TAXATION AND ECONOMIC GROWTH: SWEDEN AND OTHER 16 OECD COUNTRIES

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DECLARATION

We hereby declare that:

(1) This undergraduate research project 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.

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Abstract

Taxation is often seen as an important catalyst for the economic growth. In this paper, we would like to strengthen the previous empirical literature. So, we estimate the impact of taxation on economic growth by employing data of Sweden and other 16 OECD countries over the period from 1971 to 2007. Here, we apply dynamic Ordinary Least Square to examine the impact of taxation on economic growth. Besides that, we had examined the impact of different component taxes on the economic growth. The result we obtained proved that there is a statistically significant negative relationship between taxation and economic growth regardless the countries' tax bracket while different component taxes have different impact on the economic growth. For the import taxes, it has a positive effect on the economic growth for most of the OECD countries, while corporate taxes, good and services taxes, individual taxes and property taxes show a negative impact on the economic growth. In addition, we found that when the countries fall into a higher tax bracket, taxation generally will have a permanent effect on the economic growth. Lastly, by using impulse responses, regardless of which level of tax bracket the country is falling, the responses of the government spending and taxes on the economic growth always have a short term negative impact.

CHAPTER 1: RESEARCH OVERVIEW

1.0 INTRODUCTION

Economical growth is the key to drive a country into a successful pathway. Sustained economic growth would lead to higher real living standards and lower the rate of unemployment and it depends mainly on the country's productivity and investment. Tax policy is one of the most important factors that either causes the improvement in economic growth or worsens the economic growth. So, a proper taxation level can play a major role in determining the countries' economic growth.

Theoretically, high tax rates can bring negative impact to the growth in one country. When the government increases tax rates in the country, this will exacerbate the economic growth as consumers will receive lower disposable income for spending and savings while investors will reduce their investment in a response to high tax rates. However, in the real world, changes in tax might have positive or negative effect on the economic growth. Government policy plays essential role in determining the contribution of taxes towards the economic growth. Higher imposition of taxes will endanger the economic growth as the government officials misused the tax revenues in corruption activities. However, if the tax revenues are applied properly into the development for the country, it will help to boost the economic growth.

In this research, our primary result shows consistencies with the theory where higher tax rates will worsen the economic growth. However, the rise in different type of taxes may affect the economic growth in different way where the impact is positive, negative or ambiguous. In most of the cases, the influence of positive effect on taxes was unable to offset the negative effect of taxes in the economy such as Sweden, Turkey and Germany.

Earlier work done by Chen (2007) shows that higher tax rate charge on labor has ambiguous growth effects in both short run and long run growth. However, if the elasticity of substitution for labor supply is sufficient small, higher tax rate will always lower the long run economic growth, despite the existence of productive government taxation. Besides that, consumers tend to decrease their consumption when the tax increases, so it is the best options for them to save more in the bank. This will stimulate the investment and boost the economic growth. Normally, if the consumers are rational, they will not increase their consumption although there is reduction in taxes because they know that the current tax cut is offsetting by the higher taxes in the future. However, consumers are usually short-sighted, so they will increase their consumption in response to the lower taxes. Shimizutani (2006) found that tax cut does not promote the long run economic growth because consumer spent tax cut benefits on services and non-durables goods and households did not respond to those tax cut at the timing expectation.

Apart from this, increase labor income tax will distort the labors' work incentive, which discourages them from longer working hours, causing the decrease in labor supply along with the decrease in the productivity and the long run economic growth. People tend to spend more time in evading tax instead of improving the productivity. Conversely, lower labor income taxes might encourage the working incentive of the labors. Effective labor supply will leads to high productivity growth which will improve the economy growth. Other than that, increases of tax produce a globally negative impact that will distort the incentive to invest because it become less profitability for every single dollar invest in their investment. Thus, lower investment will reduce the job opportunity and increase unemployment. Indeed, the economic growth will shows a decline as well as the standard living. Earlier work done by Lucas (1990) and Rebelo (1990) found that increase of the capital income tax reduces private investment return, which in turn implies a decrease in the capital accumulation and thus economic growth. However, Uhlig and Yanagawa (1996) claims that higher capital income tax charge on the investment will bring higher growth to the economy. A higher capital income tax means a lower labor income tax, which leaves the nation with more net income out of which to save. Higher savings can faster growth in the long run.

1.1 RESEARCH BACKGROUND

Tax which consists of direct or indirect tax is an imposition of financial charges or other levy on an individual or a legal entity by the state. Meanwhile, changes in taxes do have direct effect towards consumers, businesses and overall economy. The common types of taxes are income tax, corporate tax, capital gain tax, tariff and goods and services tax. However, sometimes nations might dislike the changes in taxes which are due to uncontrollable forces. Thus, the foremost challenges for today's economists are to determine the right policies that can increase the economic growth. In our research, we are interested in clarifying the effects of taxation on the long run economic growth in developed countries by using the endogenous growth model which emphasizes the role of tax and how government applied the tax revenues as the main determinant of long run growth. At this juncture, we are more interested to distinguish the effect of taxation in Organization for Economic Co-operation and Development (OECD) countries rather than developing countries because there are serious tax evasion which cause tax data to be inappropriate, huge underground economy and hardly available data in developing countries as compare to the developed countries.

In theory, taxation has negative impact on economic growth. For example, higher capital income tax will lower the return on investment. So, it will lower the firm's willingness to invest and lead to lower growth rate. On the other hand, participation of labor force will be affected by the labor income tax. Higher labor income tax will discourage incentive to work and leads to lower growth in respond to the decrease in productivity. Figure 1.1 shows the relationship between taxation and economic growth on an individual country (Sweden) over the time. This figure shows that there is a significant negative relationship between taxation and economic growth in Sweden from 1971 to 2007. This is consistent with the theory that higher tax will lower the economic growth in the long run and apparently a first glance at data has confirmed the theoretical conjecture. Figure 1.2 shows the average tax rates across 17 countries at a point of

time in bar chart. As it shown, Sweden has the highest tax rate, which is approximately 48%, as compared to 16 other countries while Turkey hits the lowest in ranking.

Figure 1.3 shows the relationship between taxation and economic growth for 17 cross countries which is similar to Figure 1.1. The link is weaker for cross countries comparison but generally still point to negative relationship. In this Figure, Turkey (TR), with the lowest taxes, achieves a higher growth rate and Sweden (SE) which imposes the highest taxes obtains a lower economic growth. However, when we divided the countries according to the level of tax bracket, the results we gained are poles apart. The countries that fall into the highest tax bracket, which is from 40% to 48%, do not necessary comes with lowest growth rates. For example, Norway (NO) is able to achieve high growth rates with high taxes. Meanwhile, the countries that fall into lower tax bracket, which is around 16% to 24%, do not achieve high economic growth as well. As compared to Ireland (IE), although Turkey (TR) imposes lowest tax rates, the growth rate in Turkey is still lower than Ireland which imposes higher tax rates.

After consideration, we would like to find out the impact of taxation on economic growth using 17 OECD countries as subject study Sweden obtain almost the lowest growth rate with its highest taxation rate. Moreover, attention will be particularly paid to Sweden as the contrast between tax rate and growth rate is the largest in Sweden among all other countries. Since Sweden provides similar relationship with theory, we would like to identify whether this empirical evidence is reliable to explain the theory as not all of those selected countries present same result with Sweden.

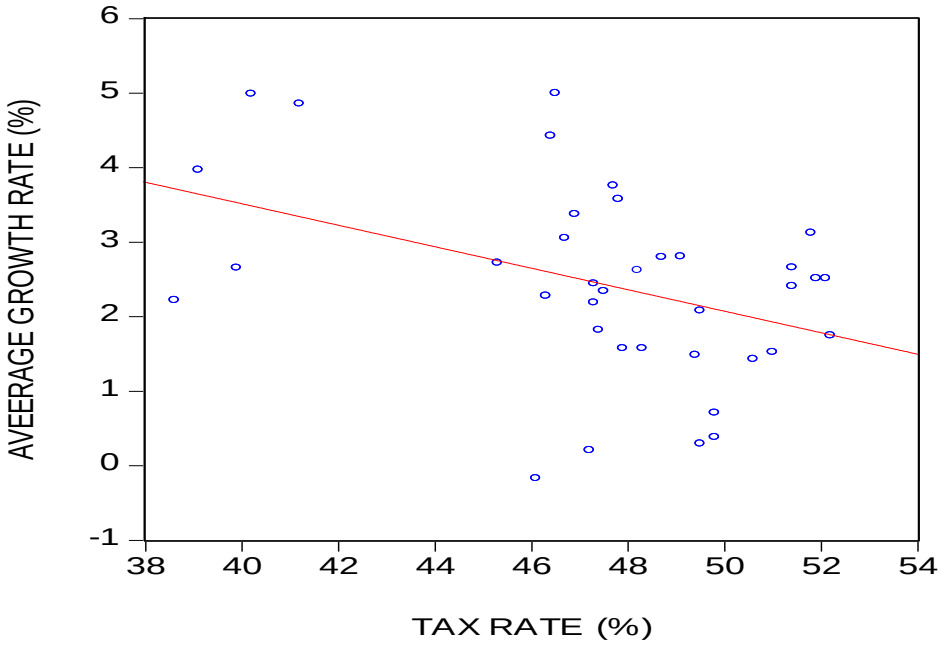

Figure 1.1: Relationship between taxation and economic growth in Sweden, 1971- 2007

Sources: OECD Factbook 2009.

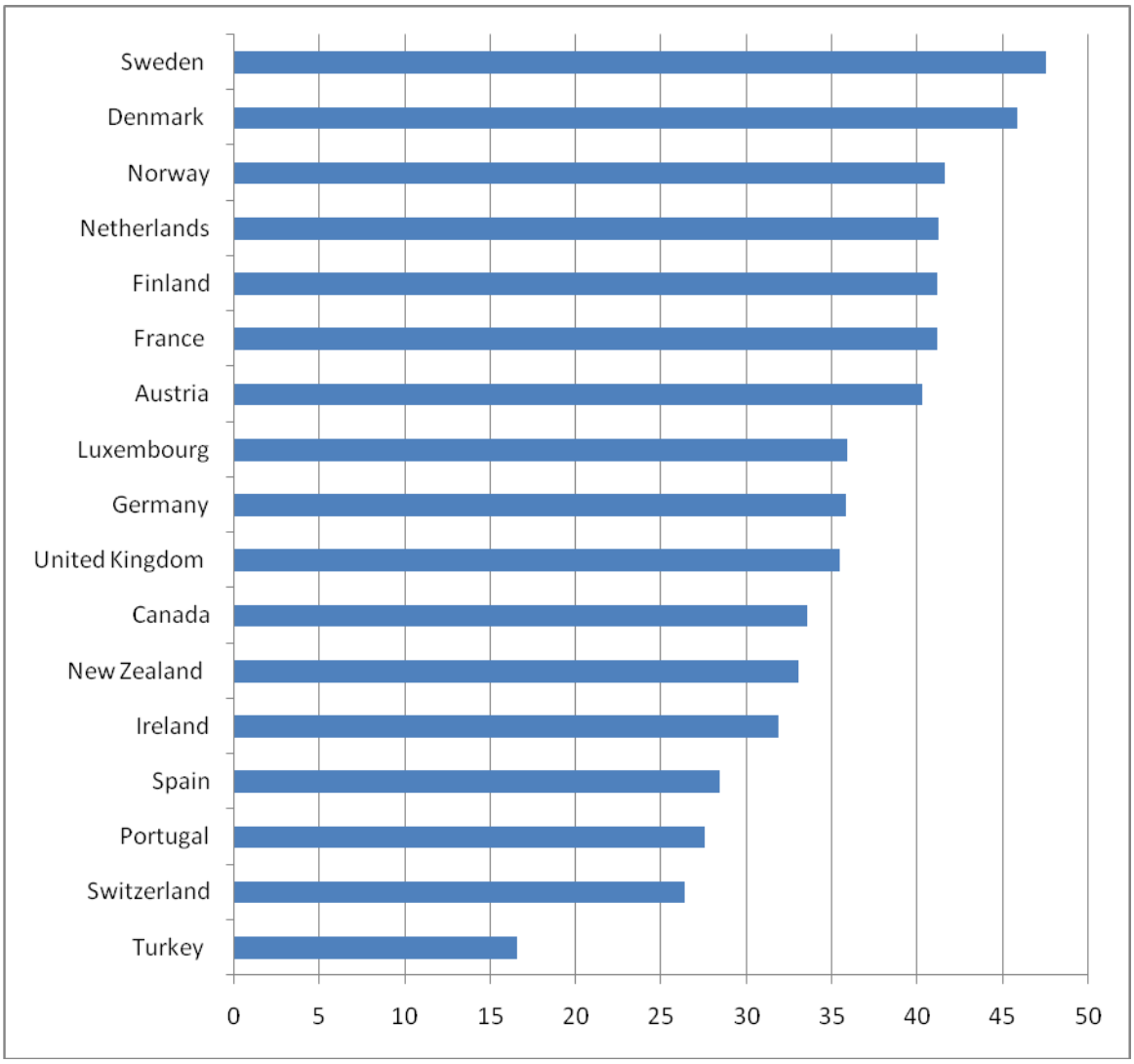

Figure 1.2: Tax average for 17 OECD countries, 1971- 2007.
Sources: OECD Factbook 2009.

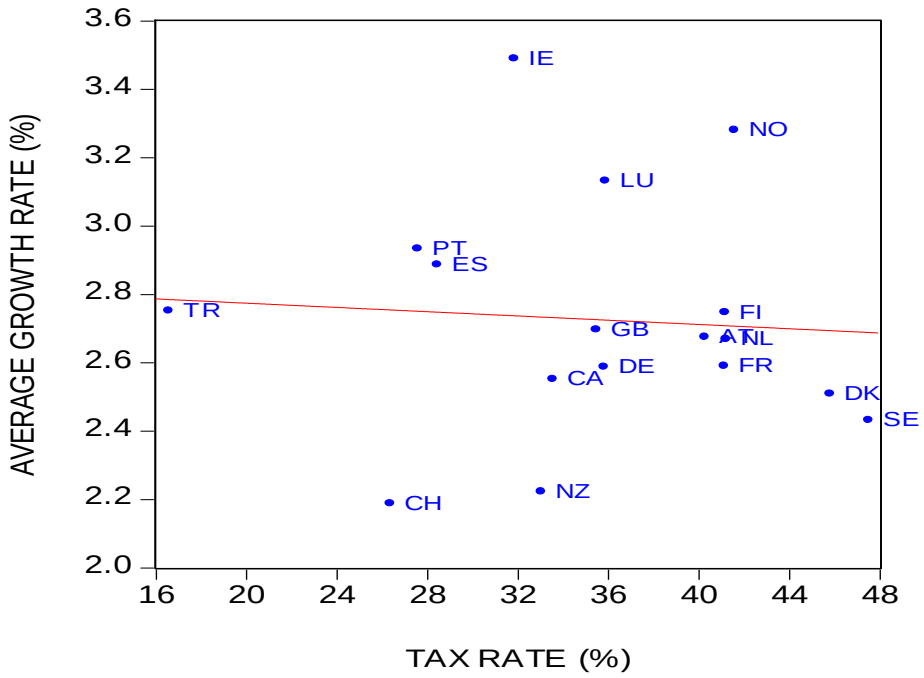

Figure 1.3: Tax rate and Growth Rate for 17 OECD countries from 1971 to 2007

Table 1.1: Tax rate and Growth Rate for 17 OECD countries from 1971 to 2007

Country	Average Tax Rate (%)	Average Growth rate (%)
Lower Tax bracket		
Turkey	**16.5649**	**2.7519**
Switzerland	26.3540	2.1884
Portugal	27.5621	2.9337
Spain	28.4351	2.8868
Average Tax Bracket		
Ireland	**31.8432**	**3.4897**
New Zealand	33.0378	2.2233
Canada	33.5541	2.5521
United Kingdom	35.4595	2.6964
Germany	35.8162	2.5874
Luxembourg	35.8730	3.1324
Higher Tax Bracket		
Austria	40.2676	2.6758

France	41.1243	2.5907
Finland	41.1568	2.7471
Netherlands	41.1946	2.6692
Norway	**41.5676**	**3.2811**
Denmark	45.8027	2.5094
Sweden	**47.5135**	**2.4319**

1.2 PROBLEM STATEMENT

Although Figure 1.1 to Figure 1.3 generally point to negative relationship between tax and growth, the observation are not rigorous. There are at least three problems. Firstly, it didn't consider the way tax revenue is spent. Higher taxes will lead to an increase of expenditure on public goods, which is government collect money from the citizens to finance program and improvement in infrastructure such as improving public facilities, public education, and health-care system. Besides, tax revenue also provides public welfare through capitalism point of view, for instance the enforcement of law, expenditure on war, and protection of property. Furthermore, increase in government services will benefit the public especially to lower income groups and higher the economic growth as well. Redistribution of tax revenue transfers the wealth from the rich to those poor income groups. Hence the poverty gap will become smaller and thus promote the long run economic growth. Barro (1990) and Glomm and Ravikumar (1994) claims that if all the taxes revenues used to fund public goods and services will enhance private returns and thus sustained the economic growth. Furthermore, Turnovksy and Fisher (1995) contributed that if governments allocate all the tax revenues to utility augmenting services and to infrastructure structure investment boost the long run growth of economy.

Secondly, tax rate is normalized by GDP. Higher growth rate, which causes GDP tend to be larger, will lead to lower tax rate. In the previous researches, both GDP and tax rate are normally considered as the main component to determine the economic growth. However, in order to obtain the net effect of taxes on the economic growth, we should ignore the business

cycle effect so that the tax effect is not underestimated. This is associated with the third problem that is endogeneity problem has not been taken into account by those researchers in the previous studies. It is important for us to understand that not only tax rate will affect the growth rate, but it might also be in the other way round where the growth rate will affect the tax rate as well. Higher growth rate indicates that nations' income per capita has improved. So, they will fall into a higher income tax bracket, paying higher tax to the government. Since government receives higher tax payment, it will increase government tax revenue.

In a nutshell, combination of these several evidences leads us to come across the query as whether the impact of taxation on economic growth is jointly determined and inconsistent among the countries with different level of income.

1.3 RESEARCH OBJECTIVES

1.3.1 GENERAL OBJECTIVES

In our research, we would like to examine how taxation will affect the long run economic growth in the OECD countries by using Sweden as the focal point to compare with the other 16 OECD countries from 1971 to 2007.

1.3.2 SPECIFIC OBJECTIVES

Specifically, we would like to:

1. Identify the impact of the taxation on the long run economic growth in Sweden from 1971 to 2007 along with 16 OECD countries.
2. Find out will the relationship between tax and growth will change when the counterpart of tax revenue that is government spending, is taken into account.
3. Take stock of the endogeneity problem that is neglected by most of the researchers. There are endogenous effects between taxes and economic growth.

4. Access the different effect of different component tax, i.e. corporate tax, goods and services tax, import tax, individual income tax and tax on property on economic growth.
5. Evaluate whether tax has permanent effect or temporary effect on growth.

1.4 RESEARCH QUESTIONS

In corresponding to the research objectives, this research attempts to address the following questions:

1. Why the changes in the economic growth are not consistent with the changes in taxation in Sweden and the other 16 OECD countries?
2. How consideration of government spending could have affected the effect of tax on economic growth?
3. Is the existence of endogeneity problem significant?
4. Can different type of taxes have different effects on economic growth?
5. Does tax have permanent effect on growth?

1.5 SIGNIFICANCE OF STUDY

This research would be able to expose deeper understanding on the relationship between tax policy and economic growth rate. Tax rates will always negatively affect the economic growth regardless the tax bracket of those OECD countries. However, different taxes present different effect on economic growth to those OECD countries. So, government policies play an important role to determine the economic growth. It would be a guide for them to decide the best way to use the tax revenue in a proper way to strengthen the economic growth. Through this research, the empirical results show that tax rates do affect the economic growth permanently when the government imposes higher tax rates to the nation.

1.6 CHAPTER LAYOUT

The remaining section of this research proceeds as follow. Section 2 is literature review of existing studies impact of taxation on economic growth, component taxes on the economic growth and government redistributed the tax revenue on economic growth. Section 3 is present theoretical framework, econometric methodologies and model. Our based line study is focusing on taxation and economic growth for 17 OECD countries. On top of that, we also will randomly choose three countries for each level of tax bracket to study the impact of component taxes and economic growth. Not only that, in Section 3, we also choose one country for each level of tax bracket to examine the dynamic changes of the fiscal variables on economic growth through impulse responses. Following section reports data analysis. Final section contains discussion, conclusion and implications.

1.7 CONSLUSION

In short, this research will enlighten the readers on the impact of taxation on economic growth which was and still is a hot issue among researches and economist. In addition, this research would further explore the impact of which component of taxes has the most significant effect on the economic growth in 17 OECD countries. To be more specific, this paper will examine the role of government in the usage of tax revenues to promote the growth in the long run.

CHAPTER 2: LITERATURE REVIEW

2.0 INTRODUCTION

For the past decades, the issue of taxation and economic growth has brought about quite attention among researchers. The debate about the impact of taxation on economic growth has remained uncertain. This research has been carried out to re-examine the potential effects of taxation on the economic growth. In section 2.1, a literature review about the significance of taxation on economic growth in past studies done will be carried out. Section 2.2 will be conducted on the basis impact of component of tax on the economic growth. Section 2.3 will be the role of government in the usage of the tax revenues to promote the growth.

2.1 TAXATION AND ECONOMIC GROWTH

In order to support the motive of this research, we did a literature review on some articles written in respect to the effect of taxation on economic growth. According to most of the articles, taxation does have negative effect on economic growth. Engen and Skinner (1996) show that taxation had negative effect on the economic growth through Solow Growth Model. Tax policy affects output growth involves tax distortion on the efficient allocation of the factors of production across sectors. For example, in the absent of taxes, capital will be distributed between the two sectors (corporate and non corporate) so that the marginal return to capital among the sectors is equal. If instead, there is a tax on the corporate sector, the after tax marginal productivity of capital in the corporate sector falls when the after tax rate of return to capital in two sectors is equalized. A greater share of capital is allocated to the non-taxed sector as computed to the situation with no taxes. For instance, large capacity of underground activities influences the total tax revenue of government as lower or even no taxes are charge by the

government on those sectors. So, government spending reduces and this was indirectly slow down the economic growth. Folstar and Henneksan (2001), as well by using the Solow Growth Model, state that taxation has negative effect on the economic growth in both OECD and non OECD countries.

Padovano and Galli (2002) and Mullen and Williams (1994) use the marginal tax rate as the best measure impact of tax on economic growth. Using 25 industrialized countries from 1970 to 1998, Padovano and Galli (2002) exemplified that there are negative impact of marginal tax rates and tax progressivity on economic growth. Conversely, average taxation shows that there is no effect on output growth because it is highly correlation with average fiscal spending. They stated that every 10% increase in marginal tax rates or tax progressivity will reduces the annual rate of economic growth by 0.23%.

In addition, Poulson and Kaplan (2008) had supported the idea Padovano and Galli (2002) that uses the marginal tax rates to examine the impact of taxes on economic growth. Prior to that, they still examined the relationship between tax and the economic growth, they have stress on three empirical issues. Firstly, convergence in growth rates across the states which imply that there is a negative relationship between growth rates and the initial level of income per capita. When examine the relationship between taxes and economic growth, analysts would have to control for the initial income to isolate convergence and tax effects on the state growth rates. Secondly, regional factors must also take into consideration. These regional differences may independently affect the growth patterns in individual states, apart from their initial level of income per capita. Finally, marginal tax rates will always be the most suitable factor to examine the relationship between taxation and economic growth. Marginal tax rates able to measure how much individual paid on the last dollar earned from the working and investing and use to measure the additional income of the nations. They argue that many researchers often use average tax rates to make justification about the effect of tax on economic growth; it is an incorrect demonstration whereby they did not take into account the behavioral changes in individuals. After consideration, they estimated over the period from 1963 to 2004 by using the aggregate U.S. time series data, and find out that higher marginal tax rates had a negative impact

on the economic growth in the states. The negative coefficient on the marginal tax rate is -0.374. This value is larger than other researchers' results and accounts for a greater share of economic growth than those found in other studies because there are longer times period covers in this study.

Equivalently, Avila and Strauch (2008) concluded that taxation will negatively affect the economy growth. According to endogenous growth theory, taxation will affect investment decision and hence in turns of higher growth. When government imposed higher tax rate, it will reduce the private investment and worsen the economic growth. They have come across some limitations before they conclude their paper. Firstly, panel unit root test that apply in this analysis fail to allow the structural breaks which may bias the results towards the non-rejection of the joint non-stationary null. However, this can be done by using the cointegration analysis. Secondly, since the time horizon is limited, it is difficult to test whether the growth impact estimated is the results of a continuum of level shifts along the transitional path as advocated by the endogenous growth theory. Lastly, the researcher uses average tax rates as a measurement of growth rates although marginal tax rates is more applicable than average tax rates as suggested in the endogenous growth model. Thus, it will bias the results of the study.

On the other point of view, Gilbert (1942) shows that taxation leads to economic stability of a country. An appropriate tax can either help the country to recover from recession faster or restrict the expansion to limits. Beyond that, it can also control consumer spending and saving which is one of the key factor to affect the economy. Therefore, higher tax rates do not necessarily lower the economy growth of the economy. Shimizutani (2006) used monthly data on worker's households in the Family Income and Expenditure Survey (FIES) to identify the impact of the tax cut on economic growth. Researcher found that tax cut does not promote long run economic growth because households anticipate that there is a tax cut by the government. Thus, they did not respond to those tax cut and spent the benefit generated by the tax cut on services and non-durables goods.

Song (2002) had found out that higher tax rate can bring the long run economic growth. He builds up an overlapping generation's model of endogenous model with the inclusion of the human capital accumulation into the Blanchard overlapping generation's model. What is more that, he did not argue that higher tax rate will indeed stimulate the long run growth but he stressed on the length of time horizon and elasticity of factor substitutions should take into account seriously along with other variable. Higher tax rate will cut down the after-tax interest rate and raise the shares of human wealth at the same time. If the factor substitution is highly elastic and time horizon is short, higher rate of taxation will then increase the share of human capital wealth and bring the growth in the long run. Progressive tax generally bring the meaning that tax rate increases as the taxable base amount increases which will faster the economic growth. This can be shown by Weller (2007). Researcher found that higher progressive tax will be more equitable in the income distribution, higher revenues and less volatility. Through this mechanism, it can boost the economic growth.

However, the taxation affect towards economic growth might also be ambiguous. Kneller, Bleaney and Gemmell (1999), using panel of 22 OECD countries, declared that endogenous growth model is derived by classifying elements of government budget into four categories: distortion or non distortion taxation and productive or non productive explanation. The result achieved shows that non distortion taxation does not affect saving or investment decision because of the assumption nature of the preference function and hence has no effect on the rate of growth. Meanwhile, distortion taxation will affect the investment decision of agent, creating tax wages and hence destroying the steady-state rate of growth.

Smith (1996) incorporates the uncertainty to examine the impact of taxation on economic growth and found that it is ambiguous. Purpose of introducing the uncertainty in between taxes and growth is to capture the effect of tax policies that generally change the riskiness of disposable income. An increase tax rate will reduces the mean and variance of the rate of return of investment and reduce the incentive to save, hence growth will be falling just same as the model that without include any uncertainty. However, if the model comes with uncertainty, the results is generally needs to depend on the consumers. Economic growth will be reduced through

the saving if the consumers do not like to substitute consumption over time. On the other hand, if the consumers like to substitute consumption over time, then saving will increase as the tax increase. Hence, the rise in economic growth is certainty.

2.2 COMPONENT TAXES AND ECONOMIC GROWTH

2.2.1 CORPORATE TAX

Corporate tax or company tax refers to a tax charge on the entity level in a particular jurisdiction. The tax is generally imposed on net taxable income. There is some empirical evidence shown that corporate tax has positive and negative effect on the economic growth. On one hand, Tosun and Abizadeh (2005), Gorber and Borns (1997) and Peretto (2007) argue that the impact of corporate tax on economic growth is positive. Except from that, Lee and Gordan (2005), Skinner (1988), Engen and Skinner (1996), Ihori (1997), Lin and Russo (1999) and Yakita (2003), show that higher corporate tax will reduce the economic growth.

At first, Tosun and Abizadeh (2005) found out that corporate taxes show positive sign without significantly change the economic growth in OECD countries. This has come to the same result as Gorber and Borns (1997). They used GNP, saving and investment as the economy indicators. The increase of these taxes will leads to the increase in growth because tax payers will invest in the business which reduce the current income and thereby delays the payment of tax stability. Besides, Peretto (2007), explain the role of taxation by using very tractable model which know as Schumpeterian growth model. This model enables the corporation to think about distortionary taxes, in particular taxes on corporate activity. Surprisingly, researcher found that increase in dividend tax can improve the economy growth and welfare surprising. The given reason is that taxation of dividends leads the financial market to reallocate resources from the investment activity with less growth opportunity to the investment activity with high growth opportunity in order to ensure that the rate of return delivered by firms keeps matching the consumer's reservation rate of return on savings.

Specifically, in order to match his reservation after tax rate of return, the dividend income tax requires firms to raise the pre-tax dividend or the after tax capital gain components of the return that they deliver to stockholder. This implies that firms can raise the growth rate of future earnings by investing more in quality growth.

On the contrary, Lee and Gordan (2005), using the cross country data from 1970 to1997, found that various measurement of the personal tax rate is not significantly associated with the economy growth. However, they found that corporate tax rate has a negative and significant effect on economy growth, even after controlling other determinants of economic growth and it will speculatively affects the entrepreneur activity. Consistently, this provides the evidence that low corporate tax rate leads to fall in personal income tax revenue in spite of higher growth rate. People will choose to become an entrepreneur rather than employee because income is subject to the personal tax and become an entrepreneur can generate corporate tax revenue and perhaps personal tax loses. Coefficient of the corporate tax rate remains highly significant and does not vary much after other tax variable included in the model. Decrease in corporate tax by 10 percentage point, annual growth rate will increase around 1.1 percentage point. Same conclusion done by Skinner (1988), examined the impact of corporate tax on the economic growth by using 31 Africa countries and shows that corporate tax will negatively affect the output growth.

Engen and Skinner (1996) eloquently argued that corporate taxes might discourage research and development on the high taxes business which may have an effect on overall growth in technological development throughout the state. Moreover, Lin and Russo (1999), they further illustrated how the taxation of different source capital income affect long run growth through input demands, stock market P/E ratio and saving by incorporate the Romer's R&D-based endogenous growth model. Researchers concluded that there is a relationship between corporate tax and R&D tax credit which creates a subsidy that encourages R&D. Based on this tax liability, the entire research firm can claim the tax benefits for R&D when corporate tax rate is 35%. However, firms will generally lose the R&D tax credit if the corporate tax is eliminated. Firm can loss the tax credit and decrease the after-tax marginal profits that will discourage R&D and economic growth in response to the decrease in corporate tax. Hence, tax cuts should be

focus on those non-innovative firms in order to increase the economic growth. Lin and Russo's research have come with several conclusions. Firstly, the steady growth rate will increase by 0.63 percentage point when all the capital income taxes are eliminated. Secondly, when the corporate tax is eliminated for those non-innovative firms, the steady state growth rate will increase by 0.47 percentage point. Lastly, when corporate tax charge on the innovative firms is eliminated, 0.20 percentage point of the steady state rate will be reduced.

Interest income taxation is also one type of the corporate income taxes. For instance, Yakita (2003) using the overlapping generation model and assume that under a closed economy which populated by overlapping generation of two periods lived individual without bequest motive. Researcher found that interest income taxation not necessary will boost the economic growth. This is due to the reason that tax transferred was redistributed from the old generation with financial assets to the young without financial assets. So, lower after-tax interest rate will increase the present value of the second period wage income of the young generation. Besides, incentive to save will reduce when human capital transfer from the old generation to young generation is sufficiently large. With a small "wedge" effect of taxation, time of study will reduce through the arbitrage between the financial assets and human capital, and thus worsen the economic growth.

2.2.2 INCOME TAX

Income tax normally is the tax that levied on the total income of individual. Chang, Tsai and Lai (1999), Gorber and Borns (1997) and Yakita (2003) shows that there are taxes have positive effect on economic growth. According to Chang, Tsai and Lai (1999), they set up endogenous time preference into the neoclassical growth framework. They clarify that if the time preference is endogenously determined, a rise in the income tax could lead to an increase in the steady-state output. Meanwhile, Gorber and Borns (1997) identify that higher income taxes will cause the taxpayers to invest in business which reduces the current income and thereby delay the

payment of tax liabilities. So, it will help to improve the economic growth. In addition, Yakita (2003) also found that wages tax will generally promote the economic growth. When taxes is transferred from older and richer generation to those younger and poorer, will generally induce the incentive of young generation to accumulate the financial assets. So, this will reduce the interest rate, stimulate the incentives to learn and increase growth rate without any distortions.

However, some researchers found out that income tax does have negative effect on economic growth. (Sonedda, 2009; Engen and Skinner, 1996; Poulson and Kaplan,2008; Tosun and Abizadeh, 2005; Skinner, 1988; Holcombe and Lacombe, 2004; Mino, 1989; and Chin and Lai, 2009). Based on Tosun and Abizadeh (2005), Holcombe and Lacombe (2004) and Skinner (1988), taxes have negative sign and statistically significance to change the economic growth. Taxes will create the disincentive on the taxed activity, as well as the income tax. Income tax will create the disincentive on those earning taxable income, thus reduce the growth rate. Engen and Skinner (1996) stated that high income taxes might discourage people from working, pursuing them to reduce the working hours or early retirement. This will indirectly dampen the economy growth of a country. Poulson and Kaplan (2008) show that imposed an income tax to generate a given level of revenue experienced lower rates of economic growth relative to jurisdictions that relied on the alternative taxes to generate the same revenue. Sonedda (2009) had encountered negative relationship between labor income taxes and economic output. He used ECM (Error Correction Method) to separate the long run relationship from the short run dynamics. The 15 OECD countries in this research did not come across any significant short run effect. However, there is a negative and significant long run relationship between the change in labor income taxes and economic output statistically robust. This can conclude that income tax will affect the economic growth permanently.

Additional, Mino (1989) used the prefect-foresight optimizing model to test the impact of income taxation on the long run growth. Further, this researcher assumed that steady-state rate of economic growth is generally endogenous and determined the technical progress activities of private agents. Higher income tax will discourage the technical progress and lower the economic growth rate in the long run. This is because higher income taxation will lower the capital

intensity in the goods sector which will cause the increase in marginal product of capital of the goods sector. However, negative effect of the higher income taxation cannot be offset by the increase in the marginal product. In due course, the steady state of the long run growth will be depressed.

Chin and Lai (2009) set up a two-sector endogenous growth model with new generation compared to the increase in the labor income tax rate, the total tax revenues and lump-sum transfers decreases and equally distributed among generations, and concluded that tax rate on the labor income will have a negative impact on the economic growth. A higher tax rates causes a reduction in the accumulation of human capital and moreover leads to an increase in the human capital value. In addition, as the reduction of the accumulation of human capital has a greater for old generation. Older generation respond positively towards the rise in the income taxation as they have larger accumulation of stock of assets. They increase their consumption due to the increase in the total wealth, while the young generation will reduce their consumption caused by a fall in the total wealth. The consumption of the older generation is greater than the reduction of consumption in the young generation, leading to an adverse effect on the economic growth rate.

On the other hand, the empirical results from Chen (2007) had shown that there is ambiguous relationship between income tax and economic growth. He uses AK type growth models with factor income taxes, public capital stock and labor-leisure tradeoffs to do the analysis. On one hand, a higher labor income tax will directly reduce the labor supply, and lower the marginal productivity of capital, hence the economic growth. On the other hand, the higher the labor income tax will have an indirectly effect on the economic growth. A higher labor income tax will increase the labor supply through the higher shadow price of capital and thus lower the consumption. Furthermore, it is an indirect negative effects on labor demand via the lower private capital, and also indirect positive effect through the higher public infrastructure. Besides, he also shows that there is negative net direct effect if the inter-temporal elasticity of substitution of labor supply is small enough, and thus a higher labor income tax rates will always reduce the economic growth in the long run.

Baier and Glomm (2001) defined that the relationship between the income tax and the economic growth need to depend on the elasticity of substitution between physical capital and public capital. Higher taxes will boost the growth rate provided that the private capital and public capital are less substitutable, vice versa.

2.2.3 CAPITAL INCOME TAX

A capital income tax is a tax charged on capital income, the profit that gain on the sale of a non-inventory asset that was purchased at a lower price and sell at the higher price. The most common capital gains are realized from the sale of stocks and bonds. Capital income tax can bring harm and also benefit to the economy growth.

Uhlig and Yanagawa (1996) and Caballe (1998) concluded that increasingly the capital income tax lead to faster growth in the economy. Researcher assumed that the government expenditures are fixed proportion of total GNP, in two periods overlapping generation model with endogenous growth, higher capital income tax rate can faster growth. In this model, higher capital income tax generally means that there is lower labor income tax which leaves the presently young with more net income out to save. Higher saving always can promote the growth, but provided that saving need to be sufficiently interest inelastic.

Moreover, there is also an argument for capital income tax done by Liu (1994). Liu found out that capital income taxes does not necessary reduce the long term economic growth. He stressed that human capital accumulation is the force that driving the growth and he used two capital models in these studies. The results obtained explained the higher tax on the income from physical capital can generally boost the economic growth due to the increase of the attractiveness of investing in human capital accumulation and generates the positive externalities. Besides, through analyzing the effects of intergenerational transfer on growth, he found that transfer to young will promote the growth rather transfer to old.

In addition, Hek (2006) stated that a tax on the capital income will have a positive impact on the long run economic growth. Taxation on the capital income will encourages the labor spent more time on production and human capital accumulation. In their perception, only the capital will be taxed while the human capital will not be taxed. Therefore, improvement in the productivity will positively affect long run growth.

Furthermore, Chin and Lai (2009) applied the Blanchard-type overlapping generations to examine the relationship between the physical capital taxation and the growth and wealth. When there is an increase in the physical capital taxation, the value of the physical capital value of the older generations will be greater than those younger generations as older generations will accumulate higher stocks of assets. The total wealth of the old generations will reduce and increase the wealth of the young generations. Other than that, with the presence of intergenerational channel, the birth rate of a country is positively correlated with physical capital taxation then leads to economic growth.

Conversely, Ho and Wang (2007), higher capital income tax will reduce the economic growth with overlapping generation in endogenous growth model. They found that capital taxation does not promote growth constantly because higher capital income tax will worsen the adverse selection problem in credit financing relationship, causing a greater deadweight loss due to screening. As a result, capital income tax will generate the adverse on the capital accumulation and growth effect due to a rising inefficiently in the credit market,

Chen (2007) applying AK growth model, document that higher capital tax rate will always reduce the economic growth in the short run, and the long run growth effect is ambiguous and will remain ambiguous even if the level of tax rate is larger than the degree of government externality. When the capital income tax rate raise from 28% to 35% and then to 40%, economic growth will generally reduce by 0.334 and then follow by 0.59 percentage points respectively and the welfare will lower by 20.132% and 35.566%. Likewise, Lucas (1990) and Rebelo (1990) found that higher capital income tax will cause a fall in the private investment return, which in turn implies a decrease in the capital accumulation and thus diminish economic growth.

In addition, Ihori (1997) generally believed that increased taxes on capital income reduce economic growth. He clarified that the effect on capital accumulation is not necessarily the same as the effect on the rate of economic growth. Add on with this point, models of endogenous growth must distinguish transfer capital from life-cycle capital. This paper applies into an endogenous growth model with an altruistic bequest motive three types of taxes on capital which is a tax on life-cycle physical capital income, a tax on human capital income, and a tax on transfer physical capital or bequests. The analytical results depend on whether bequests are operative or not. Firstly, if bequests are not operative and the externality effect of human capital is small, the laissez-faire growth rate will be high. An increased tax on human capital income may raise the rate of economic growth, while a tax increase on life-cycle physical capital income such as an interest income tax will reduce the growth rate. If bequests are operative, the laissez-faire growth rate will be low. A tax on life-cycle capital income will not affect the growth rate, while an increase in taxes on transfer capital income(i.e. a wage income tax and a bequest tax generally will reduce the growth rate.)

2.2.4 OTHER COMPONENT TAX (CONSUMPTION TAX, EXPORT AND IMPORT TAX, PROPERTY TAX AND ETC.)

There are also some arguments on the effect of consumption tax on the economic growth. Milesi-Ferriti and Roubini (1998) shows that consumption tax does have negative effect on the economic growth because it involves one fundamental distortion. Higher consumption tax will affect the total time spent in leisure time, labor and education activities and thus affect the economic growth. However, it is very difficult to classify statistically significant effects of taxes on economic growth after controlling other determinants of long-run growth. So, it makes researcher difficult to find an appropriate data in doing the analysis. Chernick and Reschovsky (2000) clarify that the consumption taxes can be regressive. Consumption tax can affect the average value of lifetime income and spending. Tax is a burden to the low income people. It will increase the gap between low income and high income people. Since rich people will become

richer and poor people become poorer, it will affect the overall growth rates. However, Zeng and Zhang (2002) using the non-scale model in the analysis of the impact of taxation on economic growth. They use non scale model because the innovation generally can be view as long run main contributor. They show that consumption tax will not influence the long run growth although it will affect the labor-leisure choice and the size of the effective labor force. Tosun and Abizadeh (2005) also stated that goods and services tax also obtains the same result with consumption tax and carries a negative sign and statistically significance to change the economic growth. Since government needs to increase goods and services tax in order to cover the decline in other taxes, consumers will then reduce their consumption in respond to the higher goods and services tax and thus decrease the economic growth.

On the other hand, Wang and Yip (1992), examine the various tax policies on the economic growth on the basis of endogenous growth theory. They found out that higher consumption tax can offset the negative effect of factor taxation and bring the positive impact on the economic growth. A higher consumption tax creates the incentive to accumulate more internal funds, which generally through the private savings, and boosts the economic growth in the earlier stage of economic development with an efficient government sector. Value added tax (VAT) is one type of the consumption taxes. A higher VAT can promote the economic growth due to its higher tax revenues, more equitable income redistribution and less volatility (Weller 2007).

Property tax also one of the factors that can affect economic growth. As what mention by Tosun and Abizadeh (2005), property tax is the only one that reveals several interesting result. The coefficient of growth variables shows a positive sign and statistically significant result. Although property tax increase together with economic growth, but it is the possibility that these taxes will cause burden to the elderly. It is an interesting finding that the government seems to be exploiting those property owners because most of the wealth is usually owned by the older cohort of the population. Moreover, higher property tax will create excess demand for property that will shoot up property prices and increase tax revenues of the country. On the contrary, Yamarik (2000) that pooled the 48 contiguous U.S. states into a single observation found that

there is a significantly negative relationship between property tax and economic growth. Higher property tax will lower the return on non-reproducible land and reproducible physical capital which will reduce growth in investment, productivity and output.

Government often imposes import and export tax without taking the impact of those taxes into consideration. Skinner (1988) had done the research on import and export taxes and finds out that it will affect the economic growth negatively. By using 31 Africa countries, Skinner found that import and export tax will reduce the output growth through investment. A higher export tax will generally reduce the net-return to large scale investment necessary in the export-oriented industries. By holding the tax revenue constant, an increase of 10 percentage point in the export tax will generally leads to a fall in the annual growth rate by 0.36 percentage point. There are limitations during the study such as accurate construction of the data and all studies explanation how the government expenditure and tax policy "explain" the GDP growth rate suffer from a potential endogenity problem, since government policy will be strongly affected by economy condition.

2.3 GOVERNMENT REDISTRIBUTION AND ECONOMIC GROWTH

Relatively speaking, government always plays an important role in the economic growth. Higher tax imposed not necessary will bring harm to the economic if the tax revenues use by the government in a proper way. For example, if the government uses all the tax revenues to finance the public such as infrastructure, public education, public health care, highway and etc, this will benefit the society rather than harm it, (eg. Barro (1990), Glomm and Ravikumar (1994) and Turnovksy and Fisher (1995))

Earlier work done by Helms (1985) stated that if the tax revenues use in a proper way it can boost the economy growth instead of harm. In this study, researcher utilizes a time series

from 1965 to 1979 through the cross sectional data of 48 states. By using this richness of data, it is able to capture the unexplained differences between states which could be expected to obtain unbiased result. In addition, by using a large sample, it allows necessary statistical power to disentangle the separate effects of different categories of taxes, public expenses and transfer payments. Helms using the pooled time series and cross sectional data, and find out that state and local tax increase significantly retard economic growth when the revenue is use for the transfer payment. However, when the tax revenues are use to improve the public services such as infrastructure highways and education, the negative influence may be outweighed by the value of the services provided.

In addition, Song (2002) assumes that if all tax revenues spent by the government; the combined effect of dictionary taxation and resources consumed by the government can thus improve the economy. If tax revenues are rebated to household hands, it shows that higher tax rate on income can increase the steady growth rate even the elasticity of factor substitution is less than unity.

Moreover, by using the data of 23 developed countries from 1960 to 2007, Blankenau, Simpson and Tomljanovich (2007), concluded that taxation can alter positive growth effects from increased public education expenditures. They run the regression with and without tax by using the OLS (Ordinary Least Square) to compare the public education expenditures. Public education expenditures do not promote growth when taxation is not taken into account. When they run the regression with taxes, the public education expenditures are positively affect the growth. One percentage point increase in the public education expenditures will increase the economic growth by 0.201 percentage point. Furthermore, as one percentage point increase in the taxes, economic growth in a country will reduce permanently by 0.099 percentage point. Blankenau et. al claims that method of finance should be taken into consideration seriously in order to obtain significant results for public education expenses.

Baier and Glomm (2001) found out that when the government collects revenue from taxes and use to provide public infrastructure and transfer the revenue from taxes to the

household. An increasing function of the percent of government revenues that go to the infrastructure can achieve balance growth rate. When researchers apply the one-sector model with the infrastructure investment, the results indicates that lower tax rates will cause under-investment infrastructure and slows down the growth. As lower tax will cause the government revenue become lower, the accumulation for the public capital will reduce the marginal product of human and physical capital.

2.4 CONSLUSION

After reviewing of those entire journals, all these hard evidences overwhelmingly point to fact that taxes will bring different impact on the economic growth. Hence, we can make our prior conclusion that different types of taxes can leads to different impact on the economic growth which can be either significance or insignificance. On the other hand, the way government spends the revenue could offset, outweigh or enhance the negative effect of tax on the economic growth. In Chapter 3, we are going to use a model to derive testable hypothesis which bring in government spending and cyclical-adjusted tax rate to overcome the problem of using average tax rate as mention in Padavano and Galli (2002). In our further research, we would like to give more concern on the effect of corporate tax, goods and service tax, import tax, individual tax and tax on property in the determination of economic growth.

CHAPTER 3: METHODOLOGY

3.0 INTRODUCTION

This chapter introduces the theoretical and empirical framework to discuss the role of the taxation in the economic growth. Under the theoretical framework, we generally deal with the endogenous growth model and add in the perspective of the household, firm and government into our study to find out that whether taxation has impact on the long run economic growth rate. Furthermore, this chapter also provides the empirical framework and deal with different econometric method that consists of unit root test, dynamic ordinary least square, vector autogressive (VAR) model to study the relationship between taxes, the usage of the tax revenues by government and economic growth

3.1 THEORETICAL FRAMEWORK: ENDOGENOUS GROWTH MODEL WITH TAX AND GOVERNMENT SPENDING

Solow growth model as the earliest growth model is useful to examine the relationship between nation's long-run standard of living and growth. According to Solow growth model, productivity growth is the only source for the long run growth in terms of output per capita. However, this model only considers the productivity growth as an exogenous factor rather than explaining how it is determined. Due to this limitation, people had developed other growth model known as endogenous growth model, which provide the explanation about how productivity growth can be endogenous to change its policy within the model. Besides, an increase in innovation, public goods and physical and human capital accumulation will faster the steady growth rates.

In this study, AK model will be used as our theoretical framework. AK model is the first generation of endogenous growth model which developed by Sergio Rebelo (1991).

Suppose that production function output, Y evolves according to Cobb-Douglas technology

$$y = Ak_t^{\alpha} L_t^{1-\alpha} \quad (1)$$

Where k denotes capital labor ratio, A denotes the labor productivity and L denotes the labors.

By rearranging it,

$$y = A\left(\frac{K_t}{L_t}\right)^{\alpha} L_t$$

$$\frac{Y_t}{L_t} = A\left(\frac{K_t}{L_t}\right)^{\alpha}$$

$$y_t = Ak_t^{\alpha}$$

Hence, for the special case when $\alpha = 1$, the production function doesn't show the decreasing return to scare in the capital stock.

$$y = Ak_t \quad (2)$$

where A denotes the labor productivity, k denotes the capital labor ratio and y is output per labor

Equation (2) is known as AK model as it shows that labor productivity and capital stock will contribute to higher production.

As what we know that firm, government and household playing an important role in affecting the economic growth, so in this part, we will develop a budget function for firm, government and household to study the impact of tax on economic growth.

3.1.1 HOUSEHOLD'S UTILITY MAXIMIZATION

From the AK model, household budget constraints will be:

For the optimization problem, household always want to maximize their utility with the function of

$$U = U(C) = logC_t$$

which subject to household budget constraint,

$$\frac{B_t}{P_t} = (1 + i_{t-1})\frac{B_{t-1}}{P_t} + \pi_t + \Omega_t + (1 + r_t)K_{t-1} - C_t \quad (3)$$

We can write household's utility maximization function in lagrangian form:

$$U(C) + \lambda\left\{(1 + i_{t-1})\frac{B_{t-1}}{P_t} + \pi_t + \Omega_t + (1 + r_t)K_{t-1} - C_t - \frac{B_t}{P_t}\right\} = 0 \quad (4)$$

where λ denotes shadow price.

By differencing the equation (4), the first order conditions are given by

$$U'(C_t) = \lambda_t \quad (5)$$

$$\lambda_t\left(\frac{1}{P_t}\right) + \lambda_{t+1}\left(\frac{1 + i_t}{P_{t+1}}\right) = 0$$

By rearrange it,

$$\lambda_{t+1}\left(\frac{1 + i_{t+1}}{P_{t+1}}\right) = \left(\frac{\lambda_t}{P_t}\right)$$

$$\left(\frac{\lambda_t}{\lambda_{t+1}}\right) = \left(\frac{P_t}{P_{t+1}}\right)(1 + i_t) \quad (6)$$

Substitute (5) into (6), we have

$$\frac{U'(C_t)}{U'(C_{t+1})} = \frac{P_t}{P_{t+1}}(1 + i_t) \quad (7)$$

Equation (7) is known as consumption Euler Condition, which shows how intertemporal consumption allocation is related to real return.

3.1.2 FIRM'S PROFIT MAXIMIZATION

From the AK model, firm budget constraints will be

$$\pi_t = (1 - T_t)Y_t - (r_{k,t} + \delta)K_{t-1} \quad (8)$$

where Π denotes profit, T denotes tax that need to pay, Y denotes the revenues, r denotes cost of capital and δ denotes the depreciation rate

Equation (8) shows the firm budget constraint. In the firm's perspectives, they are always wanted to maximize the profit which is subject to the revenue that can be generating by the sales. At the same time, they need to pay tax for their revenues. So that is the role of the tax in the firm budget. Then, when the time firm sells goods, they get the revenue and need to pay tax and they also need to pay the cost of capital and depreciation for the capital. So the higher of r and δ will lead to decrease of the firm's profit.

For the firm's perspectives, they always want to maximize profits. So that from the equation (8), we can know that firm only able to control the capital but not the taxes which control by the government, labor productivity, depreciation rate and the cost of capital. So in this case, we will difference the capital in the equation (8)

$$\pi_t = (1 - T_t)Y_t - (r_{k,t} + \delta)K_t$$

Since Y is the function of AK which shows by equation (2), therefore, we substitute it into firm's budget, so

$$\pi_t = (1 - T_t)AK_t - (r_{k,t} + \delta)K_t \quad (9)$$

By differencing K_t equation (9) against, we will obtain

$$0 = (1 - T_t)A_t - (r_{k,t} + \delta)$$

By rearranging it,

$$(r_{k,t} + \delta) = (1 - T_t)A_t$$
$$r_{k,t} = (1 - T_t)A_t - \delta$$
$$1 + r_{k,t} = (1 - T_t)A_t + 1 - \delta \quad (10)$$

Equation (10) shows that real return on capital is determined by tax-technological level and depreciate rate.

3.1.3 GOVERNMENT BUDGET

From AK model, government budget constraints will be

$$T_t Y_t + \frac{B_t}{P_t} = (1 + i_{t-1})\frac{B_{t-1}}{P_t} + \Omega_t \quad (11)$$

where T denotes tax that need to pay, Y denotes the revenues, B denotes debt, *i* denotes interest rate and Ω denote the subsidy or the infrastructure that provide by the government.

Equation (11) shows the government budget constraint. Firstly, we divided the government budget constraint into two parts which is the revenues part and spending part. For the revenue part, $T_t Y_t + \frac{B_t}{P_t}$, government revenues is generally come from the tax revenues that collects from the nation and by issuing the newly bonds to the nation. Besides, for spending part, $(1 + i_{t-1})\frac{B_{t-1}}{P_t} + \Omega_t$,they spend on the subsidy that giving to the nation and provide the infrastructure such as highway, public healthcare, public education which shown by Ω and pay the interest rate of the debt that incur in the past which shown by $(1 + i_{t-1})\frac{B_{t-1}}{P_t}$.

By rearrange equation (11) we have,

$$\frac{B_t - B_{t-1}}{P_t} = i_{t-1}\frac{B_{t-1}}{P_t} + \Omega_t - T_t Y_t \quad (12)$$

Equation (12) shows that government budget constraint in terms of debt dynamics.

3.1.4 REVIVING RELATIONSHIP BETWEEN ECONOMIC GROWTH AND FISCAL VARIABLES.

At equilibrium, cost of capital always equal to the interest rates. So $1 + r_{k,t} = 1 + i_t$

So now by combining the equations (7) and (10)

$$\frac{U'(C_t)}{U'(C_{t+1})} = \frac{P_t}{P_{t+1}}[(1 - T_t)A_t + 1 - \delta] \quad (13)$$

P_t is always referring as the price of goods so it can be measured by the inflation rate.

Since

$$\pi_t = \frac{P_{t+1} - P_t}{P_t}$$

$$= \frac{P_{t+1}}{P_t} - 1$$

$$1 + \pi_t = \frac{P_{t+1} - P_t}{P_t}$$

$$\frac{P_t}{P_t + 1} = \frac{1}{1 + \pi_t} \quad (14)$$

where π denotes inflation. So,

$$\frac{U'(C_t)}{U'(C_{t+1})} = \frac{1}{1 + \pi_t}[(1 - T_t)A_t + 1 - \delta] \quad (15)$$

As we employ logarithmic consumption function, $U'(C_t) = \frac{1}{C_t}$. Thus equation (15) can be written as

$$\frac{U'(C_t)}{U'(C_{t+1})} = \frac{1}{1+\pi_t}[(1-T_t)A_t + 1 - \delta]$$

$$\frac{1/C_t}{1/C_{t-1}} = \frac{1}{1+\pi_t}[(1-T_t)A_t + 1 - \delta]$$

$$\frac{C_{t+1}}{C_t} = \frac{1}{1+\pi_t}[(1-T_t)A_t + 1 - \delta] \quad (16)$$

As we know that, consumption always can grow at a rate equal to output in the long run. So, equation (16) is rewritten in terms of real output growth rate:

$$\frac{Y_{t+1}}{Y_t} = \frac{C_{t+1}}{C_t} = 1 + g_{y,t} = \frac{1}{1+\pi_t}[(1-T_t)A_t + 1 - \delta] \quad (17)$$

where g denotes growth rate

According to Rao and Singh (2010) they assume that

$$\mathrm{Y}_t = A_0 e^{GS} K_t^{\alpha} \quad (18)$$

Where 0<α<1 and GS denotes government spending.

Given that $\mathrm{A}_t = A_0 e^{GS}$, logarithmic transformation given us

$$\ln \mathrm{A}_t = In\ A_0 + ln(e^{GS})$$

$$= In\ A_0 + G\mathrm{S} \quad (19)$$

For the sake of simplicity without implications, we assume initial level of productivity $A_0 = 1$ when means $In\ A_0 = 0$

Equation (17) can be finalized at

$$1 + g_{y,t} = \frac{1}{1+\pi_t}[(1 - T_t)GS_t + 1 - \delta] \quad (20)$$

In equation (20) we expect that taxes will negatively affect the economic growth, government spending can leads to a higher growth, and inflation will lower the growth of economy.

3.2 EMPIRICAL FRAMEWORK

Our baseline empirical equation which is derived from equation (20) is given by

$$g_{y,t} = \alpha_0 + \alpha_1 T_t + \alpha_2 GS_t + \alpha_3 \pi_t \quad (22)$$

As conventional macroeconomic theory has generally assumed that increase in taxation will leads to a lower economic growth. When government imposed the higher tax rate, it will reduce the incentives to save thus reduce the economic growth (Avila and Strauch 2008). Besides, we expect that government spending will have a positive impact on the economic growth. As shown by Song (2002), suggested that if all tax revenues spent by the government; the combined effect of dictionary taxation and resources consumed by the government can thus improve the economy.

We have augmented that Padovano and Galli (2002)'s modals to include the inflation in the function above. As we know that inflation potentially influences the correlation between the taxation and output growth due to government may substitute the inflation for taxation as another way to raise the revenue. Besides, inflation also will affect the economic growth directly by increasing the uncertainty and lower the incentives of the individuals to invest. Priori, we generally expect that inflation will have a negative relationship with the economic growth.

Generally speaking, taxes can be divided into many components, and each component may have different impact on the economic growth. So in our study, we have randomly chosen three countries from each category to examine the role of the component taxes in the economic growth.

$$g_{y,t} = \alpha_0 + \alpha_1 T_{i,t} + \alpha_2 \mathrm{GS}_t + \alpha_3 \pi_t \quad (23)$$

Where *i*= COR, GSC, IM, IND, PPOPERTY

COR denotes corporate taxes, GSC denotes good and services taxes, IM denotes import taxes, IND denotes individual income taxes, and PROPERTY denotes property taxes.

3.3 ECONOMETRIC METHODS

In our study, we use time series analysis to study the impact of taxation on economic growth. Unit root tests, dynamic Ordinary Least Square (OLS) and Vector Autoregressive Model (VAR) will be conducted to analyze our model.

Before running dynamic OLS, we always want to make sure that those series must be stationary. Stationary will be very important in time series to avoid spurious regression problem. Argumented Dickey Fuller (ADF) test will be used to detect unit root. Once stationary had been detected, dynamic OLS will be conduct to examine the impact of taxation, government spending and inflation on the economic growth. In our study, we using the VAR to investigate dynamic properties and find out whether taxation has the permanent or temporary effect on economic growth.

3.3.1 AUGUMENTED DICKEY FULLER (ADF) UNIT TOOT TEST

Before we examine the relationship between the variables, we must always ensure that our variables are stationary. This can avoid the spurious regression problem. By examine whether our variables we had perform the ADF test.

The ADF model as seen in the equation (24)

$$\Delta y_t = \alpha_0 + \alpha_1 t + \Upsilon y_{t-1} + \alpha \sum_{i=2}^{p} \Delta y_{t-i+1} + \varepsilon_t \quad (24)$$

Where y_t is our variable which is real GDP growth, taxes, government spending and CPI, Δis the differencing operator, t is the time trend and ε is the white noise residual term with the zero mean

and constant variance. $\alpha_0, \alpha_1, \Upsilon, \alpha_1, \ldots\ldots \alpha_1$ is the set of parameters will be estimated. Δy_t is help to "soak up" any dynamic structure present in the dependent variable, to ensure that ε_t is uncorrelated.

The hypothesis can be written as:

H_0 : Υ =0 (y_t contains the unit root or non stationary)

H_1 : $\Upsilon \neq 0$ (y_t is stationary)

The unit root hypothesis of the Augumented Dickey-Fuller can be rejected if the t-statistics from the test is more negatively than the critical value tabulated. In others words, a unit root exists in the series Y_t, if the null hypothesis of Υ equals zero is not rejected

3.3.2 DYNAMIC ORDINARY LEAST SQUARE

In our study, we would like to introduce dynamic model in which it allows us to use lag variables included dependent. This is because dynamic model is used to capture the characteristics or the behavior of the individuals over time. In this study we did not introduce OLS model, which is known as static model because OLS model just able capture the effect at a single period between the dependent and independent variables. For our research, the relationship between taxation and economic growth will not just influenced by this year but also by the previous year. Since OLS is not applicable so in our study, therefore we will use dynamic model to run our analysis.

Dynamic model can be separated into two models, that is, Autoregressive model which is lag dependent variables and Distributed-Lag model which allows us to lag independent variable. In our study we will emphasis on Autoregressive model.

$$g_{y,t} = \alpha_0 + \alpha_1 g_{t-1} + \alpha_2 T_t + \alpha_3 GS_t + \alpha_4 \pi_t + DUM \quad (25)$$

We expected that taxation will negatively to affect the economic growth, $\alpha_2<0$, government spending positively affect the economic growth, $\alpha_3>0$, and CPI (inflation) negatively affect the economic growth, $\alpha_4<0$. Furthermore, we had added dummy variable in our model in order to take out the effect of the outlier for the corresponding year for the 17 OECD countries.

3.3.3 PERMANENT OR TEMPORARY EFFECT

In this section, we want to find out that whether taxation has permanent effect or temporary effect on economic growth. In our study, we do not apply the cointegration test as the previous researcher to examine whether taxation has permanent effect, but instead, we generally tend to examine the effect through

$$g_{y,t} = \alpha_1 g_{y,t-1} + \alpha_2 GS_t + \alpha_3 INF_t + \sum_{i=0}^{n} \alpha_{4+i} T_{t-i} \quad (26)$$

Relatively speaking, permanent effect also known as steady-state effect. At steady state, we known that $g_{y,t} = g_{y,t-1} = g_{y,}^{ss}$, $T_t = T_{t-1} = T_{t-2} = T^{ss}$

So to find the permanent effect, we can rewrite equation (26) as :

$$g^{ss} = \alpha_1 g^{ss} + \alpha_2 GS_t + \alpha_3 INF_t + \sum_{i=0}^{n} \alpha_{4+i} T_{t-i} \quad (27)$$

Thus, whether tax has permanent or temporary effect on growth can be measured by

$$g_{y,}^{ss} = \left(\frac{\sum_{i=0}^{n} \alpha_{4+i} + T_{t-i}}{1-\alpha_1} \right) T^{ss} \quad (28)$$

If $\left(\frac{\sum_{i=0}^{n} \alpha_{4+i} + T_{t-i}}{1-\alpha_1} \right)$ is close to 0 we can conclude that there is temporary effect on the economic growth, if close to 1, then we say that taxation has the permanent effect on economic growth.

The lag of the properties is based on the general to specific method. Once there found that one of the lag is insignificant it will be drop from the model.

3.3.4 VECTOR AUTOREGRESSIVE MODEL (VAR)

In this section, we want to investigate dynamic properties by using VAR and impulse responses function. VAR models were popularized in econometrics as a natural generalization of univariate autoregressive models. A VAR is a system regression models which there is more than one dependent variable can be consider as a kind of hybrid between the univariate time series models. So in our study the model can be written as

$$g_t = a_{10} + a_{11}g_{t-1} + a_{12}T_{t-1} + a_{13}GS_{t-1} + a_{15}INF_{t-1} + U_t \quad (29)$$

$$T_t = a_{20} + a_{21}g_{t-1} + a_{22}T_{t-1} + a_{23}GS_{t-1} + a_{24}INF_{t-1} + V_t \quad (30)$$

$$GS_t = a_{30} + a_{31}g_{t-1} + a_{32}T_{t-1} + a_{33}GS_{t-1} + a_{34}INF_{t-1} + W_t \quad (31)$$

$$INF_t = a_{40} + a_{41}g_{t-1} + a_{42}T_{t-1} + a_{43}GS_{t-1} + a_{44}INF_{t-1} + Z_t \quad (32)$$

Or it can be written as

$$\begin{pmatrix} g_t \\ T_t \\ GS_t \\ INF_t \end{pmatrix} = \begin{pmatrix} a_{10} \\ a_{20} \\ a_{30} \\ a_{40} \end{pmatrix} + \begin{pmatrix} a_{11} & a_{12} & a_{13} & a_{14} \\ a_{21} & a_{22} & a_{23} & a_{24} \\ a_{31} & a_{32} & a_{33} & a_{34} \\ a_{41} & a_{42} & a_{43} & a_{44} \end{pmatrix} \begin{pmatrix} g_{t-1} \\ T_{t-1} \\ GS_{t-1} \\ INF_{t-1} \end{pmatrix} + \begin{pmatrix} u_t \\ v_t \\ w_t \\ z_t \end{pmatrix}$$

After the model had been constructing, we estimate our model by first setting lag equal to six and using AR root table to ensure that our model did not consist any unit root. If there is consists unit root, lag length need to be reduce one by one.

An important element in the VAR is the determination of the lag length. There are several alternative criteria for finding the most appropriate model, which taken into account certain tradeoffs between better fit, minimize residuals and loss of degrees of freedom due to the number of estimated parameters There are some criteria such as Final prediction error (FPE), Akaike information criterion (AIC), the Likelihood ratio test (LR), the Schwarz information criterion (SIC) and the Hannan-Quin information criterion (HQ).

In general, under fitting of the lag length will cause the errors terms tend to be auto-correlated and over fitting will causes an increase in the mean-square forecast errors of the VAR. Hence, in this study, we will focus on the AIC to identify the most suitable lag length to use when investigate the dynamic properties through VAR model.

Conventionally, a shock to i-th variable not only directly affects i-th variable itself but is also transmitted to all of the other endogenous variables through the dynamic (lag) structure. An impulse response function generally helps to trace out the responsiveness of the dependent variables in the shocks to each of the variables. Thus, for each variable from each equation separately, a unit shock is applied to the error and the effects upon the VAR system over time are noted. If there are i variables in a system, a total i^2 impulse responses will be generated. Hence, through the impulse responses, we can find out how fiscal variables changes over the period of time.

3.3.5 DIAGNOSTIC TEST

In order to ensure that the appropriateness of the estimated model, there are several of diagnostic tests is common in empirical studies. In this studies, we will focus on three diagnostic checking which include Breusch-Godfrey serial correlation LM test, Autoregressive Conditional Heteroscedasticity (ARCH) test and Jarque-Bera (JB) test for normality.

Under the Breusch-Godfrey serial correlation LM test, the null hypothesis is that there is no serial correlation up to the specified number of lags and the alternative hypothesis states that

there is serial correlation up to the lag specified. Generally, Breusch-Godfrey serial correlation LM test help to regress the residuals on the original regress and lagged residuals up to specified lag order.

Other than that, ARCH test is help to check whether the estimated model is suffer from the heteroscedasticity problem. Under the null hypothesis it stated that there is no heteroscedasticity while the alternatives stated that there is heteroscedasticity. ARCH test regress the squared residuals on the original regressors by default.

Lastly, JB test of normality is an asymptotic or large sample test. It is also based on the OLS residuals. Firstly, this test will computes the skewness and kurtosis measures of the OLS residuals and uses the following test statistics:

$$JB = n\left[\frac{S^2}{6} + \frac{(K-3)^2}{24}\right] \quad (33)$$

where n= sample size, S= skewness coefficient and K= kurtosis coefficient. For a normally distributed variable, S= 0 and K= 3. Hence, JB test of normality is a test of the joint hypothesis that S and K are 0 and 3, respectively. In this case the value of the JB statistics is anticipated to be 0.

Under the null hypothesis the residuals are normally distributed, Jarque and Bera showed that asymptotically the JB statistics is follows the *Chi-square* distribution with *2df*. If the computed p value of the JB statistics in an application is sufficiently low, which will happen if the value of the statistics distributed is very different from zero, one can reject the hypothesis that the residuals are normally distributed. But if the p value is high, which will happen if the value of the statistics is close to zero, normality assumption does not be rejected, (Gujarati and Porter, 2009)

3.4 DATA

This study use annual data for the 17 developed countries from the period 1971-2007 for Gross Domestic Product (GDP), taxes (total tax revenues and component taxes), government spending (GS) and Consumer Price Index (CPI). In this study, we had classified 17 counties into different tax brackets. Turkey, Switzerland, Portugal and Spain considers as the lower tax brackets because the tax rate lie between 15% to 29%, Ireland, New Zealand, Canada, United Kingdom, Germany and Luxembourg fall into the average tax bracket which tax rate lie between 30% to 39% and lastly, higher tax brackets start from the 40% to 50%, for instance, Austria, France, Finland, Nerthlands, Norway, Denmark and Sweden.

The GDP, Taxes and CPI data are collected from the OECD Tax Database while government spending is collected from the Penn World Table. For the GDP are deflated by the Consumer Price Index (CPI), whereby the year 2000 has been treated as the base year (2000=100).

3.4.1 SOLVING ENDOGENEITY OF FISCAL VARIABLES

According to Poulson and Kaplan (2008) and Padovano and Galli (2002) they suggested that marginal tax rates to examine the impact of taxes on economic growth is more appropriate than using the average tax. Relatively speaking, marginal tax rates able to measure how much individual paid on the last dollar earned from the working and investing and use to measure the additional income of the nations. They argue that many researchers frequently use average tax rates to make justification about the effect of tax on economic growth. This is not relevant because they did not take into account the behavioral changes in individuals.

Skinner (1988), during his studies he had raise up one issue which is explanation how the government expenditure and tax policy “explain” the GDP growth rate always suffer from a potential endogeneity problem, since government policy will be strongly affected by economy condition. Hence in our study, we will deal with this problem.

Generally, for the regression tends to be valid, we always assume that the fiscal variables (tax and government spending) on the right hand side tend to be exogenous. However, there is

existence of automatic response to the state of economy. For example, government built into fiscal regulations that lead to counter-cyclical fluctuations of transfers and taxation over the business cycle. Besides, most of the previous researchers assume that government spending, such as the public investments are always not affected by the automatic stabilizers. Sorry to say that, this will tentatively lead to the endogeneity problem and result will bias. This is because on one hand, when the government increases spending, it will promote the economy growth. On the other hand, when economy growth is rising, governments automatic spending will fall. There is same for taxes. Increase in taxes may slow down the growth of economy. It can also be the other way round. When the economy growth is rising, nation will generate more income and falls into the higher tax bracket, paying higher tax. In order to know that government actual policy and solve the endogeneity problem which had been neglected by previous researcher, we calculated taxes, component of taxes and government spending by taking out the effect of the business cycle fluctuations. This is known as cyclical-adjusted average tax and cyclical-adjusted government spending.

We calculated cyclical-adjusted average tax and cyclical-adjusted government spending by using formula as below:

$$T\_C = (1 + Real\ GDP\ growth_{1971}) / (1 + Real\ GDP\ growth_t) * Average\ Tax_t$$

$$GS\_C = (1 + Real\ GDP\ GDP\ growth_{1971}) / (1 + Real\ GDP\ growth_t) * Government\ spending_t$$

where T_C denotes cyclical-adjusted average tax, T denotes average tax rate (as percentage of GDP), GS_C denotes cyclical-adjusted government spending and G denotes the average government spending (as percentage of GDP).

All the series are in percentage form.

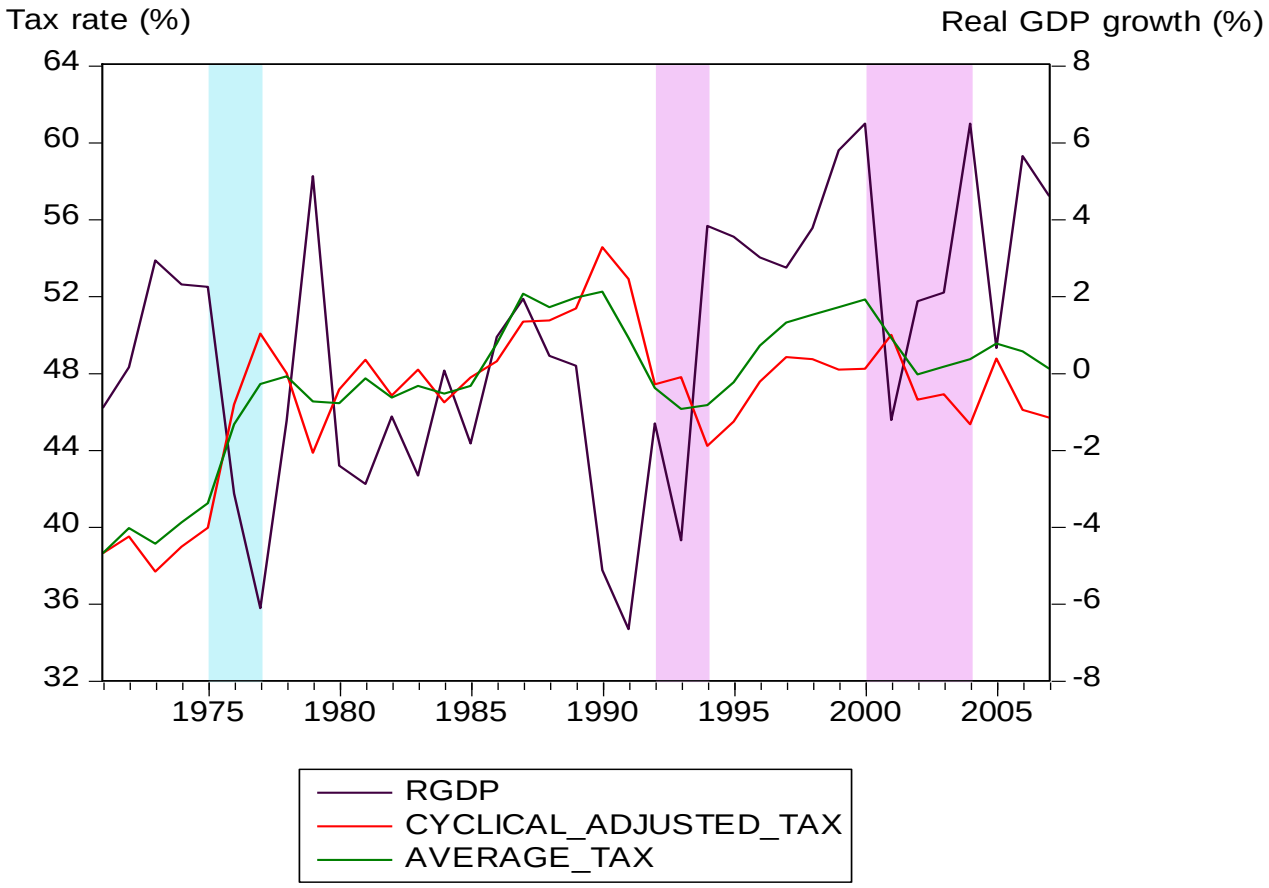

Figure 3.1: Comparison of the effect of Average Tax rate and the Cyclical-adjusted tax on the real GDP growth in Sweden

Figure 3.1, X-axis on the left measure the average tax rate and cyclical-adjusted tax, while X-axis on the right measured real GDP growth and the Y-axis measure year. Based on the graph above, we found that average taxes to examine the impact of taxation on economic growth are not as relevant as the result obtain by using cyclical-adjusted tax rates. This is because we found average taxes are always following the business cycle fluctuations. For example, when there is a recession during 1975 to 1977 (blue shaded area), the increase in the average tax rates is smaller as compared to the cyclical-adjusted tax rates. This main cause behind is that in the average tax rates measurement, it involves the GDP which tends to underestimate the effect of

taxes on economy growth. As the endogenous component is taken out, average tax rate will tend to rise greater, and we are more certain about unidirectional effect of tax on growth

Other than that, in 1992, Sweden came across recession as well with a sharp decline of the real GDP growth and a slight increase in the cyclical-adjusted taxes compare to average tax rate. In fact, based on the usual measurement, the average tax rates should be rising. Later in 1993 and the following years, the moving trend shows that the real GDP is still positively correlated with the average taxes and negatively correlated with the cyclical-adjusted tax rates. Thus, Figure 3.1 above provides a solid fact that the result obtained through cyclical-adjusted taxes is more applicable. The government can rely on the cyclical-adjusted tax rates to implement the right policy to control the GDP growth in the country.

CHAPTER 4: DATA ANALYSIS

4.0 INTRODUCTION

This chapter reports the results of our studies. In section 4.1, Unit Roots Tests will be performed by ADF test. Section 4.2 diagnostic checking will be conducted; Section4.3 presents the Dynamic Ordinary Least Square to examine impact of taxation, government spending and inflation on the economic growth. Besides, the impact of component taxes on economic growth will be carried out in Section 4.4. In Section 4.5, it will examine whether taxation have the permanent effect or temporary effect on economic growth. Lastly, Section 4.6 will examine the dynamic properties through VAR and impulse responses.

4.1 UNIT ROOT TEST

In this study, stationary of the data is tested with Augmented Dickey Fuller (ADF) Test. For the ADF test, the null hypothesis states that the variables are non-stationary, in other words, a unit root is presents. This test is to test for the robustness of the result to make sure that the variables are the right order of integration or stationary to avoid spurious regression problem.

Table 4.1: ADF Test in Level form with Trend and Intercept

Country	DGDP	T	GS	INF
Lower Tax Bracket				
Turkey	-4.9684***	-3.3261**	-4.0707**	-3.5351*
Switzerland	-3.4135*	-3.8770**	-2.2229	-4.4310***
Portugal	-5.1041***	-3.4403***	-3.8615**	-3.8122**
Spain	-4.0356**	-3.5258**	-3.9556**	-3.0877

Average Tax Bracket				
Ireland	-3.4720*	-4.0424**	-3.3293*	-3.7176**
New Zealand	-3.8251**	-3.3303*	-4.8876***	-3.2272*
Canada	-4.3218***	-3.9520**	-2.8158	-3.2569*
United Kingdom	-3.5700**	-3.4815**	-4.4736***	-3.8517**
Germany	-3.5639**	-3.2374*	-3.4710*	-3.8876**
Luxembourg	-4.2114**	-3.7110**	-3.6604**	-4.8813***
Higher Tax Bracket				
Austria	-5.2780***	-3.5895**	-3.2118*	-3.3309*
France	-3.4553**	-3.6556**	-6.0036***	-1.6340
Finland	-3.3220*	-2.1974	-3.3345*	-4.6081***
Nerthlands	-3.8169**	-2.4748	-2.4368	-5.0341***
Norway	-5.3745***	-3.8995**	-0.7084	-3.3989*
Denmark	-5.9767***	-3.7242**	-3.2889*	-3.2196*
Sweden	-4.1076**	-3.3202*	-3.6274**	-3.5542**

Notes:
The null hypothesis for ADF is unit root. ***,**,* indicates 1%, 5%, and 10% significant level respectively
DGDP :Real GDP growth GS : Government spending as a share of GDP
T :Tax Revenue as a share of GDP INF: Inflation rate

Table 4.2: ADF test for component taxes in Level form with Trend and Intercept

Country	COR	GSC	IM	IND	PROPERTY
Lower Tax Bracket					
Turkey	-4.2419**	-3.4825**	-3.8649**	-3.3126*	-5.4452**
Portugal	-4.7456***	-3.5689*	-4.91778***	-3.2281*	-4.1170**
Spain	-9.2255***	-3.9156**	-5.2686***	-6.1591***	-4.6945***

Average Tax Bracket					
Ireland	-4.0156**	-3.5138*	-3.4889*	-4.6483**	-3.6157**
Canada	-4.1018**	-3.5963**	-3.3065**	-5.0386**	-4.3269***
Luxembourg	-3.2682*	-4.2876**	-4.2115**	-3.8716**	-3.7153***
Higher Tax Bracket					
France	-3.3557*	-3.7500**	-7.0504***	-3.4375*	-4.8208**
Denmark	-3.3387*	-3.4688*	-3.9895**	-4.3463***	-3.5946 **
Sweden	-3.2797*	-4.9604***	-4.4174**	-3.3242*	-4.6082***

Notes:
The null hypothesis for ADF is unit root. ***,**,* indicates 1%, 5%, and 10% significant level respectively.
COR : Corporate tax as a share of GDP
GSC : Goods and services tax as a share of GDP
IM : Import tax as a share of GDP
IND : Individual income tax as a share of GDP
Property: Property tax as a share of GDP

The results of the Argumented Dickey Fuller (ADF) test at the level are reported in Table 4.1and Table 4.2 by taking consideration of trend variable in the regression. Based on the Table 4.1 and 4.2, the t-statistics for most series are statistically significant to reject the null hypothesis of non-stationary or unit root. This indicates that series are in stationary at the level form. Therefore, we conclude that these variables are stationary.

As a conclusion, we can conclude that all the series which is GDP growth, taxes, government spending, inflation and component taxes are stationary or in other words do not contain a unit root. Hence there is no spurious regression problem in our series.

4.2 DIAGNOSTIC CHECKING

In section4.2 we will conduct diagnostic checking to ensure that our model tend to be valid for estimation. The residuals of the models are examined for Normality, Autocorrelation and Heteroscedasticity. The test included residuals Normality test, Breusch-Godfrey serial correlation LM test and ARCH test. Based on Table A1 to Table A18 in Appendix, it shows that our model is no longer suffered of Normality, Autocorrelation and Heteroscedasticity problem. This is because all the p-values are failed to reject null hypothesis for each diagnostic test, except France suffer of normality problem for component taxes.

4.2 DYNAMIC ORDINARY LEAST SQUARE

In our studies we apply dynamic OLS to study the impact of taxation, government spending and inflation economic growth. Table 4.3 reports the estimation results for the dynamic OLS.

Table 4.3: Result of Dynamic OLS

Country	DGDP(-1)	T	GS	INF	DUM
Lower Tax Bracket					
Turkey	0.0435	-0.2513	-0.3503	-0.7374	8.0108
	(1.0370)	(-2.5239)**	(-2.1360)**	(-8.5674)***	(2.4036)**
Switzerland	0.1729	-0.4286	-3.4459	-0.7725	3.6615
	(1.6974)*	(-2.5687)**	(-4.3449)***	(-4.8140)***	(2.1319)**
Portugal	0.1467	-0.5833	-0.0565	-0.9012	-5.6460
	(1.770)*	(-3.2776)***	(-0.1247)	(-11.6582)***	(2.6969)**
Spain	0.1165	0.3031	-2.3004	-0.7418	2.8228
	(1.3481)	(2.0718)**	(-4.5161)***	(-8.5541)***	(2.4163)**

Average Tax Bracket

Ireland	0.0963	-0.6555	-0.1882	-0.5863	-4.8744
	(1.0221)	(-5.1802)***	(-0.9008)	(-5.6552)***	(2.5922)**
New Zealand	0.1334	-0.5064	-0.5667	-0.6262	4.8928
	(1.6516)	(-4.5513)***	(-1.8087)*	(5.7374)***	(2.5630)**
Canada	0.1079	-0.6728	-0.1300	-0.4275	-4.7294
	(1.2231)	(-5.8822)***	(-0.8353)	(-3.7939)***	(-3.2982)**
United					
Kingdom	0.0578	-0.4920	0.3510	-0.8499	-4.2633
	(0.6977)	(-3.4548)***	(1.3684)	(-5.7139)***	(2.6819)**
Germany	0.6068	-1.0497	0.1909	-0.4016	4.4458
	(6.0684)***	(-6.8405)***	(1.0832)	(3.6221)***	(3.6983)***
Luxembourg	-0.1053	-0.6799	-0.8616	-1.0154	-6.0326
	(-0.9431)	(-3.8103)***	(1.1255)	(-4.9862)***	(-1.9717)

Higher Tax Bracket

Austria	0.0274	-0.7105	-0.6168	-0.5976	3.6111
	(0.3306)	(-8.3300)***	(-2.2878)**	(-4.6215)***	(3.2923)***
France	0.1159	-0.1431	-0.7904	-0.4651	-5.0455
	(1.2582)	(-1.4723)	(-3.4466)***	(-6.7080)***	(-4.4976)***
Finland	0.0912	-0.5423	-0.5728	-0.6975	-4.0934
	(0.8688)	(-5.3021)***	(-2.5702)**	(6.7546)***	(2.1812)**
Nerthlands	0.1948	0.6077	-2.3543	-0.6237	2.9284
	(1.7456)*	(3.4677)**	(-5.2180)***	(-5.7252)***	(1.9882)
Norway	-0.0028	-0.9646	-0.9477	-0.3484	6.3447
	(-0.0373)	(-7.6018)***	(-4.6531)***	(3.9256)***	(3.4545)***
Denmark	-0.0824	-0.4510	-0.2346	-0.6946	-0.4147
	(-0.8216)	(-4.8117)***	(-1.1472)	(-5.1611)***	(-3.1668)***

Sweden	0.0631	-0.3614	-0.2827	-0.4975	-4.0027
	(0.5147)	(-3.5755)***	(-1.1357)	(-3.9965)***	(-1.9119)*

Notes:
***,**,* indicates 1%, 5%, and 10% significant level respectively. t statistics are in parentheses.

Since the variables are stationary, hence we can proceed to conduct the dynamic Ordinary Least Square test. First of all, we added the lagged one year of the growth rate in our model because economic growth not just will be affect by this year, it also will be affected by the previous year. The result shows that most the sign of the coefficient of the lagged GDP is positive. However, the magnitude is generally small and there is weak autocorrelation in the economic growth. Taken Sweden, for example the result shows that real GDP growth is influenced by the lag one year of the real GDP growth by 0.0631%, nevertheless it is no longer significant.

Economic growth and its macroeconomic determinants consists of taxes, government spending and inflation exhibit a relationship. Coefficients of taxes and inflation are expected to be negatively with the economic growth, while government spending expected to have positive sign. Furthermore, we also incorporate dummy variable corresponding to the year for 17 OECD countries. This is because we want to wash out the influence of this outlier of the year.

Again for our main focal point, the relationship between the economic growth and its macroeconomic determinants for Sweden is presented in equation 34 (standard errors are shown in parentheses).

DGDP = 26.8714+ 0.0631 DGDP (-1) -0.3412 Tax -0.2827GS -0.4975 INF -4.0027 DUM93
(0.1226) (0.1011) (0.2489) (0.1245) (2.0935) (34)

In equation 34, we can see that the expected sign of the coefficients for taxes and inflation is consistent with the theory, but government spending no longer consistent with what theory suggest.

From equation 34, it indicates that every 1% increase in taxes as share of GDP, it will leads to 0.3412 % decrease in the real GDP growth rate and it is statistically significant. This is consistent with the theory that we learnt. According to the endogenous growth theory, it suggest that taxation will affect investment decision and hence in turns of growth. When government imposed higher tax rate, it will reduce the private investment and worsen the economic growth (Avila and Strauch, 2008). Besides, Engen and Skinner (1996) also found that higher taxes will discourage investment and consumption as well. Higher taxes will discourage the worker from working, pushing them to cut back on hours or retire early. In other words, higher taxes will hinder the economic growth by eroding incentive to work hard, save, invest and spend.

Government spending exhibits a negative relationship with economic growth in Sweden. However, it is no longer statistically significant. As 1% increase in the government spending as a share of GDP, real GDP growth decrease by 0.2827%. The result tends to be contra with previous researchers. This is probably because of the crowding out effect through the interest rate and exchange rate channel. When the government finances spending through bond assurance given the tax rate, rising bond supplies cause which it reduce the incentives of the private firms to invest. Besides, when governments issue more bonds to the foreigners, it leads to an increase the demand in terms of the domestic currency and for sure domestic currency tends to be appreciated and lower the export. Hence, through these two channels, larger government spending, without effective rise in tax rate, it retarded the economic growth.

There is a statistically significant negative relationship between inflation and economic growth. 1% increase in inflation will leads to 0.4975 % decrease in the real GDP growth rate. This is because when one country is facing inflation, nations are uncertainty about the future and loss of confidence in the economy. Thus, they reduce their consumption and lower the economic growth.

Based on Table 4.3, we found that regardless whether the country is in the lower tax bracket, average tax bracket or higher tax bracket; taxes play an important role in determining the economic growth. It is also shown that it is consistent with the theory suggested; higher tax will lower the economic growth. Nevertheless, tax effect is not necessary higher when the level of tax rate is higher.

In the lower tax bracket, for instance, Turkey, the impact of taxation on economic is greater compare to France which fall in the average and higher tax bracket. As 1% increase in the taxes as share of GDP, it leads to 0.2513% decrease in the real GDP growth. In 1990s, government of Turkey had imposed to the lower tax rate to their nations because they believe that the higher tax rate will discourage the incentive to invest. Besides, by levy the lower tax rate, it can increase nation consumption and can has better prepared than that of other countries to deal with the global financial crisis and would be able to stay alive the storm. However, it had been rejected and question by IMF (International Monetary Fund). The reason behind is that with a lower tax rate it will leads to a large budget deficit in coming period and it cannot really only depend on the consumption alone without any complementary increase in the employment rate and the nation income to boost the economy. Hence, this statement is consistent with our results. Based on the Table 4.3, it shows that although Turkey imposed the lower tax rate compared to other 16 developed countries but tax effect on the economic growth not the smallest. Besides, it also can be explained that in Figure 1.3 (Chapter 1) why Turkey imposed a lower tax rate without achieving the highest growth rate.

When come to the average tax bracket, we observed that Germany has the greatest negative impact of taxation on economic growth compare to the 16 OECD countries this is because of lack of efficiency of fiscal policy. For the past decades, German economy appeared as a huge deficit, thus, to recover the huge deficit, German's government had decided a removing distortions in the tax system and making the key government services more efficient. Thus, they decided value added tax need to be increased in order to speedily reduce the structural deficit by compensating for revenue losses from past. However, they never thought that it will bring an even worse and greater negative impact to the economy. This is because VAT can affect the

employment rate and hours of works in the same way as income tax. An increase in the VAT will tend to lower the purchasing power of the real after -tax wages, thus it will curb labor supply and reduce the productivity and dampen the economic growth. Besides, it would tend to be cause underground economy in German. As higher consumption tax for instance, VAT levy to the nation, it certainty will encourage more nation take part in the underground economy. This is because government definitely hard to exactly identify the goods and services that fall into underground economy, especially since many consumer purchases can be made with cash. Furthermore, it should be highlighted that even the underground economy pays a nonzero rate of VAT as it is tend to be unable to reclaim the VAT paid on its inputs. Hence, it may be governmentally easier to counter the incentive to enter the underground economy by a combination of avoiding extremely high rates of tax and having a fairly high VAT threshold rather than by a multi-rate VAT system.

In the higher tax bracket, Norway has the greater negative effect of taxation on economic growth compare others countries that fall in the same tax bracket. As 1% increase in the tax as percentage of GDP, 0.9646% decrease in the real GDP growth rate. On the contrary, our main focal point, Sweden imposed the higher tax rate but the impact on the economic growth is smaller than Norway although these two countries are in the same category. The reason behind why Swedish taxes are known to be relatively high compare to others because everyone who lives in Sweden is entitled to extensive tax-funded services and benefits. According to OECD statistics, research found that Sweden spends more of its GDP on social services than other country in the world. The money goes to heavily tax subsidized health care and education. As a result, even Sweden imposed the higher tax rate compare to Norway, but through this transformation from government to nations it will cause a smaller negative impact on economic growth.

If we take a bird-eye view on the relationship between tax and economic growth, one interesting observation appears. We take an average of all the negative and statistically significant tax coefficients for each bracket, and found that lower tax bracket has the smallest tax coefficients which is -0.421, average tax bracket has the highest tax coefficients (-0.676) and higher tax bracket has a declining and thus smaller tax coefficients (-0.529).

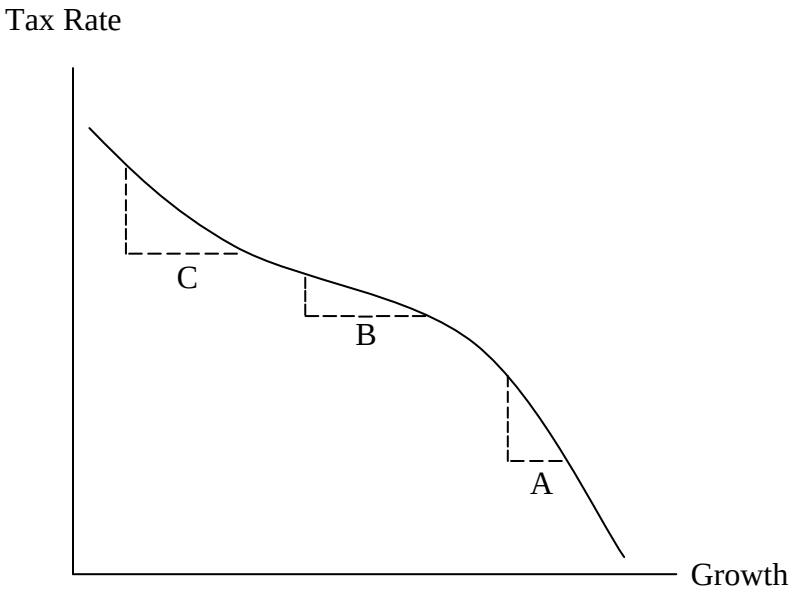

Figure 4.1: Relationship between tax and growth
Notes: A: Lower tax bracket
B: Average tax bracket
C: Higher tax bracket

Based on figure above, it shows that the relationship between tax and growth is nonlinear. In order to promote the growth in one country by reduce or increase, it really needs to depend on the level of tax rate. Like for Turkey which shows as triangle A, cutting tax while contributing to huge budget deficit may not result in significant growth performance. Moreover Germany for instance, a country in the average tax rate, a minor change of taxes might affect the economy growth significantly due to the existence of active underground economy. Country with the highest tax rate like Sweden happens to have a fact that an increase in taxes may not hurt the growth rate significantly as the government transfer the tax revenues back to the nation hand. Hence, it could improve government budget balance and improve social welfare, which at the end it leads to stronger growth.

4.4 COMPONENT TAXES AND ECONOMIC GROWTH

In this section, the impact of the component taxes on economic growth will be examined and result is presented in Table 4.4.

Table 4.4: Result on Component taxes and economic growth

Country	COR	GSC	IM	IND	PROPERTY
Lower Tax Bracket					
Turkey	-2.6625	-0.2965	2.0666	-0.9306	0.8343
	(2.5519)**	(-1.9321)*	(2.2693)**	(-1.9694)*	(0.7072)
Portugal	-0.2857	0.0090	-0.5032	-0.7866	-4.5942
	(-0.6636)***	(0.0145)	(-0.3597)	(-1.5834)	(-2.4905)**
Spain	1.1704	-0.1109	0.6980	0.4038	1.3982
	(3.8030)***	(-0.3309)	(-0.7586)	(0.9624)	(2.6005)**
Average Tax Bracket					
Ireland	-1.1225	-0.9813	1.8777	-0.9922	2.1897
	(1.3970)	(2.8634)***	(0.6471)	(-4.2023)***	(2.87713)***
Germany	1.3705	-0.8672	12.8552	-1.2662	-4.7848
	(1.5407)	(-1.0150)	(7.6194)***	(-6.2506)***	(-3.3076)***
Luxembourg	-0.7651	-1.1469	6.0295	0.9840	-2.8452
	(-1.3602)	(-3.8795)***	(0.6877)	(1.5555)	(-3.1306)***
Higher Tax Bracket					
France	-1.003	0.1912	6.3526	-0.5476	-1.9563
	(-1.4270)***	(0.3785)	(2.0776)**	(-3.0379)***	(2.5592)**
Denmark	-1.1543	-0.7378	3.1482	-0.8968	-2.6136
	(-2.0827)**	(-1.8676)*	(1.7246)*	(-5.5047)***	(-1.7942)*
Sweden	-1.9050	-2.0914	0.5513	0.0325	-1.6597

	(-1.9439)*	(-6.3141)***	(0.3038)	(0.0940)	(-2.2344)**

Notes:

***,**,* indicates 1%, 5%, and 10% significant level respectively.

t-statistics are in parentheses.

In this section we have randomly chosen three countries from each category to examine the impact of component taxes on the economic growth. Based on Table 4.4, we found that different types of taxes will have different impact on the economic growth. First of all, we found that corporate taxes mainly have negative impact on GDP growth rate in most of the countries and statistically significant in the lower and higher tax brackets countries. Our results tend to be consistent with the previous research Lee and Gordan (2005) and Engen and Skinner (1996). Higher corporate taxes will reduce firms' incentives to invest in innovative activities by reducing the after-tax investments, which is an important source of productivity growth in developed countries. Besides, high corporate tax is a root that leads firms face high tax compliance costs, with corresponding high administrative burdens for the government. As a consequence, it will suck up the resources that would be used in the productivity activities, leads a fall in productivity and output. Thus higher corporate tax will affect the GDP growth adversely.

Goods and service (GSC) tax shows a negative relationship with the GDP growth rate and is highly significant when the country falls into average tax bracket. The reason behind that GSC will adversely affect the economic growth is that as higher GSC taxes, it will lower the purchasing power of real after-tax wages, these taxes reduce individuals' incentives to work in a similar way as a proportional income tax, potentially reduce labor supply, and thereby employment and economic growth. This result is consistent with Tosun and Abizadeh (2005).

Furthermore, import tax shows a positive impact on economic growth but it is less significant in lower, average and higher tax, and it is contra with previous research which done by Skinner (1998). The objective for most of the country to impose import taxes is to protect the domestic producers from the foreign competitors and thus increase the terms of trade. Besides, it can also help to reduce the unemployment and also improve the nation's balance of payments

due lower import. All this benefits that bring by the import tax can help to promote the country's economy growth.

Individual income tax is negatively affecting the GDP growth rate and it is become highly significant as the country move from lower tax bracket to higher tax bracket. Taxes will create the disincentive on the taxed activity, so do the income tax. Income tax will create the disincentive on those earning taxable income, thus reduces the growth rate. Besides, higher income tax will discourage the technical progress and lower the economic growth rate in the long run. This is because higher income taxation will lower the capital intensity in the goods sector which will cause the increase in marginal productivity of capital of the goods sector. However, negative effect of the higher income taxation cannot be offset by the increase in the marginal productivity. Consequently, the steady state of the long run growth will be depressed.

In addition, result of the property tax is consistent with Yamarik (2000), in which it will adversely affects the GDP growth rate and it is tend to be significant in most the selected countries. Taxes on financial and capital transactions are likely to have substantial negative effects on economy growth. In reality, they discourage not only the ownership of the taxed assets but also the transactions that would allocate these assets towards their most productive uses. For example, higher property tax will discourage people from buying and selling houses. Besides, it also discourages nation from moving to areas where labor is in the greatest demand, thus it causes negative consequences for economic growth.

For the Sweden case, we found that import tax and individual tax appear to have less impact on the economic growth and no longer significant. On the other hand, goods and service tax, corporate tax and property taxes appear greatest adverse effect on the growth and play the import role in determining economic growth in Sweden. As 1% increase in the GSC, corporate and property taxes as share of GDP, it cause 2.0914%, 1.9050% and 1.6597% decrease in the real GDP growth rate respectively. The negative impact of property taxes on economic growth is smaller compared to the goods and services taxes and corporate taxes. As we knowing that Sweden has a large public sector and needs huge expenditures to invest in this public sector which financed by the government. In order to maximize revenue from taxation, government in

Sweden has identified those property taxes as one of the effective tools adopted by the government to finance the expenditures. There are few numbers of reasons. Firstly, property taxes generally do not influence the decisions of nations in terms of labor supply, incentive invest in the human capital and production of the private firms. Furthermore, the tax base of the property tax is more stable compared to the other component taxes and the tax revenue generated from this tax is therefore more expectable compared to the other revenues that obtain from corporate tax, goods and services taxes and labor taxes this is partly due to less cyclical fluctuation in property values. Besides, it also encourages greater responsibility on the side of government, especially when the government used the tax revenues to finance the local government.

4.5 PERMANENT OR TEMPORARY EFFECT

In this section, we want to examine whether taxation has the permanent effect or temporary effect on the economic growth. If $\left(\frac{\sum_{i=0}^{n} \alpha_{4+i} + \tau_{t-i}}{1-\alpha_1}\right)$ is close to 0, we can conclude that there is temporary effect on the economic growth, if it is close to 1, then we say that taxation has the permanent effect on economic growth. In others words, if the coefficients is less than 0.5, this implies that taxation only have the temporary effect on economic growth. On the contra, if the coefficients are 0.5 or above, we will treat it as the permanent effect of taxation on economic growth. Coefficients sign is just tell us that the relationship between taxation and economic growth.

Based on Table 4.5, in general we can see that taxation on economy growth have temporary effect in lower tax bracket and average tax bracket, but have a permanent effect in those countries fall into higher tax bracket. Among the 17 OECD countries, Turkey imposed the lowest tax rate but the effect on economic growth is temporary rather than permanent. This is consistent with Katircioglu (2010). The reason behind that why Turkey only has temporary effect

of taxation on economy growth is that taxation in Turkey is not transparent in the economy and most tax revenues in Turkey is paid by employees.

Sweden, the highest tax rate, compared with other 16 countries and the result declared that taxation has the permanent effect on economic growth. Taxes are the largest sources of government revenue in Sweden, especially during the past decades Sweden faces a larger budget deficit. \In order to restore the deep budget deficit, government had levy higher tax rate on the nation to generate more income. In Sweden, tax is more than just a source of revenues and growth. Generally, it also plays a key role in building up institutions, reduces the unemployment rate, transfer to sickness and pensions in the long run that is not liable in the other countries. If there is lack of tax structure in the long run, it will cause weak and unresponsive governance. It also leads to over rely on foreign aid. With tax, nation can hold governments to take into consideration for their decision and not feel tie to the will of aid donors. In addition, taxation can also help Sweden's government to plan ahead with greater uncertainty in future especially the financial crisis during 2008. Through the facts above, it shows that taxation will have a permanent effect on economy growth in Sweden.

Table 4.5: Result of Permanent or Temporary effect

COUNTRY	GDP(-1)	INF	GS	T	T(-1)	T(-2)	$\left(\frac{\sum_{i=0}^{n} \alpha_{4+i} + T_{t-i}}{1-\alpha_1}\right)$	TEMPORARY OR PERMANENT EFFECT
Lower Tax Bracket								
Turkey	0.0359	-0.756	-0.3829	-0.211758			-0.2196	Temporary
	(0.7984)*	(-0.7560)***	(-2.1801) ***	(-2.0074)*				
Switzerland	0.2362	-0.5583	-3.5029	-0.9519	0.6256		-0.4272	Temporary
	(2.3948)**	(-3.0290)***	(-4.5151)***	(-3.8695)***	(2.4488)**			
Portugal	0.3467	-0.7099	-0.0071	-1.0421	0.607		-0.6660	Permanent
	(3.0325)***	(-6.5282)***	(-0.0150)	(-3.251)***	(2.0170)*			
Spain	0.0986	-0.7375	-2.3215	0.3032			0.3264	Temporary
	-1.0645	(-7.9107)***	(-4.2393)***	(1.9275)*				
Average Tax Bracket								
Ireland	0.328	-0.5037	0.0897	-1.1216	0.7411		-0.5662	Permanent
	(3.0884)***	(-5.0209)***	-0.4303	(-5.8584)***	(3.4102)***			
New Zealand	0.1159	-0.5843	-0.6135	-0.5127			-0.5799	Permanent
	-1.2971	(-4.9856)***	(-1.8059)*	(-4.2434)***				
Canada	0.3482	-0.3058	-0.1546	-1.1628	0.641		-0.8006	Permanent
	(2.0016)*	(-1.7499)*	(-0.8522)	(-5.0392)***	(1.7854)*			
United Kingdom	0.3787	-0.5207	0.1396	-0.9026	0.7344		0.2702	Temporary
	-3.0616	(-2.9976)***	-0.5470	(5.0234)***	(3.1976)***			

Germany	0.608	-0.1718	-0.0005	-1.4353	0.6897		-1.902	Permanent
	(5.1864)***	(-1.2337)	(-0.0027)	(-6.1397)***	(2.5513)**			
Luxembourg	0.1609	-0.4064	-0.2700	-1.3616	0.7130	0.2935	-0.4232	Temporary
	-1.1315	(-2.4206)**	(-0.5147)	(-8.3674)***	(3.1535)***	(1.7873)*		
Higher Tax Bracket								
Austria	0.5377	-49870	-0.3325	-1.1084	0.9245	-0.342	-1.1376	Permanent
	(4.4871)***	(-3.6290)***	(-1.3511)	(10.9021)***	-5.1074	(-2.9554)***		
France	0.4769	-0.1623	-0.3339	-1.2265	1.1364		-0.1722	Temporary
	(4.6015)***	(-2.0182)*	(-1.6014)	(-6.7181)***	(6.1088)***			
Finland	0.299	-0.4683	-0.3945	-0.8456	0.4774		-0.5253	Permanent
	(2.2982)**	(-3.3975)***	(-1.7710)*	(-5.4262)***	(2.3804)**			
Nerthlands	0.2396	-0.6363	-2.2737	0.5791			0.7616	Permanent
	(2.0951)**	(-5.5900)***	(-4.8348)***	(3.1681)***				
Norway	0.4333	-0.1684	-0.7452	-1.5694	0.8927		-1.1941	Permanent
	(2.7736)***	(-1.5700)	(-3.2152)***	(-7.7897)***	(3.2226)***			
Denmark	-0.0906	-0.6515	-0.3200	-0.4846			-0.4443	Temporary
	(-0.7960)	(-4.2818)***	(-1.3893)	(-4.5797)***				
Sweden	0.3565	-0.2464	-0.3631	-0.8094	1.5711		-1.1837	Permanent
	(2.2245)**	(-1.9981)*	(-1.6962)	(-4.2647)***	(2.9376)***			

Notes:

***,**,* indicates 1%, 5%, and 10% significant level.

t-statistics are in parentheses.

4.6 VECTOR AUTOREGRESSIVE MODEL (VAR)

In our study, we have incorporate VAR model and impulse responses to trace out the effect of how the changes of fiscal variables on the real GDP growth in Sweden. The optimal lag for the VAR in levels is determined by using Akaike Information Criterion statistical criteria (AIC) to identify the most suitable lag length to use when specifying a VAR. It shows that the most suitable lag length is four.

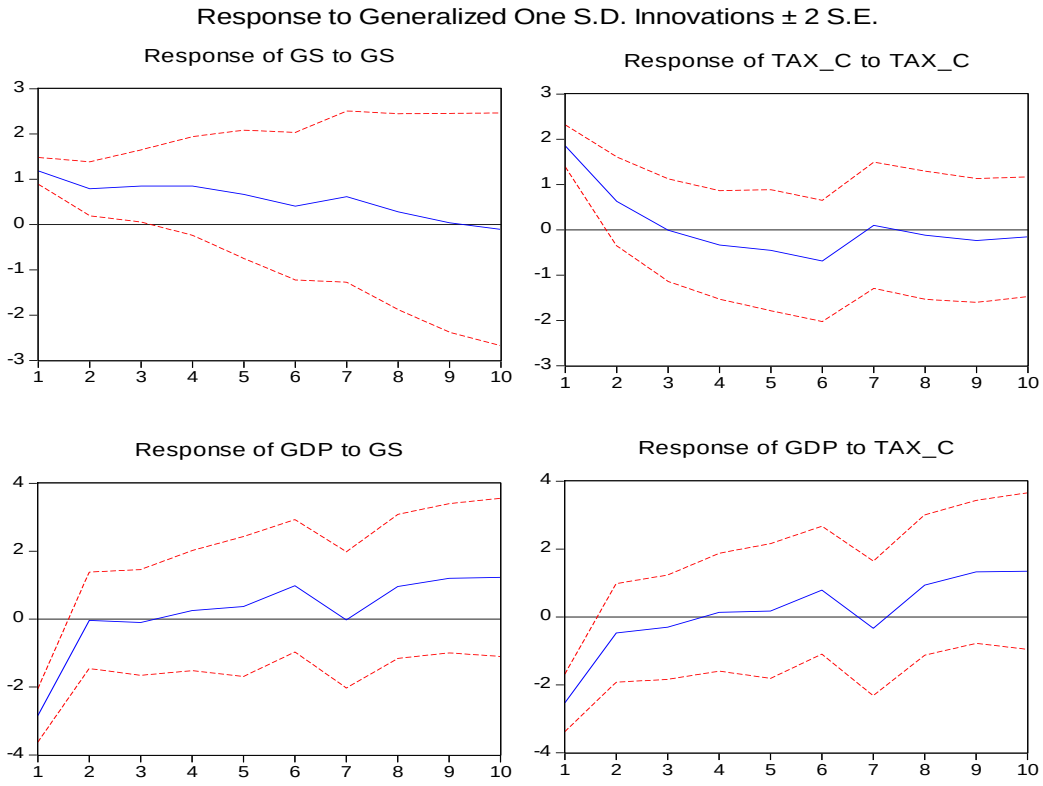

Figure 4.2: Impulse Responses of the fiscal variables in Sweden. (First ordering)

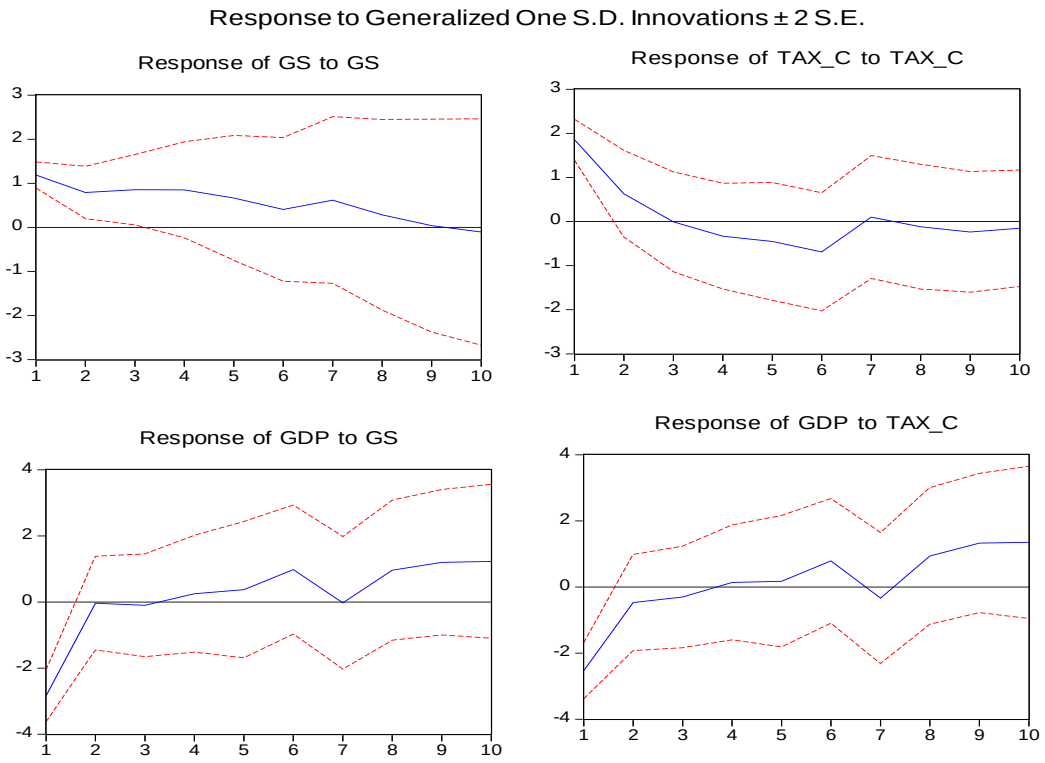

Figure 4.3: Impulse Responses of fiscal variables in Sweden (Second ordering)

The ordering of variables is important in the decomposition, thus in our studies, two ordering are applied. The first ordering will be government spending, taxes, real GDP growth and inflation. It is based on belief that government spending is the contemporaneously most exogenous variable which affects other variables; tax rate is influenced contemporaneously by government spending and itself but affecting others as well. On the other hand, the second ordering will be real GDP growth, government spending, taxes and inflation, then it believed that real GDP growth is the most exogenous one; government spending responds to real GDP growth and itself; tax responds to growth, government spending and itself.

So, in this research, our main focus is on how the changes of fiscal variables response to the economic growth. From the figure 4.2 and 4.3 above, we can found that the responses of the government spending and taxation on the economic growth always have a negative impact. For

example, Figure 4.2, as the taxation as the percentage of GDP increase by 1.80 percentage points, the real GDP growth in Sweden will reduce by 2.27 percentage points. Taxation did not have the permanent effect on the economic growth in Sweden; this is because once there are any changes in taxation, growth in Sweden will respond quickly, for instance, during the period six to period nine. As we can see that during this period, as increase in taxation, economic growth will tend to be falling, however, once the reduce in taxation, the growth rate will responses quickly which raise from -0.03 percentage point to approximately 1.50 percentage point. There is same going for the government spending.

Relatively speaking, government spending and taxes are basically level data and they may contain the linear trend in themselves. Hence, in this section, we included trend variable in our model and re-estimate the two ordering as above.

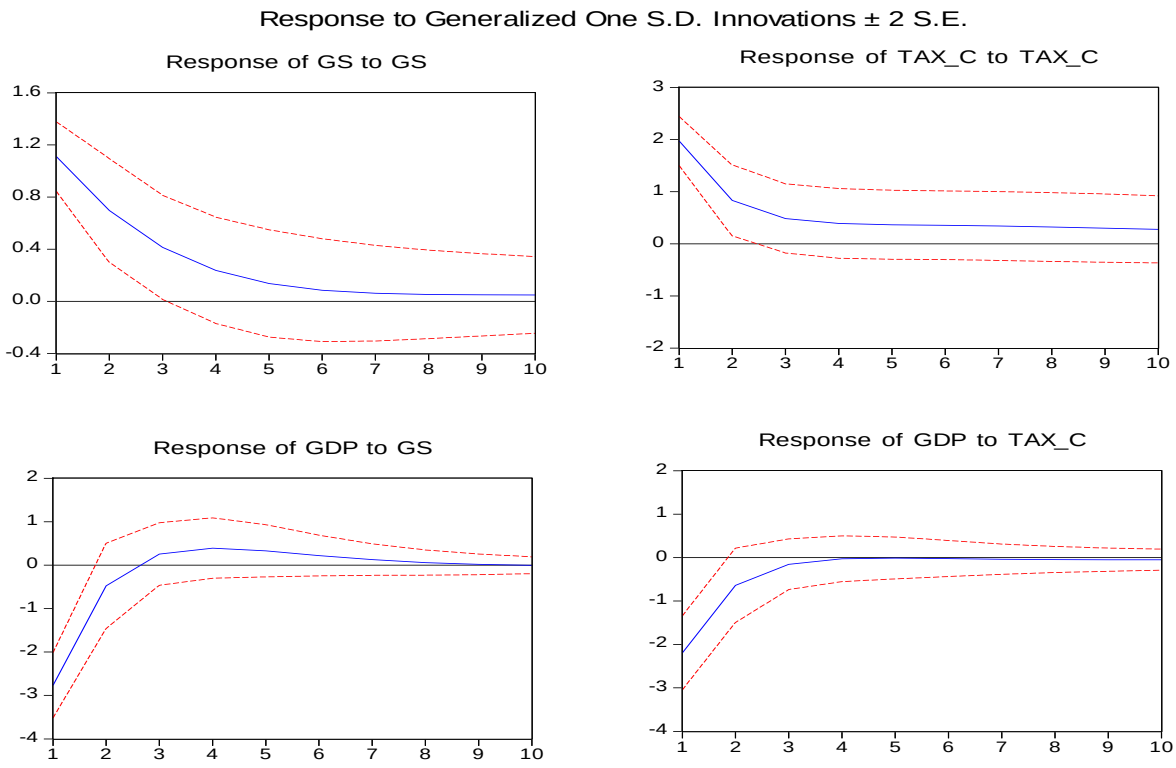

Figure 4.4: Impulse Responses of fiscal variables in Sweden (First ordering, with trend)

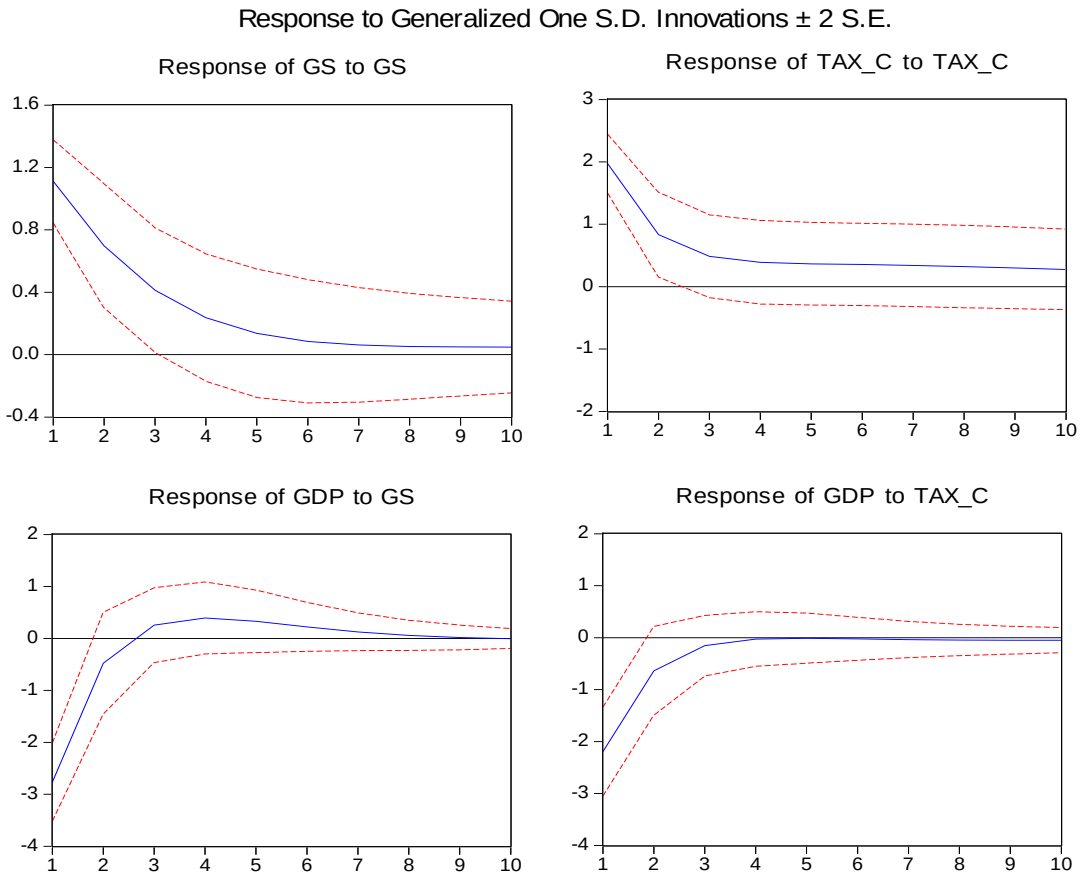

Figure 4.5: Impulse Responses of fiscal variables in Sweden (Second ordering, with trend)

Once again, impulse responses show us that there are negative impact of fiscal variables on the economic growth. After we included the trend for taxes and government spending, the pattern of the impulse responses tend to be different with the one without the trend. Figure 4.4 and 4.5 shows that the responses of changes in the fiscal variables are gradually stable. Over the period of time as the Sweden's govenrment lower the spending or taxation, the real GDP growth is improve and its show that there is a short live, no longer the permanent effect on the economic growth.

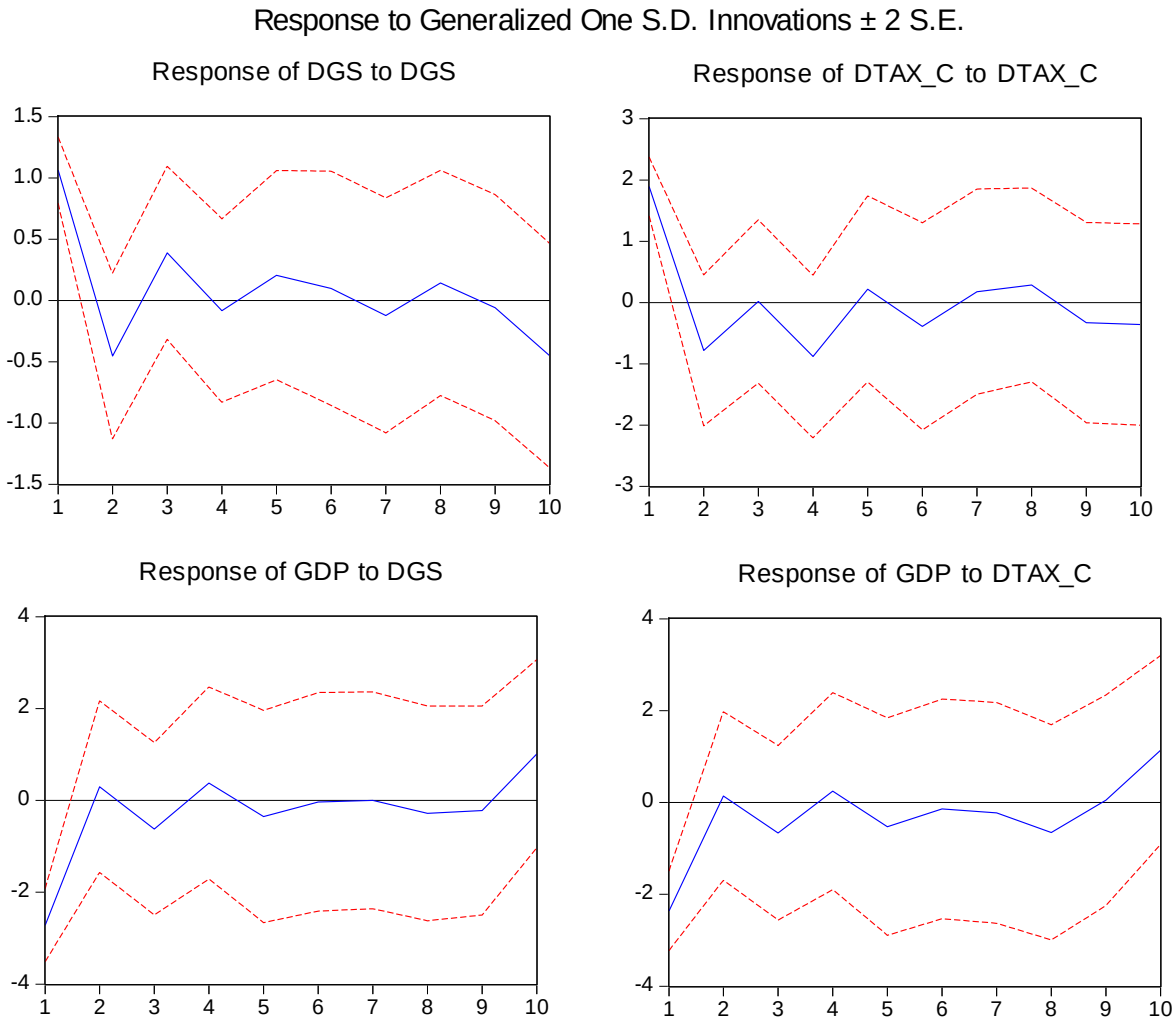

Figure 4.6: Impulse Responses of fiscal variables in Sweden (First difference)

Lastly, by first difference government spending and taxes, the responses still remain the same as the previous. As growth in taxes as the percentage of GDP increase by 1.80 percentage point, real GDP growth will decrease 2.10 percentage points. There is same going for the government spending, where growth in government spending as the percentage of GDP increase by 1.02 percentage point, real GDP growth will decrease 2.35 percentage points.

In order to find that whether there is the same responses of fiscal variables on the economic growth in the lower and average tax bracket as Sweden (higher tax bracket), Turkey (lower tax bracket) and Germany (average tax bracket) will be selected in this study.

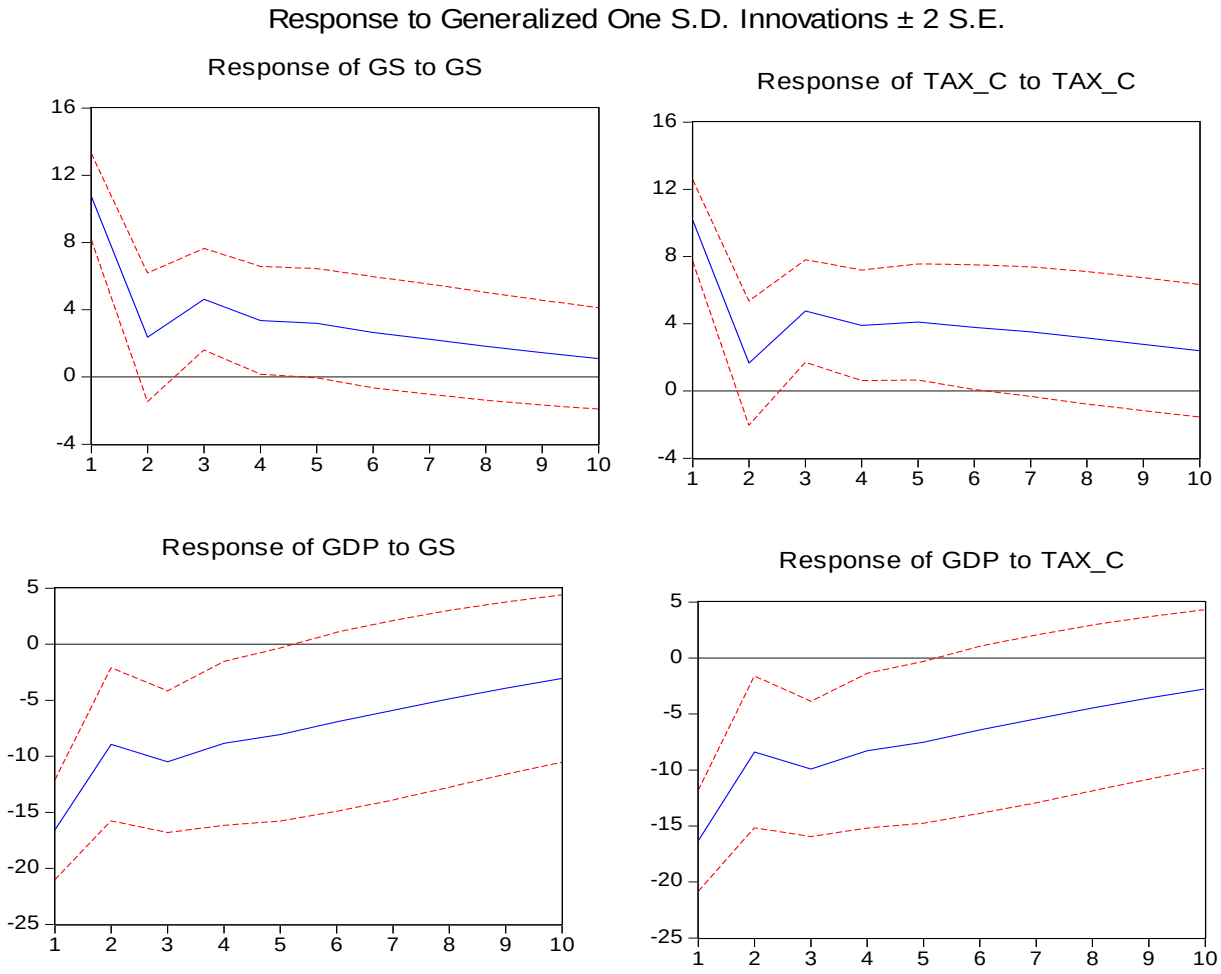

Figure 4.7: Impulse Responses of fiscal variables (First ordering) for Turkey

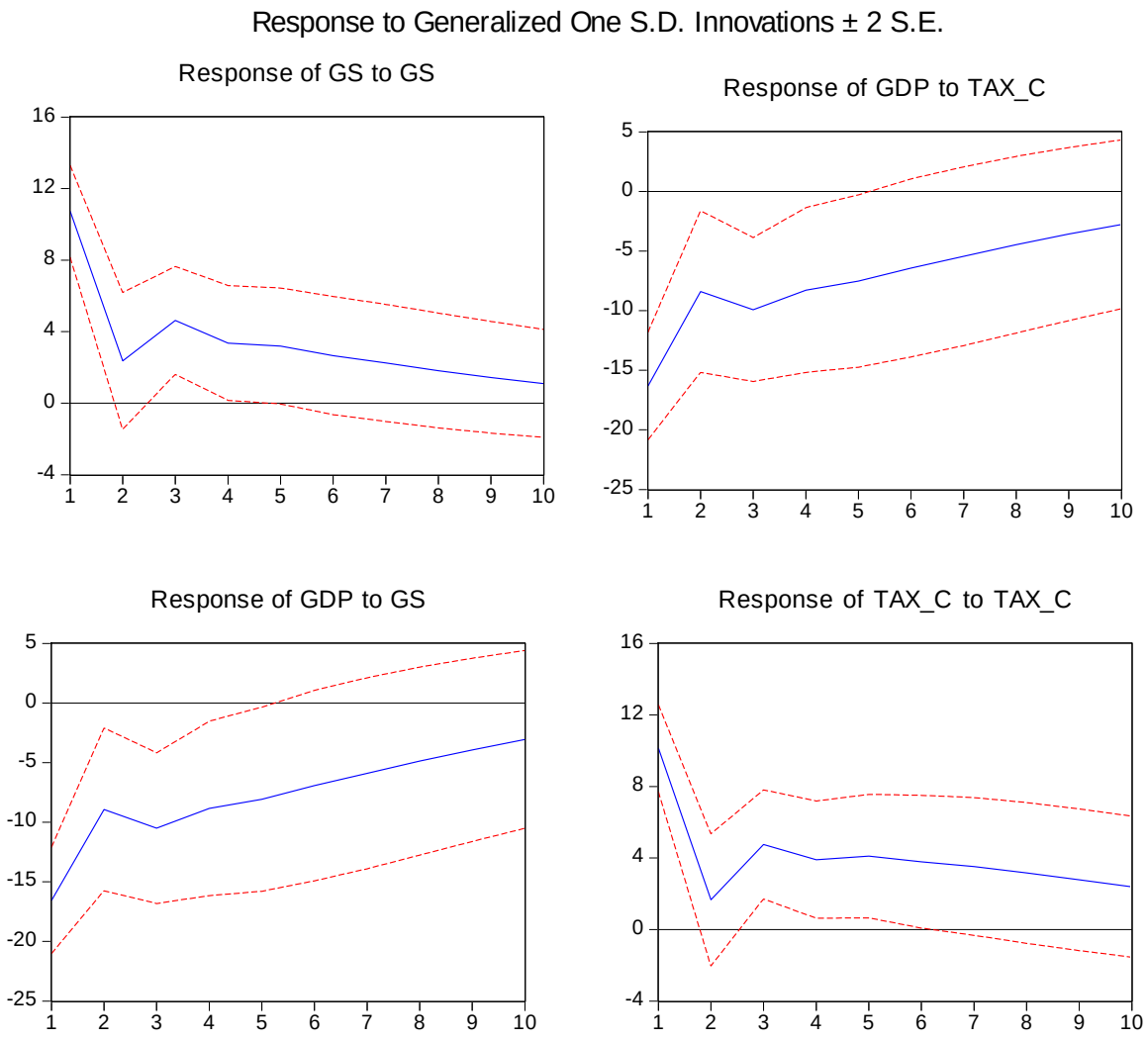

Figure 4.8: Impulse Responses of fiscal variables (Second ordering) for Turkey

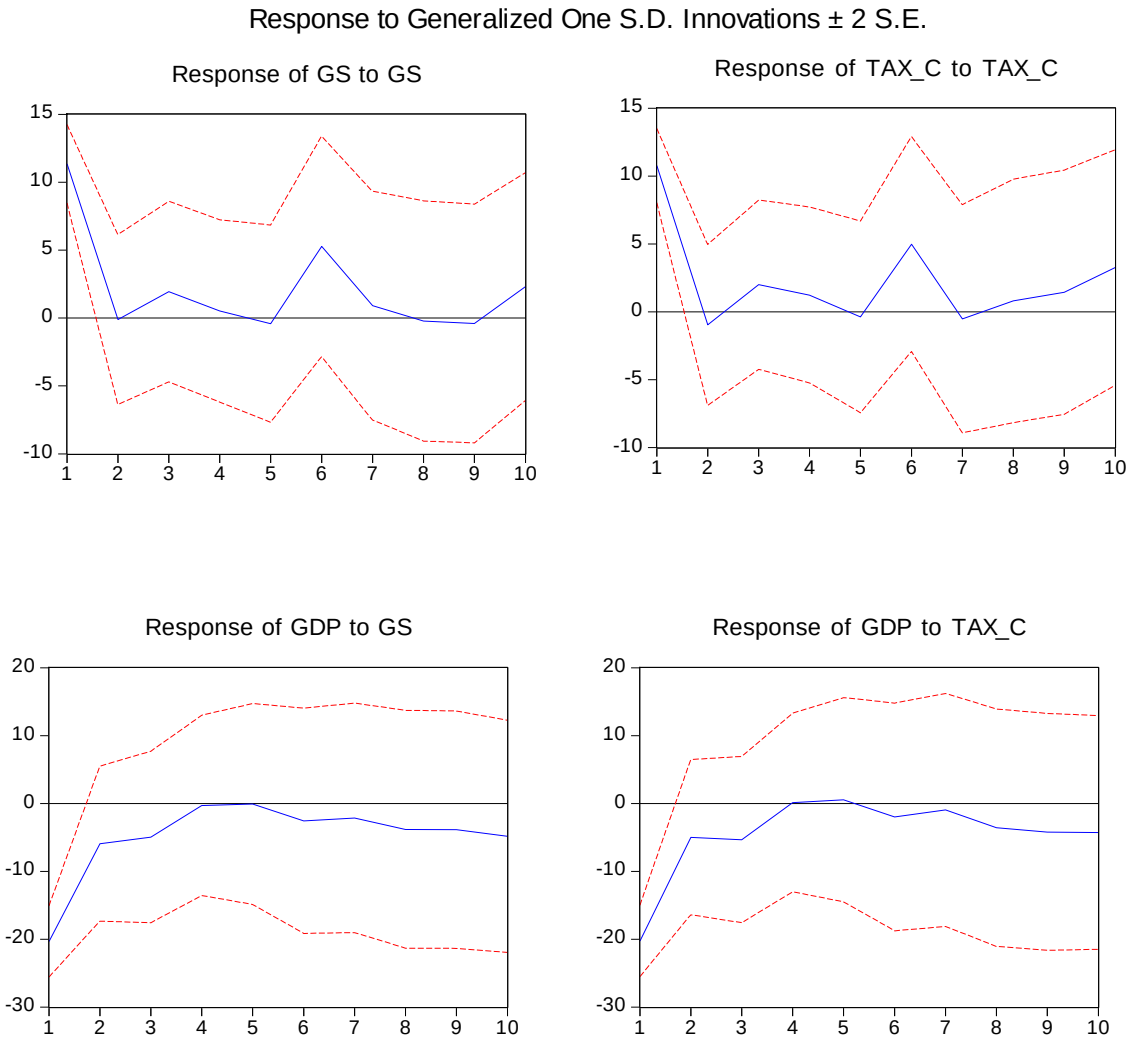

Figure 4.9: Impulse Responses (First ordering, with trend) for Turkey

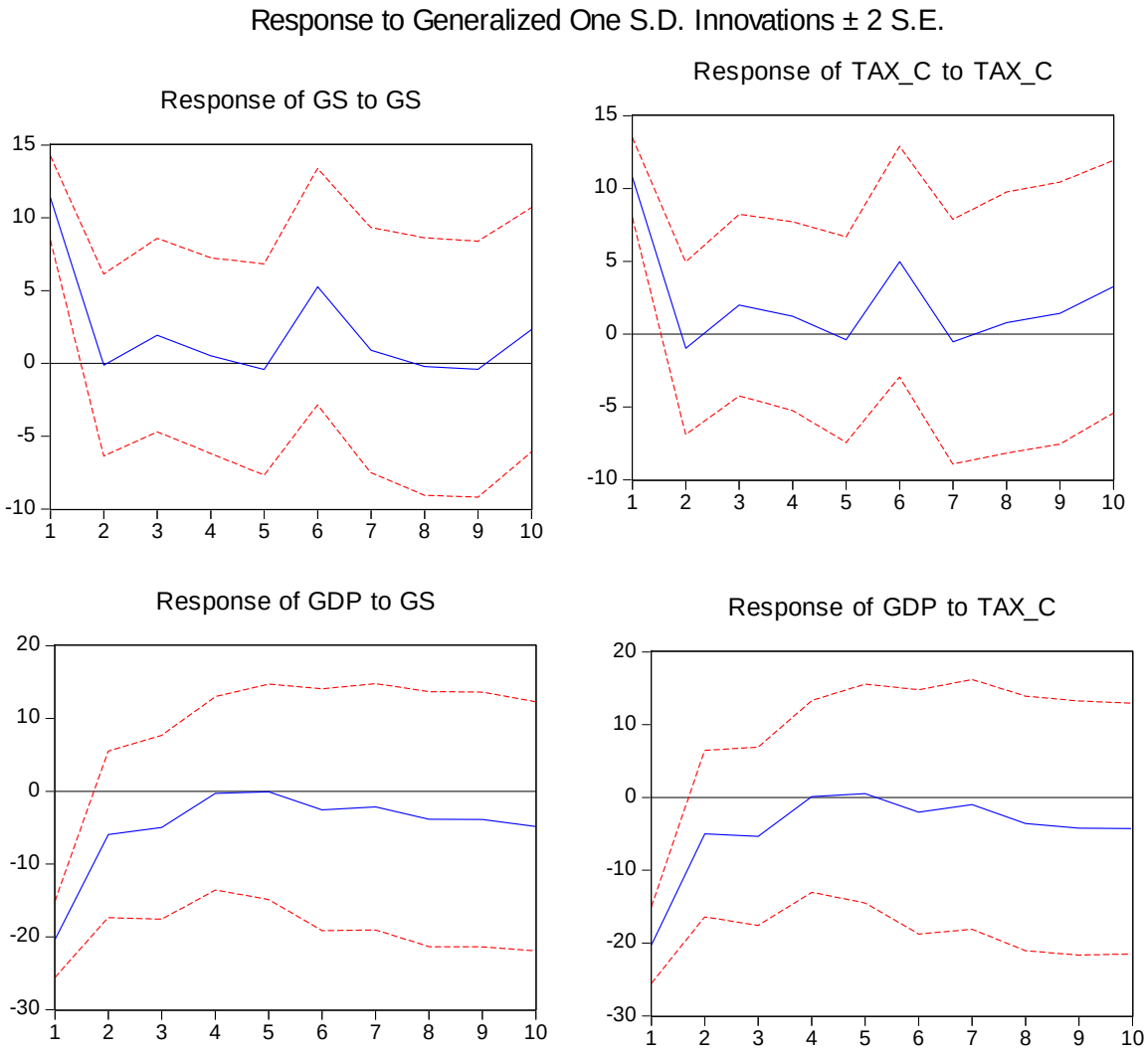

Figure 4.10: Impulse Responses of fiscal variables (Second ordering, with trend) for Turkey

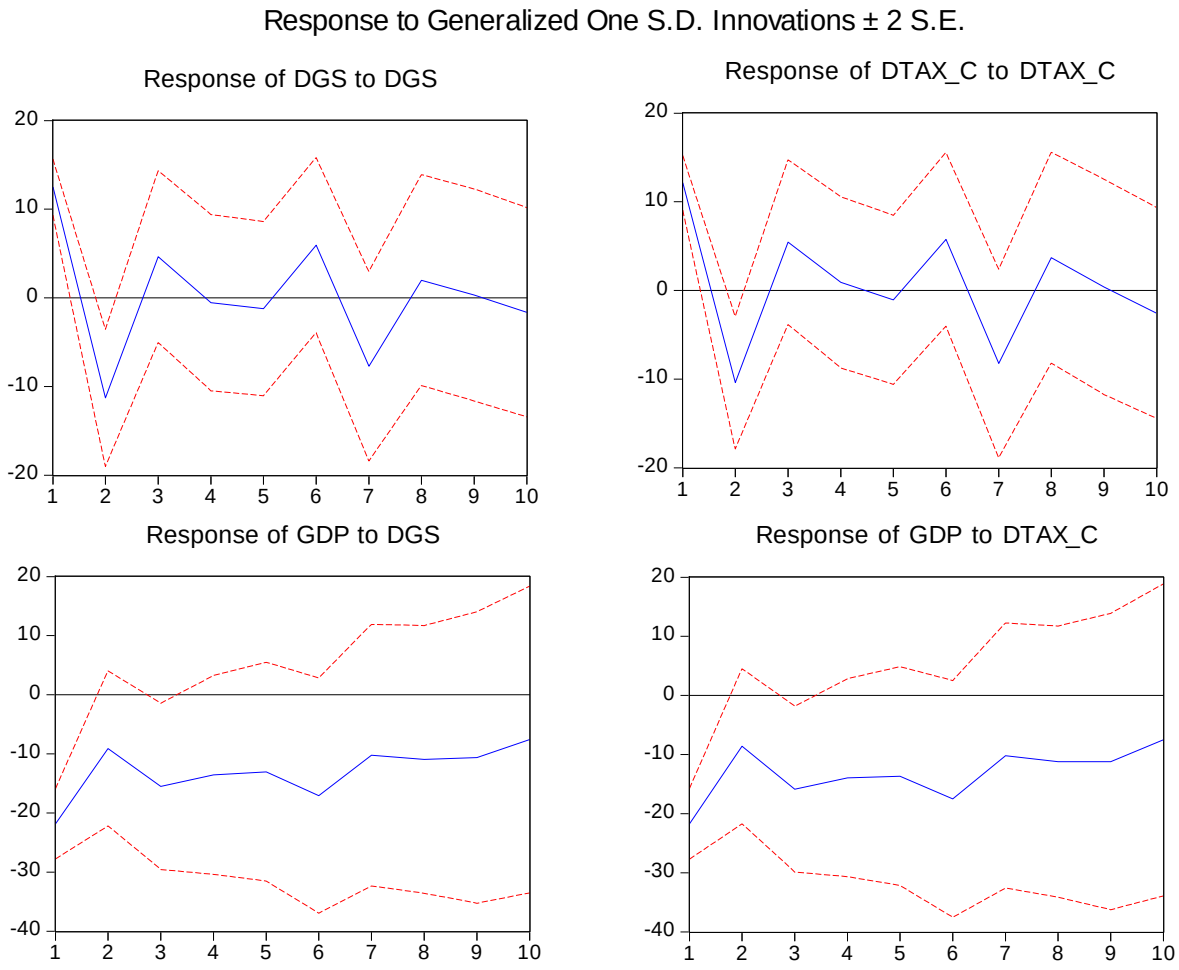

Figure 4.11: Impulse Responses of fiscal variables (First Difference) for Turkey

Figure 4.12 Impulse Responses of fiscal variables (First ordering) for Germany

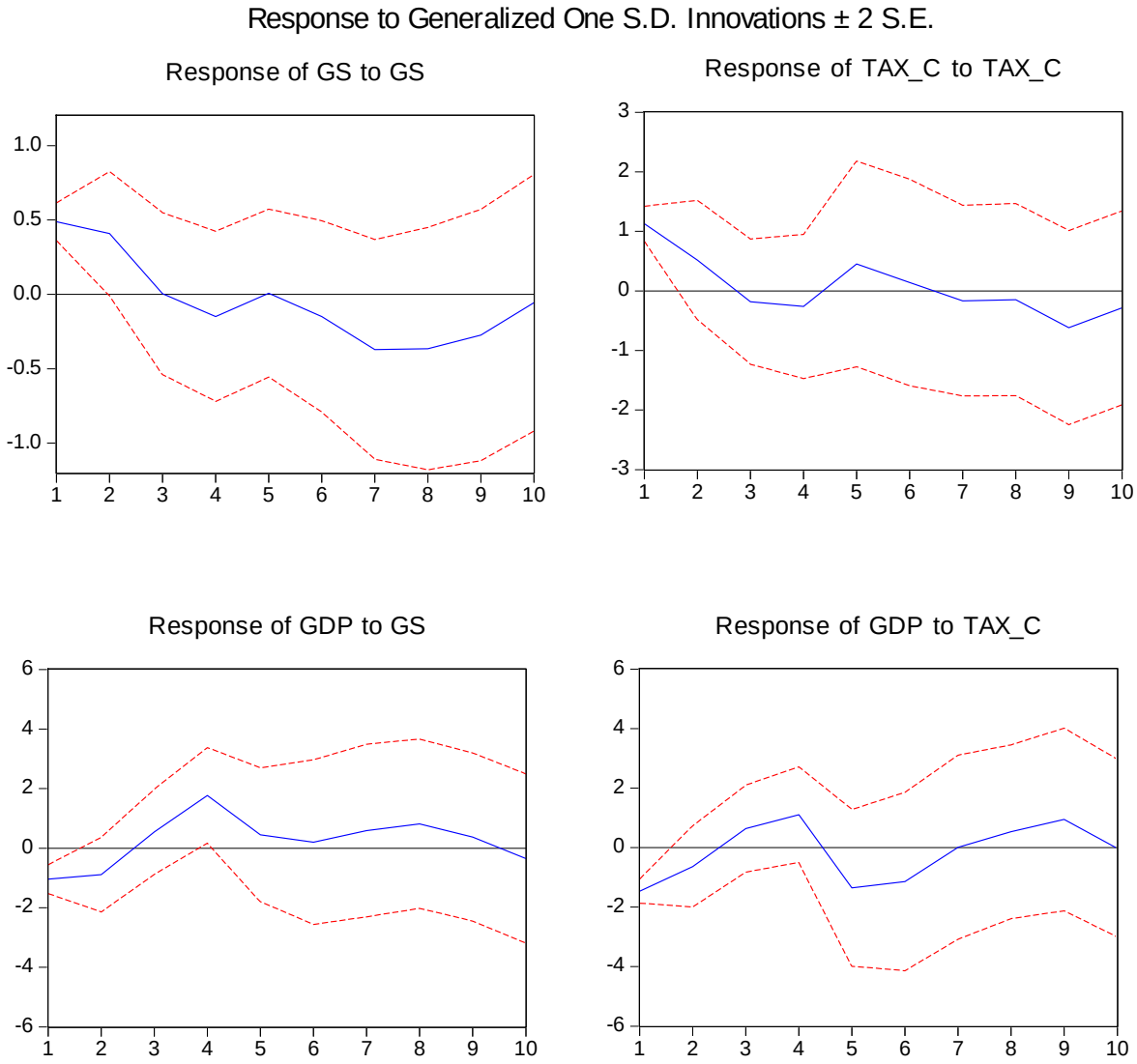

Figure 4.13: Impulse Responses of fiscal variables (Second ordering) for Germany

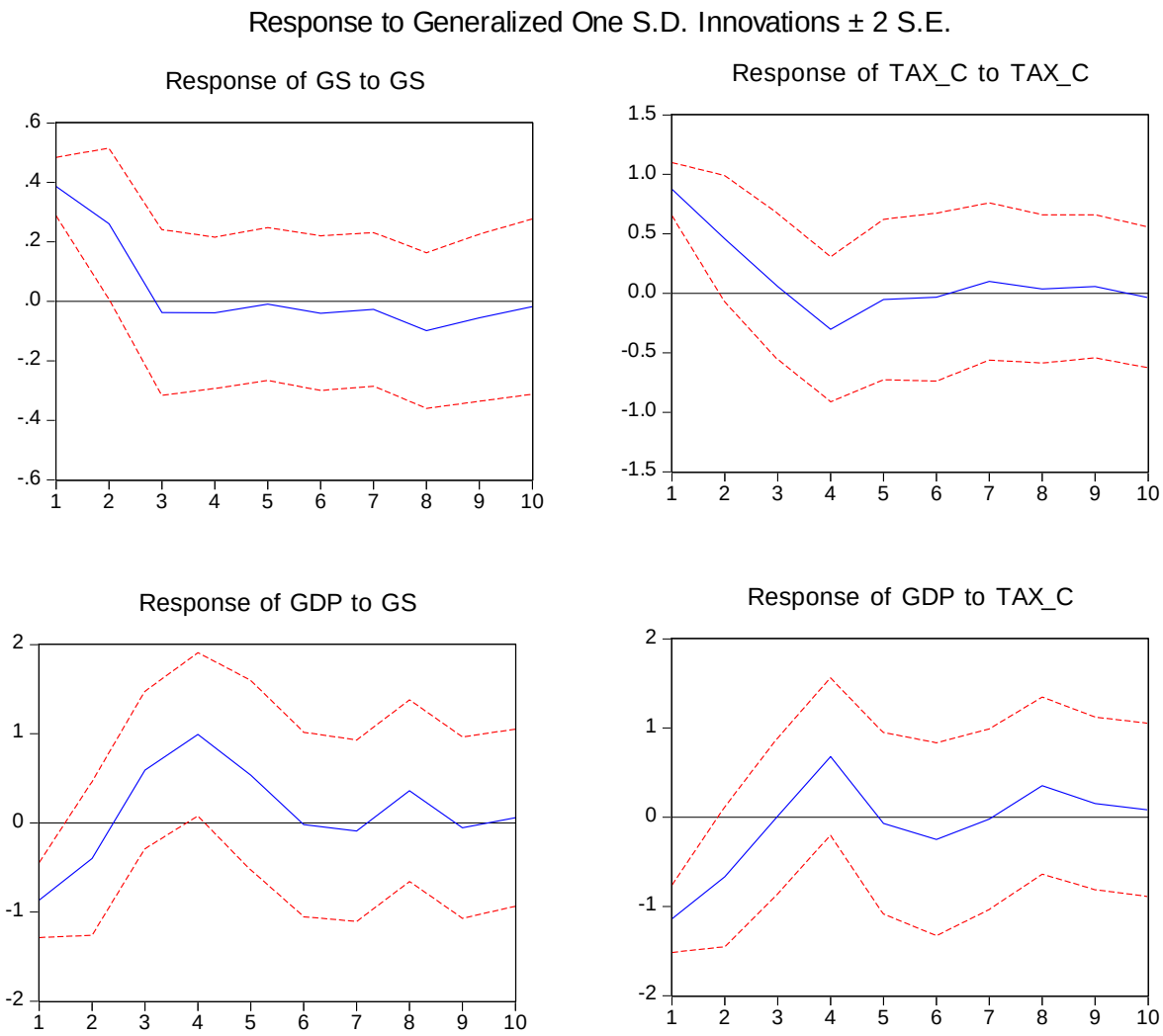

Figure 4.14: Impulse Responses of fiscal variables (First ordering, with trend) for Germany

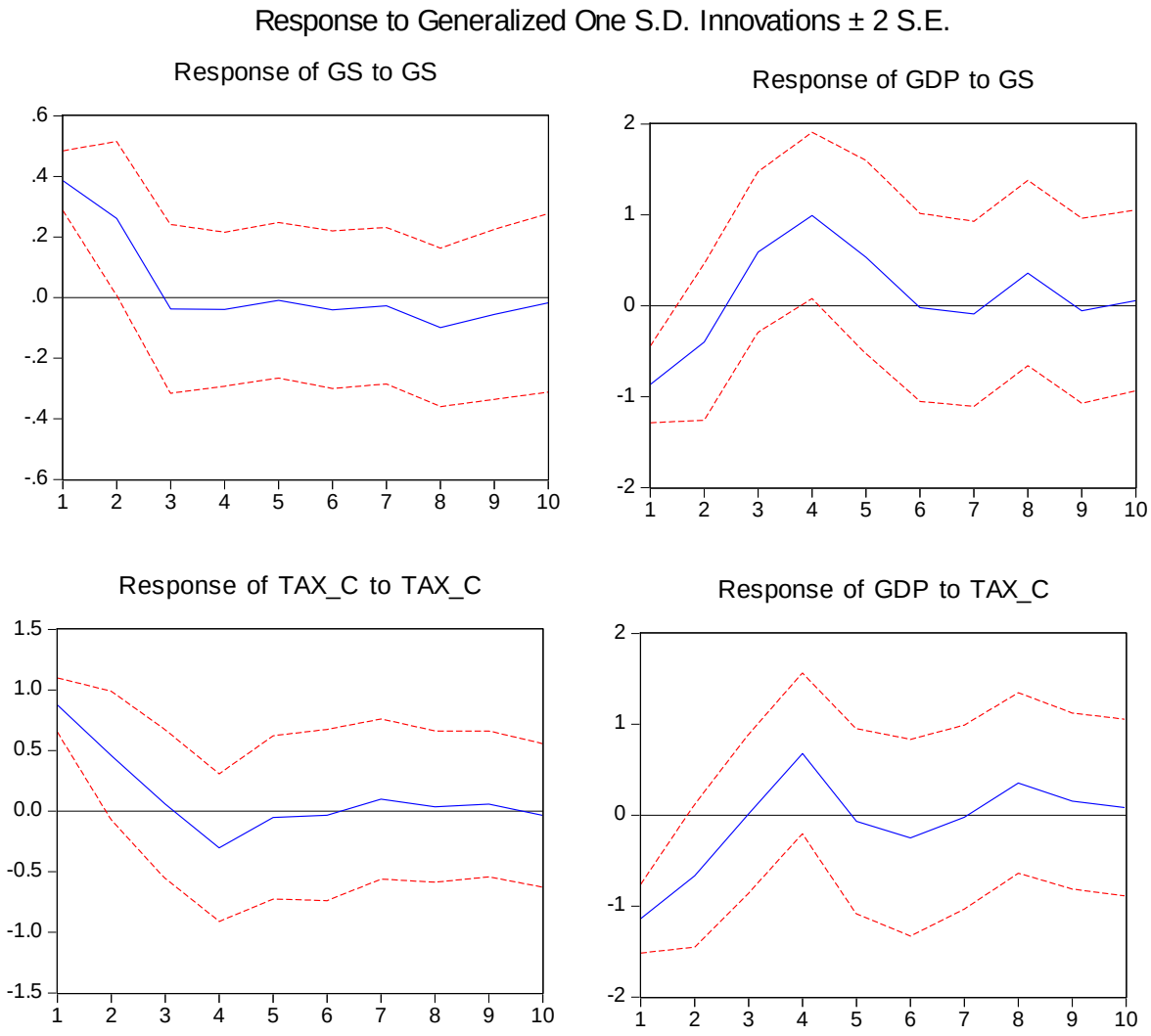

Figure 4.15: Impulse Responses of fiscal variables (Second ordering, with trend) for Germany

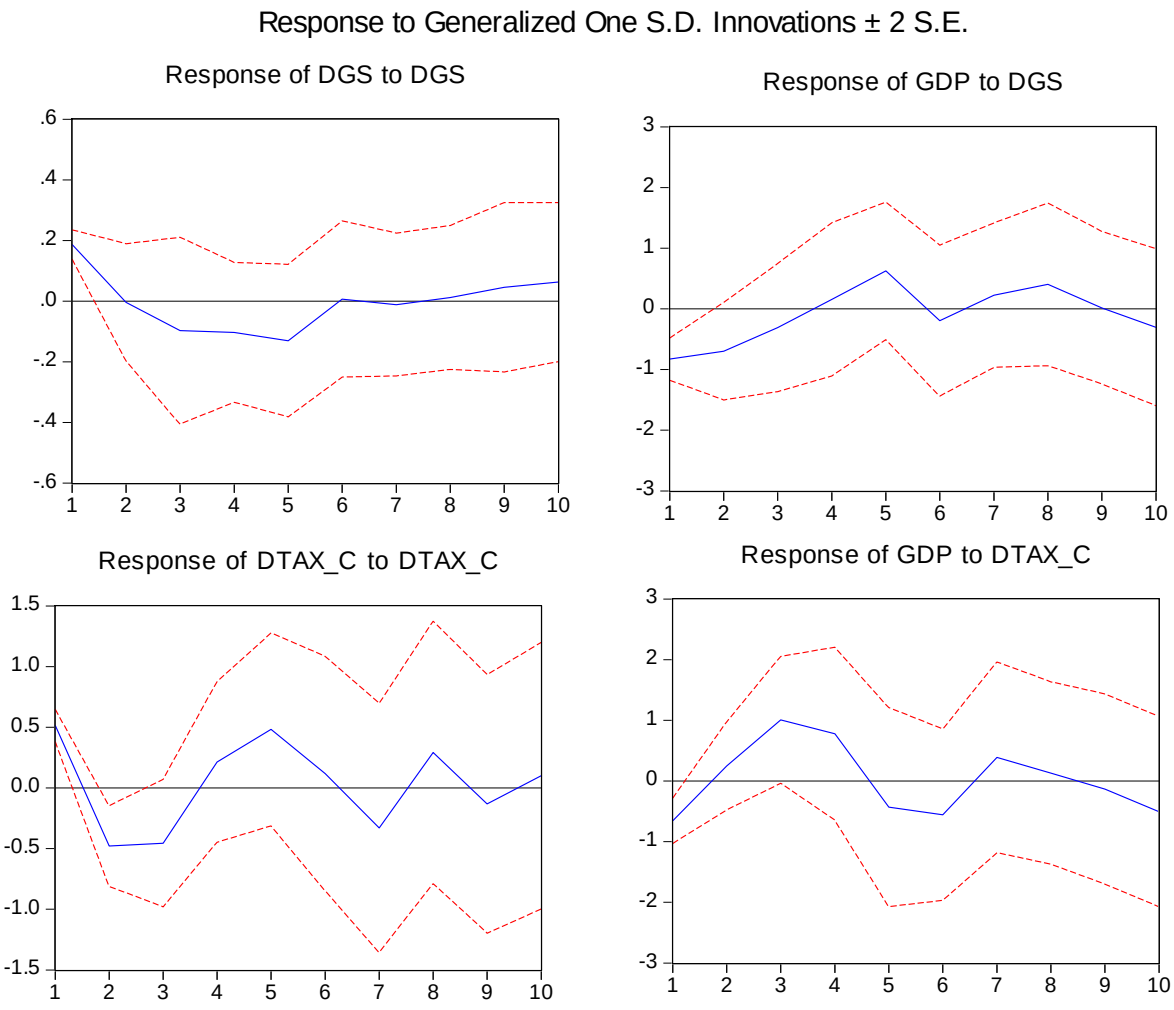

Figure 4.16: Impulse Responses of fiscal variables (First difference) for Germany

From Figure 4.7 to Figure 4.16, overall, the responses of the fiscal variables are always have the negative impact on the economic growth and does not die down. In conclusion, the result are very consistent and robust no matter the country is falling into which level of tax bracket; real GDP growth declined as the taxes or the government spending increase.

CHAPTER 5: CONCLUSION

5.0 INTRODUCTION

Our objective of this paper is to investigate the impact of taxation on the economic growth in Sweden with comparison to the other 16 OECD countries from 1971 to 2007, with the consideration of the effect of tax redistribution by the government. In order to reach for an in-depth study, we also examine the impact of component taxes on the economic growth in 17 OECD countries. This paper performs an empirical analysis on whether taxation has permanent or temporary effect on the economic growth and we adopt the Impulse Responses to examine how the economic growth response towards the fiscal variables. Hence, in this chapter, we will summarize the findings of the study. On the latter part, based on the result obtained in the study, our study suggest few policies implications and lastly, we will discuss some of the limitations of the study and recommendations that can be improved for further analysis.

5.1 DISCUSSION OF MAJOR FINDINGS

First and foremost, our results indicate that there is a statistically significant negative relationship between the taxation and economic growth, except for Spain and Netherlands. This negative relationship explained that higher taxations will discourage people from working and leads them to reduce their working hours and participate in those underground activities. Besides, higher taxation will reduce the incentive for investment and consumption. Through this mechanism, higher taxation put dampened pressure on the economy and retards the economic growth.

Secondly, our study had incorporated the government spending because we believe that the negative impact of taxation can be reduced when the government redistributed those tax

revenues to the nations. Nevertheless, our result shows that Sweden and the other 16 OECD countries exhibit a negative impact of government spending on the economic growth which tends to be contra with the results obtained by the previous researchers. This negative impact can be explained by crowding out effect through the use of interest rate and exchange rate channel. On one hand, as the government finances their spending through bonds issuance, it definitely leads to a higher interest rate, thus reduce the incentive to invest from the private sector. On the other hand, when those bonds are issued to those foreigners, it causes an appreciation in domestic currency because of the increase of demand for currency, which later reduces the export of the country. Besides, with the competition between the private sector and the less efficient public sector in the credit markets, interest rate usually rises which reduces the private investment and eventually retards the economic growth. In addition, when the important role of expectation and the effect of constant budget deficit have been included, a rise in government spending definitely causes an increase in the expected future taxes. Consumers and firms reduce their spending and investment due to the uncertainty in the future. Thus, in the long run, lower investment leads to a fall in the capital stock and then turn into lower GDP.

Furthermore, different taxes have different impact on the economic growth and it could be either positive or negative impact. For the import taxes, it has a positive effect on the economic growth for most of the OECD countries, while corporate taxes, good and services taxes, individual taxes and property taxes show a negative impact on the economic growth.

In addition, we found that when the countries fall into a higher tax bracket, taxation generally will have a permanent effect on the economic growth. For those higher tax bracket countries, the ratio of tax revenues is comparatively higher than the ratio of other sources of revenue and growth. Higher tax imposed by those countries can help the government to plan for the uncertainty in the future. Therefore, we conclude that tax revenue is an important resource for one country and it no longer has the short term effect but it lasted for a longer term.

Last but not least, in this paper, we have studied the impulse responses to find out the dynamic changes between the fiscal variables and the economic growth. We can conclude that

regardless of which level of tax bracket the country is falling, the responses of the government spending and taxes on the economic growth always have a short term negative impact.

5.2 POLICY IMPLICATIONS

Without a doubt, our results suggest that government need to reduce the taxation that levy on the nation as well as the government spending in terms of issuing bonds, it can benefits the economic growth. We found that without an effective rise in tax rate, larger government spending tends to hold back the economic growth. Hence, in order to promote economic growth, governments should make good use of the tax revenues to provide public infrastructure and transfer the revenue from taxes to household, it helps to out weight the negative impact of taxation which imposed to those nation.

Taxation always aims as the sources of the public expenditures and economic concern. Reform of taxation policy different across countries as it depends on the objectives to be achieved. However, lower taxation does not guarantee the achievement of higher growth rate. This is because it needs to be set up to minimize the tax payer's compliance costs and government administrative costs and at the same time it will also discourage tax evasion. Therefore, the level of taxation is not the only effect but it also takes into account of the way how government designs and combines the tax structures to generate more revenues and bring the long run growth.

The analysis of this paper suggests some of the policy implications that could be considered. Firstly, policy maker should raise the import tax in order to achieve for greater revenue and economic growth through protecting the domestic firms and create more jobs opportunity. Secondly, our results show that goods and services taxes have adverse effect on the economic growth. Lately, many countries switched their tax policy towards goods and services taxes as they believe that it can generate more revenue compare to other taxes. Nevertheless, those policy makers did not consider that goods and services are generally less progressive than

the individual or the corporate taxes. A shift from the corporate taxes to goods and services taxes will cause share prices to rise, along with the increase of wealth inequality and income inequality by lowering the corporate income taxes. Lastly, a reduction of the individual taxes will bring benefit to the economy growth. Higher individual taxes have the potentially adverse effect on the labor supply through the decision to works and hours to works. Besides, it also influences the firm's cost of labor especially when the tax cannot be shifted on the lower net wages. In this case, lower individual taxes can increase the national productivity through the increase in the labor supply and increase the job opportunity through increase in the labor demand.

In conclusion, if the government wants to use taxes as an effective tool to achieve long run economic growth, an appropriate design of the tax structures has more effective affect rather than reducing the level of taxes.

5.3 LIMITATIONS AND RECOMMENDATIONS

There are few limitations that we face in our study. First, in this study, we only focus on 17 OECD countries to examine the impact of taxation on economic growth. So here, for the extension studies, we suggest that future researcher can coverage other developed countries to find out whether taxation always have the negative impact on economic growth as what the theory suggested.

Furthermore, lack of diversity in this study also another limitation that we encountered. In this study, we only focus on those OECD countries as the established tax system in these countries is more complete and more details available compare to those developing and less developed countries. We would like to suggest for future studies, a further research can be carried out towards those developing and less developed countries to find out whether the impact of taxation on the economic growth is consistent with those developed countries or there is a different story.

In our study, we hit upon an issue where higher taxation will lead most of the tax payers to participate in the underground economy. However, we did not take into the account how the taxation affects the underground economy and thus the effect to the economic growth. In future, researchers can kindly focus on the limitations we discovered and proceeds with a better analysis.

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Appendix

Countries name

Austria	AT
Canada	CA
Denmark	DK
Finland	FI
France	FR
Germany	DE
Ireland	IE
Luxembourg	LU
Netherlands	NL
New Zealand	NZ
Norway	NO
Portugal	PT
Spain	ES
Sweden	SE
Switzerland	CH
Turkey	TR
United Kingdom	GB

Table A1: Results of Normality test for Dynamic OLS

Country	Jarque-Bera	df	p-value	Result
Lower Tax Bracket				
Turkey	1.5038	2	0.4715	Do not reject H_o
Switzerland	1.0328	2	0.5950	Do not reject H_o
Portugal	5.1695	2	0.0754	Do not reject H_o
Spain	0.9520	2	0.6213	Do not reject H_o
Average Tax Bracket				
Ireland	1.4920	2	0.4743	Do not reject H_o
New Zealand	0.4987	2	0.7793	Do not reject H_o

Canada	0.2138	2	0.8986	Do not reject H_o
United Kingdom	1.2945	2	0.5235	Do not reject H_0
Germany	1.0223	2	0.6057	Do not reject H_0
Luxembourg	1.9211	2	0.3844	Do not reject H_0
Higher Tax Bracket				
Austria	1.1902	2	0.5515	Do not reject H_0
France	0.1093	2	0.9468	Do not reject H_0
Finland	1.0893	2	0.5800	Do not reject H_0
Nerthlands	2.7836	2	0.2486	Do not reject H_0
Norway	0.9177	2	0.6320	Do not reject H_0
Denmark	0.3389	2	0.8441	Do not reject H_0
Sweden	0.0595	2	0.9707	Do not reject H_0

Notes:
Ho: Normally Distributed Residuals

Table A2: Results of LM Autocorrelation for Dynamic OLS

Country	p-value	p-value X^2	Result
Lower Tax Bracket			
Turkey	0.8828	0.8525	Do not reject H_0
Switzerland	0.9808	0.9753	Do not reject H_0
Portugal	0.1794	0.1251	Do not reject H_0
Spain	0.9253	0.9053	Do not reject H_0
Average Tax Bracket			
Ireland	0.8031	0.756	Do not reject H_0
New Zealand	0.6251	0.552	Do not reject H_0

Canada	0.1514	0.1031	Do not reject H_0
United Kingdom	0.5977	0.5222	Do not reject H_0
Germany	0.6294	0.5568	Do not reject H_0
Luxembourg	0.1321	0.0844	Do not reject H_0
Higher Tax Bracket			
Austria	0.4769	0.3956	Do not reject H_0
France	0.5366	0.4571	Do not reject H_0
Finland	0.2097	0.1254	Do not reject H_0
Nerthlands	0.1593	0.099	Do not reject H_0
Norway	0.1403	0.0953	Do not reject H_0
Denmark	0.842	0.8027	Do not reject H_0
Sweden	0.2576	0.1897	Do not reject H_0

Notes:

H_0: No Autocorrelation

Table A3: Results of ARCH for Dynamic OLS

Country	p-value	p-value X^2	Result
Lower Tax Bracket			
Turkey	0.076	0.0722	Do not reject H_0
Switzerland	0.1368	0.129	Do not reject H_0
Portugal	0.911	0.9077	Do not reject H_0
Spain	0.8834	0.8791	Do not reject H_0
Average Tax Bracket			
Ireland	0.4545	0.4396	Do not reject H_0
New Zealand	0.3274	0.3131	Do not reject H_0
Canada	0.2194	0.2077	Do not reject H_0
United Kingdom	0.734	0.7246	Do not reject H_0
Germany	0.9321	0.9202	Do not reject H_0
Luxembourg	0.8833	0.879	Do not reject H_0

Higher Tax Bracket			
Austria	0.8125	0.8057	Do not reject H_0
France	0.5194	0.5051	Do not reject H_0
Finland	0.2926	0.2788	Do not reject H_0
Nerthlands	0.5086	0.4942	Do not reject H_0
Norway	0.6713	0.6495	Do not reject H_0
Denmark	0.994	0.9938	Do not reject H_0
Sweden	0.6918	0.6812	Do not reject H_0

Notes:
H0: No Heteroscedasticity

Table A4: Result of Normality for Corporation tax

Country	Jarque-Bera	df	p-value	Result
Lower Tax Bracket				
Turkey	0.799	2	0.6706	Do not reject H_0
Portugal	0.6716	2	0.7148	Do not reject H_0
Spain	0.3097	2	0.8565	Do not reject H_0
Average Tax Bracket				
Ireland	1.1368	2	0.5664	Do not reject H_0
Canada	5.117	2	0.0774	Do not reject H_0
Luxembourg	1.3293	2	0.5144	Do not reject H_0
Higher Tax Bracket				
France	21.5519	2	0	Reject H_0
Denmark	0.504	2	0.7772	Do not reject H_0
Sweden	0.807	2	0.668	Do not reject H_0

Notes:

H_0: Normally distributed residuals

Table A5: Result of LM Autocorrelation for Corporation tax

Country	p-value	p-value X^2	Result
Lower Tax Bracket			
Turkey	0.8384	0.8104	Do not reject H_0
Portugal	0.1188	0.0947	Do not reject H_0
Spain	0.2886	0.2391	Do not reject H_0
Average Tax Bracket			
Ireland	0.1511	0.1238	Do not reject H_0
Canada	0.2017	1617	Do not reject H_0
Luxembourg	0.1829	0.1456	Do not reject H_0
Higher Tax Bracket			
France	0.1183	0.0918	Do not reject H_0
Denmark	0.763	0.7249	Do not reject H_0
Sweden	0.1608	0.1268	Do not reject H_0

Notes:

H_0: No Autocorrelation

Table A6: Result of ARCH for Corporation tax

Country	p-value	p-value X^2	Result
Lower Tax Bracket			
Turkey	0.2700	0.2474	Do not reject H_0
Portugal	0.1710	0.1614	Do not reject H_0
Spain	0.346	0.3314	Do not reject H_0
Average Tax Bracket			
Ireland	0.3725	0.3577	Do not reject H_0
Canada	0.4076	0.3927	Do not reject H_0
Luxembourg	0.1212	0.1143	Do not reject H_0

Higher Tax Bracket			
France	0.8905	0.8864	Do not reject H_0
Denmark	0.4308	0.4158	Do not reject H_0
Sweden	0.4354	0.4204	Do not reject H_0

Notes:

H_0: No heteroscedasticity

Table A7: Result of Normality for Goods and Service tax

Country	Jarque-Bera	df	p-value	Result
Lower Tax Bracket				
Turkey	0.4474	2	0.7996	Do not reject H_0
Portugal	0.4892	2	0.7830	Do not reject H_0
Spain	0.9058	2	0.6358	Do not reject H_0
Average Tax Bracket				
Ireland	1.0120	2	0.6029	Do not reject H_0
Canada	4.3155	2	0.1156	Do not reject H_0
Luxembourg	2.3502	2	0.3088	Do not reject H_0
Higher Tax Bracket				
France	23.7756	2	0000	Reject H_0
Denmark	1.5751	2	0.4550	Do not reject H_0
Sweden	2.2440	2	0.3256	Do not reject H_0

Notes:
H_0: Normally distributed residuals

Table A8: Result of LM Autocorrelation for Goods and Service tax

Country	p-value	p-value X^2	Result
Lower Tax Bracket			
Turkey	0.9389	0.9273	Do not reject H_0
Portugal	0.1999	0.1481	Do not reject H_0
Spain	0.1506	0.1183	Do not reject H_0
Average Tax Bracket			

Ireland	0.2660	0.1962	Do not reject H_0
Canada	0.1777	0.1366	Do not reject H_0
Luxembourg	0.3086	0.2574	Do not reject H_0
Higher Tax Bracket			
France	0.278	0.2095	Do not reject H_0
Denmark	0.8609	0.8363	Do not reject H_0
Sweden	0.2583	0.2116	Do not reject H_0

Notes:

H_0: No autocorrelation

Table A9: Result of ARCH for Goods and Service tax

Country	p-value	p-value X^2	Result
Lower Tax Bracket			
Turkey	0.163	0.1538	Do not reject H_0
Portugal	0.1459	0.1376	Do not reject H_0
Spain	0.6826	0.6719	Do not reject H_0
Average Tax Bracket			
Ireland	0.3998	0.3849	Do not reject H_0
Canada	0.6164	0.6039	Do not reject H_0
Luxembourg	0.4183	0.4034	Do not reject H_0
Higher Tax Bracket			
France	0.8985	0.8947	Do not reject H_0
Denmark	0.5702	0.5568	Do not reject H_0
Sweden	0.9525	0.9507	Do not reject H_0

Notes:

H_0: No heteroscedasticity

Table A10: Result of Normality for Import tax

Country	Jarque-Bera	df	p-value	Result
Lower Tax Bracket				
Turkey	0.4633	2	0.7932	Do not reject H_0
Portugal	0.4283	2	0.8072	Do not reject H_0
Spain	1.1131	2	0.5732	Do not reject H_0
Average Tax Bracket				
Ireland	0.8031	2	0.6693	Do not reject H_0
Canada	1.0664	2	0.5867	Do not reject H_0
Luxembourg	1.9760	2	0.3723	Do not reject H_0
Higher Tax Bracket				
France	13.8851	2	0.0010	Reject H_0
Denmark	0.1837	2	0.9123	Do not reject H_0
Sweden	0.0222	2	0.9889	Do not reject H_0

Notes:
H_0: Normally distributed residuals

Table A11: Result of LM Autocorrelation for Import tax

Country	p-value	p-value X^2	Result
Lower Tax Bracket			
Turkey	0.9867	0.9841	Do not reject H_0
Portugal	0.1406	0.1134	Do not reject H_0
Spain	0.1490	0.1170	Do not reject H_0
Average Tax Bracket			
Ireland	0.1838	0.1354	Do not reject H_0
Canada	0.2692	0.2214	Do not reject H_0
Luxembourg	0.1673	0.1323	Do not reject H_0
Higher Tax Bracket			
France	0.2084	0.1675	Do not reject H_0
Denmark	0.6738	0.6265	Do not reject H_0
Sweden	0.3794	0.3243	Do not reject H_0

Notes:
H_0: No autocorrelation

Table A12: Result of ARCH for Import tax

Country	p-value	p-value X^2	Result
Lower Tax Bracket			
Turkey	0.1089	0.1037	Do not reject H_0
Portugal	0.1104	0.1043	Do not reject H_0
Spain	0.8045	0.7974	Do not reject H_0
Average Tax Bracket			
Ireland	0.6463	0.6345	Do not reject H_0
Canada	0.6483	0.6365	Do not reject H_0
Luxembourg	0.1418	0.1389	Do not reject H_0
Higher Tax Bracket			
France	0.6399	0.6218	Do not reject H_0
Denmark	0.4361	0.4212	Do not reject H_0
Sweden	0.7848	0.777	Do not reject H_0

Notes:

H_0: No heteroscedasticity

Table A13: Result of Normality for Individual Tax

Country	Jarque-Bera	df	p-value	Result
Lower Tax Bracket				
Turkey	1.0626	2	0.5859	Do not reject H_0
Portugal	1.1449	2	0.5642	Do not reject H_0
Spain	0.6809	2	0.7114	Do not reject H_0
Average Tax Bracket				
Ireland	0.567	2	0.7531	Do not reject H_0
Canada	0.6784	2	0.0336	Do not reject H_0

Luxembourg	0.9061	2	0.6357	Do not reject H_0
Higher Tax Bracket				
France	12.4936	2	0.0019	Reject H_0
Denmark	0.3695	2	0.8313	Do not reject H_0
Sweden	0.0469	2	0.9768	Do not reject H_0

Notes:

H_0: Normally distributed residuals

Table A14: Result of LM Autocorrelation for Individual tax

Country	p-value	p-value X^2	Result
Lower Tax Bracket			
Turkey	0.9028	0.8849	Do not reject H_0
Portugal	0.1262	0.1052	Do not reject H_0
Spain	0.1184	0.092	Do not reject H_0
Average Tax Bracket			
Ireland	0.1998	0.16	Do not reject H_0
Canada	0.3765	0.3215	Do not reject H_0
Luxembourg	0.2654	0.218	Do not reject H_0
Higher Tax Bracket			
France	0.1943	0.1553	Do not reject H_0
Denmark	0.3586	0.3043	Do not reject H_0
Sweden	0.411	0.3549	Do not reject H_0

Notes:

H_0: No autocorrelation

Table A15: Result of ARCH for Individual tax

Country	p-value	p-value X^2	Result
Lower Tax Bracket			
Turkey	0.1034	0.11	Do not reject H_0
Portugal	0.4695	0.4547	Do not reject H_0
Spain	0.2087	0.1975	Do not reject H_0
Average Tax Bracket			
Ireland	0.2900	0.2764	Do not reject H_0
Canada	0.5347	0.5207	Do not reject H_0
Luxembourg	0.2198	0.2054	Do not reject H_0
Higher Tax Bracket			
France	0.5307	0.5165	Do not reject H_0
Denmark	0.7757	0.7676	Do not reject H_0
Sweden	0.6875	0.6768	Do not reject H_0

Notes:

H_0: No heteroscedasticity

Table A16: Result of Normality for Property tax

Country	Jarque-Bera	df	p-value	Result
Lower Tax Bracket				
Turkey	1.5700	2	0.4561	Do not reject H_0
Portugal	2.3373	2	0.3108	Do not reject H_0
Spain	0.800	2	0.6704	Do not reject H_0
Average Tax Bracket				
Canada	1.3525	2	0.5085	Do not reject H_0
Germany	2.0847	2	0.3526	Do not reject H_0
Luxembourg	1.7133	2	0.4246	Do not reject H_0

Higher Tax Bracket				
France	19.7022	2	0.0000	Reject H_0
Denmark	1.7948	2	0.4076	Do not reject H_0
Sweden	0.2283	2	0.8921	Do not reject H_0

Notes:
H_0: Normally distributed residuals

Table A17: Result of LM Autocorrelation for Property tax

Country	p-value	p-value X^2	Result
Lower Tax Bracket			
Turkey	0.7078	0.6636	Do not reject H_0
Portugal	0.2007	0.1554	Do not reject H_0
Spain	0.3444	0.2909	Do not reject H_0
Average Tax Bracket			
Ireland	0.228	0.1846	Do not reject H_0
Canada	0.1315	0.0982	Do not reject H_0
Luxembourg	0.1314	0.1025	Do not reject H_0
Higher Tax Bracket			
France	0.3564	0.3023	Do not reject H_0
Denmark	0.8761	0.8538	Do not reject H_0
Sweden	0.5655	0.5111	Do not reject H_0

Notes:

H_0: No autocorrelation

Table A18: Result of ARCH for Property tax

Country	p-value	p-value X^2	Result
Lower Tax Bracket			
Turkey	0.1423	0.1342	Do not reject H_0
Portugal	0.5768	0.5634	Do not reject H_0

Spain	0.8818	0.8774	Do not reject H_0
Average Tax Bracket			
Ireland	0.3128	0.2987	Do not reject H_0
Canada	0.9513	0.9495	Do not reject H_0
Luxembourg	0.8144	0.8076	Do not reject H_0
Higher Tax Bracket			
France	0.6856	0.6748	Do not reject H_0
Denmark	0.2872	0.2736	Do not reject H_0
Sweden	0.4544	0.4395	Do not reject H_0

Notes:

H_0: No heteroscedasticity

Table A19: Results of Corporation tax and economic growth

Country	GS	INF	COR
Lower Tax Bracket			
Turkey	-0.2951	0.8560	-2.6625
	(2.2480)**	(-15.5933)***	(2.5519)**
Portugal	-1.3437	-0.7268	-0.2857
	(-6.8314)***	(-13.7218)***	(-0.6636)***
Spain	1.7261	-0.8478	1.1704
	(-10.6798)***	(16.2141)***	(3.8030)***
Average Tax Bracket			
Ireland	-0.9243	-60.3646	-1.1225
	(-2.0041)*	(-3.6260)***	(1.3970)
Canada	-0.1120	-0.3964	1.3705
	(-0.3046)	(-1.6126)	(1.5407)
Luxembourg	-2.1500	0.7354	-0.7651
	(-2.9495)***	(-3.4163)***	(-1.3602)
Higher Tax Bracket			
France	-1.332	-0.4384	-1.003

	(6.2698)***	(-6.8207)***	(-1.4270)***
Denmark	-0.7560	-0.2820	-1.1543
	(-2.4741)**	(-1.7641)	(-2.0827)**
Sweden	-0.9918	-0.4828	-1.9050
	(-4.6584)***	(-3.0459)***	(-1.9439)*

Notes:

***,**,* indicates 1%, 5%, and 10% significant level respectively.

t-statistics are in parentheses.

Table A20: Results of Good and Services tax and economic growth

Country	GS	INF	GSC
Lower Tax Bracket			
Turkey	-0.4129	-0.8377	-0.2965
	(-3.5026)***	(-14.3527)***	(-1.9321)*
Portugal	-1.3600	-0.7371	0.0090
	(-2.3209)**	(-9.167)***	(0.0145)
Spain	-1.6172	-1.0078	-0.1109
	(-6.3143)***	(-9.6840)***	(-0.3309)
Average Tax Bracket			
Ireland	0.2412	-74.6913	-0.9813
	-0.6438	(-5.3252)***	(2.8634)***
Canada	-0.3167	-0.0069	-0.8672
	(-0.9612)	(-0.0343)	(-1.0150)
Luxembourg	-1.9584	-1.0175	-1.1469
	(-3.3875)***	(-5.1741)***	(-3.8795)***
Higher Tax Bracket			
France	-1.124	-0.4221	0.1912
	(-5.3948)***	(-5.1062)***	-0.3785
Denmark	-0.2586	-0.3699	-0.7378
	(-0.8538)	(2.0996)**	(-1.8676)*
Sweden	-0.4223	-0.5985	-2.0914
	(-3.0148)***	(-6.0419)***	(-6.3141)***

Notes:

***,**,* indicates 1%, 5%, and 10% significant level respectively.
t-statistics are in parentheses.

Table A21: Results of Import tax and economic growth

Country	GS	INF	IM
Lower Tax Bracket			
Turkey	-0.5712	-0.8189	2.0666
	(4.9792)***	(13.8920)***	(2.2693)**
Portugal	-1.4647	-0.6896	-0.5032
	(-3.8770)***	(-4.8051)***	(-0.3597)
Spain	-1.7118	-0.9479	0.6980
	(-8.5876)***	(-15.5177)***	(-0.7586)
Average Tax Bracket			
Ireland	-0.59937	-68.1731	1.8777
	(-1.5205)	(-4.3253)***	(0.6471)
Canada	-1.5381	-0.7516	12.8552
	(-7.7252)***	(-5.6933)***	(7.6194)***
Luxembourg	-2.6426	-0.6815	6.0295
	(-3.9502)***	(-3.0868)***`	(0.6877)
Higher Tax Bracket			
France	-1.2932	-0.5004	6.3526
	(-6.8369)***	(-6.7342)***	(2.0776)**
Denmark	-0.4468	-0.3559	3.1482
	(-1.5876)	(-2.0175)*	(1.7246)*
Sweden	-0.7890	-0.3072	0.5513
	(-4.0190)***	(-2.0774)**	(0.3038)

Notes:

***,**,* indicates 1%, 5%, and 10% significant level respectively.

t-statistics are in parentheses.

Table A22: Results of Individual tax and economic growth

Country	GS	INF	IND
Lower Tax Bracket			
Turkey	-0.2618	-0.8500	-0.9306
	(-1.6353)	(14.8220)***	(-1.9694)*

Portugal	-1.2489	-0.7989	-0.7866
	(-5.8368)***	(-12.8694)***	(-1.5834)
Spain	-2.0490	-0.9291	0.4038
	(-4.7040)***	(13.5200)***	(0.9624)
Average Tax Bracket			
Ireland	-0.4205	-62.6240	-0.9922
	(-1.6297)	(-4.9489)***	(-4.2023)***
Canada	-0.1476	-0.6197	-1.2662
	(-0.8215)	(-4.4086)***	(-6.2506)***
Luxembourg	-3.6685	-0.7070	0.984
	(-3.9098)***	(-3.4714)***	(1.5555)
Higher Tax Bracket			
France	-1.2715	-0.5125	-0.5476
	(-7.3233)***	(-7.9177)***	(-3.0379)***
Denmark	-0.3553	-0.5123	-0.8968
	(-1.6794)	(-3.9103)***	(-5.5047)***
Sweden	-0.7846	-0.2948	0.0325
	(-3.7350)***	(-1.7666)*	(0.0940)

Notes:

***,**,* indicates 1%, 5%, and 10% significant level respectively.
t-statistics are in parentheses.

Table A23: Results of Property tax and economic growth

Country	GS	INF	PROPERTY
Lower Tax Bracket			
Turkey	-0.5822	-0.8287	0.8343
	(-3.3200)***	(-11.1583)***	-0.7072
Portugal	-1.3516	-87140	-4.5942
	(-6.9776)***	(12.3042)***	(-2.4905)**
Spain	-1.8165	-0.8968	1.3982
	(-9.8321)***	(-16.8109)***	(2.6005)**
Average Tax Bracket			
Ireland	-0.6486	-60.9346	2.1897
	(-2.2005)**	(-4.2690)***	(2.87713)***
Canada	-0.0365	-0.6928	-4.7848
	(-0.1380)	(-3.0286)***	(-3.3076)***

Luxembourg	-2.8150	-0.9470	-2.8452
	(-4.7664)***	(-4.5872)***	(-3.1306)***
Higher Tax Bracket			
France	-1.0124	-0.6762	-1.9563
	(-5.2965)***	(-5.5929)***	(2.5592)**
Denmark	-0.4749	-0.0423	-2.6136
	(-1.6971)*	(-0.2202)	(-1.7942)*
Sweden	-0.6289	-0.5152	-1.6597
	(-3.2982)***	(3.2650)***	(-2.2344)**

Notes:

***,**,* indicates 1%, 5%, and 10% significant level respectively.
t-statistics are in parentheses.