frac{x}{\delta_2}$	6.9	4.6
Equation 6	$y_2 = \frac{\alpha_2 (y^*)}{\delta_2}$	5.5	4.6
Equation 10	$y_3 = \frac{[-(1+\lambda\alpha_1+\delta_1)(p_f+e-p_d) + \lambda\alpha_2 Y^* + \emptyset (k - p_d)]}{\delta_2}$	7.3	4.6
Required elasticities and averages			
World income growth, y*		2.7	
World income elasticity of export, $\alpha 2$		1.29	
Income sensitivity of import, $\delta 2$		0.63	
Price sensitivity of exports, $\alpha 1$		-0.41	
Price sensitivity of imports, $\delta 1$		0.02	
REER		-0.21	
Export growth, x		4.3	
Import growth, m		1.5	
Growth of real capital flows, k		4.4	

The empirical data robustly confirms the favourable and statistically significant influence of world income and capital on Malaysia's exports, while simultaneously indicating a negative correlation with its exchange rate. Furthermore, both the long-term and short-term studies reveal a substantial positive association between imports and domestic income (GDP), emphasising the vital importance of these variables in influencing economic performance. The study's comprehensive research and rigorous methods offer useful insights for policymakers. Policymakers must urgently tackle the underutilisation of economic capacity and adapt methods to properly harness Malaysia's resources. This will be pivotal in enhancing its growth trajectory and economic robustness in the face of global swings.

In addition, authorities should prioritize promoting innovation and expanding export markets in order to reduce the dangers associated with depending too heavily on certain industries or trade partners. Implementing this diverse strategy would strengthen Malaysia's economic stability and improve its development potential in an ever more integrated global economy.

6. CONCLUSION AND RECOMMENDATIONS

This study employs a demand-led growth model to examine the factors that impact Malaysia's economic growth from 2011 to 2022, focusing on export demand, capital positions, and the REER. The research confirms that the balance of payments does not constrain Malaysia's growth through the utilization of an ARDL econometric approach to cointegration. The study demonstrates that the basic BPCG model, which incorporates exports, forecasts a growth rate of 6.9%, significantly higher than the actual growth rate of 4.6%. Moreover, when relative prices and capital positions are incorporated into the model, the projected growth increases to 7.3%.

This study emphasizes the substantial impact of export performance on the Malaysian economy. The export sector heavily relies on manufactured goods, specifically in sectors such as electric and electronic (E&E), mineral fuels, and oil palm products, which continue to dominate despite efforts to diversify. Malaysia's continued dependence on these industries, despite prior diversification initiatives, was evident in 2022, when the E&E sector and petroleum commodities constituted approximately 50% of the country's exports (Department of Statistics Malaysia (DOSM), 2023). Malaysia is susceptible to global economic fluctuations as a result of this concentration, underscoring the pressing necessity for more effective diversification strategies to improve economic resilience.

Policymakers should prioritise the enhancement of market access, the fortification of trade agreements, and the investment in high-potential sectors such as E&E, palm oil, and halal products. The export base can be further

diversified, and global competitiveness can be boosted by enhancing technology, innovation, and supporting SMEs. This will align Malaysia with global economic trends and promote sustainable growth.

Exchange rate fluctuations significantly impact Malaysia's economy. Exports may be stimulated by depreciating currency; however, instability must be prevented. Diversifying export markets and attracting consistent foreign capital can maintain the value of the ringgit and sustain demand for Malaysian products. The study underscores the critical role of FDI and FPI in Malaysia's growth, but it also identifies a void in FPI strategy. In order to attract and retain foreign investments, it is advisable to establish a collaborative policy framework that includes the government, Bank Negara Malaysia (BNM), and the Securities Commission Malaysia.

Although Malaysia aspires to be a premier investment destination, bureaucratic inefficiency is a potential consequence of overlapping initiatives such as the NIA, NIP, and National Investment Master Plan. It is imperative to optimise the economic impact of these endeavours by streamlining them.

In light of the research outcomes, the study recommends that Malaysia intensify its strategies to encourage FDI into the country. The country should enhance investment incentives and improve infrastructure. Competitive tax breaks, grants, and subsidies can make Malaysia more appealing to foreign investors. Investing in high-quality transportation networks and digital infrastructure, such as high-speed internet and 5G networks, will facilitate smoother business operations. Simplifying regulatory processes, ensuring transparent frameworks, and strengthening the legal system, particularly in protecting intellectual property and resolving disputes, will further build investor confidence.

Focusing on high-potential industries like electrical and electronics, healthcare, renewable energy, and advanced manufacturing will attract targeted investments. Promoting Malaysia as an investment destination through international marketing campaigns, investment roadshows, and participation in trade fairs can showcase the country's opportunities. Malaysia Investment Development Authority (MIDA) should be the one-stop centre to support and guide investors and streamline the investment process without overlapping with other agencies. Finally, maintaining stable governance and implementing sound economic policies will foster a conducive environment for long-term investments, ensuring political and economic stability, which is essential for attracting and retaining FDI.

This study primarily focuses on goods exports from the balance of payments (BOP), without considering the combined impact of both goods and services exports. Additionally, while examining capital positions, the study does not account for the effect of interest payments on foreign capital, which is significant given the increasing repayment obligations under the BOP. Future research should incorporate a broader range of variables to provide a more comprehensive analysis. Specifically, variables such as interest payments on foreign capital, service exports, and external debt should be included. By considering these factors, future studies can better capture the complexities of Malaysia's economic growth and offer more detailed insights into its economic dynamics.

Funding: This study received no specific financial support.
Institutional Review Board Statement: Not applicable.
Transparency: The authors state that the manuscript is honest, truthful, and transparent, that no key aspects of the investigation have been omitted, and that any differences from the study as planned have been clarified. This study followed all writing ethics.
Data Availability Statement: The corresponding author can provide the supporting data of this study upon a reasonable request.
Competing Interests: The authors declare that they have no competing interests.
Authors' Contributions: All authors contributed equally to the conception and design of the study. All authors have read and agreed to the published version of the manuscript.

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