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INTRODUCTION

Although fiscal policy is a classic topic in economic theory there is still no clear answer about its potential impact on the economy. A common belief is that a fiscal expansion increases production in the short run, while a fiscal tightening slows down the dynamics of growth. The basis for such a belief is the Keynesian approach. However, empirical studies in recent years show that such a rate of GDP growth in the short run is not a norm. This has been confirmed by numerous examples of countries where a fiscal tightening led to an increase of GDP growth, while a fiscal expansion led to a decline of GDP growth. Hence, it can be hypothesized that the effectiveness of fiscal policy assuming a linear dependence of changes in spending and taxation on behaviour of the private sector and thus on dynamics of production is not always correct. This implies that the standard approach to fiscal policy described by the Keynesian model is not entirely appropriate.

Since private consumption constitutes a large part of aggregate demand its behaviour may be the key to understand the non-linear influence of fiscal variables on an economy. Hence the purpose of this thesis is to investigate the role of the consumption channel in the transmission of non-Keynesian effects of fiscal policy. As a research method we introduce an econometric model where we examine the influence of fiscal variables on national savings for the period 1981-2009 for Italy using Generalized Method of Moments and simple Ordinary Least Squares. Further we use our results to verify the Keynesian models, modified Keynesian models, models based on Ricardian equivalence and non-Keynesian models concerning the direction of the impact of changes in taxes and government spending on private consumption and thus on the total savings in the economy. The structure of the paper is as follows. In chapter 1 we present a theoretical approach to fiscal policy. We discuss the standard Keynesian approach, the modified Keynesian approach and broadly describe non-Keynesian theory. Chapter 2 comprises the literature survey of the empirical studies on Keynesian and non-Keynesian effects of fiscal policy. In Chapter 3 we present the outcomes of our own research. We describe the research strategy and hypotheses referring to the model and conduct a broad quantitative analysis. The final section of the thesis concludes.

CHAPTER I. The Size and Sign of Fiscal Multipliers - Overview of Theory

1.1 The Role of Fiscal Policy

According to the literature, fiscal policy is a part of economic policy, which in turn serves to indicate goals of a given economic system and to use method of their realization (Ćwikliński, 2004). Fiscal policy determines the choice of activities implemented by authorized state agencies in order to collect public revenues, as well as the choice of directions for making public spending to achieve specific economic and social goals. (Fedorowicz, 1998). These goals are determined by the democratic institutions of a given country. Fiscal policy can be distinguished as state and local one.

Since the economic and social system of a given country determines the range of the state's possibilities to influence the behaviour of economic agents, they also shape the form of fiscal policy. However, the differences in the effects of fiscal policy may also occur within a single economic system. As pointed out by Fedorowicz (1998), the market economy may exhibit some differences specific to a given country that should be included in shaping its fiscal policy.

In the literature we may distinguish three functions of fiscal policy: redistribution, allocation and stabilization.

Budgetary redistribution is the secondary allotment of income among members of the society, which had already been originally divided in the market. This applies only to the redistribution of funds and is performed by direct and indirect methods. The direct methods include the system of social transfers and taxes. With these tools the state adjusts the amount of income of the population. Indirect income redistribution is done by satisfying the specific needs of the society, they are, for example, spending on health care or education. It is worth mentioning that the main area of impact of fiscal policy in its redistributive role is the labour market. The country through setting limits on this market, such as the minimum wage or work tax, affects the level of employment and shapes wages, hence it influences the size of the income of the population.

The aim of the allocative function is to direct the factors of production to produce goods, desirable from the point of view of social welfare. It is related to the generation of public goods. In contrast to the redistributive function of fiscal policy, this role applies to the provision to members of the society the access to goods

increasing their welfare, while not the redistribution of funds. The allocative function of fiscal policy may also be expressed by shaping the distribution of production factors within the public sector. (Fedorowicz, 1998).

Fiscal stabilization is realized by the appropriate use of fiscal tools in order to maintain an appropriate growth of production, level of inflation and a high level of employment. The basis for creating this function of fiscal policy was Keynesian theory. The effectiveness of this function plays the central role in this thesis.

In order to ensure that a country's economic potential has been fully exploited, the state must shape global demand in a way to ensure adequate production level and efficient use of production factors. Fiscal policy in its stabilization role can be divided into active (discretionary) and passive.

Discretionary fiscal policy relies on active prevention of fluctuation of production. In execution of this goal, the country uses various fiscal instruments. To basic fiscal tools according to Pietrewicz (1994) one can ascribe the changes in taxes, changes in government expenditures and changes of budgetary deficit. Accordingly, using these tools, the state regulates the size of global demand. A country influences aggregate demand directly by purchasing goods and services and indirectly through determining the level of income of private agents and thereby their consumption ability. The indirect influence of a country on private demand is realized by an adequate tax system. However, as Ćwikliński (2004) emphasizes, it is important that tax policy implemented by government does not hamper private sector development.

Passive fiscal policy is associated with the concept of automatic stabilizers, they are spending and budget revenues, the size of which depends on the condition of the economy, and their interaction with it is to send a contradictory impulse following fluctuations in demand. Their impact on the economy is not preceded by a decision of the government, they are automatic.

The described functions of fiscal policy are realized by the state with help from a variety of tools. According to Pietrewicz (1994), the fiscal instruments can be associated with the methods by which the state collects and expends cash. A special measure of fiscal policy is the state budget, which contains a list of all revenues and expenditures of the country. The budgetary revenues can be distinguished between current income, national income and tax revenues. Budgetary expenditures can be divided with respect to various criteria. In our analysis, particularly important is the allotment of government expenditures on final use and redistribution, as it is

associated with the influence of the state on the level of demand in the economy. Final expenditures are government spending on goods and services, while redistributive ones constitute transfers. Hence, eventually, fiscal tolls can be divided into budgetary expenditures and revenues. The analysis of the revenue side of the state budget can be limited only to taxes, as they are the main source of government revenue. Hence at the aggregate we may consider the fiscal policy instruments as expenditures and taxes. This is consistent with the view of Begg et al. (2008), who consider these variables as the basic tools of fiscal policy affecting aggregate demand.

The influence of particular fiscal tolls on aggregate demand is not obvious. Along the Keynesian approach to fiscal policy, assuming the negative impact of increase in taxes and a positive of increase in government spending on aggregate demand, there is also a non-Keynesian approach, which allows the reverse influence of fiscal variables on an economy. In the subsequent sections the different concepts of fiscal policy effectiveness in stimulating economic situation are presented.

1.2 Fiscal Multipliers-The Standard Keynesian Approach.

The framework which attracted popularity in the aftermath of the Great recession in the 1920s was developed by John Maynard Keynes (1936) and influences substantially the economic view on the role and effectiveness of fiscal policy. Although recently there is growing evidence indicating that the size and sign of fiscal multipliers are different to what the standard Keynesian approach would suggest, Keynesian economics is still the most prominent and recognizable way of explaining the influence of fiscal variables on output.

Thus in this section we will describe the standard Keynesian framework. In general the Keynesian view suggests that a rise in government expenditures leads to an acceleration of output growth, while a tax increase reduces growth. This mechanism will be investigated closely in the models presented below. It will serve as the base when outlining approaches suggesting different outcomes of fiscal policy in subsequent sections. Since our main focus of interest is the effectiveness of fiscal policy in a short-run horizon, the described model has static characteristics.

The Samuelson model was one of the first to provide the mathematical framework for Keynesian theory (Samuelson and Nordhaus, 1995). The basic assumptions in this model are as follows: i) production is below its potential level (this

means that not all factors of production are used in the economy); ii) prices and wages are characterized by nominal rigidities; iii) income generated by the business sector is fully transferred to households. In this framework the values of all variables, except private consumption, are exogenously determined. Consumption depends positively on current income and negatively on the value of tax.

These assumptions allow one to analyse the influence of fiscal policy on output. Following an increase in government expenditure aggregate demand accelerates and production increases. Consequently households' income also increases, since it is equal to the value of production. Because households consume the constant fraction of their current income, their spending also increases. Since consumption is a part of aggregate demand, the latter accumulates again. This mechanism is called the multiplier effect and it plays a crucial role in Keynesian economics. Consequently the increase in government expenditures tends to increase private consumption, while tax increases reduce consumption. The size of this multiplier is said to be greater than one (Keynes, 1936), thus it allows for government policy to stimulate an economy.

Though the general sign of the fiscal multiplier in the Samuelson model is clear, its size depends considerably on the composition of government expenditures. Spending on social transfers and changes in taxation have smaller multipliers than government purchases. That is because households spend just a fraction of their income, while the rest is saved, hence just a part of any increase in social transfers or tax reduction support aggregate demand. Direct government spending however stimulates demand by its whole amount.

Although according to the Keynesian view, fiscal consolidation is usually perceived to have a negative short run influence on GDP growth, differences in the sizes of fiscal multipliers derived from the Samuelsson model let us demonstrate that even in the standard Keynesian framework fiscal consolidation can be expansionary. To obtain this result an increase in tax must be followed by an increase in government purchases. However, the ratio of the increase in expenditures to the increase in taxes has to be greater than the consumption rate and smaller than one. Hence, despite having a surplus government can still stimulate aggregate demand. However, one has to have in mind that this phenomenon constitutes only an interesting theoretical variation, based on the simple design of Samuelson model.

The Samuelson model can be extended to the case of open economy. Here aggregate demand may be supplemented by the trade balance. This modification has an influence on the size of fiscal multipliers. Since imports are positively related to households' income, the trade balance exhibits the opposite correlation. As a result the size of the fiscal multipliers is reduced. Thus the trade balance behaves acyclic and plays the role of an automatic stabilizer in the economy (Budnikowski, 2003).

The Samuelson model focuses on explaining the variation in the size of production in the economy through changes in the goods and services market. However, limiting the analysis only to this market may be an over-simplification, since whether economic agents are able to realize their transactions depends on the supply of means of payment. Therefore, the next model to be presented is the Hicks-Hansen model, which extends Samuelson's framework to include the money market.

The Hicks-Hansen model apart from equilibrium in the goods and service market describes the symmetry in the money market. (Hicks, 1937). Obviously money is not the only means of payment in an economy, since there exist bonds, stock shares and other securities. However, treating the other means of payment as perfect substitutes and using Walras' Law¹ we can limit the analysis just to the money market.

Equilibrium in both markets is described in terms of product and interest rate levels. A convenient starting point in the discussion of features of the model is the market for goods and services. Each higher level of interest rate is accompanied by lower household consumption and investment thus also a lower level of production. This is because the increase in the interest rates encourages households to increase savings, and companies to withdraw from investment projects which bring a lower rate of return than the new higher level of interest rate (Rzońca, 2007b). Moving to the money market, the real money supply is autonomic, since prices are sticky. Thus, equilibrium in the money market depends on the demand for money, which positively depends on production and negatively on the interest rate. The equilibrium in the model is achieved when both goods and money markets are in equilibrium.

¹ Walras' Law says that if the economy consists of n markets and there is a balance on the $n-1$ markets, there is a balance in all markets. (Varian, 2008, pp. 536-538).

The effectiveness of fiscal policy in this model is considerably limited in comparison to the Samuelson sketch due to transactional crowding out effect (TCE) of private consumption and investment. The increase in government spending increases the demand for money, consequently interest rates must increase to bring symmetry in the money market. Accordingly the higher interest rate reduces investment and consumption, hence the impact of the positive demand shock is alleviated. The strength of transactional crowding out effect depends on the sensitivity of the demand for money to interest rates and production. It is larger, the less the demand for money is sensitive to changes of the interest rate and the more to the production level.

A natural question that arises is if through transactional crowding out effect the non-Keynesian effect of fiscal policy is possible. The answer is negative! This is because the mechanics of TCE is based on the change in the demand for money. If re-adjustment of production in response to changes in the level of private spending catches up with the scale of changes to production caused by the fiscal stimulus, the demand for money returns to the original level. Thus further adjustments of production and private spending are not possible, since their source – the shock in money demand disappears.

1.3 Fiscal Multipliers-The Modified Keynesian Approach

As was outlined in the preceding section the standard Keynesian approach assumes positive fiscal multipliers in the case of government expenditures and negative ones in the case of taxes. However, critics say that these signs are based on the simple design of Keynesian framework. Hence, an interesting view is provided by the so-called modified Keynesian models which by complicating some of the features of standard Hicks-Hansen framework allows for smaller, so called weak Keynesians, fiscal multipliers, or even non-Keynesian effects of fiscal policy. These models are discussed in this section.

Since the feature which reduces the size of fiscal multipliers is the transactional crowding out effect (TCE) it is a natural candidate to be developed to obtain weak Keynesian effect of fiscal policy. This topic is investigated by Mankiw and Summers (1987) who modified the function of money demand. The authors argue that money demand sensitivity should not be considered as homogenous to all parts of aggregate demand. They claim that money demand is much more sensitive

to changes in private consumption than to investments or government spending. The reason being, that since the number of households is substantial and the value of their transactions is relatively small, they have a lower possibility, with respect to other institutional sectors, to postpone payments for their purchases. As a result the change in private consumption affects the value of money demand the most.

The above assumption substantially increases the size of TCE of private sector expenditures. Mankiw and Summers investigated the effectiveness of tax changes in this new environment, though the analysis may also be applied to government spending. Having favourable conditions in this model the size of fiscal multipliers is lower or even reversed compared to the standard Keynesian view. The mechanism is as follows. A rise in expenditures or a cut in taxes increase the households income and consequently their consumption. If money demand is strongly sensitive to changes in consumption, which in turn is weakly sensitive to the interest rate, then we observe the substantial rise in the latter which considerably reduces investment that is strongly sensitive to the interest rate. As a result, it may be the case that even if the change in aggregate demand, caused by TCE, returns to its level before the fiscal impulse, the interest rate level may still be higher than initially. As a result it may produce subsequent changes in private spending sensitive to changes in interest rates. Hence, there is a chance that after a positive/negative fiscal impulse we would observe drop/rise in aggregate demand.

After analysing the Mankiw-Summers model one may come to the conclusion that the effectiveness of fiscal policy depends on the development of financial system, since it determines access to credit of particular institutional sectors. In other words it shapes the possibility to postpone payments for transactions and as a consequence influences money demand (Rzońca, 2007a). Thus, in countries with a poorly developed financial system we may observe substantial differences among institutional sectors in their access to credit supply. As a result money demand sensitivity to particular parts of aggregate demand may also be different. However, when the financial system is well developed all institutional sectors may have broad and similar access to credit, hence money demand sensitivity to private consumption, investment or government expenditures is similar. Then the outcome from the Mankiw-Summers model is in line with the Hicks-Hansen framework. It is worth emphasizing that creditworthiness of particular institutional sectors may also influence money demand sensitivity to their expenditures. Thus, it may be the case

that government lowers its creditworthiness for example by high debt and as a consequence would be forced to keep higher cash reserves. As a result it may be that government expenditures, thorough the mechanism presented in the Mankiw-Summers model, would crowd out consumption and investment and lower aggregate demand, producing contractionary fiscal expansion.

By complicating the money demand function TCE appears to be a feature which substantially affects the effectiveness of fiscal policy. Another framework, provided by Silber (1970), modifies the consumption function of the standard Hicks-Hansen model by supplementing it with wealth levels, which positively influences money demand. Simultaneously the wealth level is positively correlated to value of debt, since government bonds constitute a way of capital allocation. Having the above modifications, the constant expansionary fiscal policy leading to debt acceleration produces two opposite effects. The first-Lerner effect leads to a private consumption acceleration through an increase of the wealth level. The second - portfolio crowding out effect (PCE) operates thorough reducing private spending due to higher interest rates which resulted from higher money demand, which in turn is a consequence of households' higher wealth level. Money demand rises because along with wealth acceleration households want to keep a diversified portfolio of assets, hence they increase their demand for money which also represents an asset. The sign and size of the government expenditures multipliers depend on which of these two effects prevails. According to Rzońca (2005) to observe a positive (Keynesian) influence of government expenditure increases on output, the planned expenses should be strongly sensitive to wealth changes, while PCE should affect investment mostly.

The portfolio crowding out effect is developed further by the Friedman (1978) model. In this framework the particular assets – government bonds, physical capital, etc. – are not treated as perfect substitutes any more. The joint demand for assets is determined by wealth level. The demand for a particular type of asset depends positively on its rate of return and the production level, while it is negatively correlated with the rate of return of other assets.

Hence, when government issues bonds to finance debt, it accelerates households' wealth levels. The demand for all type of assets increases accordingly. As a result we observe supply surplus on the market for government bonds and

demand surplus in other markets. To bring equilibrium in all markets the rate of return of particular assets must change. The assured result of government bonds issue is the increase of their rate of return, since it helps to bring equilibrium to all markets. What happens to the rate of return of physical capital is ambiguous, because its increase helps to provide equilibrium to money market, while its drop supports equilibrium on bonds market. Thus, the direction of changes depends on whether government bonds are closer substitutes to physical capital or money. If the former is the case, then the increase of government bonds' rate of return affects demand for physical capital more strongly than the demand for money. Hence to provide equilibrium in the money market an increase in the rate of return of physical capital is required. However, if the government bond is a closer substitute to money, then the rate of return of physical capital must drop. As a result, the direction of changes of the rate of return to physical capital stimulates or reduces the size of private investment, which implies that we may observe the stimulation or PCE of private investment by debt acceleration, resulting from expansionary fiscal policy.

The next model complicating the environment of the Hicks-Hansen model is the Mundell-Fleming framework. (Romer, 2000). It extends the analysis to the case of an open economy. The basic assumptions refer to international capital flows conditions and are as follows: i) there are no barriers to capital flows; ii) investors are risk neutral and do not expect exchange rate movements. The above conditions indicate that capital flows are shaped by changes of interest rates in the home and foreign country. However, to ensure that all the assets in the world are held the domestic and foreign interest rates must be equal. This implies that money demand depends positively on production and the foreign interest rate. The economy is open to goods transfers and the trade balance is positively related to production and the real exchange rate in direct notation².

The above set of assumptions indicates that the effectiveness of fiscal policy in a free float exchange rate regime is null. That is because a positive fiscal impulse accelerates domestic demand and as a consequence also the demand for the home stock of money. As a result, the home interest rate increases, which leads to an increase in the foreign demand for domestic assets. As a consequence the demand

² Direct notation of exchange rate means that the price of unit of foreign currency is expressed in a units of domestic currency. (Budnikowski, 2003, p. 285).

for the home currency also increases, since it is required to buy domestic assets, leading to an appreciation of exchange rate and a reduction in exports. To bring money demand to its initial level, the drop in exports must restore demand in the economy to its original level, thus it must be equal to the increase in government expenditures. The above implies that the fiscal impulse is completely alleviated by an opposite reaction of exports. However, it is visible that when we substitute a free float by a fixed currency regime then the effectiveness of fiscal policy is restored.

The Mundell-Fleming model can be complicated further by replacing standard function of money demand by the one from the Mankiw-Summers framework. This modification affects substantially the effectiveness of fiscal policy. If we assume that money demand is more sensitive to consumption and government expenditures changes than net exports, then the fiscal multipliers take non-Keynesian signs. Fiscal expansion creates pressure on the interest rate to increase. To bring money demand to its initial level (to equalise the domestic and foreign interest rates needed to alleviate the inflow of capital to the home country) a drop in net exports is required. However, due to the fact that money demand is less sensitive to net export changes compared to private and government spending, the net export reduction must be greater than the initial acceleration of domestic demand caused by the fiscal expansion, which, as a consequence, leads to a drop in production.

1.4 Fiscal Multipliers-The Non-Keynesian Approach

In the previous sections we analysed the Keynesian view of fiscal policy. In general, this approach suggests that a fiscal expansion positively affects the level of consumption and accordingly output. However, there is growing empirical evidence that the reaction of particular parts of aggregate demand can be different than Keynesian economics predicts. Thus, in subsequent sections we discussed groups of models which try to address this phenomenon, a group of models that can be labelled 'Non- Keynesian Models'. These frameworks in contrary to Keynesian models are derived from microeconomics. Since non-Keynesian effects are mostly associated with fiscal contraction, the mechanisms of those kind of episodes are especially emphasized. The presented models investigated in complex ways the role of internal factors, such as the horizon of utility maximization or the composition of households, but also environmental ones, such as the stance of public finances or features of the fiscal impulse itself to the occurrence of non-Keynesian reactions of

private consumption to fiscal policy. However, to present this complex view of the sources of non-Keynesian effects of fiscal policy we provide also a brief sketch of the investment channel.

1.4.1 Ricardian equivalence

Since the Keynesian view of the size and signs of fiscal multipliers were used for decades to implement policies stimulating an economy, there has gradually arisen a problem of stabilization of public finances. Hence it has been advocated that expansive fiscal policy, as suggested by the standard Keynesian view, would not be the optimal approach in the long run. Although in reference to the sign of fiscal multipliers the Keynesian view has dominated, it is argued that their size is the subject to debate and at least is not constant over time. Hence it is plausible that in favourable macroeconomic conditions their size may be close to zero, which reflects the point of view based on Ricardian equivalence, hence this theory was revived (Costa Carvalho, 2009).

The standard macroeconomic model of Ricardian Equivalence assumes that households do not react to changes in fiscal variables because they perceive them always as to some extent a temporarily phenomenon. Hence the increase in government spending does not accelerate private consumption because households know that current fiscal expansion must be financed by a future increase in taxes. Consequently, in their perspective their stream of lifetime income does not change. This intertemporal maximization behaviour is based on strong assumptions: i) infinitely lived or at least extremely forward looking economic agents, ii) perfect capital markets and a lack of budget constraint and distortionary taxation (Romer, 2000). Obviously these conditions are hard to satisfy in the real world.

The model which is worth presenting is the Ramsey-Cass-Koopmans framework, which clearly describes how Ricardian equivalence works in a standard neoclassical framework. In this model and in contrast to Keynesian models, all relationships between aggregate variables are derived from microeconomics. The behaviour of unit households is generalized for the whole economy. The assumptions are as follows: i) the number of households is constant and they exhibit infinite time horizon, ii) households face intertemporal budget constraints which consisted of their wealth level and lifetime income discounted in the consumption moment, iii) the value of aggregate saving determines capital accumulation, which in turn determines the

level of production. Hence households must choose the level of current consumption and saving which allows them to realize their future spending³, which implies that they want to smooth their consumption over time. Additionally government expenditures must be covered by its revenues. Thus, increases in government spending require current or future tax increases.

Having all these assumptions we observe the crowding out effect of private consumption by government spending. However, it must be noted that the level of crowding out effect of private spending depends on households' perceptions of the persistency of fiscal impulse. If households perceive a fiscal shock as permanent, then they accordingly set the value of their consumption oppositely to the sign of the fiscal impulse. However, if they treat expenditure changes as temporary, then they do not adjust their consumption.

The mechanism is as follows: the permanent increase of government spending implies that government will have to increase the tax level in the future, hence households decrease their consumption accordingly by exactly the value of fiscal expansion, since they save part of their higher current disposable income to pay for higher taxes in the future. However, if we consider temporary fiscal expansion, it does not affect the value of current consumption. That is, households try to smooth their consumption over time and are not willing to react by rapidly changing their spending level to temporary changes of government expenditures. To limit the volatility of own consumption they adjust it only at the moment when the government expenses level go back to its initial value.

Overall, the Ricardian approach suggesting a zero magnitude of fiscal multipliers is hard to defend, however it can serve as a base point for further analysis (Costa Carvalho, 2009). In the next subchapters the results of a group of models which try to specify the conditions in which the size of fiscal multipliers is null or even reverse the standard Keynesian view will be discussed.

1.4.2 The Non-Keynesian models based on public finance conditions

As was stated in the previous subchapter the size of fiscal multipliers may not be constant across time but may change in response to macroeconomic conditions.

³ Too high consumption in present time would imply a drop of savings resulting in a reduction of capital accumulation and production, which would lead to lower consumption in future periods. (Rzońca, 2007b, p. 105).

The convenient starting point for a discussion of this is the Ricardian model. Although the Ricardian assumption that economic agents are perfectly forward looking is not satisfied, in a specific macroeconomic environment economic agents may appear to have a longer horizon of utility maximisation. The models which are discussed in this section investigate this topic further and provide suggestions on the conditions which favour the non-Keynesian size of fiscal multipliers.

In general, non-Keynesian models provide a different approach to the analysis of fiscal episodes. In particular these phenomena should not be investigated from a static perspective but in the context of their dynamic influence on household expectations about future changes of fiscal policy (Bertola and Drazen, 1993). This can be associated with the approach which is commonly known as the “German view” and which was developed in the early 1980s. In line with this view, a credible and permanent program of cuts in government spending can positively influence households’ expectations about future tax liabilities and can cause a substantial increase in private spending (Barry and Devereux, 2003). This is similar to the non-Keynesian approach according to which the state of public finances plays the central role in this expectations forming process.

The model which to a great extent describes the basic assumptions of this approach, while remaining relatively simply is the Blanchard (1990) model. (Rzońca, 2007b). In this model a special emphasis is put on the manner in which households maximize their utility. The central assumptions are as follows. i) The households differ among each other with respect to the horizon of utility maximization; the part of income which is not consumed increases their wealth. ii) There exists a critical level of taxation above which tax becomes distortionary and decreases income in the economy permanently. In the standard Blanchard model the increase of the tax rate is taken into analysis. This fiscal impulse according to the above assumptions leads to two opposite effects: a wealth effect and a myopia effect. The wealth effect evinces the increase in lifetime income of households through fiscal consolidation (which is achieved by the increase in the tax rate). In the households assessment, the increase of taxes and resulting fiscal consolidation decreases the probability that the tax rate would have to be increased above the critical level in the near future. Thus, they verify positively their expectations about their lifetime income and increase their consumption.

The myopia effect operates through increasing, in the households assessment, the overall tax burden in the period in which they maximize their utility. Hence it lowers their lifetime income and decreases their consumption. The intensity of the myopia effect depends on the share of households with a relatively short horizon of utility maximization in the whole population.

So, whether the first effect prevails over the second (i.e. lifelong stream of income growth is greater than the increase in the overall tax burden) depends on the condition of public finances. The likelihood of private consumption growth as a result of tax increases is higher when the national debt is substantial and growing, despite the fact that the current tax rate is close to the critical value. It should be noted here that the chance of the occurrence of such effects is higher in economies with well-developed financial systems, because it allows households to smooth consumption over time (Rzońca, 2004a). Blanchard in his model analyses only the effects of tax increase, however this analysis can be naturally extended to the reduction of government expenditure, which is provided by Rzońca (2004b). In this model the mechanism operates in the same way. Cuts in expenditures can lead to a non-Keynesian response of consumption, i.e., to its growth, as it shifts in time, according to the households' assessment, the moment at which public debt will exceed the level at which it would be necessary to increase taxes above the critical value.

There exists also a second channel which may lead to an increase in private consumption after debt consolidation. The existence of public debt brings the risk that governments will try to decrease its value through higher inflation or may become insolvent or illiquid, and consequently this is reflected in a higher risk premium (Borys et al., 2011). Accordingly if the condition of public finances is bad a fiscal consolidation may convince economic agents that the probability of debt default decreases substantially. They would then ask for lower interest rate for government bonds. If these lower interest rate lead to a lower real interest rate charged from households, then their component of spending, sensitive to the real interest rate, increases (Alesina, 2010). A similar effect may lead to the acceleration of investment (Alesina et al., 2002). Moreover, a lower real interest rate increases the value of financial assets held by economic agents which leads to a positive wealth effect which may trigger an increase in consumption and investment.

A similar mechanic, which is exhibited by the Blanchard model, is followed by models of Sutherland (1985) and Drazen (1990). In the Sutherland model, the

government conducts constant expansionary fiscal policy which causes a debt acceleration, which in turn leads to the situation when increase in taxes would be necessary to consolidate public finances. Hence if the government continues its policy, it negatively influences the households' expectations of the future tax level and as a consequence their perception of the value of lifetime income. As a result, households decrease their current consumption. Thus, we may observe a drop in aggregate demand after fiscal expansion, which stands for non-Keynesian effects.

The above discussion suggests that fiscal policy changes in times of poor public finances may cause a non-Keynesian response of aggregate demand. However, to influence households expectations, the change must be perceived as permanent. Drazen (1990) associates the credibility of a change in fiscal policy with the size of the fiscal impulse. Namely, small changes in taxes and expenditures are not perceived as stable and therefore households react to them in a Keynesian manner. However, if there is a large increase in taxes or drop in spending, households can perceive such activity as a stabilization of government fiscal policy and as an inhibition of public debt expansion, which could disrupt production in the economy in the future. As a result, households increase their consumption, since in their opinion, the sum of their expected lifetime income increases.

1.4.3 The New Neoclassical Synthesis - dynamic general equilibrium models

The group of models discussed in this section describe the point of view of the New Neoclassical Synthesis, which is sometimes labelled as 'New-Keynesianism'. (Linnemann and Schabert, 2000). The standard Keynesian models were criticized for a lack of micro foundations and expectations forming processes. On the other hand, arguments against neoclassical models underline the lack of frictions in the goods or labour markets. Hence, the New Neoclassical synthesis provides the range of the real General Equilibrium Models which are based on microeconomics but include also some features exhibited by Keynesian models. These models were developed by Baxter and King (1993) and Linnemann and Schabert (2000) amongst others.

In the Linnemann and Schabert framework the baseline assumptions are as follows: i) government collects lump-sum taxes, ii) households face an intertemporal budget constraint, iii) there exists price stickiness. In addition to these features, the authors introduced imperfect competition in to the framework and modelled the behaviour of the fiscal and monetary authorities based on a Taylor rule to ensure

endogenously determined monetary policy. In general an increase in government spending reduces private consumption. This reaction is mostly due to the fact that households, in this type of frameworks, exhibit infinite time horizons that can be associated with Ricardian equivalence. Hence, after fiscal expansion through higher government expenditures, households suffer a negative wealth effect. This effect is caused by an increase, in the eyes of households, of the tax burden in the horizon of their utility maximization. As a result their lifetime income decreases which encourages them to reduce current consumption. The negative wealth effect, however, also positively influences households' willingness to work. In general, although the negative wealth effect produces an increase in labour supply, higher employment and as a result higher output, the reaction of private consumption is purely negative. Hence according to the Linnemann and Schabert model, the introduction of price stickiness and monetary policy based on Taylor rules is not sufficient to ensure the reaction of private consumption in line with the Keynesian approach. Since empirical evidence suggests that private consumption rises in response to fiscal expansion, Gali et al. (2004, 2007) develop a model that looks to address these discrepancies.

Gali et al. extend the standard New Keynesian framework. The central assumptions of their model are to a large extent in line with the framework discussed above. However, it provides a modification with respect to the horizon over which consumers maximize their utility (Gali et al., 2004). In the model, apart from households with infinite horizons (Ricardian households) whose spending decisions depends on an intertemporal budget constraint, there also exist households who base their consumption on current income (Rule of Thumb consumers) (Gali et al., 2007). This modification allows one to address the phenomenon, that in reality, a large share of households do not have enough means to save money which makes them practically unable to smooth consumption across income fluctuations (Gali et al., 2004).

The existence of Rule of Thumb consumers along with sticky prices are necessary factors to observe a rise in private consumption after an increase in government spending. The mechanism is as follows: The increase in government expenditures produces a negative wealth effect associated with the increase in the expected tax burden in the future needed to finance fiscal expansion. This negative wealth effect decreases the consumption of Ricardian households, who increase

their labour supply. If the economy is characterized by sticky prices then the real wage may stay unchanged or it may even rise if labour demand reacts more strongly than labour supply. Labour demand may rise more strongly due to the fact that mark-ups vary inversely to employment, hence declining mark-ups stimulate labour demand. Consequently the income of households increases. As a result, Rule of Thumb households increase their consumption since it is sensitive to their current income. If the share of Rule of Thumb households is sufficiently high then the overall response of aggregate private consumption may be positive. Interestingly after model calibration the outcome obtained by Gali et al. on the response of private consumption were to a great extent in line with existing empirical findings. (Gali et al., 2004). It is worth noting that the research conducted by Coenen and Strabaub (2005) accounted for the limited ability of households to smooth consumption over time and allowed for the existence of Ricardian and non-Ricardian households. They estimated a model for the euro area over the period of 1980 to 1999 on the basis of the dynamic general equilibrium framework using Bayesian inference methods. Their results suggest that the share of non-Ricardian households in the euro area is relatively small. Although the authors noted that the existence of non-Ricardian households is essential to consumption growth after fiscal expansion in order to support the model of Gali et al., this was not plausible. The main reason is due to large negative wealth effect anticipated by Ricardian households after fiscal expansion.

In this section it is also worth describing the model which investigates the role of negative wealth effects further in a slightly different environment. Barry and Devereux (2003) provide an interesting theoretical framework for the occurrence of non-Keynesian effects of fiscal policy in dynamic general equilibrium models. In this model, increases in government expenditures have a permanent and negative influence on GDP growth. The baseline assumptions are as follows: i) economic agents face finite horizons of utility maximisation and the overlapping generation model is implemented; ii) the labour force supply is not sensitive to the wealth effect.

Consequently, the average consumer is a saver and does not have intergenerational financial connections. Hence, a drop in government spending increases the tax burden on all generations which live in a given period. Since all citizens are savers, their natural behaviour is to increase present consumption by

less than they increase future spending. As a result, national savings rise which leads to a drop in the real interest rate, which accelerates investment and may provide output growth.

However, this outcome is not assured. As stated by Barry and Devereux, the single life-cycle saving pattern is not sufficient for the occurrence of a negative sign of the government spending multiplier. The second feature which is necessary is the lack of a considerable wealth effect in endogenously determined labour supply. To examine the importance of this feature we must investigate two channels through which a drop in government expenditures operates. Namely, a decrease in expenditures provides a rise in national savings which must be eliminated by a lower real interest rate. However, at the same time we observe a wealth effect; lower interest rates increases the value of assets held by citizens and deteriorates their supply of labour. As a result, we obtain a drop in output. According to Barry and Devereux, quantitatively the second effect always prevails. Hence to observe the positive reaction of consumption and as a result production in response to a cut in government expenditure, the labour force must be insensitive to the wealth effect.

This model has been extended to the case of an open economy. Since investment does not depend on domestic savings any more the effect of fiscal policy on GDP is null. However, if we consider GNP instead, then it is to some extent affected by a balanced budget contraction. However, the impact is ambiguous because it depends on whether the world interest rate is above or below the domestic subjective discount factor. (Barry and Devereux, 2003).

The effectiveness of fiscal policy in the Barry and Devereux model depends also on the state of public finances. Since the economy is not based on Ricardian equivalence the way of financing government expenditures has real consequences on the steady state. The drop in government spending in the balanced budget case shifts the economy's resource constraint upwards, which deteriorates the steady state interest rate. Aggregate employment increases, and hence output grows. However, in the case where a fiscal contraction is conducted when the ratio of debt to GDP is high, apart from the direct positive effect of the increase of savings, we observe also a positive effect of debt reduction. The mechanism is as follows: If the tax is not reduced simultaneously in response to a cut in government spending or it is reduced gradually then debt is falling, hence in a new steady state we have a lower debt/GDP ratio. However, according to Barry and Devereux this positive effect of

debt reduction is very small, thus the most important channel of growth acceleration is still the savings channel. The effectiveness of fiscal policy depends also on the tax type which is implemented. In the case of income tax, the negative fiscal multiplier of government spending is much higher than in the case of a lump sum tax.

If we look at the dynamic effect of fiscal contraction the evidence provided by the model suggests that the instantaneous positive effect of a spending reduction on GDP is rather small, and it becomes larger in a longer run perspective.

1.4.4 The Lane-Perotti model underling the existence of investment channel

In this section we briefly outline the mechanism behind the investment channel of non-Keynesian effects of fiscal policy. Although the models discussed above to some extent refer to the dynamics of this variable, it is treated as a supplement to consumption adjustment and does not play a crucial role in the transmission mechanism. Nevertheless, since investment constitutes a substantial part of aggregate demand its reaction may influence the sign of fiscal multipliers.

The framework which underlines the most important features of the investment channel is the Lane and Perotti (2001) model. The scholars claim that in small open economies the influence of fiscal policy on aggregate demand is small, hence they investigate how the changes in fiscal variables affects the supply side of the economy. The assumptions made are as follows: i) the economy consists of government and a private sector; ii) production in the private sector is fully exported while government produces for domestic consumption; iii) labour is the sole production factor. Thus, the marginal cost of unit of production is shaped by the wage rate. Aggregate labour demand is determined by the joint demand exhibited by the government and private sectors. Private labour demand is given by the decreasing function of the domestic goods price in foreign currency, since it is determined by foreign demand for domestic goods. Labour supply is an increasing function of after tax wage.

In addition, Lane and Perotti assume that domestic consumers do not have an influence on domestic production, since their demand constitutes a small part of the world demand. Moreover companies set the prices of their goods on the basis of marginal cost and mark-up. The crucial assumption is that the bargaining power of workers in the wage negotiations in the private sector is positively affected by the wage rate in the government sector.

All these conditions substantially affect the effectiveness of fiscal policy. The cut in government spending on wages in the public sector decreases its competitiveness as an employer, leading to the alleviation of pressure on wage increases in the private sector, and aggregate labour demand decreases. This adjustment allows private companies to reduce production costs and consequently also the price of final goods, without profits declining, which as a result increases foreign demand for domestic goods and accordingly boosts home country production.

Although the drop in government expenditures increases the competitiveness of domestic companies on the foreign market it may also positively affect the profitability of investment. This phenomenon may occur when companies do not perfectly adjust the price of final goods in response to cost changes, or when the technology exhibits increasing returns to scale⁴. Then companies enjoy a higher profit rate. This rise in profitability increases the incentives of firms to invest and consequently boosts aggregate production.

It is crucial to discuss also the effectiveness of taxes as a tool of fiscal policy. It turns out that these can also lead to a non-Keynesian reaction of output. Tax increases reduce the net value of wages, leading to a drop in labour supply. Accordingly, the increasing cost of labour raises the price of final goods, which harms the competitiveness of domestic firms in the foreign market and consequently reduces production.

Overall, in the Lane-Perotti model the influence of government expenditure on production in the short run is the opposite of that in the standard Keynesian model. The drop in expenditures through mechanisms in the labour market leads to a product acceleration in short term. Consequently the model's outcomes show that expansionary fiscal consolidation can be achieved by a cut in government expenditures rather than tax increases. Accordingly, unlike in the models discussed in the preceding sections, the Lane-Perotti framework indicates that the occurrence of non-Keynesian effects of fiscal policy depends on the structure of changes in government spending and/or taxes rather than on the conditions of public finances.

⁴ Increasing returns to scale mean that an increase in the use of a factor of production leads to more than a proportional increase in production. (Varian, 2006, pp. 346-347).

1.5 The Summary of the Consumption Channel of Non-Keynesian Effects Transmission

According to the preceding review of existing theoretical frameworks examining the impact of fiscal policy on aggregate demand, the two channels of transmissions underlined are the consumption and investment channel. Since the consumption channel is of prime importance for this thesis a summary is provided below.

A fiscal shock influences private consumption via three effects: the wealth effect, the pure expectation effect and the substitution effect.

The role of the pure expectation effect is emphasized by models which underline the role of public finances in the occurrence of non-Keynesian effects of fiscal policy, that is, the Blanchard, Sutherland, Drazen and Bertola models. These frameworks argue that the dynamics of the debt-to-GDP ratio plays a central role in household's expectation forming process. That is, its reduction or stabilization via fiscal consolidation may positively influence households' assessments referring to future tax burdens, and as a result increases their lifetime income and consequently consumption. However, to influence economic agent's expectations fiscal impulses must be substantial to indicate fiscal policy changes, a result underlined by the Drazen model.

The mechanics of the wealth effect operate via a drop in interest rates. The interest rate reduction can be caused by successful fiscal consolidation. The improved stance of public finance reduces the risk of insolvency or illiquidity of government. Hence government are able to offer lower interest rate for bonds, since economic agents are willing to accept a lower risk premium. Consequently, the drop in interest rates increases the present value of assets held by households hence their wealth level increases. Moreover, lower interest rates reduce the opportunity cost of savings. These two effects encourage economic agents to increase their current consumption.

The pure expectational and wealth effect by affecting the value of households life time income work in opposite directions to the fiscal impulse, alleviating its strength. However, it must be emphasized that fiscal shocks also directly affect households' current disposable income which plays a central role in the pure Keynesian transmission channel of a fiscal impulse. Hence to obtain effects different

to the standard Keynesian reaction of private consumption to a fiscal shock, the pure expectational and wealth effect on lifetime income must overcome the direct effect on current income. Hence the reaction of private consumption depends on the horizon of utility maximization of economic agents. As emphasized by Gali et al. model, the larger is the ratio of households with relatively infinite horizons to those with finite horizon, the higher is the possibility of a non-Keynesian reaction of private consumption. However, it must be noted that this is not a sufficient condition, since even if households exhibit an infinite horizon they must be able to move consumption between periods. Thus, the development of the financial system can play a crucial role in determining the effectiveness of fiscal policy.

The last effect to discuss is the substitution effect. Its occurrence depends on whether households' treat government spending as a substitute to their own consumption. This is intuitively linked to the type of government expenditures. If government expenditures finance mostly crucial goods like education or health care, their reduction is most likely to be replaced by households' own spending.

CHAPTER II. Survey of the Empirical Literature

In this section we provide a survey of empirical findings referring to the effectiveness of fiscal policy. We mainly focus on research on the consumption transmission channel of fiscal impulses. Cited works examine not only the size and sign of fiscal multipliers but also the role of the stance of public finance in the occurrence of potential non-Keynesian effect. Moreover they investigate the composition of the fiscal impulse, its strength and durability. In general evidence exists supporting both the Keynesian and non-Keynesian views on private consumption reactions to changes of fiscal variables and they are discussed accordingly.

2.1 Empirical Evidence on The Existence of Non-Keynesian Effects of Fiscal Policy

Giavazzi and Pagano (1990) were two of the first scholars who investigated the occurrence of non-Keynesian effects. They examined the relationship of private consumption to taxes, government spending and the money supply (all explanatory variables were in relation to GDP) for 10 European countries. The tested period covered the years 1973-1989. The impact of taxes on consumption growth turned out to be negative and statistically significant. The money supply appeared to have a positive impact on consumption for the majority of the countries and proved to be statistically significant. The response of consumption to the increase in government spending turned out to be different in various countries. A negative and statistically significant relation between government spending and private consumption was observed for Ireland, the UK and the Netherlands. In none of the countries was the relationship found to be positive and statistically significant.

Giavazzi and Pagano (1996) examined the impact of fiscal variables on private consumption for 19 OECD countries for the years 1970-1992. They reached the following conclusions. The reaction of private consumption to fiscal impulses proved to be nonlinear. In normal times, private consumption reacted positively to the growth of government expenditure and negatively to the growth of taxes. However, in the case of strong and permanent changes in fiscal policy, the response of private consumption to the fiscal impulse was different than in the standard Keynesian approach. Under such conditions, an increase in taxes and a decrease in transfers were accompanied by an increase in private consumption growth. They found that an

increase in taxes by one dollar caused a rise in private consumption of 15-20 cents. Similarly, a non-Keynesian reaction of private consumption was observed for government spending shocks. An increase in government spending by one dollar caused a decrease in private consumption by 10 cents. It should be noted that the estimates of the parameters for the non-Keynesian fiscal variables proved to be resistant to the presence of outliers as well as the endogeneity of income and fiscal variables. After examining in detail the case of Sweden, Giavazzi and Pagano came to the conclusion that the presence of non-Keynesian effects is at least partially linked to changes in households' expectations about future capital and labour income, rather than to the changes in the size of the real interest rate and asset value.

Perotti (1999) conducted research in to how the composition and conditions of fiscal adjustment impacted private consumption using panel data for nineteen OECD countries over the period 1965-1994. He found evidence of a non-Keynesian response of private consumption to fiscal shocks. The estimation results implied that during times of prosperity and good conditions of public finance, a rise in government expenditures influenced positively private consumption, the coefficient being 1.10, signalling a Keynesian effect. However, when the stance of public finance was bad the coefficient was negative (i.e. non-Keynesian) equal to -0.51. Similar patterns were found for taxes, though the results were not so clear. Perotti associated these results with the development of the financial system of a given country, since this determines the liquidity constraint of economic agents. The results proved that observed non-Keynesian reactions of private consumption were much more likely in countries with well-developed financial systems.

This observed difference in the effectiveness of fiscal policy in different macroeconomic conditions was investigated further by Afonso (2001) who studied the occurrence of non-Keynesian effects for EU15 using annual data over the period 1970-1999. The author examined the influence of a fiscal impulse on private consumption. Results suggested that in normal times the government spending multiplier with respect to consumption was positive. However, during fiscal consolidation, its size was reduced. In turn, the negative influence of tax increases turned out to be reversed in the presence of fiscal adjustment. However, the reported non-Keynesian effects were asymmetric, being more likely in the case of changes of government spending.

Afonso (2006) repeated his research running fixed effects panel models for UE15 countries for the period 1975-2005. The results were much in line with his previous findings. The short run impact of fiscal episodes on private consumption was not statistically significant. Of more interest however was the results that the long run consumption elasticity with respect to general government final consumption was negative and its magnitude increased in the presence of fiscal consolidation. These results were found also in the case of taxes. The consumption elasticity with respect to tax in the short-run was similarly not statistically significant while in the long-run it became positive. Afonso additionally investigated if the stance of public finance affected the size of fiscal multipliers. He found out that the positive consumption elasticity with respect to social transfers changed sign to negative when the debt-to-GDP ratio was above a given threshold and fiscal consolidation occurred, signalling a non- Keynesian effect.

Carmignani (2008) applied the simultaneous equations framework and used General Method of Moments estimation to examine the impact of fiscal policy on private consumption in transition economies and OECD countries over the period 1990–2003. The results suggested that the level of development influences the possibility of the occurrence of non-Keynesian effects. In transition economies the expenditure multiplier stayed positive in both normal and in consolidation times. However, in the case of OECD countries the results suggested nonlinearity in private consumption's reaction, which was positive in normal times and negative during fiscal consolidation. Hence there was evidence that fiscal tightening was always contractionary in transition economies, while it might become expansionary in the case of developed countries, however the multiplier was likely to be small.

Bhattacharya (1999) examined the impact of government spending and public debt on households' propensity to consume in 12 OECD countries during the years 1966-1999. In general, the relationship between the households' propensity to consume and the size of public debt was negative, the only country for which this relation was positive was the United States. As Bhattacharya pointed out, this might be due to a high degree of confidence of United States' lenders that the debt would be paid back, meaning that the increasing public debt did not concern the households that the state would not be able to finance its obligations. In the group of countries with the low and stable relation of public debt to GDP, there was no clear relationship between the size of public debt and the propensity to consume. For the

countries with a high level of debt, the negative relationship between public debt and household consumption occurred when the level of debt exceeded 30-35% of GDP. After reaching this threshold the propensity to consume was decreasing when public debt was increasing. In the case of Italy and Belgium, the negative relationship between the propensity to consume and the amount of debt came down, though this may happen due to an attempt to prevent the accumulation of the public debt.

A further study by Bhattacharya and Mukherjee (2010) considered the dependence of households' propensity to consume on fiscal variables for 18 OECD countries. The results allowed the researchers to draw the conclusion that the restrictive effects of fiscal consolidation in developed countries with high public debt could be reversed by an increase in private consumption. This supported the theory that households change their behaviour regarding the maximization of consumption from a non-Ricardian to Ricardian approach. The results for Australia, Belgium, Holland and Spain showed that the marginal households' propensity to consume over the last decade grew when the ratio of public debt to household income fell. This can serve as confirmation of the earlier conclusion that the negative impact of the fiscal adjustment on aggregate demand can be reversed by an increase in private consumption. In addition, the study suggests that private and government consumption are substitutes in the utility function of households. Therefore, this supports the possibility of non-Keynesian effects due to the consolidation of public finances through cuts in government spending.

Evidence found by Bhattacharya and Mukherjee is much in line with Berben and Brosens (2007) findings who ran a panel estimation on the basis of OECD countries data. Their research suggested that debt had a negative influence on private consumption in high debt countries while in low debt countries this negative effect was not observed. This implies that in high debt countries the effectiveness of fiscal policy in stabilizing an economy could be substantially reduced.

Although studying the impact of the influence of a fiscal impulse on private consumption is our particular interest, the availability of reliable data on this macroeconomic magnitude is quite scarce. Since data on saving are much more precisely collected, (Giavazzi et al., 1999) they are widely used to estimate effectiveness of fiscal policy. Moreover, on the basis of saving reactions, one is also

able to draw conclusions on the consumption response, since these two magnitudes are too a large extent complementary.

Giavazzi et al. (1999) studied whether the impact of fiscal variables on total savings depends on the strength of the fiscal impulse and its direction as well as on the state of public finances during the fiscal impulse occurrence for 18 OECD countries for the years 1970-1996. The results proved that the response of total savings to changes in taxes and government expenditures was nonlinear. In normal times, the impact of fiscal variables on total savings was in line with the Keynesian approach, however, during strong fiscal expansions and fiscal contractions coefficients were considerably reduced. At the same time, the reaction of total saving was more non-Keynesian in the case of strong fiscal tightening rather than fiscal stimuli. The tax coefficient during a large fiscal contraction was practically equal to zero, which may indicate that in such periods, the positive impact of taxes on total savings is almost completely neutralised. Also, it was shown that the level of public debt and its rate of growth did not affect the direction of the impact of the fiscal variables on total savings in the economy.

The above mentioned study was extended by Giavazzi et al. (2000) by adding developing countries to the initial sample. The results confirmed most of the previous findings referring to a relationship between total savings and the fiscal variables. The impact of taxes and government spending on total savings proved to be nonlinear, as with the results obtained in the previous study. At the same time the non-Keynesian reaction of total savings was more likely in the case of large fiscal contractions as opposed to fiscal stimuli. In normal times the impact of government spending was greater by almost a half than during large fiscal contractions and was greater by about one-third than during large fiscal expansions.

A further update of this line of research was conducted by Giavazzi et al. (2005) and covered 19 OECD countries. They studied the impact of fiscal variables on total savings in the economy and focused on the direction of the impact during large and permanent fiscal expansions and contractions. On the basis of their results they verified the conclusions from previous studies. The general direction of the impact of taxes on total savings proved to be positive and the impact of government spending appeared to be negative, which is consistent with the standard Keynesian approach. However, during the permanent and strong changes in the fiscal policy, the

impact of the fiscal variables was weakened significantly. This weakening was comparable for both the changes in taxes and government spending, so it can be concluded that the sole fact of the occurrence of a strong impulse is important, and the source of it, whether it is coming from changes in taxes or government spending is not crucial. They also found out that the government spending which affects total savings in the strongest way are social expenditures. However, unlike the results of their previous studies, the authors found that the non-Keynesian total savings response to fiscal impulses is just as probable for a fiscal contraction as for a fiscal expansion. In addition, they confirmed their earlier conclusions implying that a large and rapidly growing public debt had no impact on the direction of the impact of taxes and government expenditure on total savings.

However, the level of development of an economy, the financial system and the stance of public finance are important environmental factors that influence the effectiveness of fiscal policy, with the composition of the fiscal impulse also potentially important. Hence below we present empirical evidence concerning this topic.

Alesina and Ardagna (1998) examined the characteristics of fiscal adjustment in OECD countries over the period 1969-1998 that work in favour of GDP growth accelerations. Their main finding suggested that the composition of fiscal adjustment mattered, emphasizing that cuts in transfers and wages in the public sector were the most likely to produce output growth. Moreover devaluation preceding fiscal tightening increased the probability of its success. Additionally wage moderation was found to be an important component of expansionary fiscal adjustment. These findings were not confirmed in the case of tax based adjustments, which were not expansionary. The authors also found weak evidence indicating that the stance of public finances played a role in the occurrence of expansionary fiscal consolidation.

These results were confirmed by Zaghini (2001) who found that the composition and persistence of fiscal adjustment played a crucial role in its success. He undertook comparative analysis of 52 significant fiscal episodes in 14 European countries over the period 1970-1998. Successful adjustments were based on expenditure cuts (80% of cases) while unsuccessful ones almost entirely (98%) relied on tax increases. Accordingly successful consolidation was much more persistent and on average lasted about 3 years while unsuccessful ones lasted about 1.5 years.

Moreover substantial differences were noted with respect to the conditions of public finance. Successful adjustment took place in the presence of a much worse stance of public liabilities, on average the debt to GDP ratio and budget deficit were respectively 30 percentage points and 2 percentage points higher, than during unsuccessful fiscal consolidations. These results are in line with predictions from non-Keynesian models (e.g. the Drazen and Blanchard models⁵) which propose the size and length of fiscal adjustment as crucial factors signalling to economic agents the stabilization of public debt. This signal, as a consequence, influences positively households expectations about their lifetime income and leads to a consumption acceleration.

Afonso et al. (2005) examined the conditions which increased the probability of successful fiscal consolidations in Central and Eastern European countries for the period 1991–2003 on the basis of the logit model. Similarly to results for EU15 countries the authors reported that expenditure-cuts based fiscal consolidations tended to be much more successful than those relying on tax increases. The results were robust to different ways of fiscal tightening identification.

Analogous evidence was found in recent studies by Giudice et al. (2007) who run the probit regression on the basis of European Union countries over the period 1970–2002 examining which features of fiscal consolidation increased its probability of being expansionary. The results underlined, accordingly, that adjustments conducted in the weak phase of the cycle and based on expenditures cuts were much more likely to produce GDP growth.

Although the aim of this thesis is to examine the consumption channel of the non-Keynesian effects we find it crucial to recall evidence showing the existence of the investment channel. Alesina et al. (1999) examined the effects of government spending and taxes on the profitability of firms in 18 OECD countries for the years 1960-1990. So their study concerned the non-Keynesian effects of the supply side according to the conclusions of the Lane and Perotti model. Government spending had a negative impact on the profitability of private investment. Namely, an increase of government spending by one percentage point caused a decrease in the share of profits in investment of about 0.1 percentage points. A similar effect on the profitability of investments followed an increase in taxes. The most negative impact on the

⁵ See section 1.4.2.

profitability of enterprises was government spending on wages, which is consistent with the Lane and Perotti model, according to which the decline in expenditure on wages in the government sector reduces the pressure on the growth of wages in the private sector and thus increases the profitability of enterprises⁶. A drop in government spending on wages by 1%, other things being equal, caused an increase in the profitability of companies by 0.42 percentage point on average. Similarly, a tax that had the most negative impact on the profitability of enterprises was a tax on labour.

Although many recent studies report the existence of non-Keynesian effects of fiscal policy we find it crucial to recall empirical evidence in favour of the standard Keynesian view of fiscal policy effectiveness. The work of Heylen and Everaert (2000) examined which features of fiscal consolidations increased the probability of their success on the basis of a sample of 39 fiscal episodes in 18 OECD countries over the period 1975-95. The authors found that successful fiscal consolidation was much more plausible in favourable macroeconomic conditions, underling high economic growth and low interest rate as crucial factors. However, the authors strongly rejected the hypothesis raised by preceding research that fiscal consolidations relying on cutting the government wage bill tended to be more successful than those relying on tax increases. Furthermore they did not find any evidence indicating that the stance of public finances influences the effectiveness of fiscal policy. However, they reported weak evidence that large and persistent fiscal tightening seemed to be more successful.

Von Hagen et al. (2001) studied fiscal consolidation in the member states of European Monetary Union during the 1990's. They found evidence suggesting that the costs of fiscal consolidations were reduced in the 1990's. Although these phenomena could be partially attributed to non-Keynesian effects it could also be evidence supporting the existence of expansionary fiscal tightening. Furthermore, similar to previous evidence, the quality of fiscal tightening turned out to affect its probability of being successful. The authors reported that expenditure based consolidations were much successful than those relying on taxes, especially when they were conducted by reducing transfers, subsidies and the government wage bill. However, what is especially interesting, was that they argued that environmental

⁶ See section 1.4.4.

factors influenced the quality of fiscal consolidation. In times of economic downturn and a high debt-to-GDP ratio, government was more likely to conduct long lasting fiscal tightening based on expenditures cuts.

Hjelm (2002) provided a critique of the research of Giavazzi and Pagano (1996) and claimed that it could not be generalized. He argued that reported non Keynesian effects of fiscal policy in the case of Ireland and Denmark were due to country specific factors. Instead, he proposed the application of panel estimation to 55 contraction and expansion episodes over the period 1970-1997 for 19 OECD countries to study the response of private consumption to fiscal policy changes. He examined if the growth rate of private spending was affected during fiscal episodes when variables referring to income and interest rates were controlled for. In general, he found evidence suggesting pure Keynesian effects of fiscal policy. He reported that private consumption growth was significantly lower during fiscal tightening in comparison to non-contraction/expansion periods. The author claimed that this finding suggested a lack of a positive expectation effect referring to the value of future income due to fiscal consolidation, which was raised by non-Keynesian models. He argued that this effect operated rather in the opposite direction. Furthermore, he found that the initial condition of public finances did not affect fiscal policy effectiveness. The rate of growth of private consumption during fiscal consolidation preceded by a high debt-to-GDP ratio was not statistically significant different than in a period of good public finances. Similarly, the size of the fiscal episode turned out to not influence the level of the private consumption response. Interestingly Hjelm's empirical evidence suggested that fiscal tightening preceded by currency depreciations produced a higher growth of private spending than a contraction preceded by appreciation. Hence he indicated the crucial role played by currency devaluations in the occurrence of expansionary fiscal consolidation in the cases of Denmark and Sweden.

Although Hjelm's study showed that fiscal policy had pure Keynesian effect regardless of environmental factors and of the composition of the fiscal episode, there also exists evidence which exhibits ambiguous effects of fiscal changes on consumption. The brief example is Hogan's (2004) work, who studied the occurrence of expansionary fiscal contraction using panel data analysis on the basis of 18 OECD countries over the period 1970-1999. The author found weak evidence of non-Keynesian effect during times of crisis and poor public finances, which constituted

support for some of the non-Keynesian frameworks (Blanchard, Sutherland). However, he reported that the long-run effect of government spending was not statistically significant, which implied that current changes of fiscal policy did not affect households' future consumption decisions, a result in line with the standard Keynesian view. Furthermore, Hogan found no evidence indicating that the size of the fiscal episode influenced its effectiveness. Overall, the expansionary fiscal contraction effect was found to be very small. Hence fiscal tightening may produce some non-Keynesian effects, however they are not expansionary.

The evidence against the non-Keynesian view of fiscal policy can also be found in the more recent studies of Candelon and Lieb (2010) who examined whether the effectiveness of fiscal policy depends on the stance of public finance on the basis of USA quarterly data over the years 1960-2000. The authors did not find non-Keynesian effects of fiscal policy neither in good nor in bad times. However, the government expenditures policy was a more effective tool in stabilizing the economy in the short run than tax policy.

2.2 Main Conclusions From The Empirical Evidence

After conducting a survey of empirical findings concerning the effectiveness of fiscal policy we may derive the following conclusions.

The response of private consumption to fiscal impulse is nonlinear. The standard Keynesian approach seems to correctly describe reality in normal times predicting a positive impact on private spending in the case of government expenditures and negative in the case of taxes. However, under several macroeconomic and structural environmental factors the size and sign of fiscal multipliers are substantially different.

Empirical evidence confirms the view that the state of public finances is crucial. The reaction of private consumption to fiscal policy changes takes a standard Keynesian pattern in normal times, but in periods of economic downturn and high and growing debt-to-GDP ratios the size of multipliers are reduced or even reversed. Moreover, this negative relationship was observed between the level of public debt and the households' propensity to consume. Hence we may argue that the stance of public finance affects people spending decisions.

Non-Keynesian effects are more plausible in developed economies with a mature financial system. This support the hypothesis that economic agents are

indeed forward looking and maximize their life time utility moving their consumption between periods. However, they are bounded by a liquidity constraint which is determined by the development of the financial system. Moreover we may assume that non-Keynesian effects of fiscal policy are reported mostly in developed countries because their citizens are richer and possess higher savings, and hence anticipate a stronger wealth effect.

The sign of the fiscal impulse matters. The non-Keynesian reaction of private spending is much more likely in the case of fiscal tightening than fiscal expansion. This can be associated with the frequency of a particular fiscal impulse. Fiscal consolidations are conducted rarely in comparison to fiscal stimuli and hence they constitute a more clear policy change and more strongly affect economic agents' behaviour. This is linked also to the size of fiscal consolidations. They are much more likely to be expansionary if they are large and long lasting, a result in line with the Drazen and Bertola model⁷. Furthermore, what is worth emphasizing is that the obtained evidence on the existence of non-Keynesian effects of fiscal policy are robust regardless of the way in which the fiscal consolidation is defined.

The composition of fiscal impulse matters as well. As empirical evidence suggests that the government expenditure changes tend to more frequently produce non-Keynesian reactions of private consumption than tax changes. Moreover expansionary fiscal tightening is to a great extent based on cuts in expenditures on social transfers and wages in the public sector.

⁷ See section 1.4.2.

CHAPTER III. Empirical Evidence for Italy

After providing, in the previous chapters, a broad overview of theoretical frameworks describing the effectiveness of fiscal policy and of the existing empirical evidence, we are able to isolate the factors which help explain the non-Keynesian effects of fiscal policy. We believe that these factors are associated mostly with the condition of public finances. The research strategy adopted in the thesis is described in the following subsections.

3.1 Research Strategy

We would like to verify the Keynesian models, the modified Keynesian models (the Silber model (Silber 1970, p. 461-472), the Mankiw and Summers model (Mankiw and Summers, 1987)), models based on Ricardian equivalence and non-Keynesian models (the Blanchard model, the Sutherland model, the Drazen–Bertola model (Rzońca, 2004b, p. 24-34)) concerning the direction of the impact of changes in taxes and government spending on private consumption and thus on total savings in the economy. The impact of fiscal variables on private consumption can be examined by analysing the impact of these variables on total savings in an economy. According to the literature, savings are a better variable to consider in the econometric model because data on savings is much more precise than data on consumption (Giavazzi et. al., 1999). According to the model of total savings in the economy we have:

$$S=S_G+S_P=(T-G)+(Y-T-C)=Y-(C+G) \quad [1]$$

Where S denotes total savings in the economy, S_G stands for government savings, S_P denotes private savings, Y refers to national income, G denotes government spending, and C stands for private consumption.

Using the above formula we can examine the impact of fiscal variables on private consumption. We estimate this model for Italy over the period 1981-2009.

3.2 Hypotheses

In this section we present the research hypotheses. We focus on four group of the models the most relevant in the context of our analysis. We derive the hypothesis from the Keynesian approach, the models involving finite and infinite time horizon of the households and Non-Keynesian Theory.

3.2.1 Keynesian models

The increase in taxes reduces the disposable income of households, and thereby reduces the private consumption and savings. At the same time, tax revenues supply the state budget, which increases government savings. The increase in government savings is greater than the decline in private savings, since households when paying taxes use mostly the means devoted to consumption and their savings are reduced by a smaller amount. Thus, according to the standard Keynesian approach, the impact of the increase in taxes on total savings in the economy is positive.

As was pointed out by Giavazzi et al. (2000) the strengthening of the negative impact of a tax increase on total savings in the economy may be obtained by the wealth effect (Giavazzi et al., 2000, p. 5). The increase in the government surplus can lead to a decline in interest rates and by the traditional effect of portfolio crowding out, as is the case in the Silber model (1970), it can increase the consumption, which in turn may reduce total savings in the economy. The increased crowding out effect of consumption by the interest rate can occur when the demand for money is very sensitive to consumption, as in the case of the Mankiw and Summers model (1987). Thus, in modified Keynesian models the impact of taxes on total savings is not defined.

The change in government spending in the Keynesian approach has an ambiguous effect on total savings. In the traditional Keynesian model, this effect is negative. However, if we extend the analysis by the wealth effect, higher government spending can lead to higher interest rates, which will induce households to increase savings, which in turn may lead to an increase in national savings (Giavazzi et al., 1999, p 6). Thus, in the Keynesian models extended by the wealth effect, the increase in spending increases income and the interest rate, though these variables have the opposite effect on investment and consumption. As such, we cannot clearly identify the impact of the increases in government spending on national savings.

3.2.2 Models involving an infinite time horizon of households

According to the models with infinite time horizons, the impact of increases in taxes on total savings is neutral, because households know that the sum of their total expected income is unchanged. Also the level of consumption will remain unchanged. The reduction in the disposable income causes a reduction in private savings one to one, so private savings fall, but at the same time government savings rise by the same amount, as money from taxes supplies the state budget. As a result national savings do not change.

The reaction of total savings to a change in government spending is neutral (provided that the increase in spending will not affect the labor supply of households). This is because the increase in government spending crowds out by the same amount households' spending on consumption, thus private savings increase and government spending increases by the same amount too, meaning that the balance of total savings in the economy remains unchanged. However, if following Linnemann and Schabert (2000) the increase in government spending encourages households to increase labour supply, because they experience a negative wealth effect, then we may observe an acceleration of production and an increase in saving.

3.2.3 Models involving a finite time horizon of households

The increase in taxes reduces the current income of households, which in turn results in a decrease in private consumption and savings. Revenues from taxes supply the state budget. However, the reduction of private savings is lower than the increase in government savings because households distribute the new tax burden for the entire period of their life, which means as a result that national savings increase (Giavazzi et al., 2000, p. 5.). So here we observe a positive correlation between the increase in taxes and total savings.

The increase in government consumption reduces private savings. Therefore, the impact of the increase in government spending on government savings is negative, such that the overall impact of government spending on total savings in the economy is negative.

3.2.4 Non-Keynesian models

According to this approach, what happens to private consumption and savings after a fiscal contraction or expansion depends on the condition of public finances in

the country in question. If the state of public finances is good, i.e. public debt is low, then the increase in taxes has a positive impact on total savings in the economy, as is the case in models with a finite time horizon of households. But if we have a situation where there is a high ratio of public debt to GDP and the public debt is constantly growing (Blanchard model), households know that the probability of an increase in taxes goes up and they also know that the government in the near future will have to consolidate public finances and taxes will increase above a critical level, permanently lowering production in the economy. However, if the increase in taxes does not exceed the critical level, then the household concludes that the probability of the rise in taxes is lower in comparison with the previous situation. Thus, they will verify their expectations about future income and will increase their consumption, which according to equation [1] will decrease total savings in the economy. So, the Blanchard model assumes a positive impact of taxes on national savings in normal times and a neutral or negative impact during times of high public debt. A similar effect of changes in taxes on total savings can be observed in the Sutherland model. According to the Drazen model, the main factor affecting the strength of the impact of taxes on total savings may be the scale of the changes. In particular, a strong increase in taxes may signal a change in fiscal policy and stabilization of public debt for households. As a result, the threat of a disturbance to the functioning of an economy by the expansion of public debt is lower. As a result, the total amount of households' expected income increases, so they increase their current consumption, which reduces the growth of national savings.

The standard Blanchard model represents only the effect of changes in taxes on private consumption. However, analyzing the extended Blanchard model (Rzońca 2004b) leads to the conclusion that the impact of the increase in the government spending on total savings can be either negative or positive. If public debt is low, then we expect a negative effect of government spending increase on total savings, as in the model with a finite horizon of households. However, if the public debt is high, then according to the theory presented in the first section, the increase in spending approximates the moment at which it will be inevitable to increase taxes above the level which permanently lowers production in the economy. Thus, the total amount of households' expected income decreases in the period in which they maximize their utility, so they reduce their current consumption. One can reach a similar conclusions by analyzing the effects of consolidation of government finances through spending

cuts. This can lead to a non-Keynesian response of consumption, i.e. to its growth and thus a reduction of total savings, as it moves away in time, in households' assessment, the moment at which public debt will exceed the level at which it would be necessary to increase taxes above the critical value.

Overall and considering that Italy is a highly developed country, in normal times we would expect a Keynesian effect on national saving of changes in taxes and expenditures. However, having in mind that this country has recently suffered from high debt and a poor fiscal situation we assume that in periods when it experiences high public debt the positive impact of spending and negative of taxes can be considerably lower or even be reversed. What may also matter is the size of the fiscal expansion and contraction which can considerably affect household expectations about the future government strategy regarding the consolidation of public finances. Hence the size of the fiscal change may substantially affect the level of consumption and in turn the level of savings. We therefore assume that similar to high debt periods, large fiscal episodes can lower the Keynesian effect of changes in expenditures and taxes on national savings. Table 1 summarizes the above hypotheses.

Table 1
Research hypotheses regarding the effect of fiscal variables on the rate of the total savings

Model	Increase in taxes (given level of government expenditures)	Increase in government expenditure (given level of taxes)
Standard Keynesian approach	positive	negative
Modified Keynesian approach, Silber model, Mankiw and Summers model	undefined	undefined
Models of infinite time horizon of households (neutral Ricardian hypothesis)	neutral	neutral
Models of finite time horizon of households	positive	negative
Blanchard model, modified Blanchard model, Sutherland model	Positive when public debt is low, zero or negative when public debt is high,	Negative when public debt is low, zero or positive when public debt is high
Drazen and Bertola model		Depends on the increase of G in relation to Y, negative when the increase is low, neutral or positive when the increase is high, Non-collinearity only in the case of large fiscal expansions
Drazen model	Positive when the increase in taxes is small, negative when the increase in taxes is high	Negative when the increase in G is low, neutral when the increase is high
Ramsey-Cass-Koopmans model		Negative when the increase in G is low, neutral when the increase in G is high

Source: Own elaboration.

3.3 Methodology and Data Set

We would like to estimate the following function of national savings, similar to that in the study by Giavazzi, Pagano and Japelli (1999) for Italy over the period 1981-2009:

$$\frac{S_t}{Y_t^*} = \alpha_1 \frac{S_{t-1}}{Y_{t-1}^*} + \alpha_2 \frac{Y_t - Y_t^*}{Y_t^*} + \alpha_3 r_t + \beta_0 \frac{T_t}{Y_t} + \sum_{k=1}^{k=3} \beta_k d_{tk} \frac{T_t}{Y_t} + \gamma_0 \frac{G_t}{Y_t} + \sum_{k=1}^{k=3} \gamma_k d_{tk} \frac{G_t}{Y_t} + \varepsilon_t \quad [2]$$

We have chosen Italy as the country of interest, since this country experienced relatively many episodes of large fiscal expansions and contractions and high public debt. The sample contains 29 observations.

Dependent variable:

- The rate of total savings in the economy

$$S_t/Y_t^*$$

The rate is constructed by dividing national savings by potential product. In the estimation is used as a percent of potential GDP.

Independent variables:

- The rate of total savings in the economy in the previous period.

$$S_{t-1}/Y_{t-1}^*$$

The rate of total savings lagged by one period, according to Giavazzi et al. (2000, p. 14), captures the dynamics of the dependent variable. The variable has been created by dividing gross national savings from period t-1 by potential production in period t-1. In the estimation it is used as a percent of potential GDP.

- The gap between the potential production and actual production in the current period.

$$(Y_t - Y_t^*)/Y_t^*$$

The demand gap should mirror the reaction of private savings and the government surplus to temporary changes in income. The variable is constructed by subtracting current and potential GDP and then dividing by potential production. In the estimation it is used as a percent of potential GDP.

- Interest rate

$$r_t$$

Changeable interest rate which is defined as the short run interest rate adjusted by the GDP deflator.

- The ratio of taxes to GDP

$$T_t/Y_t$$

The rate of taxation is defined as total government revenues refined from the influence of business cycle divided by GDP. In the estimation it is used as a percent of GDP.

- The ratio of government expenditures to GDP

$$G_t/Y_t$$

The ratio of government spending is defined as government spending refined from the influence of business cycle and subtraction of interest payments, divided by GDP. In the estimation it is used as a percent of GDP.

Definitions of the variables in the AMECO database are presented in table 2.

Table 2
Definition of variables in AMECO database

Variable	Definition of variables in AMECO database	Code
G/Y	Total expenditure excluding interest of general government adjusted for the cyclical component: Adjustment based on potential GDP Excessive deficit procedure	(UUTGBP)
T/Y	Cyclically adjusted total revenue of general government: Adjustment based on potential GDP ESA 1995	(URTGAP)
$(Y_t - Y_t^*)/Y_t^*$	Gap between actual and potential gross domestic product at 2000 market prices	(AVGDGP)
S	Gross national saving, Gross national saving measures the proportion of national disposable income that is not used for final consumption expenditure. Gross saving always means saving without deduction of consumption of fixed capital.	(USGN)
r	Real short-term interest rates, deflator GDP	(ISRV)
Y^*	Potential gross domestic product at 2000 market prices	(OVGDP)
Primary balance	Net lending (+) or net borrowing (-) excluding interest of general government adjusted for the cyclical component: Adjustment based on potential GDP Excessive deficit procedure	(UBLGBP)
Public debt	General government consolidated gross debt :Excessive deficit procedure (based on ESA 1995) and former definition	(UDGGL)

Source: Own elaboration.

Additionally, the inclusion of dummies, d_i , allow us to examine whether the direction of the influence of fiscal variables on total savings depends on the extent of the change but also on the level of national debt, as suggested by the Blanchard or

Drazen-Bertola models. In our model therefore, we create interactions between the fiscal variables and the dummies defining these variables as follows:

d₁: d₁=1 for strong and permanent fiscal expansions, d₁=0 in the opposite case

d₂: d₂=1 for strong and permanent fiscal contractions, d₂=0 in the opposite case

d₃: d₃=1 when in a given year the public debt was larger than 100% of GDP, d₃=0 in the opposite case

Strong and permanent fiscal contractions and expansions were defined for years in which the total change of the primary balance (negative for expansion and positive for contraction) in relation to GDP in a year or two subsequent years was at least 1.5 percentage point. The identification of the periods of large fiscal episodes and high public debts was based on the AMECO data. The definition of the variables describing gross government debt and primary balance are reported in the bottom of table 2. The list of fiscal episodes defined in such way is presented in table 3.

Table 3

The episodes of large and permanent fiscal contractions and expansion and periods of high public debt in case of Italy

Time Period	Large and permanent fiscal expansions	Large and permanent fiscal contractions	High public debt
1981-2009	1981,1984-1985, 1998-2002, 2004-2005	1982-1983,1990-1993, 1995-1997	1992-2009

Source: Own elaboration.

Since there is a lagged dependent variable (lagged total savings) on the right-hand side of the equation we have the problem of endogeneity, the right-hand side variables are correlated with the disturbance term. In this case both the OLS and the weighted LS estimator are biased and inconsistent and so we need to use some other procedure of estimation. The methods used to deal with that problem are called instrumental variables methods. The method involves finding a set of variables as instruments that are correlated with the explanatory variables in the model and uncorrelated with the disturbance term (Quantitative Micro Software, 2010). As instruments we use lagged values of the explained and explanatory variables. The lagged values are chosen in a way that they are correlated with the independent variables in the model and uncorrelated with the dependent variable. The rationale standing behind using them is to eliminate a correlation between the explanatory

variables and the disturbance term. To conduct our research we decide to use the Generalized Methods of Moments (GMM) as in the literature on our subject there is an agreement between researchers about the specification of the model.

GMM is an estimation procedure which enables one to consistently estimate population parameters. The procedure is used when the parameter of interest is finite dimensional, though the shape of the distribution function of the data may not be known. It constitutes an extension of the Classical Method of Moments which uses an assumption that the sample moments converge to population moments (Arnold, 1999). The General Method of Moments unlike the classical procedure allow the moments to be the functions of estimated parameters. The moment conditions must be satisfied by the estimated parameters.

The GMM estimator will be identified when there are at least as many instruments as there are parameters in the regression equation. Then the value of the optimized objective function will be greater than zero, whereas when the number of instruments and parameters is the same, then the value of the optimized objective function is zero. The value of the objective function, which is called the J-statistic can be employed to test over-identification of moment conditions i.e. whether the instruments are correctly chosen. In our model we have 11 explanatory variables and 12 instruments, so the condition is satisfied.

To implement GMM we need the weighting matrix. The matrix is used to weight moment conditions. The choice of weighting matrices is an important issue when specifying the GMM estimator as we obviously want to assign less weight to the moment conditions which are measured imprecisely. The choice of weighting matrix influences the asymptotic variance of the GMM estimator and depends on the features exhibited by the data set. There are various methods offered in EViews to specify the weighting matrix, including the White and HAC–Newey-West methods. The White matrix is robust to hetroscedastisity of unknown form and is widely used in cross sections analysis. Since we base our research on time series analysis of macroeconomic data we may face potential problems of autocorrelation and heteroscedasticity, hence the more proper choice of weighting matrix would be HAC–Newey-West. This matrix is a heteroscedasticity and autocorrelation consistent.

The instrumental variables and GMM diagnostics tests have been conducted to check the validity of the instruments and the specification of the model. Carefully

examining the quality of the instruments is an unbounded part of reliable research based on GMM applications (Stock et al., 2002). First, a summary of the instruments was undertaken to check the number of instruments specified, the instrument specification, and a list of the instruments that were used in the estimation. In our model none of the instruments have been automatically dropped as there were no collinear instruments. Then we check whether the instruments are orthogonal to a function of the parameters of the model. To do this we conduct the Instrument Orthogonality Test. The next step was to check for endogeneity of all or some of the equation regressors by conducting Regressor Endogeneity Tests. To obtain the diagnostic information about the instruments in the model we conducted the J-statistic test. Additionally we use the Cragg-Donald statistic to measure the validity of the instruments in the instrumental variable regression. Weak instruments i.e. those which are only marginally valid, can cause biased inferences based on the instrumental variable estimates, which is why one should test whether they are applicable in the model. Even though this statistic is not valid for GMM, EViews computes it in the case of GMM for comparative purposes. We also conducted Moment Selection Criteria (MSC) to compare different instrument sets and choose the best set of instruments. To do this we compare the MSC for equations with different instrument. EViews provides us with three different MSC and we use the Relevant MSC. The more detailed descriptions and outcomes of the diagnostic tests are included in the subsequent sections.

3.4 Estimation

In this section we describe the estimation procedures employed to estimate our model. We discuss the rationale behind using particular methods of estimation and consecutive steps which we have undertaken to obtain the final outcomes. We discuss also in more detail the diagnostic tests which we have undertaken to assure the reliability of the results.

3.4.1 Estimation procedure

In the columns with GMM in Table 4. we present the outcomes of the model estimated using Generalised Method of Moments. The instrumental variables that we have used are the lagged values of the variables included in the model. Using lagged values of variables used in the model as instruments means that we lose some

observations, however this approach is widely used in the literature hence we implement it.

Table 4

The outcomes of the estimations

National savings are dependent variable. Definitions of the explanatory variables are in the text. Regressions were conducted using Generalized Method of Moments (GMM) and Ordinary Least Squares (OLS). Standard errors are in parenthesis. Stars denote the significance level:

*** 1% significance level, ** 5% significance level, * 10% significance level

Method	GMM	GMM	OLS	GMM	OLS
Estimation	Initial Estimation	Intermediate Estimation	Intermediate Estimation	Final Estimation	Final Estimation
Lagged savings	0.055 (1.077)				
Output gap	1.337 (1.118)	1.355 (0.137)***	1.268 (0.121)***	1.367 (0.115)***	1.260 (0.084)***
Interest rate	-0.412 (1.537)	-0.548 (0.118)***	-0.504 (0.092) ***	-0.567 (0.084)***	-0.743 (0.067)***
Taxes (T/Y)	1.597 (2.198)	1.229 (0.628)*	1.981 (0.228) ***	0.389 (0.012)***	0.410 (0.010)***
--Large fiscal expansions	0.109 (1.033)				
--Large fiscal contractions	0.867 (0.918)	0.689 (0.280)**	0.597 (0.136) ***	0.409 (0.155)**	0.354 (0.089)***
--Large public debt	-1.456 (2.901)	-0.936 (0.719)	-1.634 (0.261) ***		
Expenditures (G/Y)	-1.148 (2.326)	-0.777 (0.586)	-1.488 (0.208) ***		
--Large fiscal expansions	-0.109 (1.132)				
--Large fiscal contractions	-0.942 (1.001)	-0.748 (0.307)**	-0.660 (0.140) ***	-0.440 (0.167)**	-0.366 (0.094)***
--Large public debt	1.471 (2.728)	0.975 (0.680)	1.630 (0.248) ***	0.097 (0.012)***	0.080 (0.010)***
No. of observations	24	24	29	25	25
Adjusted R ²	0.930	0.959	0.971	0.970	0.981
Instrument rank	12	12	-----	9	-----
J-statistic ¹	0.005	2.38	-----	6.5	-----

¹The value of J-statistic obtained by multiplying the value of J-statistic form EViews by the number of observations.

Source: Own elaboration.

The first exercise involved including four lags of each variable from the model as instruments. However, in this case the value of J-statistic multiplied by the number of observations was greater than the value of the corresponding X^2 statistics with 95% confidence level, which made us reject the null hypothesis that the instruments are correct.

After several attempts with different sets of instruments, we finally obtained a set of instruments which satisfied the J-statistic test. To choose the proper set of instruments we conducted Moment Selection Criteria (MSC) to compare different instrument sets and chose the best set of instruments. The lists of the instruments which we used in the estimations are presented in Table 5.

Table 5
Instruments used in the GMM estimations

	Initial Estimation	Intermediate Estimation	Final Estimation
No. of instruments	12	12	9
Instruments used	Constant, Output Gap(-2 to -3), Taxes(-2 to -5), Expenditures (-2 to-4), Savings(-3), Interest rate(-2)	Constant, Output gap(-2 to -3), Taxes(-2 to -5), Expenditures (-2 to-4), Savings(-2), Interest rate(-2)	Constant, Output Gap(-2 to -3), Taxes(-2), Expenditures (-2 to-4), Savings(-3), Interest rate(-2)

Source: Own elaboration.

Although in the initial estimation we found a set of instruments which satisfied the J-statistic test, the coefficients for all explanatory variables were statistically insignificant at the level of 5%, (column “GMM Initial Estimation” in Table 4). Therefore, in the next step we excluded from the model the explanatory variables with the lowest modulus of the t-statistic, namely lagged savings and the variables expressing changes in taxes and government expenditures during large fiscal expansions. We also slightly changed the set of instrumental variables. Excluding the most insignificant explanatory variables led to an increase in the significance of the remaining explanatory variables in the model (column “GMM Intermediate Estimation” in Table 4).

Further we have excluded consecutively from the model the variables which had the lowest modulus values of the t-statistics. The joint significance of the excluded explanatory variables was checked by the Wald test. The outcomes of the

Wald test are presented in Table 6. To satisfy the J-statistic in the model with the lower number of explanatory variables we changed slightly the set of instrumental variables. Finally, we were left with six explanatory variables, all of which were significant at the 5% level. The results are presented in column “Final Estimation” in Table 4.

Table 6
The outcomes of the Wald test

After Intermediate Estimation	H ₀ : Coefficients for lagged savings and the variables expressing changes in taxes and government expenditures during large fiscal expansions are jointly insignificant			
	Test Statistic	Value	df	Probability
	F-statistic	0.015448	(3, 13)	0.9972
	Chi-square	0.046344	3	0.9974
After Final Estimation	H ₀ : Coefficients for expenditures and the variable expressing changes in taxes when the public debt exceed 100% are jointly insignificant			
	Test Statistic	Value	df	Probability
	F-statistic	0.877892	(2, 16)	0.4348
	Chi-square	1.755783	2	0.4157

Source: Own elaboration.

After excluding from the sample lagged savings which creates an endogeneity problem, we estimated the model (the intermediate and final form) additionally using simple ordinary least squares (OLS) method for purposes of comparison. The results are also presented in Table 4, in the columns marked with OLS headings.

The rationale behind this exercise is that in the series of papers by Giavazzi et al, on which this research is based, the estimation is conducted using OLS. Hence supplementing our GMM results with those from OLS enables us more directly to compare the coefficients obtained from our research with those obtained by the mentioned authors.

The reliability of both GMM and OLS estimations were checked using diagnostic tests which are described in the section 3.5.3.

3.4.2 The economic interpretation of the results

In this section we provide the economic interpretation of the results. We compare the results obtained from the GMM estimation to those from simple OLS. Considering the economic interpretation, we will concentrate especially on the influence of the fiscal variables on national savings, as is the aim of this paper.

Overall, with reference to the sign of the coefficients of the explanatory variables the results obtained from both types of estimations are similar. It must be emphasised that since GMM estimation requires the specification of instrumental variables which are the lagged values of the variables used in the model the sample used in this estimation is restricted to 25 observations. However, when we restrict the sample used in OLS estimation also to 25 observations, as in GMM, the obtained coefficients have similar sizes in both regressions.

The greatest differences between the GMM and OLS estimation occur in the significance of many of the explanatory variables and in the size of the coefficients for Intermediate OLS and Final GMM estimation. The OLS estimation reports more significant variables than GMM estimation, however this occurs probably due to the fact that in OLS Intermediate Estimation we have 29 observations while in GMM Final there are only 25.

Since, the outcomes of the GMM Final estimation presented in table 4 seem to be the most reliable, we base our economic reasoning on the results obtained from this estimation and compare them to those from simple OLS estimation. This analysis is presented in the first part of this section.

Nevertheless, it is worth noting that after excluding from the sample the lagged dependent variable and estimating the model using simple OLS on the whole sample (OLS Intermediate Estimation) the estimation results seems to be very interesting. They show a strong nonlinear pattern of the influence of fiscal variables on national savings and are more non-Keynesian than those obtained from GMM estimation. Therefore they are discussed further in this section after the main analysis.

- **Interpretation of the results of the Final Estimation in GMM and OLS**

This analysis is done mostly on the basis of outcomes of GMM estimation on the restricted sample, (see. column “GMM Final Estimation” in table 4). The results are compared with the outcomes of OLS estimation also conducted on the restricted sample (see column “OLS Final Estimation” in table 4).

In GMM estimation the savings rate lagged by one period was statistically insignificant at the level of 10%. Therefore, it was excluded from the model. Through this we were able to estimate model also using simple OLS.

The estimation of the parameter for the variable denoting the output gap is positive (1.367) and statistically different from zero at 1% level, which is in line with the results obtained by Giavazzi et al. (2000). If we look at the quantitative interpretation of this parameter, it means that the increase of the output gap by 1 percentage point increases the national savings rate by 1.367 percentage point. This is consistent with the theory, namely that during the temporal increase in production, private savings tend to increase, whereas the public deficit tends to decrease, which as a result increases national savings. However, the coefficient is considerably smaller than that obtained by Giavazzi et al. (2000) for panel data. The interest rate has a negative influence on national savings. The coefficient for this variable is negative (-0.567) and statistically significant at the 1% level, which means that the increase of the interest rate by one percentage point decreases national savings by 0.567 percentage point. This is in line with intuition and with the results from previous research by Giavazzi et al.

According to our results, taxes have a positive impact on national savings. The coefficient for taxes has a positive sign (0.389) and is statistically different from zero at the 1% level. So the influence of taxes on national savings takes a Keynesian sign during normal times. It means that increase of one percentage point of taxes to GDP ratio increases the national saving rate by 0.389 percentage point. However, the positive impact of taxes was augmented during large fiscal contractions. Namely, the coefficient for taxes interacted with the dummy variable expressing large fiscal contractions is positive (0.409) and statistically different from zero at the 5% level. Hence, the positive impact of taxes during large fiscal contractions was twice as large as during normal times ($0.389 + 0.409 = 0.798$). So the impact becomes more Keynesian. However, we observe a non-linear influence of taxes on national savings rate during large fiscal contractions, that can be explained by the Blanchard model. If the fiscal contraction is conducted by an increase in taxes above the level causing a permanent distortion in economy, we observe a permanent decline in production. As a consequence, the perceived stream of lifetime income obtained by households deteriorates dramatically. Therefore they lower their current consumption substantially and increase private savings, increasing national savings significantly.

The coefficient for government expenditures is statistically insignificant at the 10% level. Therefore, we can conclude that in normal times government expenditures have no impact on the total savings rate in the economy, which is in line with infinite

horizon of households' models. However, these results can be also explained by modified Keynesian models such as the Mankiw-Summers model or modified Keynesian models extended with a wealth effect. In particular, the increase in government expenditures decreases the budget surplus, which in turn increases the interest rate and we observe an increase in the effect of crowding out of private consumption by the interest rate. This leads to a decrease in private consumption and a decrease of private savings. If the increase of private savings equals the decrease in government expenditures, then national savings remain unchanged. This can also be explained by the portfolio crowding out effect in the Silber model. Here, the acceleration in the increase of public debt due to the rise in government spending, increases the level of the households wealth, which according to the Silber model increases the demand for money and increases the interest rate. As a result we observe an increase in the portfolio crowding out effect of private consumption which causes a consumption decline. Hence, private savings grow and if this growth equals the decrease in government spending, the national savings rate remains unchanged. Therefore, the lack of an impact of the increase in government expenditures on the national savings rate will be true, if the demand for money is weak and if private consumption is strongly sensitive to changes in the interest rate.

Similar to taxes, in the case of government expenditures, one can observe a nonlinear impact on the national savings rate. The coefficient for the variable expressing the changes in expenditures during the large fiscal contractions is negative (-0.440) and statistically significant at the 5% level. This result is confirmed by both GMM and OLS estimation. So the neutrality of the expenditures during normal times becomes a negative influence during large fiscal contractions, so it takes the Keynesian sign. This change can be explained on the basis of the Ramsey-Cass-Koopmans model. The households treat a large decline in government expenditures as permanent, and therefore increase their consumption, which leads to a decrease in private savings and in turn a drop in the national savings rate. This pattern is also in line with the modified Blanchard model. Namely, during large fiscal contractions due to a cut in government spending, there is – in the households' assessment – a decrease in the probability of an increase of taxes to the level which exceed the level that would cause a permanent decline in production. Therefore, their lifetime stream of income increases and they increase their consumption, which lowers private savings and in turn reduces the national savings rate.

What is very interesting is that a high public debt level, exceeding 100% of GDP, has an impact on the influence of expenditures on the national savings rate. The coefficient for expenditures interacted with the dummy variable expressing high public debt is positive in GMM (0.097) and in OLS (0.080) estimations and statistically significant at the 1% level. It means that when the public debt is high the neutral influence of government spending increase on national savings becomes positive. These results support non-Keynesian models, which treat a high public debt as a source of nonlinear behaviour of the private consumption, and as a consequence national savings due to changes in fiscal variables (for example, the Blanchard model).

A high public debt influences households' expectations of their lifetime stream of income. The increase in government spending causes an increase in households' assessment of the necessity of conducting the consolidation of public finances through an increase in taxes. Therefore, their perceived lifetime stream of income is reduced, which causes a drop in their current consumption. The decline in private consumption causes the increase in private savings and as a result causes national savings to grow.

Overall, the model based on the restricted sample provided moderate evidence of the existence of non-Keynesian effects of fiscal policy. What is worth emphasizing is that the influence of fiscal variables was strongly nonlinear. It took a slightly different pattern for taxes and for government spending. The reaction of taxes was more Keynesian. A large fiscal contraction seems to increase the Keynesian influence of fiscal variables on consumption. The large public debt changes the influence of government spending on national savings to non-Keynesian, however, it does not have an impact on the influence of taxes.

- **Interpretation of the results of the Intermediate Estimation in OLS**

As was mentioned at the beginning of this section it is worth paying more attention to the results obtained on the unrestricted sample (29 observations) even though it was estimated using simple OLS method. (see column: "OLS Intermediate Estimation" in table 4). Surprisingly model exhibits the strong nonlinear pattern of the response of the national savings to changes of fiscal variables. All of the variables in this estimation are significant at the 1% level.

In normal times the influence of tax increase on national savings is positive (1.981) while the government spending impact is negative (-1.488). This supports the Keynesian theory and is in line with the results obtained by Giavazzi et al in their papers.

The large fiscal expansions do not change the influence of fiscal policy, whereas large fiscal contractions do. The coefficient of the fiscal variables interacted with the dummy variables expressing large fiscal contractions equals respectively 0.597 for taxes and -0.660 for government expenditures. It suggests that during strong fiscal tightening the positive impact in the case of taxes and the negative impact in the case of government expenditures were intensified. The positive tax influence was strengthened by about 30% ($1.981 + 0.597 = 2.578$). Similarly, the negative influence of government spending was enhanced by about 45% ($-1.488 - 0.660 = -2.148$). These results stand in contrast to those obtained by Giavazzi et al. These authors in their panel estimation reported that large fiscal impulses (both contractions and expansions) reduce the Keynesian effects of fiscal variables. Whereas our results imply that these Keynesian effects are rather intensified in the case of large fiscal tightening and stay the same during large fiscal expansions.

In our OLS results public debt seems to play a central role in the occurrence of non-Keynesian effects of fiscal policy. The coefficients of fiscal variables interacted with the dummy variable expressing large public debt equals respectively -1.634 for taxes and 1.630 for government spending. If we look at the quantitative interpretation we clearly see that in periods of large public debt, the positive influence of taxes on national savings is considerably reduced, by almost 75% ($1.981 - 1.634 = 0.347$). An even more non-Keynesian pattern is reported in the case of government expenditures, where the negative influence (-1.488) in normal times is turned to a positive influence ($-1.488 + 1.630 = 0.142$) in periods of large public debt. These findings constitute strong support for the non-Keynesian model of fiscal policy based on the quality of public finances. It is worth noting that in the series of papers by Giavazzi et al., the evidence supporting the role of the conditions of the state budget in the non-Keynesian response of private consumption were not found.

To sum up, the analysis of the empirical material proved that in the case of Italy the influence of fiscal variables on the national savings shows a strong nonlinear pattern. The pattern of the influence of taxes seems to be more Keynesian than the

pattern referring to government expenditures, although the reported non-linearity does not take the fully non-Keynesian shape. What is worth emphasizing is the occurrence of non-Keynesian effects of fiscal policy for which the size of the fiscal impulse does not play a role. These effects were not observed during large fiscal contractions as predicted by theory. Conversely we find strong evidence that during large fiscal contractions the positive influence of taxes on national savings is enhanced. A similar pattern was reported in the case of government spending. However, the obtained results support the non-Keynesian theory that the bad quality of public finances may under certain circumstances reverse the standard (Keynesian) influence of a fiscal impulse on private consumption. We reported that in times when the public debt was considerably high the negative or neutral influence of government expenditures on national savings was reduced. One estimation results find this effect especially strong (negative influence of government spending was reversed to positive), with a similar phenomenon reported in the case of taxes as well.

The results prove that the consumption channel indeed plays a role in the transmission of non-Keynesian effects of fiscal policy or expressing it in a broader sense it plays a role in transmitting the nonlinearity of the influence of fiscal policy on an economy.

3.5 Diagnostic Tests

In this section we present the analysis of the diagnostic tests for GMM and for OLS estimations. We provide the brief characteristic of the tests and then their results.

3.5.1 Diagnostics of the instruments and regressors in GMM estimations

- **The J-statistic test of validity of instruments**

In our paper we estimated three models to show the changes in the model after excluding from the group of explanatory variables the variables which were statistically insignificant. However, this approach required specifying three slightly different sets of instruments. We have checked if the instruments were appropriate using the J-statistic test. We multiplied the J-statistic obtained from EViews by the number of observations and compared the obtained value with critical values of $\chi^2_{0.95}$ from the chi squared distribution. The J-statistic and corresponding $\chi^2_{0.95}$ are

presented in table 7. As we can see the J-statistic in each case is smaller than the critical $\chi^2_{0.95}$ so there is no reason to reject the null hypothesis that the instruments are proper. Therefore we can conclude that the instruments are proper. Although the Cragg-Donald statistics is not valid in the GMM estimations we used this test to compare the sets of instrumental variables.

Table 7

The J-statistics and corresponding critical values from chi squared distribution

H₀: The instruments are proper			
	Initial Estimation	Intermediate Estimation	Final Estimation
J-statistic ¹	0.005	2.38	6.5
Chi ² _{0.95}	3.84146	9.48773	7.81473

¹The value of J-statistic obtained by multiplying the value of J-statistic from EViews by the number of observations.

Source: Own elaboration.

- **The Eichenbaum, Hansen and Singleton test for orthogonality of instruments**

One of the central assumptions in the instrumental variables estimation is that the instruments are orthogonal to the function of the parameters of the model. To check the orthogonality assumption of the instruments we conducted the Eichenbaum, Hansen and Singleton (EHS) test. The EHS test tests subsets of Δk orthogonality conditions. The null hypothesis is that the $k-p$ overidentifying restrictions on the moment condition are valid. We conducted the EHS test for all instruments in our model, and in all cases the p-value was greater than 0.05, which leads us to not reject the null hypothesis and conclude that the instruments are valid. The outcomes of the EHS test are presented in Table 8.

Table 8

The outcomes of the Eichenbaum, Hansen and Singleton test for orthogonality of the instruments

H₀: The k-p overidentifying restrictions									
	Difference in J-stats								
	Initial Estimation			Intermediate Estimation			Final Estimation		
Instrument	Value	df	Prob.	Value	df	Prob.	Value	df	Prob.
Output gap(-2)	0.00022	1	0.988	0.00052	1	0.9818	0.03259	1	0.8567
Output gap(-3)	0.00022	1	0.988	0.00682	1	0.9342	0.00516	1	0.9428
Tax(-2)	0.00022	1	0.988	0.01795	1	0.8934	0.02658	1	0.8705
Tax(-3)	0.00022	1	0.988	0.05677	1	0.8117	-----	--	-----
Tax(-4)	0.00022	1	0.988	0.04018	1	0.8411	-----	--	-----
Tax(-5)	0.00022	1	0.988	0.05690	1	0.8129	-----	--	-----
Interest rate	0.00022	1	0.988	0.04274	1	0.8362	0.02135	1	0.8838
Expenditures(-2)	0.00022	1	0.988	0.06533	1	0.7983	0.05366	1	0.8168
Expenditures(-3)	0.00022	1	0.988	0.00357	1	0.9523	0.26296	1	0.6081
Expenditures(-4)	0.00022	1	0.988	0.00594	1	0.9385	0.12892	1	0.7209
Savings(-2)	-----	--	-----	0.02980	1	0.8629	-----	--	-----
Savings(-3)	0.00022	1	0.988	-----	--	-----	0.04060	1	0.8403
constant	0.00022	1	0.988	0.10818	1	0.7422	0.00101	1	0.9747

Source: Own elaboration.

- **Durbin-Hausman-Wu test for endogeneity of the regressors**

To check if we have a problem of endogeneity in our model we conducted the Durbin-Hausman-Wu test. The outcomes of the Durbin-Hausman-Wu test suggest that all explanatory variables are exogenous at the 5% confidence level. In the Initial Estimation the p-values for all explanatory variables are larger than 0.05, which leads us to maintain the null hypothesis that they are not endogenous in the model. The outcomes of the Durbin-Hausman-Wu test are presented in Table 9. In the Intermediate and Final Estimations for some of the explanatory variables we observe endogeneity. Namely, in the case of Intermediate Estimation the variable referring to the expenditures during large fiscal contractions is endogenous (the p-value =0.03<0.05). In the case of Final Estimation the variable referring to expenditures when public debt is high is found to be endogenous if we assume a 10% confidence

level ($p\text{-value} = 0.067 < 0.1$). However, these variables are not used as instruments in the estimation, therefore they do not violate the GMM assumption that the regressors used as instrumental variables cannot be endogenous.

Table 9

The outcomes of Durbin-Hausman-Wu test for endogeneity of the variables

Variable	Probability from Durbin-Hausman-Wu test H_0 : The variable is exogenous		
	The p-values		
	Initial Estimation	Intermediate Estimation	Final Estimation
Lagged savings	0.9611	---	---
Output gap	0.5665	0.4986	0.3627
Interest rate	0.6197	0.1897	0.1047
Taxes (T/Y)	0.6977	0.6758	0.2159
--Large fiscal expansions	0.8195	---	---
--Large fiscal contractions	0.4602	0.0407	0.410
--Large public debt	0.3468	0.1181	---
Expenditures (G/Y)	0.919	0.7986	---
--Large fiscal expansions	0.8246	---	---
--Large fiscal contractions	0.3854	0.0321	0.365
--Large public debt	0.3017	0.0888	0.0679

Source: Own elaboration.

3.5.2 The diagnostic tests of OLS estimations

To check if our OLS estimations satisfy the standard assumptions of Classic Linear Regression Model (CLRM) we conducted the diagnostic tests which are described below.

- **Ramsey RESET test for appropriate functional form**

One of the central assumptions used in OLS estimation is that the model has a linear form. To check if our model has appropriate functional form we conducted Regression Specification Error Test (RESET) (Mycielski, 2010). This is a general test which apart from checking for proper functional form also tests for potential specification errors which may arise from omitted variable problem or simultaneity. The null hypothesis is that the model has a proper (linear) functional form. Table 10 provides the outcomes of the tests. Since p-values are greater than 0.05 then we

may conclude that our model does not exhibit specification errors and its functional form is proper.

Table 10
Ramsey RESET test for appropriate functional form

H₀= The functional form of the model is proper				
Estimation	Test statistic	Value	df	Probability
Intermediate Estimation OLS	t-statistic	0.325722	20	0.7480
	F-statistic	0.106095	(1, 20)	0.7480
	Likelihood ratio	0.153431	1	0.6953
Final Estimation OLS	t-statistic	0.795639	18	0.4366
	F-statistic	0.633041	(1, 18)	0.4366
	Likelihood ratio	0.864116	1	0.3526

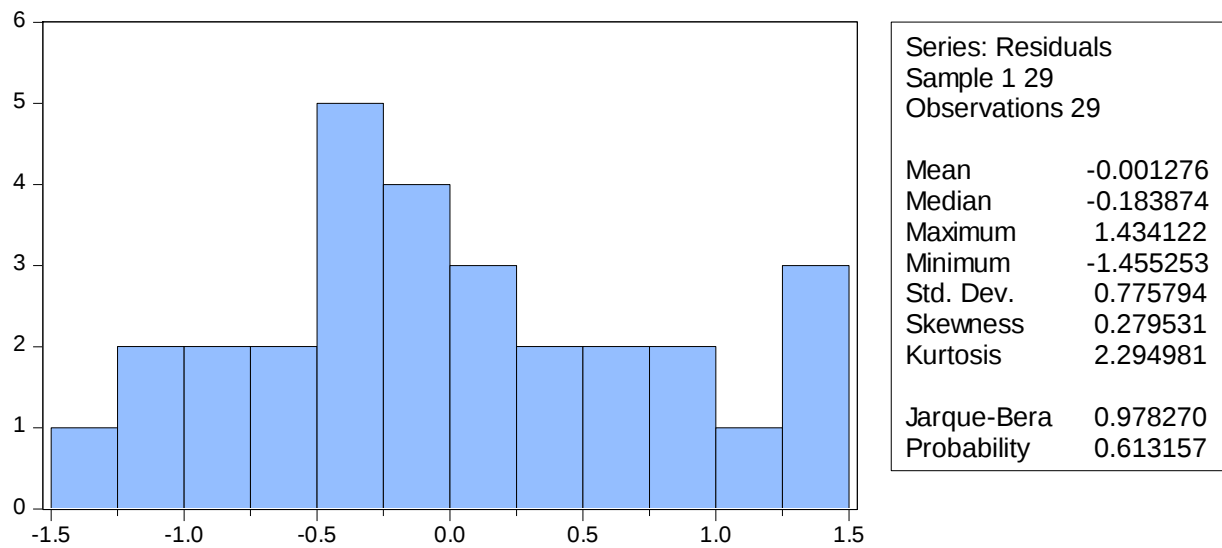
Source: Own elaboration.

- **Jarque-Bera test for normal distribution of the residuals**

The normality distribution of the residuals is the next assumption of the Classical Model of Linear Regression to be tested. This assumption is essential to be able to conduct statistical reasoning on the basis of standard test statistics. If the assumption is violated then the distribution of the test statistic is different to those normally used. This assumption is of less importance in large samples, but is crucial in small samples (Mycielski, 2010). Exhibits 1 and 2 provide a visual representation of the distribution of the residuals from OLS estimation and the outcomes of the Jarque-Bera test for the normality of residuals distribution. The null hypothesis in this test is that the residuals have a normal distribution. Since in our model p-values in both estimations are larger than 0.05 we may conclude that in our model the assumption of normal distribution of residuals is satisfied.

Exhibit 1

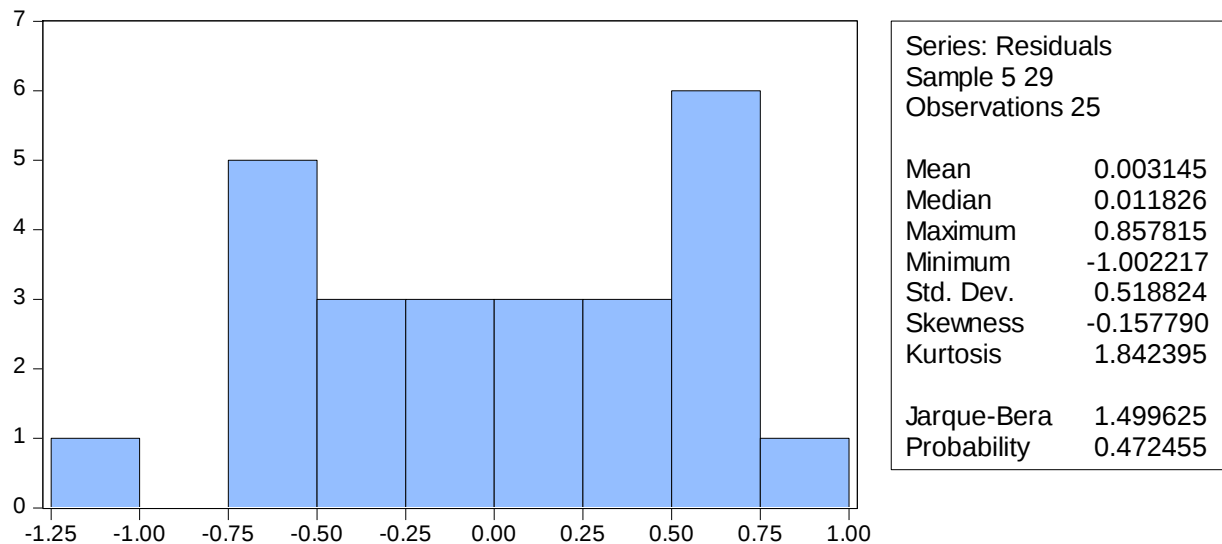
The outcome of Jarque-Bera test and The residuals distribution from OLS Intermediate Estimation



Source: Own elaboration.

Exhibit 2

The outcome of Jarque-Bera test and The residuals distribution from OLS Final Estimation



Source: Own elaboration.

- **Tests for heteroscedasticity and autocorrelation**

The next assumption of the CLRM tested is that of the variance of the error term. The assumption of homoscedasticity says that the variance of the error term is constant, whereas the assumption of no-autocorrelation states that the error terms are not correlated. If one of these assumptions is violated then we conclude that the error term in our model is non-spherical, which has serious implication for the reliability of the model. It causes the estimation of the variance covariance matrix to be biased, which implies that standard errors and in consequence inference are biased as well. Similar to a violation of the assumption of a normal distribution of the error term, this situation does not let us conduct reliable statistical reasoning. To examine the two assumptions in our model we conducted the Breusch-Pagan test for heteroscedasticity and the Breusch-Godfrey test for autocorrelation. In the former test, the null hypothesis is that variance of error terms in the model is constant over time, while in the latter the null hypothesis stance for lack of autocorrelation respectively of order 1, 2 and 3 among error terms. The outcomes of the mentioned tests are presented in table 11. Since the all p-values are greater than 0.05 we may conclude that in our model we do not have problem of heteroscedasticity and autocorrelation of error terms.

Table 11

The outcomes of Breusch-Pagan test for heteroscedasticity and Breusch-Godfrey test for serial correlations

	H₀: The variance of error terms in the mode is constant over time	H₀: Lack of autocorrelation		
Test Estimation	Breusch-Pagan Test Prob>chi²	Breusch-Godfrey Test Prob>chi²		
		Autocorrelation		
		1st order	2nd order	3rd order
Intermediate Estimation	0.5958	0.3127	0.6008	0.5958
Final Estimation	0.8463	0.6541	0.6906	0.4901

Source: Own elaboration.

CONCLUSIONS

The aim of this research was to conduct a theoretical and empirical analysis of the short run effects of fiscal policy. As is well known, the effectiveness of fiscal policy in stimulating the economic situation depends on the impact that the changes in taxes and government spending have on aggregate demand. As shown in the analysis of the empirical data using the example of Italy, the influence of fiscal variables on the extent of households' demand shows that there exist certain structural breakdowns. The factors indicated by the non-Keynesian models, such as high public debt and the strength of fiscal impulse, have a significant influence on the observed non-linearity. However, the change in the influence of both taxes and expenditures on the total savings rate during the occurrence of these factors not always occurred in the way that the models predict. As we reported the high public debt seems to indeed cause the reduction of the size of Keynesian multipliers. However, our findings suggest also that the size of fiscal impulse is the source of nonlinear influence of fiscal variables on national savings but only in the case of fiscal tightening. However, large fiscal contraction tends to rather strengthen the Keynesian influence of fiscal variables on economy than alleviating it, what stance in contradiction to non-Keynesian models. Thus we may conclude that the occurrence of non-Keynesian effects of fiscal policy cannot always be caused by the changes in private consumption. However, bearing in mind that the conducted research has a fragmentary character and has not analyzed in detail the influence of the changes of the fiscal variables on aggregate demand, the conclusions coming from the research should be treated with a degree of caution.

At the same time, it should be noted that the results of the research challenge the Keynesian theory, and in particular it should be mentioned that the unreliability of the expected influence of fiscal variables on private demand has not only concerned the periods of potential breakdowns, but has also been ambiguous in normal times. The impact of public spending on national savings did not have a Keynesian sign. Hence, maintaining a constant unbalanced fiscal situation to stimulate the economy may appear to be untrustworthy. This constitutes an unambiguous argument advocating limitations on expansionary fiscal policy. At the same time, the equivocal influence of fiscal variables on aggregate demand in normal times and the diagnosed breakdown of this influence may serve as valuable hints for policy makers how and in

what times conduct consolidation of public finances to minimize the costs of drop in the production.

As was mentioned earlier, the research has not analyzed the complex influence of the fiscal variables on aggregate demand. That is why it seems to be important to define the direction of subsequent research which should be conducted in order to better understand the nature of the non-Keynesian reaction of the product to fiscal impulses. Namely, the analysis should be extended by checking the influence of fiscal policy on investment. Also it may be the supply side of the economy that is the key issue when accounting for non-Keynesian effects, as it is assumed by some non-Keynesian models, hence research on this subject is also crucial.

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APPENDIX 1: Zusammenfassung

Trotz der Tatsache, dass es ein klassisches Thema in der Wirtschaftstheorie ist, gibt es immer noch keine Einigung über die Auswirkungen von Veränderungen in den finanzpolitischen Variablen auf die gesamtwirtschaftliche Nachfrage. Obwohl die Keynesianische Theorie weit verbreitet ist, gibt es zunehmend Hinweise darauf, dass der Einfluss der Fiskalpolitik auf die Wirtschaft nicht linear ist und anders, was standardkeynesianische Theorie vorschlagen würde, sogar in kurzer Frist. In dieser Arbeit führen wir eine breite theoretische und empirische Literaturübersicht über die Auswirkungen der Fiskalpolitik auf die Gesamtnachfrage. Wir wenden GMM und OLS Schätzungen an, um die Rolle des Konsumkanals bei der Übertragung der nicht-keynesianischen Effekte der Fiskalpolitik in Italien zu untersuchen. Die Ergebnisse bestätigen einen nichtlinearen Einfluss der finanzpolitischen Variablen auf den Verbrauch. In normalen Zeiten die keynesianischen Effekte dominieren und werden sogar verstärkt, wenn erhebliche finanzpolitische Kontraktionen in Betracht genommen werden. Allerdings finden wir Hinweise darauf, dass die Qualität der öffentlichen Finanzen zur nicht-keynesianischen Reaktion des privaten Konsums beiträgt. In Zeiten der hohen Staatsverschuldung wurde der keynesianische Einfluss der finanzpolitischen Variablen reduziert.

APPENDIX 2: Abstract

Despite the fact that it is a classic issue in economic theory, there is still no agreement on the impact of changes in fiscal variables on aggregate demand. Although Keynesian theory is prevalent there is growing evidence suggesting that the influence of fiscal policy on an economy is non-linear and different to what standard Keynesian theory would suggest even in the short run. In this thesis we conduct a broad theoretical and empirical literature survey on the impact of fiscal policy on aggregate demand. We apply GMM and OLS estimations to investigate the role of the consumption channel in the transmission of non-Keynesian effects of fiscal policy in Italy. The results confirm a non-linear influence of fiscal variables on consumption. In normal times the Keynesian effects dominate and are even strengthened when sizable fiscal contractions are considered. However, we find evidence that the quality of public finance contributes to the non-Keynesian response of private consumption. In periods of large public debt the Keynesian influence of fiscal variables was reduced.

APPENDIX 3: Curriculum Vitae

Adam Olszewski

Education

Master's Studies

- 10.2012-06.2013** **University of Vienna**
Department of Economics
Full time Master's Studies in Economics, studies in English
- 09.2011-12.2011** **Institute of Management Technology (IMT) Ghaziabad, Delhi, India**
Major: Finance and Management
(Students Exchange from University of Warsaw)
- 10.2011-06.2013** **University of Warsaw**
Faculty of Economic Sciences
Full time Master's Studies in International Economics, studies in English
- 10.2011-06.2014** **Warsaw School of Economics**
Full time Master's Studies in Finance and Accounting

Bachelor Studies

- 2009-2014** **University of Warsaw**
Faculty of Journalism and Political Sciences
Institute of International Relations
Full time first cycle programme in International Relations
- 2008-2011** **University of Warsaw**
Faculty of Economic Sciences, Faculty of Management
Interdisciplinary Economic-Management Studies
Full time first cycle programme

High School

- 2005-2008** II C. K. Norwid High School in Ostrołęka, Poland

Publications

- 08.2011** **One chapter: *Rola sieci osobistych powiązań i procesu uczenia się przedsiębiorcy w rozwoju małych firm*** (English: *The Role of Entrepreneur's Personal Networks of Relationships and the Learning Process in the Small Business Development*), **in the book: *Młodzi Przedsiębiorcy*** (English: *Young Entrepreneurs*), Faculty of Management of University of Warsaw Publishing House edited by Prof. Beata Glinka, Ph.D. Prof. Jacek Pasieczny, Ph.D and Agnieszka Brzozowska, MSc.

Achievements

23.02-24.03.2013	Scholarship holder of Energy Academy organized by Lesław A. Paga Foundation 2065
2012-2013	Scholarship of the Austrian Agency of International Cooperation in Education and Research for studies at the University of Vienna
2012-2013 &2011-2012	Scholarship of the Rector of the University of Warsaw for the best students
04.2012	3 rd place in national competition "Get a job", organized by SKN INWESTOR from University of Łódź and X-Trade Brokers Brokerage House S.A.(Competition on the knowledge of capital and financial markets)
2011-2012	Scholarship of the Minister of Science and Higher Education for outstanding academic achievements
07.2011	Bachelor Thesis defended at the Faculty of Economic Sciences of the University of Warsaw, grade 5. Diploma with honours (Summa Cum Laude)
07.2011	Bachelor Thesis defended at the Faculty of Management of the University of Warsaw, grade 5. Diploma with honours (Summa Cum Laude)
05.2011	The winner of the competition "Wachta UW" for outstanding academic performance at the University of Warsaw
2010-2011 &2009-2010	Scholarship for academic performance at the University of Warsaw

Work experience

07.2013 - 10.2013	PricewaterhouseCoopers, Poland Business Advisory-Consulting Department, Internship
1-22.10. 2010	State Budget Department in the Polish Ministry of Finance Internship

Languages

Polish - native
English - fluent

Skills

Computer skills - MS Office (Word, Excel, Power Point),
Econometric packages Stata and EViews

Interests

Fiscal policy, public sector economics, investment banking,
energy market, capital market, corporate finance, nonmaterial
conditions of companies development