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# CONSUMER TAX SYSTEM OF BULGARIA IN TERMS OF ECONOMIC GROWTH AND CRISIS

The tax revenue of the Republic of Bulgaria has been analyzed in terms of consumer tax system. Two sub-periods have been covered - at economic growth and at crisis. The results show that in the first case, the revenues from indirect and direct taxes form the necessary budget funds, as in the second case - they are insufficient. There are prerequisites for increasing the national debt as a result of lower tax revenues in terms of crisis.

JEL: H 24; H25; H63

The types of taxes and the derived tax system have always been at the center of discussions on the formation of the state economic politics. The modern distorting taxes (Stiglitz, 1996, p. 540) are designed to solve the uneasy task - to find an approach to generate fiscal revenue within the economic cycle. The economic theories so far do not give a definite answer what taxation is the best. Some rely on higher income taxes, while others give priority to consumption taxes. Looking at the ratio as a choice between direct and indirect taxes, many countries apply the income tax system (US, Japan, Denmark), others rely heavily on hybrid system (France, Germany), others adhere to the tax system of consumer type (Italy, Portugal, Greece). Tax system, formed entirely of consumer type, has been established in Bulgaria during the years of transition to a market economy. Presumably, the government relies mainly on taxing the consumption trough VAT, excise and customs duties. Considering that the world is in a period of global financial and economic crisis, relevance and specificity of the consumer tax system are very topical.

## Literature review

The state budget is a financial account that shows the revenues and expenditure of the state. Presumably, in terms of a balanced budget, we assume that the Aggregate Budget Spending ($GS$) and Aggregate Budget Revenue ($GR$) are equal.

(1) $GS = GR.$

In an open economy such equation is not always valid. In terms of cyclicity, in registered high economic growth, the Aggregate Budget Revenues are able to anticipate the pace of the general government spending, in which case there is a surplus

(2) $GS < GR.$

In terms of economic crisis, budget revenues may turn to be insufficient, in which case we register an inverse equation and there is a budget deficit.

(3) $GS > GR.$

Choosing an appropriate tax system in this case is extremely important. Under these terms, there are two options for the state. The first one is to cut costs because of lower tax revenues. The second is based on the so-called *broadly balanced budget* i.e. the economics balance can be preserved in exchange of deficit spending.

Therefore the Aggregate Budget Revenue ($GR$) is the product of tax revenues ($T$), quasi-tax revenue ($Q$) and non-tax revenues ($N$).

(4) $GR = T + Q + N.$

Major contributions in the field of indirect taxation have the research works of F. Ramsey (Ramsey, 1927). He assumes that if the flexibility of supply is infinite, goods with high price flexibility of demand should be subjected to lower taxes, and these with low price flexibility, to high taxes. Ramsey proves that to reduce the demand deformation in imposing of indirect taxes, the rates should be the inverse of the demand flexibility to price.

Auerbach has found that the taxing consumption is influenced by taxes on investments (Auerbach, 2006). First you need to tax what goes in the economy, i.e. income, capital and income from investments, which form the following equation:

(5) $C = W + R - I - G - X + M,$ wherein:

$C$ is consumption; $I$ - investments; $G$ - Government spending; $X$ - Export; $M$ - Import; $W$ - Income from wages; $R$- capital revenue of domestic investment.

Hence, consumption taxation allows taxation of net income from salary and that portion of the profit that is not invested. The logic here is that formal taxation of consumption depends on the paradox of savings accruing from work wages and profit on capital. It is believed that if investments are taxed, that shall result in higher future taxation of consumption. Presumably investments are nothing more than delayed form of consumption, and unless they are taxed, taxes on consumption are supposed to be lower. Main focus is the so-called *Decoupling of capital*. The conclusions suggest that indirect taxes should have lower rates than those on the income.

Regarding the revenue taxes, E. Sheshinski proves that charging linear (proportional) taxes meets the requirements for optimal income taxation (Sheshinski, 1972).

(6) $t(y) = -\alpha + (1 - \beta)y,$ wherein:

$\gamma$ is the revenue before taxation, $t(\gamma)$ - the sole linear taxation (negative budget revenues after transfers); $\alpha$ is single taxation and indicates the presence of negative taxes (so-called "lump-sum tax") to individuals with low incomes.[1] The connection $(1 - \beta)$ is the ultimate proportional rate to the presence of non-taxable minimum

[1] In Bulgaria income is subjected to a proportional income tax free of non-taxable minimum. All income regardless of their magnitude, tolerate even taxation by equal tax rate. Hence there is no negative lump-sum tax.

also called Benton's progression (considering that the collection is increased without affecting the social justice).

D. Mirrlees finds these views contradictory, as he states that higher wages need to be taxed by progressive income tax (Mirrlees, 1971, p. 208). With this kind of taxation we may accomplish optimality as income is transferred from high to low-income groups. It is also believed that progressive taxation has "automatic stabilizers", which ceteris paribus is convenient anti-crisis mechanism.

In taxation of capital we study the relationship between three major factors- the size of corporate taxation, attracting investment and growth. Fundamental here is the Jorgensen's principle, the so-called *user cost of capital* (Jorgensen, 1963). It proves that the value of capital depends on the tax rates, the prices, the magnitude of financing and depreciation, i.e. the profit- p which unit of invested capital must cover the costs is the equation of:

(7) $$p = \frac{q(1-tz)(r-\pi+\delta)}{(1-t)}$$, wherein:

$q$ is a capital good, expressed through its unit price; $t$ - tax rate; $z$ - current value of all future depreciation per unit of borrowed capital; $r$ - the cost of funding; $\pi$ - Inflation pace of Capital property; имущество; $\delta$ - Depreciation rate.

Jorgensen assumes that taxation lowers the minimum required efficiency. However, each unit invested capital should form additional profit margin in order to reach the necessary level of efficiency, expressed through the equation 1/(1- $t$). "On the other hand, if companies have the ability to deduct immediately all future effective depreciation payments out of the profit, therefore, if $z$ = 1, we can assume that the effective rate of taxation on the part of investment in fixed capital is zero" (Ganchev, 2010, p. 160). This argument offers suggestions for removing investments from the taxable profits (similar arguments, regarding taxation of consumption, are reviewed by Auerbach). Apparently, that theory takes into account only the taxation of investment activity. The main conclusion of Jorgensen formed principles of neutrality in the taxation of capital.[2] Sørensen, however, believes that regardless of these findings, there are objective grounds for applying progressive rates (Sørensen, 2006).

## Empirical research results

B. O'Connor explores the Irish tax system and fiscal revenues (O'Connor, 2013) and he published the results of simulation model. He found that if you increase the tax burden on consumption and lower income taxes, this will increase the budget revenues. As a result, the reform will ensure higher employment and lower unemployment in the country.

In the study of the countries from Latin America, G. Bacarreza, H. Vazquez and V. Vulovic analyze the influence of direct and indirect taxes and their relationship

[2] The proportional taxation of profits from the use of capital is preferred in most countries, as well as in Bulgaria, which is contrary to the presented theory.

to economic growth (Bacarreza, Vazquez and Vulovic, 2013). They apply vector autoregressive model (VAR) and generalized method of moments (GMM) in panel data for 19 countries, for the period 1990 – 2009, and they found that in all countries, the direct income taxes, have a positive influence on the collection and growth. For Argentina, Mexico and Chile the revenue generated from corporate taxation is unreliable fiscal factor. The negative trends are the result of a higher tax rates. The authors conclude that consumption taxation is the main source of fiscal revenue and economically growth in Latin America.

D. Stoilova and N. Patonov publish results of regression analysis of panel data for the Member States of the European Union (Stoilova & Patonov, 2013). They explore the impact of the structure of tax revenues on economic growth in the selected set of countries. Applying the Ordinary Least Squares Method, the authors came to the conclusion that the tax system, with predominant budget revenues accumulated through direct taxes, is more efficient and compatible with economic growth, than one based on revenues from consumption taxes.

K. Bhattarai explores empirically the relationship between collection and tax rates of direct and indirect taxes for the period 1991-2006, regarding the OECD countries with a linear regression (Bhattarai, 2010). He found out that countries with smaller rates of direct and indirect taxes form a high collection rate and faster growth. In countries with higher taxes on income and consumption an inverse relationship with the income is registered and economic growth is slowing. Bhattarai assumes that the negative effects of high taxes are often offset by positive effects from the provision of public benefits. Greater redistribution leads to the development of human capital and it increases the growth in the long term.

## Empirical analysis and survey results

The survey includes variables registered by shares: *tax revenues, government spending, debt, revenues from VAT, excise revenues, revenues from customs duties, income from employment, income from capital, income from dividends (these variables form the largest share the revenue side of the budget).* For calculating the parameters, we have used an econometric tool based on multi-factor linear regression known as ordinary least squares (OLS), and its subsequent modification - OLS method with included dummy variable. The study consists of two phases:

*The first phase* analyzes revenue at a time of economic growth and crisis, including observation in monthly time series of data as follows: for the period I (2003-2007) in economic growth for the period II (2008-2013) in economic crisis where monthly data for the 2003-2013 period is used, including 132 observations, respectively for period I – 60, for period II - 72. The set dummy variable takes the value of 1.0 in terms of economic growth and 0.0 in terms of economic crisis. The used variables are tax revenue and share of revenue from *VAT, excise duties, earnings, capital, dividends.*

The second phase of the study examines the relationship between the dynamics of public debt and the aggregate tax revenues as factors serving the

spending policy. Monthly time series of data for the period 2010-2013 are used. The number of registered observations is 48. The studies, which use monthly or quarterly data, often encounter the so-called seasonal fluctuations. In order to eliminate the trend and smooth the lines we apply *Seasonal adjustment (Census X12)*.

Analysis of the statistics with linear method requires the use of procedure for a unit root in the time series. The latter are stationary when the arithmetic mean, variance and auto co-variance of the submitted phenomena and processes are independent in time (Arkadiev, 2005) Hence, in order to be defined as stationary (stochastic process) a single $Y_t$ time series must have the following features (see Hendry, 1995):

(8) $E\,(Y_t) = \mu$

(9) $D\,(Y_t) = E\,(Y_t - \mu)^2 = \sigma^2$

(10) $cov\,(Y_t, Y_{t+k}) = E\,(Y_t - \mu)\,(Y_{t+k} - \mu) = \gamma_k$.

Equations (8) and (9) show that the arithmetic mean and variance should be constant in time, and equation (10) requires the covariance between two of the values of the variable to depend only on the time interval between them, not by their location in time. If these processes are met, the prerequisite for independence over time is met. This process is known as white noise (see Hendry, 1995).

The stationary check in time series of the variables is based on the Augmented Dickey-Fuller Test with preset level of probability of error of 5% (see Dickey, Fuller, 1979). This test is based on the assumption that the time-line is characterized as an autoregressive process of line $\rho$. The null hypothesis of the test establishes that the time line has a unit root or it is non-stationary, when $\delta = 0$, i.e. $H_0 : \delta = 0$ and the alternative hypothesis is $H_1 : \delta \leq 0$.

The Dickey-Fuller test results for the period 2003-2013 are presented in Appendix 1. Some variables of tax revenue, government spending, VAT, excise duties, labor, capital and dividends are tested and a unit root in variables of dividends, customs and tax revenues is established.

The variables of tax revenue, government spending and debt are tested for the above-mentioned period, which does not indicate the presence of a unit root in them (see Appendix 2).

It is a common occurrence for variables to register non-stationary processes. The presence of co-integrational relation establishes a long-term and a balanced relationship between two variables. Here, the Johansen co-integration test is applied only to those variables that are non-stationary and integrated of the same series (see Appendix 1). The test results are given in Appendix 3 and 4.

Appendix 5 presents the correlation coefficients of the separate pairs of variables included in the regression equation for the period 2003-2013. The correlation coefficients take values from $-1...+1$. The high values of the coefficients indicate the presence of this process, and a result with a null value indicates that there is no

such correlation between the studied variables. It is established that all coefficients of the variables have positive values. We have to note that this was expected due to the fact that tax revenues consist largely of the used tax shares. The strongest correlation occurs between the share of VAT revenues and the tax revenues. Relatively high is the correlation between tax revenues and revenue from excise duties, corporate tax and customs duties. The lowest correlation factor is registered at the income tax revenues.

The results for the period 2010-2013 (see Appendix 6) also show presence of correlations. There is a negative correlation between government spending and government debt correlation between aggregate tax revenue and government spending. This result is normal, since government spending, tax revenues and public debt are both sides of the budget. The correlations are the foundation of the multi co-linear processes. According to the literature the presence of these processes does not reduce the accuracy of the calculation procedure and thus does not impact seriously the survey results (see Ramanathan, 1995). Since there is evidence of these processes, we will refrain from a broader comment.

The results for the presence of heteroskedasticity are presented in Appendix 7 and 8, by applying the White Test. For both monitored periods we register the absence of this process (the balances do not affect the regression coefficients), which is a prerequisite for the use of a standard linear regression.

The reliability of the results and conclusions is controlled further by the complement and the specificity of other tests included in the analysis.

*Analysis of revenues from direct and indirect taxes within the state budget for the period 2003-2013*

After removing the single root and attaching the integration of variable of first series, a multi-factor linear regression is applied in the following standard form:

(11) $Y_t = C + X_{it} + \varepsilon_t$, wherein:

$Y_t$ is a share of tax revenues in the budget; $X_{it}$ - share of revenue from direct and indirect taxes (*VAT, excise duties, labor, capital and dividends*); $\varepsilon_t$ - vector of residues.

The calculations in the two sub-periods (in terms of growth and in crisis) are made with included dummy variable with the following standard form:

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

$Y_t$ is a share of tax revenue in the budget; $X_{it}$ - share of revenues from direct and indirect taxes (*VAT, excise duties, labor, capital and dividends*); $EXPT$ - included dummy variable; $\varepsilon_t$ - vector of residues.

Table 1 shows the used variables with their abbreviations included in the various modifications of the applied regression equations.

*Table 1*

| № | List of used observation | Variables |
|---|---|---|
| 1. | TR | Tax Revenue |
| 2. | VAT | Share of Revenue from VAT |
| 3. | DUTIES | Share of Revenue from Duties |
| 4. | EXCISES | Share of Revenue from Excises |
| 5. | INCOME TAX | Share of Revenue from Labor |
| 6. | CORPORATE TAX | Share of Revenue from Capital |
| 7. | DIVIDENDS | Share of Revenue from Dividends |
| 8. | $\varepsilon_t$ | Residues |

The analysis of the coefficients of direct and indirect taxes on the dynamics of tax revenues shows the presence of proportional and inverse relationships. In the regressive equation, the dependant variable is the dynamic of the tax revenues, and the independent one is the revenues from direct and indirect taxes. The linear regression is as follows:

$$(13)\quad y_t TR = c + \beta_1 VAT + \beta_2 EXCISES_t + \beta_3 DUTIES_t + \beta_4 CORPORATE\ TAX_t + \beta_5 INCOME\ TAX_t + \beta_6 DIVIDENTS_t + \varepsilon_t$$

The findings, regarding the results show that the variables, included in the model, largely explain the researched process, which can be establish trough the high results for $R^2$ (Table 2) - 97% of the factors (independent variables) explain the dynamics of the outcome (dependent variable) in the researched process.

*Table 2*

Dependent variable: tax revenues

| Variable | Coefficient | Std. Error | t-Statistic | Probability |
|---|---|---|---|---|
| Constant | 4.753572 | 1.520730 | 3.125849 | 0.0022 |
| VAT | 0.484664 | 0.018965 | 25.55507 | 0.0000 |
| Excises | 0.207900 | 0.021638 | 9.608055 | 0.0000 |
| Duties | 0.030831 | 0.008839 | 3.487858 | 0.0007 |
| Corporate Tax | 0.102206 | 0.010927 | 9.353283 | 0.0000 |
| Income Tax | 0.119502 | 0.021769 | 2.733296 | 0.0072 |
| Dividends | 0.022952 | 0.005023 | 4.569488 | 0.0000 |

| | | | |
|---|---|---|---|
| R-squared | 0.970277 | Mean dependent var | 53.55025 |
| Adjusted R-squared | 0.968850 | S.D. dependent var | 5.227492 |
| S.E. of regression | 0.922622 | Akaike info criterion | 2.728379 |
| Sum squared resid | 106.4040 | Schwarz criterion | 2.881254 |
| Log likelihood | -173.0730 | Hannan-Quinn criter. | 2.790500 |
| F-statistic | 680.0716 | Durbin-Watson stat | 1.601149 |
| Prob(F-statistic) | 0.000000 | | |

Based on the registered results, we can conclude that in terms of consumer tax system the taxes on consumption have the most impact on tax revenues in the budget. This determination is the result of the revenue dynamics from VAT with coefficient of 0.484664 on the dynamics of the tax revenue, with registered coefficient of 4.753572. There is a proportional relationship, indicating that VAT takes the first place in formation of the tax income in the budget of Bulgaria. High relationship rate is registered in the second most important coefficient - that of excise duty (0.207900). The relationship between the excise dynamic and the one of the tax revenue is again proportional. This leads to the conclusion that taxes, levying consumption, are most important in respect to the revenue in the budget. The coefficient of revenue from customs duties is 0.030831 and generates less than 1% of the aggregate revenues. Therefore, at a unit growth of tax income, 48% are generated by the revenue from VAT and 20% - by the excise duties.

The coefficients of the direct taxes also register statistically significant relations, but with significantly lower values. The revenues from levying the capitals are with a coefficient of 0.102206, and those of labor income are 0.119502. Dividends provide about 0.022952 in the budget. When other conditions are equal, at unit growth, the capital revenue forms about 10% and the labor revenue is nearly 12%. The revenues from the taxes on the dividends are characterized with a low collection rate - below 1%. As we distinguish the importance of the registered relations, it appears that the parameters of the estimated coefficients also shape the secondary place of direct taxes in the budget's revenue part.

The regression equation does not register negative relations, hence all revenues, included in the model, increase the constant $C$.

The reliability of results and adequacy of the applied linear method are checked by the Ramsey reset test. Higher value of $R^2$ means that the results are reliable and OLS is applicable. The null hypothesis $H_0$ confirms that the linear form of the relationship is correct, but alternative $H_1$ is incorrect (see Kabaivanov, 2014, p. 65), wherein:

(14) $$H_0 = \epsilon \sim N(0, \sigma^2 I)$$
$$H_1 = \epsilon \sim N(\mu, \sigma^2 I) \quad \mu \neq 0.$$

Here the results for $R^2$ establish higher parameters, in which null hypothesis may be considered (see Table 3). The consequent conclusions give general idea about the specifics of the studied tax revenues, but they do not answer the question how they react in conditions of economic crisis and growth.

A dummy variable is added to the registered equation, to determine the strength of the relations in times of economic growth and crisis. Value 1 is used to indicate economic growth for the period 2003-2007, and value 0 to indicate economic crisis for the period 2008-2013. The equation is the following:

(15) $$y_t TR = c + \beta_1 VAT + \beta_2 EXCISES_t + \beta_3 DUTIES_t + \beta_4 CORPORATE\ TAX_t + \beta_5 INCOME\ TAX_t + \beta_6 DIVIDENTS_t + EXPT1,0 + \varepsilon_t$$

*Table 3*

Dependent variable: tax revenues

| Variable | Coefficient | Std. Error | t-Statistic | Probability |
|---|---|---|---|---|
| Constant | -4.762504 | 5.910561 | -0.805762 | 0.4219 |
| VAT | 0.720668 | 0.142966 | 5.040826 | 0.0000 |
| Excises | 0.306814 | 0.063164 | 4.857402 | 0.0000 |
| Duties | 0.044381 | 0.011969 | 3.708051 | 0.0003 |
| Corporate Tax | 0.148147 | 0.029645 | 4.997388 | 0.0000 |
| Income Tax | 0.082454 | 0.025637 | 3.216255 | 0.0017 |
| Dividends | 0.038208 | 0.010431 | 3.662911 | 0.0004 |
| FITTED^2 | -0.004748 | 0.002851 | -1.665278 | 0.0984 |

| | | | |
|---|---|---|---|
| R-squared | 0.970927 | Mean dependent var | 53.55025 |
| Adjusted R-squared | 0.969285 | S.D. dependent var | 5.227492 |
| S.E. of regression | 0.916147 | Akaike info criterion | 2.721412 |
| Sum squared resid | 104.0764 | Schwarz criterion | 2.896128 |
| Log likelihood | -171.6132 | Hannan-Quinn criter. | 2.792409 |
| F-statistic | 591.5835 | Durbin-Watson stat | 1.515668 |
| Prob(F-statistic) | 0.000000 | | |

Table 4 reveals the results in terms of crisis, and Table 5 – in terms of economic growth.

*Table 4*

Dependent variable: tax revenues

| Variable | Coefficient | Std. Error | t-Statistic | Probability |
|---|---|---|---|---|
| Constant | 9.395383 | 1.843368 | 5.096858 | 0.0000 |
| VAT | 0.469645 | 0.018298 | 25.66655 | 0.0000 |
| Excises | 0.208543 | 0.020437 | 10.20431 | 0.0000 |
| Duties | 0.024152 | 0.008512 | 2.837279 | 0.0053 |
| Corporate Tax | 0.096708 | 0.010411 | 9.289398 | 0.0000 |
| Income Tax | 0.103568 | 0.020939 | 2.080684 | 0.0395 |
| Dividends | 0.000568 | 0.007318 | 0.077561 | 0.9383 |
| EXPT=0 | -1.487619 | 0.370319 | -4.017131 | 0.0001 |

| | | | |
|---|---|---|---|
| R-squared | 0.973699 | Mean dependent var | 53.55025 |
| Adjusted R-squared | 0.972215 | S.D. dependent var | 5.227492 |
| S.E. of regression | 0.871369 | Akaike info criterion | 2.621189 |
| Sum squared resid | 94.15114 | Schwarz criterion | 2.795904 |
| Log likelihood | -164.9984 | Hannan-Quinn criter. | 2.692185 |
| F-statistic | 655.8145 | Durbin-Watson stat | 1.575282 |
| Prob(F-statistic) | 0.000000 | | |

The results in Table 4 show that in terms of crisis, the revenues from the taxes analyzed in the budget, tend to decrease. This is confirmed by the negative sign of EXPT (0) and its coefficient (-1.487619). Comparing the result of EXPT (0) and this of the $C$ constant (tax revenues) with its coefficient (9.395383), we reach the conclusion that the tax system of consumer type, in terms of economic crisis, the revenues tend to decrease. Particularly important are the rates of VAT (0.469645) and excise duties (0.208543). The negative sign of EXPT (0) leads to a decline in incomes and other taxes. It was found that in respect of the tax on capital the coefficient is 0.096708, while tax on labor - 0.103568. It is seen that decreasing consumption leads to a drop in budget revenues from indirect taxes.

Revenues from customs duties have a statistically significant coefficient (0.024152). The registered negative sign of EXPT (0) is a reason to believe that in terms of economic crisis, the revenues from all types of taxes are decreasing. When comparing the results with those from Table 2, it can be concluded that the crisis reduces revenues and collectability. Therefore, to relying on taxes, levying the consumption, is not the best possible choice.

*Table 5*

Dependent variable: tax revenues

| Variable | Coefficient | Std. Error | t-Statistic | Probability |
|---|---|---|---|---|
| Constant | 7.907764 | 1.636866 | 4.831039 | 0.0000 |
| VAT | 0.208543 | 0.020437 | 10.20431 | 0.0000 |
| Excises | 0.469645 | 0.018298 | 25.66655 | 0.0000 |
| Duties | 0.024152 | 0.008512 | 2.837279 | 0.0053 |
| Corporate Tax | 0.096708 | 0.010411 | 9.289398 | 0.0000 |
| Income Tax | 0.103568 | 0.020939 | 2.080684 | 0.0395 |
| Dividends | 0.000568 | 0.007318 | 0.077561 | 0.9383 |
| EXPT=1 | 1.487619 | 0.370319 | 4.017131 | 0.0001 |

| | | | |
|---|---|---|---|
| R-squared | 0.973699 | Mean dependent var | 53.55025 |
| Adjusted R-squared | 0.972215 | S.D. dependent var | 5.227492 |
| S.E. of regression | 0.871369 | Akaike info criterion | 2.621189 |
| Sum squared resid | 94.15114 | Schwarz criterion | 2.795904 |
| Log likelihood | -164.9984 | Hannan-Quinn criter. | 2.692185 |
| F-statistic | 655.8145 | Durbin-Watson stat | 1.575282 |
| Prob(F-statistic) | 0.000000 | | |

In times of growth, taxes which levy the consumption, are able to generate the required tax revenue. The results of the Table 5 show that a directly proportional relationship is recorded between EXPT (1) and the $C$ constant. The coefficient of

EXPT (1) is 1.487619, while the tax revenue one is 7.907764. The positive sign of EXPT (1) increases the $C$ constant, and it is a reason to believe that the planned budget revenues are achievable. However, this is valid under two conditions: if the consumer demand for goods and services maintains the same or increases, or if the amount of indirect taxes changes, i.e. the tax system is not distorted. Taxes which have the greatest importance for the fiscal revenues in the state budget, expressed through their coefficients are VAT (0.469645), excise (0.208543), custom duties (0.024152), a tax on labor (0.103568) and tax on capital (0.096708).

During an economic crisis there are lower incomes and during economic growth we see the opposite trend. Therefore, ceteris paribus, the planned budgetary revenues are achievable. It is assumed that during economic growth people consume more, resulting in stimulating domestic markets and the accumulation of a higher revenue. This conclusion is confirmed by the coefficient of EXPT (1). In times of crisis, when confidence in the economy decreases, consumption decreases as well and people prefer to save their income. The decreased consumption leads to lower revenues from indirect taxes. If the conclusions of the representatives of the liberal economy, in respect to their opinion that consumption creates its own demand and the economy in times of crisis can be self adjusted, are true, a significant deviation from the equilibrium in the economy should not be observed.

Keynes believed the opposite to be true – the more people earn, the more they spend on goods, therefore “if they have less income, then they spend less" (Keynes, 1936). He assumes that during economic crisis the income decreased due to reduced consumption. In this sense Keynes states that when an entity, whatever it is, spend less money, it reflects negatively on all entities bound by it, because their incomes reduce. Each of these entities would start spending less due to decreased income and so the process continues indefinitely. Therefore, in recession the aggregate demand of economies falls. In other words, businesses and people tighten their belts and spend less money (paradox of thrift, also described by Keynes), and the revenues tend to decline.

Once indirect tax revenues are shrinking, the question whether it is necessary to rely heavily on taxes, levying consumption arises. This specific feature is the result of the downward trend in the amount of direct taxes and the share of the economy. The adoption of proportional income tax in 2008 in the so-called “pure form” is a motive, which should be considered, in respect to the lower revenues from indirect taxes. In this regard the efforts should be focused on increasing the size of direct taxes, taking into account their automatic stabilizers. Under these conditions, if you seek to achieve a balance between revenue and spending, in terms of crisis, when indirect taxes are prevailing, it is necessary to limit government spending or to boost demand through higher deficit spending and subsequent increase in Government Debt.

Therefore, we shall consider the question what is the relationship between the Aggregate Budget Revenues and government spending, presented as a share of GDP, in terms of growth and crisis. The variable of the Aggregate Budget Revenues

reflects all types of income included in the budget: tax, non-tax and quasi-tax revenue (Table 6).

*Table 6*

| | | |
|---|---|---|
| 1. | BR | Budget Revenue |
| 2. | GS | Government Spending as a share from GDP |
| 3. | EXPT 1 | Dummy variable in period of economic growth |
| 4. | EXPT 0 | Dummy variable in period of economic crisis |

The equation is as follows:

(16) $$y_t\text{GS} = c + \beta_1\text{BR} + EXPT1.0 + \varepsilon_t$$

The results are presented in Table 7.

*Table 7*

Dependent variable: government spending

| Variable | Coefficient | Std. Error | t-Statistic | Probability |
|---|---|---|---|---|
| Constant | 33.56504 | 5.148224 | 6.519732 | 0.0000 |
| BR | 0.232717 | 0.101612 | 2.290248 | 0.0236 |
| EXPT=1 | 2.336111 | 1.062720 | 2.198237 | 0.0297 |

| | | | |
|---|---|---|---|
| R-squared | 0.188859 | Mean dependent var | 47.08894 |
| Adjusted R-squared | 0.176283 | S.D. dependent var | 5.005254 |
| S.E. of regression | 4.542710 | Akaike info criterion | 5.887390 |
| Sum squared resid | 2662.072 | Schwarz criterion | 5.952908 |
| Log likelihood | -385.5677 | Hannan-Quinn criter. | 5.914013 |
| F-statistic | 15.01764 | Durbin-Watson stat | 0.363096 |
| Prob(F-statistic) | 0.000001 | | |

A positive result is registered in terms of economic growth between the dynamics of budget revenues and public expenditures. Consequently tax, non-tax and quasi-tax revenues are able to accumulate the necessary fiscal resources for the budget. That was illustrated by the positive sign of EXPT (1) with a coefficient of 2.336111. The presence of proportional relation between the $C$ constant and its coefficient 33.56504 shows that, in terms of growth, in consumer tax system, the budget revenues are achievable in respect to the provided spending.

The data in Table 8 revels that in terms of economic crisis the registered relations are inversely proportional. The Dummy variable EXPT (0) has a negative sign of its coefficient (-2.336111) compared to the $C$ constant and its coefficient

(35.90115). A budget deficit is formed under this condition. The dynamics of the Aggregate Budget Revenues implies contraction of government spending.

*Table 8*

Dependent variable: government spending

| Variable | Coefficient | Std. Error | t-Statistic | Probability |
|---|---|---|---|---|
| Constant | 35.90115 | 5.856026 | 6.130634 | 0.0000 |
| BR | 0.232717 | 0.101612 | 2.290248 | 0.0236 |
| EXPT=1 | -2.336111 | 1.062720 | -2.198237 | 0.0297 |

| | | | |
|---|---|---|---|
| R-squared | 0.188859 | Mean dependent var | 47.08894 |
| Adjusted R-squared | 0.176283 | S.D. dependent var | 5.005254 |
| S.E. of regression | 4.542710 | Akaike info criterion | 5.887390 |
| Sum squared resid | 2662.072 | Schwarz criterion | 5.952908 |
| Log likelihood | -385.5677 | Hannan-Quinn criter. | 5.914013 |
| F-statistic | 15.01764 | Durbin-Watson stat | 0.363096 |
| Prob(F-statistic) | 0.000001 | | |

Two possible outputs are formed by relying mainly to revenue on consumption during crisis: cutting government spending or financing the deficits by increasing Government Debt. According to Keynes in recession balance can be accomplished. The state must intervene at the cost of raising the debt, in order to stimulate the consumer demand. In cases of lower collection rates with prevailing consumption taxes, we can form the conclusion that requires a further study of the government debt as a determinant of government spending.

*Analysis of government revenues and debt on the dynamics of government spending during economic crisis for the period 2010-2013*

The results so far show that relying heavily on consumption taxes in an economic crisis, generates insufficient revenues and a budget deficit. A major economic instrument to finance the budget deficit is the Government Debt. Here we examine the influence of general government revenues and the deficit financing through an increase in Government Debt as determinants of public expenditure policy. The equation takes the following form:

$$(17) \qquad y_t\mathrm{GS} = c + \beta_1\mathrm{BR} + \beta_2\mathrm{GD} + \varepsilon_t$$

Results are presented in Table 9. It was found that in terms of economic crisis, the dynamics of aggregate budget revenue leads to a reduction of government spending, presented as a share of GDP. This result is formed by the negative coefficient of the income (-0.907397) compared to the dynamics of government spending with a coefficient of 54.82418. The dynamics of Government

Debt has a compensating effect, which is proved by the proportional relationship between debt and government spending. Ceteris paribus, we can draw a conclusion that the coefficient of government debt (0.020505) leads to preserving the government spending with a coefficient 54.82418. Therefore, in the consumer tax system in a period of crisis, the Aggregate Budget Revenues decreases dynamics of government spending by about 9%. Increasing public debt leads to a general increase in government spending by about 2%.

*Table 9*

Dependent variable: government spending

| Variable | Coefficient | Std. Error | t-Statistic | Probability |
|---|---|---|---|---|
| Constant | 54.82418 | 1.888072 | 29.03712 | 0.0000 |
| BR | -0.907397 | 0.221690 | -4.093082 | 0.0002 |
| GD | 0.020505 | 0.009216 | 2.224925 | 0.0311 |

| | | | |
|---|---|---|---|
| R-squared | 0.330772 | Mean dependent var | 47.97459 |
| Adjusted R-squared | 0.301029 | S.D. dependent var | 1.905805 |
| S.E. of regression | 1.593338 | Akaike info criterion | 3.830001 |
| Sum squared resid | 114.2427 | Schwarz criterion | 3.946951 |
| Log likelihood | -88.92003 | Hannan-Quinn criter. | 3.874197 |
| F-statistic | 11.12084 | Durbin-Watson stat | 1.258220 |
| Prob(F-statistic) | 0.000119 | | |

Appendix 9 shows the results from Granger's test for the presence of two-way causal relations (see Granger, 1969). The study of causality between two variables helps to verify that changes in one of them lead to changes in the other one and vice versa. The test evaluates the following two equations in two variables of $x$ and $y$:

(18) $$y_t = D_t^y + \sum_{i=1}^{n} \alpha_i x_{t-i} + \sum_{i=1}^{n} \beta_i y_{t-i} + u_t^y$$

(19) $$y_t = D_t^y + \sum_{i=1}^{n} \lambda_i x_{t-i} + \sum_{i=1}^{n} \delta_i y_{t-i} + u_t^x$$

The null hypothesis states that no casualty occurs and the alternative establishes the opposite.

The conclusion is that when two lags occur, we register causality between the debt dynamics and that government spending. In short periods, in terms of economic crisis, it is found that the government debt affects the dynamics of public spending. There is a short period in which the debt has an impact on the dynamics of government spending.

In cases where there are four lags, we observe interesting results. The revenue sets the dynamics of government spending. Consequently lower revenues lead to cuts in government spending which affects the dynamics of debt. This means that

maintaining the government spending to a flat level would increase the amount of debt. Government debt determines the dynamics of revenues.

In cases where there are six lags, the results show that the dynamics of government spending determine the dynamics of revenues and debt. These results make sense. One of the options is to maintain the spending at the same level regardless of the lower revenue. In this condition there is a determination in respect to the government spending compared to the variable of income and debt.

The revenues, which the government redistributes on one hand, must ensure its spending policies. On the other hand, they serve to repay the debt. From the perspective of economic efficiency it is necessary to check how budget revenues affect debt dynamics. Linear equation is a one-factor regression in the following form:

(20) $$y_t\mathrm{GD} = c + \beta_1\mathrm{BR} + \varepsilon_t$$

The results are presented in Table 10.

*Table 10*

Dependent variable: government debt

| Variable | Coefficient | Std. Error | t-Statistic | Probability |
|---|---|---|---|---|
| Constant | 208.9472 | 59.85007 | 3.491178 | 0.0011 |
| BR | -3.431519 | 1.167095 | -2.940223 | 0.0051 |

| | | | |
|---|---|---|---|
| R-squared | 0.158202 | Mean dependent var | 33.25505 |
| Adjusted R-squared | 0.139902 | S.D. dependent var | 25.22826 |
| S.E. of regression | 23.39707 | Akaike info criterion | 9.183872 |
| Sum squared resid | 25181.45 | Schwarz criterion | 9.261839 |
| Log likelihood | -218.4129 | Hannan-Quinn criter. | 9.213336 |
| F-statistic | 8.644911 | Durbin-Watson stat | 0.977718 |
| Prob (F-statistic) | 0.005117 | | |

It was found that the national debt is affected by the variable revenues. A negative correlation is registered. The coefficient of income is negative (-3.431519) and the government debt coefficient is 208.9472. The conclusion is that during the period in unit growth, debt decreases by about 3%.

To comply with the economic correctness and justification we must point out that the underlying variables and survey results do not claim to be thorough and complete in respect to the topic of consumer tax system in Bulgaria. We do not claim that the choice of econometric method is the best possible, but given the comparability of the two sub-periods, that is a convenient mechanism for calculation and interpretation of results.

*

Proceeding from the empirical and statistically backed attempt to analyze the revenues from indirect and direct taxes to the government budget of Bulgaria, in terms of consumer tax system, and based on the econometric models, we can summarize the following:

1. In terms of economic crisis, the taxes on consumption failed to generate the necessary revenues and form a drop in the collection rates. This result is evidenced from the negative sign of EXPT (0) and the statistically significant coefficient of the $C$ constant, which leads to lower tax revenue. Therefore, the revenue, generated from indirect tax, shrinks by the uncertainty in economics, resulting from the decreased consumption levels.

2. In terms of economic growth, the taxes on consumption generate the needed revenue. This is confirmed by the positive sign of EXPT (1) compared to the dynamics of tax revenue. A positive correlation is registered, which tendency is a reason to believe that the economic growth increases the consumption rates and therefore increases the revenues.

3. Exploring the dynamics of aggregate budget revenues, we have established that in terms of economic crisis, the tax, non-tax and quasi-tax revenues register a negative result compared to the dynamics of government spending. Therefore, it is assumed that under equal conditions, spending policy is not guaranteed with fiscal revenues and there is a budget deficit. In economic growth the registered relations are proportional and we register a positive trend in view of the collection rates.

4. A proportional, statistically significant relationship is registered among the dynamics of government spending, aggregate government revenue and government debt dynamics in terms of economic crisis. The results evidence that the government dept leads to preserving the government spending policy, as a consequence of the lower collection rates, under such conditions.

5. In view of the studied results, we have established that the Bulgarian tax system is not well structured and is inadequate in conditions of economic crisis. This raises the question whether we should seek a solution for decreasing the indirect taxes and increasing the size of direct taxes (as indicated by theory). Obviously, relying mainly on taxes, levying the consumption, is not the best possible choice. It is necessary to concentrate efforts on increasing the direct taxes as a factor for ensuring higher revenues.

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*Appendix 1*

Dickey-Fuller Unit Root test (2003-2015)

| Test critical values: 5% level | Augmented Dickey-Fuller test statistic | t-Statistic | Prob.* |
|---|---|---|---|
| *VAT* | -3.424499 | -2.883579 | 0.0118 |
| *Excise* | -5.577059 | -2.883579 | 0.0000 |
| *Income Tax* | -3.178222 | -2.883753 | 0.0235 |
| *Corporate Tax* | -3.006370 | -2.883930 | 0.0369 |
| *Government Spending* | -3.642156 | -2.883579 | 0.0061 |
| *Duties* | -2.547135 | -2.883579 | 0.1069 |
| *Duties (differenced)* | -13.62018 | -2.883753 | 0.0000 |
| *Dividends* | -1.686368 | -2.883579 | 0.4358 |
| *Dividends (differenced)* | -13.18191 | -2.883753 | 0.0000 |
| *Government Revenue* | -2.204481 | -2.883753 | 0.2058 |
| *Government Revenue (differenced)* | 14.48884 | -2.883753 | 0.0000 |

*Appendix 2*

Dickey-Fuller Unit Root test (2010-2013)

| Test critical values: 5% level | Augmented Dickey-Fuller test statistic | t-Statistic | Prob.* |
|---|---|---|---|
| *Government Spending* | -8.964533 | -2.926622 | 0.0000 |
| *Government Revenue* | -2.941234 | -2.925169 | 0.0482 |
| *Government Debt* | -4.288374 | -2.925169 | 0.0013 |

*Appendix 3*

Johansen Cointegration Test

Series: GR DIV

Unrestricted Cointegration Rank Test (Trace)

| Hypothesized No. of CE(s) | Eigenvalue | Trace Statistic | 0.05 Critical Value | Prob.** |
|---|---|---|---|---|
| None | 0.380383 | 12.54020 | 15.49471 | 0.1328 |
| At most 1* | 0.341029 | 5.839050 | 3.841466 | 0.0157 |

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

| Hypothesized No. of CE(s) | Eigenvalue | Max-Eigen Statistic | 0.05 Critical Value | Prob.** |
|---|---|---|---|---|
| None | 0.380383 | 6.701148 | 14.26460 | 0.5251 |
| At most 1* | 0.341029 | 5.839050 | 3.841466 | 0.0157 |

*Appendix 4*

Johansen Cointegration Test
Series: GR Duties
Unrestricted Cointegration Rank Test (Trace)

| Hypothesized No. of CE(s) | Eigenvalue | Trace Statistic | 0.05 Critical Value | Prob.** |
|---|---|---|---|---|
| None | 0.390363 | 12.55020 | 15.51471 | 0.1399 |
| At most 1* | 0.351029 | 5.889050 | 3.861466 | 0.0169 |

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

| Hypothesized No. of CE(s) | Eigenvalue | Max-Eigen Statistic | 0.05 Critical Value | Prob.** |
|---|---|---|---|---|
| None | 0.390363 | 6.901148 | 14.27760 | 0.5358 |
| At most 1* | 0.351029 | 5.849062 | 3.842966 | 0.0178 |

*Appendix 5*

Correlations (2003-2013)

| | Government Revenue | VAT | Excises | Duties | Corporate Tax | Income Tax | Dividends |
|---|---|---|---|---|---|---|---|
| *Government Revenue* | 1.000000 | | | | | | |
| *VAT* | 0.916892 | 1.000000 | | | | | |
| *Excises* | 0.541614 | 0.428947 | 1.000000 | | | | |
| *Duties* | 0.631701 | 0.710147 | 0.239678 | 1.000000 | | | |
| *Corporate Tax* | 0.617114 | 0.366043 | 0.190489 | 0.121760 | 1.000000 | | |
| *Income Tax* | 0.351677 | 0.178815 | -0.251733 | 0.084783 | 0.649105 | 1.000000 | |
| *Dividends* | 0.492378 | 0.268475 | 0.175722 | 0.074949 | 0.589916 | 0.604130 | 1.000000 |

*Appendix 6*

Correlations (2010-2013)

| | Government Spending | Government Revenue | Government Debt |
|---|---|---|---|
| Government Spending | 1.000000 | | |
| Government Revenue | -0.507102 | 1.000000 | |
| Government Debt | 0.028569 | -0,028547 | 1.000000 |

*Appendix 7*

Heteroskedasticity Test: White (2003-2013)

| | | | |
|---|---|---|---|
| F-statistic | 8.711906 | Prob. F (27,104) | 0.0000 |
| Obs*R-squared | 91.53086 | Prob. Chi-Square (27) | 0.0000 |

*Appendix 8*

Heteroskedasticity Test: White (2010-2013)

| | | | |
|---|---|---|---|
| F -statistic | 7.711906 | Prob. F (27,104) | 0.0021 |
| Obs*R-squared | 19.53086 | Prob. Chi-Square (27) | 0.0421 |

*Appendix 9*

Granger Causality Tests

| Null Hypothesis: | Lags | Obs. | F-Statistic | Prob. |
|---|---|---|---|---|
| *GR does not Granger Cause GS* | 2 | 46 | 2.94337 | 0.0639 |
| *GS does not Granger Cause GR* | | | 1.33236 | 0.2750 |
| *GD does not Granger Cause GS* | 2 | 46 | 0.12822 | 0.8800 |
| *GS does not Granger Cause GD* | | | 2.55723 | 0.0898 |
| *GD does not Granger Cause GR* | 2 | 46 | 6.39223 | 0.0038 |
| *GR does not Granger Cause GD* | | | 0.73782 | 0.4844 |
| *GR does not Granger Cause GS* | 4 | 44 | 3.39847 | 0.0189 |
| *GS does not Granger Cause GR* | | | 2.45789 | 0.0636 |
| *GD does not Granger Cause GS* | 4 | 44 | 0.68399 | 0.6078 |
| *GS does not Granger Cause GD* | | | 5.31134 | 0.0019 |
| *GD does not Granger Cause GR* | 4 | 44 | 4.15849 | 0.0074 |
| *GR does not Granger Cause GD* | | | 1.04984 | 0.3957 |
| *GR does not Granger Cause GS* | 6 | 42 | 1.62521 | 0.1759 |
| *GS does not Granger Cause GR* | | | 2.88700 | 0.0249 |
| *GD does not Granger Cause GS* | 6 | 42 | 0.88460 | 0.5187 |
| *GS does not Granger Cause GD* | | | 4.21330 | 0.0036 |
| *GD does not Granger Cause GR* | 6 | 42 | 1.82062 | 0.1298 |
| *GR does not Granger Cause GD* | | | 0.96401 | 0.4665 |

25.I.2016