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Economic measurement of the impact of a number of macroeconomic variables on Singapore's foreign trade for the period (1980-2023)

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Abstract
Foreign trade is one of the most essential elements of international economic relations and represents the oldest and most advanced forms of these interactions. It helps unite nations into a single international financial system by facilitating the transition of many economies from one state to another. Globalization of capital has become one of the most critical factors influencing and transforming the global economy, along with other production-related processes. The study aims to measure and analyze the impact of various macroeconomic variables on Singapore's foreign trade during the period (1980–2023). The empirical analysis using the ARDL model found that Gross Domestic Product has a significant impact on the value of foreign trade. More specifically, a one-unit increase in Gross Domestic Product leads to an increase in the value of foreign trade by (0.95) at a significance level of (1%). In addition, a one-unit increase in government spending per year leads to an increase in the value of foreign trade by about (0.74) at a significance level of (1%). Foreign direct investment is inversely proportional to foreign trade, although this relationship is not significant at the 5% level. The study concludes with several recommendations, including the need to focus on international trade and diversify export and production sources, especially in developing countries. It also suggests adopting measures that support and protect national production, reforming the banking system, allocating public funds to capital expenditure, reducing unnecessary expenditure, limiting current expenditure, and increasing foreign investment in various sectors of the economy, such as industry, agriculture, and services.

Keywords: Foreign trade, gross domestic product, public spending, foreign direct investment

Introduction
Foreign commerce is a longstanding model of inter-state relations, playing a crucial role in global economic contacts. It unifies nations into a cohesive global economic structure. In recent times, there have been swift and substantial changes in the political milieu and economic landscape, which have had a notable effect on Singapore's economic performance, particularly its international commerce. Given its status as a dominant global financial center and a significant participant in international commerce, Singapore offers an intriguing opportunity to analyze the impact of different macroeconomic factors on foreign trade. Given its status as a tiny, highly developed, and open economy, Singapore's international commerce is closely intertwined with its economic performance and policy. Furthermore, the objective of this study is to ascertain the influence of Gross Domestic Product, government spending, and foreign direct investment on the international commerce of Singapore. Given Singapore's dependence on commerce as a critical catalyst for economic expansion and its geopolitical location as a crossing point between the East and West, comprehending these connections is essential. Gross Domestic Product is a comprehensive measure of the overall economic well-being and efficiency. An analysis of fluctuations in gross domestic product allows for a deeper comprehension of economic processes. Budgetary spending is a vital determinant that mirrors the government's preferences and allocations in infrastructure, education, and other domains that might impact commerce. Foreign direct investment is a crucial component of Singapore's economic strategy and significantly influences the evolution of economic models. This study investigates the impact of foreign direct investment flows on Singapore's trade by enhancing access to money, technology, and

market, therefore governing the magnitude and composition of international trade. Quantitative techniques are employed to evaluate these factors.

Research Problem: Singapore presents itself as a prominent center for international trade in the fast-changing global economy. Being a tiny, highly developed, and open economy, its international commerce may be significantly influenced by a range of economic factors, including macroeconomic variables. Evaluating the characteristics of fluctuations in Singapore's Gross Domestic Product, government spending, and foreign direct investment, and their influence on its international commerce, is of utmost importance for policymakers, enterprises, and investors.

Research Hypotheses: This study is grounded on the premise that macroeconomic variables play a crucial role in Singapore's foreign trade, considering its substantial dependence on trade for economic expansion.

Importance of the Research: This research is essential since it specifically examines macroeconomic variables and their influence on the international commerce of Singapore. Comprehending the function of these factors in shaping the external trade sector, the characteristics of their connection, and the degree to which they might impact it, whether favorably or negatively, is crucial.

Research objective: To identify the various macroeconomic variables, namely GDP, government spending, and foreign direct investment, and their relationship to foreign trade in Singapore using modern analytical and econometric methods throughout (43) years.

Research Methodology: This research relies on an analytical approach using data sourced from the World Bank, as well as quantitative econometric analysis employing standard trade models and macroeconomic variables, utilizing the Eviews-12 statistical software package.

Scope of the Research: The research is confined to Singapore as the geographic focus, and spans the temporal range (1980 - 2023).

Their Relationship

The first topic The Theoretical Framework of Foreign Trade and Some Macroeconomic Variables and Their Relationship

First: Conceptual Framework of External Trade

1. Nature of External Trade: The nature of external commerce is one of import and export operations that plays a vital role in addressing the demands of nations. Regardless of the political disparities across nations, no country can attain absolute self-sufficiency for a prolonged duration. The reason for this is that attaining self-sufficiency necessitates a nation to manufacture all of its requirements, even at periods when its economic and geographical circumstances do not allow it. Irrespective of a country's will to embrace such a strategy, it cannot live independently from other nations. It follows that a nation, like to people, is unable to manufacture all the commodities and services it needs. Instead, it should focus on manufacturing things that align with its natural and economic circumstances and then trade these products for excess products from other nations that are unable to manufacture similar commodities inside their borders or can only do so at a relatively high cost. Therefore, it is desirable to restrict imports from other countries. Furthermore, this has led to advances in international economic and trade relations, including the movement of capital, goods, services, and labor through international migration, thus expanding their scope and importance in interstate relations (Verter, 2015, 6) [17]. Foreign trade is defined as an area in which countries try to escape isolation by finding markets for their products, taking advantage of price differences, and making quick profits (Al-Izawi, 2018, 29) [6].

2. Importance of External Trade: The importance of overseas commerce is underscored by its profound impact on economic, social, and political spheres. This function serves to delineate the political attributes of a country and the essential elements of its bilateral interactions with other states. External trade's significance may be succinctly described as follows

A. International commerce is crucial for attaining economic and social progress, particularly in emerging nations. It facilitates the acquisition of technology, manufactured and semi-made materials, and technical experience by these countries for the implementation of their development objectives.
B. Foreign commerce has a vital role in facilitating specialization and the division of labor, critical elements of the global economy. It enables cost reduction, production and productivity rise, quality improvement, and resource utilization optimization. Following this strategy, each nation focuses on producing commodities and services in which it has a comparative advantage and relies on importing things that it is unable to produce as effectively.
C. International commerce offers each nation the chance to acquire specific commodities and services that are not possible to produce inside its borders, either because of insufficient material and human resources or unfavorable environmental and climatic circumstances. Even under conditions of resource availability, it may be more economically advantageous to import certain commodities instead of manufacturing them domestically (Al-Izawi, 2018, 34) [6].

3. Reasons for the Emergence of Foreign Trade: The emergence of foreign trade is driven by several key factors that provide significant benefits to nations through specialization and division of labor, which ultimately contribute to increasing the gross domestic product. The main reasons for the establishment of foreign trade are as follows (Abdul Latif, 2021, 19) [10]:

A. The use of specialization and the international division of labor allows nations to effectively reduce their production costs by transferring excess output to other markets.
B. Scarcity and unequal distribution of natural resources: Due to the limited nature of its resources, no country can achieve complete self-sufficiency. Foreign trade

allows countries, producers and consumers to access goods and services that are not available on their own territory.

C. Different consumer preferences: Differences in tastes and preferences lead consumers to prefer goods with superior production quality over others.

4. Factors Influencing External Trade: Several factors affect external trade, which can be summarized as follows (Al-Wadi et al, 2009, 231) [9]:

A. Easy transportation and shipping costs: Countries with low transportation costs and efficient connections with other countries record higher trade volumes, as opposed to countries with higher transportation costs and less effective logistics.

B. Absence of Artificial Barriers: Systems such as quotas, tariffs, and other import regulations hinder external trade and reduce its volume.

C. Relative Production Advantage and High Efficiency: Countries with relative superiority and high production efficiency in certain industries tend to specialize more effectively, expanding their industry and increasing exports.

D. Differences in Tastes and Preferences: Variation in consumer preferences can lead to the export of certain types of goods while importing others of the same category, resulting in what is known as intra-industry trade.

E. Income Effects: Trade theories, notably the Linder theory, highlight the significance of customer demand. The idea suggests that the probability of a country exporting a product rises as the domestic markets for that commodity become more accessible. Additionally, the diversity of products in local markets is impacted by the per capita income (Al-Izawi, 2018, 32) [6].

F. Commercial transactions between multinational corporations and their subsidiaries make up a substantial and expanding segment of worldwide trade: As multinational firms engage in the movement of money and technology across borders, the production processes have become increasingly decentralized. Global commodity production now extends beyond the boundaries of a single nation to include the production of components in many countries where there is a comparative advantage or possession of the necessary technology.

Second: Theoretical Framework of Macroeconomic Variables

Many macroeconomic variables have emerged and increasingly interact with each other in various political, economic, scientific, technological, and environmental fields around the world. This interaction has important implications for the political and economic balance of power and affects the internal conditions of each country. This section examines several critical macroeconomic variables, including:

1. Gross Domestic Product: Gross domestic product is one of the most important economic variables and reflects the level of economic activity and the efficiency of a country's performance. It is a primary objective of economic policy because of its direct impact on various sectors of the economy. Gross domestic product indicates the direction of economic development and measures improvements in individual well-being. Economists give priority to gross domestic product because of its significant economic and social impact on a country. Gross domestic product is defined as the total monetary value of all final products and services produced in a year using various factors of production in a country's economy (Tayeh, 2020, 326) [2]. It also encompasses the value of final goods and services, including investment goods and replacement investment, produced by residents within a nation's borders during a specific period, usually a year. Thus, Gross Domestic Product includes all domestically produced goods and services, even if some are manufactured in units owned by non-citizens of the country, as long as they are considered residents. Consequently, Gross Domestic Product is a geographic measure of income, regardless of the nationality of the production unit owners. Therefore, income generated by a foreign company investing in a specific country is included in that country's Gross Domestic Product estimate. In contrast, income earned by the country's citizens from investments abroad is considered in the national income estimate, not the domestic income estimate (Al-Jubouri, 2017, 114) [12].

2. Public expenditure: The study of public expenditure occupies a fundamental place in financial science and develops in parallel with the development of financial thought and policy. They are an effective fiscal policy tool used by the government to achieve economic, financial, and social objectives within a specified period. Public expenditure is defined as the amount spent by the public treasury, once approved by the legislative authority, to provide public goods and services and achieve economic and social objectives (Zaghir, 2017, 8) [11]. Others define it as the amount of money spent by the state or its public institutions to meet a public need. (Al-Daami, 2018, 8) [16]. Generally, public expenditure is a general monetary outlay made by a public entity to achieve a public goal. It is a fiscal policy tool involving the allocation of funds, whether current or capital expenditure, by the government to address economic instability, such as inflation and recession and to promote economic stability.

Forms of Public Expenditure: Despite its varied and different purposes, public expenditure takes the following forms

- Compensation and remuneration awarded to government personnel and workers, include pensions.
- Procurement of commodities and services by the government.
- Repayment of the principle and interest on a public debt.
- Expenses related to grants, in-kind assistance, and payments to social insurance.

3. Foreign Direct Investment: Investment involves allocating available funds into various assets with the expectation of earning future financial returns. These returns serve as compensation for the invested capital over time, taking into account the need to achieve returns that cover

the compensation value and the risks associated with the uncertainty of future returns while also surpassing the inflation rate (Al-Shabeeb, 2020, 20) [1]. Foreign direct investment is understood in different ways. According to the United Nations Conference on Trade and Development (UNCTAD), foreign direct investment is defined as non-national investment in fixed assets in a particular country. The International Monetary Fund (IMF) characterizes them as a series of different operations aimed at influencing the market and managing a business in a country other than the investor's home country (Al-Ateen, 2018, 286) [7]. Furthermore, the Organization for Economic Co-operation and Development (OECD) defines foreign direct investment as an activity that demonstrates the intention of a company located in one economy to obtain sustainable benefits from a company operating in another economy. The concept of sustainable benefits is based on a long-term relationship between the company and the direct investor and its effective influence on the management of the company (Al-Samarrai, 1999, 11) [13].

Importance of Foreign Direct Investment: Foreign Direct Investment plays a critical role in the global economy by promoting economic growth in host countries. It provides essential capital flows, facilitates technology transfer, and enhances managerial expertise, which can lead to increased productivity and competitiveness. Moreover, Foreign Direct Investment often creates job opportunities and stimulates infrastructure development, contributing to economic stability and advancement. For the investing country, Foreign Direct Investment offers opportunities to expand markets and access new resources. However, the impact of Foreign Direct Investment can be complex, as it may affect local markets and industries, influence trade balances, and pose challenges to regulatory and economic sovereignty. Overall, Foreign Direct Investment is a pivotal mechanism for economic integration and international growth (Al-Jubouri, 2016, 25) [14].

Third: The relationship between macroeconomic variables and foreign trade

Economic transformations often require countries to adapt to current global economic trends. These transformations focus on aspects such as the organization of production, quality, efficiency, and the use of technological advances, all of which can improve a country's competitiveness in the global market. Below is an overview of the relationship between macroeconomic variables and foreign trade:

1. **The Relationship between Gross Domestic Product (GDP) and Foreign Trade:** Foreign trade acts as a powerful driver of economic development. Research consistently supports the notion that increased engagement in trade can stimulate economic growth by boosting Gross Domestic Product. This, in turn, is essential for achieving broader developmental outcomes by connecting global markets with producers and consumers. Trade provides a crucial channel for capital, technology, and services flows, which are necessary for the continuous improvement of productivity in agriculture, industry, and services—conditions that foster structural changes in the economy (UNCTAD, 2014). Economic progress in any country extends beyond merely raising living standards for individuals or communities; it also enhances mutual dependence among nations and strengthens international economic cooperation. Thus, foreign trade is a crucial indicator of economic development. A trade deficit, where a country's demand for investment goods exceeds its export capacity, can be mitigated by imports providing goods, services, and expertise to utilize natural resources better and support the trade balance. Conversely, a trade surplus is a potent driver for rapid growth, as active participation in exports increases Gross Domestic Product (Abdelhamid, 2008, 148) [4].
2. **The Relationship Between Public Spending and Foreign Trade:** The relationship between foreign trade and public spending can manifest in two directions—either positively or negatively. Negative impacts arise when public spending is misallocated or fails to support economic development, mainly through consumption and operational expenditures that increase consumer demand. This can lead to a trade imbalance, favoring imports and resulting in a trade deficit. Conversely, public spending can have a positive impact on foreign trade, mainly when directed towards infrastructure projects, which are fundamental to enhancing trade. Governments are expected to use public spending to meet social needs and intervene in the economy. While such spending can positively influence economic growth through the multiplier effect, it may also lead to a trade deficit if misallocated. A trade deficit is problematic for developing countries as it often necessitates raising interest rates to attract foreign savings, which, in turn, can reduce domestic investment and negatively affect other components of aggregate demand, disrupting resource allocation. Therefore, it is crucial for countries to prioritize the production of goods and favor domestic products (Jassim & Al-Kawaz, 2022, 162) [15].
3. **The relationship between foreign direct investment (FDI) and foreign trade:** The relationship between foreign direct investment and foreign trade, as well as the mechanisms by which they influence each other, have evolved considerably over time. Historically, multinational corporations, present as early as the 17th century through trading companies such as the Dutch East India Company and the British West Africa Company, have played a vital role in this dynamic. Some historians even attribute such activities to the Phoenician trade in the Mediterranean in the 9th century BC. However, the development and increasing activity of multinational corporations only became apparent after World War II. Many economic studies and publications have examined the nature of the relationship between FDI and foreign trade, often focusing on the question of whether FDI acts as a substitute or a complement to trade. Economists generally support the idea that foreign direct investment has a positive impact on foreign trade. For example, foreign direct investment can lead to increased trade by opening new markets and facilitating access to foreign markets for domestic firms. However, the impact of foreign direct investment on trade is a matter of debate. Economist Robert Mundell argues that foreign direct

investment can reduce exports because it moves capital from one country to another, often leading to significant differences in factor prices and productivity. Similarly, Kojima has suggested that foreign direct investment in the United States, operating primarily in an oligopolistic market structure, could be unfavorable to trade and have adverse long-term effects on both the investing and host countries. Despite these debates, there is ample evidence in the literature of the positive relationship between FDI and foreign trade. Foreign direct investment often complements trade by improving a country's ability to engage in international markets and by improving its trade infrastructure, thereby promoting greater economic integration and growth (Samantha, 2018, 88) [18].

The second topic

Economic Measurement of the Impact of Macroeconomic Variables on Foreign Trade

First: Description of the Proposed Econometric Model: The indicators utilized in the economic measurement of the relationship between macroeconomic variables and their impact on foreign trade can be described as follows:

A. The dependent variable (Y): Foreign Trade.
B. The independent variables (X), representing macroeconomic indicators, are as follows:

- Gross Domestic Product (X1)
- Public Expenditure (X2)
- Foreign Direct Investment (X3)

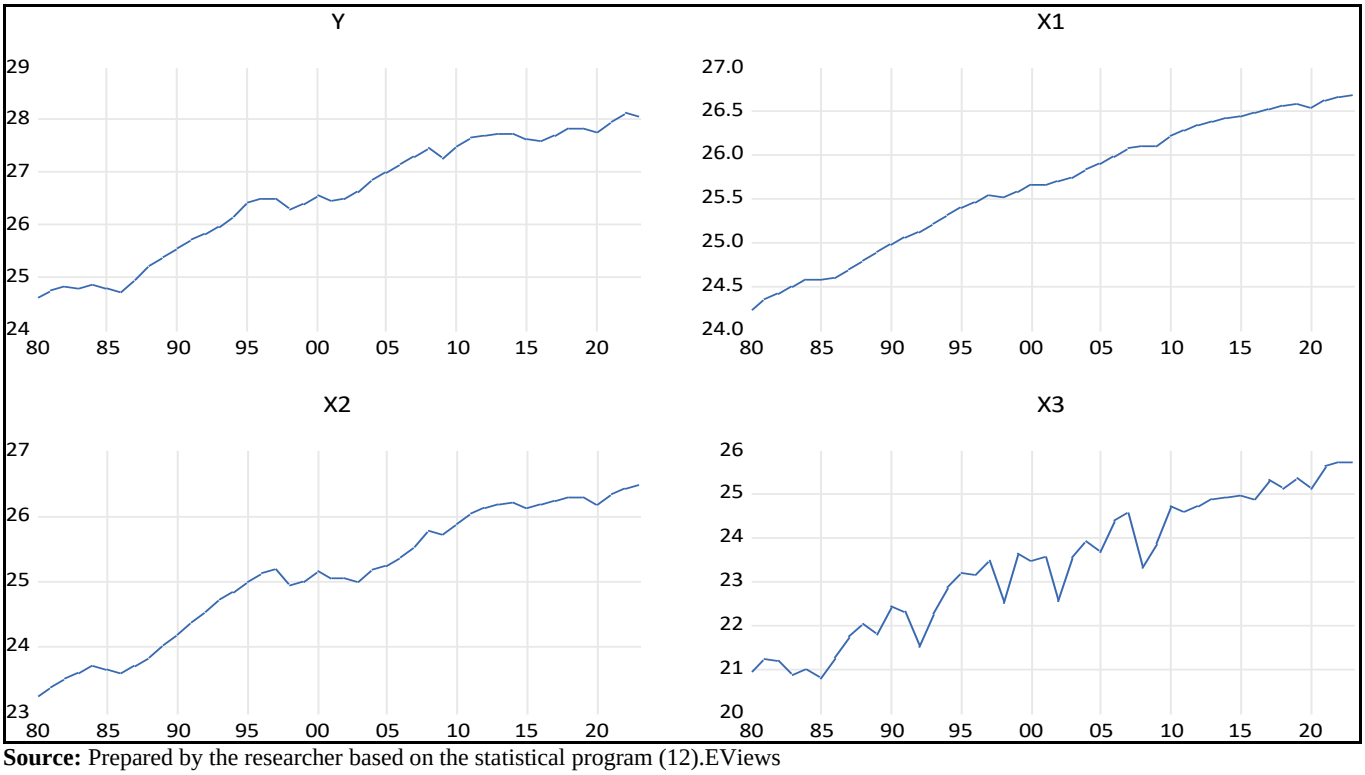
Second: The Standard Form of the Model Used in the Research: The econometric model has been constructed in the following form:

$$\log Y1 = \beta 1 \log X1 + \beta 2 \log X2 + \beta 3 \log X3 + \epsilon it \ldots\ldots\ldots (1)$$

Given the use of various methods to measure the variables, the logarithmic model was employed to standardize the data and mitigate the impact of discrepancies. An econometric analysis was conducted on the data provided in the appendix.

Thirdly: Analysis of the Econometric Study Results in Singapore

1. Time Series Plot: Before testing the study variables, it is essential to graphically represent them over time to understand the nature and characteristics of the series under investigation. Graphical plots of time series provide preliminary indications of their potential nature. The time series plots of the study variables reveal that the series is unstable due to a general trend, as illustrated in Figure (1) below.



Source: Prepared by the researcher based on the statistical program (12).EViews

Fig 1: Shows the temporal trend of the study variables in Singapore over the duration. (1980-2023)

2. Unit Root Test: To confirm that the time series is accessible from a unit root and to assess its stability, the Augmented Dickey-Fuller (ADF) test was employed. Table (1) shows that the time series for Gross Domestic Product (X1) stabilized at the level with a constant term and at a significance level of (10%). Similarly, the time series for Foreign Direct Investment stabilized at the level with a constant term and a general trend. However, Foreign Trade and Public Expenditure were only stable after taking the first difference, with a constant term, at a significance level of (1%). This supports one of the essential conditions for the ARDL model, which requires that the study variables be stable at both the level and the first difference.

Table 1: Results of the Unit Root Test in Singapore

Unit Root Test Results Table (ADF)					
Null Hypothesis: the variable has a unit root					
At_ Level					
		Y	**X1**	**X2**	**X3**
With Constant	t-Statistic	-1.2184	-2.7502	-1.6129	-1.4179
	Prob.	0.6580	0.0741	0.4674	0.5634
		n0	*	n0	n0
With Constant & Trend	t-Statistic	-1.3726	-0.6187	-1.4851	-5.6837
	Prob.	0.8550	0.9727	0.8194	0.0001
		n0	n0	n0	***
Without Constant & Trend	t-Statistic	4.2846	9.1019	4.8356	4.5680
	Prob.	1.0000	1.0000	1.0000	1.0000
		n0	n0	n0	n0
At_ First Difference					
		d(Y)	d(X1)	d(X2)	d(X3)
With Constant	t- Statistic	-5.1841	-5.3665	-5.1858	-6.2421
	Prob.	0.0001	0.0001	0.0001	0.0000
		***	***	***	***
With Constant & Trend	t- Statistic	-5.1986	-5.9997	-5.2577	-6.3693
	Prob.	0.0006	0.0001	0.0005	0.0000
		***	***	***	***
Without Constant & Trend	t- Statistic	-4.0707	-1.3695	-3.8568	-8.7187
	Prob	0.0001	0.1559	0.0003	0.0000
		***	n0	***	***
a: (*) Significant at the (10%); (**)Significant at the (5%); (***) Significant at the (1%) and (no) Not Significant					

Source: Prepared by the researcher based on the statistical program (14).EViews

Based on the results of the unit root tests for the study variables in Singapore, we can apply the ARDL model to the data**.**

3. Results of Applying the ARDL Model in Singapore: After testing the stationarity of the time series for the macroeconomic variables (Gross Domestic Product, Public Expenditure, Foreign Direct Investment) as independent variables and Foreign Trade as the dependent variable, it was found that they were stable at both the level and the first difference. Consequently, the ARDL model can be applied. Table (2) presents the results of this application.

Table 2: Results of Applying the ARDL Model in Singapore

Dependent Variable: LOGY				
Method: ARDL				
Sample: 1984 2023				
Included observations: 41 after adjustments				
Maximum dependent lags: 4 (Automatic selection)				
Model selection method: Schwarz criterion (SIC)				
Dynamic regressors (4 lags, automatic): LOGX1 LOGX2 LOGX3				
Fixed regressors: C				
Number of models evalulated: 500				
Selected Model: ARDL(1, 0, 1, 3)				
Note: final equation sample is larger than selection sample				
Variable	Coefficient	Std . Error	t-Statistic	Prob *
LOGY(-1)	0.663834	0.092209	7.199201	0.0000
LOGX1	0.810507	0.168231	4.817828	0.0000
LOGX2	0.708373	0.106172	6.671914	0.0000
LOGX2(-1)	-0.707136	0.101239	-6.984843	0.0000
LOGX3	-0.001666	0.026079	-0.063875	0.9495
LOGX3(-1)	-0.017078	0.023789	-0.717904	0.4780
LOGX3(-2)	-0.068249	0.023737	-2.875190	0.0071
LOGX3(-3)	-0.061256	0.022834	-2.682637	0.0115
C	-8.466128	1.971676	-4.293874	0.0002
R- squared	0.998141	Mean dependent var		26.69249
Adjusted R-squared	0.997676	S.D. dependent var		1.054800
S.E . of regression	0.050851	Akaike info criterion		-2.928665
Sum squared resid	0.082745	Schwarz criterion		-2.552515
Log likelihood	69.03762	Hannan - Quinn criter.		-2.791691
F- statistic	2147.393	Durbin - Watson stat		1.762290
Prob (F- statistic)	0.000000			
*Note: p - values and any subsequent test results do not account for model selection.				

Source: Prepared by the researcher using the statistical software (14.EViews).

The table above reveals that, according to the R^2 coefficient of determination, the model explains (99%) of the variations in Singapore's foreign trade attributable to the independent variables, with (1%) attributed to other random variables outside the model. According to the F-test, the Prob value is (0.000), which is less than 0.05, indicating that the model is suitable for forecasting future trends.

4. Testing the Long-Term Equilibrium Relationship (Counteraction) Among Study Variables in Singapore: To test the existence of a long-run equilibrium relationship (counteraction) between gross domestic product, government expenditure and foreign direct investment as independent variables and foreign trade as dependent variable in Singapore, the bounds test was conducted. The results are presented in the table below.

Table 3: Results of Counteraction Testing Among Study Variables

F - Bounds Test	**Null Hypothesis: No levels relationship**			
Test Statistic	**Value**	**Signify.**	**I (0)**	**I (1)**
F - statistic	6.604014	Asymptotic: n = 1000		
k	3	10%	2.37	3.2
		5%	2.79	3.67
		2.50%	3.15	4.08
		1%	3.65	4.66
Actual Sample Size	40	Finite Sample: n = 40		
		10%	2.592	3.454
		5%	3.1	4.088
		1%	4.31	5.544

Source: Prepared by the researcher using the statistical software (12.EViews).

The table above shows the results of the counteraction test, where the F-statistic value is (6.60), which exceeds the critical value of (4.66) at the (1%) significance level. This indicates the presence of a counteraction relationship among the study variables.

5. Results of Short- and Long-Term Relationships in Singapore: Using this test, we estimate the short- and long-term parameters to illustrate the impact of the independent variables on the dependent variable and determine the nature of the relationship, as shown in the table below.

Table 4: Results of Short- and Long-Term Relationships among Study Variables in Singapore

ARDL Long Run Form and Bounds Test				
ARDL Long Run Form and Bounds Test				
Dependent Variable: D (LOGY)				
Selected Model: ARDL(4, 0, 4, 3)				
Case 2: Restricted Constant and No Trend				
Sample: 1980 2023				
Included observations: 40				
Conditional Error Correction Regression				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-11.43892	2.422537	-4.721877	0.0001
LOGY(-1)*	-0.479446	0.124605	-3.847713	0.0007
LOGX1**	0.953634	0.211940	4.499549	0.0001
LOGX2(-1)	0.225141	0.123944	1.816474	0.0813
LOGX3(-1)	-0.256571	0.069930	-3.668967	0.0012
D(LOGY(-1))	0.238270	0.162125	1.469663	0.1541
D(LOGY(-2))	0.174288	0.137156	1.270727	0.2155
D(LOGY(-3))	0.429281	0.141832	3.026681	0.0057
D(LOGX2)	0.746007	0.122141	6.107775	0.0000
D(LOGX2(-1))	-0.262643	0.172366	-1.523749	0.1401
D(LOGX2(-2))	-0.306050	0.177232	-1.726837	0.0965
D(LOGX2(-3))	-0.310147	0.192296	-1.612864	0.1193
D(LOGX3)	-0.037426	0.027878	-1.342513	0.1915
D(LOGX3(-1))	0.163520	0.037470	4.363965	0.0002
D(LOGX3(-2))	0.077602	0.025316	3.065341	0.0052
* p - value incompatible with t-Bounds distribution.				
** Variable interpreted as Z = Z (-1) + D (Z).				
Levels Equation				
Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGX1	1.989033	0.381533	5.213269	0.0000
LOGX2	0.469586	0.228605	2.054137	0.0506
LOGX3	-0.535141	0.180007	-2.972885	0.0064
C	-23.85863	4.748061	-5.024920	0.0000
EC = LOGY - (1.9890*LOGX1 + 0.4696*LOGX2 -0.5351*LOGX3 - 23.8586)				

Source: Prepared by the researcher using the statistical software (12.EViews).

A. Results of short-run relationships: The error correction model (ECM) test was used to predict the return of the model to equilibrium and to measure the long-run speed of adjustment between the independent variables and the dependent variable included in the model. The results are presented in Table (1).

- The results indicate that Gross Domestic Product significantly affects Foreign Trade, meaning that an increase of one unit in GDP leads to a rise in Foreign Trade value by 0.95 at the (1%) significance level.
- The results from the Distributed Lag Autoregressive Model for Public Expenditure on Foreign Trade were significant at the (0.01) level. This implies that an increase of one unit in Public Expenditure per year will raise the Foreign Trade value by (0.74) at the (1%) significance level.
- The coefficient of foreign direct investment has a negative sign, indicating an inverse relationship with foreign trade, although this relationship is not significant at the 5% level.
- The results show that the unconditional error correction term CointEq (-1) = (-0.377) is negative and significant at the (5%) level with a probability of 0.000. This confirms the necessary and sufficient condition for a short-run relationship and indicates a trend towards a long-run relationship between the independent variables and the dependent variable. Any shock or change in the independent variable that caused a short-run imbalance in the previous year is corrected within 38% of the current year.

B. Long-Term Relationship: This test also reveals the type of relationship between the independent variables and the dependent variable, as well as the extent of their influence on each other, as shown in Table (4).

- The results show that Gross Domestic Product significantly affects Foreign Trade, meaning that an increase of one unit in GDP leads to an increase in Foreign Trade value by (1.98) at the (1%) significance level.
- The positive sign indicates a direct relationship between Public Expenditure and Foreign Trade, which is significant at the (5%) level. A (1%) increase in Public Expenditure leads to a (0.46%) increase in Foreign Trade.
- The negative sign indicates an inverse relationship between Foreign Direct Investment and Foreign Trade. A (1%) increase in Foreign Direct Investment results in a (0.53%) decrease in Foreign Trade.

6. Testing for Autocorrelation

Table 5: LM Test for Serial Correlation

Breusch-Godfrey Serial Correlation LM Test:			
Null hypothesis: No serial correlation at up to 2 lags			
F - statistic	1.689380	Prob. F(2,23)	0.2067
Obs *R - squared	5.123454	Prob. Chi - Square(2)	0.0772

Source: Prepared by the researcher using the statistical software (12.EViews).

The results indicate that the estimated model does not suffer from autocorrelation issues, as the F-statistic value is not significant.

7. Testing for Homoscedasticity

Table 6: Heteroskedasticity Test: ARCH

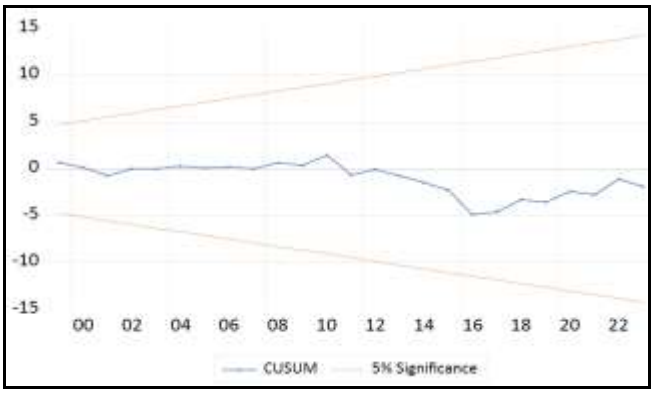
Heteroskedasticity Test: ARCH			
F - statistic	0.530424	Prob. F(1,37)	0.47101
Obs*R-squared	0.551194	Prob. Chi-Square(1)	0.45783

Source: Prepared by the researcher using the statistical software (12.EViews).

The results indicate that the estimated model does not suffer from heteroscedasticity issues, as the F-statistic value is not significant.

8. Results of the Stability of the Estimated Model

Based on the CUSUM test shown below, the model is stable throughout the study period. Additionally, there is a potential for returning to the equilibrium point in the long term if a specific shock occurs in the explanatory variables of the model. This is evident from the Error Correction Term, which is negative and statistically significant, with the parameter's p-value being well below (0.05).



Source: Prepared by the researchers based on outputs from the statistical software (12.EViews).

Fig 2: Graphical Representation of the CUSUM Test for the Estimated Model

Conclusions and Recommendations

Conclusions

Short-run relationship: The error correction model (ECM) test, which predicts the model's return to equilibrium and measures the long-run speed of adjustment between the model's independent and dependent variables, produces the following results

1. The results show that Gross Domestic Product significantly affects Foreign Trade, indicating that a one-unit change in GDP leads to a (0.95%) change in Foreign Trade at the (1%) significance level.
2. The Distributed Lag Autoregressive Model results for Public Expenditure on Foreign Trade are significant at the (0.01) level. This means that a one-unit increase in Public Expenditure per year will result in a (0.74%) increase in Foreign Trade at the (1%) significance level.
3. The negative coefficient indicates an inverse relationship between Foreign Direct Investment and Foreign Trade, though this relationship is not significant at the 5% level.

4. The unconditional error correction term CointEq (-1) = (-0.377) is negative and significant at the (5%) level with probability (0.000). This result confirms the necessary and sufficient condition for a short-run relationship and suggests a trend toward a long-run relationship between the independent and dependent variables. Any shock or change in the independent variable that caused a short-run imbalance in the previous year is corrected within (38%) of the current year.

Long-Term Relationship: The study tests reveal the nature and degree of the long-term relationship between the independent variables and the dependent variable as follows:

1. The results show that Gross Domestic Product significantly affects Foreign Trade. Specifically, a (1%) change in GDP leads to a (1.98%) change in Foreign Trade at the (1%) significance level.
2. The positive sign indicates a direct relationship between Public Expenditure and Foreign Trade, which is significant at the 5% level. An increase of (1%) in Public Expenditure results in a (0.46%) increase in Foreign Trade.
3. The negative sign indicates an inverse relationship between Foreign Direct Investment and Foreign Trade. A (1%) increase in Foreign Direct Investment results in a (0.53%) decrease in Foreign Trade.

Recommendations

1. It is crucial to focus on enhancing foreign trade and diversifying production and export sources, particularly in developing countries. This includes implementing policies to protect domestic production, support local industries, reform the banking system, direct spending towards investment, reduce unnecessary expenditures, lower current spending, and increase foreign investment in various economic sectors, including industry, agriculture, and services.
2. Emphasis should be placed on expanding research that explores the relationship between macroeconomic variables and foreign trade better to understand their positive and negative impacts on trade.
3. Reducing reliance on raw material exports, which constitute a significant portion of global trade, and striving to increase product diversification in these countries can help maintain a balanced economy less affected by global shocks. This approach can break the cycle of rentier economies and safeguard the resources for future generations within the framework of sustainable development goals.
4. Conduct econometric studies focusing on contemporary economic variables related to foreign trade, including environmental, technological, and information and communication factors, among others.

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Appendix of Standard Research Data (Million Dollars)

Years	Total foreign trade (1+2)	Export of goods and services (1)	Imports of goods and services (2)	Gross Domestic Product (GDP)	General inflation	Incoming foreign direct investment
1980	48,886	24,031	24,854	33,684	3,964	1,235
1981	56,669	28,092	28,576	37,327	5,419	1,659
1982	59,919	29,812	30,107	39,978	5,497	1,601
1983	59,247	29,675	29,571	43,398	6,283	1,133
1984	61,839	30,900	30,939	47,213	7,840	1,301
1985	58,263	29,160	29,103	46,920	7,336	1,046
1986	54,798	27,644	27,154	47,550	9,265	1,710
1987	67,995	34,308	33,687	52,684	12,300	2,836
1988	91,303	46,865	44,439	58,618	10,140	3,654
1989	105,889	54,623	51,266	64,573	10,762	2,886
1990	124,456	64,045	60,411	70,914	12,030	5,574
1991	147,259	76,631	70,628	75,658	14,042	4,887
1992	162,291	84,309	77,981	80,681	14,047	2,204
1993	189,942	97,966	91,975	89,927	14,273	4,686
1994	233,016	122,465	110,550	99,905	12,289	8,550
1995	303,356	159,046	144,309	107,074	14,844	11,942
1996	322,496	169,132	153,364	115,074	21,948	11,432
1997	324,265	169,506	154,759	124,644	20,265	15,701
1998	267,540	142,983	124,556	121,913	22,557	5,958
1999	290,342	152,507	137,834	128,884	21,605	18,852
2000	350,068	180,961	169,108	140,533	26,032	15,515
2001	313,642	164,227	149,415	139,028	29,232	17,006
2002	323,649	170,350	153,299	144,483	26,753	6,157
2003	368,340	197,818	170,522	151,054	27,112	17,051
2004	461,887	246,116	215,771	166,069	27,983	24,390
2005	537,343	287,772	249,571	178,302	26,790	19,316
2006	632,206	338,926	293,280	194,362	30,835	39,129
2007	713,432	385,006	328,425	211,896	33,130	47,337
2008	846,740	443,371	403,368	215,845	39,735	13,598
2009	695,432	370,525	324,906	216,121	40,393	23,436
2010	886,535	474,817	411,718	247,501	40,587	55,322
2011	1,059,036	568,009	491,027	262,883	44,879	49,155
2012	1,089,521	580,505	509,015	274,543	45,668	55,310
2013	1,128,933	600,013	528,920	287,769	47,629	64,389
2014	1,134,980	604,391	530,588	299,095	52,465	68,698
2015	1,014,767	549,421	465,345	307,998	67,435	69,774
2016	967,443	525,530	441,913	319,051	63,661	65,363
2017	1,088,234	589,858	498,376	333,450	67,809	102,165
2018	1,231,396	671,738	559,658	345,177	74,685	82,009,
2019	1,217,657	664,478	553,179	349,820	72,715	105,890
2020	1,159,220	634,514	524,706	336,283	124,031	80,732
2021	1,431,635	794,470	637,165	368,871	95,505	137,269
2022	1,659,827	925,951	733,876	383,029	104,017	148,763

Source: The table is the work of the researcher based on the following source:
World Bank, Open Data: https://data.albankaldawli.org