DETERMINANTS OF TAX REVENUE IN MALAYSIA

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DECLARATION

We hereby declare that:

1) This undergraduate Final Year Project (FYP) is the end result of our own work and that due acknowledgement has been given in the references to ALL sources of information be they printed, electronic, or personal.
2) No portion of this research project has been submitted in support of any application for any other degree or qualification of this or any other university, or other institutes of learning.
3) Equal contribution has been made by each group member in completing the research project.
4) The word count of this research report is 13567.

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LIST OF ABBREVIATIONS

ADF	Augmented Dickey Fuller
PP	Philip-Perron
ERSP	Elliott Rothenberg Stock Point
ARDL	Autoregressive-Distributed Lag
VECM	Vector Error Correction Model
TAX	Tax Revenue
GDP	Gross Domestic Product
FDI	Foreign Direct Investment
INF	Inflation
XM	Openness Level
MF	Manufacturing
PD	Public Debt
SST	Sales and Service Tax
GST	Goods and Services Tax
ARCH	Autoregressive Conditional Heteroskedasticity
LM	Lagrange Multiplier
ECT	Error Correction Term

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ABSTRACT

The purpose of this research paper is to study the determinants of tax revenue of Malaysia which are GDP per Capita, Inflation, Openness Level, Share of Manufacturing, Public Debt, and Foreign Direct Investment. We are using the annual data from the year 1989 to the year 2018. After we conduct unit root tests, we found that all of our time series data also have unit root (non-stationary) at their level form. Therefore, we use ARDL bound test and VECM test to examine the long-run relationship and causality relationship between our dependent variable and independent variables. The results show that there has a long-run relationship between Malaysia's tax revenue and determinants of tax revenue. Moreover, public debt, openness level, and inflow of FDI have a positive impact on the tax revenue of Malaysia, while GDP per capita, inflation, and manufacturing have a negative impact on Malaysia's tax revenue.

Chapter 1: Research Overview

1.0 Introduction

Tax revenue is an important source of income that enables every country government to conduct economic development activity to boost the country's economic growth. It has been always a hot topic to discuss what determinants are affecting the total tax revenue collected by a country. Especially for a developing like Malaysia, taxation is important for Malaysia in order for the government to implement new strategies to sustain the country's economic prosperity and keep the economic performance stable (Taha, Colombage, & Malslyuk, 2010).

In Malaysia, the tax collection is uncertain because it can be upward and downward according to the current economic performance. However, from Figure 1.1 we can see most of the years Malaysia was obtaining an increasing amount of tax collection unless it faces some serious economic crises. Malaysia's federal government's major source of income is from the total tax revenue to support its government expenditure. Why taxation is important for every country? It is because tax revenue is a foundation to support the government on implementing their economic policies to improve the country's development, without tax revenue all the policies would not able to execute. Implementing an economic policy is important for Malaysia to improve on Malaysia's standings globally.

Researchers have been theoretically and empirically identified the relationship between tax revenue and economic growth, and it was found a positive relationship between each other (Taha, Colombage, & Malslyuk, 2010; Loganathan, Ahmad, Subramaniam & Taha, 2020) Malaysia's total government revenue is differentiated in two categories, namely tax revenue, and non-tax revenue. For tax revenue, it is collected by the three major departments which is Institutional Review Board and Royal Customs and

Excise Department. For non-tax revenue is basically collect from the type of income. There is two types of tax that collected for tax revenue, direct tax and indirect tax. The collection of income tax from individuals, companies, and other personal consumption such as estate, property is direct tax. Indirect tax is a tax that is not directly imposed to the tax payer but the additional fees charged on the buyer such as sales and service tax (SST), and goods and services tax (GST). Non-tax revenue is another source of income that the government earned from the services provided by the government.

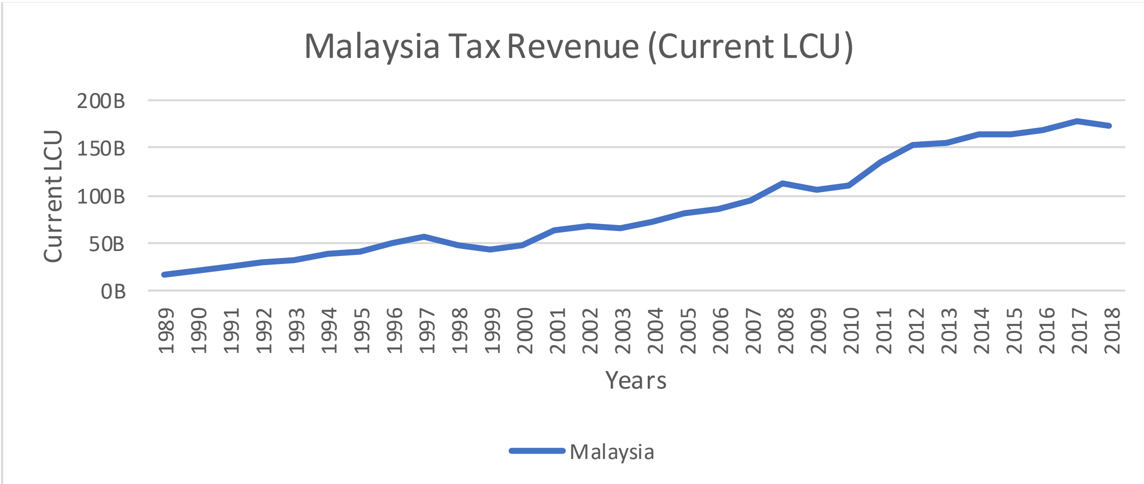
1.1 Research Background

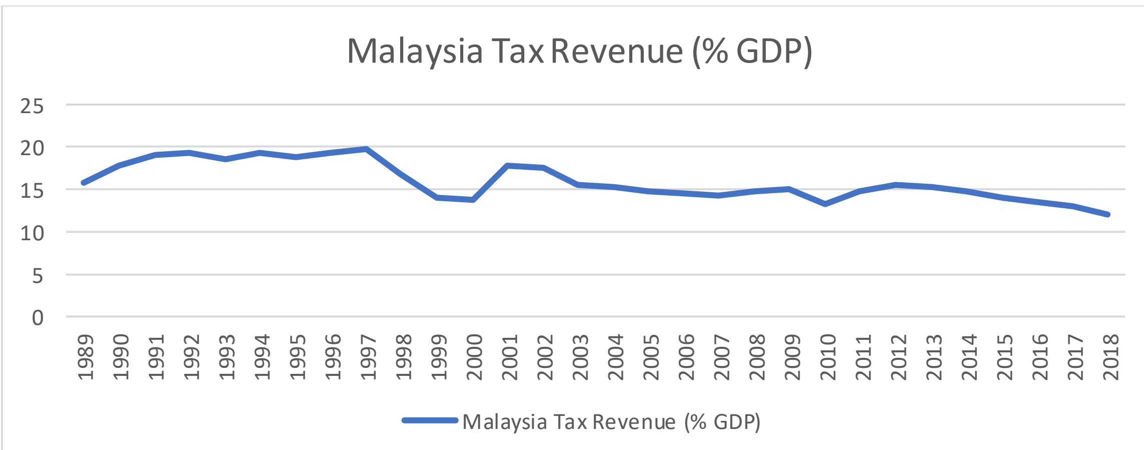
This section will briefly discuss the history of Malaysia background, economic development and tax system and policy of Malaysia.

1.1.1 The tax system and policy of Malaysia

Malaysia is one of the countries in Southeast Asia with a population of 34.2millions in 2019 (World Bank, 2019). Malaysia has a total of 13 states from East Malaysia to West Malaysia, and including three federal territories. Malaysia is located in between Thailand and Singapore, West Malaysia sharing the same land with Thailand and East Malaysia sharing with Brunei. Malaysia national capital is Kuala Lumpur and federal government are working in Putrajaya.

Figure 1.1: Tax Revenue in Malaysia



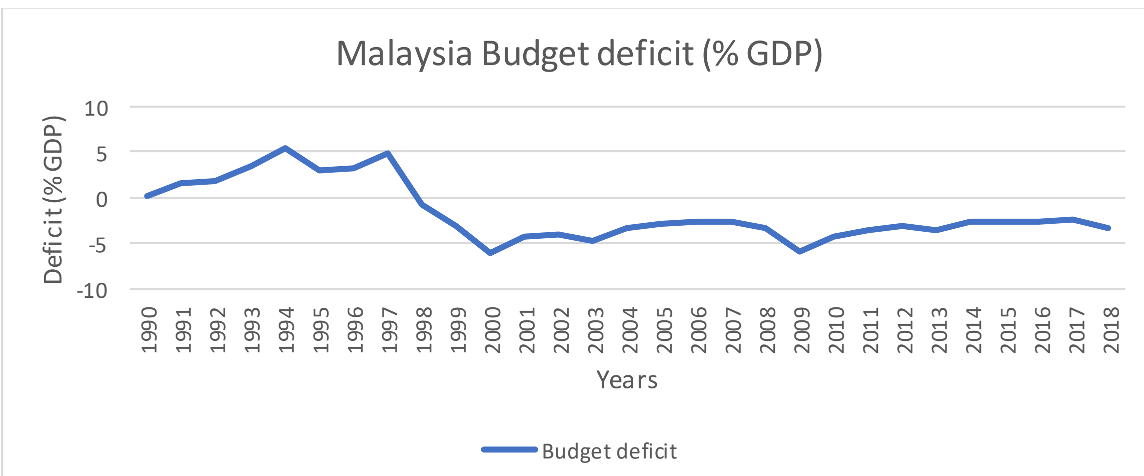


Source: Bloomberg

In the year 1972, Malaysia first introduced the sales and service tax (SST). The sales tax is charged on the manufacturers, producers, retailers or, wholesalers for a given percent of 5% or 10% depending on the category of taxable goods. It is not only charged on local taxable goods but also the imported goods from foreign countries as well (Sidik, Muhaidin & Supar). However, for service tax it is charged for a standard tax rate of 6% from the consumers that using particular services. According to Sidik, Muhaidin & Supar (2019), they found there are some limitations of using Sales and Service Tax (SST) as SST is not transparent as compared to Goods and Service Tax (GST). For example, it is a single-stage tax. SST causing a higher price because it doubles tax along the supply-chain.

Malaysian government started goods and services tax (GST) on 1 April 2015 to replace sales and services tax (SST) as it has some weakness in the tax system (Abdul Kadir, Aslam, Zarinah Yusof, 2017). The scope of tax charge of GST covers more than SST, it is charged from supply of goods and services or importation. GST had fixed its tax rate at 6% as its standard rate instead of SST having 5% or 10%. It aims to enhance the country's revenue base and at the same time resolve the limitation of SST. However, as Malaysia has been facing a budget deficit the economist has been discussing whether to increase on the collection of tax revenue or reduce government spending. According to Boqiang (2019), he illustrated the relationship of tax rate and government revenue by using the Laffer curve. He found that is a positive relationship between the tax rate and the government revenue (Boqiang, 2019). Therefore, deeper integration between the determinants of tax revenue has to be conducted to further understanding their relationship.

Figure 1.2: Malaysia Budget Deficit (% GDP)



Source: Countryeconomy

From Figure 1.1, it is found that in 1997, East Asian financial crisis and Global Financial Crisis in 2007-2008 have significantly affected the tax revenue of Malaysia because Malaysia is an open economy. If there is a shock occurs globally, it would affect the global economic performance, and thereby cause an impact on the Malaysian economy and the collection of government revenue. From Figure 1.2 we can see Malaysia is facing a budget deficit since 1998 (Ullah and Nazim, 2016). The amount of budget deficit is increasing and barely reducing, it raised a concern to Malaysia government if this budget deficit keeps rising it will affect Malaysia' economic growth as well as slowing down the economic development.

In response to the concern, the study aims to examine the determinants of tax revenue in Malaysia and suggest alternatives policies or measures to reduce the amount of budget deficit.

1.2 Problem Statement

Tax revenue is vital to the sustainable development of every country, especially developing countries such as Malaysia, Vietnam and Thailand. It is because developing countries need higher tax revenue for development, public services, reduce poverty and so on. All of these objectives can stimulate country economic growth (Dickinson& Paepe, 2014).

Based on Figure 1.1, we can see that the overall performance of Malaysia's tax revenue to GDP has been declining seriously in recent years. According to the World Bank (2017), it recommends that developing countries are consider to have a tax-to-GDP ratio of at least 15% to finance their development to achieve sustainable economic growth. Therefore, the Malaysian government can consider to increase the total tax revenues to GDP ratio of more than 15%. Unfortunately, the total tax revenue as a percentage of GDP for Malaysia is decreasing significantly from the year 2012 until 2018. In year 2018, the tax revenues to GDP ratio fell to lowest level at 12.03% since 1996.Therefore the Malaysian government are encouraged to increase the total tax revenues to GDP ratio in Malaysia.

Malaysia's tax-to-GDP ratio has fallen for several reasons. One of the reasons is that the percentage growth of Malaysia's GDP is greater than the percentage growth of Malaysia's tax revenue. Although the gross domestic product shows an upward trend in the recent years, Malaysia's tax revenues still have not increased much. Next, according to the Bayar (2018), he believed that FDI will have a positive impact on government tax revenue. However, Malaysia's total FDI has also declined by about $2.854 billion between the year 2014 and 2019. In addition, the Malaysia's total trade openness to GDP has decreased significantly in from the year 2000 to 2019 which is dropped from 220.41 % to 123%. In the research for Mushtaq (2012), he stated that trade openness has positive correlated on tax revenue. Finally, based on the research for Teera (2003), she concluded that the increase of manufacturing enterprises has a positive relationship to the tax revenue. Nevertheless, the share of manufacturing to GDP in Malaysia has shown a declined trend, from 30.864 %in 2000 to 21.443 % in 2019.All changes of these factors has had impact on Malaysia's tax revenue to GDP.

Besides that, insufficient tax revenues will lead to budget deficits, which will lead to more debt. For example, Tourinho and Sangoi (2015) pointed out that public debt hurts economic growth. According to the International Monetary Fund (2011), it has warned that persistent budget deficits could lead to an economic crisis triggered by stagnant growth. Not only that, but an unpaid national debt would also become a burden of responsibility that future generations would have to bear. Over time, continued economic contraction could create a global economic crisis worse than the one since the recession began in 2008 (Lewis, 2017).

One of the best examples of the adverse effect for high debt is the “Greece debt crisis”. The origin of this crisis is that the high amount of debt and the budget deficit had made make lenders fear that borrowers will never be repaid. Thus, investors stop lending at all or borrow at a higher interest rate. Higher interest rates would make it harder to borrow money, potentially leading to more debt, and eventually, the Greece government would be unable to pay its bills and lost its credibility causing a massive recession (Kouretas,2019).

However, as can be seen from Figure 1.2, Malaysia still has a consecutive budget deficit after 1997, and the budget deficit as a percentage of GDP remained above 3% from 2000 to 2019. This means that tax revenues have struggled to cover government spending in recent years. For this reason, it forced the Malaysian government to borrow more foreign or local debts to finance the country's expenditure resulting from the increased debt levels. According to the Finance Minister of Malaysia, Malaysia's total debt and liabilities increased from 1.09 trillion Ringgit by the end of 2018 to 1.17 trillion Ringgit by the end of June 2019 for 77.1% of total debt and liabilities to GDP (Ying,2019). The high debt and liabilities-to-GDP ratio (77.1%) indicates that Malaysia does not have enough output to finance its debt and liabilities. This is an early signal or indicators to Malaysian economy as it may not be able to repay its debt in the event of a severe crisis. Therefore, sufficient tax revenue is essential for the government to reduce the budget deficit and debt level.

In order to lower down the budget deficit in Malaysia, the government can either increase the tax revenue or reduce government spending. However, the government are recommended to rely more on increase the tax revenue, but not reduce government spending. This is because excessive cuts in spending will slacken the overall economic gain of Malaysia in the long run (Amadeo,2020). Hence, increase the total tax revenue will be more sustainable than reduce government spending in the long run.

Due to reason givens above, understanding the determinants of tax revenues, especially how foreign direct investment (FDI), could stimulate the economic development and reduce the level of budget deficit, directly or indirectly. For example, Bayar (2018), believed that FDI would influence on government tax revenue positively. This is because when the government encourages foreign direct investment in Malaysia, it can create more job opportunities for Malaysian citizens, resulting in more income and labour taxes. Also, foreign direct investment can bring modern technology from foreign countries and increase Malaysia's overall production. Additionally, it may increase the total amount of exports, so that the government can get more export tariffs or duties. All of these reasons may help to increase economic growth, which in turn increases tax revenues. Therefore, it is important to know determinants of tax revenue in order to implement suitable policy to increase tax revenue. In addition, there is lack of study, which focuses on the role of FDI in improving the tax revenue in Malaysia.

In this study, therefore, it is crucial to focus on the determinants of tax revenue in Malaysia.

1.3 Objective of the Study

1.3.1 General Objective

The overall aim of this study is to look into the factors that influence Malaysia's tax revenue from 1989 to 2019. Past research showed that the determinants of tax revenue might be different from according to country; hence we intended to investigate whether the theory hypothesis matches on Malaysia.

1.3.2 Specific Objective

Specifically, our research aimed to study on the relationship between each independent variable namely GDP, Inflation, Openness Level, Share of Manufacturing, Public Debt, and dependent variable namely tax revenue. We also like to look at the relationship between foreign direct investment and tax revenue as there is no past research of Malaysia discuss about the determinant.

1.4 Significance of the study

One of the government's primary sources of revenue is taxation. For a developing country such as Malaysia, the government needs to maintain good tax revenue every year. The government uses tax revenue to execute projects and develop the country. This could assist the country to stimulate economic growth (Dickinson & Paepe, 2014). However, Malaysia's tax revenue to GDP has been declining over the years, the government needs to implement a new policy to tackle the problem. Therefore, in this study, we like to look at the relationship between tax revenue and various variables., namely GDP, Inflation, Openness Level, Share of manufacturing, External Debt, and FDI. Many findings focus on the independent variables except FDI. There are less studies investigated the relationship between FDI and tax revenue. In Har, et al. (2008) study, it showed that FDI play a significant role in Malaysia's economy growth. Since FDI has a positive impact for the economy growth, it should have contributed to the tax revenue as well based on Thomas & Chaido (2005) findings. They proved the existence of causal link between marginal tax rate and rate of economic growth. In short, Tax revenue should have a significant relationship with FDI. However, we could not find any research regards FDI affects tax revenue in Malaysia.

In this paper, we tend to contribute to find the determinants of tax revenue. We have noticed that government expenditure is very high. Tax revenue is important to cover government expenditure and reduce the budget deficit. Hence, we tend to provide a trustworthy result for the policymakers to improve the country's fiscal policy. Our contribution of the research is to supplement the existing literature and develop an understanding of the determinants of tax revenue in Malaysia.

1.5 Chapter Layout

This research is divided into five chapters. The first chapter provides an overview of our topic, research background, problem statement, research objective, and significance of the study. Chapter 2 provide a brief literature review based on previous empirical studies. Besides that, Chapter 3 describes the source of data, conceptual framework, and the selected methodologies (diagnostic testing) for the study. Meanwhile, results and interpretation are discussed in Chapter 4. Lastly, Chapter 5 summarises the main findings of the study, policy implications, recommendations, and the limitations of the study.

1.6 Conclusion

Tax revenue is introduced and discussed as the dependent variable in this research. We have included six determinants of tax revenue which are GDP, inflation rate, trade openness, share of manufacturing, public debt, and FDI. Researchers also determine the objectives to find out the determinants of Malaysia's tax revenue to improve its collection performance. After that, researchers also provide a better understanding of the factors that will affect the tax revenue. However, researchers will further discuss the literature review in the next chapter.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

In Chapter 1, we focus on the research background which raises some issues regarding the tax revenue in Malaysia. In this chapter, we will be reviewing the past literature. We are going to discuss some findings regard to the tax revenue and independent variables namely, GDP, Inflation, Openness Level, Share of Manufacturing, External Debt, and FDI. We will discuss the methods and studies of the past researcher used. Other than that, we will also state the relationship between the predicted variable and explanatory variables from the literature.

2.1 Review of Literature

2.1.1 Tax revenue and GDP per capita

Based on the previous literature, some variables have been found to be important determinants of tax revenue, such as real GDP growth, GDP per capita and Gross domestic product (GDP). These are commonly used to measure market size and growth. The size of the host country's market also reflects the country's economic situation. Basically, a good country's economic situation indicates more tax revenue can be generated.

According to the empirical evidence of Ayenew (2016), there will be a positive correlation to real GDP per capita and tax revenue. Since a higher GDP per capita implies a higher level of development, it indicates a higher ability to reimburse taxes. Hence, a higher ability for government to collect tax revenue. Similarly, according to Hung (2019) 's regression and correlation analysis, the results reveal that the GDP per capita on personal income tax is positive and significant. Therefore, the more income tax that can be collected, the higher the tax will be.

In addition, according to the Sinbo and Miubo (2013), the growth rate of economic activity will influence on the tax revenue positively and significantly in Nigeria. Also, the researchers Terefe and Teera (2018) used the Error Correction Model and Augmented Dickey Fuller also found out the same positive result between GDP per capita and inflation. They pointed out that when a country's economy grows, its tax base grows in proportion to its income.

Besides that, the research for Gorbachev, Debela, Shibiru (2017) found that there was a positive correlation between GDP per capita to tax revenue in Ethiopia. The tax system in Ethiopia is progressive which means that people who earn high incomes will pay high taxes on different tax arrangements such as rental income tax, personal income tax, corporate income tax and business income tax etc. Thus, an increase in per capita income will result in high tax revenue in their country.

Normally the previous researchers' empirical evidence found out that there is a positive relationship for GDP per capita and tax revenue. However, the last findings from Pakistan have shown a negative relationship between the GDP per capita and tax revenue in their regression. In other words, it indicates that tax revenue decreases with the increase in GDP per capita. This is due to the poor tax system and high tax evasion for Pakistan (Chaudhry and Munir,2010).

In conclusion, based on our literature review, most of the previous research stated that GDP per capita has a positive relationship to the tax revenue. Although there is one researcher from Pakistan shown there is a negative relationship because of the high tax evasion and different tax system over there. Therefore, we expected that GDP per capita income has a positive impact on tax revenue.

2.1.2 Tax revenue and Inflation

Inflation is an increase in the price of every good and service which reduces the purchasing power of money (Suleka, Mary and Tharmalingam, 2019). The reducing power of money might give impact on the tax revenue. Therefore, there are several researches have discussed on the impact of inflation on the tax revenue.

There are several researchers has investigated that inflation has negative relationship to tax revenue. According to the to Ayenew (2012), he has used inflation in analyzing the data of tax revenue in Ethophia in the period 1975-2013 concluded that the inflation has impact to tax revenue negatively and significantly. Also, Mahdavi (2008)' study stated that inflation was associated with lower tax revenues as a percentage of GDP in developing countries. The researchers mentioned that inflation will reduce the purchasing power of society and thus the ability of taxpayers to pay taxes will be reduced as well. In other words, inflation will lead to citizens reduce the consumption and the profit for businesses and companies will be lower result in lower tax revenue.

Similarly, Terefe and Teera (2018) proved that inflation is negatively correlated and significant impact with tax revenue in East Africa, with a correlation coefficient of -0.103. They stated abnormal rise in the price of goods and services will harm the welfare of the whole society result in lower tax revenue. Additionally, Crane and Nourzad (2013) also pointed out that inflation has a negative impact on tax revenue. The researchers stated that the higher the inflation rate, the higher the likelihood of tax evasion. This is because higher price levels will lead taxpayers to engage in more informal or shadow economic activity, reducing tax revenues.

However, based on the research of QadirPatoli and Zarif (2018), they found out that there is a positive and direct relationship between inflation and the taxes in Pakistan. They stated that developing countries tend to increase tax rates in order to reduce high inflation. Therefore, any increase (decrease) in inflation will cause to an increase (decrease) in tax revenues.

To sum up, most of the previous studies believed that inflation was negatively and significantly correlated with tax revenue, this is because inflation would reduce the purchasing power, leading to the decrease of taxpayers' income and tax revenue. Therefore, this study expects inflation to have a negative impact on tax revenue.

2.1.3 Tax revenue and trade openness

Trade openness playing an important role that determinants tax revenue. International trade taxes have become the main source of revenue for many developing countries (Hisali, 2018). There are some researchers argued whether trade openness is important for a country economic development. This is mainly because of the function of trade between countries in long run will be significantly increase the productivity, for the countries that are more actively on trading will be more productive (Kim, 2013; Shahbaz, 2012; Dong, 2014). Shubati and Warrad (2018) found there is two argument form a positive relationship and a negative relationship between trade openness and tax revenue.

From the positive argument side, there are some researchers' studies aimed to identify the factors that can influence better tax revenue inflows (Bornhorst, 2009; Drummond et al., 2012; Stotsky and Woldemariam, 1997). Consequently, their research obtained the same result from the empirical evidence that showing the trade openness having a positive relationship to the tax revenue and they explained it by the increase of productivity of output and enhance the economic growth, therefore increase the tax revenue as well. Mushtaq (2012) also indicated international trade openness is positively correlated on tax revenue by identifying the determinants of tax revenue of Pakistan from 1975 to 2010. Through their research, there are many variables that determinants the tax revenue such as exchange rate, gross domestic product. However, the study claimed that by comparing to all the variables trade openness is found to be more significant to the tax revenue of Pakistan.

Gnangnon (2017) also supported trade openness has a positive relationship on tax revenue in the long run from his research. The research is based on panel data of 169 countries for the period of 1995 to 2013 by identifying the impact of trade openness to tax revenue, then the study obtained a positive relationship of trade openness and tax revenue. Especially in long run, a higher level real GDP of the country will increase the positive impact of trade openness of tax revenue. Based on Lutfunnahar's (2007) study also identifying the determinants of tax revenue in Bangladesh. From the study result, he claimed that for Bangladesh the increasing trade openness will also increase the tax revenue.

Piancastelli (2001) sampling 75 countries for the period 1985-1995, his study finds trade openness having a positive relationship to tax revenue. According to Bahl (2003) study, the data of OECD and developing countries found trade openness is positively correlated to tax revenue. Therefore, most of the previous research that study on the determinants of tax revenue support trade openness positively correlated to tax revenue.

However, there are also few researchers who argued there is a negative relationship between trade openness and tax revenue. According to Khattry and Rao (2002), they argued the trade liberalization can lead in decrease in government revenue. They explained it because indirect tax revenue is the major income for developing countries such as the taxes collected from import tariffs. Thus, when the degree of trade openness is higher it will cause a reduction in the restriction of import tariff and hence, it decreases the tax revenue. Cage and Gadenme (2014) also indicated trade openness is having a negative impact on developing countries. Based on Shubati and Warrad (2018) by using panel fully modified OLS to estimate the relationship between trade openness and government revenue and found negatively correlated. Johnson, Hammed and Odunsi (2018) also conducted the Augmented Dicky-Fuller Unit Root test to identify the relationship of trade openness and tax revenue and found negatively correlated to each other.

2.1.4 Tax Revenue and Share of manufacturing in GDP

Many scholars discuss the contribution of manufacturing to tax revenue. According to Teera (2003), she concluded that manufacturing enterprises are typically contributed to tax revenue. She stated that typically manufacturing enterprises keep better books of accounts and records than other industries such as agriculture. Well recorded accounts are easier to tax. In the research of Uganda, the results proved that the theory of manufacturing has significant effects on total tax revenue. However, there are certain researches believe in the theory that manufacturing positively affects tax revenue but the empirical results were insignificant. According to Chaudhry and Munir (2010), their finding also showed that manufacturers are having better bookkeeping skills in general but the effect of manufacturing value-added in Pakistan is insignificant due to lower manufacturing volume. They also mentioned that tax incentives in Pakistan are only given to large enterprises that contribute to low tax revenue. This indicates that small manufacturing volume could not significantly affect the tax revenue.

In other findings, we have discovered that a wider manufacturing market is easier to track and tax., a larger share of manufacturing in GDP contributes to economic development. However, not every country has the same empirical results. The study showed that manufacturing imports have a negative relationship in the lower-income country (Morrisey, et al., 2016). The relationship between tax revenue and manufacturing activities are depended on the nature of the country. Morrisey specifically mentioned that lower-income, non-resource rich, and non-democracies countries will have a negative relationship, based on the empirical results. The researchers explained that poorer counties usually maintain a low tax rate for the manufacturing enterprise to sustain their international competitiveness. By considering that poor countries have a lower manufacturing volume and low tax rate, the contribution of tax revenue from manufacturing activities will be insignificant.

Furthermore, a study of Iran also showed a positive relationship between tax revenue and industry activities. According to Basirat, Aboodi, and Ahangari, as the industrialization of a country increase, economic activities are exploited in larger scales, hence encourage further taxation. The more the country develops economically, the more the domestic consumption and import increase, the industry activities will increase and ultimately increase the tax revenue to increase.

Therefore, whether the share of manufacturing in GDP increase or decrease tax revenue is an ambiguous question. The relationship is depending on the nature of the country (Morrisey, et al., 2016). In this study, we are using manufacturing in GDP as a determinant that increases the tax revenue mainly because the share of manufacturing as a percent of GDP in Malaysia is more than 20% since 1988 (The World Bank, 2019). Manufacturing operations have a huge economic effect. Nonetheless, most of the manufacturing firms have better recording accounts than other sector firms, this will increase the tax capacity of Malaysia. As the volume of manufacturing increases, the tax revenue is increased.

2.1.5 Tax revenue and public debt to GDP

Public debt to GDP is normally used to indicate the government's ability to meet its future obligations, which will influence fiscal policy decisions. Therefore, public debt is an important factor in determining the taxation in a country. A research paper described that after they apply the annual balance panel data and study on selected 22 OECD countries, there is a significant positive relationship between government debt and tax revenue (Ong et al., 2014). In other words, when a country's public debt increases, it will lead to an increase in the country's tax revenue. On the other side, Alawneh have found a significant positive relationship between tax revenue and public debt in Jordan (Alawneh, 2017). This research paper not only has separated the public debt into external debt and internal debt as two independent variables but also added capital and current public expenditure as another two independent variables to explain the tax revenue in Jordan. Both of these four variables also show the significant positive related to tax revenue in Jordan.

However, a small group of economists found that the relationship between public debt and tax revenue can be significantly negative in some countries or regions. For instance, Republic (2018) has pointed out government debt and tax revenue is a significant negative relationship in 23 selected countries. Besides that, Ismail et al. (2019) found that the relationship between public debt and economic growth is ambiguous and also stated that if the borrowing is used for productive purposes, the negative relationship will turn to positive. Simply put, if the government makes good use of the borrowed money to develop the country, the national economy will rise. On the contrary, if the government does not make good use of the borrowed money to develop the country, the higher the country's debt, the greater the slowing down of the country's development. As we mentioned above, there has a significant positive relationship between tax revenue and economic growth. Therefore, it's not difficult for us to understand why some studies show a negative relationship between public debt and tax revenue in certain countries.

On the other hand, Krogstrup (2002) pointed out the taxes of EU countries with high-debt normally higher than EU countries with low-debt. In other words, it's indicated that the higher debt of a country, the higher the country's tax revenue (the positive relationship between tax revenue and public debt). In a subsequent study, Eltony (2002) found that outstanding foreign debt is significantly positive related to the tax revenue in 16 selected Arab developing countries. In addition, they claimed that Arab countries will raise the tax rate in order to reduce government debt, which leads the public debt to have a positive relationship related to the tax revenue.

In conclusion, bases on previous empirical review, the impact of public debt on tax revenue is ambiguous, it has to depend on the nature of the country. However, we believe public debt is an important determinant of tax revenue in a country because public debt able to influence the government's fiscal policy decision. Therefore, we selected public debt as an independent variable to explain Malaysia's tax revenue in our research.

2.1.6 Tax revenue and inflow of Foreign Direct Investment

Foreign direct investment (FDI) is where individuals or companies from one country invest in another country (Boyce, 2020). FDI is an important factor in determining tax revenue indirectly through economic growth. According to a research paper of "Determinants of Tax Revenue in Ethiopia", there have a positive relationship between tax revenue and the net inflow of foreign direct investment and statically significant in Ethiopia (Gobachew, Debela, and Shibiru, 2017). Hence, when the country's net inflow of FDI increases, the country's tax revenue will increase. After that, based on the research paper "Long Run Effect of FDI on Tax Revenue" shows that the inflow of FDI has a positive impact on tax revenues in developing countries excluding resource exporting countries in the long run (Camara, 2019). On the other hand, the result of this research paper also indicates that the impact of FDI inflows on tax revenue is positive, but there was no statistical significance at the conventional level of significance in the short term.

Besides that, Grop, and Costial (2000) have pointed out the inflow of FDI can indirectly have a positive impact on the total tax revenue by promoting economic growth and employment. Simply put, the increase in FDI inflows can increase the country's employment rate and promote economic growth. After that, economic growth is the main driver of taxation levels. In an era of increasing taxes, the economy is performing well (Lundeen,2017). On the other hand, the benefits of FDI inflow include job creation and increased government tax revenue (Abbas, & Xifeng, 2016). In other words, this shows the positive relationship between FDI inflow and employment rate as well as employment rate and total tax revenue. Therefore, there has an indirect positive relationship between FDI inflow and the tax revenue.

Mahmood, Haider, and Chaudhary (2013) have pointed out FDI inflow has a positive and significant impact on tax revenue no matter in the long and short term. However, Bayar (Associate Professor of Economics) claimed that many countries willing to provide tax cuts, legal privileges for income transfer, and fiscal incentives in order to attract FDI, which will lead to accelerate the economic growth. When government provide tax cut to attract FDI, it may reduce the tax revenue in the country directly. In this sense, the net impact of foreign direct investment inflows on total tax revenue is still ambiguous.

According to previous research, we found that the impact of FDI toward tax revenue is ambiguous. In other words, the relationship between tax revenue and the inflow of foreign direct investment varies from country to country. For instance, the FDI inflow has had a positive impact on the total tax revenue of Iceland, Sweden, Israel, the United States, and the United Kingdom, while there has had a negative impact on total tax revenue in Austria, Italy, France, and Poland (Bayar 2018). However, many well-known articles also have pointed out the FDI inflow directly or indirectly has had a positive impact on the tax revenue.

2.2 Hypotheses of Study

Table 2.1: Hypotheses of Study

Hypotheses of Study	
Independent Variable	Setting the hypotheses (T-test)
GDP (GDP per capita)	H_0: $\beta_1 = 0$ (Insignificant, no relationship between GDP per capita and Tax revenue) H_1: $\beta_1 \neq 0$ (Significant, there has a relationship between GDP per capita and Tax revenue)
INF (Inflation (%))	H_0: $\beta_2 = 0$ (Insignificant, no relationship between Inflation and Tax revenue) H_1: $\beta_2 \neq 0$ (Significant, there has a relationship between Inflation and Tax revenue)
XM (Openness level)	H_0: $\beta_3 = 0$ (Insignificant, no relationship between Openness level and Tax revenue) H_1: $\beta_3 \neq 0$ (Significant, there has a relationship between Openness level and Tax revenue)
MF (Manufacturing to GDP)	H_0: $\beta_4 = 0$ (Insignificant, no relationship between Manufacturing to GDP and Tax revenue) H_1: $\beta_4 \neq 0$ (Significant, there has a relationship between Manufacturing to GDP and Tax revenue)
PD (Public debt to GDP)	H_0: $\beta_5 = 0$ (Insignificant, no relationship between Public debt to GDP and Tax revenue) H_1: $\beta_5 \neq 0$ (Significant, there has a relationship between Public debt to GDP and Tax revenue)
FDI (Inflow of Foreign Direct Investment to GDP)	H_0: $\beta_6 = 0$ (Insignificant, no relationship between Inflow of Foreign Direct Investment to GDP and Tax revenue) H_1: $\beta_6 \neq 0$ (Significant, there has a relationship between Inflow of Foreign Direct Investment to GDP and Tax revenue)
Regression Model	Setting the hypotheses (F-test)
TAX= f (GDP, INF, XM, MF, PD, FDI)	H_0: $\beta_i = 0$ H_1: At least one of the β_i are not equal to zero, $i = 1, 2, \ldots, 6$

2.3 Conclusion

Based on the literature reviews, there is a little study that focuses on the relationship between FDI and Tax revenue especially in Malaysia. Different scholars have different interpretations of the relationships. However, most of the scholars are agreed that FDI would bring our positive relationship to the tax revenue. Other than that, we found a lot of literature reviews regard to the other independent variables namely GDP, Inflation, Openness Level, Share of Manufacturing, External Debt, and FDI. However, the results from the above mentioned were hardly to be consistent as the empirical results from each country is different. The reviews are just reference and could not explain the determinants of tax revenue in Malaysia. Therefore, we will discuss the methodology and data for the conducting test.

CHAPTER 3: Methodology

3.0 Introduction

Methodology is a plan for achieving research objectives. In order to achieve the research objectives, researchers need to choose among various models, procedures and methods of research. Therefore, in the chapter 3, we will explain the type of data collection and the specific method of selection. In addition, this study will clearly explain the determinants of tax performance in Malaysia. The subtopics for this topic will be research design, source of data, determinants of Tax Performance, model estimation and empirical testing methodology.

3.1 Research design

This study is to examine the relationship between the predicted variable and predictor variable. In this research, the dependent variable is Tax Revenue in Malaysia and the independent variables that have been selected are GDP per capita, inflation rate, Share of manufacturing to GDP, trade Openness to GDP, Foreign Direct Investment (FDI) and Public debt to GDP.

3.2 Sources of Data

There is only one country involved for this empirical study which is Malaysia. The data used for this project is time series because it is a collection of ordered data values observed at continuous time points. Time series is a collection of data that can be as annually, semi-annually, quarterly and monthly. We will be using annually data to carry on our research and the observation period is from year 1989 until 2018. Due to the availability of the data, we only used 30 years of data for our study.

Besides, all our data were based on secondary data. We have used some popular online database platform to collect our independent and dependent variable data for year 1989 until 2018. The data source for our dependent variable, tax to GDP ratio is based on the Bloomberg.

On the other hand, the independent variable for GDP per capita, inflation rate, foreign direct investment, Manufacturing value added to GDP were collected from World Bank Financial Structure Database. Lastly the data of trade openness to GDP ratio and public debt to GDP ratio were obtained from the Global Economy.com.

3.3 Determinants of Tax Performance: Theoretical Issues

3.3.1 GDP per capita

Based on the literature review, the general conclusions from the previous researchers have proven that there is a significant and positive relationship between the GDP per capita and tax revenue. This is because basically, higher GDP per capita indicates a higher level of country development and economy growth. Due to the reason, it is expected higher income for individuals result in higher personal income tax revenue. At the same time, a higher personal income will rise the demand for purchasing good and services result in higher businesses and companies' profit. Therefore, the higher taxpayers' income will increase the tax collection for government (Teera,2000).

Moreover, if GDP per capita rises, it means that country is becoming more urbanized. In general, urbanization means high income level for the country, thus it will bring more demand for public goods and services. As a result, it will lead to more spending and lead to more tax revenue being levied on the government.

Nevertheless, one of the researches' results showed GDP per capita have a negative impact on tax revenues. This is due to the Pakistan' poor tax systems that political leadership is reluctant to impose more income taxes and also high tax evasion in the country, then it can lead to a negative impact on tax revenues (Chaudry and Munir ,2010). However, this does not apply to say that GDP per head is negatively correlated with tax revenues, as this is due to Pakistan's imperfect tax system.

In short, based on the discussions, this study expected per capita GDP to have a positive impact on tax revenue in Malaysia. This is because higher GDP per capita indicates promote country development and economic growth, thereby increasing tax revenues.

3.3.2 Inflation

There are several researches have pointed out that inflation has a negative impact on tax revenues. This is because when a country's inflation rate rises, the real income of individuals will be reduced. Due to the reason, the lower consumption will decrease the profit for the businesses and companies. Hence, the lower profit for businesses and companies indicates that lower tax revenue can be generated (Ayenew,2012).

Besides that, when inflation rate is increasing, taxpayers will try to maintain the purchasing power of their real income by avoiding taxes. This has led to an increasing number of taxpayers engaging in informal economic activity. Therefore, tax revenues will be reduced (Crane and Nourzad,2015).

In addition, researchers Terefe and Teera (2018) noted that inflation will be negatively correlated with tax revenues due to the "Oliveira Tanzi effect". The Oliveira Tanzi effect is the economic condition of a country in which high inflation causes to a reduce in tax revenues over a period of time. As the cost of all goods and services rises, it hurts consumers' purchasing power, leading to a decline in businesses revenue. At the same time, after the tax revenue adjusted by inflation, the real tax revenue of the government will worsen because of the increase of operating costs and the decrease of corporate tax revenue.

However, one of the researches stated that inflation will positively impact the tax revenue. The is because a country with high inflation rate will lead to the governments to reduce the inflation by conducting fiscal policy which is increasing tax rate on the goods and services (QadirPatoli and Zarif ,2018). But raising taxess rate on goods and services will raise short-term tax revenues, not long-term ones. Because it reduces the purchasing power of citizens, resulting in lower profits for taxpayers such as business and companies.

In a nutshell, this study expected that inflation will have a negative impact on tax revenue in Malaysia. As higher inflation reduces purchasing power, leading to lower taxpayers' income and more tax evasion. Therefore, all of these reasons will reduce the tax revenue.

3.3.3 Trade Openness

Among the determinants of tax revenue, trade openness is also an important factor that will affect the tax revenue. In much empirical study, the changes of trade openness has always impact on the amount of tax revenue. The theoretical linkage of trade openness on tax revenue performance is found to affect by several factors such as the price elasticity of import and export and the structure of trade liberalization.

According to Gnangnon (2017) and Lutfunnahar (2007) empirical evidence support the positive relation of trade openness and tax revenue. An increase in the degree of trade openness tends to increase the amount of tax revenue. This is because when a higher degree of trade openness will lead to increase in total productivity of output for a country. When productivity of goods increases will result in the lower price of goods and lead to increasing consumption of goods. Tax revenue will increase along with the increase of consumption. Therefore, trade openness has a positive impact on tax revenue.

However, Shubati and Warrad (2018), Cage and Gadenme (2014) and Johnson, Hammed and Odunsi (2018) all contributed relationship of trade openness and tax revenue if reduce the restriction on import tariff. They further explain when a country increases the degree of trade openness it will indirectly reduce the import tariffs tax it will also affect the collection of tax revenue. Hence, in this paper we have included trade openness as one of the variables and use the degree of trade openness ratio of GDP to study its effect on the tax revenue. We expect in our study, Malaysia trade openness will also positively correlated to tax revenue.

3.3.4 Share of Manufacturing

In much empirical study, the manufacturing value-added can affect the amount of tax revenue. A rise in industrial value-added helps to boost the country's tax revenue. The researcher expects a positive sign of this variable. The variable is measured as the ratio of manufacturing value-added to GDP. When manufacturing activities increase, the volume of manufacture products increase, that would raise direct taxes by levying a corporate income tax. The tax collection will be easier and the tax capacity will be enhanced because typically the manufacturer has better bookkeeping skills compare to other sectors (Teera, 2003). Not only that, but a study of Iran also showed that a large scale of manufacturing activities will encourage the growth of the economy, it encourages further taxation, hence increase the tax revenue in general (Basirat, Aboodi & Ahangari, 2014).

3.3.5 Public Debt

Public debt is one of the important factors to determinant the tax revenue. We are expecting the impact of public debt on tax revenue should be positive in a developing country. This is because developing countries generally need a lot of funds in order to maintain the speed of development of their country. The central bank of a country cannot print money at will, so the government needs to issue a lot of government bonds in order to obtain sufficient funds to develop the country.

Furthermore, when the country's debt is getting higher and higher, the government will begin to worry about whether the government has enough funds to solve the problem when the financial crisis or environmental disaster arrives. Therefore, the government will try to increase the tax revenue in order to reduce government debt and avoid the government's insufficient funds to bail out the market when facing a financial crisis. That is the theory behind why the public debt may have a positive impact on the country's tax revenue.

3.3.6 Foreign Direct Investment

FDI inflow is an important determinant of GDP growth as well as tax revenue. The FDI inflow may affect the host country's economic growth, capital accumulation, employment rate, competitiveness, financial sector development, and technological progress, and in turn affect taxation. In other words, increase FDI inflows, thereby indirectly increasing taxes. Although many countries provide tax cuts, legal privileges for income transfer, and fiscal incentives in order to attract FDI, which will directly reduce the country's tax revenue, a large inflow of FDI usually able to creates additional tax revenue through taxation of foreign companies' wages and profits.

For instance, if many multinational corporations (MNCs) make investments and built a lot of factories in Malaysia, which will bring the export of Malaysia increase. Moreover, the government of Malaysia able to collect more tax revenue from an increase in export duty. On the other hand, multinational companies (MNCs) set up factories in Malaysia, and they need to hire a large number of workers in order to process the production in Malaysia. The employment rate in Malaysia will increase, and the income tax collected by the government will also increase.

3.4 Estimation Model

When specifying a tax input model, it is necessary to make judgments to determine which form of expression can best combine economic reasoning and statistical value. As Chelliah (1971) asserted, the assessment of the actual and potential tax performance of any country is a matter of judgment. It should be based on consideration of economic development and structural stages and should take into account the country's traditions and special circumstances.

However, it is impossible to develop a tax model that includes all variables, due to lack of data and small sample size. Therefore, based on the empirical literature, this study attempts to empirically investigate the effect of Tax Base (real GDP per capital income), Policy Variable (Inflation), the Ratio of Manufacturing to GDP, Openness Level, Public debt (government debt), and FDI inflow to GDP. Therefore, in this study the model is specified as:

TAX= f (GDP, INF, XM, MF, PD, FDI, T)

where;

TAX = Tax to GDP ratio

GDP = GDP per capita, in RM

INF = Inflation (%)

XM = Openness level (total of both exports and imports divided by nominal GDP)

MF = The ratio of manufacturing to GDP

PD = The ratio of public debt to GDP

FDI = Inflow of Foreign Direct Investment to GDP ratio

T = Time trend (from year 1989 to 2018)

Table 3.1:

Definition of Variable

Independent Variables	Definition of Variable
GDP	Gross domestic product per capita is a measure of a country's economic output per capita, calculated by dividing a country's GDP by its population. The most common use to measure economy growth is GDP because it is a good measure of a country's standard of living, and in particular it tells you how prosperous each citizen feels about the country (Chappelow,2020).
INF	Inflation rate is the annual increase in the cost of living as measured by the consumer price index. The consumer price index is calculated based on a representative basket of goods and services purchased by consumers in an economy. It refers to an increase in the real purchasing power of a unit of money that is lower than the overall price level of the previous period (Chen,2020).
XM	The sum of imports and exports of a country indicate the trade openness for a country. Trade openness reflects how the trade relation between the host countries and external countries is. Foreign investors can use it as a measurement to determine whether the host country is freely or strictly to conduct international trade.
MF	This variable is used to demonstrate the impact of manufacturing operations on tax revenue, specifically the effect of manufacturing value added on Malaysia's tax revenue. When manufacturing activities increase, the volume of manufacture products increase, it would raise direct taxes by levying a corporate income tax. The tax collection will be easier and the tax capacity will be enhanced because typically manufacturer has better book keeping skills compare to other sectors. In contrast, the researcher expects a positive relation in this variable. The variable is measured as the ratio of manufacturing value added to GDP.
PD	Public debt is the debt a country owes to lenders other than itself. These can include individuals, businesses, and even other governments. Public debts can be raised internally (domestic creditors) and externally (foreign creditors). Moreover, public debt to GDP is normally used to indicate the government’s ability to meet its future obligations, which will influence fiscal policy decision making.
FDI	Foreign direct investment (FDI) is where individuals or companies from one country invest in another country. FDI is an important factor in the economic growth of developing countries such as improve the export duty, which will lead to increase tax revenue.

3.5 Empirical Testing Methodology

3.5.1 Unit Root Test

The unit root test is an econometric method used to test whether a time series variable is stationary or non-stationary. The null hypothesis is defining the time series variable has a unit root. This also means that the time series variable is non-stationary. On the other hand, the alternative hypothesis is indicating the time series variable is considered stationary. When the time series data is stationary, it also means that the time series data is considered constant mean, constant variance, and constant covariance.

Furthermore, when non-stationary time series variables are used to form a regression model, the result normally will indicate very high R-squared (close to 1) with very low Durbin-Watson statistics ($R^2 > DW$) and also indicate the independent variable is strongly significant to affect the dependent variable (Reject H_0 in t-test at significant level 0.01) even though these two variables are irrelevant in reality or theory.

For instance, if we selected Malaysia's consumer price index (MCPI) as our dependent variable and Bangladesh's population (BP) as our independent variable. After we estimate the equation in Eview, we found that BP is strongly significant to affect the MCPI. However, bases on theory or logical thinking we know it is not making sense. In other words, the result show in the Eview is misleading, we call this problem is a spurious regression problem.

On the other hand, if the time series data containing a unit root, it follows a random walk (stochastic trend), the time series variable need to differentiate d time until obtaining stationary properties. However, if the variables are differentiated, the relationship between dependent and independent variables only can be short term.

3.5.2 ARDL bounds test

In this study, we use ARDL bounds test estimation. We use this test instead of the conventional cointegration tests because we are dealing with mixed unit root conditions. The use of bounds tests through the ARDL modeling was proposed by Pesaran et al. (2001). The ARDL approach of Pesaran, Shin, and Smith (2001) tends to solve the conundrum that arises when dealing with two traditional cointegration methods, such as Engle and Ganger (1987) and Johansen's (1988, 1991, 1995) maximum likelihood test. The Engle and Granger tests are unable to distinguish between several cointegrating vectors. However, the Johansen test could detect multiple cointegrating vectors but it is sensitive to the normalization adopted and can result conflicting conclusions (Peereia, 2013). The conclusion appears to dismiss the null hypothesis of no cointegration, despite the fact that it exists.

The ARDL solution has many benefits. For one, the research process is relatively straightforward. In the case of small and finite sample data sizes, it is therefore more effective. Not only that, but this approach is also able to test whether the combination of the variables are I(0), non-stationary or I(1), stationary at first differentiation. However, we would reject the case of I(2) variable because it may lead to spurious results (Ahmad & Qayyum, 2008). Furthermore, by applying the ARDL technique, unbiased long-run estimates are obtained. For econometric analysis, we applied natural log to the variables to eliminating problem such as heteroscedasticity.

Equation's ARDL model is constructed as follows:

$$\Delta LTax_t = \beta_{10} + \beta_{11} LTAX_{t-1} + \beta_{12} LFDI_{t-1} + \beta_{13} LGDP_{t-1} + \beta_{14} LINF_{t-1} + \beta_{15} LMF_{t-1} + \beta_{16} LPD_{t-1} + \beta_{17} LXM_{t-1} + B_{18} TREND + \sum_{i=1}^{p} \alpha_{11} \Delta LTAX_{t-i} + \sum_{i=0}^{p} \alpha_{12} \Delta LFDI_{t-i} + \sum_{i=0}^{p} \alpha_{13} \Delta LGDP_{t-i} + \sum_{i=0}^{p} \alpha_{14} \Delta LINF_{t-i} + \sum_{i=0}^{p} \alpha_{15} \Delta LMF_{t-i} + \sum_{i=0}^{p} \alpha_{16} \Delta LPD_{t-i} + \sum_{i=0}^{p} \alpha_{17} \Delta LXM_{t-i} + \varepsilon_{1t}$$

We are using Ordinary Least Squares Techniques to estimate the between LTax, Lfdi, Lgdp, Linf, Lmf, Lpd, and Lxm (1). Then, by constraining all estimated coefficients of lagged level variables to 0, we measure the presence of the long-run relationship. Therefore, bounds test is tested by using Wald Test to prove the existence of cointegration of variables with the null hypothesis of no cointegration (H0: B1=B2=B3=B4=B5=B6=B7=B8=0) against its alternative hypothesis (H0: at least one variable $\neq 0$). If the computed F-Statistic is greater than the upper critical bounds value generated by Pesaran et al. (2001) and Narayan (2005), the null hypothesis will be denied.

3.5.3 VECM (vector error correction model)

VECM model is an econometric model, we are using this model because it can help to determine the long run relationship and short run dynamic adjustments between tax revenue and all the independent variables (Maulia, Miftahuddin, and Softyan, 2017). This model provides us a good way to separate long term and short term component from the data generation process. If the variables are cointegrated there will be causality in one direction. However, to determine the direction of the causality between the variables vector error correction model is conducted. VECM model is different to VAR model, VECM can model on the cointegrated or non-stationary time series data.

According to Maulia, Miftahuddin and Soyan (2017) there are few analysis that use to identify the VECM. First is stationary test, all the independent variables must be stationary for VECM. Augmented Dicky-Fuller test will be conducted to determine the stationary properties of the series of macroeconomic variables. After that, the cointegration test is used to, discern the long term relationship between the variables. To avoid spurious regression of the model, cointegration is the only way. Moreover, optimal lag test is also required for us before we conduct VECM. We need to determine the length of lag to be used when estimating the VECM. This is because if the length of lag is inappropriate for us when estimating VECM, it will cause us to get inaccurate result. Lastly, use Granger causality test to determine the two way or one way relationship of our variables. This test is to check on how the variable influence on another variable.

3.6 Conclusion

In this chapter, we have mentioned about the relationship between Malaysia's tax revenue and independent variables that including real GDP per capita, Inflation, Openness level, manufacturing to GDP, public debt to GDP, and Inflow of FDI to GDP. At the same time, we intend to test whether the model has suffered from a spurious regression model through unit root test, and determine whether the model has a long run or short run relationship between dependent and independent variables through the ARDL bounds test and VECM analysis.

Chapter 4: Research result and interpretation

4.1 Unit Root Test

As we know, if we use those variables that have unit roots, the estimated result show in Eview may be misleading. In other words, the estimated result shows the independent variables is strongly significant to affect the dependent variable (Reject H_0 in t-test at significant level 0.01) even though these two variables are irrelevant in reality or theory, we call this problem is a spurious regression problem. In order to avoid spurious regression problem, we used Augmented Dickey Fuller (ADF), Ng-Perron, and Elliott Rothenberg Stock Point (ERSP) tests to conduct unit root test for all variables we have chosen that including Tax Revenue (TAX), Foreign Direct Investment (FDI), Inflation Rate (INF), Gross Domestic Product (GDP), Public Debt (PD), Openness Level (XM), and Manufacturing (MF).

Table 4.1:

Unit Root Test Results

	ADF		Ng-Perron		ERSP	
	Level	1st difference	Level	1st difference	Level	1st difference
LTAX	-2.8635	-5.4647***	-9.6290	-12.5308**	12.4117	1.3739***
LFDI	-2.4276	-6.3133***	-14.4800*	-26.7276***	5.9242*	0.8635***
LINF	-2.3187	-6.5105***	-14.4337	-10.9791**	6.4135	1.1034***
LGDP	-2.0184	-4.6128***	-6.5334	-13.7817**	13.5987	1.7380***
LPD	-2.3192	-3.2402**	-1.7419	-11.5078**	74.1312	2.0184**
LXM	-1.9857	-3.7979***	-1.2959	-11.4871**	87.5869	2.9374**
LMF	-1.8997	-4.0530***	-1.3922	-13.0271**	81.1878	1.9853**

- The number of lags we had chosen is based on Schwarz Information Criterion (SIC) in order to solve autocorrelation problem.
- Test critical values calculated for 50 observations and may not be accurate for a sample size of 30 for ERSP test.
- Significance level of variables are rated as 1 star at (α=0.10) *, 2 stars at (α=0.05) **, 3 stars at (α=0.01) ***

In statistics, the unit root test is used to test whether a time series variable is stationary or non-stationary. Table 4.1 shows the result of all the time series data we had chosen is stationary or non-stationary for ADF, Ng-Perron, and ERSP tests. The null hypothesis for these three unit root tests also indicates the time series data has unit root (non-stationary data), while the alternative hypothesis indicates the time series data is stationary. Based on table 4.1, most of the t-statistics for all series data at the level form (except FDI) are also insignificant to reject the null hypothesis at a significant level of 1%, 5%, or 10%. In other words, this indicates that these time series data are non-stationary data at their level form. Therefore, these variables have unit root and may cause spurious regression problem when we estimate the model.

When ADF, NG-Perron, and ERSP tests are performed at the first difference for each variable, the null hypothesis for unit root tests was rejected at either a significance level of 1% or 5%. The results were very similar between these three unit root tests. Hence, we have the confidence to conclude that the time series data we had chosen are stationary at their first difference form.

The results we obtain are consistent with previous studies that are the most of the macroeconomics and financial series are also expected to contain a unit root and we can obtain stationary when we first difference our data (first-order, I (1)). Therefore, it is very important for us to use these three unit root tests to prevent spurious regression problem (high R square, low Durbin-Watson statistic) before estimate the relationship among those variables we had chosen.

4.2 ADRL Bound Test

Table 4.2:

Cointegration

Dependent variable	Computed F-statistic
LTAX	9.1127***
LFDI	1.7091
LGDP	0.8850
LINF	2.3963
LMF	2.0530
LPD	1.2279
LXM	0.6270

	Pesaran et al. (2001) [a]		Narayan (2005) [b]	
Critical Value	I(0)	I(1)	I(0)	I(1)
1 per cent	2.96	4.26	4.104	6.151
5 per cent	2.32	3.50	2.875	4.445
10 percent	2.03	3.13	2.384	3.728

Notes:
*a. Pesaran et al. (2001) provided the critical values, Table CI(iii) Case III: Unrestricted intercept and no trend, p. 300. *, ** and *** indicate significance at 10%, 5% and 1% levels.*
*b. Narayan (2005) provides the critical value), Table case III: unrestricted intercept and no trend, p. 10; *, ** and *** indicate significance at 10%, 5% and 1% levels.*

Table 4.3:

Estimation result of long run relationship

Variables	Coefficient	t-Statistic	Probabilty
LTAX	1.00	-5.4830	0.0015

LFDI	0.24**	3.3338	0.0157
LGDP	-0.35***	-4.7297	0.0032
LINF	-0.37***	-5.3810	0.0017
LMF	-3.92***	-5.6593	0.0013
LPD	0.37**	3.2372	0.0177
LXM	2.73***	5.7650	0.0012

Table 4.4:

Goodness of fit & Diagnostic Checking

	F-Statistic	Probability
LM test	0.3678	0.5707
Jarque-Bera Test	0.4652	0.7925
Ramsey Reset (2)	3.8716	0.1160
ARCH (1)	0.6518	0.4275

The findings of the bounds test based on tax revenue and its determinants are shown in Table 4.2. To suit the data of value tax revenue, the ARDL optimal lag is chosen in table 4.2. The computed F-statistic is obtained by running the Wald test for the variables. Since the F-Statistic used for this test has a non-standard asymptotic distribution. For the 1%,5%, and 10% significance levels, Pesaran et al. (2001) presented two sets of critical values. All variables are integrated integrated of order zero, I(0), in the lower critical value, while all variables are integrated of order one, I(1), in the upper critical value. We also used the similar set provided by Narayan (2005) given that the set focuses on small sample size. The computed F-statistic of LTAX (9.1127) is higher than the upper critical values provided by Pesaran et al. (2001) and Narayan (2005) at a 1% significance level. It denies the null hypothesis of no cointegration and confirms the long-run cointegration relationship alternative hypothesis. The results show a long-run co-integration relationship between the variables (LFDI, LGDP, LINF, LMF, LXM) when LTAX is the dependent variable.

Table 4.3 shows the long-run relationship between the variables and Tax Revenue. We realize that LGDP, LINF, LMF, and LXM possess a long-run relationship with tax revenue at the significant level of 1%, whereas LFDI and LPD possess a long-run relationship with tax revenue at the significant level of 5%.

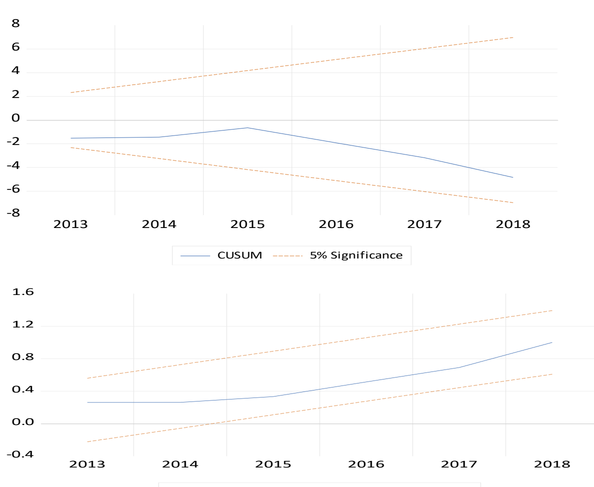
Foreign direct investment (FDI), Public Debt (PD), and Openness level (XM) have a positive tax revenue relationship. Meaning that increase in Foreign direct investment, public debt and openness level will increase the tax revenue, vise versa. This supports the findings from Grop & Costial (2020), Gobachew, et al (2017), and Camera (2019). FDI inflows can increase the country's employment rate promote economic growth, while the taxation level is based on economic growth. In previous findings, we notice that the relationship of public debt is based on the nature of the country. The Malaysian government's fiscal debt has a positive relationship with tax revenue, implying that the government will increase the tax rate to decrease government debt., this in line with the study from Eltony (2002). Not only that, but our finding also shows that the increase in openness level could lead to an increase of productivity of output and enhance the economic growth. The result is in line with several studies from Bornhorst (2009), Drummond et al. (2012), Stotsky & Woldemariam (1997). It enhances the literature that openness level will bring a positive relative to tax revenue.

However, GDP, Inflation (INF), and Share of manufacturing (MF) have a negative relationship with tax revenue. This indicates that an increase in GDP, inflation, and share of manufacturing will decrease the tax revenue, vice versa. The result of GDP varied from what we expected from the theory. A previous study from Chaudry and Munir (2010) explained that a poor taxation system and tax evasion will lead to a decrease in tax revenue. This indicates that Malaysia's taxation system is not efficient for its economic performance based on the result. Furthermore, the result also supports that a higher inflation rate will be reducing the purchasing power of the society and thus the taxpayers would be reduced as well which in line with the previous findings from Ayenew (2012), Mahdavi (2008), Terefe & Teera (2018), and Crane & Nourzad (2013). For the share of manufacturing, it shows a negative relationship with tax revenue which also varied from the theory. The previous study from Morrisey, et al. (2016) explained that poorer countries usually maintain a low tax rate for manufacturing enterprises to sustain themselves in the international market. Malaysia's government maintains a lower tax rate in the manufacturing industry to keep the competitiveness of the manufacturing good in the international market. Therefore, the taxation from the manufacturing industry is lesser.

There are a few diagnostic tests that can be used to determine the model's robustness such as the Breusch-Godfrey serial correlation LM test, Ramsey RESET test, and autoregressive conditional heteroskedasticity (ARCH) test. Moreover, we also use CUSUM and CUSUM of squares tests in our diagnostic checking. The Breusch-Godfrey serial correlation LM test is to test the autocorrelation in the errors in a regression model. Table 4.4 shows the result of a P-value of 0.5707. This indicates the model insignificant under a significance level of 1%, 5%, and 10% indicates the model is free from serial correlation problem.

The Jarque-Bera test is a goodness-of-fit test that determines whether sample data has skewness and kurtosis that are similar to a normal distribution. The normality test is carried out. The P-value for Jarque-Bera is 0.7925, which is insignificant at the significant level of 1%, 5%, and 10%. The result indicates the data is normally distributed as the result is insignificant. Furthermore, the ARCH is tested for the P-value of 0.4275. This indicates insignificant under significance levels 1%, 5%, and 10%, therefore the model has no presence of ARCH effect and no heteroskedasticity problem found. On other hand, we know that the model did not have any misspecification by running the Ramsey RESET test. In Table 4.4 the F-statistic for the Ramsey test is 3.8716, insignificance at 1%,5%, and 10%. Therefore, the model does not possess any misspecification errors.

<u>Figure 4.1: Plot of the cumulative sum (CUSUM) and CUSUM of squares tests</u>



Notes: Figures above obtain from e-views results.

Furthermore, cumulative sum (CUSUM) and CUSUM of squares tests were carried out to test the model for additional confirmation. Based on figure 4.1 that obtained from the test, shows that the blue line in the CUSUM test lies between the 5% critical line indicates the model is stable. On the other hand, it also shows that the blue line in the CUSUMSQ test lies between the 5% critical line indicates the model is stable. There was no structural instability in long-run and short-run estimated parameters that appeared in the same period.

4.3 Granger Causality Tests Based on VECM Estimation

Table 4.5:

Granger Causality tests result based on VECM

Dependent Variable	F-statistics							ECT (t-statistics)
	ΔLTAX	ΔLFDI	ΔLINF	ΔLGDP	ΔLXM	ΔLPD	ΔLMF	
ΔLTAX	-	6.865**	2.9737	3.8061*	1.4660	0.3943	0.2573	-0.02281 (-0.5388)
ΔLFDI	2.8804*	-	5.6609**	1.6406	0.4225	0.9819	1.6966	-0.8329** (-2.7649)
ΔLINF	3.5658*	7.0032**	-	1.6243	1.6299	1.2537	1.8096	-0.1972 (-0.8634)
ΔLGDP	0.4481	11.8909***	1.7467	-	7.1115**	2.342	0.3386	-0.0175 (-0.5102)
ΔLXM	1.6964	0.2739	2.6173	0.0444	-	1.469093	4.7196**	-0.00368 (-0.1835)
ΔLPD	0.1456	5.276**	1.5916	8.4117***	0.8977	-	0.1352	-0.0641** (-2.2443)
ΔLMF	0.0720	2.6526	0.6808	0.8536	0.6461	0.3678	-	0.016124 (1.1874)

*Note: *, ** and *** indicate significant level at 10%, 5% and 1%.*

According to Zou (2018), VECM is conducted for identifying the long run and short run relationship between the cointegrating variables. Thus, we have conducted Granger

Causality test based on Vector Error Correction Model (VECM) in our study to identify short-run dynamic causal relationship between the variables Tax revenue, FDI, inflation, GDP, openness, public debt, and manufacturing level.

In the table 4.5, when we put our dependent variable tax revenue in the Granger causality test. The granger causality for tax revenue occurs as FDI with 5% significance and GDP with 1 % significance. Each of our variables must be represent as independent variables so that we able to obtain the seven equations and the result of ECT for each equation. The results of ECT (t-statistics) measures how fast is the speed of adjustment towards the long run equilibrium. From the table, the Error Correction Term (ECT) only found to be significant with negative sign when the variable FDI and Public Debt is put as dependent variables. The t-statistics is -2.7649 for FDI and -2.2443 for Public Debt, thus it is able to reject the null hypothesis and adjustments towards the long run equilibrium. It means that it will converge by 8.3 percent for FDI and 6 percent Public debt in the long run equilibrium. According to Engle and Granger (1981) the significance in Error Correction Term (ECT) denote the long run causality for FDI and public debt. The result we obtained are consistent with the previous studies that FDI and PBD are cointegrated and has long run causality with the tax revenue.

However, for other variables such as tax revenue, inflation, GDP, and manufacturing level are not significant when put them as dependent variables. The results confirm no long run causality for each of them. Thus, according to the Error Correction Term (ECT) the results indicate there is no any adjustments towards the long run equilibrium. From table 4.5, we can see results suggest that long run unidirectional relationship running from manufacturing level, inflation, tax revenue, GDP, openness level, public debt to FDI.

Chapter 5: Discussion, Conclusion and Implication

5.0 Introduction

The findings of Chapter 4 are explained and discussed in detail in this chapter. The main findings, policy implications, limitations and recommendations for future research will be discussed. Lastly, at the end of this paper, we will draw a conclusion and summarize the relationship between dependent variables and independent variables.

5.1 Discussion of Major Finding

It is important to understand the determinants of tax revenue in Malaysia, as the government collects this revenue and uses it to implement appropriate policies and strategies, which can help increase the country's economic growth. In this study, we used annual data from 1989 to 2018 to analyze the factors that will affect tax revenues in Malaysia. We will use Unit Root test, Granger Causality Tests base on VECM estimation and Autoregressive Distributed lag to examine the relationship between the dependent variable Tax to GDP ratio and the independent variable which is GDP per capita, inflation, Openness level and the ratio of manufacturing to GDP, The ratio of public debt to GDP and Inflow of Foreign Direct Investment to GDP ratio.

The result from unit root test show that all variables are also insignificant to reject null hypothesis at a significant level of 1%, 5%, and 10% at their level form excepted the FDI. We have sufficient evidence to conclude that FDI do not have a unit root at 10% significant level. In other words, most of the variables we have chosen also has a unit root at their level form. Moreover, after we first difference our data, we are able to obtain the result of all variables are also significant (do not have unit root) at a significant level of 1% and 5%. It's also indicated that all variables are considered stationary after first order "I (1)". Furthermore, the result we obtain are consistently with the previous studies, which is most of the macroeconomic and financial series data are also has unit root at their level form and become stationary after we first difference the data.

Secondly, the result of this study was supported by the result obtained from Granger Causality test based on VECM. It shows that when the tax revenue is put as the dependent variable it shows that it is significantly affected by the foreign direct investment (FDI) at 5% significant level and gross domestic product (GDP) at 1% significant level. After that for the result of Error Correction Term (ECT), foreign direct investment (FDI) and Public debt (PBD) are significant at 5% significance level implies there is long-run causality for FDI and Public debt. The results indicate that the coefficient of the error correction term (ECT) is negative sign and statistically significant at 5percent, with the value of 0.83 and 0.06. It means that it will converge by 8.3 percent for FDI and 6 percent PBD in the long run equilibrium. All in all, we obtained are consistent with the previous studies that FDI and PBD are cointegrated and has long run causality with the tax revenue.

Lastly, based on the Wald Test, the conclusion obtained from the ARDL bounds testing cointegration method shows that there is a long-run relationship between Tax revenue and independent variables. The null hypothesis is rejected since the F-statistic value exceeds the upper critical value based on Pesaran et al. (2001), and Narayan (2005)'s study. From the long-run model, we notice that tax revenue is significantly affected by the share of manufacturing (MF) at a 1% significant level and the Openness level (XM) at a 1% significant level. Foreign direct investment (FDI), Public Debt (PD), and Openness level (XM) have a positive tax revenue relationship. Meaning that increase in Foreign direct investment, public debt and openness level will increase the tax revenue, vise versa. However, GDP, Inflation (INF), and Share of manufacturing (MF) have a negative tax revenue relationship. This indicates that an increase in GDP, inflation, and share of manufacturing will decrease the tax revenue, vice versa.

5.2 Policy Implications of the study

Based on the results of our study, it can assist the Malaysia government to understand the determinants of tax revenue and implement appropriate policies to increase Malaysia's tax revenue in different ways. In this section, we will provide some recommendation to policy makers for improving the government's tax collection.

Firstly, according to our findings on the VECM results, only independent variables of foreign direct investment inflows to GDP and public debt to GDP have a long-term causal effect on tax to GDP in Malaysia. This means that in our study, these two variables have the greatest impact on tax revenues in Malaysia. Therefore, Malaysia policy makers can pay more attention to improving Malaysia's tax revenues by implementing policies that regarding FDI inflows and public debt.

Moving to the ARDL results, all independent variables have significant long run impact to the tax to GDP in Malaysia. Therefore, policymakers in Malaysia may implement appropriate policies according to the relationship between the variables.

At first, the ADRL results show that Malaysia's public debt to GDP has a positive impact on tax to GDP in Malaysia. Studies by Krogstrup, S. (2002) and Alawneh (2017) also show that there is a positive correlation between public debt and tax revenue. This implies that an increase in public debt would increase Malaysia's tax revenues. Alawneh (2017) pointed out that the government can use borrowed money to develop the country, which will lead to the increase of national tax revenue. Therefore, in order to increase Malaysia's tax revenue, policy makers could consider increasing public debt to improve the country's development, such as improving technology and infrastructure. National development projects may help Malaysians increase their wealth and, indirectly improve government tax revenues.

Next, the ARDL model found out that there will be a negative correlation between inflation and tax to GDP in Malaysia, which is consistent with the results of researchers Ayennew (2016), Terefe & Teera (2018) and Crane & Nourzad (2013). This implies that rise in inflation will lower tax revenues. This is because inflation worsens individuals' spending power. Due to the reason, if policymakers want to raise taxes, they may try to implement policies that reduce inflation.

Besides that, the ARDL result show that the inflows of foreign direct investment to GDP have a positive impact to the tax to GDP in Malaysia which is similar with the test result by Camara (2019) and Mahmood & Chaudhary (2013). This means that the more foreign direct investment flows into Malaysia, the more tax the government receives. Since FDI inflow can promote economic growth, it indirectly increases tax revenue. As a result, the Malaysian Government are recommended to encourage more FDI inflows into Malaysia by improving the skill base of its economy.

Moreover, the ratio manufacturing share of GDP has a negative effect on the Malaysia's tax to GDP in the ARDL test. This means that the higher the share of manufacturing, the higher the tax revenue to GDP. A journal article by Morrisey et al. (2016) noted the reason of negative effect which is most low-income countries have small manufacturing industries, and the tax would be a burden on smaller firms, thus policymakers will lower down the tax rate to improve international competitive. Since most of the other study stated that increasing in manufacturing activities will improve tax revenue. Hence, government could conduct policy that can improve overall performance and earnings of the manufacture company to increase tax collection.

In addition, the ARDL test result prove that the openness level has a positive impact on the tax to GDP in Malaysia. This result is similar to the results of previous studies by Mushtaq (2012) and Dong (2014). This is mainly because a higher level of openness will increase the productivity of output, thus promoting economic growth and increasing tax revenues. So, the recommendation to the government is to encourage more exports. For example, promoting the productivity of the private sector, reducing tariff and non-tariff barriers (O'Connell, & Golub, 2008).

Last but not least, the ADRL model also shows that Malaysia's per capita GDP has a negative impact on tax revenue to GDP, which is consistent with the test results of Chaudhry and Munir (2010). Preliminary studies stated the main reason is the high tax evasion rate and poor tax system in the country. Therefore, the Malaysian government are recommended make better policies to avoid tax evasion and improve the tax system. For example, the government can imitate the tax system from some good tax system countries such as Singapore and the United States to prevent individuals or companies from evading taxes. This is because Singapore and United States have a better tax system over there. The government probably can increase penalties for tax evaders. If Malaysia had a better tax system, per capita GDP will have a positive effect on tax revenue, as most previous researchers believed that per capita GDP had a positive effect on tax revenue.

5.3 Limitation of study

This section we will discussed what difficulties we have encountered in the process of research. The main limitation of our study is the limitation of the data. Due to we cannot get enough data, so we have to reduce the sample size of the data in our study. We originally planned to look at quarterly data from 1989 to 2018. However, there are some quarterly data that we are not able to get. Then, we try to extend the annual data to more than 30 years, but the data sources are still limited, especially the variables for tax to GDP, foreign direct investment, tax to manufacturing to GDP. Eventually, we decided to use all available annual data to conduct our study from 1989 to 2018. Since the total sample of data is insufficient, our research results may not be accurate.

In addition, we also lack journal articles to support some of the test results between variables. For example, only one journal noted that manufacturing activity would have a negative impact on tax revenues. As a result, we may lack the information to conduct our research.

5.4 Recommendations for future research

In this section, we offer some suggestions for future researchers to prevent errors and reduce limitations in order to achieve better research results.

Firstly, we suggest that future researchers to obtain a larger data pool from other reliable data sources, as larger data yields more accurate results. Since we are lack of the data for the variables in Malaysia, we suggest that future researchers can use panel data that involve other countries in the research instead of time series data to study. For example, future researchers could include research from other developing countries, in Asia such as Vietnam, Thailand, and Indonesia. By using panel data, our research can contain more information, be more efficient and have more variability than time series data (Hsiao,2007).

Last but not least, we suggest that future studies add more other variables. This is because there are still many factors, such as demographics, unemployment, and interest rates, that may also affect tax revenues.

5.5 Conclusion

In this study, the result from unit roots test shows that all of the variables in this study have unit root at their first level form. However, after the first differentiate of the data, all of the variables have become stationary which is similar with the previous study results.

Next, the result from the VECM shows that Inflow of Foreign Direct Investment to GDP and public debt to GDP are cointegrated and has long run causality with the tax revenue to GDP. This mean that two of these variables will bring most impact to the tax revenue. Thus, in order to improve tax revenue for Malaysia, it is recommended that policymakers implement more policies that will affect the inflows of foreign direct investment and public debt.

Lastly, the ADRL model shows that there is a positive correlation between the dependent variables tax revenue and independent variables which is public debt to GDP, openness level and Inflow of Foreign Direct Investment to GDP. However, GDP per capita, inflation and manufacturing to GDP are negatively correlated with tax revenue. Policymakers can know each of the variable's relationship in this study and implement appropriate policies to improve tax revenues in Malaysia.

REFERENCES

Abbas, A. O., & Xifeng, Z. (2016). Impact of foreign direct investment on employment evidence: Zanzibar Tourism Industry. *International Journal of Economics, Finance and Management Sciences*, 4(5), 250-256.

Ahiabor, G. (2013). The effects of monetary policy on inflation in Ghana. *Developing Country Studies*, *3*(12), 82-89.

Amadeo, K. (2020). How to reduce a budget deficit, from the Government's to yours. Retrieved from. https://www.thebalance.com/budget-deficit-definition-and-how-it-affects-the-economy-3305820

Amadeo, K. (2020). What is the public debt? Retrieved September 06, 2020, Retrieved From. https://www.thebalance.com/what-is-the-public-debt-3306294

Anastassiou, Thomas & Dritsaki, Chaido. (2005). Tax revenues and economic growth: An Empirical Investigation for Greece Using Causality Analysis. *Journal of Social Sciences*. 1. 10.3844/jssp.2005.99.104.

Andrejovska, A., & Pulikova, V. (2018). Tax revenues in the context of economic determinants. *Montenegrin Journal of Economics*, 14(1), 133-141.

Alawneh, A. (2017). The impact of public expenditure and public debt on taxes: A case study of Jordan. *Accounting and Finance Research*, 6(3), 10-23.

Appiah, E. N. (2017). The effect of education expenditure on per capita GDP in developing countries. *International Journal of Economics and Finance, 9*(10), 136-144.

Ayenew, W. (2016). Determinants of tax revenue in Ethiopia (Johansen co-integration approach). *International Journal of Business, Economics and Management*, *3*(6), 69-84.

Bahl, R. W. (2003). Reaching the hardest to tax: consequences and possibilities. *Georgia State University*.

Bal, E., & Fazl, B. (2016). Does foreign capital increase tax revenue: The Turkish case. *International Journal of Economics and Financial Issues*, 6(2).

Bornhorst, F., Gupta, S., Thornton, J. (2009). Natural resource endowments and the domestic revenue effort. *Europen Journal of Political Economy*.

Basirat, M., Aboodi, F. & Ahangari, A. (2014). Analyzing the effect of economic variables

on total tax revenues in Iran. *Asian Economics and Financial Review*, 4(6): 755-767.

Bayar, Y., & Ozturk, O. F. (2018). Impact of foreign direct investment inflows on tax revenues in OECD countries: A tabl cointegration and causality analysis. *Theoretical & Applied Economics*, *25*(1).

Boyce, P. (2020). Foreign Direct Investment (FDI) definition: 3 Types. Retrieved from https://boycewire.com/foreign-direct-investment-definition/

Cage, J., Gadenne, L. (2014). Tax Revenues, Development, and the Fiscal cost of Trade Liberalization. *International Journal of Economics and Financial Issues*.

Chaudhry, I. S., & Munir, F. (2010). Determinants of Low Tax Revenue in Pakistan. *Pakistan Journal of Social Sciences (PJSS)*, *30*(2).

Crane, S. E., & Nourzad, F. (2013). Inflation and tax evasion: An empirical analysis. *The Review of Economics and Statistics*, 217-223.

Cung, N. H. (2019). Gross Domestic Product per capita and individual income tax revenue: Empirical evidence from Vietnam. *International Journal of Business and Economics Research*, *8*(6), 369.

Dong, F. (2014). The impact of economic openness on standard of living and income inequality in eight countries. *Emerging Markets Review*.

Drummond, P., Daal, W., Srivastava, N., Oliveira, L.E. (2012). Mobilizing Revenue in Sub-saharan Africa: Empirical Norms and Key Determinants. *IMF Working Paper*.

Ebrill, L. P., Stotsky, J. G., & Gropp, R. (1999). Revenue implications of trade liberalization (Vol. 180). Washington, DC: International monetary fund.

Eltony, N. (2001). The determinants of tax effort in Arab countries. *Arab Planning Institute*.

Engle, R.E., Granger, C.W.J. (1981). Cointegration and error-correction: representation, estimation and testing. *Econometrica* 55, 251-276.

Finance and Development. (2020). Retrieved September 05, 2020, from https://www.imf.org/external/pubs/ft/fandd/1999/03/mallampa.htm

FocusEconomics. (2014). What is public debt? - definition, data and forecasts. Retrieved from https://www.focus-economics.com/economic-indicator/public-debt

Gobachew, N., Debela, K. L., & Shibiru, W. (2018). Determinants of tax revenue in Ethiopia. *Economics*, 6(6), 58-64.

Gnangnon, S. (2017). Structural economic vulnerability, openness and bilateral development aid flws. *Economic analysis and Policy*.

Har, W. M., Teo, K. L. & Yee, K. M. (2008). FDI and economic growth relationship: an empirical study on Malaysia. *International Business Research*. 1(2), 11-18.

Hsiao, C. (2007). Panel data analysis—advantages and challenges. *Test*, 16(1), 1-22.

Hisali. (2018). Trade policy reform and international trade tax revenue in Uganda. *Economic Modelling*.

Ismail, S., Abdul, R. R., & Nur, H. R. (2019). How does public debt affect economic growth?

A systematic review. *Cogent Business & Management*, 6:1, 1707339, DOI: 10.1080/23311975.2019.1701339

Johnson A. E., Hmmed B, A. & Odunsi, K. (2018). Trade Openness and Tax Revenue Performance in Nigeria (198-2016). *International Journal of Academic Research in Business & Social Sciences*.

Kadir, J. M. A., Aslam, M., & Yusof, Z. (2017) Tax and revenue trends and implications in Malaysia.

Kim, D., Lin, S., Suen, Y. (2013). Investment, trade opennnes and foreign direct investment: Social capability matters. *Iternational Reiew of Economics and Finance*.

Kouretas, G. P., & Vlamis, P. (2010). The Greek crisis: causes and implications. *Panoeconomicus*, *57*(4), 391-404.

Krogstrup, S. (2002). Public debt asymmetries: the effect on taxes and spending in the European Union.

Lewis, J. (2017). What are the dangers of the budget deficit? Retrieved from https://smallbusiness.chron.com/dangers-budget-deficit-26184.html

Lin, B., & Jia, Z. (2019). Tax rate, government revenue and economic performance: A perspective of Laffer curve. *China Economic Review*, *56*, 101307.

Loganathan, N., Ahmad, N., Subramaniam, T., & Taha, R. (2020). The dynamic effects of growth, financial development and trade openness on tax revenue in Malaysia. *International Journal of Business and Society*, *21*(1), 42-62.

Lundeen, A. (2014). Economic Growth Drives the Level of Tax Revenue. *Tax Foundation*.

Lutfunnahar, B. (2007). A panel study on tax effort and tax buoyancy with special reference to Bangladesh. *Research Department Bangladesh Bank*.

Mahdavi, S. (2008). The level and composition of tax revenue in developing countries: Evidence from unbalanced panel data. *International Review of Economics & Finance*, *17*(4), 607-617.

Mahmood, H., & Chaudhary, A. R. (2013). Impact of FDI on tax revenue in Pakistan. *Pakistan Journal of Commerce and Social Sciences* (PJCSS), 7(1), 59-69.

Maulia, E., & Sofyan, H. (2018). Tax revenue and inflation rate predictions in Banda Aceh using Vector Error Correction Model (VECM). *MS&E*, *352*(1), 012056.

Malaysia National Debt 2018. (2019). Retrieved from. https://countryeconomy.com/national-debt/malaysia

Morrissey, O., Haldenwang, C.V., Schiller, A.V., Ivanyna, M. & Bordon, I. (2016). Tax revenue performance and vulnerability in developing countries. *The Journal of Development Studies*, 52:12, 1689-1703.

Muibi, S. O., & Sinbo, O. O. (2013). Macroeconomic determinants of tax revenue in Nigeria (1970-2011). *World Applied Sciences Journal*, *28*(1), 27-35.

Mushtaq, S., Bakhsh, K., Hassan S. (2012). Estimating impact of trade liberalization on tax revenue in Pakistan. *Journal of Agriculture & Social Sciences*.

Narayan, P.K. (2005), "The saving and investment nexus for China: Evidence from Cointegration Tests," *Applied Economics*, 37, 1979-1990.

OECD. Publishing. (2014). Development co-operation report 2014: Mobilising resources for sustainable development. *OECD Publishing*.

Ong, J. Y., Ong, L. C., Peh, E. L., Tan, H. Y., & Thin, P. S. (2014). Influence of Government debt level on fiscal spending & tax revenue! Doctoral dissertation, UTAR.

O'Connell, S. A., & Golub, S. S. (2008). Export competitiveness and development in LDCs.

Pereira, E.A. (2013). Using time series analysis to understand price setting, working paper, *Economic Theory Department*, University of Campinas.

Pesaran, H., Y. Shin, and R.J. Smith (2001), "Bounds testing approaches to the analysis of level relationships," *Journal of Applied Econometric*, 16, 289-326

QadirPatoli, A., Zarif, T., & Syed, N. A. (2012). Impact of inflation on taxes in Pakistan: An empirical study of 2000-2010 period. *Journal of Management and Social Sciences*, *8*(2), 31-41.

Shaari, M. S. B., Hong, T. H., & Shukeri, S. N. (2012). Foreign direct investment and economic growth: Evidence from Malaysia. *International Business Research*, 5(10), 100.

Shahbaz, M. (2012). Does trade openness affect long run growth? Cointegration, causality and forecast error variance decomposition tests for Pakistan. *Economic Modelling*, *29*(6), 2325-2339.

Shubati, R. F., & Warrad, T. A. (2018). The effects of international trade openness on government revenue: Empirical evidence from Middle East and North African Region countries. *International Journal of Economics and Financial Issues*, *8*(1), 153.

Sidik, M. H. J., Muhaidin, N. J., & Supar, M. (2019). Goods and Services Tax and Sales and

Services Tax in Malaysia: A review of literature. *International Journal of Financial Research*, *10*(5).

Smith, L. (2021). How governments reduce the national debt. Retrieved from

https://www.investopedia.com/articles/economics/11/successful-ways-government-reduces-debt.asp

Stotsky, J.G., WoldeMariam, A. (1997). Tax effort in Sub-Saharan Africa. *IMF Working Paper*.

Sulekha, A., & FrancinaPracilaMary, R. Tharmalingam (2019). Impact of inflation of the

household spending power. *International Journal of Recent Technology and Engineering (IJRTE) Volume-7 Issue-5S*, 8-11.

Taha, R., Colombage, S. R., & Maslyuk, S. (2010). Stock market, tax revenue and economic

growth: A case-study of Malaysia in 2010. *International Conference on Management Science & Engineering 17th Annual Conference Proceedings* (pp.1084-1090). IEEE.

Taxes & Government Revenue. (n.d.). Retrieved from https://www.worldbank.org/en/topic/taxes-and-government-revenue

Teera, J.M. (2003). Determinants of tax revenue share in Uganda. *Centre for Public*

Economics.

Terefe, K. D. (2017). Determinants of tax revenue in East African countries: An application

of multivariate panel data cointegration analysis (Doctoral dissertation, Makerere University).

The World Bank. (2019). Manufacturing, value added (% of GDP) – Malaysia. Retrieved from. https://data.worldbank.org/indicator/NV.IND.MANF.ZS?locations=MY

Tourinho, O. A., & Sangoi, R. (2016). Public debt and economic growth: Tests of the reinhart-rogoff hypothesis1. In pet 16-rio

Ullah, N. (2016). The relationship of government revenue and government expenditure: A case study of Malaysia.

Ying, T. (2019). Malaysia's total debt, liabilities rose to RM1.17 tril as at end-June. Retrieved from https://www.theedgemarkets.com/article/malaysias-total-debt-liabilities-rose-rm117-tril-endjune

APPENDICES

Appendix I: Variables data

	Year	Tax revenue (% of GDP)	Foreign direct investment, net inflows (% of GDP)	Inflation rate (%)	GDP per capita	Public debt to GDP	Openness level	Manufacturing to GDP
2	1989	15.84483955	4.293264	2.813200897	2216.250446	82.34	136.69	23.80241939
3	1990	17.84079744	5.298123388	2.617801047	2441.741991	80.74	146.89	24.2246874
4	1991	19.11577514	8.136329636	4.358333333	2653.526742	73.32	159.31	25.54986531
5	1992	19.29361171	8.760474402	4.7672283	3113.646333	64.38	150.61	25.82259328
6	1993	18.52561646	7.482853658	3.536585366	3433.163316	54.9	157.94	25.92599045
7	1994	19.17569234	5.829614258	3.724970554	3728.111974	46.9	179.9	26.64060861
8	1995	18.73081228	4.710245402	3.450575096	4329.707364	41	192.11	26.37803239
9	1996	19.37792632	5.035342931	3.488559459	4798.61314	35.2	181.77	27.84276323
10	1997	19.75336681	5.136241158	2.662514597	4637.865016	31.8	185.67	28.38020547
11	1998	16.7301575	2.997750852	5.270342003	3263.33385	36.1	209.49	28.78270602
12	1999	14.09370802	4.921466665	2.744561302	3492.669354	36.9	217.57	30.93621577
13	2000	13.6669089	4.038428624	1.534740237	4043.662051	35.3	220.41	30.86354977
14	2001	17.79488881	0.597029318	1.416784732	3913.428726	41.4	203.36	29.33640404
15	2002	17.44695509	3.166124323	1.807872463	4165.726104	43.1	199.36	29.24639822
16	2003	15.49565512	2.920942095	1.089676326	4461.847687	45.1	194.2	29.92867189
17	2004	15.19909376	3.50787262	1.421271159	4952.212975	45.7	210.37	30.37814736
18	2005	14.82639106	2.734393126	2.975070927	5587.02565	42.71	203.85	27.54968008
19	2006	14.51619698	4.727194488	3.609235642	6209.124508	41.54	202.58	27.56608756
20	2007	14.30372284	4.686888049	2.027353178	7243.455987	41.22	192.47	26.12258394
21	2008	14.66295826	3.280787035	5.440782211	8474.586829	41.24	176.67	24.56071766
22	2009	14.94050153	0.056692268	0.583308406	7292.494447	52.81	162.56	23.80014505
23	2010	13.33219531	4.268663866	1.622852356	9040.566251	53.51	157.94	23.43377557
24	2011	14.79435317	5.074455346	3.174470922	10399.37275	54.26	154.94	23.32020449
25	2012	15.61314674	2.829056466	1.663571025	10817.44287	53.3	147.84	23.13817629
26	2013	15.31023528	3.494301779	2.105012312	10970.12328	54.7	142.72	22.84074242
27	2014	14.84079071	3.141267795	3.142990509	11319.07976	52.7	138.31	22.87393024
28	2015	14.05686436	3.270949574	2.104389802	9955.242127	54.5	131.37	22.29330102
29	2016	13.55072185	4.471318192	2.090566595	9817.740861	52.7	126.9	21.79694614
30	2017	12.95221278	2.937208936	3.871201158	10254.23402	50.7	133.22	21.85633632
31	2018	12.02969239	2.389996038	0.884709161	11373.233	51.8	130.5	21.56396303
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Appendix II: Empirical Result of Unit Root Test, ARDL Test, and VECM Test

Unit Root Test: ADF

Null Hypothesis: TAX has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 2 (Fixed)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.863546	0.1889
Test critical values:	1% level	-4.339330	
	5% level	-3.587527	
	10% level	-3.229230	

Null Hypothesis: D(TAX) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.422273	0.0008
Test critical values:	1% level	-4.339330	
	5% level	-3.587527	
	10% level	-3.229230	

Null Hypothesis: GDP has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.018422	0.5673
Test critical values:	1% level	-4.309824	
	5% level	-3.574244	
	10% level	-3.221728	

Null Hypothesis: D(GDP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.612819	0.0010
Test critical values:	1% level	-3.689194	
	5% level	-2.971853	
	10% level	-2.625121	

Null Hypothesis: FDI has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 3 (Fixed)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.427622	0.3580
Test critical values:	1% level	-4.356068	
	5% level	-3.595026	

Null Hypothesis: D(FDI) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.313306	0.0000
Test critical values:	1% level	-3.699871	
	5% level	-2.976263	
	10% level	-2.627420	

Null Hypothesis: INF has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 2 (Fixed)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.318698	0.4106
Test critical values:	1% level	-4.339330	
	5% level	-3.587527	
	10% level	-3.229230	

Null Hypothesis: D(INF) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.510494	0.0000
Test critical values:	1% level	-3.699871	
	5% level	-2.976263	
	10% level	-2.627420	

Null Hypothesis: MF has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.899725	0.6289
Test critical values:	1% level	-4.309824	
	5% level	-3.574244	
	10% level	-3.221728	

Null Hypothesis: D(MF) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.053044	0.0042
Test critical values:	1% level	-3.689194	
	5% level	-2.971853	
	10% level	-2.625121	

Null Hypothesis: XM has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.985685	0.5844
Test critical values:	1% level	-4.309824	
	5% level	-3.574244	
	10% level	-3.221728	

Null Hypothesis: D(XM) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.797903	0.0077
Test critical values:	1% level	-3.689194	
	5% level	-2.971853	
	10% level	-2.625121	

Null Hypothesis: PD has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.319186	0.4112
Test critical values:	1% level	-4.309824	
	5% level	-3.574244	
	10% level	-3.221728	

Null Hypothesis: D(PD) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.240241	0.0280
Test critical values:	1% level	-3.689194	
	5% level	-2.971853	
	10% level	-2.625121	

Ng-Perron

Null Hypothesis: TAX has a unit root
Exogenous: Constant, Linear Trend
Lag length: 0 (Fixed Spectral GLS-detrended AR)
Sample: 1989 2018
Included observations: 30

		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-9.62904	-2.12262	0.22044	9.75577
Asymptotic critical values*:	1%	-23.8000	-3.42000	0.14300	4.03000
	5%	-17.3000	-2.91000	0.16800	5.48000
	10%	-14.2000	-2.62000	0.18500	6.67000

Null Hypothesis: D(TAX) has a unit root
Exogenous: Constant
Lag length: 0 (Spectral GLS-detrended AR based on SIC, maxlag=7)
Sample (adjusted): 1990 2018
Included observations: 29 after adjustments

		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-12.5308	-2.44720	0.19530	2.16723
Asymptotic critical values*:	1%	-13.8000	-2.58000	0.17400	1.78000
	5%	-8.10000	-1.98000	0.23300	3.17000
	10%	-5.70000	-1.62000	0.27500	4.45000

Null Hypothesis: FDI has a unit root
Exogenous: Constant, Linear Trend
Lag length: 0 (Spectral GLS-detrended AR based on SIC, maxlag=7)
Sample: 1989 2018
Included observations: 30

		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-14.4798	-2.69033	0.18580	6.29543
Asymptotic critical values*:	1%	-23.8000	-3.42000	0.14300	4.03000
	5%	-17.3000	-2.91000	0.16800	5.48000
	10%	-14.2000	-2.62000	0.18500	6.67000

Null Hypothesis: D(FDI) has a unit root
Exogenous: Constant
Lag length: 1 (Spectral GLS-detrended AR based on SIC, maxlag=7)
Sample (adjusted): 1990 2018
Included observations: 29 after adjustments

		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-26.7276	-3.65440	0.13673	0.92066
Asymptotic critical values*:	1%	-13.8000	-2.58000	0.17400	1.78000
	5%	-8.10000	-1.98000	0.23300	3.17000
	10%	-5.70000	-1.62000	0.27500	4.45000

Null Hypothesis: GDP has a unit root
Exogenous: Constant, Linear Trend
Lag length: 0 (Spectral GLS-detrended AR based on SIC, maxlag=7)
Sample: 1989 2018

Included observations: 30

		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-6.53339	-1.78357	0.27299	13.9494
Asymptotic critical values*:	1%	-23.8000	-3.42000	0.14300	4.03000
	5%	-17.3000	-2.91000	0.16800	5.48000
	10%	-14.2000	-2.62000	0.18500	6.67000

Null Hypothesis: D(GDP) has a unit root
Exogenous: Constant
Lag length: 0 (Spectral GLS-detrended AR based on SIC, maxlag=7)
Sample (adjusted): 1990 2018
Included observations: 29 after adjustments

		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-13.7817	-2.62131	0.19020	1.79187
Asymptotic critical values*:	1%	-13.8000	-2.58000	0.17400	1.78000
	5%	-8.10000	-1.98000	0.23300	3.17000
	10%	-5.70000	-1.62000	0.27500	4.45000

Null Hypothesis: INF has a unit root
Exogenous: Constant, Linear Trend
Lag length: 0 (Spectral GLS-detrended AR based on SIC, maxlag=7)
Sample: 1989 2018
Included observations: 30

		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-14.4337	-2.61651	0.18128	6.70905
Asymptotic critical values*:	1%	-23.8000	-3.42000	0.14300	4.03000
	5%	-17.3000	-2.91000	0.16800	5.48000
	10%	-14.2000	-2.62000	0.18500	6.67000

Null Hypothesis: D(INF) has a unit root
Exogenous: Constant
Lag length: 0 (Spectral GLS-detrended AR based on SIC, maxlag=7)
Sample (adjusted): 1990 2018
Included observations: 29 after adjustments

		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-10.9791	-2.15499	0.19628	2.92885
Asymptotic critical values*:	1%	-13.8000	-2.58000	0.17400	1.78000
	5%	-8.10000	-1.98000	0.23300	3.17000
	10%	-5.70000	-1.62000	0.27500	4.45000

Null Hypothesis: MF has a unit root
Exogenous: Constant, Linear Trend
Lag length: 0 (Spectral GLS-detrended AR based on SIC, maxlag=7)
Sample: 1989 2018
Included observations: 30

		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-1.39217	-0.73795	0.53007	54.2588
Asymptotic critical values*:	1%	-23.8000	-3.42000	0.14300	4.03000
	5%	-17.3000	-2.91000	0.16800	5.48000
	10%	-14.2000	-2.62000	0.18500	6.67000

Null Hypothesis: D(MF) has a unit root
Exogenous: Constant
Lag length: 0 (Spectral GLS-detrended AR based on SIC, maxlag=7)
Sample (adjusted): 1990 2018
Included observations: 29 after adjustments

		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-13.0271	-2.54303	0.19521	1.91554
Asymptotic critical values*:	1%	-13.8000	-2.58000	0.17400	1.78000
	5%	-8.10000	-1.98000	0.23300	3.17000
	10%	-5.70000	-1.62000	0.27500	4.45000

Null Hypothesis: XM has a unit root
Exogenous: Constant, Linear Trend
Lag length: 0 (Spectral GLS-detrended AR based on SIC, maxlag=7)
Sample: 1989 2018
Included observations: 30

		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-1.29587	-0.68244	0.52663	54.4861
Asymptotic critical values*:	1%	-23.8000	-3.42000	0.14300	4.03000
	5%	-17.3000	-2.91000	0.16800	5.48000
	10%	-14.2000	-2.62000	0.18500	6.67000

Null Hypothesis: D(XM) has a unit root
Exogenous: Constant
Lag length: 0 (Spectral GLS-detrended AR based on SIC, maxlag=7)
Sample (adjusted): 1990 2018
Included observations: 29 after adjustments

		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-11.4871	-2.37709	0.20694	2.20773
Asymptotic critical values*:	1%	-13.8000	-2.58000	0.17400	1.78000
	5%	-8.10000	-1.98000	0.23300	3.17000
	10%	-5.70000	-1.62000	0.27500	4.45000

Null Hypothesis: PD has a unit root
Exogenous: Constant, Linear Trend
Lag length: 0 (Spectral GLS-detrended AR based on SIC, maxlag=7)
Sample: 1989 2018
Included observations: 30

		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-1.74188	-0.88592	0.50860	48.5285
Asymptotic critical values*:	1%	-23.8000	-3.42000	0.14300	4.03000
	5%	-17.3000	-2.91000	0.16800	5.48000
	10%	-14.2000	-2.62000	0.18500	6.67000

Null Hypothesis: D(PD) has a unit root
Exogenous: Constant

Lag length: 0 (Spectral GLS-detrended AR based on SIC, maxlag=7)
Sample (adjusted): 1990 2018
Included observations: 29 after adjustments

		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-11.5078	-2.39097	0.20777	2.15889
Asymptotic critical values*:	1%	-13.8000	-2.58000	0.17400	1.78000
	5%	-8.10000	-1.98000	0.23300	3.17000
	10%	-5.70000	-1.62000	0.27500	4.45000

ERSP

Null Hypothesis: TAX has a unit root
Exogenous: Constant, Linear Trend
Lag length: 0 (Fixed Spectral OLS AR)
Sample: 1989 2018
Included observations: 30

		P-Statistic
Elliott-Rothenberg-Stock test statistic		12.41172
Test critical values:	1% level	4.220000
	5% level	5.720000
	10% level	6.770000

Null Hypothesis: D(TAX) has a unit root
Exogenous: Constant
Lag length: 1 (Spectral OLS AR based on SIC, maxlag=7)
Sample (adjusted): 1990 2018
Included observations: 29 after adjustments

		P-Statistic
Elliott-Rothenberg-Stock test statistic		1.373851
Test critical values:	1% level	1.870000
	5% level	2.970000
	10% level	3.910000

Null Hypothesis: FDI has a unit root
Exogenous: Constant, Linear Trend
Lag length: 0 (Spectral OLS AR based on SIC, maxlag=7)
Sample: 1989 2018
Included observations: 30

		P-Statistic
Elliott-Rothenberg-Stock test statistic		5.924244
Test critical values:	1% level	4.220000
	5% level	5.720000
	10% level	6.770000

Null Hypothesis: D(FDI) has a unit root
Exogenous: Constant
Lag length: 1 (Spectral OLS AR based on SIC, maxlag=7)
Sample (adjusted): 1990 2018
Included observations: 29 after adjustments

		P-Statistic
Elliott-Rothenberg-Stock test statistic		0.863528
Test critical values:	1% level	1.870000
	5% level	2.970000
	10% level	3.910000

Null Hypothesis: GDP has a unit root
Exogenous: Constant, Linear Trend
Lag length: 0 (Spectral OLS AR based on SIC, maxlag=7)
Sample: 1989 2018

Included observations: 30

		P-Statistic
Elliott-Rothenberg-Stock test statistic		13.59874
Test critical values:	1% level	4.220000
	5% level	5.720000
	10% level	6.770000

Null Hypothesis: D(GDP) has a unit root
Exogenous: Constant
Lag length: 0 (Spectral OLS AR based on SIC, maxlag=7)
Sample (adjusted): 1990 2018
Included observations: 29 after adjustments

		P-Statistic
Elliott-Rothenberg-Stock test statistic		1.738037
Test critical values:	1% level	1.870000
	5% level	2.970000

Null Hypothesis: INF has a unit root
Exogenous: Constant, Linear Trend
Lag length: 0 (Spectral OLS AR based on SIC, maxlag=7)
Sample: 1989 2018
Included observations: 30

		P-Statistic
Elliott-Rothenberg-Stock test statistic		6.413450
Test critical values:	1% level	4.220000
	5% level	5.720000
	10% level	6.770000

Null Hypothesis: D(INF) has a unit root
Exogenous: Constant
Lag length: 1 (Spectral OLS AR based on SIC, maxlag=7)
Sample (adjusted): 1990 2018
Included observations: 29 after adjustments

		P-Statistic
Elliott-Rothenberg-Stock test statistic		1.103361
Test critical values:	1% level	1.870000
	5% level	2.970000
	10% level	3.910000

Null Hypothesis: MF has a unit root
Exogenous: Constant, Linear Trend
Lag length: 0 (Spectral OLS AR based on SIC, maxlag=7)
Sample: 1989 2018
Included observations: 30

		P-Statistic
Elliott-Rothenberg-Stock test statistic		81.18775
Test critical values:	1% level	4.220000
	5% level	5.720000

Null Hypothesis: D(MF) has a unit root
Exogenous: Constant
Lag length: 0 (Spectral OLS AR based on SIC, maxlag=7)
Sample (adjusted): 1990 2018
Included observations: 29 after adjustments

		P-Statistic
Elliott-Rothenberg-Stock test statistic		1.985312
Test critical values:	1% level	1.870000
	5% level	2.970000
	10% level	3.910000

Null Hypothesis: XM has a unit root
Exogenous: Constant, Linear Trend
Lag length: 0 (Spectral OLS AR based on SIC, maxlag=7)
Sample: 1989 2018
Included observations: 30

		P-Statistic
Elliott-Rothenberg-Stock test statistic		87.58686
Test critical values:	1% level	4.220000
	5% level	5.720000
	10% level	6.770000

Null Hypothesis: D(XM) has a unit root
Exogenous: Constant
Lag length: 0 (Spectral OLS AR based on SIC, maxlag=7)
Sample (adjusted): 1990 2018
Included observations: 29 after adjustments

		P-Statistic
Elliott-Rothenberg-Stock test statistic		2.937361
Test critical values:	1% level	1.870000
	5% level	2.970000
	10% level	3.910000

Null Hypothesis: PD has a unit root
Exogenous: Constant, Linear Trend
Lag length: 0 (Spectral OLS AR based on SIC, maxlag=7)
Sample: 1989 2018
Included observations: 30

		P-Statistic
Elliott-Rothenberg-Stock test statistic		74.13121
Test critical values:	1% level	4.220000
	5% level	5.720000
	10% level	6.770000

Null Hypothesis: D(PD) has a unit root
Exogenous: Constant
Lag length: 0 (Spectral OLS AR based on SIC, maxlag=7)

Sample (adjusted): 1990 2018
Included observations: 29 after adjustments

		P-Statistic
Elliott-Rothenberg-Stock test statistic		2.018419
Test critical values:	1% level	1.870000
	5% level	2.970000
	10% level	3.910000

ARDL Bounds Test (LTAX)

Dependent Variable: D(TAX)
Method: Least Squares
Date: 02/06/21 Time: 02:58
Sample (adjusted): 1992 2018
Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TAX(-1)	-1.038374	0.189381	-5.482985	0.0015
FDI(-1)	0.251541	0.075451	3.333829	0.0157
GDP(-1)	-0.365167	0.077207	-4.729685	0.0032
INF(-1)	-0.389202	0.072332	-5.380775	0.0017
ME(-1)	-4.069968	0.719162	-5.659317	0.0013
FD(-1)	0.385445	0.119065	3.237275	0.0177
XM(-1)	2.832649	0.491357	5.764946	0.0012
C	3.289944	1.801747	1.825974	0.1176
D(TAX(-1))	0.212442	0.151323	1.403891	0.2099
D(FDI)	0.090435	0.032801	2.757129	0.0330
D(FDI(-1))	-0.087036	0.030607	-2.843699	0.0294
D(FDI(-2))	0.016115	0.011420	1.411175	0.2079
D(INF)	-0.186055	0.041855	-4.444836	0.0044
D(INF(-2))	-0.154706	0.029128	-5.311328	0.0018
D(GDP)	-1.099266	0.275283	-3.993220	0.0072
D(GDP(-1))	-0.198867	0.225285	-0.882717	0.4114
D(ME(-1))	1.315006	0.372374	3.531415	0.0123
D(FD)	-0.982507	0.302654	-3.246307	0.0175
D(FD(-1))	-0.782177	0.342241	-2.285460	0.0623
D(XM(-1))	-1.445238	0.301010	-4.801299	0.0030
D(XM(-2))	-0.504765	0.245598	-2.055248	0.0856

R-squared	0.958657	Mean dependent var	-0.017153
Adjusted R-squared	0.820846	S.D. dependent var	0.083571
S.E. of regression	0.035373	Akaike info criterion	-3.794281
Sum squared resid	0.007507	Schwarz criterion	-2.786408
Log likelihood	72.22279	Hannan-Quinn criter.	-3.494587
F-statistic	6.956318	Durbin-Watson stat	2.118593
Prob(F-statistic)	0.011738		

Wald Test (LTAX)

Wald Test:
Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	9.112708	(8, 6)	0.0074
Chi-square		8	0.0000

Null Hypothesis: C(1)=C(2)=C(3)=C(4)=C(5)=C(6)=C(7)=C(8)=0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(1)	-1.038374	0.189381

C(2)	0.251541	0.075451
C(3)	-0.365167	0.077207
C(4)	-0.389202	0.072332
C(5)	-4.069968	0.719162
C(6)	0.385445	0.119065
C(7)	2.832649	0.491357
C(8)	3.289944	1.801747

Restrictions are linear in coefficients.

ARDL Bounds Test (L.fdi)

Dependent Variable: D(FDI)
Method: Least Squares
Date: 02/02/21 Time: 07:27
Sample (adjusted): 1991 2018
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TAX(-1)	-2.173215	3.239493	-0.670850	0.5212
FDI(-1)	-1.508972	0.574366	-2.627194	0.0303
GDP(-1)	0.458063	1.455987	0.314606	0.7611
INF(-1)	0.804471	1.609653	0.499810	0.6307
ME(-1)	2.688988	12.72297	0.211349	0.8379
FD(-1)	1.626031	2.053950	0.791661	0.4514
XM(-1)	1.627201	7.808628	0.208385	0.8401
C	-20.17009	36.97330	-0.545531	0.6003
D(TAX)	-1.605578	3.026557	-0.530497	0.6102
D(TAX(-1))	3.325122	2.767500	1.201490	0.2639
D(FDI(-1))	0.465723	0.330412	1.409521	0.1963
D(INF)	0.482209	0.476994	1.010933	0.3416
D(INF(-1))	-0.359439	0.669590	-0.536805	0.6060
D(GDP)	0.479495	3.270587	0.146608	0.8871
D(GDP(-1))	-4.246527	3.548802	-1.196608	0.2657
D(ME(-1))	4.220711	8.227091	0.513026	0.6218
D(FD)	-6.040928	4.312598	-1.400763	0.1989
D(FD(-1))	-3.982355	5.699746	-0.698690	0.5045
D(XM)	1.598185	3.505805	0.455868	0.6606
D(XM(-1))	-1.756877	5.786101	-0.303638	0.7692

R-squared	0.928758	Mean dependent var	-0.028431
Adjusted R-squared	0.759560	S.D. dependent var	1.272721
S.E. of regression	0.624075	Akaike info criterion	2.070717
Sum squared resid	3.115760	Schwarz criterion	3.022292
Log likelihood	-8.990041	Hannan-Quinn criter.	2.361623
F-statistic	5.489154	Durbin-Watson stat	2.509851
Prob(F-statistic)	0.009393		

Wald Test (L.fdi)

Wald Test:
Equation: EQ01

Test Statistic	Value	df	Probability
F-statistic	1.709148	(8, 8)	0.2325
Chi-square	13.67319	8	0.0907

Null Hypothesis: C(1)=C(2)=C(3)=C(4)=C(5)=C(6)=C(7)=C(8)=0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(1)	-2.173215	3.239493
C(2)	-1.508972	0.574366
C(3)	0.458063	1.455987
C(4)	0.804471	1.609553
C(5)	2.688988	12.72297
C(6)	1.626031	2.053950
C(7)	1.627201	7.808628
C(8)	-20.17009	36.97330

Restrictions are linear in coefficients.

ARDL Bounds Test (Lgdp)

Dependent Variable: D(GDP)
Method: Least Squares
Date: 02/02/21 Time: 07:33
Sample (adjusted): 1991 2018
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TAX(-1)	-0.577538	0.295791	-1.952518	0.0867
FDI(-1)	0.029542	0.083981	0.351770	0.7341
GDP(-1)	-0.196346	0.142102	-1.381719	0.2044
INF(-1)	-0.200142	0.161643	-1.238173	0.2508
ME(-1)	-1.866672	1.208939	-1.544058	0.1612
FD(-1)	0.142045	0.224715	0.632114	0.5449
XM(-1)	1.268506	0.716483	1.770463	0.1146
C	2.474811	3.969769	0.623414	0.5504
D(TAX)	-0.308063	0.314083	-0.980832	0.3554
D(TAX(-1))	0.038984	0.324314	0.120205	0.9073
D(FDI)	0.005588	0.038117	0.146608	0.8871
D(FDI(-1))	-0.008620	0.039737	-0.216927	0.8337
D(INF)	-0.072770	0.048254	-1.508064	0.1700
D(INF(-1))	0.034355	0.072567	0.473425	0.6486
D(GDP(-1))	-0.097655	0.414554	-0.235567	0.8197
D(ME(-1))	0.371099	0.893069	0.415533	0.6887
D(FD)	-1.095544	0.346255	-3.163983	0.0133
D(FD(-1))	-0.186568	0.630376	-0.295964	0.7748
D(XM)	-0.057989	0.382808	-0.151482	0.8833
D(XM(-1))	-0.402555	0.611899	-0.657878	0.5291

R-squared	0.899975	Mean dependent var	0.054948
Adjusted R-squared	0.662415	S.D. dependent var	0.115956
S.E. of regression	0.067373	Akaike info criterion	-2.381347
Sum squared resid	0.036313	Schwarz criterion	-1.429772
Log likelihood	53.33885	Hannan-Quinn criter.	-2.090441
F-statistic	3.788412	Durbin-Watson stat	1.929130
Prob(F-statistic)	0.029744		

Wald Test (Lgdp)

Wald Test:
Equation: EQ01

Test Statistic	Value	df	Probability
F-statistic	0.884969	(8, 8)	0.5665
Chi-square	7.079751	8	0.5281

Null Hypothesis: C(1)=C(2)=C(3)=C(4)=C(5)=C(6)=C(7)=C(8)=0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(1)	-0.577538	0.295791
C(2)	0.029542	0.083981
C(3)	-0.196346	0.142102
C(4)	-0.200142	0.161643
C(5)	-1.866672	1.208939
C(6)	0.142045	0.224715
C(7)	1.268506	0.716483
C(8)	2.474811	3.969769

Restrictions are linear in coefficients.

ARDL Bounds Test (Linf)

Dependent Variable: D(INF)
Method: Least Squares
Date: 02/02/21 Time: 07:37
Sample (adjusted): 1991 2018
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TAX(-1)	-1.329283	1.996372	-0.665850	0.5242
FDI(-1)	0.653203	0.335450	1.947247	0.0874
GDP(-1)	-2.079545	0.926427	-2.244695	0.0550
INF(-1)	-2.749665	0.731157	-3.761156	0.0055
MF(-1)	-21.21394	7.238116	-2.930865	0.0190
PD(-1)	-0.117936	1.367217	-0.086260	0.9334
XM(-1)	11.12838	3.936678	2.826846	0.0223
C	35.74316	25.15391	1.420979	0.1931
D(TAX)	-1.789043	1.789367	-0.999819	0.3467
D(TAX(-1))	-0.198930	1.882191	-0.105690	0.9184
D(FDI(-1))	-0.134863	0.211861	-0.636566	0.5422
D(INF(-1))	0.567256	0.442328	1.282432	0.2356
D(GDP)	-3.435737	1.794265	-1.914840	0.0918
D(GDP(-1))	-3.560914	1.959372	-1.817375	0.1067
D(MF)	-7.647358	4.253392	-1.797953	0.1099
D(MF(-1))	3.714982	5.195560	0.715030	0.4949
D(PD)	-5.851334	2.182218	-2.681371	0.0279
D(PD(-1))	-3.338709	3.365197	-0.992129	0.3502
D(XM)	1.836241	2.262243	0.811691	0.4404
D(XM(-1))	-5.889127	3.502762	-1.681281	0.1312

R-squared	0.911307	Mean dependent var	-0.038744
Adjusted R-squared	0.700662	S.D. dependent var	0.713513
S.E. of regression	0.390376	Akaike info criterion	1.132396
Sum squared resid	1.219148	Schwarz criterion	2.083971
Log likelihood	4.146454	Hannan-Quinn criter.	1.423302
F-statistic	4.326262	Durbin-Watson stat	2.278141
Prob(F-statistic)	0.019937		

Wald Test (Linf)

Wald Test:
Equation: EQ01

Test Statistic	Value	df	Probability
F-statistic	2.396333	(8, 8)	0.1189
Chi-square	19.17067	8	0.0140

Null Hypothesis: C(1)=C(2)=C(3)=C(4)=C(5)=C(6)=C(7)=C(
8)=0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(1)	-1.329283	1.996372
C(2)	0.653203	0.335450
C(3)	-2.079545	0.926427
C(4)	-2.749995	0.731157
C(5)	-21.21394	7.238116
C(6)	-0.117936	1.367217
C(7)	11.12838	3.936678
C(8)	35.74316	25.15391

Restrictions are linear in coefficients.

ARDL Bounds Test (Lmf)

Dependent Variable: D(MF)
Method: Least Squares
Date: 02/02/21 Time: 07:39
Sample (adjusted): 1991 2018
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TAX(-1)	0.062779	0.142150	0.441640	0.6704
EDI(-1)	0.038050	0.025203	1.509736	0.1696
GDP(-1)	-0.149712	0.063885	-2.343310	0.0472
INF(-1)	-0.135476	0.070628	-1.918167	0.0914
MF(-1)	-1.335501	0.558288	-2.392136	0.0437
PD(-1)	-0.093128	0.090128	-1.033290	0.3317
XM(-1)	0.529397	0.342645	1.545031	0.1609
C	3.184012	1.622401	1.962531	0.0853
D(TAX)	-0.026424	0.132806	-0.198969	0.8473
D(TAX(-1))	-0.147243	0.121438	-1.212488	0.2599
D(EDI(-1))	-0.013223	0.014499	-0.912001	0.3884

D(INF)	-0.037632	0.020931	-1.797953	0.1099
D(INF(-1))	0.048780	0.029382	1.660225	0.1354
D(GDP)	-0.141621	0.143514	-0.986809	0.3526
D(GDP(-1))	-0.139781	0.155723	-0.897630	0.3956
D(NE(-1))	0.296618	0.361008	0.821640	0.4351
D(PD)	-0.263563	0.189238	-1.392756	0.2012
D(PD(-1))	0.015662	0.250107	0.062620	0.9516
D(XM)	0.169532	0.153836	1.102029	0.3025
D(XM(-1))	-0.371449	0.253896	-1.462996	0.1816

R-squared	0.825810	Mean dependent var	-0.004155
Adjusted R-squared	0.412107	S.D. dependent var	0.035716
S.E. of regression	0.027385	Akaike info criterion	-4.181861
Sum squared resid	0.005999	Schwarz criterion	-3.230286
Log likelihood	78.54605	Hannan-Quinn criter.	-3.890955
F-statistic	1.996144	Durbin-Watson stat	2.188607
Prob(F-statistic)	0.159431		

Wald Test (Lmf)

Wald Test:
Equation: EQ01

Test Statistic	Value	df	Probability
F-statistic	2.052998	(8, 8)	0.1645
Chi-square	16.42398	8	0.0367

Null Hypothesis: C(1)=C(2)=C(3)=C(4)=C(5)=C(6)=C(7)=C(8)=0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(1)	0.062779	0.142150
C(2)	0.038050	0.025203
C(3)	-0.149712	0.063889
C(4)	-0.135476	0.070628
C(5)	-1.335501	0.558288
C(6)	-0.093128	0.090128
C(7)	0.529397	0.342645
C(8)	3.184012	1.622401

Restrictions are linear in coefficients.

ARDL Bounds Test (Lnd)

Dependent Variable: D(PD)
Method: Least Squares
Date: 02/02/21 Time: 07:41
Sample (adjusted): 1991 2018
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.

TAX(-1)	-0.293976	0.217598	-1.351005	0.2137
FDI(-1)	0.049778	0.044534	1.117756	0.2961
GDP(-1)	-0.230662	0.112640	-2.047792	0.0748
INF(-1)	-0.235073	0.116412	-2.019328	0.0781
MF(-1)	-2.086056	0.978781	-2.131281	0.0657
ED(-1)	-0.055612	0.159623	-0.348396	0.7365
XM(-1)	1.079755	0.531525	2.031427	0.0767
C	4.427821	2.916187	1.518360	0.1674
D(TAX)	-0.191571	0.212621	-0.900999	0.3939
D(TAX(-1))	-0.029631	0.221211	-0.133951	0.8967
D(FDI(-1))	-0.013375	0.025092	-0.533041	0.6085
D(INF)	-0.080892	0.030168	-2.681371	0.0279
D(INF(-1))	0.058562	0.053215	1.100402	0.3032
D(GDP)	-0.629020	0.124288	-5.061007	0.0010
D(GDP(-1))	-0.189247	0.265537	-0.712694	0.4963
D(MF)	-0.740440	0.531636	-1.392756	0.2012
D(MF(-1))	0.349400	0.617875	0.565487	0.5872
D(ED(-1))	-0.050619	0.418927	-0.120829	0.9068
D(XM)	0.099301	0.274490	0.361767	0.7269
D(XM(-1))	-0.536806	0.439623	-1.220228	0.2571

R-squared	0.930444	Mean dependent var	-0.015852
Adjusted R-squared	0.765250	S.D. dependent var	0.094734
S.E. of regression	0.045900	Akaike info criterion	-3.148908
Sum squared resid	0.016854	Schwarz criterion	-2.197333
Log likelihood	64.08471	Hannan-Quinn criter.	-2.858002
F-statistic	5.632424	Durbin-Watson stat	2.042764
Prob(F-statistic)	0.008637		

Wald Test (Lnd)

Wald Test:
Equation: EQ01

Test Statistic	Value	df	Probability
F-statistic	1.227899	(8, 8)	0.3893
Chi-square	9.823192	8	0.2777

Null Hypothesis: C(1)=C(2)=C(3)=C(4)=C(5)=C(6)=C(7)=C(8)=0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(1)	-0.293976	0.217598
C(2)	0.049778	0.044534
C(3)	-0.230662	0.112640
C(4)	-0.235073	0.116412
C(5)	-2.086056	0.978781
C(6)	-0.055612	0.159623
C(7)	1.079755	0.531525
C(8)	4.427821	2.916187

Restrictions are linear in coefficients.

ARDL Bounds Test (Lxm)

Dependent Variable: D(XM)
Method: Least Squares
Date: 02/02/21 Time: 07:42
Sample (adjusted): 1991 2018
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TAX(-1)	0.004187	0.308092	0.013591	0.9895
FDI(-1)	-0.022111	0.060678	-0.364398	0.7250
GDP(-1)	0.021229	0.177511	0.119595	0.9078
INF(-1)	0.082274	0.180416	0.456022	0.6605
MF(-1)	1.324200	1.494161	0.886250	0.4013
PD(-1)	-0.114940	0.201422	-0.570643	0.5839
XM(-1)	-0.962303	0.763739	-1.259988	0.2432
C	0.823633	4.218668	0.195235	0.8501
D(TAX)	-0.153821	0.279865	-0.549626	0.5976
D(TAX(-1))	-0.033021	0.282701	-0.116807	0.9099
D(FDI(-1))	0.004484	0.032584	0.137611	0.8939
D(INF)	0.041437	0.051051	0.811691	0.4404
D(INF(-1))	-0.027659	0.072300	-0.382553	0.7120
D(GDP)	0.072934	0.324473	0.224777	0.8278
D(GDP(-1))	0.288838	0.334627	0.863164	0.4132
D(MF)	0.777437	0.705459	1.102029	0.3025
D(MF(-1))	-0.528815	0.783025	-0.675349	0.5185
D(PD)	0.162093	0.448059	0.361767	0.7269
D(PD(-1))	0.143642	0.533309	0.269342	0.7945
D(XM(-1))	0.490700	0.587032	0.835900	0.4275

R-squared	0.715150	Mean dependent var	-0.004225
Adjusted R-squared	0.038633	S.D. dependent var	0.059809
S.E. of regression	0.058643	Akaike info criterion	-2.658898
Sum squared resid	0.027512	Schwarz criterion	-1.707323
Log likelihood	57.22457	Hannan-Quinn criter.	-2.367992
F-statistic	1.057105	Durbin-Watson stat	2.176273
Prob(F-statistic)	0.496352		

Wald Test (Lxm)

Wald Test:
Equation: EQ01

Test Statistic	Value	df	Probability
F-statistic	0.627024	(8, 8)	0.7380
Chi-square	5.016194	8	0.7558

Null Hypothesis: C(1)=C(2)=C(3)=C(4)=C(5)=C(6)=C(7)=C(8)=0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(1)	0.004187	0.308092
C(2)	-0.022111	0.060678

C(3)	0.021229	0.177511
C(4)	0.082274	0.180416
C(5)	1.324200	1.494161
C(6)	-0.114940	0.201422
C(7)	-0.962303	0.763739
C(8)	0.823633	4.218668

Restrictions are linear in coefficients.

Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 1 lag

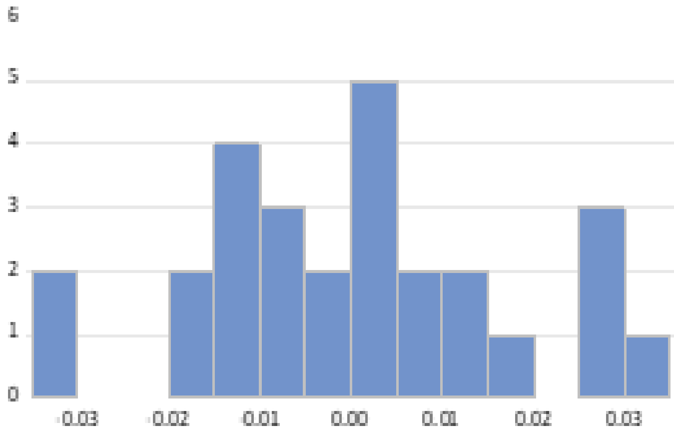
F-statistic	0.367792	Prob. F(1,5)	0.5707
Obs*R-squared	1.849996	Prob. Chi-Square(1)	0.1738

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 04/07/21 Time: 21:05
Sample: 4 30
Included observations: 27
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TAX(-1)	-0.047676	0.215104	-0.221644	0.8334
FDI(-1)	0.043235	0.106985	0.404124	0.7028
GDP(-1)	-0.040366	0.105325	-0.383251	0.7173
INF(-1)	-0.055073	0.118722	-0.463887	0.6622
MEI(-1)	-0.435730	1.046100	-0.416528	0.6943
PD(-1)	0.003874	0.126043	0.030737	0.9767
XMI(-1)	0.229275	0.642490	0.356854	0.7358
C	0.708757	2.234827	0.317142	0.7640
D(TAX(-1))	0.013041	0.161425	0.080786	0.9387
D(FDI)	0.014528	0.042148	0.344694	0.7443
D(FDI(-1))	-0.012733	0.038573	-0.330096	0.7547
D(FDI(-2))	-0.003015	0.013057	-0.230927	0.8265
D(INF)	-0.028791	0.064903	-0.443607	0.6759
D(INF(-2))	-0.008555	0.033872	-0.252560	0.8107
D(GDP)	-0.152493	0.384615	-0.396477	0.7081
D(GDP(-1))	0.026663	0.242211	0.110084	0.9166
D(MEI(-1))	-0.036534	0.398274	-0.091731	0.9305
D(PD)	-0.117483	0.374052	-0.314082	0.7661
D(PD(-1))	0.087152	0.389327	0.223853	0.8317
D(XMI(-1))	-0.030910	0.322298	-0.095906	0.9273
D(XMI(-2))	-0.036290	0.266464	-0.136190	0.8970
RESID(-1)	-0.454206	0.748947	-0.606459	0.5707

R-squared	0.068518	Mean dependent var	2.30E-15
Adjusted R-squared	-3.843705	S.D. dependent var	0.016992
S.E. of regression	0.037398	Akaike info criterion	-3.791186
Sum squared resid	0.006993	Schwarz criterion	-2.735318
Log likelihood	73.18100	Hannan-Quinn criter.	-3.477221
F-statistic	0.017514	Durbin-Watson stat	1.734856
Prob(F-statistic)	1.000000		

Jarque Bera Test



Series: Residuals
Sample 4 30
Observations 27

Mean	2.30e-15
Median	0.000607
Maximum	0.033064
Minimum	-0.031666
Std. Dev.	0.016992
Skewness	0.149906
Kurtosis	2.431124
Jarque-Bera	0.465196
Probability	0.792472

Ramsey RESET Test

Ramsey RESET Test
Equation: UNTITLED
Omitted Variables: Powers of fitted values from 2 to 3
Specification: D(TAX) TAX(-1) FDI(-1) GDP(-1) INF(-1) MF(-1) FD(-1) XM(-1)
C D(TAX(-1)) D(FDI) D(FDI(-1)) D(FDI(-2)) D(INF) D(INF(-2)) D(GDP)
D(GDP(-1)) D(MF(-1)) D(FD) D(FD(-1)) D(XM(-1)) D(XM(-2))

	Value	df	Probability
F-statistic	3.871584	(2, 4)	0.1160
Likelihood ratio	29.07838	2	0.0000

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.004950	2	0.002475
Restricted SSR	0.007507	6	0.001251
Unrestricted SSR	0.002557	4	0.000639

LR test summary:

	Value
Restricted LogL	72.22279
Unrestricted LogL	86.76198

Unrestricted Test Equation:
Dependent Variable: D(TAX)
Method: Least Squares
Date: 04/07/21 Time: 21:08
Sample: 4 30
Included observations: 27

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TAX(-1)	-0.670248	0.389068	-1.722701	0.1600
FDI(-1)	0.180676	0.087353	2.068347	0.1074
GDP(-1)	-0.242845	0.092672	-2.620482	0.0588

INF(-1)	-0.257787	0.128134	-2.011863	0.1146
ME(-1)	-3.017681	0.932782	-3.235142	0.0318
FD(-1)	0.265350	0.145775	1.820274	0.1428
XM(-1)	2.106112	0.688156	3.060517	0.0376
C	1.935158	1.475392	1.311623	0.2599
D(TAX(-1))	0.127513	0.197061	0.647109	0.5528
D(FDI)	0.061797	0.030406	2.032391	0.1119
D(FDI(-1))	-0.060898	0.038195	-1.594392	0.1861
D(FDI(-2))	0.013345	0.008876	1.503555	0.2071
D(INF)	-0.130547	0.060414	-2.160857	0.0968
D(INF(-2))	-0.113251	0.040403	-2.803041	0.0487
D(GDP)	-0.786808	0.327100	-2.405405	0.0739
D(GDP(-1))	-0.071748	0.167454	-0.428466	0.6904
D(ME(-1))	0.957322	0.409837	2.335860	0.0797
D(FD)	-0.891883	0.367415	-2.427454	0.0722
D(FD(-1))	-0.388742	0.385717	-1.007845	0.3705
D(XM(-1))	-1.106151	0.423150	-2.614084	0.0592
D(XM(-2))	-0.432220	0.180830	-2.390204	0.0752
FITTED^2	0.830700	1.653919	0.502261	0.6419
FITTED^3	9.326978	12.92001	0.721902	0.5103

R-squared	0.985918	Mean dependent var	-0.017153
Adjusted R-squared	0.908464	S.D. dependent var	0.083571
S.E. of regression	0.025284	Akaike info criterion	-4.723110
Sum squared resid	0.002557	Schwarz criterion	-3.619249
Log likelihood	86.76158	Hannan-Quinn criter.	-4.394874
F-statistic	12.72911	Durbin-Watson stat	2.169523
Prob(F-statistic)	0.011917		

ARCH Test

Heteroskedasticity Test: ARCH

F-statistic	0.651765	Prob. F(1,24)	0.4274
Obs*R-squared	0.687411	Prob. Chi-Square(1)	0.4070

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 04/07/21 Time: 21:10
Sample (adjusted): 5 30
Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000291	7.95E-05	3.656634	0.0012
RESID^2(-1)	-0.147238	0.182379	-0.807320	0.4274

R-squared	0.026439	Mean dependent var	0.000250
Adjusted R-squared	-0.014126	S.D. dependent var	0.000313
S.E. of regression	0.000315	Akaike info criterion	-13.21586
Sum squared resid	2.38E-06	Schwarz criterion	-13.11908
Log likelihood	173.8062	Hannan-Quinn criter.	-13.18799
F-statistic	0.651765	Durbin-Watson stat	2.266858
Prob(F-statistic)	0.427411		

VECM Test

Dependent Variable: D(TAX)
Method: Least Squares
Date: 02/05/21 Time: 21:43
Sample (adjusted): 1991 2018
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECT(-1)	-0.018971	0.035159	-0.539579	0.5958
D(TAX(-1))	0.291105	0.228051	1.276490	0.2172
D(FDI)	-0.049439	0.018868	-2.620203	0.0168
D(INF)	0.044372	0.025731	1.724453	0.1009
D(GDP)	0.293323	0.150350	1.950930	0.0660
D(PUBLICDEBT(-1))	-0.123405	0.196524	-0.627940	0.5375
D(OPENNESS)	-0.352497	0.291128	-1.210799	0.2408
D(MANUF(-1))	0.238651	0.470471	0.507259	0.6178
C	-0.029474	0.016068	-1.834309	0.0823

R-squared	0.478792	Mean dependent var	-0.014075
Adjusted R-squared	0.259337	S.D. dependent var	0.083610
S.E. of regression	0.071956	Akaike info criterion	-2.170427
Sum squared resid	0.098376	Schwarz criterion	-1.742218
Log likelihood	39.38597	Hannan-Quinn criter.	-2.039519
F-statistic	2.181726	Durbin-Watson stat	2.103742
Prob(F-statistic)	0.077804		

Dependent Variable: D(FDI)
Method: Least Squares
Date: 02/03/21 Time: 18:01
Sample (adjusted): 1991 2018
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECT(-1)	-0.832887	0.301233	-2.764931	0.0138
D(TAX)	-3.093854	1.829340	-1.691241	0.1102
D(TAX(-1))	3.745088	1.886837	1.984850	0.0646
D(FDI(-1))	-0.278629	0.112776	-2.470634	0.0251
D(INF)	0.536971	0.225688	2.379266	0.0301
D(GDP)	2.425018	1.893290	1.280848	0.2185
D(PUBLICDEBT)	-3.336270	2.884624	-1.156570	0.2644
D(PUBLICDEBT(-1))	3.309704	2.391331	1.384043	0.1853
D(OPENNESS)	-1.827471	2.811446	-0.650011	0.5249
D(MANUF)	9.729407	4.444224	2.189225	0.0438
D(MANUF(-1))	5.343147	4.102149	1.302524	0.2112
C	-0.054727	0.155621	-0.351665	0.7297

R-squared	0.869369	Mean dependent var	-0.028431
Adjusted R-squared	0.779560	S.D. dependent var	1.272721
S.E. of regression	0.597556	Akaike info criterion	2.105590
Sum squared resid	5.713175	Schwarz criterion	2.676535
Log likelihood	-17.47827	Hannan-Quinn criter.	2.280134
F-statistic	9.680195	Durbin-Watson stat	2.028148
Prob(F-statistic)	0.000040		

Dependent Variable: D(INF)
Method: Least Squares
Date: 02/04/21 Time: 15:59
Sample (adjusted): 1991 2018
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECT(-1)	-0.197203	0.228417	-0.863350	0.3987
D(TAX)	3.022555	1.600650	1.888330	0.0743
D(FDI)	0.377858	0.142785	2.646347	0.0159
D(INF(-1))	-0.063181	0.223233	-0.283028	0.7802
D(GDP)	-1.759343	1.380448	-1.274473	0.2179
D(PUBLICDEBT)	-1.911795	1.707413	-1.119702	0.2768
D(OPENNESS)	3.141827	2.460918	1.276689	0.2171
D(MANUF)	-5.325590	3.958916	-1.345214	0.1944
C	0.085348	0.132672	0.643300	0.5277

R-squared	0.563938	Mean dependent var	-0.038744
Adjusted R-squared	0.380333	S.D. dependent var	0.713513
S.E. of regression	0.561670	Akaike info criterion	1.939288
Sum squared resid	5.993998	Schwarz criterion	2.367497
Log likelihood	-18.15004	Hannan-Quinn criter.	2.070196
F-statistic	3.071470	Durbin-Watson stat	2.546425
Prob(F-statistic)	0.021273		

Dependent Variable: D(GDP)
Method: Least Squares
Date: 02/04/21 Time: 15:41
Sample (adjusted): 1991 2018
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECT(-1)	-0.017466	0.034235	-0.510173	0.6158
D(TAX)	0.194785	0.290973	0.669425	0.5113
D(FDI)	0.073118	0.021204	3.448329	0.0027
D(INF)	-0.043266	0.032737	-1.321633	0.2020
D(GDP(-1))	0.623003	0.249800	2.494005	0.0220
D(PUBLICDEBT(-1))	0.425049	0.277744	1.530364	0.1424
D(OPENNESS(-1))	0.988716	0.370758	2.666739	0.0152
D(MANUF(-1))	-0.341197	0.586383	-0.581866	0.5675
C	0.032351	0.022484	1.438873	0.1665

R-squared	0.578497	Mean dependent var	0.054948
Adjusted R-squared	0.401022	S.D. dependent var	0.115956
S.E. of regression	0.089742	Akaike info criterion	-1.728656
Sum squared resid	0.153020	Schwarz criterion	-1.300448
Log likelihood	33.20119	Hannan-Quinn criter.	-1.597749
F-statistic	3.259598	Durbin-Watson stat	2.104750
Prob(F-statistic)	0.016414		

Dependent Variable: D(OPENNESS)
Method: Least Squares
Date: 02/04/21 Time: 15:51
Sample (adjusted): 1991 2018
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECT(-1)	-0.003681	0.020064	-0.183462	0.8564
D(TAX)	-0.212739	0.163337	-1.302455	0.2083
D(FDI)	-0.006417	0.012260	-0.523427	0.6067
D(INF)	0.029865	0.018460	1.617811	0.1222
D(GDP(-1))	-0.030951	0.146883	-0.210719	0.8353
D(PUBLICDEBT(-1))	-0.194216	0.160236	-1.212062	0.2403
D(OPENNESS(-1))	0.096029	0.189023	0.508030	0.6173
D(MANUF)	0.725761	0.334074	2.172454	0.0427
C	-0.004577	0.012535	-0.365111	0.7191

R-squared	0.501191	Mean dependent var	-0.004225
Adjusted R-squared	0.291166	S.D. dependent var	0.059809
S.E. of regression	0.050355	Akaike info criterion	-2.884350
Sum squared resid	0.048177	Schwarz criterion	-2.456142
Log likelihood	49.38090	Hannan-Quinn criter.	-2.753443
F-statistic	2.386341	Durbin-Watson stat	2.231611
Prob(F-statistic)	0.057190		

Dependent Variable: D(PUBLICDEBT)
Method: Least Squares
Date: 02/04/21 Time: 15:57
Sample (adjusted): 1991 2018
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECT(-1)	-0.064103	0.028563	-2.244290	0.0384
D(TAX)	0.058758	0.154015	0.381510	0.7076
D(FDI)	-0.034739	0.012329	-2.817622	0.0119
D(FDI(-1))	-0.027609	0.014975	-1.843637	0.0827
D(INF(-1))	0.033068	0.026211	1.261596	0.2241
D(GDP)	-0.467639	0.114029	-4.101065	0.0007
D(GDP(-1))	0.277330	0.171863	1.613665	0.1250
D(PUBLICDEBT(-1))	0.805023	0.156815	5.133582	0.0001
D(OPENNESS(-1))	0.203065	0.214329	0.947445	0.3567
D(MANUF)	0.127336	0.346264	0.367743	0.7176
C	0.012504	0.012577	0.994151	0.3341

R-squared	0.848442	Mean dependent var	-0.015852
Adjusted R-squared	0.759291	S.D. dependent var	0.094734
S.E. of regression	0.046479	Akaike info criterion	-3.012924
Sum squared resid	0.036725	Schwarz criterion	-2.489557
Log likelihood	53.18093	Hannan-Quinn criter.	-2.852925
F-statistic	9.516848	Durbin-Watson stat	2.273740
Prob(F-statistic)	0.000036		

Dependent Variable: D(MANUF)
Method: Least Squares
Date: 02/04/21 Time: 16:19
Sample (adjusted): 1991 2018
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECT(-1)	0.016124	0.013581	1.187284	0.2497
D(TAX)	-0.028293	0.105437	-0.268337	0.7913
D(FDI)	0.016179	0.009934	1.628681	0.1198
D(INF)	-0.011005	0.013338	-0.825097	0.4196
D(GDP)	-0.072650	0.078633	-0.923920	0.3671
D(PUBLICDEBT(-1))	-0.057158	0.094253	-0.606432	0.5514
D(OPENNESS(-1))	0.120017	0.149310	0.803812	0.4314
D(MANUF(-1))	0.002845	0.233254	0.012198	0.9904
C	-0.002427	0.008810	-0.275464	0.7859

R-squared	0.307176	Mean dependent var	-0.004155
Adjusted R-squared	0.015460	S.D. dependent var	0.035716
S.E. of regression	0.035438	Akaike info criterion	-3.586948
Sum squared resid	0.023862	Schwarz criterion	-3.158739
Log likelihood	59.21727	Hannan-Quinn criter.	-3.456040
F-statistic	1.052998	Durbin-Watson stat	2.378196
Prob(F-statistic)	0.433666		