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FISKALINĖS POLITIKOS POVEIKIS ASMENINĖMS VARTOJIMO IŠLAIDOMS IR INVESTICIJOMS	**IMPACT OF FISCAL POLICY ON PERSONAL CONSUMPTION EXPENDITURE AND INVESTMENTS**

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INTRODUCTION

Fiscal policy is viewed in the wide range of scientific literature, but its effectiveness remains the issue under investigation, including determination of the effects on the economic growth in the country and long-term development (Nguyen, 2018). The Great Recession has substantially changed the perception of the macroeconomic effects of the fiscal policy on the country's growth (Krajewsk & Szymańska, 2019). Fiscal policy and stabilizing economic effects raise the biggest interest of the scholars, because in the periods of economic recession the optimal fiscal policy can drive country out of the recession. The growing interest is also observed to the study of the responses of the economy to the government's fiscal policy at the different stages of the business cycle (Baranowski, Krajewski, Mackiewicz, & Szymańska, 2015). It can be used to support macroeconomic stability for the purposes of economic growth and correction of the failures on national or global markets. Usually, the governments' national income for spending is varied within 25% to 40%. It includes the redistribution of incomes between social groups. Governments' spending and taxes have the effect on the reduction or increase of poverty and inequality in the society. Therefore, the policy of government spending matters much for the quality of the economic growth (López, Thomas, & Wang, 2010).

Relevance of the topic. Fiscal policy issues are raised in the public debates and discussions of the government's policy. The major issue is the establishment of the role of fiscal policy in the maintenance of sustainable and inclusive growth and mitigation of the business cycles. Unambiguity existing in relation to the public debt demands looking for the ways of better understanding the fiscal risks connected with it (International Monetary Fund, 2017). In the last decade, most attention in the debates was paid to the role, composition and productivity of fiscal policy for the economic growth (Romer, 2012). The study of fiscal policy is important because of the number of challenges which countries met in the global scale, such as pressure of population ageing, competition from the foreign countries which offer the low rates of labour cost, functions of the labour markets and overall changes of the industrial structure of the economy (Viren, 2014). The future of the economic growth and fiscal responsibility of the country are directly connected. The volume of budget deficit which the government challenges today will have impact on the wellbeing of the society in the forthcoming days (The Concord Coalition, 2020).

Level of exploration of the topic. The issues of the fiscal influence policy were studied by Blanchard and Perotti (2002), Mountford and Uhlig (2009), Hayford (2016),Auerbach, Kotlikoff, & Koehler (2016), Sims and Wolf (2018) and others.

Ngueyn et al. have established that unexpected changes of the aggregate taxes both personal and corporate can have huge short-term impact on the country's Gross Domestic Product

and determine its private expenditures (Nguyen, Onnis, & Rossi, 2017). Auerbach et al. studied the correlation of the fiscal progressivity and inequality and their measurement. The inequality estimation based on the remaining lifetime expenditures independently on the wealth and income allowed the scholars to study the Federal Reserve Survey of Consumer Finances and life-cycle programs of smoothing consumption which covers the use of life-time resources, tax policy, borrowing restrictions. The scholars established that inequality in wealth and incomes leads to the substantial overall inequality in the remaining lifetime spending (Auerbach, Kotlikoff, & Koehler, 2016). Aurebach, Gorodnichenko and Murphy studied the local fiscal multipliers and spillovers in the United States based on the data using the US Department of Defence contracts. In addition, the scholars relied on the variables concerning the income and employment. They established that there are strong positive spillovers across the US industrial sectors and geographic locations. The positive spillovers are achieved due to the backward linkages and general income multipliers and other equilibrium effects, while geographic spillovers are characterized by dissipating quickly with the distance (Auerbach, Gorodnichenko, & Murphy, 2019). D'Acunto et al. studied the unconventional fiscal policy. It uses the announcement of the future rises in the consumption taxes to cause the inflation expectations and speed up the consumption expenditures (D'Acunto, Hoang, & Weber, 2016). Unconventional fiscal policy is budget neutral and is characterized by the time consistency. Hayford studied the impact of temporary tax changes on the consumption. The scholar estimated the impacts of the fiscal policy stipulated by the temporary increase of the disposable income on the personal consumers' expenditures (Hayford, 2016). Sims and Wolff study the effects of the economic shocks on the tax rates. According to the scholars, the tax rate cut represents the most stimulating effect on the production in the time when it is relatively high (Sims & Wolff, 2018). Jaramillo and Chailloux studied the effects of the income and wealth on the consumption by the method of their disaggregating. The scholars established that there are long-term relationship between consumption and different components of the household incomes and wealth (Jaramillo & Chailloux, 2015).

In 2019-2020, the study of fiscal policy is done under influence of Covid-19 outbreak that caused the widespread disruption in the developed economies of the world, including the USA, China and others. The crisis is compared with the returning of the Federal Reserves and other central banks to the state of 2008-2009 fiscal years (Castro M. , 2020). There was no differentiation between studies of fiscal policy in the developed and developing countries while it is important factors which should be accounted in the analysis of fiscal policy and conditions of its implementation. The studies show that the fiscal policy has effect on the economic growth of the country in the short-run and long-run dependently on its resources, revenues and expenditures, that is why reasonable fiscal policy is a key to the development of the country (Blanchard and

Perotti, 2002; Burriel et al. 2010; Fatas and Mihov, 2001; Mountford and Uhlig 2009). As stated by Bouzian et al. public spending can have positive effect on the real country's GDP in the short-run perspective, but the studies shows that in the long-run it can have rather negative impact (Bouzian, Chibi, & Shokori, 2007). Thus, tax shocks can positively influence on growth of gdp per capita in short-run, but in the long-run the effect will be equal to zero (Alesina and Ardagna, 2009; Blanchard and Perotti ,2002; Romer and Romer,2010; Mountford and Uhlig, 2009). Some studies focus attention on the role of fiscal policy in the addressing of the fiscal imbalances. Qabbor argues that there is relationship between public expenditures and revenues, on the one part, and economic growth, on the other part (Qabbor, 2008). Khalot emphasizes that settlement of the economic imbalances should be done with the help of both fiscal and monetary tools without disregarding one of them (Khalot, 2004). It was proposed that fiscal policy refers to the regulation of spending and taxes to achieve the macroeconomic objectives (Togo, 2007).

The scholars studied the shocks and consequences of fiscal policy. It was detected that fiscal policy shocks belong to the unpredicted changes. In the opinion of Mountford & Uhlig, tax rules can be changed for many types of incomes (Mountford & Uhlig, 2002). It was established that the government spending and taxes have the immense effect on the aggregate demand. In view of Kopcke et al., fiscal policy has the influence on the volume of the aggregate demand and country's capacity to manufacture goods and services. In the short run, the taxation or spending changes can change the patterns of the demand for the products and services (Kopcke, Tootell, & Triest, 2006).

The novelty of the study. The study will cover analysis of US fiscal policy for the last two decades. The fiscal policy within this term has survived many fluctuations caused by the economic crisis and other changes in country's economic relationships that have influenced on the investment inflows and consumption expenditures in the United States.

Problem of the study. The research question of the paper is as follows:

Does tax as a fiscal policy instrument have a larger multiplier effect on personal consumption expenditures and investments, comparing with government expenditures in short-run and long-run periods?

This paper will provide the proper description of the effect of US fiscal policy instruments (government expenditures and taxes) on its economic activity. First, it is necessary to reveal the influence of the US fiscal policy on its GDP, private consumption expenditures and investments. Therefore, author shall determine the possible crowding-out effects of the US fiscal policy on tested variables. Secondly, it is necessary to establish the direct link between US fiscal policy and its effect on the personal consumption and level of investments. Thus, checking the causality

relationship between tax and government expenditures should provide robust result for model estimation.

Aim of the study. The aim of the paper is to detect which fiscal policy instrument has more a powerful impact on the personal consumption expenditure and investments in the short-run and long-run period.

Objectives of the study. Attainment of the aim of the study requires focusing on the fulfillment of the following objectives:

(1) to investigate the concept of fiscal policy and to discuss its instruments (taxes and government expenditures);

(2) to determine the economic effects of the US fiscal policy on targeted variables;

(3) to highlight the influence of the fiscal policy instruments on personal consumption expenditures and investments;

(4) to explore the exogenous (macroeconomic) factors as crisis and fiscal policy stimulus's which are affecting on government decision to impose US fiscal policy;

(5) to reveal theoretical stimulation effects of US fiscal policy instruments on the personal consumption expenditures and investments;

(6) to define and to collect data to measure the impact of fiscal policy on personal consumption expenditures and investments;

(6) to evaluate effects of fiscal policy on the personal consumption expenditures and investments via applying structural VAR model;

(7) to consider the results of empirical research to answer on the research question of the paper.

Research object. The US fiscal policy during 2001Q1-2019Q4

Methodology. For the purposes of analysis effects of fiscal policy the structural VAR model will be used. Applying of SVAR model allows to evaluate impact of fiscal instruments on targeted variables before and after imposing structural shocks in variables. For the representation of the results, the special software EViews will be used.

The **defense statements** of the paper are based on the aim and objectives of the study. They include as follows:

(1) US fiscal policy determines the perspective of growth one of the main components of GDP as private consumption expenditures.

(2) Effective US fiscal policy can contribute to the increase of domestic and foreign investments for the short-run perspective.

(3) US fiscal policy can differently influence the targeted variables consequently decreasing investment flows from residential investors and reduction of demand and consumption inside the country.

Structure of the paper. The study divided into three major chapters which task is to represent all the aspects of chosen topic more comprehensively.

1. in the Introduction the relevance, aim, objectives, methodology, structure and other components of the paper are disclosed. The research question and defense statements are revealed;

2. literature review will contain critical evaluation of the articles and academic publications, government publications, and other sources dedicated to the study of the different aspects of the fiscal policy as an economic concept and particularly the US fiscal policy;

3. in the methodology methods of data collection and research model is presented;

4. in the analytical part of the paper, the focus is done on the empirical study of the impact of the US fiscal policy on the investments, personal consumption expenditures and gdp per capita in the country;

5. the results received during fulfillment of the analytical part are summarized in the conclusions. The author develops the set of proposals and recommendations for the further directions of the US fiscal policy development. The perspectives for the further studies are highlighted.

1. THEORETICAL CHARACTERISTICS OF FISCAL POLICY

In this chapter several issues will be discussed. First of all, it is necessary to determine the role and instruments of the fiscal policy. Establishment of the economic effects of fiscal policy is required to recognize its role in regulation of the economic relationships in the country. The dependence between the development of fiscal policy and investments will be investigated and its influence on population's consumption and spending will be researched. This chapter will include the description of the effects which US fiscal policy has on the americans' investment and consumption expenditures. For these purposes, it is necessary to analyze the macroeconomic factors which contribute to the development US fiscal policy. It is demanded to determine the stimulation effects of the US fiscal policy on the consumption expenditures.

1.1. Theoretical aspects of implementing fiscal policy

Fiscal policy plays the important role in the maintenance of the economic balance. Optimal fiscal policy allows the governments to reach the sustainable growth, ensure the price stability, increase of wellbeing and employment of the population in the country. It should be noted that the appropriate fiscal policy is equally necessary for both developed and developing countries because in order to ensure the economic growth, it is necessary to invest finances into the improvement of the infrastructure, education, health care and other sectors (Lojanica, 2015).

1.1.1. Fiscal policy and its instruments

The essence of fiscal policy is to mobilize and attract funds that the state needs, as well as to distribute these funds in such a way as to solve the existing socio-economic problems of the state most effectively. To establish a stable economy, the state uses various methods, one of which is the implementation of fiscal policy. Fiscal policy allows for shorter economic cycles, promotes sustainable economic growth, and increases employment levels, making sure that inflation does not rise too much. As claimed by Kramer, in the broad sense, fiscal policy is determined as the measures used by the government to regulate the spending and tax rates for the purposes of monitoring and influencing on the growth of national economy (Kramer, 2019) . In the narrow aspect, it is a strategy close to the monetary policy used by the central bank to effect on the national money supply (Kramer, 2019).

Depending on the situation in the country, fiscal policy performs several objectives. First, it is used to ensure optimal allocation of the economic resources. Usually, this objective of fiscal policy is important for the increase of country's productive resources. Secondly, it is directed to provide distribution of the wealth and incomes on the equitable basis. Due to it, the different groups of people receive incomes which are transferred from the rich to poor. Thirdly, fiscal policy

helps to maintain the stability of prices. For example, it is known that deflation usually leads to the decrease of the business activity. Instead, inflation can damage fixed income rates while speculators and sellers will benefit from it. Consequently, fiscal policy is a method of adjusting stable prices which are advantageous for all segments of the society (Karmakar, n.d.).

In the economy, two types of fiscal policy are distinguished. They are expansionary and contractionary. In relation to expansionary fiscal policy, the government it for the purposes of stimulation the economic growth of the country by means of spending or lowering the taxes, or both methods are used. In the conditions of this type of policy, the population receives more money, and accordingly it spends more. Higher spending encourages the development of businesses and creation of the job places that, in its turn, leads to the generation of more incomes (Borad, 2019). In concern to the contractionary fiscal policy, the government puts the aim to slow the economic growth. The reason of it is the necessity to reduce inflation. High rates of inflation substantially damage the economy and destruct the economic power of the country in long-term perspective. Therefore, the government is obliged to control inflation and economic steps (Borad, 2019).

Two major instruments of fiscal policy include taxes and spending. Taxes have the effect on the determination of the quantity of money which the government is needed to spend in the areas and how much money people should spend. In case when the government wants to increase spending among the consumers, then it can make the decision to decrease taxes. Tax mitigation or reduction ensures families with extra money. The government expects that this money will be spent on the purchase of goods and services, thus contributing to the development of national economy (Kuligowski, 2019).

The other fiscal policy tool is spending. It is used to allocate the governmental money to the support of areas which need the economic development. Spending include subsidies, different public work projects, welfare programs etc. Whoever receives the money, they are spent for buying goods and services. It contributes to the economic growth (Amadeo K. , 2020). Overall, there are numerous debates which of these methods are more effective – spending or tax cuts. Borad states that spending is more effective because it ensures more money to consumers which are the biggest value of any business (Borad, 2019). The others believe that tax cuts can motivate businesses to hire more employees. Government spending is frequently used in the periods after economic recession. Two examples include the European Economic Recovery Plan of 2008 and the American Recovery and Reinvestment Act of 2009 (Ferriere & Navarro, 2018). Taxation and government spending influence on the rate of employment and changes of the aggregate demand. They influence on the capacity of the government to control the economy of the country through the management of the incomes and consumer purchasing power that helps it to attain the

particular objectives which lead to the economic growth (Alkasasbeh, Haron, & Abueid, 2018, p. 32). As stated by Ben Page, tax policy of the country can influence on the national economy in three major ways. First of all, it changes the demand for products and services. Secondly, it alters the incentives to employment, saving practices and investment policies. Thirdly, it contributes to raising or lowering government's budget deficit. The specified changed in their turn can influence on the share of revenues generated by the tax system by means of implementation of the so-called dynamic effects. Therefore, tax policy effects on the country's economy by shifting the demands for products and services. It is "Keynesian" effect. However, its duration is not long. After it, the economy usually returns to its sustainable level (Page, 2017).

Ngueyn et al. have found out that the cut of personal and corporate taxes can increase the GDP for about 0.9%. In addition, it leads to shrinking the government expenditures as a reaction on the decrease of income taxes. At the same time the cuts in the average rate of consumption taxes, for example, consumption duties and VAT have no significant value and rarely differentiate from zero on GDP, government expenditures, investment and others. The scholars detected that the neutral policy of the country in relation to the incomes which caused the increase of consumption taxes and drop of income taxes is characterized by the significant growing effect on GDP (Nguyen, Onnis, & Rossi, 2017). As stated by Ngueyn et al., estimation of the tax change effects can be a difficult issue because of two reasons (2018). One of the problems is endogeneity. Fiscal policy is not studied by the random experimentation methods. Changes of tax policy and its values can influence on the different spending components of GDP. The other obstacle for the measurement of fiscal policy is distinct tax instruments. At the same time, transparent tax instruments can influence on the economy through the different separate channels and thus lead to the appearance of significant differences in the mechanism of transmitting fiscal policy. Owning to these difficulties, the existing values of the tax multipliers vary substantially from the insignificant ones to the larger extent (Nguyen, Onnis, & Rossi, 2017).

Among the other fiscal policy instruments, public debt and national budget can be mentioned. Public debt is a commitment intended to cover the share of public spending as compared with the taxes. The extent of covering public expenditures depends on the condition of the country's economy including inflation rate, employment level, monetary stability etc. Public spending is a part of continuity of the budgetary execution; therefore, in the short-run perspective, public loans are required to cover the existing expenditures (Džakula & Karalić, 2013). Weak structure of the public debt causes the reduction of country's ability to fulfill the effective counter cyclical financial policy. The participants of the market usually re-evaluate the threats of the public liabilities with the expected rating downgrades, which limit capacity of borrowing because of the

reduction of the investors' base and the issuance cost increase (Das, Papapioannou, & Pedras, 2010).

Budget policy depends on the structure and type of incomes and expenditures from the country's budget (Wołowiec, Skica, & Gercheva, 2014). It is required in order to protect country from the economic fluctuations. Different types of budgetary principles include its division into such types as (1) annual budget; (2) cyclical balanced budget, and (3) fully managed compensatory budget. Annual budget helps to maintain the balance between country's incomes and expenditures. This type of budget will never cause the stagnation or boom in the national economy, because its task is support of balance only. In addition, annual budget promotes to the support of full employment of the population without inflation. In order to make the budget balanced, the government should increase taxes to generate more money and decrease spending. Cyclically balanced budget is frequently called "Swedish budget". It suggests the existence of surpluses in the budget in the periods of economic stability and growth and use of the surplus revenues for the public debt retirement. Instead, in the periods of economic recession, budget surpluses are balanced with deficits prepared during the earlier periods of inflation. The excess of public spending over incomes is financed by means of the public borrowings. The cyclically balanced budget is an effective tool for the stabilization of the business activity. For example, in the periods of prosperity or oppositely inflation, excessive expenditures are curbed with surpluses in the budget; during economic recession periods, budgetary surpluses it ensures extra purchasing power. Due to this type of budget, the government can regulate its finances in compliance with its requirements. This is especially important in the periods of growing inflation, recession, or economic depression. However, cyclically balance budget does not guarantee the stabilization of the system at full employment, but it ensures stability without this guarantee. Finally, fully managed compensatory budget suggests the regulation of taxes, spending, incomes and public borrowings. At that the major task is attainment of the full employment and reduction of inflation. This type of budget does not lead to the budgetary balance. Its role in it is secondary. The focus of fully managed compensatory budget is done on the achievement of full employment and stable prices. Therefore, the increase of public debt can be avoided owing to the use of this budget (Pragyandeepa, n.d.).

From all of the above, we can conclude that the goals of fiscal policy are directly related to each other and they are achieved in a sequential order by regulating the revenues and expenditures of the state.

1.1.2. Economic effects of fiscal policy

Fiscal policy influences on the economy by means of several channels dependent on the time lags. The first channel is transfers which are refers to government expenditures and the second

channel is the tax level. In the short-run perspective, it can have effect on the changes in the economy through the changes of the aggregate demand in the goods and services. It means that economic effect of the fiscal policy is reflected in the stabilizing role of the economic fluctuations. Consequently, fiscal policy has impact on the components of GDP, as well as the respective volumes of the sheltered segments (Gupta, Akitoby, Senhadji, & Jenkner, 2015). Therefore, it will have substantial meaning for handling the structural adjustments, for example, such as petroleum sector and others which have the biggest importance for the economic growth. In the long-run perspective, fiscal policy has the substantial influence on the sustainable economic growth. Its concerns the policy in relation to taxes, supply of labour and capital etc. (Government.no, 2016).

As claimed by Gupta et al., fiscal policy plays crucial role in the conditions of economic crises which aftermaths can strongly influence on the country's growth (Gupta, Akitoby, Senhadji, & Jenkner, 2015). Fiscal policy is heavily important in the periods of economic recession in order to stimulate the economy through stimulation of the aggregate demand. It plays important role in the attainment of the multiple goals of the national economy through implementation of its numerous instruments including taxes, government spending etc. (Alkasasbeh & Haron, Fiscal Policy and Its Relationship with Economic Growth: A Review Study, 2018). In the view of Soli et al., in the economic theory there is no absolute conclusion about the effect of government spending on the economic performance. It is undoubted that under particular conditions, the higher government spending can be required and even desirable. When the government does not spend, its economic growth will be slow because it would be difficult to develop the industrial and other infrastructures, protect property and fulfill the other government obligations. In the other words, the government spending is necessary to ensure the successful economic operation of the country (Soli, Harvey, & Hagan, 2008).

According to Bunea-Bontas & Petre (2009) and Debrun & Jonung (2018), fiscal policy has stabilizing effect on the economy. Stabilization of the business cycles can be achieved in several ways: (1) through automatic stabilizers, (2) discretionary fiscal policy and (3) rule based. The first way includes application of the built-in fiscal mechanism (Bunea-Bontas & Petre, 2009). Its task is the automatic reduction of the expansion or contraction of the business cycle. Automatic stabilizers are effective during the periods of the economic recession and are reduced in the booming time. They depend on the volume of aggregate production and population incomes because when there is economic instability, business cycles are automatically dampened. Automatic stabilizers do not require enacting legislation, acceptance of bills and requirement to perform other legal actions. They are called "built-in" because they are fixedly implemented into the structure of the economy. Discretionary fiscal policy lies in the changes of the program accepted by the government to influence on the aggregate demand (Bunea-Bontas & Petre, 2009).

It serves as the alternative way of stimulating the economy in the periods when the aggregate demand and interest rates tend to be low or when the prices fall down (Bunea-Bontas & Petre, 2009). Discretionary policy is more difficult to fulfill because of the lags lying in the recognizing the demand in modified fiscal policy and the lags which appear as a result of enacting the changed fiscal policy (Bunea-Bontas & Petre, 2009). It means there is frequently the lag existing between the time needed to implement changes in the fiscal policy and time needed to act (Bunea-Bontas & Petre, 2009). The rule based fiscal policy is based on fulfilling the predetermined objectives (Debrun & Jonung, 2018). This policy restrains promises by politicians during elections which are based on improving economy well-being by imposing special policy which will change citizens life, after selecting candidate. Rule based policy is focused mainly on improving the population growth rate or stabilizing the inflation rate in the short-run period.

As claimed by Canh, the effects of fiscal policy on the economic growth are motivated by many factors which include the employment, transparency of the government and composition of its spending (Canh, 2018). Government expenditures can stimulate economy through the increase of output in the short-run perspective at the expense of higher inflation rate and public budget deficits (Canh, 2018). Increase of taxes can encourage the economic growth in the medium- and long-term perspectives, but they will have only temporary effect on the improvement in the balance of public budget deficit. As a result, the scholar characterizes economic effects of the fiscal policy as more counter-cyclical (Castro & Cos, 2008). The effect of fiscal policy on the economic growth is linked to spending on the output. As stated by Surjaningsih et al, fiscal policy should be synchronized with the economic business cycles (Surjaningsih, Utari, & Trisnanto, 2012). It can serve as a stabilizer for the economy. When it is expanded, the government spending is cut, while tax revenues usually increase. Oppositely, when the economy is worsened, then fiscal policy should be expanded by means of increasing expenditures and reduction of tax revenues.

1.1.3. Relation of fiscal policy and investments

The discussion of the relationships between fiscal policy and increase of private investments has started in the mid of 1980s. It was the period of appearance of the endogenous growth models, according to which the economic development is characterized by the endogenous feature (Hermes & Lensink, 2001). In comparison with the neo-classical models, the specified models were characterized by the non-assumption of the marginal productivity of the capital. Accordingly, the stock of capital was assumed as a method which has long-run effect on the per capita growth. The examples of non-productive spending include subsidizing the ineffective state-owned businesses or companies producing market products and services. Expenditures on salaries of servants working in the public sector can be also estimated as non-productive (Hermes & Lensink, 2001).

During an economic downturn, they often pursue a stimulating policy, the purpose of which is to increase investment activity both within the state and to attract foreign investments. First, through an increase in government spending on the procurement of goods and services in order to compensate for the lack of private demand, to increase the total output. Secondly, through the rate of bank interest, this should not be too high for entrepreneurs to take loans which as well influences investments. Thirdly, through an adjustable tax rate, in order to increase both production and consumer demand by reducing taxes. When the country needs to attract public investments, then it is needed to ensure the capital for financing. The government can receive the required capital by the public loan, but the limit of indebtedness is established dependently on the expected profitability of the public investments. The economy challenges the negative attitude to the expenditures financed by the public loans (Džakula & Karalić, 2013).

Private investments are one of the major factors contributing to the economic growth both in the developed and developing countries. Private and foreign investments promote to the creation of the new working places, sharing of technologies and leads to the population's income growth. In the opinion of Soli et al., the government has opportunity to increase its productivity through the cooperation with the private sector and attraction of investments into national economy development (Soli, Harvey, & Hagan, 2008). According to Balls, the changes of the government spending and taxation policy directly or indirectly influence on the private investments (Balls, 2005). To create a fiscal stimulus through the use of increased expenditures or decreased tax revenues, the government is obliged to raise the size of its budget deficit and appeal to the creditors to borrow money required for financing this stimulus. This should cause the increase of the interest rates and respectively decrease the investments and consumer spending. In its turn, rise of the interest rates lead to the depression of the country's economy, because businesses challenge the problem of paying higher rates for borrowing money required to invest in their companies' growth (Stupak, 2019). In concern to the public investments, the government always expects that they should encourage the growth. On the one part, the higher the public investments are, the bigger is the national rate of the capital accumulation in the private sector. Consequently, the private expenditures on the capital goods can be crowded out by the public capital spending. On the other part, public capital including transport infrastructure, water systems and others support relationships with the private capital required for the production technology. Therefore, the higher public investments are, the bigger the marginal productivity of the private capital is (Afonso & Jalles, 2011).

A feature of the American tax system is the parallel use of major taxes. States and local governments form independent budgets on the basis of the right to set their own taxes and other types of income, regulating economic and social activities in their own territory. Despite the fact

that during the formation of local budgets the main source of their income is local taxes, the federal government provides them with subsidies and subventions. Transfers are divided into targeted and narrowly targeted. The latter are allocated only for clearly defined purposes, for example, the construction of a certain social facility. Targeted transfers are also targeted, but the wide range of opportunities for their use allows state authorities to determine the general needs that require financial injections. Productive government spending and non-distortionary taxes encourage the growth while non-productive spending and distortionary taxes reduce it. The expenditures are recognized as productive when the government spending forms the positive production externalities. It is assumed that public investments belong to productive government spending, especially the investments into education, health sector and transport infrastructure. In case of scarcity of the financial resources, the public investments may decrease the opportunities for the private sector on the obtainment of loans required to finance the investments. In addition, when public investments are financed from the monetary funds, then the private investment can be strongly discouraged. In this case, as stated by Hermes and Lensink, the public investments crowd-out the opportunities of private investments (Hermes & Lensink, 2001).

In the United States, net taxes related to all transfer programs at the federal and state level. For example, they include personal income taxes, state income taxes, sales taxes, welfare benefits, security income taxes, Obamacare subsidies, auxiliary benefits on the social security etc. As founded out by Auerbach, in compliance with Tax Cuts and Job Act of 2017 in the United States, the distribution of lifetime spending is highly unequal. For example, the scholar established that 1% of US population aged from 40-49 rated by the resources take about 34.1% of the overall wealth, while only 14.5% including lifetime spending. It means that human wealth in the country is not distributed equally (Auerbach, Kotlikoff, & Koehler, 2016). It means that people with lowest resources challenge substantially negative average lifetime net tax rates and, oppositely, citizens with the highest resources have positive average lifetime net tax rates. The scholars state that longevity does not play big role in the estimation of the fiscal success. Average net tax rates among the poorest people are expected to be even lower whether they live as long as people in more beneficial quintile, for example, the lowest is 40-49 years old and 60-69 years old (Auerbach, Kotlikoff, & Koehler, 2016).

1.1.4. Influence of fiscal policy on consumption and spending

As argued by López et al., government spending should be differentiated on public and private goods. In relation to the first object, public goods include expenditures which complement the production in the conditions of private economy. In case of the market fail, the spending of the government is directed to mitigate the consequences of the failure. The measures can include cash transfers to households which suffered financially, or to such important sectors as health, social

protection and education etc. Spending on the private goods include substitution rather than complement. Compared with spending on the public goods, they are used to exacerbate the market failures. The government's subsidies include corporate subsidies, credits, energy or agricultural subsidies etc. (López, Thomas, & Wang, 2010).

The most immediate influence of the fiscal policy is observed on the changes in the aggregate demand in the goods and services. In particular, economic growth helps to increase the aggregate demand through one of two channels. The first one takes places when the government directly increases the demand through the rise of purchases while the taxes are kept constant. The second channel includes the reduction of taxes by the government and increase of the transfer payments. It leads to the rise of household incomes, and population consumes more products and spends more money. The growth of consumption rate, in its turn, contributes to the raise of the aggregate demand. In addition, in the opinion of Weil, fiscal policy changes the overall composition of the aggregate demand. For example, when the government challenges the problems of deficit, it has to bear the expenditures by means of issuing the bonds. Through this activity, it is able to compete with the private borrowers for the finances which were loaned by the savers. Consequently, fiscal expansion also leads to the increase of interest rates and crowing out some types of private investments. Finally, it helps to reduce the fraction of the output consisting of the private investments (Weil, 2003). When the state consciously wants to increase the real volume of national production, employment of the population, slow down inflation, accelerate economic growth, it already consciously approaches the management of tax rates and government procurement. In this case, the government changes tax rates, creates public works projects and projects for the employment of the population. Consciously approaching the solution of the set tasks, the government achieves great results with the help of the multiplier effect, which is clearly manifested in the following process: with an increase in government purchases per unit, which is a component of aggregate demand, the aggregate demand per unit also increases, and the graph itself moves up by one unit.

Most obviously the effect of government expenditures is observed in the developing countries. The low incomes per capita and high level of poverty in these countries put obstacles to the economic growth. As a result, it intensifies the burden on the governmental policy and restricts the efficacy of the policy instruments as compared with the highly developed countries. Thus, weak government apparatus in relation to spending leads to wrongful allocation of investments and increase of prices (Jha, 2007).

Nguyen et al. claim that there is the positive relationship between tax cuts and growth of the employment. Potentially it can positively effect on the increase of consumption. However, the scholars emphasize that the tax cut for about 10% is too small to stimulate economy (Nguyen,

Onnis & Rossi, 2017). In addition, as argued by the scholars, the consumption tax changes are correlated to incomes. The majority of tax changes is included into the set of fiscal reforms (Nguyen, Onnis & Rossi, 2020).

According to Auerbach et al., the consumption measures are usually well-defined, while others including taxes and transfer programs are not. For example, if the government changes the measures on social security transactions from the public-based taxes and transfers in the favour of purchase of the government bonds and private-based debt service, it will have no substantial influence on the lifetime spending, despite it still would effect on the flow of taxes and transfer per year (Auerbach, Kotlikoff, & Koehler, 2016). However, the scholars emphasize that some government interventions can effect on the choice of measures. The example is policy of raising the minimum wages. It can be implemented with using government employment and transfer taxes for the workers (Auerbach, Kotlikoff, & Koehler, 2016). At the industry level, studied by Auerbach, Gorodnichenko and Murphy, spending is characterized by the positive spillovers in relation to the industries in the location. They include demand of the consumers in the intermediate inputs and overall equilibrium spillovers such as through income multipliers. In relation to the industry-level income in the other locations, there is a little evidence that local spending in an industry crowds out production. The same industries and other ones in nearby locations benefit from the operation, despite the benefits are small (Auerbach, Gorodnichenko, & Murphy, 2019). Jaramillo and Chailloux argue that labor remains the major driver of the consumption. The scholars found out that taxes on personal incomes and contributions to the social security has negative effect on the population's consumption, compared with the social benefits which are characterized by the positive effect. The positive coefficient is peculiar to the financial assets and housing assets, in comparison with the household debt which have negative coefficient (Jaramillo & Chailloux, 2015).

1.2. Effect of US fiscal policy on investment and consumption expenditure

In this section it is necessary to highlight the macroeconomic factors which influence on the fiscal policy in the United States. The impact of US fiscal policy on the investment will be discussed and its stimulation effects on the consumption expenditure will be examined. National competitiveness is viewed by the United States as a state priority in the context of solving the problem of overcoming the state of budgetary and debt crises. Strategically, the main task is to maintain the world's technological superiority by providing financial support to the latest highly profitable research that can widen the economic gap between the United States and other countries. And this means America's priority in solving global financial problems and reforming the world monetary and financial system, proceeding, first of all, from American interests.

1.2.1. Macroeconomics factors influencing on US fiscal policy

Before the Great Depression until 1929, the United States' fiscal policy was laissez-faire. After the World War II ended, the US government was obliged to take active measures to stabilize the economy and regulate the growing unemployment rate, inflation and business cycles (Kramer, 2019). Fiscal policy of the United States is relied on the vision of the British economist John Keynes (1883-1946). According to the scholar, the economic recession are caused by the decrease of consumption spending and deficiency of business investments of aggregate demand. As stated by Keynes, the governments can stabilize the economic productivity by means of adjustment of the spending and tax policies. His theory appeared as a result of response to the Great Depression. Keynes' theory suggests that the aggregate demand serves as a driver of the economic performance. It consists of four major components including business investment spending, consumer spending, net government spending and net exports. The components of the private sector are more variable because they depend on the emotional and psychological factors (Chappelow, 2020).

In the United States, fiscal policy is determined by the President and Congress, i.e. it is specified by the both executive and legislative branches. In concern to the executive powers, the control over fiscal policy is fulfilled by the President and the Secretary of the Treasury. In addition, the President can appeal for the advice to the Council of Economic Advisers. In relation to the legislative branch, the fiscal policy is regulated by the laws and decrees accepted by the US Congress. It passes laws about spending for financing any fiscal policy measures. Fiscal policy in the United States is generally implemented through the complex of spending public funds and lowering taxes (Ross, 2020). The US Congress' fiscal policy is outlined in the federal budget that is accepted each year. It includes mandatory spending, usually for the maintenance of the Social Security, Health Care and similar programs. The rest of spending belongs to discretionary. The US fiscal policy caused the massive debt of the country (Amadeo K. , 2020).

In order to neutralize the effects of the financial crisis that arose in the fall of 2008, the US Economic Recovery and Reinvestment Act (ARRA) was adopted in February of the following year, reducing taxes by $ 288 billion and an increase in spending by $ 499 billion. This approach is linked to the traditional view of fiscal policy that dominates the academic environment: a budget deficit has a short-term stimulus effect, but is accompanied by a crowding out of investment and a reduction in long-term income. Under conditions of a deep decline in production and the establishment of a minimum level of interest rates, timely, focused and temporary fiscal stimuli are able to quickly restore the dynamics of economic growth. At the same time, an increase in government procurement was considered the best, while a smaller effect was expected from a permanent reduction in taxes, and the smallest from investment benefits. The timeliness of fiscal

stimulus was desirable to prevent a rise in long-term interest rates. The reduction of tax rates and the legislative consolidation of the permanent nature of tax benefits of 2001 and 2003 valid until 2011 were not supported (Elmendorf & Furman, 2008).

In the recent years the US government finances have challenged substantial changes. The gains of the previous years were lost in relation to the budget surpluses, and the United States' budget deficit grew. The problem was stipulated not only by the entire government level, but budget deficit on the local levels too. It is reported by Mühleisen & Towe that the US government budget deficit is the highest in the world and the public debt size is approaching to the other industrial countries (Mühleisen & Towe, 2014). As of the date of 2020 the US federal budget deficit reached $1.103 trillion. The reason of such big deficit was caused by higher spending that the US government generates. For comparison, a year before the federal budget deficit was $1.09 trillion. According, the US government has spent about $4.529 billion that it received in revenues (Plecher, 2020).

The high rates of budget deficit raise the other important concerns. First of them is projections about further growing of the budget deficit that can have impact on the investments into such sectors as defense and security, taxation and others. Secondly, US budget deficit makes the country less prepared to the ensure wellbeing of the further generations (Mühleisen & Towe, 2014). There are three main factors influencing on the US budget deficit. The first reason is the War on Terror that followed after terrible attacks of 9/11 that led to the increase of debt for $2.4 trillion in 2001. The government took decision to increase its spending on the army and defense. The expenditures on them have been doubled. The second factor is cutting taxes. Tax reduction caused the decrease of revenues per each dollar cut. For example, in 2013 the Center on Budget and Priority Policies reported that the tax cuts initiated by the Bush administration increased the debt for $5.6 trillion within 2001 to 2008. Trumps policy of tax cutting also reduced the revenues and increased the budget deficit. It is expected that the deficit can grow for $1 trillion over the next decade. The third factor is social security spending. In 2017 the US government invested finances into the development of Medicare sector, Family Foundation and others. It invested about 15% and this value is expected to grow to 18% in 2028 (Ross, 2019). The evidences show that during 2020 the US spending has grown substantially. In particular in the first quarter of 2009, the annual expenditures of US government were $5.41 trillion (FRED,2020). The spending of the government has grown and in the first quarter of 2020 the spending reached $7.54 trillion (Duffin, 2020). It means that the United States government started to invest more finances to cover it needs in social security, medical aid, defence and others. The annual spending of the US government reached $7.54 trillion in the first quarter of 2020, while in 2009 this value was $41 trillion (FRED,2020).

The spending of the US government is oriented to ensure mandatory and discretionary programs. In 2019 the United States spent $1038 bln on the social security (FRED,2020). In 2020 the government invested more finances on the development of this sector – $1092. The size of spending on the defence has also grown. In 2019 it was $676 mln and increased to $713 mln in 2020. Non-defence spending has raised from $661 mln in 2019 to $724 in 2020. One of the mandatory sectors which needs government support is medicine. The US government spent $644 mln for medicare in 2019 and $724 mln in 2020 and for medicare $409 mln in 2019 and $447 mln in 2020. Therefore, the US government invests a lot of finances into the development of social and medical sectors of the economy (Duffin, 2020). It is expected that by 2021 the mandatory expenditures in the United States will reach about $3.01 trillion. Mainly it covers such sectors of US policy as Medicare and Medicaid, social security, defense and others. Discretionary spending is expected to reach about $1.49 trillion and it will be allocated for the defense and non-defense policies. The net interest spending is intended to pay debts which the government and public have made (Duffin, 2020).

The US spending has changed after coronavirus pandemic outbreak. This crisis affected the economy of many countries and the United States is not exclusion. In accordance with Alpert's prognoses, the pandemic will lead many countries to the steep recession. The United States gained high rate of unemployment and GDP decrease because of COVID-19 outbreak.

In response to the pandemic effects, the US central banks were obliged to accept monetary stimulus measures. The US Congress has invested trillions of dollars into the fiscal programs to combat the economic disruption. In particular, on the 28th of July in 2020, the US Federal Reserve has prolonged its lending programs until the end of September, 2020. The Federal Reserve stimulus measures cover three major categories: cutting of the interest rates; purchases of loans and assets; and regulatory changes. Thus, the federal funds rate was cut several times. Once it was decreased by 0.50% and secondly by 1.00%. It is substantial because the US Federal Reserve did not changed interests rates in increments more than 0.25% since the times of Great Recession. In order to support small businesses, on the 9th of April in 2020 the US government has launched the Paycheck Protection Program Lending Facility. The task of this program was assurance of lending money to the banks in order that they could lend money to the small businesses. On the 30th of April in 2020 the Program was expanded and more types of lenders were included into it. Today the US fiscal policy supports the absence of limits in relation to the size of credit that can be provided through the Program (Alpert, 2020).

The US tax system is one of the most advanced tax systems in the world. In the United States, taxes on the economically active population are the main source of financial revenues to the federal budget and at the same time the most important channel for the redistribution of

national income controlled by the federal government. The United States, as a federal state, has three levels of financial structure: federal budget, state budgets, and local government budgets. The US tax system consists of three levels, corresponding to three levels of government:

- the upper one, where federal taxes are collected that go to the federal budget;

- the middle, where taxes and fees are collected, introduced by state laws, going to state budgets;

- the lower one, where taxes are collected, introduced by local governments, going to local budgets.

The US tax system is complex and multi-tiered. This system has a large number of specific features caused both by the centuries-old history of the development of this state, and by the fact that the United States is the bearer of the Anglo-Saxon legal system. Separately, it should be noted the pronounced social orientation of the US tax system.

1.2.2. Influence of US fiscal policy on investment

Before Great Depression of 1920s, the US government used hands-off approach in relation to the economic policy. Later it took decision that it is necessary to gain larger role in the determination of the country's economy (Kuligowski, 2019). Fiscal policy of the country has direct or indirect impact on the investment policy. The direct impact is observed through the increase or decrease of the interest rates. The indirect impact is implemented through the expectations concerning inflation. The US Federal reserve has several tools to influence fiscal policy. It can use open market transactions of sales and purchases of the financial instruments as a measure of control. It can charge the discount or interest rate to the depository institutions. The banks can maintain deposits as reserves. For example, during economic crisis of 2008-2009, the Federal Reserve was required to use short-run interest rates near zeros as a measure of stimulating the US economy. However, when this strategy was unsuccessful, it was obliged to use successive cycles of quantitative easing which included purchase of the long-run mortgage protected securities directly from the financial institutions. It has led to the decrease of interest rate pressure that attracted billions of US dollars to the national economy (Investopedia, 2020).

The United States invests huge finances in the development of trade and partnership relations. It direct investments abroad has increased from $1.32 trillion in 2000 to $5.96 trillion in 2019. The countries which received the biggest support from the United States included Netherlands, the United Kingdom and Luxembourg (Rudden, 2020). Foreign direct investment in the United States played the role in the policy of privatization, development of the country's infrastructure and effective use of natural resources. Thus, governmental infrastructure was leased to private equity funds not based in the United States. The majority of cash flows come to the United States from its trade partners such as China, Germany, Israel, Canada, France etc. The

background of fiscal policy on investments is supported by the law. In the USA, there are no laws which prohibit any foreign investments especially for the purposes of maintenance of the economic security (Mir, 2019).

For nineteen years, the volume of FDI into the US economy has doubled. For example, as of the date of 2000, the foreign investments were about $1.26 trillion, while in 2019 they have risen to approximately $4.46 trillion. The growth of investments in the United States is stipulated by the establishment of trade relation with other countries which estimate the country as a place for doing business (Rudden, 2020).

Despite the United States receive big amount of investments annually, their policy also includes investing to the other countries. In particular, the United States has invested nearly $866 billion to the Netherlands' economy and $758 billion to the United Kingdom's in 2018 (Rudden, 2020).

The US investment policy is strongly affected by its relationships with other countries. For example, at the beginning of 2019, the US government has introduced higher tariffs on the US imports from China by the increase of average tariff rate from earlier 2.7% to 17.5%. As a response, China increased the tariff on the US exports from 5.7% of 20.4%. This tension between countries was called "trade war" and it caused the reduction of the US investments by 0.3% already to the end of 2019. According to the prognoses, the decrease of investments will reach 1.6% by the end 2020 because the coronavirus pandemic outbreak added into worsening of the relations with China and other countries (Amiti, Hoon Kong, & Weinstein, 2020).

As argued by Parker and Fry, more than half of the US households have investments in the stock market. In the United States the households' investments varied dependently on the demographic groups. One of five families with annual income equal about $35 ths invests money into the stock market. For example, 61% of white population has investments into the stock, compared with 31% Afro-American population (Parker & Fry, 2020).

The tax policies of the United States encourage or discourage investments. Following the requirements of the 2017 Tax Cuts and Jobs Acts (TCJA), the corporate tax system in the country started to encourage the investments from both the US and foreign corporation in the country. Today the rate of corporate tax in the United States is a little below than the average rate of the major country's trading partners. The country also offers more generous provisions for the capital recovery provisions. The companies have opportunity to deduct 100% of the costs for machinery and equipment in the country (Occhino, 2020). In addition, the 2017 Tax Cuts and Jobs Acts foresee provisions for the companies whose owners have limited liability. They are subjected to the rule of corporate taxation that encourages US domestic investments. The US corporations can lease office buildings without necessity to pay corporate income taxes. Following TCJA, the US

tax system continues to encourage US-based multinational corporations to invest in the low taxed countries instead of domestic ones. The US multinational companies are not obliged to pay US taxes on the incomes received in the foreign countries up to 10% of the size of tangible capital abroad (Briefing Book, n.d.).

The US federal investments reached $4.4 trillion in 2019. 62% of the overall investments were intended for the programs which were not subjected to the regular budget review. 30% included discretionary programs for which the Congress created special funds. 8% of investments were directed to cover the government debt. The other 60% of mandatory investments were directed for the support of social security and programs (Tax Policy Center, 2020). It is expected that by 2021 the US federal investments will be about $4.829 trillion. The budget for them will be 20.7% of the gross domestic product (Amadeo & Estevez, 2020). However, as argued by Vietor and Weinziel, the US fiscal policy is worrisome. According to the scholars, the country is incapable to invest enough finances into the public sector, especially into the state-owned infrastructure and education. They also emphasize on the dysfunction of the corporate tax code which leads to levying the rates but causes the insignificant rise of the revenues. Besides, recent US budget deficit added to debt increase that makes investment flows inside and outside the country lesser (Vietor & Weinzierl, 2012).

These policy failings are evident in a statistic often cited in discussions of U.S. competitiveness: our large current account deficit, which includes the trade deficit. Some analysts have argued that the current account deficit does not represent a problem for U.S. competitiveness because it is the flip side of a capital account surplus – implying that the United States must be an attractive destination for investment. It has become clear, though, that reduced saving, not increased investment, explains the rising U.S. capital account surplus. The drop in domestic saving in the U.S. from 1980 to 2007 is almost identical to the increase in the current account deficit (5% of GDP) over the same period, while non-housing investment, net of depreciation, has fallen from 3.2% of GDP in the 1970s to just 0.5% since 2000. The United States is borrowing to consume, not to invest in the future productive capacity of the economy.

1.2.3. Stimulation effects of US fiscal policy on consumption expenditure

As stated by D'Acunto and others, the governments of all countries seek for the ways of stimulating the economy. Big stocks of the debt restrict the fiscal stimulation, if the zero lower bound on the nominal interest rates is equal to zero and central back suffer from inflation and are obliged to restrict the conventional and unconventional monetary policy (D'Acunto, Hoang, & Weber, 2016). VAT can influence on the consumers' decision to buy durable goods. The effect is achieved through the increase of income and wealth rather than inflation. However, household income expectation rarely changes after the announcement of the VAT changed by the

government. For comparison, changes in non-distortionary taxes do not cause the changes of the consumers' behavior. The potential worrisome for policymakers is stimulation of the overall consumption is that households can come from non-durable to durable consumption, because VAT change is aimed at non-durable goods rather than on the durable ones (D'Acunto, Hoang, & Weber, 2016). The aggregate consumption represents the combination of the households which act as a consumer during life cycle together with the thumb regulation or liquidity restricted households which consumer the biggest share of their disposable income. If consumption expenditures are guided by mixture of life-cycle and Keynesian-type of consumers, then the temporary tax cuts should cause the raise of the consumption expenditures. Its size will depend on the spread of tax cuts among various types of consumers (Hayford, 2016).

After the Great Recession of 2007 to 2009, the US government search for the way to increase the consumption by means of fiscal policy induced by the disposable income which is characterized by the increased disposable income. The background of this policy is based on the idea that when people have more income at their disposal, they usually spend more (Hayford, 2016).

The United States is recognized as the largest consumer marker in the world. It generates GDP of about $20 trillion and employs approximately 325 mln people. In this country the household spending are considered to be the highest than anywhere in the world. Accordingly, it accounts nearly third of the overall household consumption around the world (Select USA, n.d.).

High consumer spending is the reason of growth of the GDP rate. Since the Great Recession in the United States, it healthy rate varied from 2% to 3%. Consumer spending was the closest to the healthy range since 2010 after the economic recession has been overcome. In 2010, the consumption rate was $10.6 trillion. In 2019 the size of consumption is $13.2 trillion. Annually, the rate of consumption has grown: in 2011 the growth was equal to 1.9%, in 2012 to 1.5%, in 2013 to 1.5%, in 2014 to 1.9%, in 2015 to 3.8%, in 2016 to 2.8%, in 2017 to 2.6%, in 2018 to 2.7% and in 2019 to 2.2% (Duffin, 2019).

The worst decline of consumer spending in the USA was observed in 2015. In order to stimulate the consumption, the United States government directed support for the small businesses. The soft business investments were a great concern of that time. Despite the consumer spending did not grow too much, the solid job growth and wages rise lead to the increase of household incomes, and consequently their spending (Li, 2019).

The volume of retail sales in the United Stated have fallen in the second quarter of 2019. The drop reached 8.1%. However, the rate below 3% of retail sales per year is desirable. During pandemic, people stay at home and contribute to online sales more (24.9% growth) (Amadeo, 2020). In the opinion of Barello, for the several decades, US consumers were recognized to be a

driver of the economic growth in the United States. When the consumers buy products or services, they directly contribute to the support of job places for the population. The indirect effect of the consumers on jobs is observed on the example of making inputs for the final production (Barello, 2014).

The American population takes about 5% of the overall world population. It consumes 24% of the energy resources. The US people consume 200 tons of food every day. The water consumption is about 159 gallons daily compared with half of the world's population who consume only 25 gallons (The Associated Press, 2008). The annual consumption expenditures of the US population usually cover such sectors as housing ($20091 bln), transportation ($9761 bln), food ($7923 bln), personal insurance and pensions ($7296 bln), healthcare ($4968 bln), entertainment ($3226), apparel and services ($1866 bln) and other expenditures ($2030 bln) (Duffin, 2019, p. 1).

As argued by Duffin, every year the expenditures of the US population becomes larger. Compared with 2000 then the level of expenditures was about $38.045 bln per year averagely, this value in 2018 reached approximately $61224. It should be noted that in the periods of economic recession and after it, the level of expenditures decreased, for example, after financial crisis of 2008, the rate of consumers' expenditures has decreased from $50486 bln to $49067 bln in 2009 and $48109 bln in 2010 (Duffin, 2019).

The United States started active economic stimulus in 2009. The former president Barak Obama signed the Recovery Act. According to it, the total stimulation expenditures were $832 billion in 2019. The Recovery Act ensures about $763 billion for the financial support. The tax incentives offered by the law include as follows: (1) households and business tax incentives; (2) fiscal relief to the authorities on the state and local level; (3) direct federal spending on the infrastructure and other things. The Recovery Act suggested allocation of about $425 billion for the tax incentives including tax cuts for the households and businesses. In addition, it ensured about $208 billion of the overall government spending. More than 90% of federal spending to stimulate economy is directed for medic aid and $130 for the development of transport and communication system, wastewater etc. (Carlino, 2017). The American families with lowest incomes receive from the government about $5.28 per every $1 they pay in taxes. The families with average incomes receive approximately $1.49 of total spending per 1 tax dollar, compared with the families with highest incomes which receive only $0.25 in spending per every tax dollar. The average and lower income families in the United States are the biggest beneficiaries (Hodge, 2013).

As claimed by Mutikani, the US consumption spending in 2019 has increased that helped a little outlaid the fears of economic recession after the trade war of the United States with China.

The consumer spending in this period has risen by 0.6% (Mutikani, 2019). To support the businesses and households, the US Congressed has passed the emergency relief for $2 trillion that will cover on the unemployment insurance. As a result, the majority of the American population was provided $1.2 ths stimulus checks under conditions of the emergency financial relief. The stimulus package is directed to ensure the sense of security in the American population. Compared with the Recovery Act of 2009 when $900 billion were financed into recovery, the stimulus package value is $2 trillion. It can be understood as the US government "put money" into the pockets of US population that they could spend more now, when it is very needed to support national economy. The financial injects of the US government can promote to the prevention of the economic decline by control of the overall spending. This stimulus package can be called "transfer payment" because the government allocates money among population while it transfers the money to businesses which, in their turn, pay taxes. As an example, the US government supports unemployed people by unemployment insurance programs with total cost of $250 billion. $349 billion are provided to small businesses to encourage them to pay rent and taxes (Melancon, 2020).

Thus, the model of fiscal policy of any country is a consequence of economic and political development of society. It reflects the interests of various social groups and political parties and is formed by reaching consensus in the legislative process. Therefore, during the formation of fiscal policy it is necessary to consider the interests of all these entities and achieve a balance between them.

Summarizing the above-said, fiscal policy of the state is the most important, if not the most important, part of the general policy of the state. In fact, in the conditions of market relations, it is the fiscal policy that determines the direction and rate of development of the national economy. If the state's economy is slipping, then first of all it is necessary to analyze the tax system as the basis of the state's fiscal policy. The fiscal policy of the state is called upon not only to form the state budget necessary for the normal life of society as a whole, but also to be fair.

Fiscal policy plays the important role in the regulation of the economic processes in the country. It is characterized by such features as dynamism and business cyclicality. The need in the development of fiscal policy is connected with the changes of the economic situation around the globe that put the issue before each country to assess and forecast its financial outcomes and risks to the budget stability in the conditions of strengthening the financial integration. Fiscal policy serves as a powerful tool which influences on the country's economic stability. Its effectiveness depends on the size of the public debt and the balance of its budget system.

The US fiscal policy for many years was associated with mostly the assurance of high-quality goods or services on the part of government. When it is necessary, the US government

mobilizes the resources which are needed to finance organization of the production etc. The studies show that the United States uses the techniques of budgeting, which corresponds to the changing requirements of the modern world and provision of the country's economic stability. The United States spend finances on the support of social and medical programs, defence and non-defence measures. Understanding of the US fiscal policy is important step for proper organization of its budgeting and spending. The study shows that fiscal policy consists of the application of such components as taxes, government spending, public debt and others which have direct impact on the country's economic activity. The effects of the US fiscal policy on the wellbeing of its citizens and establishment of trade relations in the country are very extensive including employment, price stability, investments and savings etc. Fiscal policy is aimed at using several major instruments including such ones as taxes, investments, and spending.

Fiscal policy occupies an important place among the factors of economic growth, since it contributes to the achievement of the main goals of the national economy such economic development and stability. In addition to the distributive function of fiscal policy, an important role is played by its stabilizing effect, which consists in smoothing the final demand and, consequently, macroeconomic variables and economic growth.

The importance of fiscal policy stems from the fact that government spending is the main driver of economic activity in the country, stimulating the level of aggregate demand and, therefore, increasing the parameters of economic growth and government revenues. Government revenues are the main financial resource, together with government debt, which is considered government revenue after it is transferred to the treasury. Public finance is the primary vehicle used by governments to achieve economic, social and political goals.

2. METHODOLOGY FOR RESEARCHING THE IMPACT OF FISCAL POLICY ON PRIVATE CONSUMPTION EXPENDITURES AND INVESTMENTS

The *goal* of the empirical part is to find which *fiscal instrument* has affected the *personal consumption* and *investments* more powerful for the analyzed period. The impact of *fiscal instruments* on *gdp per capita* is performed to measure the effect of fiscal shocks on the output of the US economy. To measure the effect of fiscal instruments on targeted variables the structural VAR model is used. To estimate the impact of fiscal instruments on outcome variables the impulse response function is applied. Variance decomposition is used for fiscal instruments to see how the imposed shocks affect the tested variables. Thus, the empirical research is oriented to find the unidirectional or bidirectional causality relationship between fiscal instruments and (i) *personal consumption expenditures*; (ii) *investment*. Hence, the granger test will be done to check if fiscal instruments have a causality relationship with each other. The *gdp per capita* will be tested on the causality relationship between *fiscal instruments*, *personal consumption* and *investment* to find if *gdp per capita* is impacted by any of the mentioned previously variables.

To deal with these empirical goals following *objectives* were created:

(1) to identify variables and data which will enter the model;

(2) to provide description of chosen variables and data;

(3) to classify endogenous variables into 3 categories as (i) fiscal instruments variables (ii) outcome variables, (iii) controlling variables;

(3) to identify exogenous variables;

(4) to adopt the research model, according to literature to achieve the goal of the thesis;

The methodology is divided into 2 subchapters. Subchapter 2.1. deals with the process of data collection and the justification of variables. Subchapter 2.2. is focused on developing a research model, explanation of tests null hypothesis and interpretation of outcomes.

2.1. Justification of variables and data

Research of the fiscal policy is aimed to measure shocks influence of *government expenditure* and *tax* to find which instrument has a larger effect on *personal consumption*, *investment* and *gdp per capita*.

In this paper author has used the structural VAR model to assess the influence of fiscal policy on the US economy. The research was not be restricted by linear regression based on the relationship between reduced and structural disturbances in the United States during the investigated period (Mountford & Uhlig, 2009). SVAR model helped to investigate all possible changes before and after imposing structural shocks in fiscal instruments to observe changes in targeted variables.

The author has dealt with panel data and the following research includes endogenous and exogenous variables. The classification of endogenous time-varying coefficients includes eight of them. Endogenous variables were divided into 3 different categories : 1) <u>fiscal instruments</u> variables as *taxes* and *government expenditures*; 2) <u>outcome</u> variables *personal consumption*, *investment* and *gdp per capita*; 3) <u>coefficient</u> variables: *consumer price index* (CPI), *interest* rate and *industrial production index*. Table 1 provides the data description of variables.

Table 1

The endogenous time-varying coefficients

Variables	Description of variable	FRED description
Taxes	represents the average level of collected taxes for the one quarter	federal government current tax receipts, quarterly, seasonally adjusted.
Government expenditures	relates to country's public sector spending's for the purposes of acquisition of the goods and services including such ones as education, healthcare, social protection and military defense	real government consumption expenditures and gross investment, quarterly, seasonally adjusted
Personal consumption	stands for the average level of purchases made by the consumers on food, energy, clothes, leisure, education, health, housing etc.	real personal consumption expenditures per capita, quarterly, seasonally adjusted.
Investment	stands for the level of investments into US economy. Used to measure the level of allocating funds and aimed on generating future benefits for holders of the capital	real gross private domestic investment, quarterly, seasonally adjusted
GDP per capita	measures the US economy's output per citizen. Used to show the summary of economic activity for the past year	real gross domestic product per capita, chained 2012 dollars, quarterly, seasonally adjusted
CPI	is used as a statistical source for establishment of the periods of the inflation and deflation. . Was applied for personal consumption to provide the real dynamic effect of fiscal policy.	consumer price index: total all items for the united states, growth rate previous period, quarterly, not seasonally adjusted
Interest rate	represents the amount of the "fee" imposed by the lender for the use of the assets expressed through percentage. Interest rate was used for investments to provide real effect of fiscal policy	3-month treasury bill: secondary market rate, percent, monthly, not seasonally adjusted.
Industrial production index	measures the real output of produced goods for the analyzed period. Was applied for gdp per capita to provide real effect of fiscal policy.	industrial production: total index, monthly, seasonally adjusted

Source: Chen, 2020; Banton,2020; FRED, 2020; Kagan, 2011

The coefficient variables were applied for several reasons. First, the coefficient variables represent the "faster" reaction of consequences of crisis (for example interest rate rapid decline was observed in 2007 Q3, while for tax and government 2007Q3 was observed small changes). Secondly, applying coefficient variables helped to control the changes in outcome variables after

imposing structural shocks. When the author has conducted impulse analysis before and after imposing shocks without adding coefficient variables the statistical outcome was a bit higher. But when the coefficient variables entered the model the outcome redundant. Analyzing the influence of fiscal policy on personal consumption without considering price changes especially during crisis and post crisis period is incorrect. As CPI provides the information about gross citizens expenditures, it helps to observe changes in goods purchasing and shows the double verification of multiplier effect from the fiscal instrument. Therefore, considering the impact of fiscal policy on investment without taking into account interest rate is meaningless as interests affecting on investment significantly. The industrial production index controls changes in manufactured goods which affecting the future GDP.

The source of the statistical data used for the US fiscal policy analysis was Federal Reserve Bank of St. Louis or FRED. All the data expect CPI and interest rate coefficients was described in the measure per capita and the natural logarithms was taken. To get the measure per capita variables *tax, government expenditures* and *investment* were divided by the total number of population Time frames are 2001Q1-2019Q4.

The exogenous variables was used to show the next macroeconomic effects on US economy:

Crisis - introduced to show two recessions in US economy for periods 2001Q1-2001Q4 and 2007Q4-2009Q2 for variables: *personal consumption*, *investment* and *gdp per capita.*

Policy – used to show periods when congress imposed shocks for *government expenditures* and *taxes* depended on the quarter or economic situation in state. Applied for *fiscal instruments* variables and covers 2001Q2, 2003Q2, 2008Q1, 2009Q1, 2010Q4, 2011Q4, 2012Q1,2013Q1, 2018Q1.

Data collected and systemized from National Bureau of economic research, Marc D. Hayford (2016) and U.S. Government Publishing Office. The detailed explanation of each fiscal stimulus and crisis periods is represented in Annex 1.

2.2. Specification of the research model

In the following research, author has applied the EViews software. It is effective for the study of econometrics. This software is designed around the concept of objects each having its own window, menu, procedure of use and respectively data. One of the important features of EViews used for model building is the wide range of diagnostic tests which are calculated automatically (Brooks, 2014).

The empirical investigation is based on 6 stages. Stage 1 deals with the stationarity status of variables. Stages 2 is focused on the estimation VAR model. Stage 3 and 4 refer to models' verification. Stage 5 checks the long-run relationship. Stage 6 focused on adopting the SVAR

model and conducting a series of impulse and variance decomposition analyses. The graphical research model is presented in Figure 1.
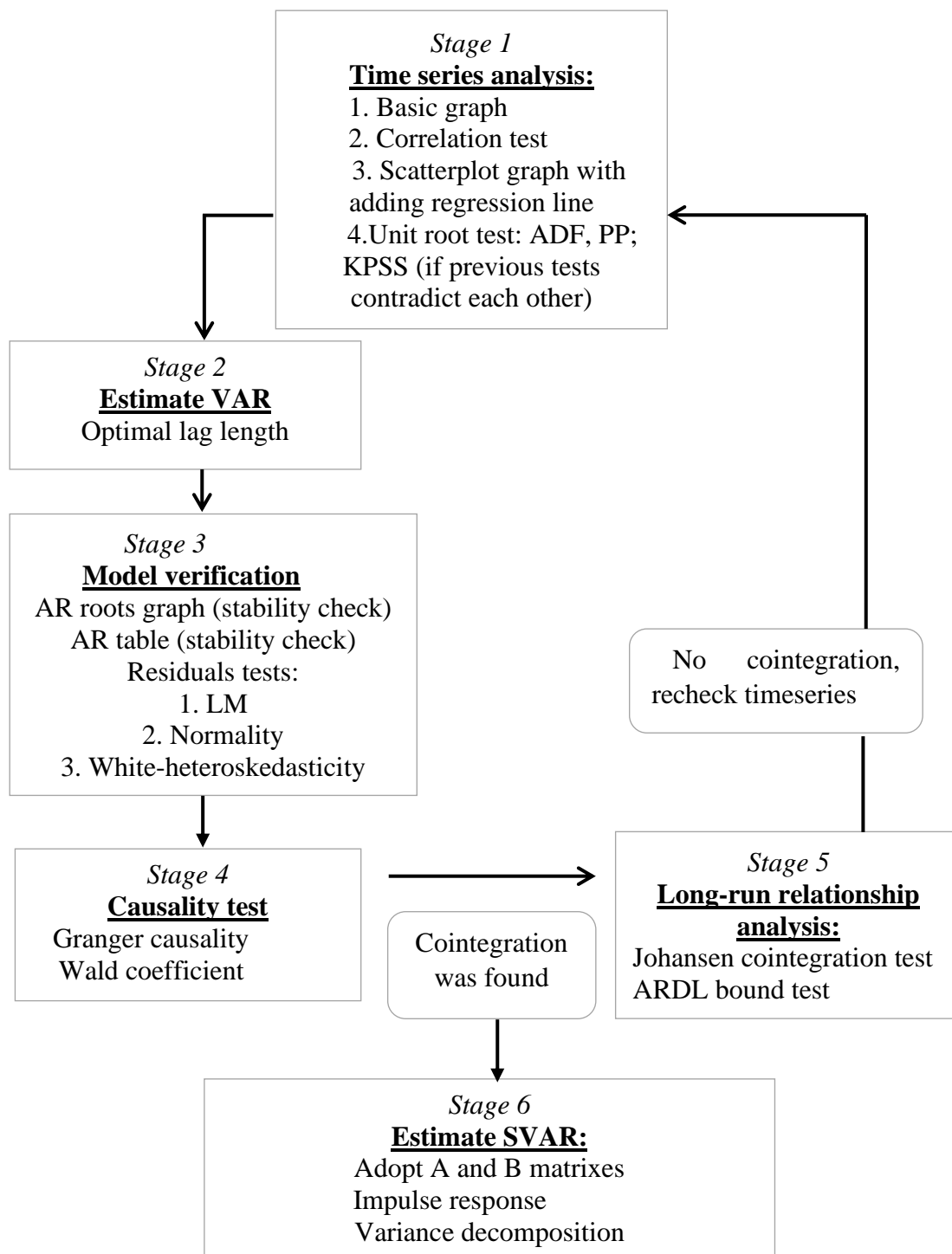

Figure 1. Research model

Source: developed by the author

Stage 1. Time series analysis.

The beginning of stage 1 is the examination of the US fiscal policy variables presented in subchapter 2.1. Firstly, variables will be plotted via applying a basic graph function to present the collected data and to perform a visual inspection of tested variables.

After visual inspection of the basic graph will be performed the correlation test between examined variables. This step will be done to 1) detect the direction of the impact between fiscal variables and outcome variables; 2) to perform a scatterplot graph. As it was quoted by Sober the correlation test suggests that if "X and Y variables are correlated, then either X caused Y, Y caused X or X and Y are joint" (Sober, 2001). Thus, the correlation exists when the produced p-value is less than 0.05. If the produced p-value is more than 0.05 the correlation is negligible or equal to zero. Building the scatterplot by adding the regression line is necessary to detect different variations between X and Y variables. In the following research scatterplot graph will be applied between policy instrument variables against outcome variables. This sequence of steps before applying unit root tests would summarize the visual inspection of tested variables.

To check the stationarity of examined variables author has applied the series of the unit root tests including Augmented Dickey-Fuller test (ADF), Philipps-Perron test (PP) and Kwiatkowski-Phillips-Schmidt-Shin test (KPSS). In case, of finding a similar outcome between ADF and PP the KPSS test will not be applied. If the first two test results would contradict each other KPSS will be performed to make the final decision about stationarity.

ADF test according to Chris Brooks is used to verify whether the existing time series are stationary or not. The ADF test is calculated in a time series of the value when alpha is equal to 1 by formula:

$$Yt = aYt - 1 + \beta Xe + \in (1),$$

where Yt represents the value of the time series at the time "t", while the value Xe is separate explanatory variable called exogenous variable. It means that the time series used in the test are non-stationary. The regression of the ADF test will include the lags of the first differences. ADF tests' null hypothesis is "variable has a unit root" or data is non-stationary. If the produced p-values are more than 0.05 the null hypothesis cannot be rejected, and data is nonstationary. If the p-values are less than 0.05 the null hypothesis is rejected, and data is stationary which implies the absence of unit root.

PP test characterizes as the modified version of ADF test which provides the deeper outcome in identifying stationarity of examined variables. Test is evaluated by the formula:

$$t_a = t_a \left(\frac{\gamma_0}{f_0}\right)^{1/2} - \frac{T(f=\gamma_0)(se(a))}{2f_0^{1/2}s} ,(2)$$

where a is the estimate variable, and t_a is understood as the $t-$ratio of a, $se(a)$ represents the standard error ratio, and s is interpreted as the standard error coefficient of the PP's test

regression. f_0 is the value which estimates the residual spectrum at the frequency equal to zero. The test can be conducted by two options (Ampatzis, 2015) . One suggests inclusion of the constant and linear time. The second suggest their exclusion.

The null hypothesis of PP stands for presence of unit root or tested data is non-stationary. If the produced p-values are more than 0.05 then the null hypothesis is not rejected which means that data is non-stationary and has a unit root. If the p-values less than 5% level of significance, the null hypothesis is rejected which means that data is stationary and there is no unit root.

KPSS test represents the detection whether the time series is stationary in relation to the mean or linear trend or non-stationary because of the unit root (Stephanie, 2016). The stationary time series are characterized by the constancy over time. Test includes breaking series of data into three trends such as a deterministic trend (βt), a random walk (r_t), and a stationary error (ε_t), with the regression equation (Stephanie, 2016). It will be calculated by the formula:

$$xt = rt + \beta t + \varepsilon 1 \text{ (3)}$$

The null hypothesis for this test "variable is stationary" or absence of unit root, while the alternative hypothesis for the test is that data is not stationary. If the produced LM statistics is less than the 5 % level of significance the null hypothesis is rejected which implies that data is non-stationary and has a unit root.

Stage 2. Estimate VAR

To perform the SVAR model firstly should be estimated the unrestricted VAR model (advantages of SVAR model wias explained in Stage 6). When the stationarity status of variables will be identified the VAR model will be applied. The VAR model will be as follows:

$$Zt = Ct + B1, tZt - 1 + \cdots Bkt, t - k + \mu t, \mu t \sim N(0, \Omega t) \text{ (4)},$$

where Zt represents n × 1 vector of established endogenous variables; Ct represents n × 1 vector of coefficients characterized by the time variation that multiply constant term; B(i,t), i = 1, …, k is n × n matrices of coefficient time varying, and finally μt is a type of unobservable shocks with n × n time-varying variance covariance matrix Ωt.

After estimating the model, the selection of an appropriate number of lags arising . To choose a number of lags function "*the optimal lag length*" will be applied. For analysis of quarter data can be included from 1 to 8 lags. Hence, EViews is proposing an automatically appropriate number of lags that can be included in model.

Stage 3. Model verification.

The AR root graph phase of verification model is aimed to test model stability. If modulus is less than 1 and unit roots lays inside the circle the model is table. The AR toot table provides the detailed information about position of unit roots in circle.

After checking the model on stability, the residual tests will be performed:

1. <u>Lagrange multipliers</u> method or LM statistic is a numerical method for solving optimization problems that allows determining the conditional extremum of the objective function, id est minimum or maximum value (Foadi, 2011, p. 2):

$$f(x_{1,}x_{2,}\ldots, x_n) \rightarrow extr \text{ , (5)}$$

in the presence of specified restrictions on its variables in the form of equalities, i.e. the range of admissible values is determined:

$$\begin{cases} g_{1(x_1,x_2,\ldots,x_n)} = 0 \\ g_{m(x_1,x_2,\ldots,x_n)} = 0 \end{cases}, \text{ (6)}$$

$x_{1,}x_{2,}\ldots, x_n$ are the values of the function argument or controlled parameters on the real region at which the value of the function tends to the extremum. The use of the name conditional extremum is since an additional condition is imposed on the variables, which limits the range of admissible values when searching for the extremum of a function (Trench, 2013, pp. 2-3). The null hypothesis of LM test is "the absence of serial correlation". If the produced p-values are higher than 0.05 the null hypothesis is accepted, and variables are not autocorrelated.

2. <u>Normality test</u> is a method to check if the residuals are normally distributed or not. The null hypothesis is "residuals are multivariate normal". If the produced p-value higher than 0.05 the null hypothesis is rejected, and variables are normally distributed.

3. <u>White heteroskedasticity test</u> (No cross terms). The presence of heteroscedasticity in a regression model can lead to negative consequences: (1) the estimates of the normal linear regression equation remain unbiased and consistent, but efficiency is lost; (2) there is a high probability that the estimates of the standard errors of the coefficients of the regression model will be calculated incorrectly, which ultimately can lead to the approval of an incorrect hypothesis about the significance of the regression coefficients and the significance of the regression equation as a whole. The null hypothesis is "residuals are not heteroskedastic". If the produced p-values higher than 0.05 the null hypothesis is accepted, and residuals are not heteroskedastic.

Stage 4. Causality test

The causality test will be performed to observe if there is existed any relationship between *fiscal instruments* and to test a causality relationship between *fiscal variables* and *outcome variables*. This step will be performed for specifying recursive factorization of the SVAR model. If a causality relationship will be detected from *fiscal variables* to *outcome variables* it will ensure the step of estimation A and B matrices.

<u>Granger'causality test</u> is a procedure for checking the causality relationship between time series. The time series are as follows (Hung, Tseng, & Balakrishnan, 2014, p. 1946) :

$$X = \{x_1, x_2, \ldots x_T\} \text{ (7)}$$

and

$$Y = \{y_1, y_2, \ldots y_T\}, (8)$$

The time series are connected by Granger's cause dependence $x_t \rightarrow y_t$, if the variation of the error for the optimal prognoses is $y_t + 1$ by $y_1, \ldots y_t, x_1, \ldots x_t$ is lesser than only $y_1, \ldots y_t$, then

$$E\left((y_{t+1} - y_{t+1})\right)^2 \mid y_1, \ldots y_t, x_1, \ldots x_t) \leq E\left((y_{t+1} - y_{t+1})\right)^2 \mid y_1, \ldots y_t), (9)$$

The idea of the test is that the values of the time series, which is the cause of the changes in the time series, should precede the changes in this time series, and, moreover, should make a significant contribution to the forecast of its values (Siggiridou & Kugiumtzis, 2015). If each of the variables makes a significant contribution to the forecast of the other, then perhaps there is some other variable that affects both (Siggiridou & Kugiumtzis, 2015) . The Granger test sequentially tests two null hypotheses that *x* is not the cause of Granger *y* and *y* is not the cause of Granger *x*. It should be noted that the test results may depend on the number of lags used in the regressions (Siggiridou & Kugiumtzis, 2015). If the produced p-values are less than 5% level of significance the granger cause was detected, and the null hypothesis is been rejected. After performing the granger causality test, the verification of causality relationship will be done by Wald coefficient test. If the produced p-values less than 0.05 the null hypothesis of existing granger causality relationship is proved.

Stage 5. Long-run relationship analysis

When the stability of the model was proved the essential part of estimating the SVAR model is arising. A cointegration test is performed to check the existence of a long-run relationship between variables. If Johansen co-integration test will not detect cointegration or the number of cointegrations will be equal to number of variables, author cannot estimate the SVAR model. The absence or an equal number of cointegrations are not allowing to provide impulse-response function for the long-run period inside SVAR model. In case of absence of the cointegration or a number of cointegration will be equal to the number of endogenous variables, author should recheck time series in *Stage 1*. Author could make the mistake in identifying stationarity status, author could forget to transform industrial production index into logarithms or could take ratio as a logarithm. One of the mentioned mistakes could effect on the outcome of the Johansen cointegration test.

To reinsure the existence of cointegration ARDL bound test will be used. The ARDL bounds test is a powerful tool for measuring co-integration (Giles,2013). It is the extension of the ARDL modeling which is based on the use of F and t statistics required to estimate the significance of the lagged levels of the variable. The null hypothesis stands for "no levels relationship". If the produced F statistics higher than the level of significance, the null hypothesis is rejected which means that cointegration was founded

Stage 6. Estimate SVAR

The first advantage of structural VAR instead of unrestricted VAR is "additional identifying restrictions and estimation of structural matrices to transform VAR errors into uncorrelated structural shocks" (EViews,n.d.). The second advantage is that SVAR allows to "obtaining structural shocks is central to a wide range of VAR analysis, including impulse response, forecast variance decomposition, historical decomposition, and other forms of causal analysis". Thirdly, Blanchard and Perotti (2002) imply that using the structural VAR model produces robustness results in evaluating the dynamic effects of fiscal policy comparing with other autoregressive approaches.

The SVAR model has the next formula:

$$Ay_t = A_1^S y_{t-1} + A_P^S y_{t-P} + C_{x_t}^S + Bu_t, (10)$$

where "A, all the A_t^s and C_t^s are the structural coefficients, and the u_t are the orthonormal unobserved structural innovations" (EViews,n.d.)

Shocks in SVAR are imposed in matrices A and B and has the next view:

$$A = \begin{pmatrix} 1 & 0 & 0 \\ NA & 1 & 0 \\ NA & NA & 1 \end{pmatrix} \qquad B = \begin{pmatrix} NA & 0 & 0 \\ 0 & NA & 0 \\ 0 & 0 & NA \end{pmatrix} (11)$$

The presence of shock or restriction is entering matrix as 1, NA stands for "no restrictions on the corresponding matrix elements", and 0 is "constant restrictions on the corresponding matrix elements" (EViews,n.d.). Thus to observe any shocks in output variables in fiscal variables should be imposed restrictions.

An <u>impulse-response function</u> will be applied to observe the shock applied to each variable to see its effects on the VAR system. Primarily, author is focused on the influence between *fiscal instruments* and between *fiscal instruments* and *outcome variables* s. An impulse response is used to describe the evolution changes of the variable of interest together with the determined time horizon after a shock in a particular moment (Alloza, 2017, p. 1). The impulse response function characterizes the return time of the endogenous variable to the equilibrium trajectory under a unit shock of the exogenous variable.

<u>Variance decomposition</u> is another method of identifying dynamic changes into SVAR model. Primarily, author is focused on the decomposition of *fiscal variables*. If impulse response is identifying the effects of a shock to an endogenous variable inside the model, variance decomposition "separates the variation in an endogenous variable into the component shocks to the SVAR." (EViews,n.d.) . Hence, applying variance decomposition helps to observe the influence of each random innovation on the endogenous variable in model (EViews,n.d.). Variance decomposition is calculated by the following form:

$$y_t = A_1 y_{t-1} + \dots + A_p y_{t-p} + u_t , (12)$$

where $y_t = (y_{1t}, \dots, y_{Kt})$ represents the vector of the K variables of interest observed; A_1 means $K \ x \ K$ parameter matrices; p means the order of lags and u_t should be understood as a process of zero means error which should be taken as white noise (Favero, 2013) .

3. EVALUATION OF DYNAMIC EFFECTS OF US FISCAL POLICY

The following results were performed based on the mentioned previously methodology. Variables in research were coded and should be interpreted as follows : *ln_tax* stands for tax, *ln_ge* is government expenditures, *ln_pc* denotes personal consumption, *ln_inv* stands for investments, *ln_gdp* refers to gdp per capita, *ln_interest* is interest rate, *cpi* is cpi and *ln_industry* refers to industrial production index. The 1st difference is represented as *d.*

Stage 1. Time series analysis. The visual inspection of variables via applying *basic graph* function suggests that variables *tax*, *government expenditures*, *personal consumption*, *investments*, *gdp per capita*, *interest* rate and *industrial production index* should be taken into differences to get stationary status. After taking the mentioned variables into 1st difference author has found that all variables, except *cpi* should be stationary. Thus, the negative influence of *crisis* 2001 and 2008 was detected for all variables. *Figure 2* summarizes variables before and after taking the first difference.
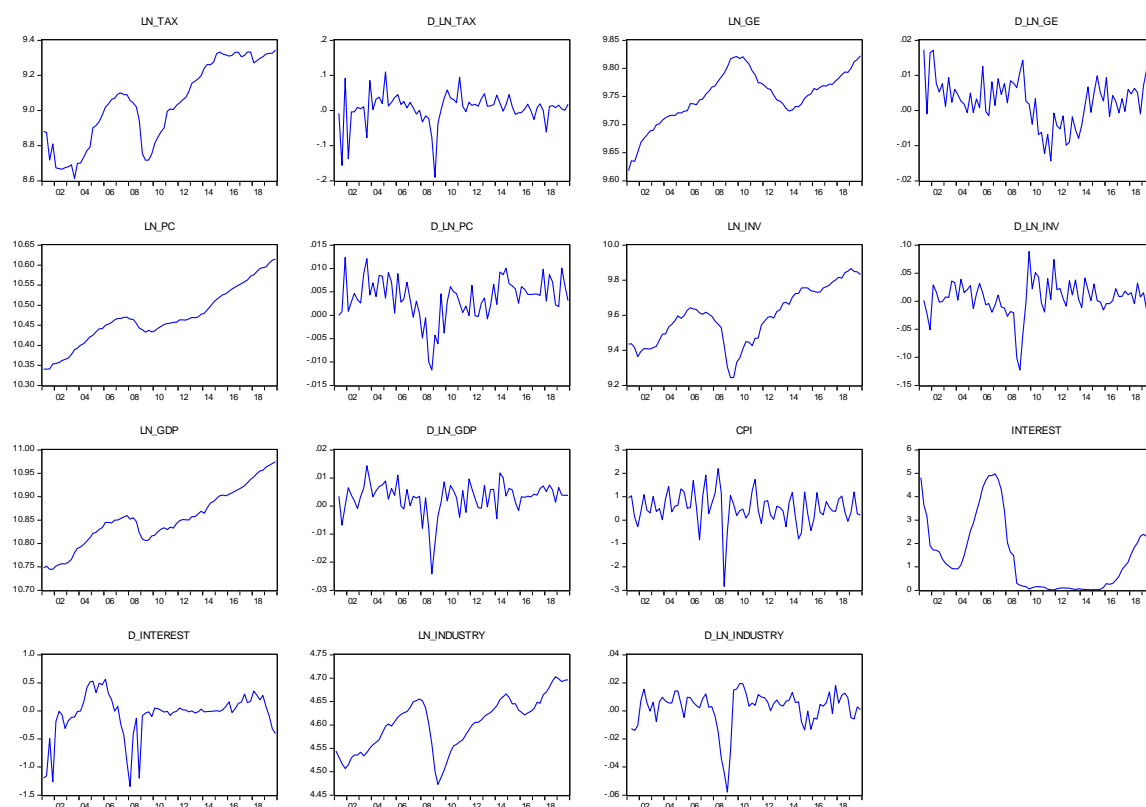

Figure 2. Time series of investigated variables

d stands for the first difference

Source: FRED, 2020

The correlation test was performed on assumption that all variables except *cpi* should be expressed in 1st difference to get a reliable outcome. Figure 3 represents the correlation test:

Correlation Probability	D_LN_TAX	D_LN_GE	D_LN_PC	D_LN_INV	D_LN_GDP	CPI	D_INTEREST	D_LN_IND...
D_LN_TAX	1.000000							

D_LN_GE	-0.274810	1.000000						
	0.0170	-----						
D_LN_PC	0.340836	0.003531	1.000000					
	0.0028	0.9760	-----					
D_LN_INV	0.435729	-0.281672	0.304898	1.000000				
	0.0001	0.0144	0.0078	-----				
D_LN_GDP	0.400721	0.027214	0.666641	0.784688	1.000000			
	0.0004	0.8167	0.0000	0.0000	-----			
CPI	0.155680	-0.027611	0.069079	0.244808	0.296068	1.000000		
	0.1823	0.8141	0.5559	0.0343	0.0099	-----		
D_INTEREST	0.246995	-0.279381	0.365434	0.412546	0.454878	0.191289	1.000000	
	0.0327	0.0152	0.0013	0.0002	0.0000	0.1002	-----	
D_LN_INDUSTRY	0.534191	-0.379014	0.493523	0.755574	0.662102	0.259783	0.411525	1.000000
	0.0000	0.0008	0.0000	0.0000	0.0000	0.0244	0.0002	-----

Figure 3. Correlation test result

d stands for the first difference

Source: FRED, 2020

To achieve the aim of the thesis was primarily decided to focus on relationship between *tax* and *government expenditures;* between *fiscal policy variables* and *outcome* variables. When the test was performed author has founded *tax* and *government expenditures* are differently correlated with *outcome variables*. Hence, the negative correlation was detected between *tax* and *government expenditures*. The decrease of *government expenditures* negatively stimulates economic activity which in turn decreases government revenues or *taxes*.
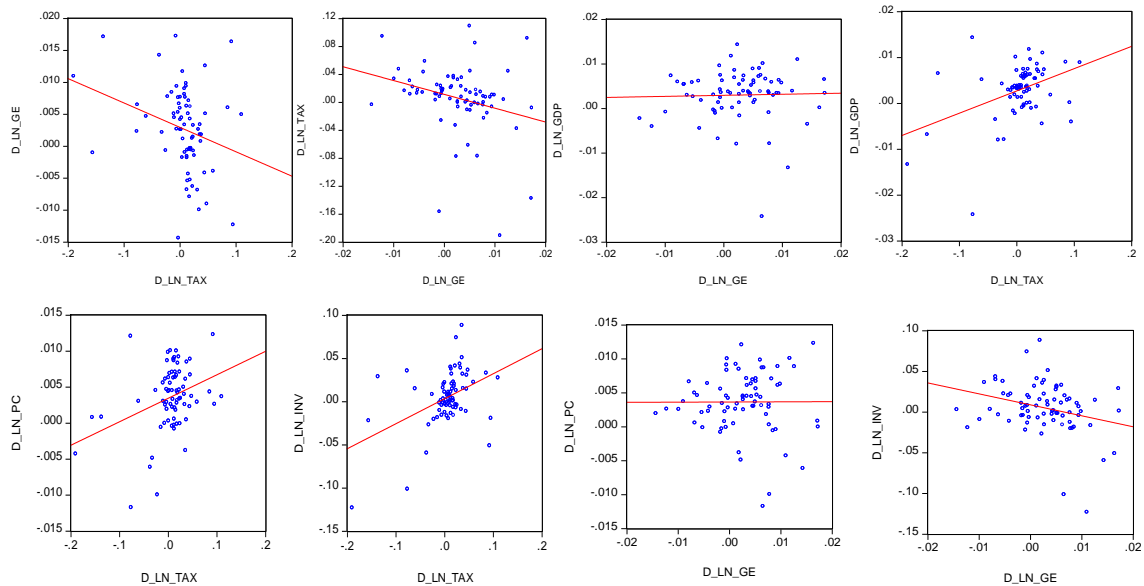

Figure 4. Scatter plot graphs with regression line

d stands for the first difference

Source: FRED, 2020

Figure 3 represents a summary of the correlation test expressed in graph form. Based on figure 3 and figure 4 and the author has concluded that *tax* is positively correlated with *personal*

consumption, *investment* and *gdp per capita*. This leads to the suggestion that *taxes* have a boost stimulus effect rather than regressive. The existence of a correlation between variables is stated as produced p-values are less than 0.05. The opposite is observed with *government expenditures*, where the impact on *investment* level is negative and produced p-values are less than 0.05. For *personal consumption* and *gdp per capita* impact is negligible. Thus, produced p-values are more than 0.05 which implies almost zero correlation between *government expenditures* and *personal consumption;* between *government expenditures* and *gdp per capita*.

Table 2

ADF and PP unit root tests

Variable	ADF			Stationary status	PP			Stationary status
	Level				Level			
	Intercept (p-values)	Trend and intercept (p-values)	None (p-values)		Intercept (p-values)	Trend and intercept (p-values)	None (p-values)	
d_ln_ge	0.1978	0.3041	0.9321	Non-stationary	0.1312	0.4172	0.9852	Non-stationary
d_ln_tax	0.8597	0.4030	0.9198	Non-stationary	0.8081	0.2359	0.8959	Non-stationary
d_ln_pc	0.8963	0.4816	0.9960	Non-stationary	0.9592	0.9000	1.000	Non-stationary
d_ln_inv	0.6480	0.4990	0.8847	Non-stationary	0.7748	0.6770	0.9177	Non-stationary
d_ln_gdp	0.9480	0.8222	0.9975	Non-stationary	0.9494	0.8381	0.9995	Non-stationary
cpi	0.0001	0.0000	0.0725 ***	**stationary**	0.0000	0.0001	0.0000	**Stationary**
interest	0.1472	0.0667 ***	0.1054	Non-stationary	0.0937***	0.3881	0.0219 **;***	Non-stationary
d_ln_industry	0.1008	0.0327 ***	0.8619	Non-stationary	0.5944	0.4404	0.8845	Non-stationary
	1st difference				1st difference			
d_ln_ge	0.0798 ***	0.2497	0.0153 **; ***	Non-stationary	0.0000	0.0000	0.0000	**Stationary**
d_ln_tax	0.0000	0.0000	0.0000	**stationary**	0.0000	0.0000	0.0000	**Stationary**
d_ln_pc	0.2580	0.4873	0.1509	Non-stationary	0.0000	0.0001	0.0004	**Stationary**
d_ln_inv	0.0001	0.0005	0.0000	**stationary**	0.0001	0.0005	0.0000	**Stationary**
d_ln_gdp	0.0000	0.0001	0.0000	**stationary**	0.0000	0.0001	0.0000	**Stationary**
interest	0.0003	0.0037	0.0000	**Stationary**	0.0003	0.0034	0.0000	**Stationary**
d_ln_industry	0.0078	0.0396***	0.006	**Stationary**	0.0078	0.0396***	0.006	**Stationary**

*, **, *** - denotes 1%, 5%, 10% levels of significance

d stands for the first difference

Source: FRED, 2020

In table 2 is presented the outcome of the following unit roots test : Augmented Dickey–Fuller test (ADF) and Phillips–Perron test (PP). The outcome of ADF and PP tests results are spurious as *government expenditures* and *personal consumption* after taking the 1st difference shows different stationary status. Considering Chris Brooks recommendation to take only 2 tests

author need to clarify the stationarity status of variables *government expenditures* and *personal consumption* (Chris Brooks,2014). To manage this situation was decided to provide the extra KPSS test.

Table 3

KPPS unit root test

Variable	KPSS					
	Level		Stationary	1 st difference		Stationary
	Intercept (LM stat)	Trend and intercept (LM stat)	status	Intercept (LM stat)	Trend and intercept (LM stat)	status
d_ln_ge	0.6288988*	0.195457*	Non-stationary	0.256915	0.159865 *	Stationary
d_ln_tax	0.945999	**0.064483**	Non-stationary	0.088156	0.068541	Stationary
d_ln_pc	1.060733	0.156662*	Non-stationary	0.169866	0.145492 **; ***	Stationary
d_ln_inv	0.748822	0.148842 **; ***	Non-stationary	0.088543	0.066308	Stationary
d_ln_gdp	1.045450	0.139923 ***	Non-stationary	0.129214	0.104791	Stationary
cpi	0.266887	0.340498	**stationary**			
interest	0.379296 ***	0.116778	**stationary**			
d_ln_industry	0.685672** ;***	0.088044	**stationary**			

*, **, *** - denotes 1%, 5%, 10% levels of significance

d stands for the first difference

Source: FRED, 2020

Three test results shows that the initial levels of all series (except for a series of *cpi*) are non-stationary in almost all tests. Both ADF test, PP test , KPSS test allows to accept hypotheses about a single root in variables *government expenditures, tax, personal consumption, investment, gdp per capita , interest and industry.*

If their differences are used instead of the original series, the results change. As to the results of ADF test only the series of the *personal consumption* and *government expenditures* are non-stationary. At the same time PP test indicates that these series are stationary. Refinement of the results with the help of the KPSS test shows these two series are stationary (belong to TS-series). All other series of the first differences are stationary in terms of tests with trends and without

trends (except *interest* which is significant only for 10% level and *industry* which is significant for 5% and 10% in intercept).

Based on tables 2 and 3 author can estimate VAR model. For VAR will be used variables in order *d_ln_tax ,d_ln_ge, d_ln_pc, d_ln_inv, d_ln_gdp, cpi d_interest d_ln_industry*.

3.1. VAR model

Stage 2. Estimate VAR. When variables were included in the VAR model the identification of a suitable number of lags arose. Originally EViews has automatically proposed to include 6 number of lags. However, when an author has selected 6 lags that were proposed by different info-criteria's the model became unstable. The inclusion of 8 variables and more than 4 lags lead to the impossibility of conducting a White-heteroskedasticity test (technical limits of EViews software) inside the VAR model. Therefore, including 8 lags as a maximum number of lags which were proposed by different info-criteria's lead to the impossibility to set up the VAR model. For the constructed regression model author has performed a test for the length of 4 lags to test the model on heteroskedasticity and to get stability inside the model. Table 4 represents results for selecting an appropriate number of lags.

Table 4

Optimal lag length

Lag	LogL	LR	FPE	AIC	SC	HQ
0	1422.069	NA	1.09e-27	-39.38223	-38.61738*	-39.07808*
1	1511.475	151.1088	5.43e-28	-40.09790	-37.29345	-38.98266
2	1593.821	120.6191*	3.53e-28*	-40.61468*	-35.77063	-38.68835
3	1650.213	69.89406	5.42e-28	-40.40036	-33.51672	-37.66295
4	1708.484	59.09146	9.80e-28	-40.23898	-31.31572	-36.69048

Source: FRED,2020

As it can be seen from the results of calculations based on following information criteria in: the sequential modified LR test statistic (LR), the final prediction error (FPE), the Akaike information criterion (AIC), the Schwartz information criterion (SC) and the Hannah-Quinn information criterion (HQ), obtained the value of the optimal maximum number of lags (they are marked with asterisks) for inclusion in the VAR model. The optimal number of lags to include in the model are different. For LR, FPE and AIC 2 lags is optimal lag length, while for SC and HQ criterions 0 lags should be included. Most of research paper suggest following the AIC or LR criteria (Hatemi & Hacker, 2009; Liew, 2004). In author's case both info criterions propose to include 2 lags. Therefore, the estimation output results of constructed model suggest using AIC criteria instead of SIC as AIC produced lower coefficient. AIC proposes - 39.52191 and SIC -

34.75723. Formal conclusion is estimating VAR model with 2 lags. This will lead to obtaining results that *fiscal variables* will affect *outcome variables* in 2nd quarter. Generally, in the following research case the "first" structural changes for targeted variables after introducing fiscal policy should be observed after 6 months.

Stage 3. Model verification. The first step of validation of stability of the model was done via checking the AR root graph. Results presented in the Figure 5.
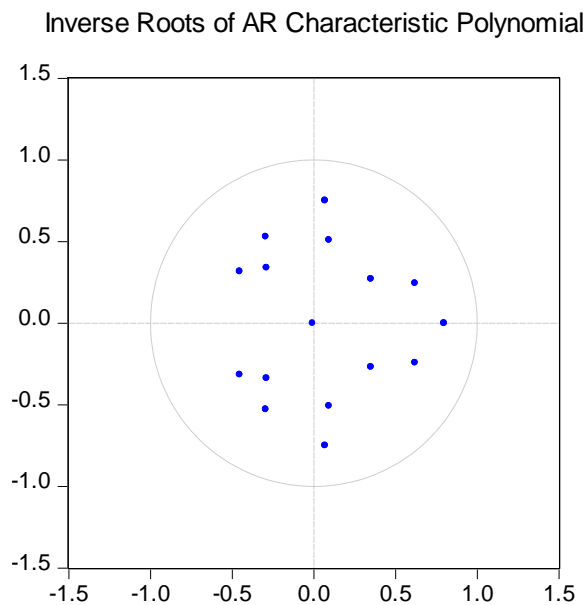

Inverse Roots of AR Characteristic Polynomial

Figure 5. AR root graph

Source: FRED, 2020

After observing the AR root graph was concluded that no unit roots lay outside the unit circle. Therefore, the modulus of unrestricted VAR model is less than 1. To finally validate this assumption AR roots table was inspected to ensure the validity of VAR model. Hence, the model is stable.

When the stability of model was checked the new phase of verification model was done by residual tests in compliance with methodology.

Table 5

Residual tests

Test	H0 Hypothesis	P-values	Result	Conclusion
Autocorrelation LM test	H0: No serial correlation at lags to h	Annex 2	H0: cannot be rejected	No serial correlation and residuals are not autocorrelated
Normality test (Cholesky of covariance (Lutkepol)	H0: Residuals are multivariate normal	0.6687	H0: is rejected	Residuals are normally distributed
White-heteroskedasticity (No cross terms)	H0: Residuals are not heteroskedastic	0.3442	H0: cannot be rejected	Model is not heteroskedastic

Source: FRED, 2020

The model was checked by three different residual tests : Autocorrelation LM test, Normality test and White heteroskedasticity. Results presented in table 5. As the model is stable, not autocorrelated, residuals are normally distributed, and not heteroskedastic author could start a new stage.

Stage 4. Granger causality

Checking granger relationship between *fiscal variables* and *outcome variables* is necessary to conduct structural shocks in impulse response function. Table 6 summarizes granger relationship between all variables.

Table 6

Pairwise Granger causality p-values

Dependent → Independent ↓	d_ln_tax	d_ln_ge	d_ln_pc	d_ln_inv	d_ln_gdp	cpi	d_interest	d_ln_industry
d_ln_tax	-	0.2832	0.3049	0.6701	0.4118	0.2078	0.9490	0.2534
d_ln_ge	**0.0000**	-	0.7940	0.1125	0.9040	0.8383	0.7166	0.2309
d_ln_pc	0.6972	**0.0212**	-	**0.0014**	**0.0060**	0.4748	0.3525	0.6293
d_ln_inv	0.9014	0.4096	0.4685	-	0.3151	**0.0254**	0.2827	0.4294
d_ln_gdp	0.2364	0.1056	0.8095	0.0907	-	0.4131	0.1197	0.3556
cpi	0.3538	0.9857	0.9101	0.5316	0.5587	-	0.8725	0.5954
d_interest	0.0727	0.8713	0.6720	0.0527	0.9843	0.7911	-	0.7011
d_ln_industry	0.1147	0.9413	0.4999	**0.0085**	0.0850	**0.0002**	0.6129	-

d stands for the first difference

Source: FRED,2020

The granger test provides the estimations that at a 5 % level applying 2 lags will not detect any relationship from *fiscal* variables to *outcome* variables. If an author would use 6 lags, the unidirectional relationship from *tax* to *personal consumption*, *investment* and *gdp* exists. The inclusion of 5 lags results in a bidirectional relationship between *tax* and personal *consumption*; thus, the unidirectional causality existed from *government expenditures* to *investment*. Using more than 2 lags for checking a causality relationship will prove the Keynesian theory. Applying 2, 5 and 6 lags lead to a common unidirectional outcome that *government expenditures* cause *tax*. The common unidirectional relationship from *government expenditures* to *tax* is existed due to the next reason. The *government expenditures* has an influence on the economic growth which should provide growth in *gdp per capita* which results in increase of government revenues or *taxes*. Therefore, changing the order of variables is resulting in a similar outcome.

Author has detected that *personal consumption* influences *government expenditures*, *investment* and *gdp*. The unidirectional relationship between *personal consumption* and *gdp per capita* occurred due to the next reason. Private expenditures are the biggest component of GDP and forms 2/3 of this indicator. Generally, GDP is a summary of economic activity for the previous year which is impacted by private expenditure level. The assumption of the unidirectional

relationship between *personal consumption* and *investment* could be explained by several reasons. The first reason, as more citizens increase their expenditures, as more business sectors investing in the economy to satisfy potential buyers with their intention to spend. The second reason, citizens' expenditures are balanced which lead to investing the "saved" money, for example into the bond market. The causality from *personal consumption* and *government expenditures* provides the suggestion that the growth of *personal consumption expenditures* causes the growth of *government expenditures*.

Other granger causalities that were detected between *outcome variables* and *coefficient variables* are not the primary sphere of investigation the aim of current research. These granger relations could be analyzed in future works.

Results of verified granger causes by Wald statistics are presented in the next table :

Table 7

Wald coefficient p-values

Dependent variable	Chi-square value	P-value	Confirmation of granger test
d_ln_tax	24.80366	0.0000	confirmed
d_ln_ge	7.709571	0.0212	confirmed
d_ln_inv	13.15540	0.0014	confirmed
d_ln_gdp	10.21977	0.0060	confirmed

d stands for the first difference

Source: FRED, 2020

The Chi-square values are high, which implies the presence of causality relationship. Therefore, the probability values are less than 0.05 that means that granger causality relationship is verified. Author has confirmed the rest of granger causes presented in Table 7 and found the same outcome. This implies that granger test states that at 2 lags there is no causality relationship from *fiscal instruments* to *outcome variables*.

Stage 5. Cointegration tests. The author has provided a series of Johansen cointegration tests inside the model and found interesting results. The inclusion of 2 lags leads to the detecting of 4 cointegrations. One of the explanations of such result is testing cointegration between variables of order I(0) and I(I) which leads to a high number of cointegrated series. Another explanation is that *personal consumption*, *investment*, *government expenditures* are the components of *GDP*. However, after a series of an increasing number of lags the cointegration results has changed. When author included 3 lags number of cointegration falls from 4 to 2. But in a strict sense, author could not apply 3 lags instead of 4 as it was not marked in table 2 during conducting optimal lag length selection. Therefore, if to test cointegration without exogenous

variables 2 cointegrations will be detected. Nevertheless, to test a long-run relationship is possible when a number of cointegration less than a number of variables. Author has 8 variables and the Johansen test proposes 4 cointegrations which allow to continue the research.

Although was provided ARDL bound test to verify cointegration between tested variables. The produced F-statistics 14. 95575 exceeds the 5% level of significance and verifies the cointegration. This outcome suggests that the author can start a new stage to estimate the structural VAR model.

3.2. SVAR model

Stage 5. SVAR estimation

Automatically proposed by EViews the recursive factorization of A unit triangular and of B diagonal has the next formula:

1. Factorization of A unit triangular:

$$
\begin{pmatrix}
1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
NA & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
NA & NA & 1 & 0 & 0 & 0 & 0 & 0 \\
NA & NA & NA & 1 & 0 & 0 & 0 & 0 \\
NA & NA & NA & NA & 1 & 0 & 0 & 0 \\
NA & NA & NA & NA & NA & 1 & 0 & 0 \\
NA & NA & NA & NA & NA & NA & 1 & 0 \\
NA & NA & NA & NA & NA & NA & NA & 1
\end{pmatrix} \quad (13)
$$

2. Factorization of B diagonal:

$$
\begin{pmatrix}
NA & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & NA & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & NA & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & NA & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & NA & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & NA & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & NA & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & NA
\end{pmatrix} \quad (14)
$$

The mentioned previous formula proposes to check impulse response function between variables without adding any structural shocks, except for itself. Firstly, was checked impact between *fiscal variables* and *outcome variables*. After that granger causality relationship between fiscal instruments from table 6 was examined. In this case will be used the impulse definition by Cholesky dof adjusted instead of structural decomposition. That is primarily done because in case of imposing no restrictions there is no difference in impulse outcome.

Table 8 provides the impulse definition for tested variables. It can be observed that a *tax* instrument has a more powerful influence on *outcome variables,* comparing with *government expenditures* instrument. However, this "power" is significant only for *personal consumption* and *investment* in the short-run period. Examination of *government expenditures* influence on *personal consumption* is low comparing with *tax,* but has a constant positive long-run effect up to the 10th

period. Both *investment* and *gdp per capita* are infulenced negatively by *government expenditures* for short and long-runs.

Table 8

*Impulse response elasticity coefficients between variables before imposing shocks*

Period	Tested variables					
	d_ln_tax to d_ln_pc	d_ln_ge to d_ln_pc	d_ln_tax to d_ln_inv	d_ln_ge to d_ln_inv	d_ln_tax to d_ln_gdp	d_ln_ge to d_ln_gdp
1	0.000	0.0000	0.000	-0.0000	-0.000	0.0000
2	0.007	0.0006	0.013	-0.0007	0.008	-0.001
3	0.005	0.0006	0.003	-0.0004	-0.001	-0.0011
4	-0.004	0.0001	-0.002	-0.0002	0.000	-0.0006
5	-0.002	0.0004	0.001	0.0001	0.002	-0.0005
6	-0.001	0.0005	-0.001	-0.0000	0.001	-0.0005
7	-0.001	0.0003	-0.000	-0.0000	0.001	-0.0003
8	-0.000	0.0003	0.000	0.0001	0.000	-0.0003
9	-0.000	0.0002	0.000	-0.0000	0.000	-0.0002
10	-0.001	0.0001	-0.000	-0.0000	0.000	-0.0001

Source: FRED, 2020

d stands for the first difference

Analysis of the impulse response functions in figure 6 shows that the fluctuations caused by the shock are damped in all three variables finally for 9 periods. A significant part of these fluctuations is compensated for 6 periods. At the same time, the behavior of the graphs shows that the processes return to the initial state after the shock.

Response of D_LN_TAX to D_LN_PC
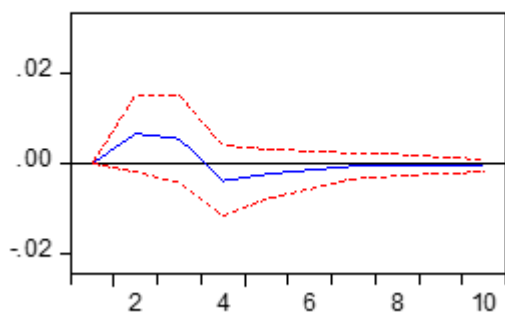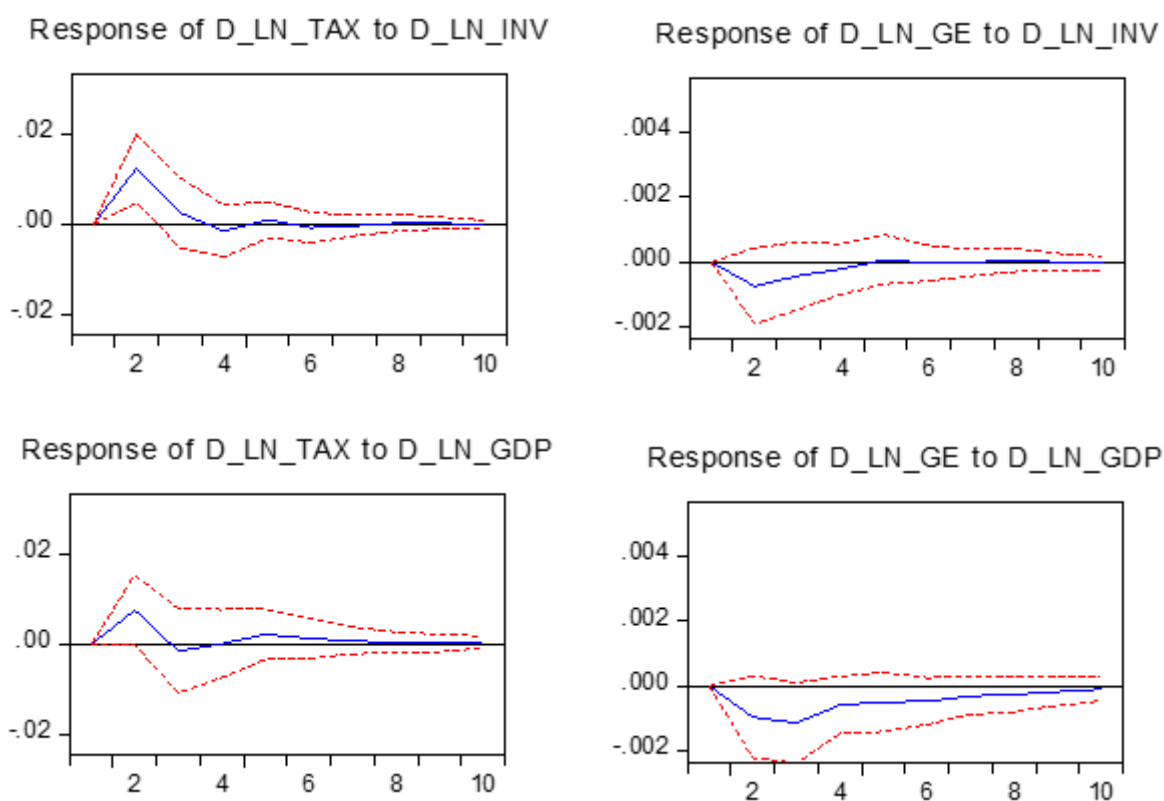
Response of D_LN_GE to D_LN_PC
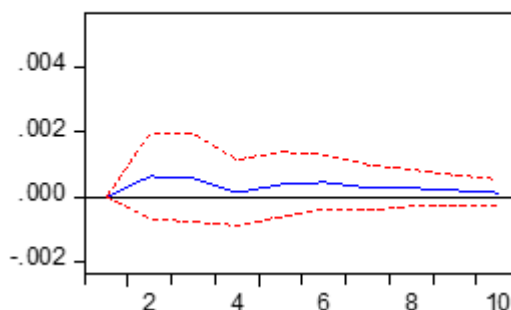
Figure 6. Impulse response without structural shocks

d stands for the first difference

Source: FRED, 2020

Fiscal variables to personal consumption. For pair *tax* to *personal consumption* and *government expenditures* to *personal consumption* can be observed the positive short-run effect. The long-run positive shock was detected only between *government expenditures* and *personal consumption*.

The positive short-run effect of *tax* to *personal consumption* explains by the fact that with the decrease of *taxes* the level of income is arising which correspondently increases *personal consumption*. However, from the 3rd period is a rapid decline which is constant till 10th period. Explanation of such phenomena related to suggestions that generally *tax* changes are efficient for fast boosting of consumption, but for the long-run frame it is harmful. Author has compared the outcome of his research with Blanchard and Perroti (2002), Mountford and Uhlig (2009), Mertens and Ravn (2012) works and find the next similarity. Researchers proposes that *tax* in the long-run has a negative effect on *personal consumption* or *taxation* is **crowd out** *private expenditures* (Blanchard and Perotti ,2002; Mertens and Ravn (2012). Consequently, for the short-run *personal consumption* is **crowded in** by *taxes*. The current research outcome is not contradicted with Blanchard and Perroti (2002), Mountford and Uhlig (2009), Mertens and Ravn (2012) research papers.

The reason of such long-run outcome effect may be interpreted by the next idea. *Government expenditures* are a set of transfers that come to residents and stabilize households' budgets after the crisis. Residents began purchasing goods after transfer as before crisis and this factor causes positive shocks from the 2nd quarter till 10th period. Thus, Blanchard and Perotti (2002), Fatas and Mihov (2001) found that *personal consumption* is **crowded in** by *government expenditures* for the short-run and for the long-run. Such outcome does not contradict with the researcher's findings which validates the outcome of current research for this pair.

Fiscal variables to investment. For the short run period *tax* to *investment* and *government expenditure* to *investment* has opposite outcome. For the long-run influence of fiscal variables are equal to zero.

The reason why in the short-run *taxes* has a positive influence on *investment* is the next. When taxes decrease the income increases which leads to resident's decisions or to invest or to spend generated cash on goods. If to assume that residents have decided to invest the generated cash into bond mark as an example such impulse outcome arising as in Figure 6. Further, similar findings that *tax* has a positive effect on investment was founded by Blanchard and Perotti (2002), Mertens and Ravn (2012). Thus it can be concluded that *investment* is **crowded in** by *taxes* in the short run. Therefore, Blanchard and Perotti pointed out that the balanced-budget fiscal expansion has a negative effect on investment level (2002). The obtained result does not contradict other research papers.

In the case of *government expenditures,* it have more a negative effect on investment rather than zero. Blanchard and Perotti (2002), Mountford and Uhlig (2009) also, found that *government expenditures* have more a <u>negative effect</u> on *investment*. Therefore, *investment* is **crowded out** by *government expenditures* in the short-run period. Hence, researchers Blanchard and Perotti (2002) pointed out that such outcome contradicts Keysian theory and mentioned that similar outcome was obtained by Alesina et. al. (1999). The explanation of such contradict result could lay to the people behavior which are more oriented on satisfying physiological needs or oriented on personal expenditures rather than investments after a crisis or during "normal" times.

Fiscal variables to gdp per capita. For short-run and long-run *tax* to *gdp per capita* and *government expenditures* to *gdp per capita* has contradict results. The *tax* have a strong positive effect in the short-run and slightly positive in the long run. *Government expenditures* have a constant negative for short-run and long-run.

Tax to *gdp per capita* was evaluated and analysis of the impulse response shows that the fluctuations caused by the shock are damped for 9th periods. The positive response of *tax* to previous components of gdp might be affecting the current pair. That is one of the reasons why *tax* changes positively impacted *gdp per capita*. . From studies of Alesina and Ardagna (2009)

Blanchard and Perotti (2002), Romer and Romer (2010), Mountford and Uhlig (2009), the decrease of tax level has a positive effect on output (*gdp per capita*). Therefore, Mountford and Uhlig proposed that the deficit-financed tax cuts better improve *gdp per capita* (2009). Another proof of the positive influence of tax on gdp per capita was discussed by Mertens and Ravn and researchers concluded that *tax* shocks on an empirical level are essential for improving economy (2012). Another explanation of *tax* influence will be provided after comparing the current results of pair *government expenditures* to *gdp per capita* with other research papers. Hence, for the period 2001Q1-2019Q4 *gdp per capita* is **crowded in** by *taxes* for the short-run and long-run periods.

As the spurious result was obtained between *government expenditures* and *gdp per capita* author decided to focus on the next researcher's outcomes. Blanchard and Perotti (2002), Mountford and Uhlig (2009), Fatas and Mihov (2001), Burriel et al. (2010) stated that with an increase of *government expenditures* the *gdp per capita* increases, while we have investigated the opposite outcome. Ramey implies that during analyzing the US data, time frames playing a significant role in the research outcome (2011). Considering this statement, Blanchard and Perotti (2002) time frames are 1960:1-1997:4; Mountford and Uhlig (2009) are 1955Q1:2000Q4; Fatas and Mihov (2001) are 1960Q1:1996Q4; our outcome could theoretically occur in such way due to different analyzed periods. One more possible explanation of such outcome is based on Bjørnland assumption (2013). Bjørnland implies that for US after 1980s the output of increasing government spending as well as tax cuts over time became weaker (2013). That is the reason why in the following research *government expenditures* could negatively influence *gdp per capita*. Consequently, *gdp per capita* is **crowded out** by *government expenditures* in the short-run and long-run periods.

Granger relationship between fiscal instruments. Impulse response between *fiscal variables* and other variables presented in Annex 3. Figure 7 represents impulse response between *government expenditures* to *tax*. *Government expenditures* has a negative impact on taxes in the short run, while for the long-run equal to zero. The possible explanations between these instruments was more detailed discussed in stage 6 after performing variance decomposition.
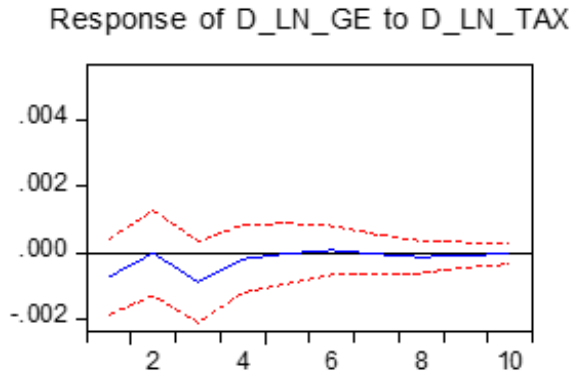
Response of D_LN_GE to D_LN_TAX

Figure 7. Impulse response between fiscal instrument before imposing shocks

d stands for the first difference

Source: FRED, 2020

If to check fiscal policy where both instruments go simultaneous the new result is occurring. Firstly, when the author has imposed simultaneous *tax* and *government expenditures* shocks for *outcome variables* the recursive factorization of A unit triangular and of B diagonal formula has been changed for the next one:

1. Factorization of A unit triangular:

$$
\begin{pmatrix}
1 & 0 & 1 & 1 & 1 & 0 & 0 & 0 \\
NA & 1 & 1 & 1 & 1 & 0 & 0 & 0 \\
NA & NA & 1 & 0 & 0 & 0 & 0 & 0 \\
NA & NA & NA & 1 & 0 & 0 & 0 & 0 \\
NA & NA & NA & NA & 1 & 0 & 0 & 0 \\
NA & NA & NA & NA & NA & 1 & 0 & 0 \\
NA & NA & NA & NA & NA & NA & 1 & 0 \\
NA & NA & NA & NA & NA & NA & NA & 1
\end{pmatrix} \quad (15)
$$

2. Factorization of B diagonal

$$
\begin{pmatrix}
NA & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & NA & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & NA & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & NA & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & NA & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & NA & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & NA & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & NA
\end{pmatrix} \quad (16)
$$

Secondly, the coefficient of each impulse response outcome after imposing structural shocks has changed. Table 9 provides statistical information about each impulse response. After imposing structural shocks *tax* remains a positive powerful effect on *personal consumption, investment* and *gdp per capita* in the short-run and long-run periods. At the same time, *government expenditures* have a negative impact on *personal consumption* in the short-run. *Investments* are negatively influenced by *government expenditures* after imposing structural shock in the short-run period.

Thus, *government expenditures* remain a negative impact on *gdp per capita* after imposing shock in the short-run and long-run periods.

Table 9

Impulse response elasticity coefficient between variables after imposing structural shocks

Period	Tested variables					
	d_ln_tax to d_ln_pc	d_ln_ge to d_ln_pc	d_ln_tax to d_ln_inv	d_ln_ge to d_ln_inv	d_ln_tax to d_ln_gdp	d_ln_ge to d_ln_gdp
1	-0.001	-0.002	-0.002	-0.0039	-0.000	-0.0003
2	0.013	0.0002	0.016	-0.0013	0.007	-0.0009
3	0.003	-0.002	-0.004	-0.0019	-0.002	-0.0012
4	0.000	-0.006	0.008	-0.0016	0.001	-0.0006
5	-0.002	-0.001	0.002	-0.0011	0.002	-0.0005
6	-0.001	-0.0000	0.002	-0.0007	0.001	-0.0005
7	0.001	-0.0000	0.003	-0.0006	0.001	-0.0003
8	0.000	0.0000	0.001	-0.0006	0.000	-0.0003
9	0.000	-0.0000	0.001	-0.0005	0.000	-0.0002
10	-0.000	-0.0000	0.001	-0.0004	0.001	-0.0001

d stands for the first difference

Source: FRED,2020

Visual inspection of impulse response function with adding structural shocks comparing with previous tests without adding shocks has different results. In Figure 8 shock 3 stands for *personal consumption*, shock 4 denotes *investment* and shock 5 is *gdp per capita*.
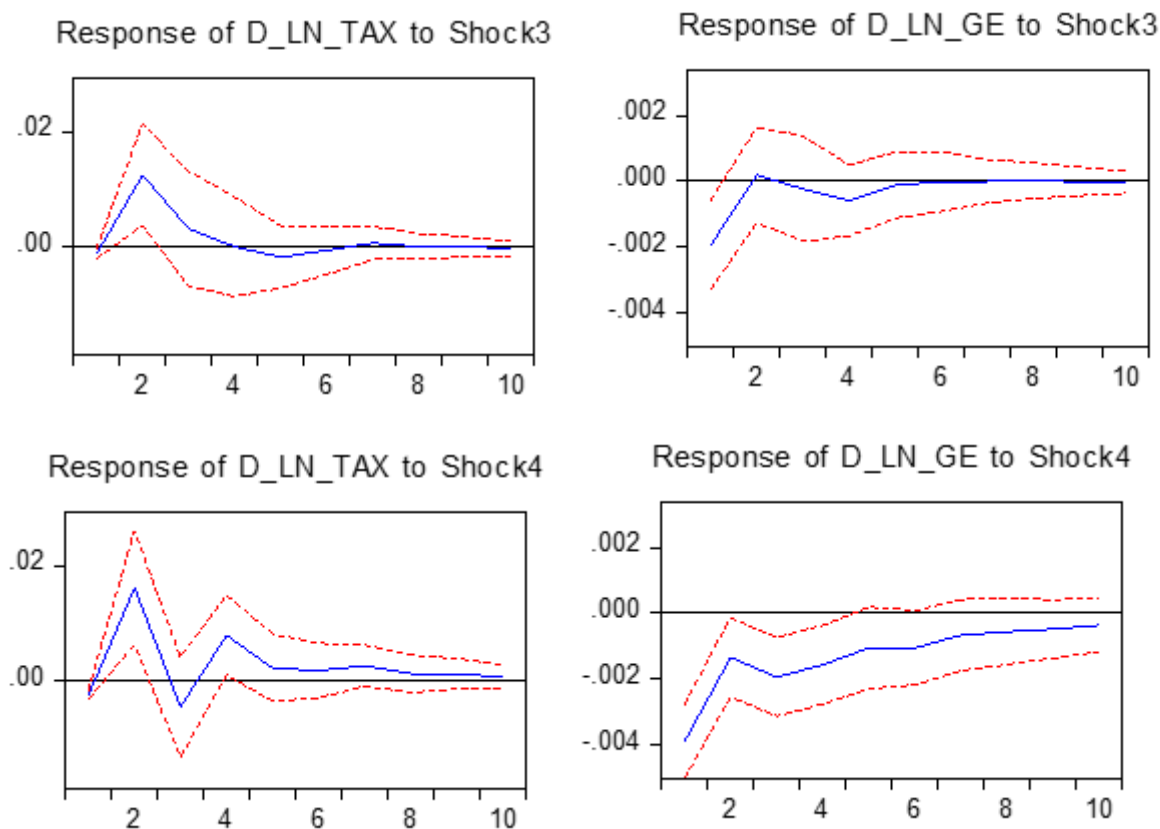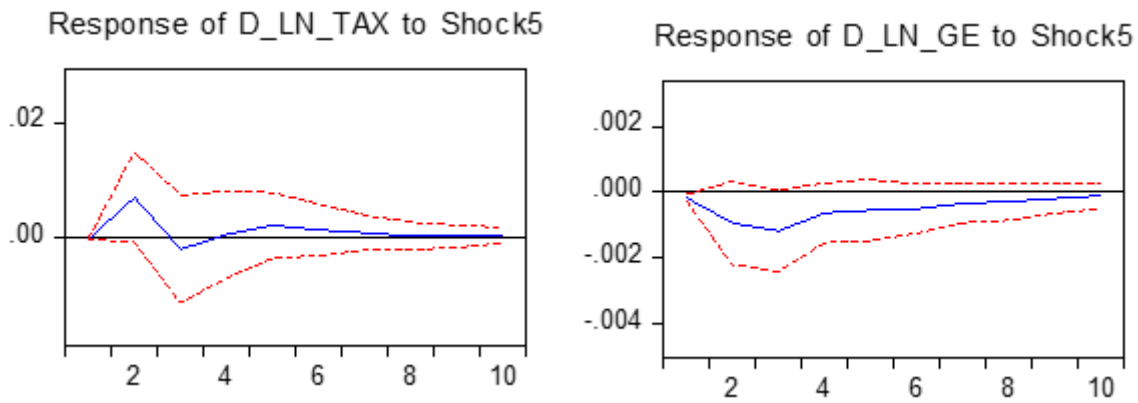
Figure 8. Impulse response after imposing structural shocks

d stands for the first difference

Source: FRED,2020

Fiscal variables to personal consumption (simultaneous applying of fiscal instruments). After imposing shock *tax* remains a positive influence on *personal consumption* in the short-run period. The peak is still observed in 2nd period. Before imposing structural restrictions on 1 US dollar spent the multiplier effect was 1.007 US, after imposing structural restrictions the multiplier arises to 1.013 US dollar. For the long-period *personal consumption* is impacted by *tax* with zero effect as it was before imposing structural shocks.

Government expenditures in short-run and long-run periods have a negative impact on *personal consumption*. If to compare current results with the previous one, it can be found that 2nd remains as the peak, but results have differed. Before imposing structural shocks on spent 1 US dollar the multiplier was 1.0006 US dollar, while after adding shocks multiplier has decreased to 1.0002 US dollar. If in the long-run period before imposing shock was detected positive effect, now was detected negative or zero effects depend on the period. For example, in the 5th period before imposing shock on 1 invested US dollar the multiplier was 1.0004 US dollar, after imposing shock on 1 invested US dollar outcome is -0.999 US dollar.

Fiscal variables to investment (simultaneous applying of fiscal instruments). After imposing structural shock *tax* have a powerful positive influence on investment in the short-run period. In 2nd period before imposing shock on invested 1 US dollar the multiplier was 1.013 US dollar, after imposing shock the multiplier arises to 1.016 US dollar. Hence, *tax* in the long-run period after imposing shock have a positive arising trend on *investment*. Before imposing shock in 5th period, the 1 US dollar spent affected in 1.001 US dollar growth, while after imposing structural shock the multiplier has increased to 1.004 US dollar.

When structural restrictions were imposed the negative impact of *government expenditures* to *investment* has raised in short-run and long run periods. If before adding restrictions in 2nd period on 1 US dollar spend the crowd out effect was 0.9993 US dollar, after imposing restrictions on

invested 1 US dollar the negative effect has increased to 0.9987 US dollar. For the long-run period the slight raise from 1.0001 USD dollar before structural shock imposing changes on the decrease to 0.9989 USD dollar.

Fiscal variables to gdp per capita (simultaneous applying of fiscal instruments). When structural restrictions were applied author founded flat changes between *fiscal variables* and *gdp per capita.*

In the case of *tax*, before imposing restrictions in 2nd period 1 USD dollar spent resulted in a multiplier effect of 1.008 USD dollar. For the 5th period before and after imposing shocks 1 USD dollar spent resulted in a growth of 1.002 USD dollar.

Before imposing restrictions in 2nd period on invested 1 USD dollar the crowd out effect from *government expenditures* was 0.999 USD dollar. After imposing structural shocks, the negative influence remains and on invested 1 USD dollar crowd out effect resulted in 0.9991 USD dollar. For long-run in 5th period before and after imposing shocks on invested 1 US dollar the crowd out effect resulted in -0.9995 USD dollar.

Granger relationship between fiscal instruments (simultaneous applying of fiscal instruments). After imposing shocks author has found flat changes between pair *government expenditures* and *tax* in the short-run and long-run periods. Table 10 summarizes the consequences of before and after imposing structural shocks.

Table 10

Summary of impulse responses elasticity coefficients between fiscal instruments and after imposing shocks

d_ln_ge to	Period									
d_ln_tax	1	2	3	4	5	6	7	8	9	10
Before restrictions	-0.0007	0.0002	-0.0009	-0.0002	-0.0000	0.0001	-0.0000	-0.0001	-0.0001	-0.0000
After restrictions	0.0002	-0.0002	-0.0006	0.0000	0.0002	0.0002	0.0001	0.0000	0.0000	0.0000

d stands for the first difference

Source: FRED, 2020

According to table 9 before imposing shock in 2nd period spent of 1 US of dollars resulted in a multiplier effect for 1.0002 US of dollars. At the same time, after imposing shock in 2nd period observed the crowd out effect and the spent of 1 US dollar resulted in -0.9998 US dollar. The opposite situation for this pair in the long-run period is observed. Before entering structural shock restrictions, the 5th period represents zero changes, while shock proposes the growth to 1.0001 US dollars. Generally, it can be concluded that in both cases in the short-run period *government expenditures* negatively influence *tax.* As for providing fiscal policy with applying transfers state

needs cash which is generated from taxes. In the long-run period was detected a zero influence of *government expenditures* to *tax*, because "pressure" of fiscal policy on a budget mostly occurred during the first three periods.

Figure 9 represents the graphical summary of influence between *government expenditures* and *tax* after imposing structural. Shock 1 denotes the *tax*.
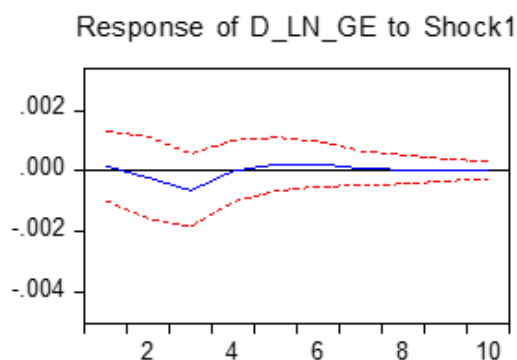

Response of D_LN_GE to Shock1

Figure 9. Impulse response between fiscal instrument after imposing shocks

d stands for the first difference

Source: FRED, 2020

When the impulse response was examined by the author and the main conclusion been formulated one question is remaining. How fiscal instruments predict itself in the short-run and long-run period. The author has decided to compare results of variance before and after imposing structural shocks

Variance decomposition of *tax* instrument by the influence of *outcome variables* before and after imposing shock is presented in Table 11:

Table 11

Decomposition of tax instrument before and after imposing shocks

Period	Decomposition of *tax* instrument									
	d_ln_tax		*d_ln_ge*		*d_ln_pc*		*d_ln_inv*		*d_ln_gdp*	
	Before	After	Before	After	Before	After	Before	After	Before	After
1	100	68.19	0.00	30.97	0.00	0.16	0.00	0.66	0.00	0.00
2	57.03	39.90	17.53	19.58	3.05	11.08	10.94	18.55	4.04	3.48
3	54.21	38.09	17.94	20.07	4.88	11.21	10.81	18.90	3.97	3.54
4	51.05	36.63	21.62	19.97	5.52	10.54	10.30	21.74	3.74	3.35
5	50.64	36.27	21.40	19.82	5.81	10.58	10.23	21.79	4.00	3.62
6	50.44	35.98	21.49	20.08	5.88	10.49	10.16	21.77	4.06	3.71
7	50.00	35.65	21.92	20.10	5.85	10.42	10.07	22.00	4.06	3.73
8	49.90	35.58	21.97	20.06	5.85	10.40	10.05	22.06	4.06	3.73
9	49.82	35.52	22.02	20.03	5.85	10.39	10.04	22.13	4.06	3.73
10	49.77	35.49	22.02	20.01	5.85	10.38	10.03	22.13	4.07	3.75

d stands for the first difference

Source: FRED,2020

Tax instrument before and after imposing structural shocks provides different and robust outcome. Before imposing shocks in *outcome variables tax* since the 1st period was fully predicted by itself. From 2nd period the fiscal instrument began weakly influencing by *government expenditures* and *investment*. Hence, in the long-run period from the 5th quarter the influence of *government expenditures* has increased, while investment remains at the same level. After imposing structural shocks author has found that *tax* since the 1st period is moderately predicting itself, but in 2nd period *tax* predicts itself weakly. The influence of government expenditure and investment with period increase contemporaneously growth. This leads to difficulty in predicting *tax* level in the long-run period. The influence of *government expenditures* on *tax* suggests that government expenditures stimulates growth of economic activity which results in growth of tax collection. When the shock was provided the influence of *investment* arises. One explanation of it can be based on the Keysian approach. In the analyzed case *tax* shock is boosting *personal consumption* which stimulates the economy. Consequently, the economy is "recovering" which leads to increase *investments* and with times *investments* are influencing the future level of *taxes*. Another, reason laying into the formation of <u>government operations</u>. Generally, budget consists of credit that is *taxes* or revenue, from debit or *government expenditures* , outflows (paying interest for bonds) and inflows (emission bonds). If the budget is deficit or debit is more than credit to cover government expenditures the number of inflows or net incurrence of liabilities is growing. From this point *investments* in form of debt securities or loans entering economy as *investments* which are affecting fiscal instruments. That is the reason why *investments* in the long-run period have an influence on *tax* instrument.

Table 12 evaluates the variance decomposition of *government expenditures* before and after imposing structural shocks for *outcome variables* :

Table 12

Decomposition of government expenditures instrument before and after imposing shocks

Period	Decomposition of *government expenditure* instrument									
	d_ln_tax		*d_ln_ge*		*d_ln_pc*		*d_ln_inv*		*d_ln_gdp*	
	Before	After	Before	After	Before	After	Before	After	Before	After
1	2.10	0.11	97.89	20.92	0.00	15.71	0.00	63.14	0.00	0.10
2	1.88	0.28	91.02	18.79	1.50	14.19	2.00	63.17	3.37	3.35
3	3.78	1.41	83.87	17.59	2.22	11.43	2.11	61.32	6.50	6.74
4	3.44	1.25	82.57	16.55	2.02	11.03	1.98	60.84	6.66	7.01
5	3.26	1.31	81.67	16.39	2.29	10.50	1.90	60.46	6.92	7.38
6	3.15	1.39	81.25	16.09	2.71	10.10	1.83	60.82	7.17	7.70
7	3.10	1.39	81.01	16.02	2.87	9.94	1.80	60.87	7.28	7.84
8	3.10	1.38	80.82	16.13	3.02	9.81	1.79	60.81	7.34	7.93
9	3.08	1.37	80.75	16.14	3.09	9.73	1.77	60.86	7.35	7.95
10	3.07	1.37	80.74	16.12	3.12	9.70	1.77	60.92	7.34	7.94

d stands for the first difference

Source: FRED,2020

Comparing variance decomposition of *government expenditures* to *tax* before and after imposing structural shocks, author has found more robust results. Firstly, *government expenditures* in both short-run and long-run periods predicts itself before imposing shocks. Hence, no weak influences from other variables are not observed before imposing structural shocks. After imposing structural shock was founded that *government expenditures* are weakly predicting itself in the short-run and long-run period. At the same time, the level of *investments* has a strong impact in the context of predicting the future level of *government expenditures* in the short-run and long-run periods. The reason of the increasing influence of *investment* to *government expenditures* has occurred due to Keysian theory. Structural shock shows that *government expenditures* boosting *outcome variables*. For example, before shock *personal consumption* influences this instrument by 1.5% in 2nd period and after shock by 14%. An increase in aggregate demand in form of *personal consumption* should affect investor's decision that the economy is out of recession. This leads to the growth of influence from *investment* on *government expenditures.* Thus, the assumption of formation of government operations which was mentioned above also influences on predicting the future levels of government expenditures.

Summarizing outcomes of author's SVAR model and considering that in some term current model was restricted by 2 lags, comparing with Blanchard and Perroti (2002) 6 lags was found the next :

1. the causality relationship from *fiscal variables* to *outcome variables* was not detected due to the small number of lags;

2. before imposing any shocks both *fiscal variables* have a positive influence on *personal consumption* in the short run. In the long-run period impact of *tax* on *personal consumption* is equal to zero, while *government expenditures* remain a slight positive effect. For example, the peak influence of *tax* on *personal consumption* is 1.007 US of dollars in 2nd quarter. *Government expenditures* peak in 2nd and 3rd quarter equal to 1.0006 US of dollars;

3. after imposing structural shock *tax* has a higher positive impact on *personal consumption*, but in the long-run period influence is still more equal to zero. Shock in *government expenditures* has a negative influence on *personal consumption* in short-run and long-run periods. *Tax* peak is observed in 2nd quarter and equals to 1.013 US of dollars, while for *government expenditures* 1.0002 US of dollars;

4. in the case of *investment* the influence of *fiscal variables* is different in the short-run period and similar for the long-run period. Before imposing structural shock *tax* impacted *investment* 1.013 US of dollars in 2nd quarter, while *government expenditures* -0.9993 US of dollars in 2nd period. In the long-run period both instruments are more equal to zero;

5. when the shock was imposed from *fiscal variables* to *investment* both affected differently. After imposing shock *tax* influences *personal consumption* positively for short-run and long-run periods. However, the peak in 2nd quarter with 1.016 US of dollars rapidly declines in 3rd quarter to 0.996 US of dollars with the correction to another peak in 4th quarter 1.008 US of dollars. *Government expenditures* in 2nd quarter represents decline to 0.9987 US of dollars, but until the 10th quarter the negative impact decreases to 0.9996 US of dollars.

6. measuring the effects of *fiscal* instruments to *gdp per capita* before imposing structural shocks suggests the opposite effect from instrument. Tax in the short-run period reaches peak in 2nd period to 1.008 US of dollars, while for *government expenditures* -0.999 US of dollars. In the long-run period tax influence equal to zero. Government expenditures still produce a negative impact, but with decreasing this effect to -0.9999 US of dollars.

7. after implying shock both instruments produced flat changes in the short-run period and in the long run period between fiscal instruments and *gdp per capita*. Tax shock has changed the peak in 2nd quarter to 1.007 US of dollar and slightly increased long run effect from zero to 1.001 US of dollars. *Government expenditures* in the short-run period, particularly in 2nd period decreased the negative effect from -0.9999 US of dollars to -0.9991US of dollars. In the long-run period observed the same influence as before imposing structural shock.

CONCLUSIONS AND PROPOSALS

In the following research, was used a SVAR model to measure the impact of fiscal policy instruments (*government expenditures* and *taxes*) on *personal consumption*, *investments* and *gdp per capita* . Based on the empirical analysis of impulse response function and variance decomposition author concluded the main finding and achieved the aim of the research. For the US economy in 2001Q1-2019Q4 <u>the effect of *tax* shocks comparing with *government expenditures* is more powerful in the short-run and long-run periods</u> .

The following conclusions and suggestion about the impact of fiscal policy on *consumption expenditure* and *investment* were formulated:

1) in the short-run period *tax* have a more <u>"power"</u> effect on *personal consumption* comparing with *government expenditures*. *Tax* shocks can be applied for states which are oriented on achieving fast results from fiscal policy in the short-run period. However, for policies which aimed for long-run multiplier effect *government expenditures* shocks should be used;

2) in the short-run period *tax* have a significant effect on *investment* in the short-run period, while *government expenditures* have a negative influence on *investments*. In the long-run period effect of *tax* instrument is equal to zero, however *government expenditures* influence negatively. For states aimed on increasing *investments tax*-based policy should be applied. The decrease in *taxes* leads to generating additional cash flow that potentially could be invested into economy;

3) *tax* have a positive effect on growth of *gdp per capita*, comparing with *government expenditures* in the short-run period. In the long-run period *tax* influence is equal to zero, while *government expenditures* present a negative influence. The *gdp per capita* should raise, if two major components of this variable will be affected by *tax* shocks. Consequently, the reduce of *taxes* leads to an increase in *personal consumption* and *investment* which automatically affects *gdp per capita.*

4) the existence of unidirectional granger causality from *government expenditures* to *tax* suggest that the increase of *tax* collection is impacted by the amount of *government expenditures*. Hence, the increase of *government expenditures* leads to stimulation of the national economy which in turn increases *tax* collection. The government in case of reducing the budget deficit and selecting the policy of decreasing *government expenditures* could simultaneously decrease *tax* collection.

The limitation of conducted research mainly based on several issues:

1) the sample of analyzed years were relatively not wide (less than 20 years);

2) different criteria for identifying exogenous variables between the current study and famous research studies were applied. For example, Blanchard and Perotti (2002) decided to add

such exogenous factor as the Vietnam war, etc; in the author's paper such type of factors was not included;

3) number of lags was restricted to 2 lags as adding more than 4 lags with 8 variables leads to the impossibility of conducting a White-heteroskedasticity test. Thus, adding 8 lags leads to the impossibility of estimating the VAR model;

4) data was not deseasonalized by Census X12 as in EViews student version lite this option is not available.

The future directions of investigating the impact of fiscal policy lay in the sphere of finding answers to several questions:

1) how the constant arising of the US budget deficit would affect the economy after the Covid-19 crisis;

2) how the growth of *government expenditures* will effect on the collection of *taxes* after the new crises;

3) how the level of *investments* will affect future *tax* shocks and *government expenditures* shocks.

The current study of investigating the impact of fiscal policy on private consumption expenditures and investments is valuable due to the next reasons:

1. implementing of fiscal policy could help the government to deal with the pressure of aging the population, promotes competition from foreign countries (by decreasing *taxes* the number of foreign investments could increase) etc;

2. as fiscal policy is aimed on boosting the targeted sector of the economy the "appropriate" instrument could boost the sector faster and powerful. For example, shock in *taxes* promotes a higher level of *personal consumption* in the short-run period, comparing with shock in *government expenditures*;

3. stimulating private and public sectors of the economy via applying the fiscal policy instruments to neutralize the consequences of the Covid-19 crisis.

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FISKALINĖS POLITIKOS POVEIKIS ASMENINĖMS VARTOJIMO IŠLAIDOMS IR INVESTICIJOMS

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Magistro darbas

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Darbo vadovė˙: docentas Laimutė Urbšienė, Vilniaus universitetas, 2020

SANTRAUKA

Darbo apimtis: 77 puslapiai, 13 lentelių, 13 paveikslų, 110 literatūros šaltinių

Pagrindinis magistro darbo tikslas yra išsiaiškinti, kuri fiskalinės politikos priemonė (vyriausybės išlaidos ar mokesčiai) turi didesnę įtaką asmeniniam vartojimui ir investicijoms trumpuoju ir ilgalaikiu laikotarpiu. Tikslui pasiekti fiskalinės politikos samprata ir pagrindiniai jos instrumentai buvo aptarti teorinėje dalyje. Analizei atlikti metodinėje dalyje buvo atliktas tyrimo modelio pritaikymas ir kintamųjų parinkimas. Autoriaus tyrimo rezultatai buvo analizuojami ir lyginami su kitais moksliniais moksliniais darbais empirinėje dalyj. Atsakymas į tyrimo tikslą pateiktas skyriuje „Išvados ir rekomendacijos".

Duomenys buvo gauti iš FRED ir išnagrinėti keliais ekonometriniais metodais.. Pirma, laiko eilutės buvo vizualiai patikrintos dėl stacionarumo. Sklaidos diagrama buvo naudojama ryšiui tarp kintamųjų stebėti. Formalus išvada stacionarių buvo padaryta po vieneto šaknų bandymų serijos. Struktūriniam VAR modeliui atlikti buvo įvertintas neribotas VAR modelis. Kintamieji buvo tikrinami kointegruojant Johanseno kointegracijos testu ir ARDL susietu testu, kad SVAR modelis būtų naudojamas trumpalaikėje ir ilgalaikėje analizėje. Grangerio priežastingumo testas buvo atliktas siekiant užtikrinti smūgių pagrįstumą A ir B matricose. Impulsų atsako funkcija ir dispersijos skilimas buvo naudojami vertinant fiskalinės politikos poveikį išbandytiems kintamiesiems.

Analizė rodo: mokesčiai turi didesnį poveikį asmeniniam vartojimui trumpuoju laikotarpiu, palyginti su vyriausybės išlaidomis. Tačiau ilgalaikėje perspektyvoje vyriausybės išlaidos turi ilgiau teigiamą poveikį asmeniniam vartojimui. Trumpalaikiai ir ilgalaikiai mokesčiai turi stipresnį poveikį investicijoms. Autorius siūlo, kad norint pasiekti greitą asmeninio vartojimo ir investicijų daugiklio efektą, reikia taikyti mokesčiais pagrįstą politiką.

IMPACT OF FISCAL POLICY ON PERSONAL CONSUMPTION EXPENDITURE AND INVESTMENTS

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Master thesis

Global business and economics study programme

Faculty of economics and business administration, Vilnius University

Supervisor: Associate prof., Laimutė Urbšienė, Vilnius, 2020

SUMMARY

Size: 77 pages, 13 tables, 13 figures, 110 references

The main goal of the master thesis is to find which fiscal policy instrument (government expenditures or taxes) has a more powerful impact on the personal consumption and investments in the short-run and long-run period. To achieve the aim, the concept of fiscal policy and its main instruments were discussed in the theoretical part. To conduct the analysis the adopting of the research model and selection of variables were performed in the methodological part. The author's investigations were analyzed and compared to other research papers in the empirical part. The answer to the goal of the research is presented in the conclusion and recommendations section.

The data was sourced from FRED and examined by the next econometric techniques. Firstly, time series were visually checked on stationarity. The scatterplot graph was used to observe a relationship between variables. The formal conclusion of stationarity was done after a series of unit root tests. To perform the structural VAR model was estimated the unrestricted VAR model. The variables were checked on cointegration by the Johansen co-integration test and ARDL bound test to use the SVAR model for the short-run and the long-run analysis. The granger causality test was done to ensure the validity of imposing shocks in the A and B matrices. The impulse response function and variance decomposition were used to evaluate the impact of fiscal policy on tested variables.

The analysis shows: taxes have a more powerful effect on personal consumption in the short-run period comparing with government expenditures. However, in the long-run government expenditures have a longer positive effect on personal consumption. Taxes in the short-run and long-run have a more powerful effect on investment. Author proposes that for achieving the fast multiplier effect in personal consumption and investment the tax-based policy should be applied.

ANNEXES

Annex 1. Dummy variables description

Policy dummy variable was estimated based on Marc D. Hayford (2016) and U.S. Government Publishing Office:

2001Q2 – Economic Growth and Tax Relief Reconciliation Act

2003Q2 - Jobs and Growth Tax Relief Reconciliation Act or JGTRRA

2008Q1 - The Economic Stimulus Act

2009Q1 - American Recovery and Reinvestment Act or ARRA

2010Q4 - Tax Relief, Unemployment Insurance Reauthorization, and Job Creation Act

2011Q4 - Temporary Payroll Tax Continuation act

2012Q1 - Middle Class Tax Relief and Job Creation Act

2013Q1 - The American Taxpayer Relief Act or ATRA

2018Q1 - Tax Cuts and Jobs Act

Crisis dummy variable was estimated based on the National Bureau of economic research:

2001Q1-2001Q4 – recession 2000s

2007Q4-2009Q2 – global financial crisis

Annex 2. Validation tests results

	D_LN_TAX	D_LN_GE	D_LN_PC	D_LN_INV	D_LN_GDP	CPI	D_INTEREST	D_LN_IND...
Mean	0.006163	0.002718	0.003664	0.005276	0.003027	0.511751	-0.043200	0.002034
Median	0.012042	0.002702	0.003726	0.004528	0.003623	0.475072	-0.006667	0.005597
Maximum	0.109687	0.017265	0.012318	0.088435	0.014355	2.195345	0.566667	0.019471
Minimum	-0.190400	-0.014352	-0.011709	-0.122799	-0.024229	-2.828529	-1.346667	-0.057788
Std. Dev.	0.046720	0.006490	0.004471	0.031030	0.005662	0.709091	0.374579	0.013262

*Figure 10..*Descriptive statistics

Source: FRED,2020

Table 13

Autocorrelation LM test

Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	104.3086	64	0.0011	1.764861	(64,231.4)	0.0013
2	66.43771	64	0.3930	1.041775	(64,231.4)	0.4040
3	60.85745	64	0.5883	0.943777	(64,231.4)	0.5986
4	76.83379	64	0.1304	1.229997	(64,231.4)	0.1374

Source: FRED,2020

Annex 3. Estimation output

	D_LN_TAX	D_LN_GE	D_LN_PC	D_LN_INV	D_LN_GDP	CPI	D_INTEREST	D_LN_IND...
D_LN_TAX(-1)	-0.181496	-0.002799	-0.025427	0.046489	-0.020747	3.435235	0.122702	-0.052505
	(0.12812)	(0.02206)	(0.01745)	(0.08383)	(0.01956)	(2.44165)	(1.14266)	(0.03628)
	[-1.41663]	[-0.12687]	[-1.45730]	[0.55455]	[-1.06064]	[1.40693]	[0.10738]	[-1.44706]
D_LN_TAX(-2)	-0.014226	-0.026132	-0.013987	-0.028623	-0.017657	2.940475	0.289400	-0.037009
	(0.10045)	(0.01730)	(0.01368)	(0.06573)	(0.01534)	(1.91430)	(0.89587)	(0.02845)
	[-0.14162]	[-1.51083]	[-1.02252]	[-0.43549]	[-1.15135]	[1.53606]	[0.32304]	[-1.30094]
D_LN_GE(-1)	-4.056876	0.266402	0.036383	-0.491630	-0.028769	8.656556	6.003912	-0.282266
	(0.82878)	(0.14271)	(0.11287)	(0.54229)	(0.12654)	(15.7946)	(7.39166)	(0.23472)
	[-4.89500]	[1.86669]	[0.32235]	[-0.90658]	[-0.22736]	[0.54807]	[0.81226]	[-1.20258]
D_LN_GE(-2)	1.093242	0.332899	0.048299	-0.757811	-0.034038	-7.351514	-2.119348	-0.147259
	(0.87695)	(0.15101)	(0.11943)	(0.57381)	(0.13389)	(16.7126)	(7.82126)	(0.24836)
	[1.24664]	[2.20452]	[0.40442]	[-1.32066]	[-0.25422]	[-0.43988]	[-0.27097]	[-0.59293]
D_LN_PC(-1)	-0.932843	0.451139	0.294658	3.178482	0.800778	-38.02723	7.474564	-0.098757
	(1.64273)	(0.28287)	(0.22371)	(1.07488)	(0.25081)	(31.3067)	(14.6511)	(0.46523)
	[-0.56786]	[1.59485]	[1.31712]	[2.95705]	[3.19281]	[-1.21467]	[0.51017]	[-0.21227]
D_LN_PC(-2)	1.164297	0.671648	0.072862	-2.589061	0.004585	-2.195410	20.98623	-0.466267
	(1.77368)	(0.30542)	(0.24155)	(1.16057)	(0.27080)	(33.8023)	(15.8190)	(0.50232)
	[0.65643]	[2.19908]	[0.30165]	[-2.23086]	[0.01693]	[-0.06495]	[1.32665]	[-0.92823]
D_LN_INV(-1)	-0.147588	0.021244	0.055717	0.206283	0.073398	-16.48250	0.547611	-0.048220
	(0.33964)	(0.05849)	(0.04625)	(0.22224)	(0.05186)	(6.47285)	(3.02920)	(0.09619)
	[-0.43454]	[0.36323]	[1.20458]	[0.92821]	[1.41542]	[-2.54640]	[0.18078]	[-0.50130]
D_LN_INV(-2)	0.042744	0.077267	0.013843	-0.465870	-0.026877	-6.637123	4.889635	-0.119084
	(0.34608)	(0.05959)	(0.04713)	(0.22645)	(0.05284)	(6.59540)	(3.08655)	(0.09801)
	[0.12351]	[1.29658]	[0.29371]	[-2.05731]	[-0.50868]	[-1.00633]	[1.58417]	[-1.21501]
D_LN_GDP(-1)	3.313869	-0.484626	-0.176895	-1.601026	-0.589476	50.78872	-16.99786	0.770069
	(2.00408)	(0.34510)	(0.27293)	(1.31133)	(0.30598)	(38.1933)	(17.8739)	(0.56757)
	[1.65356]	[-1.40432]	[-0.64815]	[-1.22092]	[-1.92654]	[1.32978]	[-0.95099]	[1.35678]
D_LN_GDP(-2)	-0.221707	-0.645989	-0.016273	2.167646	-0.136832	8.883735	-36.43840	0.410709
	(2.08337)	(0.35875)	(0.28372)	(1.36320)	(0.31808)	(39.7043)	(18.5810)	(0.59003)
	[-0.10642]	[-1.80067]	[-0.05735]	[1.59011]	[-0.43018]	[0.22375]	[-1.96105]	[0.69608]
CPI(-1)	-0.001011	-3.10E-05	-0.000311	0.003617	0.000309	0.038645	-0.018873	0.000750
	(0.00616)	(0.00106)	(0.00084)	(0.00403)	(0.00094)	(0.11731)	(0.05490)	(0.00174)
	[-0.16432]	[-0.02926]	[-0.37143]	[0.89793]	[0.32861]	[0.32941]	[-0.34376]	[0.43025]
CPI(-2)	-0.008045	-0.000160	-0.000133	-0.003006	-0.000937	-0.622151	-0.017530	-0.001592
	(0.00577)	(0.00099)	(0.00079)	(0.00377)	(0.00088)	(0.10995)	(0.05145)	(0.00163)
	[-1.39456]	[-0.16109]	[-0.16982]	[-0.79619]	[-1.06378]	[-5.65862]	[-0.34070]	[-0.97452]
D_INTEREST(-1)	0.033343	0.000392	-0.000295	0.008127	0.000196	-0.122292	0.434828	-0.003847
	(0.01618)	(0.00279)	(0.00220)	(0.01059)	(0.00247)	(0.30830)	(0.14428)	(0.00458)
	[2.06112]	[0.14055]	[-0.13389]	[0.76777]	[0.07917]	[-0.39666]	[3.01375]	[-0.83964]
D_INTEREST(-2)	-0.003965	0.001131	0.002049	-0.028308	0.000266	-0.094470	0.139260	0.001936
	(0.01828)	(0.00315)	(0.00249)	(0.01196)	(0.00279)	(0.34846)	(0.16307)	(0.00518)
	[-0.21684]	[0.35935]	[0.82303]	[-2.36610]	[0.09517]	[-0.27111]	[0.85397]	[0.37383]
D_LN_INDUSTRY(-1)	1.219064	0.034904	-0.078699	1.116607	0.162050	33.33581	3.801230	0.523145
	(0.58703)	(0.10109)	(0.07994)	(0.38411)	(0.08963)	(11.1875)	(5.23560)	(0.16625)
	[2.07665]	[0.34529]	[-0.98441]	[2.90699]	[1.80807]	[2.97973]	[0.72604]	[3.14669]
D_LN_INDUSTRY(-2)	-0.445724	-0.019113	0.082904	-0.096922	0.040338	15.45439	-4.979256	0.053871
	(0.61257)	(0.10548)	(0.08342)	(0.40082)	(0.09353)	(11.6742)	(5.46336)	(0.17349)
	[-0.72763]	[-0.18120]	[0.99379]	[-0.24181]	[0.43131]	[1.32381]	[-0.91139]	[0.31052]
C	0.012041	-0.000760	0.003520	0.007314	0.002889	0.717029	0.065981	0.005199
	(0.00795)	(0.00137)	(0.00108)	(0.00520)	(0.00121)	(0.15158)	(0.07094)	(0.00225)
	[1.51388]	[-0.55465]	[3.24986]	[1.40539]	[2.37903]	[4.73040]	[0.93014]	[2.30793]
CRISIS	0.023874	0.008227	-0.005567	-0.043511	-0.004720	0.409844	-0.322222	-0.018105
	(0.02385)	(0.00411)	(0.00325)	(0.01560)	(0.00364)	(0.45447)	(0.21269)	(0.00675)
	[1.00114]	[2.00337]	[-1.71421]	[-2.78851]	[-1.29641]	[0.90181]	[-1.51502]	[-2.68075]
POLICY	-0.034133	-0.000966	-3.77E-05	0.002269	5.63E-05	-0.023250	-0.030325	-0.004854
	(0.01280)	(0.00220)	(0.00174)	(0.00837)	(0.00195)	(0.24385)	(0.11412)	(0.00362)
	[-2.66757]	[-0.43842]	[-0.02164]	[0.27102]	[0.02883]	[-0.09534]	[-0.26573]	[-1.33941]
R-squared	0.671536	0.546701	0.437734	0.731668	0.547293	0.563773	0.605626	0.717271
Adj. R-squared	0.562048	0.395601	0.250311	0.642224	0.396390	0.418364	0.474168	0.623028
Sum sq. resids	0.044176	0.001310	0.000819	0.018914	0.001030	16.04453	3.513919	0.003543
S.E. equation	0.028602	0.004925	0.003895	0.018715	0.004367	0.545088	0.255093	0.008100
F-statistic	6.133424	3.618142	2.335549	8.180173	3.626801	3.877155	4.606987	7.610871
Log likelihood	166.8838	295.2994	312.4272	197.8467	304.0825	-48.28168	7.148542	258.9787
Akaike AIC	-4.051610	-7.569846	-8.039100	-4.899908	-7.810479	1.843334	0.324697	-6.574759
Schwarz SC	-3.455463	-6.973699	-7.442953	-4.303761	-7.214332	2.439481	0.920844	-5.978612
Mean dependent	0.008577	0.002569	0.003753	0.005701	0.003156	0.509678	-0.021826	0.002454
S.D. dependent	0.043220	0.006335	0.004499	0.031288	0.005621	0.714728	0.351783	0.013193

Determinant resid covariance (dof adj.)	1.64E-28
Determinant resid covariance	1.47E-29
Log likelihood	1594.550
Akaike information criterion	-39.52191
Schwarz criterion	-34.75273
Number of coefficients	152

Figure 11. VAR model estimation

Source: FRED,2020

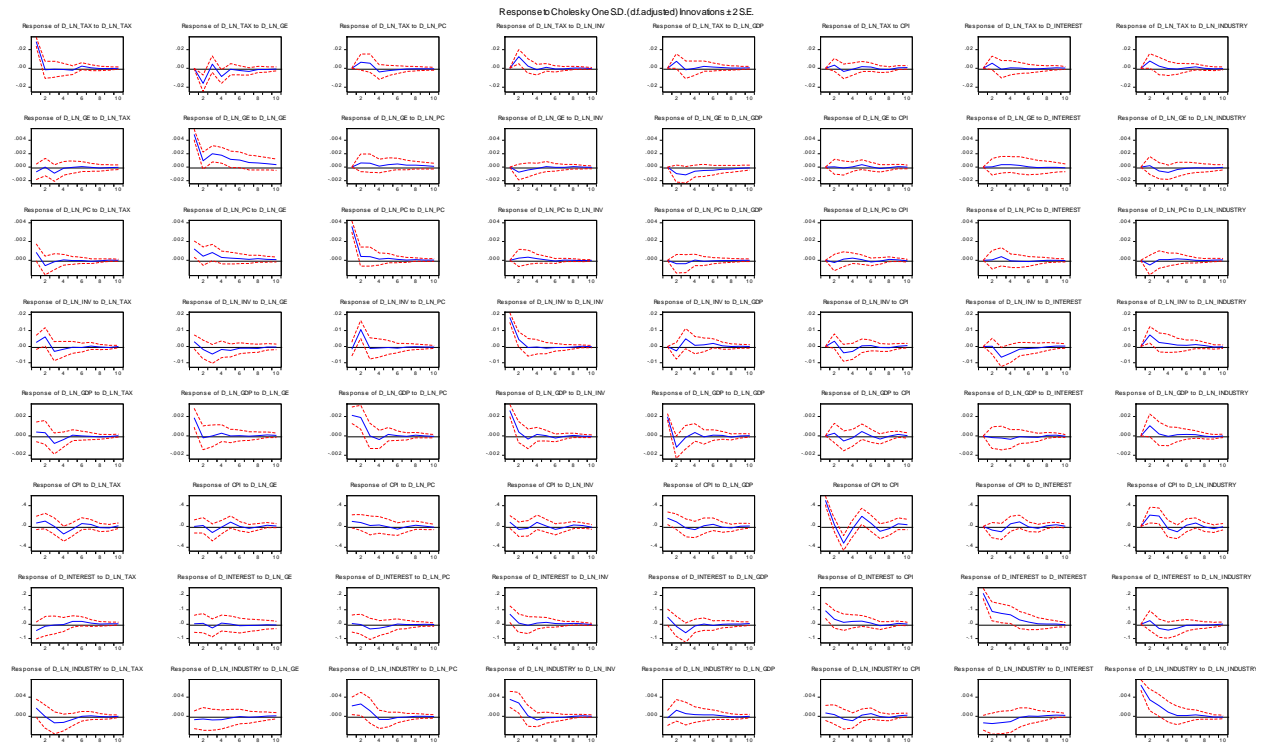*Figure 12*. SVAR impulse response before imposing shocks

Source: FRED,2020

Figure 13.SVAR impulse response after imposing shocks

Source: FRED,2020