The Impact of Macroeconomic Variables Towards Tax Revenue in Malaysia: Time Series Data

Abstract - This study is to investigate the impact of macroeconomic variables such as Population, Gross Domestic Product, Inflation Rate, Unemployment Rate, Import and Export towards Tax Revenue in Malaysia. The study use a time series data for over the period of 1976 to 2015. The data then will be analyse using E-Views 12. Augmented-Dickey Fuller (ADF) & Philips Perron (PP) Unit Root Test, Johansen Juselius Cointegration Analysis and Granger Causality Test (VECM) were used to run the data. The findings reveal that macroeconomic variables such as inflation and export have a positive impact towards tax revenue. However, import and unemployment have a negative impact towards tax revenue. The study recommends government and policy makers shall take appropriate steps to improve on fiscal and monetary policies.

Keywords: Tax Revenue, Population, Gross Domestic Product, Inflation Rate, Unemployment Rate, Import and Export

1. Introduction

Malaysia has a diversified economy and in order to generate the development of Malaysia, government collected taxes from all of the people and it became the revenue for the government. According to Collected by The Malaysian Government To Develop The Economy European Law Essay, tax in Malaysia were collected through a taxation system which started on the 1st January 1948, collected by Inland Revenue Board of Malaysia (Lembaga Hasil Dalam Negeri). Good and Services Tax (GST) was implemented on the 1st April 2015 and Royal Malaysian Customs (Jabatan Kastam Diraja) were given the mandate to collect the tax. There are three sources of revenue which are tax revenue, non-tax revenue and capital receipts. However, in this research, this study is only focus on tax revenue. According to Gurria (1961) in the OECD Data, tax revenue is explained as revenues
collected from taxes on income and profits, social security contributions, taxes levied on goods and services, payroll taxes, taxes on the ownership and transfer of property, and other taxes. Moreover, Harahap et al. (2018) stated that taxes are the major source of state revenue for financing government expenditures. Tax revenues are influenced by government policies and macroeconomic variables. This study is to investigate the impact of macroeconomic variables towards Tax Revenue in Malaysia.

2. Literature Review

2.1 Tax revenues

Felix (2013) said that aging population will reduce both the tax revenue in every state. Goudswaard (2010) found out that, there is a positive relationship and a rise of tax revenues with population growth. Harun et al. (2013) in his studies found that, macroeconomic indicators like population, exports and imports are highly correlated with tax revenue. Sumera (2012) found out that the results showed that population were negatively related to tax revenue.

2.2 Population

According to Kaldor (1963), tax revenues in underdeveloped countries are generally much lower than in developed countries because tax can only be paid from the surplus of income over the minimum subsistence’ needs of the population. Based on the simulation made by Goudswaard K., & Van de Kar, H. (1994) in the Netherlands indicate a 27 percent rise in tax revenue until 2010 because of population growth and a relatively older labor force.

2.3 Gross Domestic Product

According to Gupta (2007), the economic studies on the determinants of tax revenue in developing countries found that some structural factors like GDP per capita have strong positive determinants of revenue performance. Rshaiza Taha (2011) also found out that government tax revenue to economic growth is relatively stronger and consistent with the long run and short run elasticity findings. Dzingirai Canicio (2014) agreed that there is a positive independence between GDP and tax revenues. However, Ahsan (2005) found out that in developing countries, GDP per capita and Population Growth has the negative significant relationship with tax revenues.

2.4 Inflation

According to Saibu (2013), found that the inflation growth gives a positive impact towards the tax revenue stimulated revenue generation contrary to expectation. Taufik and Imbarine (2012) also state that inflation rate in a country was significant and directly affect the components of tax revenue especially taxes on goods and services tax. Inflation rate is higher in low- and middle-income countries and has the highest percentage of goods and services tax to the total tax revenue. However, Ahmadi (2007) found out that, variables like inflation and population have no significant relationship with tax revenues. Eslamlouian (2007) who estimated using Seemingly Unrelated Regression (SUR) method also found out that inflation leave negative effects of the tax revenue.
2.5 Unemployment Rate

Hudson (2013) simply said that increased in the number of jobless people means that increased in the number of people who cannot afford to pay tax. This means decreasing in tax revenue for the government. There would be negative relationship between the unemployment rates with tax revenue. Aghazadeh et al. (2014) research study in Iran for the year 1991-2011 found out the same result that there is a negative relationship between unemployment and tax revenue. Fall in income results in a fall in tax revenue because tax revenue consists of direct taxes from wages and indirect taxes from purchasing power.

2.6 Import

According to Winters (2001), there will be a positive relationship between imports and tax revenue especially for OECD countries. Suranovic (2012) writer of International Trade Theory and Policy said that, there is positive impacts of export and negative impact of imports on tax revenue. According to Hayes (2012) who did his research in Ireland, she claims that exports are good that it bring in new money to the country and it contributes to the tax revenue. Schulze (2002) found that there is a negative relationship between exports and tax revenue in developed countries.

2.7 Exports

The term export is defined as the sales of goods from one country to another country, whereby proceeds from the sales are added to the total output of the producing country (Jayakumar et al., 2014). According to Trading Economics (2018), taxes on exports are all levies on goods being transported out of the country or services being delivered to nonresidents by residents. Rebates on exported goods that are repayments of previously paid general consumption taxes, excise taxes, or import duties are deducted from the gross amounts’ receivable from these taxes, not from amounts receivable from export taxes. Meanwhile, Blejer (1989) stated that there is a positive relationship of imports and exports on the tax revenue especially in developing countries.

3. Methodology of Study

In this research, the data are obtained from World Bank Development Indicators (WBDI), Lembaga Hasil Dalam Negeri (LHDN) Malaysia, Department of Statistics Malaysia, Trade Economics and The Global Economy. The data was taken by annually from the year of 1976 until 2015 which is 40 years. Besides that, data also obtained from published journals and form Websites such as Investopedia, Malaysian Royal Customs, Ministry of Finance and many more. The yearly amount of tax revenue is selected as dependent variable. Population, Gross Domestic Product (GDP), Inflation Rate, Unemployment Rate, Imports and Exports of the Malaysia played as the independent variables for this study. This research is using secondary data as based on estimation. Besides that, the type of data that we use is time series data and estimates the model by using ordinary least square (OLS). The data will be analyses using the E-view Software 12.

3.1. Empirical Model

The aim of this paper is to examine the relationship of macroeconomic variables which are population, gross domestic product, inflation, unemployment, imports and exports on the tax revenue.
revenue in Malaysia. In the present study, simple linear regression analysis has been used to identify the significant importance of macroeconomic variables towards the tax revenue.

\[ Y (TR) = \beta_0 + \beta_1 (POP) + \beta_2 (GDP) + \beta_3 (INF) + \beta_4 (UNEMPLOY) + \beta_5 (IMP) + \beta_6 (EXP) + \varepsilon \]  

(3.1)

Where, the Dependent Variable is Tax Revenue (TR) and the Independent Variables are POP; Population (million), GDP; Gross Domestic Product (log), INF; Inflation Rate (%), UNEMPLOY; Unemployment Rate (%), IMP; Imports of goods and services (%), EXP; Exports of goods and services (%), \(\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6\); The regression coefficients and \(\varepsilon\); The error term.

3.2. Data Analysis

3.2.1 Unit Root Test

This test is conducted in this research in order to check whether the series of data is stationary or non-stationary. There are two unit root test conducted in the analysis namely: Augment Dickey Fuller (ADF) and Phillip Perron (PP).

3.2.1.1. Augment Dickey Fuller (ADF)

This test is used to regulate whether a unit root, a feature that can cause issues in statistical assumption is exist in an auto regression model. In addition, this test usually used in statistical research and econometrics or any related mathematics, statistics, and computer science to economic data. The augmented Dickey Fuller statistic used in the ADF test is a negative number where the more negative it is, the higher the rejection of the hypothesis that there is a unit root.

3.2.1.2 Phillip Perron (PP)

This unit root developed by Phillips and Pierre Perron and comes to Phillip Perron root test. This PP unit root test is said quite similar to ADF test and the difference of both is the ways of it manage serial correlation (Damodar N. Gujarati, 2009). When comes to PP, the test ignores any serial correlation while ADF consider the parametric auto regression to confirm the structure of errors.

3.3 Johansen-Juselius Cointegration Test

\(H_0\) : There is cointegrated among variables

\(H_1\) : There is no cointegrated among variables

The purpose for this particular test is to evaluate the VECM, that is by maximum possibility considering under various expectation on how the trend or intercept parameters and after that the number r which is the cointegrated vectors. Later the conduction of ratios tests is done. This concept of integration was made known by Granger (1981) and over the years later being elaborated by Engle and Granger (1987), Phillips (1991) and Johansen (1981) and so on.
3.4 Vector Error Correction Model (VECM)

Vector Error Correction model which is the VECM is done through the Granger Causality Test. The purpose to do the VECM model test is so that to investigate on whether nature of the causality relationships among the variables. If the variables involved in the study is more than two, then this test is particularly important especially when multiple causes simultaneously happens. Below is the cointegration equation which used ECT t-1.

\[
\Delta \text{LNTR} = \beta_1 \Delta \text{LNTR}_{t-1} + \beta_2 \text{INF}_{t-1} + \beta_3 \text{UNEMPLOY}_{t-1} + \beta_4 \text{IMP}_{t-1} + \beta_5 \text{EXP}_{t-1} + \mu_1 \text{ECT}_{t-1}
\]  

(3.2)

\[
\Delta \text{INF} = \beta_1 \Delta \text{LNTR}_{t-1} + \beta_2 \text{INF}_{t-1} + \beta_3 \text{UNEMPLOY}_{t-1} + \beta_4 \text{IMP}_{t-1} + \beta_5 \text{EXP}_{t-1} + \mu_1 \text{ECT}_{t-1}
\]  

(3.3)

\[
\Delta \text{UNEMPLOY} = \beta_1 \Delta \text{LNTR}_{t-1} + \beta_2 \text{INF}_{t-1} + \beta_3 \text{UNEMPLOY}_{t-1} + \beta_4 \text{IMP}_{t-1} + \beta_5 \text{EXP}_{t-1} + \mu_1 \text{ECT}_{t-1}
\]  

(3.4)

\[
\Delta \text{IMP} = \beta_1 \Delta \text{LNTR}_{t-1} + \beta_2 \text{INF}_{t-1} + \beta_3 \text{UNEMPLOY}_{t-1} + \beta_4 \text{IMP}_{t-1} + \beta_5 \text{EXP}_{t-1} + \mu_1 \text{ECT}_{t-1}
\]  

(3.5)

\[
\Delta \text{EXP} = \beta_1 \Delta \text{LNTR}_{t-1} + \beta_2 \text{INF}_{t-1} + \beta_3 \text{UNEMPLOY}_{t-1} + \beta_4 \text{IMP}_{t-1} + \beta_5 \text{EXP}_{t-1} + \mu_1 \text{ECT}_{t-1}
\]  

(3.6)

4. Findings and Analysis

4.1. The Result of Unit Root Test

The aim for this test to be conducted for this research is to check whether the series of data is stationary or non-stationary. It is known that, the results from regression analysis by using non-stationary data will be bias and the inferences from those results will not represent the actual results. There are two-unit root test that are conducted in the analysis namely: Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP)

\[ H_0 : \text{Time series has unit root test (non-stationary)} \]

\[ H_1 : \text{Time series has no unit root test (stationary)} \]

| Variables      | T1 ADF | T1/ADF | T1 PP | T1/PP |
|----------------|--------|--------|-------|-------|
| lnTR           | -2.096 | -3.121 | -1.964| -3.155|
| lnPOP          | -3.806***| 0.712  | -3.931***| 0.705 |
| lnGDP          | -1.054 | -1.873 | -1.022| -2.051|
| INF            | -3.496***| -5.256***| -3.578***| -4.003***|
| UNEMPLOY       | -1.350 | -2.551 | -1.710| -2.026|
| IMP            | -4.377***| -4.702***| -4.376***| -4.654***|
| EXP            | -0.745 | -2.635 | -0.608| -2.629|
| ΔlnTR          | -4.911***| -5.032***| -4.883***| -5.049***|
| ΔlnPOP         | -5.579***| 5.5126***| -5.141***| -5.126***|
| ΔlnGDP         | -5.121***| 5.082***| -5.157***| -5.126***|
| ΔUNEMPLOY      | -6.941***| -6.836***| -7.467***| -7.296***|

Note: *** significant at 1%, ** significant at 5%, * significant at level 10%. T1 represents the model with intercept and T1/1 represent the model with trend and intercept
4.2. The result for cointegration

Table 9: The Johansen and Juselius Cointegration Test Result

| Null Hypothesis | Alternative Hypothesis | Eigenvalues | λtrace | 95% Critical Values | P-Values |
|----------------|-----------------------|-------------|--------|---------------------|---------|
| r ≤ 0          | r > 0                 | 0.638       | 76.284*** | 69.819              | 0.014   |
| r ≤ 1          | r > 1                 | 0.343       | 37.699  | 47.856              | 0.315   |
| r ≤ 2          | r > 2                 | 0.262       | 21.724  | 29.797              | 0.314   |
| r ≤ 3          | r > 3                 | 0.212       | 10.162  | 15.495              | 0.269   |
| r ≤ 4          | r > 4                 | 0.029       | 1.118   | 3.841               | 0.290   |

Note: *** indicates the significant at 1% level, λtrace and λmax referring to trace statistic and maximum eigenvalue statistic respectively.

H₀ : There is cointegrated among variables
H₁ : There is no cointegrated among variables

The Johansen and Juselius Cointegration analysis is to check whether the variables are relative to each other for short run or long run relationship. Study by (Norashibah Abdul Jalil, 2009) that used Johansen-Juselius test found that the variables that are cointegrated with each other in the long run allow them to proceed with VECM test. The results in the table 9 above shows that the λtrace and λmax test is more than the value of t-critical which denotes 95% critical value for both tests. This allows the study to proceed with Granger Causality test by using Vector Error Correction Model (VECM) test.

4.3. Test Results for Granger- Causality (VECM)

Granger Causality test aim is to see whether the variable have tendency to affect other variable in the long run. The result of granger causality was extract from the VECM test.

H₀ : Independent Variable (X) does not Granger Cause Dependent Variable (Y)
H₁ : Independent Variable (X) causes Granger Cause Dependent Variable (Y)

Table 10: Granger Causality Test Results

| Independent Variables | DV | LNTR | INF | UNEMPLOY | IMP | EXP | ECTr-1 |
|-----------------------|----|------|-----|----------|-----|-----|--------|
| F-statistic           |    |      |     |          |     |     |        |
| LNTR                  | 2.190* | 2.170* | 1.560 | 1.309 | -0.281 |
| INF                   | 0.146 | 1.470 | 0.160 | 1.773 | 1.886  |
| UNEMPLOY              | 2.479** | 0.183 | 2.644** | 1.039 | -3.364 |
| IMP                   | 8.241*** | 3.558** | 2.162 | 1.853 | -1.567 |
| EXP                   | 2.795*** | 1.004 | 0.133 | 4.486*** | 0.385 |

Notes: *, ** and *** denotes the significant level at 10%, 5% and 1% respectively. ECT represents the Error Correction Term

Table 10 shows the result of Granger Causality Test that had developed in this study. As we can see, LNTR can granger cause to the IMP at 1% of significant level, INF can granger cause to IMP at 5% significant level. LNTR has granger cause to UNEMPLOY at 10% significant and EXP at 5% significant. Besides, there are inverse relationship between INF
and UNEMPLOY to LNTR at 10% significant level where LNTR also will cause fluctuation of the INF and UNEMPLOY in the long run. EXP does not show any granger-cause with other variable. It reveals that there was only unidirectional causality between INF, UNEMPLOY, IMP and EXP. There are two way of relationship between LNTR and UNEMPLOY which the granger each other. This indicates only one variable could explain the other. The coefficient of ECT of Tax Revenue is 0.286970 which indicates that 28 per cent of the adjustment is completed in a year. This simply shows that Malaysia needs approximately 4 years to have the long run equilibrium from estimated results.

5. Conclusion and Discussion

The result from this study shows that under the OLS test, it is found that inflation and export has a positive relationship with tax revenue. Inflation rate in a country was significant and directly affect the components of tax revenue especially taxes on goods and services tax (Taufik and Imbarine, 2012). According to Loganathan et al. (2017), high inflation rate in a country will force the government to increase the taxes on goods and services by increasing the price and stabilizing the consumption and aggregate expenditure. While Harun (2013) in his studies also found out that, macroeconomic indicator like exports are highly correlated with tax revenue. It means export taxes as an important source of government revenue. According to Hayes (2012) who did his research in Ireland, she claims that exports are good that bring in new money to the country and it contributes to the tax revenue.

However, import and unemployment in this study has a negative relationship with tax revenue. Suranovic (2004) writer of International Trade Theory and Policy stated that, there is a negative impact of imports on tax revenue. Moreover, Hudson (2013) stated that increased in the number of jobless people means that increased in the number of people who cannot afford to pay tax. This means decreasing in tax revenue for the government. There would be negative relationship between the unemployment rates with tax revenue. Elham Aghazadeh (2014), research study in Iran for the year 1991-2011 found out the same result that there is a negative relationship between unemployment and tax revenue. Elham Aghazadeh (2014) , research study in Iran for the year 1991-2011 found out the same result that there is a negative relationship between unemployment and tax revenue. Fall in income results in a fall in tax revenue because tax revenue consists of direct taxes from wages and indirect taxes from purchasing power. Johansen-Juselius cointegration analysis results that there is an existence of cointegration relationship between inflation (INF), unemployment (UNEMPLOY), Import (IMP) and Export (EXP) with Tax Revenue in the long run. As for Granger Causality Test, it is shown that unemployment and tax revenue has two way of relationship while other variables only have one way relationship with tax revenue.

The most important recommendation is that, the government of Malaysia should improve the data system especially on the Tax Revenue collected every year as this will help the study. It will help the future study to increase the sample of data to get more accuracy of the result. Moreover, future study also recommended to conduct this study in a broad scale such as adding more relevant macroeconomic variables and for a longer period of time. Government should also improve on the policies such as fiscal and monetary policy. According to Vengedasalam (2014), economic functions is to control inflation and unemployment in order to ensure economic stabilization. He also states that, government will control the income disparity through taxation. Besides that, improves policy might help to attract more investors and importers to import goods from Malaysia which will result to a higher Tax Revenue and a stable economic growth. Royal Malaysian Customs Department also should also find a way on the policy related on how they can find solutions especially
on smuggling issues that worth millions ringgit. If this case continues, it may lower the tax revenue collected by government.

Disclosure Statement
No potential conflict of interest was reported by the authors.

Funding
No funding was involved in this study

Acknowledgement
N/A

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