GLOBAL ECONOMIC CRISIS AND EFFECTIVENESS OF PUBLIC SPENDING: THE EU PRACTICE

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ABSTRACT

The financial crisis of 2008 affected the whole world and it had a negative impact on economies. The effects of the crisis are still experienced in several nations. Especially high budget deficits, public debt and unemployment problems caused a heated debate on public spending that was increased to prevent economic recession in the post-crisis era. This study aims to discuss public expenditure efficiency in the wake of global financial crisis. The study utilized a database including the indicators of; Public Expenditures (as a dependent variable), Gross Domestic Product (GDP), Gross Domestic Product Growth Rate, Unemployment Rate, Public Debt, Fiscal Deficit, Human Development Index (HDI). HDI. *We used panel regression analysis for 28 EU countries, and time series analysis for the the top 10 countries in terms of per capita income for the period of 2000-2015. :And this study argues that the high public spending did not affect the indicators used in this study in a positive way. In addition, to this, Norway, Luxemburg and Germany showed best performance in the post-crisis period.*

Keywords: *Global Crisis, Public Expenditure, EU Countries, Panel Data Analysis, Time Series Analysis.*

JEL Codes*: H50,C22, C23*

1. INTRODUCTION

The crisis that commenced in the United States of America (USA) in 2007 and deepened in 2008 first expanded to the countries that were US trade partners and then became a global crisis. The impact of the crisis is still going on. The weaknesses experienced in economies resulted in increasing unemployment and poverty. These negative impact of the crisis made it clear for the governments to increase their intervention on the economy to resolve economic and social problems. After the crisis, initially monetary policies, then expansionary fiscal policies were implemented. The significance of expansionary fiscal policies, which were insignificant for many years, became relevant again with this crisis. Effectiveness of fiscal policies depend on the economic structure and macroeconomic policies in a country. Nations' budget deficits, high debt ratios, decrease in production and profitability and weaknesses in the financial sector all limit the intervention of the government in the economy. The role of the state in the economy is a long standing question. Each crisis experience results in a reevaluation of this issue. Although the necessity of implementation of programs to boost the demand became prevalent after the 2008 crisis, the question of whether austerity policies should be implemented was also raised due to the fiscal imbalances in the economy. As a result, these problems experienced in the economies caused a debate on public expenditure. In the present study, the impact of public expenditures on selected macroeconomic indicators (public debt, budget deficit, unemployment, GDP growth) and Human Development Index (HDI), which is commonly used to determine the economic development level of a country, were attempted to be identified between the pre-crisis period and today in 28 European Union countries (EU-28). For this purpose, annual data for 2000 – 2015 period were used. Three different methods of analysis were utilized in the study. Initially scatter diagram was used to determine dual relationships between public expenditures and macroeconomic indicators and Human Development Index (HDI) for EU-28. Second, the impact of public expenditures on macroeconomic indicators and HDI were analyzed with panel estimation method for EU-28 countries. Finally, time series model was estimated for 2000 – 2006 and 2007 – 2015 periods for the leading 10 EU countries in per capita income. Although high public expenditures negatively affected all variables, the effects were higher for unemployment and HDI. This study presents a foundation by analyzing and presenting a critique of the theoretical constructs and empirical results to determine the extent to public expenditures affected to macroeconomic indicators and HDI in EU countries and the countries with the best performance after the financial crisis.

In the second section of the study, general information was presented about the global crisis and the global crisis and public expenditures were discussed, studies in the literature on the activity of public expenditures were discussed in the third section. Methodology and findings were explained in the fourth section. And finally, in the fifth section, conclusions are discussed.

2. GLOBAL ECONOMIC CRISIS AND PUBLIC EXPENDITURES

The financial crisis that started with the crash of the mortgage system in the USA in 2007 is conceived as the gravest crisis since the global recession of 1929. This crisis experienced at a global scale caused serious budget deficits and unsustainable public debt, affecting the economy of several countries (European Commission, 2014: 7).

2008 crisis was not a result of a short-term scenario. Adoption of the *liberalize, privatize and turn adrift* principle in the economic system of certain countries since mid-1970's and in the USA since the first half of the 1980's is a principle of market radicalism and considered as the principal reason of the crisis. In the adopted economic system, the market

functions perfectly and state intervention is unnecessary. The regulatory role of the state was kept at a minimum and the US Federal Reserve (FED) did not intervene to the housing bubble and increased debt level during that time. Very low interest rates acted as a trigger for the crisis. Regulatory institutions did not take necessary measures against financial institutions (Şenses et al., 2015: 121-126).

Mortgage market bubble, which started to build in the 1990's, rapidly grew in mid-2000's. The crisis that started in the USA expanded globally as the mortgage based financial products were distributed worldwide (Crotty, 2008: 3). Increased international capital mobility and liberalization of the markets during the last 40 years were a factor in globalization of the crisis (United Nations, 2015)

The effects of the financial crisis are still visible. Several countries still display low growth rates. Unemployment, reduced profitability, high budget deficits and debts, fragility of financial markets are still prevalent, albeit not as high as they were during the initial years of the crisis. The crisis deeply affected the social life as well. The low income groups were affected by the crisis the most. Young population experienced great income losses (OECD, 2015:1).

These problems experienced in the economies forced the countries to search for new policies. Since the crisis initially hit the financial markets, first monetary policies were implemented, but sufficient responses were not obtained. This was followed by the implementation of expansionary fiscal policies. Extreme stagflation in economies made it necessary to implement fiscal policies to revitalize the demand (Karakurt, 2010: 167). Economic liberalization experienced along with globalization caused a market-focused environment and discussions about state intervention on the economy. Afterwards in 2007, the crisis that was initially experienced in the housing industry and then expanded its effect into real sectors first affected the closer trade partners of the USA. But, it did not took the crisis too long to globalize and questions were raised on the role of the state on the economies in the following years.

The activities of fiscal tightening or expansionary fiscal policies have been debated since the global crisis throughout the world, however, there is still no consensus on the subject. During the post-crisis period public expenditures increased seriously within the context of recovery packages. However, resulting sudden and extreme increases in public debt revealed the necessity of new fiscal regulations in many countries and especially in Europe. Zero or close to zero interest rates, high unemployment and debt, and low growth rates in several developed nations resulted in liquidity trap in these countries. Thus, the discussions diverted to the necessity to reduce fiscal deficits as opposed to fiscal stimulus programs. Conducted studies underlined the concerns on increasing profitability via fiscal stimulus programs when the public expenditures increase as well (Prague Global Policy Institute,2012: 5).In fact, countries were more experienced on crisis management after the 2001 Argentina crisis. In that process, they have created temporary security nets, prioritized social spending and aimed to increase profitability and quality in expenditures (Canuto & Giugale, 2010:195). However, after the 2008 crisis, the negative experiences of the countries on macroeconomic indicators such as budget deficits, unemployment rates, public debt inflamed the discussions on public expenditure activity again.

Classical economists argued that the role of the state in economy should be limited to defense, justice and basic public services during the 19th century. In this process, needs such as public property, externalities, income distribution and redistribution of the resources were ignored. The share of public expenditures in industrialized countries varied between 11 – 12%

in average between the years of 1870 and 1913 and this tendency continued for about 43 years. Later on, as a result of the increase in the state's role in establishing economic stability, public expenditures started to increase (Tanzi & Schuknecht, 1997: 164-165). In the study by Tanzi (2011), it was stated that public expenditures generally increased during 1913 – 2000, and wars and 1929 Global Recession played a significant role in this increase. The prevailing view of the time was that high public expenditures would result in welfare. This increase was affected by the experienced wars and crises. And public expenditures approached 50% in most countries today (Tanzi, 2015: 249). Whereas for Richard Armey's idea which is related to the so-called "Armey Curve" suggested that the threshold where government's role in economic growth is between 15-50% of the national income (Afonso & Jalles, 2011: 6).With the 2008 crisis, economy policies were prioritized once more. Governments, to prevent deepening of the effects of the crisis, created several recovery packages. As post-crisis monetary policies fell short, Keynesian expansionist fiscal policies were introduced. Public expenditure and tax policies have a significant impact on stimulating the demand. However, caution is needed when implementing these demand stimulating policies during periods of fiscal instability. Otherwise, imbalances could deepen even further (Karakurt, 2010: 168).

Certain economists argued public expenditures should be high under all circumstances, while others claimed that public expenditures should be increased under current economical conditions. While the debate lingers on, the selection of actual policies by the nations to escape the impact of the crisis is extremely significant (Tanzi, 2015: 248).

Governments must promote social development and economic growth. But it is so hard to determine an increase in public intervention by increasing public spending will have positive impact on economic performance or not (Martins & Jose Veiga, 2014: 579).Some economists view the crisis as the failure of the markets and thus, argue that state intervention on the economy and public expenditures should increase (Florin & Petrisor, 2011: 416). According to this view, increases in tax revenues, public expenditures and even in public debt are normal. For instance, according to Wagner Law, as the nations develop and get richer, state intervention on the economy and thus, public expenditures would increase as well (Tanzi, 2015: 248).

At a research seminar held at the IMF in 16 November 2013, Paul Krugman assessed the condition the USA was in as a liquidity trap. In economies where natural interest rates prevail, the amounts of investments and savings are equal. However, since the USA economy was in a deep recession, this condition is not valid. In this environment, productive or not, all types of expenditures would affect the economy positively. Thus, public debt should not cause any concerns in such an environment (Tanzi, 2015: 244). However, existing budget deficits and public debt should be considered carefully to continue public spending in these countries.

The experienced crisis proved the requirement that the nations should adopt public expenditure policies, which would promote economic growth and reduce the poverty in the future. Thus, countries should prioritize social security, education, health and investment expenditures to accomplish this goal. However, as the fiscal impact of the crisis prevail, reduced revenues, the increase in expenditures related to the crisis and high public debt caused fiscal imbalances. These problems in turn resulted in discussions to reduce public expenditures in the countries. According to those who argued that expenditures should be cut, a reduction would result in a review by the government of public expenditure policies and concentrate on needs and better utilization of the budget (Canuto & Giugale 2010: 193-195).

Also, attention should be paid in lowering the expenditures to reduce budget deficits, which became a significant problem for the economies after the crisis. In fact, this situation

could result in injustice in distribution of income and increase in the number of people with low income (European Commission, 2012: 10-19). Arbitrary reduction of public expenditures should cause setbacks in public services. Especially cuts on expenses in public services that contribute to economic growth such as education and health result in a raise in concerns. Since the economic conditions in the countries when the crisis started are important, measures should be selected accordingly (Toye, 2000: 28-29).

Public intervention should be designed to achieve the best consequences for the countries. It is rather difficult to determine international level intervention tools that would provide positive results for each country. For instance, low and medium income countries that entered the crisis under poor economical conditions have less freedom in selecting policies. The primary economic goal of these countries should be to establish stability Furthermore, public expenditure programs should be designed with the lowest cost, timed perfectly and to provide maximum increase in production. Furthermore, active distribution of the resources would increase the productivity of state interventions. Selecting good projects and fast implementation is important as well (Canuto &Giugale 2010: 199-201, Florin & Petrisor, 2011: 421).

3. LITERATURE ON THE ACTIVITY OF PUBLIC EXPENDITURES

Several studies were conducted on public expenditure activity. Most of these studies reported that there was no positive relationship between the increase in public expenditure and activity.

Gupta and Verhoeven (2001) attempted to determine the productivity of education and health expenditures in 37 African countries and reported that an increase in expenditures did not have a positive impact on productivity. Hauner and Kyobe (2010) identified that productivity was low in 114 countries with high share of education and health public expenditures in GDP. St. Aubyn (2005) reported that education and health expenditure did not have a positive impact on productivity in Portugal and also Afonso and St. Aubyn (2005) identified that increased levels of education and health public expenditures did not increase productivity in OECD countries. Afonso et al. (2005) did not identify a positive relationship between public sector performance and productivity in OECD countries. Borger et al. (1994) and Borger and Kerstens (1996) reported that an increase in local government expenditures did not have a positive effect on productivity in their study on Belgium. Afonso and Fernandes (1996) stated that local government expenditures had a negative impact on productivity.

Tanzi and Schuknecht (1997) analyzed whether an increase in public expenditures affected social welfare in developed countries. They have scrutinized the effects of public expenditures on economic and social indicators such as GDP growth rate, capital accumulation, inflation, unemployment, public debt rates, length of life, stillbirth rate, education level and poverty. However, they have concluded that increasing public expenditures did not have a positive impact on welfare.

The results of an analysis conducted by Herrera and Pang (2005) for 1996 – 2002 period in 140 developing countries demonstrated that in countries with high public expenditure rate, productivity was low

Angelopoulos et al. (2008) attempted to determine the productivity in public sector in 64 developed and developing countries in their study. They reported that fiscal magnitude had no impact on economic growth, however, it was important to improve the productivity in public sector.

Afonso et al. (2010) attempted to measure public sector productivity in new EU members and rising economies. They concluded that productivity was higher in countries where public expenditures did not exceed 30% of the GDP. When public expenditure productivity is concerned, a proportion between the output and the outcome is expected. Although output is significant for operations, it is not possible to argue the same for outcome. For instance, school records or number of graduations could be given as output indicators for education activities, while operation count and number of days spent as inpatient could be given as health expenditure examples. Outcomes are how much the students learned as a result of education and the number of recovered patients going back to their normal lives. In that case outcomes are more significant.

Grigoli (2012) reported that the recent increases in public expenditures on education and health did not cause an increase in the output in Slovak Republic, but budget savings had a positive effect on productivity

European Commission (2012) assessed the quality of expenditures in a report they published and stated that use of the resources to produce output that would benefit the society should be considered in addition to the components of these expenditures.

Florin and Petrisor (2011) underlined the significance of the fact that it was necessary to keep the public expenditures at a lower level while fighting with the crisis to increase the productivity, instead of increasing the public expenditures in their study.

Tanzi (2015) studied monetary and fiscal policies implemented in the countries during the post-crisis era. He reported that fiscal austerity policies did not reflect the reality and public expenditures remained in quite high levels. Furthermore, it was reported that an analysis of the relationship between public expenditures and Human Development Index (HDI) demonstrated that in countries with high HDI levels, public expenditures were lower during the 2007 – 2013 period.

However, the contribution of especially certain public expenditure items to economic growth could not be ignored. Government intervention in the economy is significant in increasing productivity in the market and improving employment. Investments in infrastructure, and fields such as Research & Development (R&D) and education require public intervention due to the existence of market failures. However, it is not possible to determine the rate of contribution of these public expenditures to the economy. The source of the financing for these expenditures is also a significant factor in determination of their contribution to the economy. If tax revenues are the source of financing, it could result in deformation and cost inactivity. Also, public debt and the increase in public debt could have a negative impact on economic growth via future tax burden (Brahmbhatt& Canuto, 2012: 4). According to Adam and Bevan (2005), turning public expenditures into productive investments would increase their productivity. Furthermore, the source of the financing for these expenditures is also important. Cutting down low-productivity expenditures could reduce the increase in budget deficit.

4. OBJECTIVE, DATA AND METHODOLOGY

This study aims to analyze the effect of public expenditure on macroeconomic indicators and HDI. Within the scope of this objective, the following variables are used: public expenditure, budget deficit, unemployment rate, GDP and GDP growth rate. For these variables, the 2000-2015 time period is taken into account. Three analysis procedures were conducted in this study. First, we looked at scatter plots among the variables to explain two-way relations. Later on, we estimated alternative panel regression models and interpreted the

estimated coefficients. Finally, using the time series regression result, we found the country with the best economic performance after the Global Financial Crisis.

4.1. Panel Data Models

Several current studies have analyzed panel or longitudinal data sets. The analysis of panel data is the subject of one of the most active and innovative bodies of literature in econometrics, partly because panel data provides a rich environment for the development of estimation techniques and theoretical results. In more practical terms, however, researchers have been able to use time-series cross sectional data to examine issues that could not be studied in either cross-sectional or time-series settings alone (Greene, 2010: 344).

A very general linear model for panel data permits the intercept and slope coefficients to vary over both individual and time, with

$$y_{it} = \alpha_{it} + x_{it}'\beta_{it} + u_{it}, \quad i = 1, \dots, N, \quad t = 1, \dots, T, \qquad \text{(Eq.1)}$$

5. RESULTS

For the panel regression estimation procedure, first, we have to analyze the data type of variables. Results are given below:

Table 1. Linear Panel Model: Common Estimators and Models*

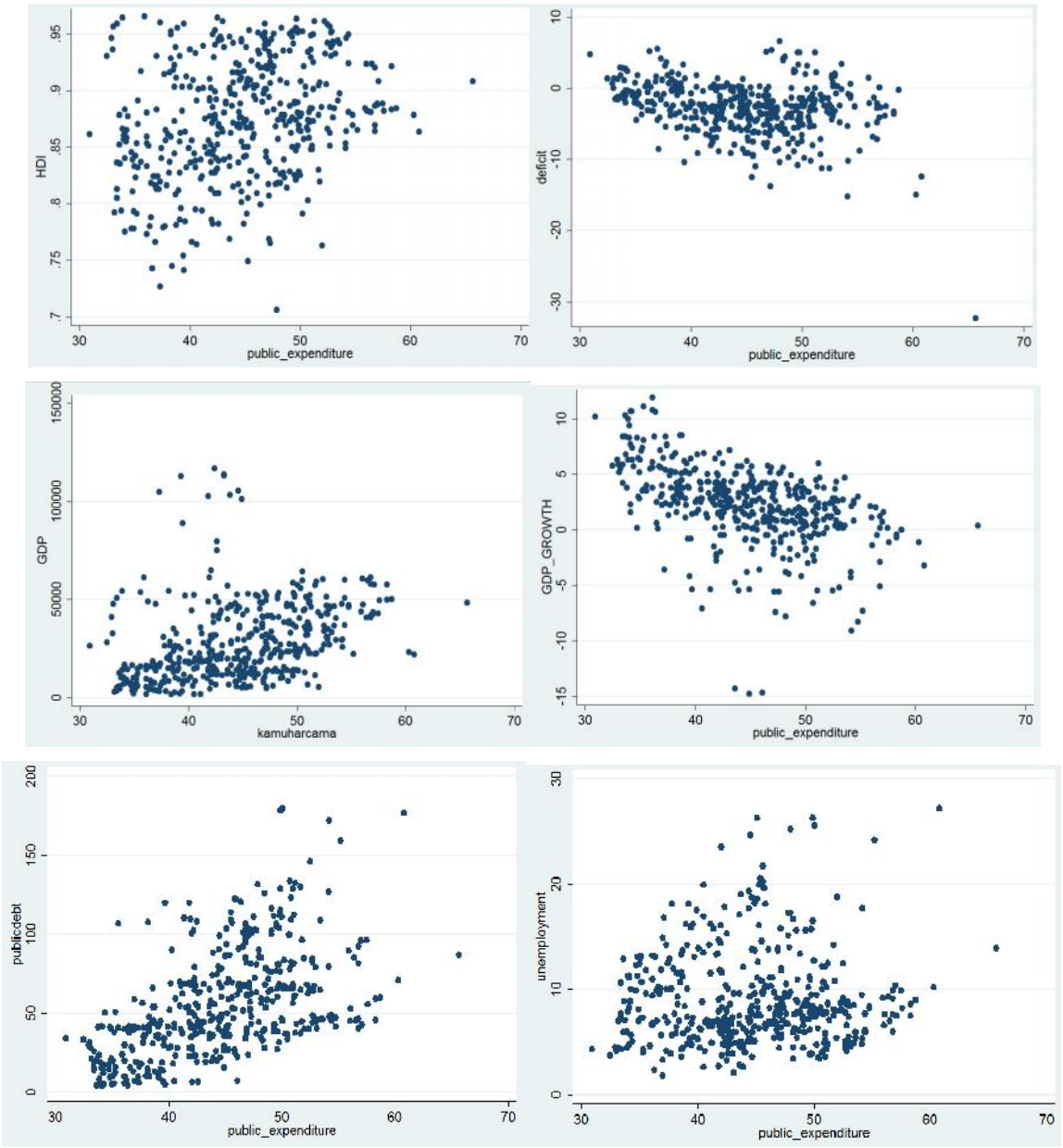
	Assumed Model		
Estimator of β	**Pooled**	**Random Effects**	**Fixed Effects**
Pooled OLS	Consistent	Consistent	Inconsistent
Between	Consistent	Consistent	Inconsistent
Within	Consistent	Consistent	Consistent
First Differences	Consistent	Consistent	Consistent
Random Effects	Consistent	Consistent	Inconsistent

*__Source__: Cameron & Trivedi (2005).

The most restrictive model is a pooled model that specifies constant coefficients, the usual assumption for cross-section analysis, so that

$$y_{it} = \alpha + x_{it}'\beta + u_{it}, \quad i = 1, \dots, N, \quad t = 1, \dots, T, \qquad \text{(Eq.2)}$$

If this model is correctly specified and regressors are uncorrelated with the error, then it can be consistently estimated using pooled OLS. The error term is likely to be correlated over time for a given individual, however, in which case the usual reported standard errors should not be used as they could be largely downward biased.



Graph 1. Scatter Plot between Variables

The scatter plots given above shows the two-way relations among variables. This plot is drawn for the years of 2000-2015 for all countries. Generally, the more public expenditure the country has, the lower HDI level, the higher budget deficits, the lower GDP, the higher unemployment rate, the higher public debt and the lower GDP growth rate it has.

Before beginning the panel data analysis, we must control the data type for all variables. Results are given

Table 2. Panel Data Types of Series

Public expenditure	Unbalanced panel data
Human Development Index	Unbalanced panel data
Budget Deficit	Unbalanced panel data
GDP	Unbalanced panel data
GDP_growth	Unbalanced panel data
Unemployment Rate	Unbalanced panel data

As seen in Table 1, all series used in study are unbalanced. So we used only Im, Pesaran and Shin (IPS) unit root test. The unit root test results are given below:

Table 3. Im, Pesaran and Shin Unit Root Test

IM, PESARAN VE SHIN (IPS) UNIT ROOT TEST H_0: All panels contain unit root. H_1: Some of panels are stationary.		
Public expenditure	t-bar statistic:-9,5244 t-tilde-bar statistic:-2.2145 z-t-tilde bar statistic:-7.3241 p-value:0.0000	Result: H_0 is rejected.
Human Development Index	t-bar statistic:-2,2547 t-tilde-bar statistic:-2.1456 z-t-tilde bar statistic:-3,1478 p-value:0.0000	Result: H_0 is rejected.
Budget Deficit	t-bar statistic:-8,5244 t-tilde-bar statistic:-2.1145 z-t-tilde bar statistic:-7.1025 p-value:0.0000	Result: H_0 is rejected.
GDP	t-bar statistic:-10,1196 t-tilde-bar statistic:-2.2145 z-t-tilde bar statistic:-8,6396 p-value:0.0000	Result: H_0 is rejected.
GDP_growth	t-bar statistic:-10,2546 t-tilde-bar statistic:-2.3245 z-t-tilde bar statistic:-8,6647 p-value:0.0000	Result: H_0 is rejected.
Unemployment Rate	t-bar statistic:-9,1478 t-tilde-bar statistic:-2,1325 z-t-tilde bar statistic:-7.1147 p-value:0.0000	Result: H_0 is rejected.

As seen in Table 3, all series used in this study are stationary, in another words, do not include unit root. So, we could estimate the panel regression models using the series level values. We took three panel models into account: pooled regression, fixed-effect model and random effect model. For this model, we used public expenditure as an explanatory variable. Later on, following the estimation of regressions, we choose the best panel model.

Table 4. Pooled Regression Estimation Results*

	SS	**df**	**MS**	**Observation**	**457**
				F(3,457)	**20,77**
	89,8867	**3**	**29,962**	**Prob > F**	**0,0000**
				R-squared (R^2)	**0,2393**
	285,6850	**198**	**1,4428**	**Adjusted R^2**	**0,2278**
Total	375,5717	201	0,8685	**Root MSE**	1,2012
Effects of Public expenditure	**Coefficient**	**Std. Error**	**t**	**P > |t|**	
HDI	-9,02491	2,01352	4,48	0,000	
Budget Deficit	-0,35782	0,04606	7,77	0,000	
GDP	2,39567	0,66088	3,62	0,000	
GDP_growth	-4,29992	0,51942	8,28	0,000	
Unemployment Rate	5,21365	0,28546	18,26	0,000	

*There are six panel regression estimation results. For all regressions, the endogeneity between variables is controlled to avoid the problem of low significant parameter estimation.

The results obtained from pooled regression demonstrated that all parameters were statistically significant at 1% significance level. So initially, pooled estimation method was available for the analysis. But we should obtain other panel estimation results.

Table 5. Two-Way Fixed-Effect Regression Estimation Results (Dummy Variable Method)

	SS	**df**	**S**	**Observation**	**457**
Total				**F**	**49,02**
Explained	**927,101**	**25**	**0,259**	**Prob > F**	**0,0000**
Sum Squared Resid				**R-squared (R^2)**	**0,9156**
	17,123	**422**	**0,195**	**Adjusted R^2**	**0,9111**
HDI	**Parameter**	**Std. Error**	**t**	**P > |t|**	
Public expenditure	-8,4342	1,2589	6,70	0,025	
_Ic_code_2	0	(omitted)			
_Ic_code_3	0	(omitted)			
_Ic_code_4	0	(omitted)			
_Ic_code_5	2,97896	0,15478	19,25	0,000	
_Ic_code_6	-0,66791	0,22566	-2,96	0,053	
_Ic_code_7	-3,25488	0,24585	-13,24	0,000	
_Ic_code_8	0,99636	0,11159	8,93	0,000	
_Ic_code_9	0,48963	0,12555	3,90	0,025	
_Ic_code_10	-0,59636	0,21563	-2,77	0,059	
_Ic_code_11	0,56963	0,14585	2,64	0,055	
_Ic_code_12	0,99778	0,20369	4,90	0,022	
_Ic_code_13	0	(omitted)			
_Ic_code_14	-2,12589	0,21445	-9,91	0,000	

_Ic_code_15	-0,33696	0,14822	-2,27	0,083
_Ic_code_16	-0,99622	0,32155	3,10	0,044
_Ic_code_17	0	(omitted)		
_Ic_code_18	0	(omitted)		
_Ic_code_19	0	(omitted)		
_Ic_code_20	0	(omitted)		
_lc_code_21	0	(omitted)		
_lc_code_22	0	(omitted)		
_lc_code_23	0	(omitted)		
_lc_code_24	0	(omitted)		
_lc_code_25	0	(omitted)		
_lc_code_26	0	(omitted)		
_lc_code_27	-1,25899	0,11478	-10,97	0,000
_Iyear_2000	-2,14145	0,92536	-2,31	0,052
_Iyear_2001	-3,11477	0,58963	-5,28	0,000
_Iyear_2002	-1,2589	0,69630	-1,81	0,115
_Iyear_2003	-1,4482	0,78966	-1,83	0,113
_Iyear_2004	2,3662	0,14565	16,24	0,000
_Iyear_2005	3,1458	0,10255	30,67	0,000
_Iyear_2006	1,2588	0,45825	2,75	0,020
_Iyear_2007	1,0258	0,14251	7,20	0,000
_Iyear_2008	-1,0255	0,01455	70,48	0,000
_Iyear_2009	4,1115	0,25555	16,09	0,000
_Iyear_2010	1,2563	0,01052	119,42	0,000
_Iyear_2011	1,0236	0,25515	4,01	0,000
_Iyear_2012	0,2589	0,69612	0,37	0,963
_Iyear_2013	0,9124	0,15524	5,88	0,000
_Iyear_2014	0,9025	0,14156	6,38	0,000
_Iyear_2015	1,4589	0,21522	6,78	0,000
Constant				

The results in Table 4 demonstrated that the dummy variables for the units 2,3,4,5,14,18,19,20,21,22,23,24,25,26,27 and 28 were omitted in order to prevent dummy variable trap problem. This estimation was obtained when HDI was used as a dependent variable. Generally, for these results we could argue that the relation between HDI and public expenditure was strongest in 2009. Public expenditure in Norway was the most effective one on HDI. Same results were also obtained for other variables (budget deficit, GDP, GDP growth and unemployment rate). The summary of the results is given below:

Table 6.Public Expenditure Effect on Variables on the basis of Years and Countries

Variables	Year	Countries
Budget deficit-Public expenditure	2010	Norway
	2009	Luxemburg
	2009	Germany
GDP-Public expenditure	2008	Norway
	2009	Luxemburg
	2009	Germany
GDP growth-Public expenditure	2008	Norway
	2009	Luxemburg
	2009	Germany
Unemployment Rate-Public expenditure	2009	Norway
	2010	Luxemburg
	2009	Germany

As seen in Table 6, for all variables, Norway had the most effective relations and in Norway, public expenditure was the most effective on budget deficit in 2010, GDP in 2008, GDP growth in 2008 and unemployment rate in 2009, respectively.

The other estimation method was two-way fixed-effect estimation and results are given below:

Table 7. Two-Way Fixed-Effect Regression Estimation Results (Intragroup Estimation Method)

	SS	**df**	**MS**	**Observation**	**457**	
Total				**F**(1,455)	**3,80**	
Explained	**3,0293**	**1**	**1,0098**	**Prob** > *F*	**0,0112**	
Sum Squared				**R-squared (R^2)**	**0,0544**	
Resid	**52,6653**	**455**	**0,2660**	**Adjusted R^2**	**0,0401**	
HDI	**Coefficient**	**Std. Error**	**t**	**P > |t|**	**Confidence Interval**	
Public expenditure	-7,04182	0,02293	-1,82	0,070	-0,0870	0,0034

	SS	**df**	**MS**	**Observation**	**457**	
Total				**F**(1,455)	**3,80**	
Explained	**4,0211**	**1**	**1,0098**	**Prob** > *F*	**0,0112**	
Sum Squared				**R-squared (R^2)**	**0,0544**	
Resid	**42,5696**	**455**	**0,2660**	**Adjusted R^2**	**0,0401**	
Budget deficit	**Coefficient**	**Std. Error**	**t**	**P > |t|**	**Confidence Interval**	
Laglog(Public expenditure)	2,5696	0,09147	28,09	0,000	2,2589	2,9689

	SS	**Df**			**457**
		1	**MS**	**Observation**	**3,80**
Total	**3,0293**	**455**	**1,0098**	**F**(1,455)	**0,0112**
Explained			**0,2660**	**Prob** > *F*	**0,0544**
Sum Squared	**52,6653**			**R-squared (R^2)**	**0,0401**

Resid				Adjusted R^2		
GDP	**Coefficient**	**Std. Error**	**t**	**$P>\|t\|$**	**Confidence Interval**	
Laglog (Public expenditure)	-2,5899	0,12589	20,57	0,000	-2,6987	-2,9963
	SS	**df**	**MS**	**Observation**	**457**	
Total				**F(1,455)**	**3,80**	
Explained	**3,0293**	**1**	**1,0098**	**Prob > *F***	**0,0112**	
Sum Squared Resid	**52,6653**	**455**	**0,2660**	**R-squared**	**0,0544**	
				Adjusted R^2	**0,0401**	
GDP growth	**Coefficient**	**Std. Error**	**t**	**$P>\|t\|$**	**Confidence Interval**	
Laglog (Public expenditure)	-3,69823	0,21476	-17,22	0,000	-3,7874	-3,9914
	SS	**df**	**MS**	**Observation**	**457**	
Total				**F(1,455)**	**3,80**	
Explained	**3,0293**	**1**	**1,0098**	**Prob > *F***	**0,0112**	
Sum Squared Resid	**52,6653**	**455**	**0,2660**	**R-squared (R^2)**	**0,0544**	
				Adjusted R^2	**0,0401**	
Unemployment	**Coefficient**	**Std. Error**	**t**	**$P>\|t\|$**	**Confidence Interval**	
Laglog(Public expenditure)	2,25611	0,114632	19,68	0,000	2,1025	2,3658

Two-Way Random-Effect Regression Estimation Results (Maximum Likelihood Method)

Dependent Variable	Parameter	Std. Error	$P>\|z\|$
Laglog(HDI)	-7,03816	0,02157	0,000
Laglog(Budget deficit)	-2,41799	0,31478	0,000
Laglog(GDP)	-2,11478	0,21477	0,000
Laglog(GDP-growth)	-3,21477	0,44596	0,000
Laglog(Unemployment)	3,65891	1,25899	0,000

For the results in Table 7, all parameters were statistically significant at 1% significance level. The effects of public expenditure on variables were for HDI=-0, 04182, for budget deficit=2, 5696, for GDP=-2, 5899, for GDP growth=-3, 69823 and for unemployment rate=2, 25611, respectively. For the two-way random effect regression estimation results, all estimated parameters were statistically significant at 1 % significance level. For the 2000-2015 period, the effect of public expenditure on variables were for HDI = -7.03816, for budget deficit = -2.41799, for GDP = -2.11478, for GDP growth = -3.21477 and for unemployment = 3.65891 approximately, respectively.

For estimated regression, we took the Durbin-Watson test into account to analyze whether there was autocorrelation. Test statistic is 2,08475 and this value is near 2, so we could argue that there was no autocorrelation problem in pooled regression. The autocorrelation test results for fixed-effect model are given below:

Table 8. Bhargava, Franzini and Narendranathan Autocorrelation Test for Fixed-Effect Model

Observation	**457**			
Prob>F	**0,0000**			
Dependent Variable	**Coefficient**	**Std. Error**	**t**	**P> |t|**
Log(HDI) (Estimation 1)	-0,0789	0,01	-7,89	0,000
Log(Budget deficit) (Estimation 2)	0,821	0,14	5,86	0,000
Log(GDP) (Estimation 3)	-0,478	0,10	-4,78	0,000
Log(GDP-growth) (Estimation 4)	-0,458	0,06	-7,63	0,000
Log(unemployment) (Estimation 5)	0,2256	0,19	1,19	0,096
Rho-ar (for Estimation 1)0,92511				
Rho-ar (for Estimation 2) 0,92589				
Rho-ar (for Estimation 3) 0,93695				
Rho-ar (for Estimation 4)0,90258				
Rho-ar (for Estimation 5)0,93214				
Sigma_u1,3258				
Sigma_e 0,1525				
Bhargava, Franzini and Narendranathan				
DW test statistic=4.5699 (for Estimation 1)				
5.1245 (for Estimation 2)				
6.2147 (for Estimation 3)				
5.9969 (for Estimation 4)				
5.1421 (for Estimation 5)				
Baltagi-Wu LBI test statistic=4,7589				

Bhargava, Franzini and Narendranathan Autocorrelation Test for Random-Effect Model

Observation	**457**			
Prob>F	**0,0009**			
Dependent Variable	**Coefficient**	**Std. Error**	**z**	**P> |z|**
Log(HDI)	0,2585	0,0255	10,025	0,000
Log(Public deficit)	0,3696	0,0136	27,176	0,000
Log(GDP)	0,4158	0,0251	16,123	0,000
Log(GDP-growth)	0,5563	0,1125	4,940	0,000
Log(unemployment)	0,9632	0,1011	9,502	0,000
Bhargava, Franzini and Narendranathan DW test statistic=3,2588 (for HDI)				
=4,9632 (for Budget deficit)				
=6,3358 (for GDP)				
=4,2133(for GDP_growth)				
=5,1179 (for unemployment)				
Baltagi-Wu LBI test statistic=6,9961				
Baltagi-Wu LBI test statistic =6,2589				
Baltagi-Wu LBI test statistic =6,1124				
Baltagi-Wu LBI test statistic =5,6333				
Baltagi-Wu LBI test statistic =7,2258				

As can be seen in Table 8, both Bhargava, Franzini and Narendranathan DW statistic and LBI statistic were greater than 2 and we could argue that the autocorrelation was not essential for fixed-effect model for random effect model, both Bhargava, Franzini and Narendranathan DW statistic and LBI statistic were greater than 2 and we could argue that the autocorrelation was not essential for random-effect model Finally, we estimated four alternative panel regressions. These were: pooled regression, two-way fixed-effect regression with dummy variable method, two-way fixed-effect regression estimation (intragroup estimation method), and two-way random-effect regression estimation (maximum likelihood method). We could determine the appropriate model that matches the objective of the study. For this determination, there are some statistical tests in the literature. We used F test and Breusch-Pagan and Hausman test. Breusch-pagan test is used to determine the differences among the countries. Thus, if there is a difference between the countries, this indicates the validity of the two-way fixed effect model. However, this group effect could be fixed or random. Therefore, Hausman test was used to test whether the effect was random.As a result of F test for classical model, H_0 is rejected, which means that unit effects were not equal to zero. Therefore, for the scope of the objective, pooled regression was not appropriate. To test pooled regression against the random-effect model, Breusch-Pagan Lagrange Multiplier test was used and obtained results are given in in Table 9:

Table 9. Breusch-Pagan Lagrange Multiplier Test

H_0: Var(u)=0
H_1: Var(u) ≠ 0

Test Results	Variance	df=sqrt(Var)
Log (public expenditure	1.963	1,401
E	0.322	0,567
U	1,225	1,107
Chi^2(1)	478.10	
Prob(Chi^2)	0.000	

As can be seen in Table 9, when LM test statistic is compared to χ^2table value, H_0 hypothesis cannot be rejected. This means, classical model is not appropriate for data and random-effect model must be chosen.

Table 10. Hausman Test

H_0: Difference between parameters is not systematic
H_1: Difference between parameters is systematic

	Parameters			
	(b) Fe	B re	(b-B) Differences	Sqrt(diag(V_b_V_B) S.E.
Log(HDI)	-0.9245	-0.8596	0.0649	0.0258
Log(Public deficit)	0,5899	0,4412	0,1487	0,0155
Log(GDP)	0,8711	0,7436	0,1275	0,0247
Log(GDP-growth)	0,7799	0,5547	0,2252	0,0358
Log(unemployment)	0,6659	0,4412	0,2247	0,0145

χ^2value: 32,58
Prob (Chi^2): 0.0002
B=Inconsistent under H_0 and H_1;
b=Inconsistent under H_1, efficient under H_0.

As seen in Table 10, the first two columns indicate the parameter estimates of fixed effect and random effect models. As a result of Hausman test and according to the estimates of b and B, we could argue that b was inconsistent under H_0 and H_1 hypotheses, on the other hand, B was inconsistent under H_1 hypothesis, but effective under H_0 hypothesis. As a result of χ^2test, H_0 hypothesis was rejected and it could be argued that the estimator of fixed effect model was inconsistent, but estimator of random effect model was valid for the analysis. Generally, to explain the public expenditure in this study, the best model was random-effect model and we could interpret the parameters of this model.

Table 11. Time Series Regression Results (% Effects)

NORWAY			
Effect of Public Expenditure	**2000-2006**	**2007-2015**	**Result**
HDI	-5,25	-5,11	After Global Financial Crisis, among the European Union countries, Norway, Luxemburg and Germany were well in terms of the effects of the crisis. Norway was also the best in terms of economic performance. We obtained this result based on the estimated values of macroeconomic indicators and HDI.
Budget Deficit	4,22	4,25	
GDP	-3,69	-3,77	
GDP_growth	-2,77	-2,99	
Unemployment Rate	6,36	7,25	
LUXEMBURG			
HDI	-6,22	-6,59	
Budget Deficit	4,58	4,65	
GDP	-4,11	-4,36	
GDP_growth	-4,09	-4,28	
Unemployment Rate	7,98	8,05	
GERMANY			
HDI	-6,89	-7,45	
Budget Deficit	4,69	4,91	
GDP	-4,33	-4,76	
GDP_growth	-4,41	-4,63	
Unemployment Rate	8,96	9,55	

As can be seen in Table 11, Norway, Luxemburg and Germany (these countries have lower public expenditure than the other countries) have showed well performance after the global financial Crisis. Especially Norway, than Luxemburg and Germany respectively; have higher HDI, Lower budget deficit and unemployment rate and higher GDP than the other European Union countries. In addition, public expenditure has significant effects on these macroeconomic indicators. These results support our theory that, lower public expenditure means well in terms of economic performance.

6. CONCLUSION

Adverse effects of the crisis that started to affect the globalizing world in 2008 still prevail. The crisis that started in the US financial markets had also affected the real sector and expanded first to EU countries and then to the whole globe and caused a widespread recession. However, despite the years that went by the fact that several of these countries are still under the yoke of the crisis causes to ponder the effectiveness of the policies implemented by these countries. In the post-crisis period, the significance of fiscal stability in maintaining financial stability is well understood. Similar to other countries, it was aimed to increase the demand via monetary and fiscal policy tools in EU countries. The crisis put the expansionist fiscal policies back into the agenda. High public expenditures, the subject matter

of a long-standing debate, was once more at the center of discussions and became a renewed concern especially due to macroeconomic problems such as borrowing, budget deficit and unemployment. Discussions focused on reduction of budget deficits and public debt, which were unsustainable for many countries instead of fiscal stimulus policies. Countries had significant difficulties in fighting against the crisis on one side, and to boost the demand and fight the recession on the other.

In the present study, the effects of public expenditures in EU-28 countries during the time range between the pre-crisis period and today on selected macroeconomic indicators and and HDI were scrutinized. For this purpose, annual data for 2000 – 2015 period was used and three different analysis methods were utilized in the study. Initially scatter diagram was used to determine inter-relationships between public expenditures and macroeconomic indicators and Human Development Index (HDI) for EU-28. As a result, it was determined that high public expenditures had a higher impact on unemployment and HDI.

Second, the effects of public expenditures on macroeconomic indicators and HDI in 28 member countries using panel estimation methods. In this analysis, three different estimation methods, namely pooled regression, fixed effects model and random effects model, were used. The most statistically and econometrically significant and reliable results were obtained with random effects model. The results of this analysis were similar to that of the scatter diagram method. Finally, time series model was predicted for 2000 – 2006 and 2007 – 2015 periods in 10 EU countries with the best per capita income. The analysis results demonstrated that countries with relatively low public expenditures, led by Norway and Luxemburg and Germany, performed better with respect to macroeconomic indicators and HDI especially during the post-crisis period.

The fact that the impact of the crisis is still visible today gives way to the question whether public expenditures were higher than necessary during the pre-crisis and post-crisis periods. In fact, analysis results cement this concern. High public spending could decrease productivity of nations, could result in increases in tax rates and borrowing and could cause those who were not in need benefit from the public spending programs. Thus, albeit increasing public expenditure activity is not an easy and short-term task, certain measures could be implemented in that direction. It is important to increase the productivity of public investments and planning these so that they would contribute to growth and development. Nations should prioritize social security, education, health and investment expenditures. Realization of public expenditures in a manner to reduce budget deficit and public debt would set an environment that could enable a review of spending policies and concentration on needs and better utilization of the budget.

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