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PAPER

Public Spending Effect and Components on GDP in Israel and in Bulgaria

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Abstract The main purpose of economic policy in new EU member states, including Bulgaria, is to realize high growth and to reach the average GDP per capita for EU. The way to aim at this permanent purpose is the usage of the experience of all over the world. Israel is a country with similar population and territory like Bulgaria and an appropriate example to be taken as the positive experience for all new member states in EU.

Keywords Public spending - Economic growth - Econometric modeling

JEL Classification H5 - E6 - O1 - O4 - C1 - C5

Israel and Bulgaria are countries with similar population and territory. The Gross domestic product (GDP) of Israel is much higher than in Bulgaria. The main purpose of economic policy in new EU member states, including Bulgaria, is to realize high growth and to reach average GDP per capita for EU. The way to achieve this permanent purpose is the usage of the experience of all over the world. Israel is a country with similar priority resources and appropriate examples to be taken as the positive experience for Bulgaria.

The main goal of economic policy in Bulgaria – higher economic growth - requires finding all instruments to influence on the aggregate supply. As it is known, this purpose could be realized with monetary and fiscal instruments.

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The current research investigates only the impact of fiscal policy on stimulating economic growth. This policy influences the aggregate demand through taxes and public expenses. The research estimates the impact of public spending and its multiple effects on economic activities and on the GDP.

1. Limitations of the Research

- Because of the different ways of data compilation adopted by National statistics – with or not accumulation, monthly, quarterly or annually – the different variables are recalculated to be mathematically compatible
- For the research the quarterly data for public spending in Israel and Bulgaria is used, without accumulation for the period 2006 – 2013. Because the project is in the early stages and will be developed, the time series of data are not enough long.
- For Israel civil public spending, excluding defense public expenditure is tested[1].
- The public spending is distinguished by the criteria " impact on the GDP " – if it creates or consumes a part of GDP.
- It is very difficult to take into account many variables and thus the research observes – only common for the two countries – public spending total, capital expenditure, for wages paid and social security, for purchases, especially for Bulgaria – public spending, financed with EF, because it strongly influences GDP [2],[3] and takes enough share in the Bulgarian public expenditure. In the research the data for public spending paid is used, not the amount in EU budget, because only the projects successfully carried out have multiple effects on the GDP.
- The efficiency is measured through the degree of impact of public spending on the GDP.
- It is very difficult to distinguish the change of GDP due to the impact of public spending or result from automatic stabilization. Therefore, the research suggests as a reason for changes only the impact of fiscal policy.
- Because the budgets in the two countries are annual, macroeconomic changes during the budget year are limited (Yaval Mazar – already cited).

1 Mazar, Yaval,"The effect of fiscal policy and its components on GDP in Israel", Israel Economic Review, Vol.9, N 1, 2011

2 Assenova Kamelia, "Public spending and their impact on the economic growth in Bulgaria", Annual Scientific Paper of Russe university, Russe, 2013

3 Assenova Kamelia, Effectiveness of public spending, financed with European funds in Central and Eastern Europe, Journal of Contemporary Management, Vol. 4, No 1, January 2015

2. Model

2.1. Model for public spending for two countries

The research of public expenditure and its impact on the GDP is not a new topic for macroeconomic theory. A similar research was made for Spain by De Castro Fernandes and Hernandes de Cos[4] and they found strong relations between public spending for wages paid and direct consumption on GDP. Perotti[5] examines the model for Australia, United Kingdom, Germany and Canada and found the response of GDP to the changes of public spending in these countries is weaker than in the US. Giordano, Momigliano, Neri and Perotti[6] tested the effects of public purchases on business activities in Italy and found a positive correlation. A numbers of researches are made for the US. Caldara and Kamps[7] found positive impact of public consumption on GDP during the period 1995 – 2006 in US.

The model is based on that of Carvalho, Eusepi and Grisse[8] for testing the influence of monetary and fiscal policy on GDP and expected inflation. It is adjusted to specific conditions in the two countries. The research compares the effectiveness of public spending for the two countries and looks for a reason for stronger and higher multiple effects of public spending in Israel and this experience to be applicable by specific conditions in Bulgaria.

The testing of public spending refers to the period 2006 – 2013. The period is different with such for public spending, financed with EF in Bulgaria, because of a lack of projects and of data for EF before 2008. The model first was tested for the public spending total.

$$GDP_t = a_0 + a_1 PS\ total_t + a_2 PS\ total_{t-1} + \varepsilon, \quad (1)$$

where

GDP_t - Gross domestic product for the current quarter

4 De Castro Fernandes, P. Hernandes de Cos, " The Economic Effects of Exogenous Fiscal Shocks in Spain: A SVAR Approach" ,ECB, Working paper N 647, 2006

5 Perotti, R, " Estimating the Effects of Fiscal policy in OECD Countries", CEPR, Discussion paper 4842, 2005

6 Giordano, R., S.Momigliano, S. Neri and R. Perotti, " The effect of Fiscal policy in Italy: Evidence from VAR Model", Banca de Italiana, Working paper 656, 2005

7 Caldara, D. and C. Kamps, " What are the effects of Fiscal Policy Shocks? A VAR based Comparative Analysis", ECB, Working paper 877, 2008

8 Carvalho, Carlos, Stefano Eusepi and Christian Grisse, " Policy Initiatives in the Global Recession: What Did Forecasters Expert?", Federal Reserve Bank of New York, Current issues in Economics and Finance, Volume 18, N 2, 2012

$PS\ total_t$ - total public expenditure for the current quarter
$PS\ total_{t-1}$ - total public expenditure for the previous period

$$GDP_t = b_0 + b_1 PCS_t + b_2 PCS_{t-1} + \varepsilon, \quad (2)$$

where

GDP_{t-} Gross domestic product for the current quarter

PCS_t - public capital expenditure for the current quarter

PCS_{t-1} - public capital expenditure for the previous period

$$GDP_t = c_0 + c_1 PSS_t + c_2 PSS_{t-1} + \varepsilon, \quad (3)$$

where

GDP_{t-} Gross domestic product for the current quarter

PSS_t - public expenditure for wages and social insurance for the current quarter

PSS_{t-1} - public expenditure for wages and social insurance for the previous period

$$GDP_t = d_0 + d_1 PMS_t + d_2 PMS_{t-1} + \varepsilon, \quad (4)$$

where

GDP_{t-} Gross domestic product for the current quarter

PMS_t - public expenditure for purchases for the current quarter

PMS_{t-1} - public expenditure for purchases for the previous period.

2.2 Specific public spending for two countries

2.2.1 Model for public spending with European funds for Bulgaria

A similar model was developed to test the impact of public expenditure paid by EU funds on the GDP. The study was carried out for the period 2008 – 2013, as well as it is tested the impact of public spending, financed with EF during different quarters on annual GDP due to significant differences in the using of EF during the years of period – from very small amounts in the first years to around full amount by the EU

budget for Bulgaria during last years of period.(see you the Graph below – part 3).

$$GDP_t = a_0 + a_1 EF_t + a_2 EF_{t-1} + \varepsilon, \quad (1)$$

where

GDP_t - Gross domestic product for the current quarter
EF_t – European funds paid for the current quarter
EF_{t-1} - European funds paid for the previous quarter

$$GDP_{year} = b_0 + b_1 EF_t + \varepsilon \quad (2)$$

$$GDP_{year} = b_0 + b_2 EF_{t-1} + \varepsilon \quad (3)$$

$$GDP_{year} = b_0 + b_3 EF_{t-2} + \varepsilon \quad (4)$$

$$GDP_{year} = b_0 + b_4 EF_{t-3} + \varepsilon, \quad (5)$$

where

GDP_t - GDP for the current year
EF_t - European funds paid for the current year in the fourth quarter
EF_{t-1} - European funds paid for the current year in the third quarter
EF_{t-2} - European funds paid for the current year for the second quarter
EF_{t-3} - European funds paid for the current year for the first quarter

The model tests the impact of public spending, financed with EF in previous periods, because EU programs have character design and this means they have more long-than short-term effect on the level of GDP. Furthermore, there is a time lag between the realization of public expenditure paid by EF and their influence on the aggregate supply.

The variables used in the model are:

- GDP – quarterly, the data used for its measurement on the components of final using. This indicator of GDP fully correspondents to public spending as a component of the aggregate demand including consumption, investments, public spending and net export.

- Public spending - quarterly, total, capital expenditure, for wages and social

insurance, for public purchases for the period 2006 – 2013.

- For Israel – public spending – civil consumption, quarterly.

- For Bulgaria - public spending financed with European funds – quarterly, paid, total and by different programs in national currency for the period 2008 -2013. Because the statistic data is with accumulation, they are revaluated quarterly to be compatible to other data.

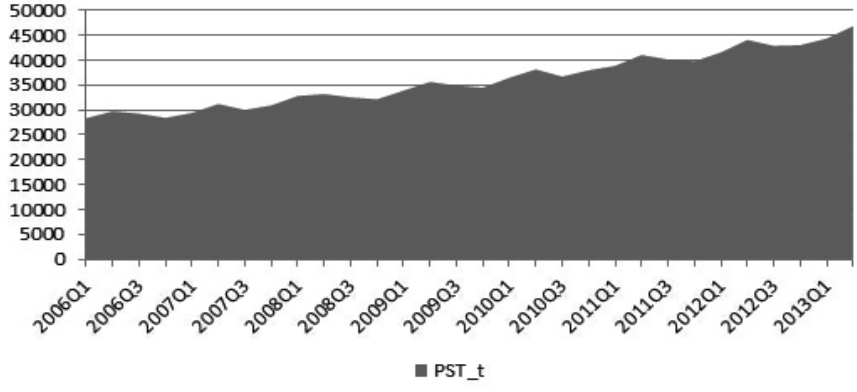
3. Graph Presentation of Data

Because limited space of paper, main data is presented in graph form below.

3.1 Data for Public Spending in Israel

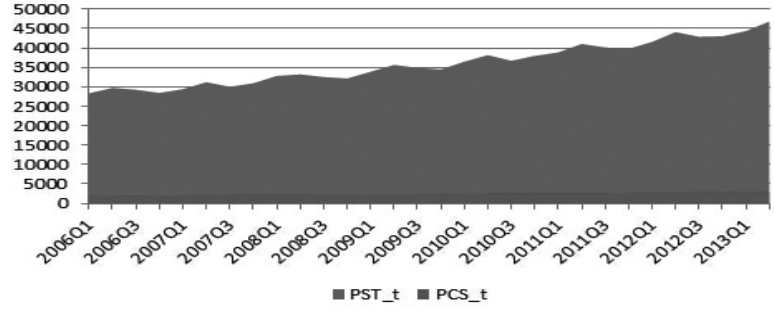
Below is presented the dynamics of public spending – civil consumption – during the period 2006 – 2013.

Figure 1 Public spending total - civil consumption in Israel (million NIS)



Source:www.cbs.gov.il - Time Series Data Bank – National Accounts – General Government Consumption Expenditure – At Constant and Current Prices

Figure 2 Public spending total and capital public spending - civil consumption in Israel (million NIS)



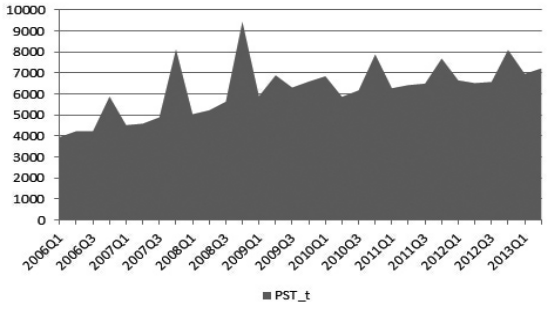
Source: www.cbs.gov.il - Time Series Data Bank – National Accounts – General Government Consumption Expenditure – At Constant and Current Prices

3.2 Data for Public Spending in Bulgaria

Data for public spending, financed with national funds in Bulgaria.

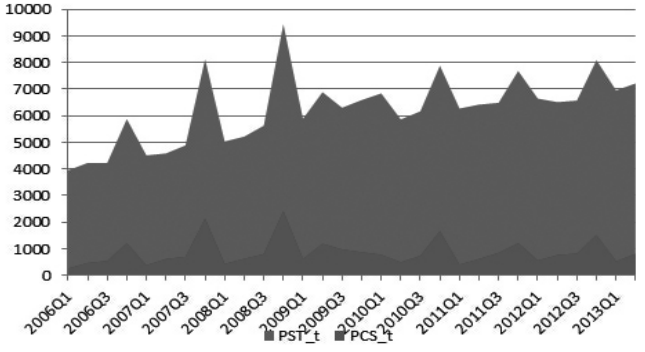
Below the dynamics of public spending, financed with national funds by consolidated state budget in Bulgaria during the period 2006 – 2013 is presented.

Figure 3 Public spending total, financed with national funds in Bulgaria (million BGN)



Source: www.cbs.gov.il - Time Series Data Bank – National Accounts – General Government Consumption Expenditure – At Constant and Current Prices

Figure 4 Public spending total and capital public spending, financed with national funds in Bulgaria (million BGN)

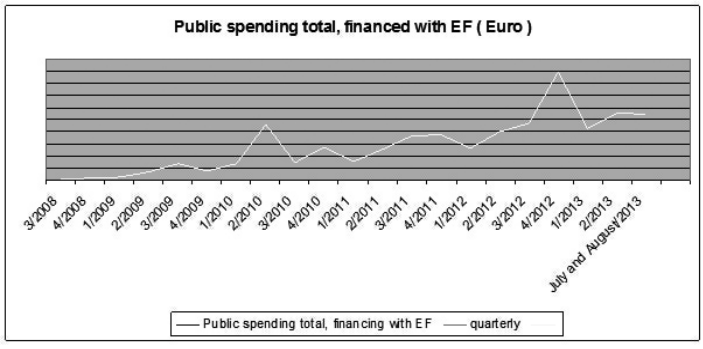


Source:www.cbs.gov.il - Time Series Data Bank – National Accounts – General Government Consumption Expenditure – At Constant and Current Prices

Data for public spending, financed with European funds.

Below the dynamics of public spending, financed with European funds total in Bulgaria is shown. The data is for the period 2008 – 2013, because after the accession of Bulgaria to EU, for one and half year the country was not ready to use European funds to stimulate the domestic economic growth and to convergence to other countries in the Union.

Figure 5 Public spending total, financed with EF (Euro)



Source:www.minfin.bg , Bulgaria and EU, Management of public spending, financed with EU funds, Structural and Cohesion funds – financial implementation

4. Results

4.1 Results for Public Spending in Israel

$$GDP_t = (1.00) - 0.802PStotal_t + 1.020PStotal_{t-1} + \varepsilon \quad (1)$$

The statistical analysis shows all correlation coefficients are significant. The coefficient of determination between public spending and GDP is high enough, suggesting a stable relationship between the dependent and independent variables. The economic analysis notes a stronger impact of the total civil public expenditure on the aggregate supply in the previous quarter. The total expenses include such with a direct effect on the aggregate supply as capital spending and others whose effect is achieved indirectly through the consumer spending. For Israel the public spending influences on the aggregate demand and therefore on the aggregate demand in long period of time (Yaval Mazar – already cited). This long term impact is very important, because due to the "stabilization plan" there and its implementation after 1986. The public spending has reduced looking for more effectiveness as well as in all countries in the world.

$$GDP_t = (1.00) + 2.084PCS_t - 1.903PCS_{t-1} + \varepsilon \quad (2)$$

The statistical analysis shows the coefficient of determination for capital spending is more significant than such for the total cost. On this base, the economic analysis confirms that the capital expenditure has a direct and an additional multiple effect on the aggregate demand and the GDP. The impact in the current quarter is strongest, indicating these costs immediately produce a high demand for goods and services. As known from the theory, as a result - income increases and employment reduces not only in sectors, where the public capital expenditures made, but also in others. It leads to an increase of aggregate demand, not only through the public spending (G),

but also indirectly through the consumer spending (C). The correlation coefficient for the previous quarter is negative. Nevertheless, because of the long duration of their turnover, the impact on GDP loss for short period of time.

$$GDP_t = (1.00) - 0.365PSS_t + 0.570\ PSS_{t-1} + \varepsilon \quad (3)$$

The statistical analysis shows that the coefficient of determination for wages publicly paid for Israel is not so high. It confirms the view of other studies for Israel that a more significant impact on the aggregate demand and therefore on the GDP has the investment spending (it is different from the Bulgarian case due to different levels of income there). For the current quarter, this coefficient shows a negative influence of the cost of wages on the aggregate demand. It is needed time lag to be delivered a multiple effect in other sectors outside publicly funded. Contrary to the Bulgarian case, it confirms for Israel the smaller elasticity of consumption on an income and such marginal propensity to consume in the country. The earned income transforms into consumer spending in a long period of time or into savings and with time lag increases the aggregate demand. This thesis is proved by the second correlation coefficient in this equation, which is positive with a great value compared to such for the previous quarters by other types of expenditure.

$$GDP_t = (1.00) – 0.292PMS_t + 0.528PMS_{t-1} + \varepsilon \quad (4)$$

The type of expenditure - immediately transforms into goods and services and increases the aggregate demand - is not exactly to note in the case of Israel. The original thesis suggests that the cost for purchases from the previous quarter will not affect the economic activity in the current one. This is not confirmed by the statistical analysis. It shows that they have multiple effects too.

In conclusion, statistically the coefficients are significant and prove the strong dependence of GDP from public spending. The high correlation coefficients between such expenses (especially capital public civil spending) and GDP mean for stimulating of the economic activities and the increasing of the aggregate demand depend on the absorption of public spending.

4.2 Results for Public Spending in Bulgaria

Results for public spending with NF

$$GDP_t = (1.00) + 0.562PStotal_t - 0.548PStotal_{t-1} + \varepsilon \quad (1)$$

The statistical analysis shows that the correlation coefficients are absolutely meaningful (Sig = 0.001 for a_1, Sig = 0.001 for a_2). The coefficient of determination is close to 0.5, which is an evidence of a stable relationship between the dependent

and independent variables. The economic analysis notes strongest impact of the total public expenditure by the consolidated state budget on the aggregate supply in the current quarter. In total expenses include such with a direct effect on the aggregate demand as capital spending and others whose effect is achieved indirectly through the consumer spending. The calculated correlation coefficient between GDP and the total public expenditure of the previous quarter in developed countries is positive. This coefficient, calculated for Bulgaria is negative and probably shows following:

- fluctuation of the total public expenditure by the consolidated state budget on the quarterly basis, confirmed by the data (each year in the fourth quarter is observed higher amount of these expenditure compared with other quarters);

- more of the public spending immediately heads to the consumption. It confirms the characteristic of countries like Bulgaria - with high elasticity of consumer spending on an income. By the overall costs a significant part is the income in different forms and the impact of public expenditure on the aggregate demand and therefore on the GDP loses in the short term ;

- short time horizon of economic agents in the country.

$$GDP_t = (1.00) + 0.538PCS_t - 0.379PCS_{t-1} + \varepsilon \quad (2)$$

The statistical analysis shows the coefficient of determination for capital spending is more significant than such for the total cost by consolidated state budget. On this base, the economic analysis confirms the capital expenditure has a direct and an additional multiple effect on the aggregate demand and the GDP. The impact in the current quarter is stronger, indicating these costs immediately produce a high demand for goods and services. As a result income increases and employment reduces not only in sectors, where the public capital expenditures are made, but also in others. It leads to an increase of aggregate demand, not only through the public spending (G), but also indirectly through the consumer spending (C). The correlation coefficient for the previous quarter is negative, but with less value compared with such in the equation for the total spending. By the capital expenditure, because of the long duration of each stage of their turnover, retains the impact on the aggregate demand and therefore on the GDP for long period of time.

$$GDP_t = (1.00) + 0.889PSS_t - 0.778\ PSS_{t-1} + \varepsilon \quad (3)$$

By the statistical analysis is found the coefficient of determination for wages publicly paid is the greatest in the comparison with such for other types of expenditure. It confirms the view of other studies of the author, that for Bulgaria the consumer spending has a more significant impact on the aggregate demand and therefore on

the GDP. For the current quarter, the correlation coefficient shows a very strong impact of the cost for wages on the aggregate demand. It notes also a multiple effect in other sectors outside the publicly funded. It confirms the high elasticity of consumption on an income and high marginal propensity to consume in the country. The earned income transforms into consumer spending in a short period of time and without time lag increases the aggregate demand. This thesis is proved by the second correlation coefficient in this equation, which is negative with a great value compared to such for the previous quarters by other types of expenditure. The impact of income received from public funds, loses in a very short period of time and reaffirms very short time horizon of economic agents in the country like Bulgaria.

$$GDP_t = (1.00) + 0.306PMS_t - 0.479PMS_{t-1} + \varepsilon \quad (4)$$

By public purchases, due to the type of expenditure, they immediately transform into goods and services and increase aggregate demand. The economic analysis notes in this case the expenditure has no significant effect on the aggregate demand in the country. As in the cases above, it confirms the economic agents without time lag transform earned income in various forms in the purchase of goods and services and realize the impact on the GDP in the same quarter.

Results for Public Spending with EF

$$GDP_t = (1.00) + 0.424EF_t - 0.338EF_{t-1} + \varepsilon \quad (1)$$

The statistical analysis finds all correlation coefficients between GDP and PS with EF are significant. The economic analysis shows that the public expenditure with EF paid has a stronger impact on the GDP in the current quarter compared with the previous one. It means that in spite of the nature of the EF projects the multiple effects on the GDP immediately realize. Moreover through the global economic crisis is realized “crowding out” effect, successfully implemented to be substituted reduced private investment with public ones, which is very important in the countries like Bulgaria with small disposal local resources. The second coefficient in the regression equation is negative. The economic relationship between the independent variable - EF, and the dependent variable - GDP is a positive. Measured like such, it shows following:

- strong seasonal fluctuations of using of EF (confirmed by the data - in the first quarter the amount paid is less compared within others for each year of the period. Nevertheless , as will be seen from coming analysis - it has a strong influence on the value of annual GDP) ;

- unequal using of European funds year by year – from small amount in first years of period to strong increase in last years.

The testing of public spending financed with EF and its impact on annual GDP quarterly begins with the data for the first quarter.

$$GDP_{year} = (1.00) + 0.896\ EF_{t-3} + \varepsilon \quad (2)$$

$$GDP_{year} = (1.00) + 0.370 EF_{t-2} + \varepsilon \quad (3)$$

$$GDP_{year} = (1.00) + 0.995 EF_{t-1} + \varepsilon \quad (4)$$

$$GDP_{year} = (1.00) + 0.895 EF_{t} + \varepsilon \quad (5)$$

The coefficients of determination between PE and GDP for the first, third and fourth quarter show a strong dependence of the GDP on the using of EF. By the economic analysis EF paid during the first quarter has a strong impact on annual GDP and most probably due to the time lag between making of the spending and its multiple effects on the value of aggregate supply. The amount of EF paid during the first quarter in each of the years studied in this paper is least, reducing the maximum possible impact on the aggregate supply. The public spending, financed with EF in the second quarter has a relatively low impact on annual GDP. This is probably due to the seasonality in some priority sectors of the Bulgarian economy and the result appears on GDP in the third quarter. The public expenditure in third quarter with these funds has strongest influence on annual GDP. From the data it was noted, that during the third quarter of years of the period the largest amounts of funds are paid. The results of analysis on a quarterly basis and their impact on annual amount of GDP corresponds to the data obtained by the analysis in paragraph 1 of this section, examining the impact of public expenditure paid by EF on GDP for the whole period - 2008 - 2013. In the fourth quarter, the public spending, financed with EF has a strong impact on annual GDP. This analysis fully corresponds with the analysis in paragraph 1 of this section, proving public expenses during the current quarter strongly influence on the amount of annual GDP in the Bulgarian economy. It explains the short time horizon of economic agents as part of the realized income in the same period allots for consumption, thereby increasing the aggregate demand and hence the aggregate supply in the economy.

In conclusion, statistically for all quarters of year (except the second) the coefficients of determination show the strong dependence of GDP on public spending, financed with European funds. The high correlation coefficients between public expenditure and GDP, means the stimulating of economic activities in countries like Bulgaria and the increasing of the aggregate demand depend on the

absorption of public spending.

4.3. Comparative Analysis for the two Countries

The public spending in Israel has longer and stronger impact on GDP. But coefficients of determination between GDP and PS in Bulgaria are more meaningful which depends on the competitiveness of Bulgarian economy. The correlation coefficients are significant, noting the important role of public spending as an instrument to be stimulated economic activities in two countries.

The stronger effect in Israel comparing with Bulgaria possibly due to:

- different horizon of economic agents in two countries –longer in Israel, shorter in Bulgaria;

- expectations of economic agents. According to the theory of rational expectations, because uncertain situation and economic agents are not sure about future, they have short horizon. The economic activities do not increase, productivities stays on same level, the aggregate demand and after it aggregate supply not raise;

- elasticity of consumer expenditure on an income and marginal propensity to consume are higher in the countries with not enough level of income. Therefore the main part of income goes to consumer spending in the current period paid and immediately influences on the aggregate demand. It loses long term multiple effects on GDP. Due to it the impact of public spending timely in the two countries is different - in Bulgaria – strong effect in current period, in Israel – in previous period and longer. In the second case it will be able to realize max potential effect.

A strong determination between public spending and GDP in Bulgaria possibly due to:

- structure of Bulgarian economy strongly depends on common European market;

- low competitiveness of Bulgarian products on the same European market. Nevertheless that for years using very actively public spending, financed with European funds, the tendency is positive.

- new very important for country infrastructure projects, financed with EF, stimulate the aggregate demand and after it the aggregate supply

For capital public spending in two countries, the statistical analysis shows the coefficient of determination between GDP and PS is more significant than such for the total cost. On this base, the economic analysis confirms the capital expenditure has a direct and an additional multiple effect on the aggregate demand and the GDP. The impact in the current quarter is strongest, indicating these costs immediately produce a high demand for goods and services. As known from the theory, as a

result - income increases and employment reduces not only in sectors, where the public capital expenditures made, but in others. It leads to an increase of aggregate demand, not only through the public spending (G), but also indirectly through the consumer spending (C).

In conclusion, the high correlation coefficients between public expenditure and GDP, means to be stimulated the economic activities in two countries and the increasing of the aggregate demand depends on the absorption of public spending.

Conclusions

Israel and Bulgaria are countries with similar population and territory. The Gross domestic product (GDP) of Israel is much higher than in Bulgaria.
The main purpose of economic policy in new EU member states, including Bulgaria, is to realize high growth and to reach the average GDP per capita for EU. The way to aim at this permanent purpose is the usage of the experience of all over the world. Israel is a country with similar priority resources and appropriate examples to be taken as the positive experience for Bulgaria.

The original model was developed to test the impact of public expenditure on the GDP. The model is based on that of Carvalho, Eusepi and Grisse for testing the impact of monetary and fiscal policy on GDP and expected inflation (already cited). The model is adjusted to specific conditions in the two countries. The testing starts with public spending total, capital expenditure, for wages paid and public purchases. The research compares the effectiveness of public spending for two countries and looks for a reason for stronger and higher multiple effects of public spending in Israel and to be applicable by specific conditions in Bulgaria.

The public spending in Israel has longer and stronger impact on GDP. But coefficients of determination between GDP and PS in Bulgaria are stronger. The correlation coefficients are significant, noting the important role of public spending as an instrument for stimulating of economic activities in two countries.

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