StatsDW Analytics: Does Services Lead Malaysia Economy Growth?

Problem Statement

- A changes in the economic structure, which is seen as a growing economic self-sufficiency of the agricultural economy to an industrial economy. The services sector increased significantly and presence a changes in the production process.

- The Gross Domestic Product (GDP) stipulates that a more open international economy, the greater the possibility to import and export that will increase the services sector as well.

- Moreover, population and economic growth will lead to an increase in the need to provide services.

Objective of Study

- To determine the short run and long run causal relationship between service sector and economic growth in Malaysia.

- To determine the short run and long run causal relationship between export of services and economic growth in Malaysia.

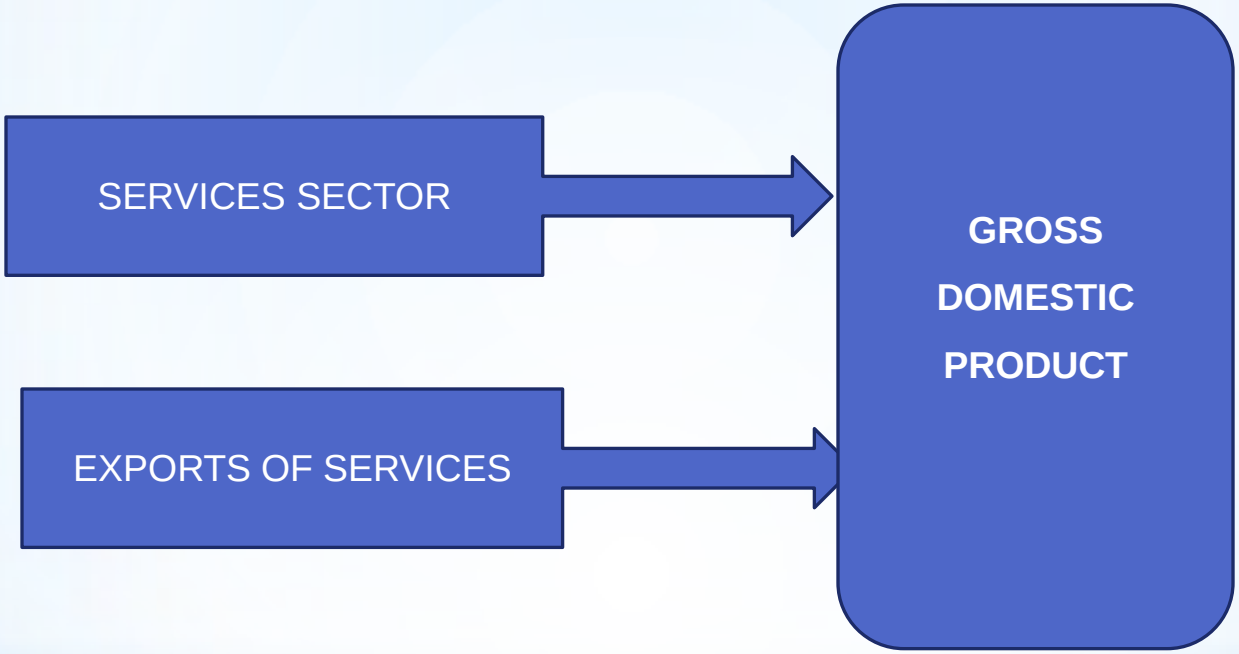
Significance of Study

- Services are becoming the most important sector in many economies. Services account for about 70 per cent of economic activity in high-income countries and even in low income countries services generate at least 45 per cent of GDP.

- Services are inputs in the production of goods and other services and, through these; they contribute to economic growth and the development of countries. According to Ghani and Homi (2010), there is a relationship between high growth in services and high overall economic growth.

- This study can shed the policy makers make a decision for a new policy or existing policy and improving a trade of service sector.

Theoretical Framework



Independent Variables

Dependent Variable

LITERATURE REVIEW

In Malaysia, there are lack of studies that addressing directly the causality relationship between services sector and exports of services :

a) Study done by Subramaniam (2009) using a Vector Error-Correction Model (VECM) to indicating the linkages among economic sectors between agriculture sector, manufacturing sector, services sector, and trade sector. Similarly, study by George K. Zestos and Xiangnan (2002) on causal relationship between trade and GDP growth have been done in the United States and Canada.

b) Khalafa and Webb (2001), studies concerning the impact of export on economic growth in Malaysia by using quarterly data from 1965 to 1996. They found that the export-led growth hypothesis was valid that export in Malaysia leads to economic growth and there is a positive relationship between exports and economic growth

c) According to Ghani and Homi (2010), there is a relationship between high growth in services and high overall economic growth.

d) Study done by Wang and Li (2010) used an empirical analysis involving unit-roots, co-integration and Granger causality tests based on time series data from 1990 to 2008 in order to find the causality among the services industry and economic growth in China.

Data & Methodology

Data & Methodology

- The annual times series data on Export of Services, Services Sector and GDP over the period 1985 to 2014. The dataset of Malaysia is obtained from DOSM StatsDW.

- All data series are transformed to natural logarithms before further analysis, so that the first difference can be interpreted as growth rates as well as to reduce the variation in time-series data sets.

- The selections of the key variables are based on the theoretical framework using a Vector Auto Regression (VAR) Model to indicate the linkages among Services Sector, Exports of Services and GDP.

Empirical Analysis

This study uses Granger causality test as define by Granger (1998), which takes into consideration the time series properties of the data to examine the incidence of causality and Johansen and Juselius (1990), procedure for estimating the number of co-integrating relationships in above variables. The E-Views econometrics software package is used to analyze the data and develop results in this study. The following procedures will be adopted:

Step 1: Stationary Test

This study utilized two tests on the individual stochastic structure, that are the Augmented Dickey-Fuller test (5) suggested by Engle and Granger (1987), and the Philips-Perron test (6) recommended by Philips-Perron (1988).

Step 2: Selection of Lag Length

The first step in co-integration analysis is selecting an appropriate lag for variables. The three most common criterion factions are the Akaike (AIC), Schwarz-Bayesian (SBIC) and Hannan-Quinn (HQ) in VAR models (Lutkepohl (1991).

Step 3: Co-integration Test

- Utilizes the Johansen and Juselius (1990) Co-integration test, which involves three steps. First, determine the order of integration for each of the variables under observation. Second, estimate co-integrating regression with vector autoregression (VAR) model. Finally, if the times series are co-integrated, then construct the vector error-correction model (VECM).

- To estimate co-integrating regression under Johansen and Juselius the two statistic test will be utilizes:

  i. *Trace Test*
  ii. *Maximal Eigenvalue Test*

  According Granger(1983) if two variables are cointegrated, then they have an error correction representation (ECM).

- The initial model of this study as below:

$$LGDP_t = \alpha_0 + \alpha_1 LSER_t + \alpha_2 LEXPSER_t + \mu_t$$

Where,
LEXPSER is log exports of services,
LDPG is Gross Domestic Product
LSER is Services Sector

Under Johansen and Juselius (1990), procedure for estimating the number of co-integrating relationships the following Model has applied:

$$\begin{bmatrix} \mathrm{LGDP}_t \\ \mathrm{LSER}_t \\ \mathrm{LEXPSER}_t \end{bmatrix} \begin{bmatrix} \alpha_1 \\ \alpha_2 \\ \alpha_3 \end{bmatrix} \begin{bmatrix} \beta_{1,1}(L) & \beta_{1,2}(L) & \beta_{1,2}(L) \\ \beta_{2,1}(L) & \beta_{2,2}(L) & \beta_{2,3}(L) \\ \beta_{3,1}(L) & \beta_{3,2}(L) & \beta_{3,3}(L) \end{bmatrix} \begin{bmatrix} \mathrm{LGDP}_t \\ \mathrm{LSER}_t \\ \mathrm{LEXPSER}_t \end{bmatrix} \begin{bmatrix} \varepsilon_t \\ \varepsilon_t \\ \varepsilon_t \end{bmatrix}$$

Step 4: Granger Causality Test

- After the Johansen and Juselius Co-integration Test, we proceed to Granger causality in Vector Autoregression (VAR) environment.

- According to Granger (1988), co-integration is concerned with long-run equilibrium. On the other hand, Ganger causality is concerned with short-run forecasting ability. These two different concepts can be consider in an error correction model (ECM) co-integrated system can be written in the form of ECM as follows:

$$\Delta x_t = \gamma_1 z_{t-1} + lagged(\Delta x_t, \Delta y_t) + \varepsilon_{1,t}$$

$$\Delta y_t = \gamma_2 z_{t-1} + lagged(\Delta x_t, \Delta y_t) + \varepsilon_{2,t}$$

FINDINGS AND DISCUSSION

Table 1: Stationary Test Using ADF and PP Tests

	Augmented Dickey-Fuller Test				Phillips-Perron Test			
	Level		First Difference		Level		First Difference	
Variable	Intercept	Trend & Intercept	Intercept	Trend & Intercept	Intercept	Trend & Intercept	Intercept	Trend & Intercept
LGDP	0.365	0.248	0.000*	0.000*	0.0368	0.252	0.000*	0.000*
LSER	0.589	0.117	0.000*	0.001*	0.615	0.348	0.000*	0.001*
LEXPSER	0.083	0.774	0.000*	0.000*	0.003	0.915	0.000*	0.000*

* denote significant at 5% level using t-stat approach

Both ADF and PP are stationary at first difference.

Note: * denote significant at 5% level using t-stat approach.

Lag Selection

Table 4: The Optimal Lag For LGDP, LSER, LEXPSER

Lag	LogL	LR	FPE	AIC	SC	HQ
0	7.348	NA	0.000	-0.212	-0.087	-0.166
1	**134.915**	**230.244***	**0.000***	**-5.996***	**-5.494***	**-5.813***
2	139.310	7.290	0.000	-5.771	-4.894	-5.452
3	142.839	5.336	0.000	-5.504	-4.251	-5.048

Based on the results, the optimal lag order selection by the criterion suggested is one lag. Here it can be concluded that the optimal lag selection is one lag as suggested by the most criterion such as LR, AIC, SC and HQ.

* Table 1 to Table 5 indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

JJ Co-integration Test

Co-integration Test	H_o	H_1	**LGDP LSER**	LGDP LEXPSER	LSER LEXPSER	LGDP, LSER LEXPSER
Trace Statistic	r = 0	**r = 1**	**18.321***	10.307	10.851	23.168
	r ≤ 1	r = 2	1.395	0.190	0.345	4.859
	r ≤ 2	r = 3				0.172
Max-Eigen Statistic	r = 0	**r = 1**	**16.927***	10.117	10.506	18.308
	r ≤ 1	r = 2	1.395	0.190	0.345	4.687
	r ≤ 2	r = 3				0.172

* denotes rejection of the Ho hypothesis at the 5% level.

Based on the result, both trace and max eigenvalue reject at 5% level that is at least one vector is co-integrated (LGDP, LSER). This indicates that the GDP and Services Sector have a long run relationship at least 1 rank. Both Trace and Max-Eigen Statistic indicate that there are cointegration exist between LGDP and LSER at 1.

Granger Causality Test

Short Run Causality

Granger Causality Wald Tests (Chi-square (***x2***))

Dependent Var	DLGDP	DLSER	DLEXPSER
DLGDP	-	0.328	0.876
DLSER	0.599	-	0.210
DLEXPSER	7.093*	5.335*	-

* indicates significant at the 5% level

It shows that there is a causality exist between LGDP and LSER towards LEXPSER in short run. The result shows that LGDP does not caused by LEXPSER but LEXPSER is caused by LGDP in the short run. Same goes to LSER and LEXPSER.

Long Run Causality

Table 7: VECM Results

	t-Statistic (p-value)		ΔECT	
Dependent Var	ΔDLGDP	ΔDLSER	t-Statistic	Coefficent
ΔDLGDP	-	0.977 (0.334)	-2.400	-0.630*
ΔDLSER	0.275 (0.599)	-	0.272	0.286

ΔLGDP = -2.833 -0.917ΔLSER (-1) -0.630ΔECT (-1) *

It indicates that there is a causality exist between DLSER and DLGDP in long run at the speed of 63.0% adjustment of equilibrium, which is very high. Thus, it can be concluded that there is a long run one-way causality exists between GDP and Services.

Further Analysis

Furthermore, we examine the initial key variables employing regression in this model and results as below:

$$LGDP_t = -0.007 + 0.853LSER_t + 0.137LEXPSER_t + \mu_t$$
$$\qquad\qquad (0.08) \quad (0.05) \qquad\qquad (0.03)$$

Where between brackets are standard errors. All of the variables are statistically significant at 1% level. Based on report, all signs of coefficients in the GDP equation are consistent with economic theory.

For every one per cent change in services, GDP increase by 85 per cent holding other variables constant. This means that increases in GDP that of growth in services sector.

This finding reveals that Services Sector lead economic growth for Malaysia.

Regression Analysis Results

Table 8 : Dependent Variable: DLGDP, Method: Least Squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLSER	0.853	0.053	16.074	0.000
DLEXPSER	0.137	0.029	4.659	0.000
C	-0.007	0.008	-0.897	0.376
R-squared	0.914	Mean dependent var		0.099
F-statistic	212.153	Durbin-Watson stat		2.279
Prob(F-statistic)	0.000			

CONCLUSION AND POLICY IMPLICATION

- In the short run, Export of Services causes the growth of GDP and Services.
- Services does Granger cause GDP in the long run.
- Malaysia has large potential in improving its services sector as well as export of services sector.
- Major policies are essential and required for the services sector to contribute more in the economic growth as well as export sector to achieve the desirable economic growth.
- Hence, these two sectors could be the catalyst to achieve the government's new ETP programme in achieving a high income country.