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TAX STRUCTURE AND ECONOMIC GROWTH: EMPIRICAL EVIDENCE FROM BULGARIA

The study analyses the tax structure of Bulgaria and its relation to economic growth for the period 2003 – 2015. The results reveal that Bulgarian budget revenue mainly depends on the taxes charged on consumption. It was found that in times of economic growth tax and non-tax revenues form the necessary fiscal resources in the budget while during a crisis the revenues are insufficient, which in turn leads to the formation of a budget deficit and a subsequent increase in government debt. There are statistical arguments in support of the notion that budget revenues are inversely related to economic growth and create conditions for its reduction. Government spending has a direct proportional relation to growth and results in its increase. The econometric estimates and the interpretation of the results are calculated with the use of a multiple linear regression with an included dummy variable (OLS with a dummy variable), the Two-Stage Least Squares method (TSLS) and the Vector Autoregressive model (VAR models).

JEL: H24; H25; H63

Keywords: direct taxes; indirect taxes; government spending; government debt; economic growth

The discussion on the topic of budget revenues from the different types of taxes and government spending are periodically covered during the formation of tax policy. In economic theory, there is much theoretical and empirical evidence explaining the relation between tax structure and growth. Many economists have presented their conclusions in regard to what the optimal approach should be when choosing between consumer and income taxes. Barro (1990) believes that taxation is essential for economic development. According to him, taxes on income and capital have a distorting effect on revenues and lead to a slowdown in economic growth. On the other hand, he states that taxing consumption does not have such an effect. Stiglitz (1994) believes that contemporary taxes are distortionary, regardless of whether they are charged on labour or consumption. Despite the existence of substantial arguments, there is no empirical evidence that budget revenues may depend only on distorting or non-distorting taxes. Sheshinski (1970) suggests that if the income is subjected to a linear tax the budget revenues increase. On the other hand, the theory of Mirrlees (1971) proves that the optimum income tax rate is close to the imposition of progressive taxes and establishes a more efficient economy. For example, Hall and Rabushka (1995) found that it is possible to generate higher revenue in the budget, if the high progressive rates charged on the income and the capital are abolished and only consumption is taxed with a single tax rate of 19%. According to Myles (2007), the different types of taxes are of particular importance for the economy. Their impact on the growth of investment,

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saving, consumption and the education level is important for growth. Hall and Jorgenson (1967) argue that lowering direct taxes increases the amount of investments in the short term. A study by Xing (2011) found that more and more countries are reforming their tax system by restructuring their government revenue from income taxes to consumption taxes.

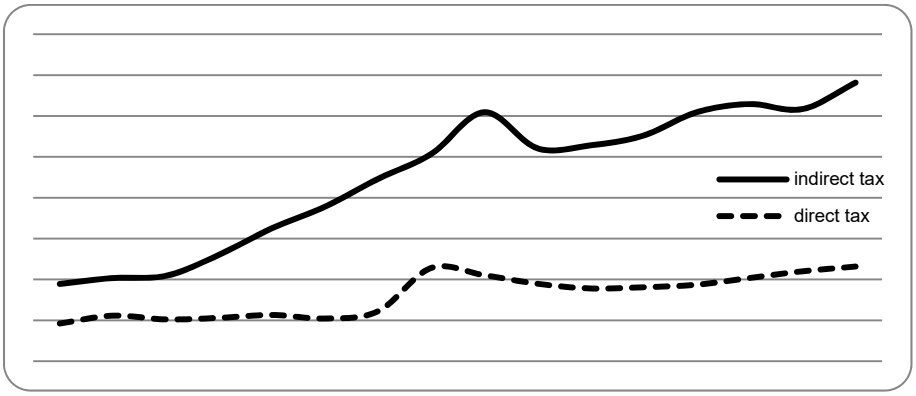
The main conclusion is that taxes on income and consumption have a distorting impact on revenue and growth. Therefore, they affect the different solutions that have to do with savings, investment, consumption and preference for work.

The tax structure of a particular country is comprised of many different taxes, including a value added tax (VAT), excise duties, taxes on income, capital, dividends and many others. The main aim of the tax structure is to maximize revenue in the budget in a way that minimizes distortions caused by taxation and does not interfere with growth. In many Eastern European countries, including Bulgaria, the revenues from indirect taxes in the budget are more prevalent than those from direct taxes. According to Naydenov (2018) the tax revenue must comply with certain rules as part of budgetary policy.

The tax structure of Bulgaria (see the Figure) is formed in such a way that the budget revenues are largely dependent on the consumption taxes.

Figure

The ratio of revenues from direct and indirect taxes in the Bulgarian budget (in million BGN)



Source: Eurostat.

The study analyses the tax revenue of Bulgaria over the span of two sub-periods: during growth and during a crisis. Observations of monthly time series of data in the following sequence are used:

- 72 observations are made (during growth) for period I (31.01.2003 – 31.12.2008);
- 82 observations are made (during the crisis and the post-crisis recovery period after 2014) for period II (31.01.2009 – 30.10.2015).

The analysed variables are: *the aggregate tax revenue, the share of revenue from VAT, the excise duties, the labour, the capital and the dividends*. The parameters in the regression equation are calculated and interpreted using the least squares OLS method with a dummy variable.

The relationship between the dynamics of public debt, tax and non-tax revenues as factors determining public spending are analysed using monthly time series data for the period 31.01.2010 – 31.10.2015 with the inclusion of 70 observations. The parameters in the regression equation are calculated and interpreted using a vector auto regression (VAR models).

The TSLS method with an instrumental variable is used to study the influence of the tax structure and the relation to the economic growth of Bulgaria for the period 2003 – 2015, with the inclusion of 154 observations.

A review of the literature

Tanchev and Yakova (2018) analysed the tax systems of Bulgaria, Greece, Hungary, Spain, Portugal, Germany, France, Belgium, the Netherlands and Austria in terms of them having either a consumption-based or a hybrid tax system for the period 2003-2014. The results show that during a period of economic growth the taxes form the necessary fiscal revenue in the budget. However, during a period of crisis the revenue is insufficient and a budget deficit is observed in both tax systems.

In an empirical research by Marsden (1983), the tax rates in 21 countries for the period 1970-1979 were analysed. It was found that there is a statistically significant negative relation between taxes and growth. The author made the assumption that if taxes as a proportion of the GDP increase by 1%, the economic growth decreases by 0.36%. It was confirmed that in countries with lower taxes the rates of savings, investment and innovation increase. Therefore, higher income leads to a stimulation of aggregate demand and economic growth. Countries with higher tax rates have lower economic growth than countries with lower tax rates.

Koester and Kormendi (1989) explored the taxes in 63 countries and prove that there is a statistical negative link between marginal tax rates as part of the GDP and economic growth.

Poterba Rotemberg and Sammers (1986) analysed the economic impact of the reduced rates of direct taxes and the transition to higher taxes imposed on the consumption in the economies of Britain and the United States. The study covers the periods 1948-1983 for the UK and 1948-1984 for the US. The analysis found that higher rates of indirect taxes increased commodity prices and led to lower industrial production. A growth in wages could be observed after taxation with lower direct taxes in the short term, however no significant economic impact on the growth could be observed in the long term.

Madsen and Damania (1986) studied the development of the economies caused by the reduction in direct taxes and the increase of indirect taxes in the Organisation for Economic Co-operation and Development (OECD) countries over the period 1960 – 1990. They empirically confirmed that budget revenues do not

increase when they are largely dependent on consumption. However, a negative effect on economic growth could be observed in the long term.

An empirical study by Blanchard and Perroty (1999) confirmed that the increase in government spending from rising taxes has a strong negative effect on investment spending. On the other hand, the increased levels of government spending lead to a positive effect on production and growth, but raising the taxes leads to a negative effect and lowers the production and growth.

Gordon and Lee (2005) proved that there is a negative correlation between corporate tax and growth. They examined the tax structure in 70 countries for the period 1970-1997 and confirmed that if the corporate tax falls by 10%, the growth on average will rise by 1.1% per year.

Taha and Loganathan (2008) empirically established that a causal link between tax revenues and public expenditure could be observed in Malaysia over the period 1970-2006. They confirmed the existence of a directly proportional relation between revenues from direct and indirect taxes and government spending, but they did not establish a correlation between tax revenues and public spending. They argued that lowering the proportion of direct and indirect taxes as a share of the GDP forms a decline in government spending and leads to a fall in economic growth in the future.

A study by Christie and Rioja (2012) on the countries of Latin America for the period 1990-2008 confirmed that government spending for public investments creates conditions for an increase in economic growth. The study shows that if the tax rates are raised, the state public investments also increase. There is a positive link between public investment and growth in the long term.

Yakova (2018) reached some interesting conclusions when studying the types of tax systems in the EU. The results show that, for the countries with a consumer tax system, the redistribution over the budget is lower than in those with income and hybrid systems. It has been empirically proven that countries with income and hybrid tax systems register higher economic growth, while in countries with consumer tax system the economic growth is lower.

Ilaboya (2012) made an analysis of the annual data for the economy of Nigeria for the period 1980-2011. She empirically confirmed that indirect taxes have a negative impact on consumption and government revenue. There is an inversely proportional relationship between indirect taxes and economic growth.

Macek (2014) examined the impact of taxes on economic growth in the OECD countries. His empirical analysis showed that government spending reduces the amount of economic growth. The result appeared to be at odds with the theory, however he attributed them to the so-called “Social State” where the unproductive expenditure prevails. There is an inversely proportional relationship between direct income taxes and economic growth. He confirmed that taxation affects the labour market, the accumulation of capital and the direct foreign investment and he reached the conclusion that economic growth can be stimulated if some measures are taken to lower direct taxes and to increase consumption taxes.

Yakova (2018) analysed Bulgaria's tax system and the link between the consumer tax system and economic growth. The survey covers the time period 1999-2015. The results show that the increase in economic growth has seen a decline in the revenue from the basic direct tax, namely the income tax. It can be argued that the per capita growth per unit of GDP would lead to an increase in the VAT revenue. Consequently, if the economy grows, this also results in an increase in VAT revenues and revenue from duties. These are expected results for a country which is reliant on consumption taxes.

In another study of hers, Yakova (2017) applied the least squares method in order to analyse the budget revenues of Bulgaria, Denmark and France and their link to economic growth. The findings show that Bulgaria's tax system is not efficient and forms budget deficits compared to the tax systems in Denmark and France.

Methodology and empirical results

Studies using monthly or quarterly data often encounter the so-called "seasonal fluctuations". The removal of the trend and the smoothening of the series have been done with the so-called *Seasonal adjustment (Census X12).*

The stationarity in the time series of the variables is based on the extended test by Dickey and Fuller with a presumed level of probability of error set at 5% (Augmented Dickey–Fuller Test). For the period 2003 – 2015, a unit root is registered in the variables of the dividends generated from income, duties, corporate tax and income tax (see Appendix 1). For the period 2010 – 2015, a unit root is not registered (see Appendix 2).

The presence of a cointegration relation establishes a long-term or equilibrium ratio between two variables. Johansen's cointegration test (1991) was applied only for those variables (see Appendix 3) which are non-stationary and integrated into the same series.

Correlations (see Appendix 4) are the foundation of the multi co-linear processes. According to Ramanathan (1995), the presence of multi co-linear processes lowers the reliability of the calculation procedure and has no significant impact on the results of the study. The strongest correlation was registered between the share of VAT revenues and tax revenues. The correlation between tax revenues and revenues from excise, corporate tax and customs duties was registered as relatively high. The lowest correlation ratio and the slightest relation were registered for the revenue from taxation.

Analysis of the revenues from direct and indirect taxes in the consolidated state budget of Bulgaria for the period 31.01.2003-31.10.2015

After the discontinuation of the trend and the integration of the variable from the first series, a multifactor linear regression with a dummy variable is implemented for calculating the coefficients and the interpretation of the results. The linear regression is recorded in the following standard form:

(1) $Y_t = C + X_{it} + EXPT(0,0/1,0) + \varepsilon_t$, where:

Y_t is the share of tax revenue in the budget of Bulgaria;

X_{it} is the share of revenues from direct and indirect taxes (VAT, excises, duties, labour, capital, dividends);

EXPT (0,0/0,1) is the included dummy variable with a value of (1) during the growth period (2003-2008) and a value of (0) during the crisis and post crisis period (2009-2015);

ε_t is the vector of residues.

Table 1 shows the results during the period of growth, and Table 2 shows the results during the period of crisis.

Table 1

Dependent variable: tax revenue

Variable	Coefficient	Std. Error	t-Statistic	Probability of error
Constant	7.541520	1.983010	3.803067	0.0002
VAT	0.473995	0.024352	19.46407	0.0000
Excises	0.269774	0.026772	6.341445	0.0000
Duty	0.030558	0.011942	2.558815	0.0115
Corporate tax	0.084330	0.011579	7.282990	0.0000
Income tax	0.077057	0.024917	3.092515	0.0024
Dividends	0.012505	0.005053	2.474795	0.0145
EXPT=1	0.973708	0.315396	3.087254	0.0024

R-squared	0.944073	Mean dependent var	53.45410
Adjusted R-squared	0.941392	S.D. dependent var	5.131261
S.E. of regression	1.242232	Akaike info criterion	3.322247
Sum squared resid	225.2985	Schwarz criterion	3.480011
Log likelihood	-247.8130	Hannan-Quinn criter.	3.386330
F-statistic	352.0805	Durbin-Watson stat	2.005666
Prob(F-statistic)	0.000000		

Source: Own calculations based on data published by the Ministry of Finance of the Republic of Bulgaria

During a period of growth (see Table 1), the taxes imposed upon consumption are able to generate the required tax revenue. There is a directly proportional relationship between the EXPT (1) with a coefficient of (0.973708) and the constant C (tax revenue) with a coefficient of (7.541520). It should be noted that the EXPT (1) results in an increase of the constant (C) and it gives us reason to believe that the planned budget revenues are achievable. However, this may be valid under two conditions: if the consumer demand for goods and services remains the same or grows, and if the amount of indirect taxes does not change, i.e. the tax system is not distorted. It is confirmed once again that the most important taxes for the state budget revenues are the indirect taxes, which are expressed through their coefficients:

the VAT (0.473995), the excise (0.269774), the labour tax (0.077057), the capital tax (0.084330), and the duties (0.030558).

These results clearly outline the consumer tax system in Bulgaria as well. Assuming that the taxes imposed on consumption are non-distorting, it can be stated that during growth, ceteris paribus, and in this structure of the tax system, the planned tax revenues in the budget are achievable. Therefore, out of all tax revenues, 47% are formed from the VAT while around 27 % come from excise duties. It is believed that, during growth, society is more inclined to reach higher rates of consumption, and thus, domestic demand is stimulated and higher revenue is formed.

Table 2

Dependent variable: tax revenue

Variable	Coefficient	Std. Error	t-Statistic	Probability of error
Constant	8.515228	2.102557	4.049939	0.0001
VAT	0.473995	0.024352	19.46407	0.0000
Excises	0.269774	0.026772	6.341445	0.0000
Duty	0.030558	0.011942	2.558815	0.0115
Corporate tax	0.084330	0.011579	7.282990	0.0000
Income tax	0.077057	0.024917	3.092515	0.0024
Dividends	0.012505	0.005053	2.474795	0.0145
EXPT=0	-0.973708	0.315396	-3.087254	0.0024

R-squared	0.944073	Mean dependent var	53.45410
Adjusted R-squared	0.941392	S.D. dependent var	5.131261
S.E. of regression	1.242232	Akaike info criterion	3.322247
Sum squared resid	225.2985	Schwarz criterion	3.480011
Log likelihood	-247.8130	Hannan-Quinn criter.	3.386330
F-statistic	352.0805	Durbin-Watson stat	2.005666
Prob(F-statistic)	0.000000		

Source: Own calculations based on data published by the Ministry of Finance of the Republic of Bulgaria.

During a crisis (see Table 2) the opposite results can be observed. The revenues from direct and indirect taxes in the budget are shrinking. This is confirmed by the negative value of the EXPT (0) and its coefficient (-0.973708) against the constant C (tax revenues) with a coefficient of (8.515228). A minus sign in front of the EXPT (0) generally leads to a decrease in the revenue side of the budget. Therefore, relying exclusively on non-distorting taxes imposed upon consumption is not the best possible choice.

As tax revenues in the budget in times of crisis are insufficient, it is necessary to analyse the importance of budget non-tax revenues and debt, as determinants of public spending.

In public finance, the econometric analysis of the links between public expenditure, tax non-tax revenues and debt is likely to be based on the use of

Granger's causality links, as well as on vector autoregressive models (VAR models) which are types of equilibrium models.

Using Granger causalities suggests that the reason precedes the result. The null hypothesis rejects the existence of causation, and the alternative one finds the opposite. The calculations (see Appendix 5) are considered reliable at the level of probability of error of 5%. The results show that, in the short and long term, the use of debt during crisis and post-crisis recovery determines the dynamics of public spending. In turn, government spending in the short term affects the dynamics of tax revenues, while in the long-term the dependence diverts and the tax revenues determine the dynamics of public spending. In the short-term, government spending defines the dynamics of non-tax revenues while in the long term no statistically significant relationship between these variables is established.

The application of autoregressive vector analysis is designed to detect long-term relations, allowing the movement of the analysed variables to the state of balance. It is assumed that on the one hand taxation in the economic system disturbs the balance, but on the other hand, government spending restores it. The use of vector autoregressive models (VAR models) can be used in the analysis of public finances.

VAR is suitable as variables are not divided into endogenous and exogenous as in the Structural Econometrics (Equation 1), but are instead considered in a complete system. In the VAR model each variable is represented as a linear function of its past values and the past values of the remaining variables, which are characterized with specific conduct, such as a constant and a time trend.

Besides assessing the dependence of the variables, the Autoregression models allow for the calculation of the so-called impulse responses and variance decomposition. The impulse response establishes how a variable changes over time under the influence of other variables and the variance decomposition gives information on what share of changes in one variable is caused by the impact of its own lag meanings. Impulse responses show (see Appendix 7) that the change in government spending, due to the dynamics of tax revenues is a trend that changes from positive to negative, but in the long term tends to remain close to zero (i.e. there is equilibrium). The correlation between government spending and tax revenues shows that trends change from positive to negative and do not tend to reach zero. Between the government spending and the government debt there is a trend from negative to positive with a declining function close to zero.

Variance decomposition (see Appendix 8) also gives interesting results – almost 50% of the fluctuations in government spending can be explained by the impact of tax and non-tax revenues and debt. The remainder to 100% is due to the very meaning of government spending.

For the calculation of the parameters, the VAR model has the following standard form:

(2) $$y_t = A_1 y_{t-1} + \ldots + A_p y_{y-p} + Bx_t + \varepsilon_t$$, where:

y_t is the vector of internal model variables (government spending for the period 31.01.2010 – 31.10.2015);

x_t is the vector of external model variables (tax and non-tax revenue and debt for the period 31.01.2010 – 31.10.2015);

$A_1 \ldots A_p$ and B are the matrixes of the calculated coefficients;

ε_t is the vector of the residuals.

The results of the VAR models (see Appendix 6) show that in times of crisis where the consumption taxes prevail, government spending (see equation 1) shrinks in the short term. The result is established between the constant of government spending at a moment in time *(t)* with a coefficient of (22.64915) and the temporal trend in the presence of lag *(t-1)* with a coefficient of (-2.324954). The reason for this dynamic is in the inverse correlation between the ratio of government spending (22.64915) at the moment in time *(t)* and the tax revenues in the presence of lag *(t-1)* with a coefficient of (-2.370835). The negative coefficient of tax revenues leads to a decrease in government spending (see equation 1 in Appendix 6). In the long term, a direct proportional relationship is formed between government spending at a moment in time *(t)* and the lagged value of the variable at a moment in time *(t-2)* with a coefficient of (2.015151). The tax revenues in the presence of lag *(t-2)* with a registered direct proportional relationship with a coefficient of (2.142544) compared to the dynamics of government spending are important. The positive relationship is a result of the compensational effect of government debt (increase aimed at stimulating consumer demand, which in turn leads to higher revenues in the budget). A direct proportional relationship is established between government spending at a moment in time *(t)* and the dynamics of public debt in the presence of lag *(t-1)* or lag *(t-2)* with the coefficients (0.391044) and (0.263071), respectively. In the long term, a positively influence over spending is caused by the tax revenues and debt. As a result of lower tax revenues, a contraction of government spending in the short term is established. In the long term, the tax revenues form the necessary fiscal resources and determine the dynamics of public spending. In terms of the consumer tax system, the debt also has a positive impact on government spending in the short and long term. [1]

The dynamics of government spending (see equation 2 in Appendix 6) in the presence of lag *(t-1)* registers a negative coefficient of (-3.198169) compared to the constant of tax revenues and its coefficient of (25.53083). An inverse correlation evidences that government spending has a pre-emptive effect on the growth rate of tax revenues and there is evidence of a budget deficit. In terms of consumer tax system, tax revenues are shrinking in the short term. This is confirmed by the values of tax revenues in the presence of lag *(t-1)* with a coefficient of (-3.291634) compared

[1] The implied conclusion is that when compensating the revenues after the crisis in Bulgaria, it is possible to continue with deficit spending and an increase in the rate of the government's debt.

to the constant and its coefficient of (25.53083). In the long term, a direct proportional relation is established in the presence of lag *(t-2)* with a coefficient of (2.350396). It should be indicated that in the long term, tax revenues increase, while in the short term the government debt is in a directly proportional dependency with tax revenues. This is established by the positive sign in the presence of lag *(t-1)* with a coefficient of (0.455130) compared to the tax revenues at a given moment in time *(t).* In the long term, the correlation is inversely proportional and in the presence of lag *(t-2)* the coefficient too is negative (-0.322872).[2]

In the regression equation of non-tax revenues (see equation 3, Appendix 6) it is found that during a crisis, in the short term, and in the presence of lag *(t-1)* a positive coefficient of (1.171785) can be seen, as compared to the constant and its coefficient of (31.62696). During a crisis, tax revenues are able to rise in the short term, while in the long run no statistically significant relationship is registered. The dynamics of government spending in the presence of lag *(t-1)* has a negative value of (-2.919305) compared to the constant of non-tax revenues. Under these circumstances, it must be pointed out that government spending here (as well as in cases when tax revenues are concerned) has a pre-emptive effect. The dynamics of public debt, in the short term and in the presence of lag *(t-1)* registers an inverse correlation with a coefficient of (-0.455130) and the constant of the non-tax revenues. In the long term, the relationship is directly proportional to the coefficient of (0.410177) in the presence of lag (t-2).

Government spending (see equation 4, Appendix 8) establishes an inverse correlation in the presence of lag *(t-1)* with a coefficient of (-3.587901) and a directly proportional correlation in the presence of lag *(t-2)* with a coefficient of (4.442662) compared to constant debt and its coefficient of (21.53821). Therefore, a period of time (two lags) in needed, over which the debt will become part of the expenditure policy. From the perspective of economic efficiency, it is found that tax revenues register negative rates in the presence of lag *(t-1)* with a coefficient of (-2.533113) and in the presence of lag *(t-2) with a* coefficient of (-2.966687). This result indicates that for a unit of formed tax revenues, about 3% are spent for the repayment of debt.

In these circumstances, it is essential to analyse the correlation (see Table 3) between budget revenues, expenditure and economic growth. The calculations are based on a two-stage linear regression. The dynamics of economic growth, represented as GDP growth, are displayed as a dependent variable while the budget revenues and expenditure, presented as shares of the GDP, are displayed as independent variables. The instrumental variables are lagged values in the period *t-1* of budget revenue and expenditure and the government debt. The regression equation is represented by the following standard form:

$$(3) \qquad log\ GDP = C + \log Rev + logExp + \varepsilon$$

[2] Therefore, if the tax revenues increase, the debt should decrease, and vice-versa – if the tax revenues decrease, the debt should increase.

For the instrumental variables:

$C = logDebt - 1\ logRev - 1\ logExp - 1$, where:

GDP is the rate of growth of GDP for the period 31.01.2003-30.10.2015;

Rev – the rate of growth of budget revenues for the period 31.01.2003-30.10.2015;

Exp – the rate of growth of government expenditure for the period 31.01.2003-30.10.2015;

$\mathcal{E}$ – the vector of the residuals.

Table 3

Dependent variable: economic growth

Instrumental list: log (debt-1) log (rev-1) log (exp-1)

Variable	Coefficient	Std. Error	t-Statistic	Probability
Constant	6.100500	0.829059	7.358346	0.0000
Log(REV)	-0.353536	0.204967	-2.407883	0.0199
Log(EXP)	0.108401	0.145947	3.942742	0.0412

R-squared	0.307734	Mean dependent var	4.715776
Adjusted R-squared	0.271315	S.D. dependent var	0.109305
S.E. of regression	0.105335	Sum squared resid	0.543681
F-statistic	2.953406	Durbin-Watson stat	0.100674
Prob(F-statistic)	0.061512	Second-Stage SSR	0.543787
J-statistic	0.000000	Instrument rank	3

Source: Own calculations based on data published by the Ministry of Finance of the Republic of Bulgaria

The results (see Table 3) show consequential trends. The coefficient of the budget revenues is negative (-0.353536) compared to the dynamics of the economic growth (6.100500). There is an inverse correlation, wherein the government revenue leads to a decrease in growth. The taxation and redistribution formed in the budget is approximately 35% as a share of the GDP. The aggregate taxation in Bulgaria is characterized by low dimensions, which means it is below the average level. Government spending records a positive coefficient value of (0.108401) compared to the dynamics of the economic growth. From the established direct proportional relationship it can be stated that 10% of the economic growth is explained by the dynamics of public spending.

Conclusion

On the basis of the econometric models proposed above, the following conclusions can be drawn:

During a period of growth, using the accepted structure of taxation which relies heavily on consumption taxes, it is found that tax revenues are able to form the necessary fiscal resources in the budget.

During a period of crisis, the rates of revenues in the budget are lower. Government spending has a pre-emptive effect on the rate of growth of tax revenues and therefore evidence is found of a budget deficit. In the long term, during the period of post-crisis recovery, tax revenues form the necessary fiscal resources and have a positive impact on the dynamics of public spending.

During a period of crisis, the tax revenues are able to rise in the short term. Despite the increase, the government spending registers a pre-emptive effect.

It should be noted that the formation of budget revenues mainly from indirect taxes in the conditions of an economic cycle is not the best choice. This condition results in a decline in revenues and there is an increase in government debt. As a result, the consumption decreases and so does the budget revenue. During a period of economic growth, the result is the opposite.

The results show that during a crisis the debt is part of the state expenditure policy. From the perspective of economic efficiency, it is found that tax revenues register a negative relationship with debt. Therefore, for each unit of formed tax revenues, about 3% are spent for the repayment of debt. The revenue recovery requires a period of time and this in turn results in higher government debt.

The dynamics of the budget revenues lead to a decrease of economic growth. The redistribution from the budget is about 35% form GDP. Government spending records a positive correlation with the growth and creates the conditions for its promotion. There is a direct proportional relationship, where 10% of the growth is explained by the role of government spending.

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Appendices

Appendix 1

Unit Root Test (2003-2015)

Test critical values: 5% level	Augmented Dickey-Fuller test statistic	t-Statistic	Prob.*
VAT_SA	-3.247172	-2.880463	0.0192
Excise _SA	-6.097113	-2.880336	0.0000
IT_SA	-3.625730	-2.880463	0.0063
CT_SA	-1.627208	-2.881978	0.4661
D(CT_SA)	-4.521084	-2.881978	0.0003
Duties_SA	-2.803963	-2.880336	0.0600
Duties (M_SA)	-14.87107	-2.880463	0.0000
DIV_SA	-1.489216	-2.881978	0.5363
D(DIV_SA)	-3.284063	-2.881978	0.0175
GR_SA	-2.466406	-2.880463	0.1258
D(GR)_SA	-20.47691	-2.880463	0.0000

Appendix 2

Unit Root Test (2010-2015)

Test critical values: 5% level	Augmented Dickey-Fuller test statistic	t-Statistic	Prob.*
GS_SA	-7.534569	-2.911730	0.0000
TR_SA	-9.921467	-2.911730	0.0000
NTR_SA	-4.265129	-2.904198	0.0011
GD_SA	-5.150997	-2.904198	0.0001

Appendix 3

Johansen's Cointegration Test (2003-2015)

Series: GR DIV

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.065744	13.72134	15.49471	0.0909
At most 1 *	0.023797	3.588621	3.841466	0.0495

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.065744	10.13272	14.26460	0.2034
At most 1 *	0.023797	3.588621	3.841466	0.0495

Johansen's Cointegration Test

Series: GR CT

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.065744	13.72134	15.49471	0.0909
At most 1 *	0.023797	3.588621	3.841466	0.0499

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.065744	10.13272	14.26460	0.2034
At most 1 *	0.023797	3.588621	3.841466	0.0499

Johansen's Cointegration Test

Series: GR M

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.051889	11.86009	15.49471	0.1638
At most 1 *	0.025971	3.920760	3.841466	0.0477

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.051889	7.939335	14.26460	0.3849
At most 1 *	0.025971	3.920760	3.841466	0.0477

Appendix 4

Correlations (2003-2015)

	GR	VAT	AK	M	CT	IT	DIV
GR	1.000000						
VAT	0.898783	1.000000					
Excise	0.532690	0.468086	1.000000				
Duties	0.599547	0.653913	0.221381	1.000000			
CT	0.440612	0.151424	0.103660	0.088627	1.000000		
IT	0.309840	0.137707	-0.270167	0.088250	0.450291	1.000000	
DIV	0.469269	0.437600	0.215975	0.068583	-0.045374	0.380232	1.000000

Appendix 5

Granger Causality Tests

Null Hypothesis:	Lags	Obs.	F-Statistic	Prob.
GD does not Granger Cause GS	2	68	15.1834	4.E-06
GS does not Granger Cause GD			0.53706	0.5871
GD does not Granger Cause GS	4	66	5.48159	0.0008
GS does not Granger Cause GD			0.58839	0.6724
GD does not Granger Cause GS	6	64	3.80412	0.0033
GS does not Granger Cause GD			0.61338	0.7185
TR does not Granger Cause GS	2	68	1.33236	0.2750
GS does not Granger Cause TR			12.8136	2.E-05
TR does not Granger Cause GS	4	66	2.45789	0.0636
GS does not Granger Cause TR			5.25790	0.0011
TR does not Granger Cause GS	6	64	3.10788	0.0113
GS does not Granger Cause TR			1.04984	0.3957
NTR does not Granger Cause GS	2	68	1.62521	0.1759
GS does not Granger Cause NTR			9.20082	0.0003
NTR does not Granger Cause GS	4	66	1.82062	0.1298
GS does not Granger Cause NTR			0.96401	0.4665
NTR does not Granger Cause GS	6	64	2.94337	0.0639
GS does not Granger Cause NTR			1.33236	0.2750

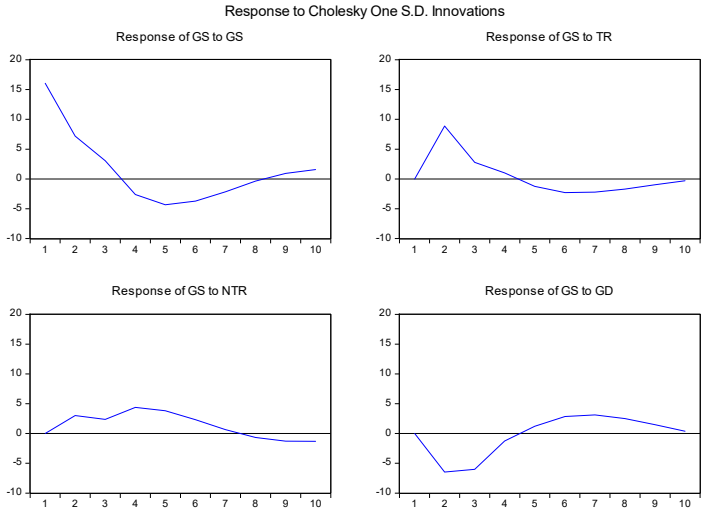
Appendix 6

Vector Autoregression Estimates
Sample (adjusted): (2010 - 2015)
Included observations: 68 after adjustments
Standard errors in ( ) & t-statistics in [ ]

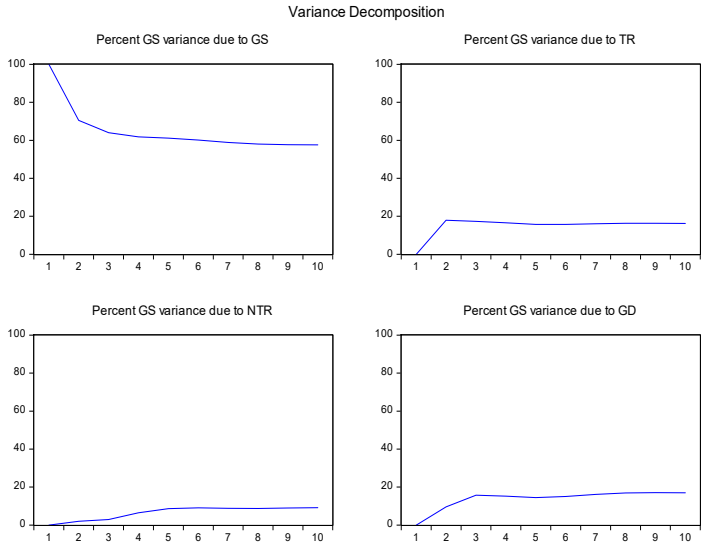
	GS	*TR*	*NTR*	*GD*
GS(-1)	-2.324954	-3.198169	-2.919305	-3.587901
	(1.00461)	(1.11347)	(1.12392)	(1.33271)
	[-2.31429]	[-2.87224]	[-2.59743]	[-2.69219]
GS(-2)	2.015151	1.955670	1.879107	4.442662
	(1.05253)	(1.16659)	(1.17754)	(1.39628)
	[2.01265]	[1.67639]	[1.59580]	[3.18177]
TR(-1)	-2.370835	- 3.291634	2.272719	- 2.533113
	(0.83654)	(0.92720)	(0.93589)	(1.10975)
	[-2.83409]	[-3.55010]	[2.42840]	[-2.28260]
TR(-2)	-2.142544	-2.350396	-2.196801	-2.966687
	(0.86167)	(0.95505)	(0.96401)	(1.14309)
	[2.48649]	[2.46102]	[-2.27882]	[-2.59532]
NTR(-1)	0.417880	0.373846	1.171785	0.534117
	(0.44625)	(0.49461)	(0.49925)	(0.59199)
	[0.93643]	[0.75584]	[2.34710]	[0.90224]
NTR(-2)	0.092383	0.282014	0.113752	-0.703667
	(0.44520)	(0.49345)	(0.49808)	(0.59060)
	[0.20751]	[0.57152]	[0.22838]	[-1.19143]
GD(-1)	0.391044	0.455130	-0.537368	0.592965
	(0.11883)	(0.13171)	(0.13294)	(0.15764)
	[3.29075]	[3.45558]	[-4.04206]	[3.76150]
GD(-2)	0.263071	-0.322872	0.410177	-0.063260
	(0.12171)	(0.13490)	(0.13617)	(0.16146)
	[2.16139]	[-2.39336]	[3.01227]	[-0.39179]
CONSTANT	22.64915	25.53083	31.62696	21.53821
	(6.38408)	(7.07590)	(7.14228)	(5.98540)
	[3.54775]	[3.60814]	[4.42813]	[3.34895]

R-squared	0.612878	0.652818	0.685966	0.352899
Adj. R-squared	0.560387	0.605743	0.643385	0.265156
Sum sq. resids	15184.06	18653.26	19004.83	26721.65
S.E. equation	16.04235	17.78080	17.94758	21.28167
F-statistic	11.67586	13.86748	16.10972	4.021977
Log likelihood	-280.3766	-287.3729	-288.0078	-299.5944
Akaike AIC	8.511077	8.716851	8.735523	9.076305
Schwarz SC	8.804835	9.010610	9.029282	9.370063
Mean dependent	47.19118	51.95588	62.01471	31.52941
S.D. dependent	24.19540	28.31794	30.05428	24.82608

Appendix 7



Appendix 8



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