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THE IMPACT OF THE EUROPEAN PUBLIC DEBT CRITERION ON THE REAL SOCIO-ECONOMIC DEVELOPMENT

¹Marian Noga

Wroclaw University of Economics
118/120 Komandorska Street
53-345 Wroclaw
Poland
E-mail: marian.noga@wsb.wroclaw.pl

²Marta Postula

Faculty of Management
Warsaw University
1/3 Szurmowa Street
02-678 Warsaw
Poland
E-mail: mpostula@wz.uw.edu.pl

³Jaroslav Klepacki

Faculty of Management
University of Warsaw
1/3 Szurmowa Street
02-678, Warsaw
Poland
E-mail: jaroslawklepacki@poczta.onet.pl

¹Marian Noga, PhD, is Professor of Economics, former Member of the Monetary Policy Council of Poland and former Rector of Wroclaw University of Economics, Poland. His research interests focus on money market and macroeconomics.

²Marta Postula, PhD, Professor of Finance, Director of the Center of Entrepreneurship at the Faculty of Management University of Warsaw. Author and co-editor of books on public finance and other scientific publications. Representative of Poland at the EPC (Economic Policy Committee) Working Group on the Quality of Public Finances. Member of the OECD Working Party of SBO.

³Jaroslav Klepacki, PhD, is currently working at the Faculty of Management University of Warsaw, is an economist and lawyer, he is also an arbitrator at International Court of Arbitration in Amsterdam, Netherlands. His research interests focus on money market, capital market and financial instruments.

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ABSTRACT. *In the period between 2004 and 2016, only 11 out of 28 European Union member states complied with the public debt criterion set out in the Stability and Growth Pact. These data clearly indicate that the public debt criterion does not fulfil its intended role and its revision should be considered, though it cannot be done hastily, and consequences of such a move should be borne in mind. The article indicates, based on qualitative research systematised with a descriptive method, to what extent the European public debt criterion has no impact on the real socio-economic development. Research conducted on selected country groups demonstrates that a low public debt level does not have a positive effect on respective countries' socio-economic development level.*

KEYWORDS: public debt, fiscal policy, fiscal rules, socio-economic development.

JEL classification: E44, E63, F02, F45, G01, G18, P34, P52.

Introduction

The contemporary economic policy in place in different countries takes account of the changing internal and external circumstances. Its content, to a major extent, reflects political programmes formulated during electoral campaigns. The division into right-wing and left-wing politics, worked out at the turn of the 20th century, with respect to economic programmes, has become largely out-dated. What remains slightly clearer is the division into proponents of a greater dose of liberalism or a greater level of state interventionism in the economic doctrine declared as the basis for the policy proposed. In contemporary times, the predominant views on the desirable shape of the economic policy would clearly follow the way of thinking of a school of economics that best addressed current problems (Ghosh, 2013; Eberhardt, Presbitero, 2015; Ahlborn, Schweickert, 2016). In the 1980s and 90s, the monetarist school preferred free market and deregulation, pushed for reducing government spending in the name of a faster long-term national income growth dynamics. In the recent years, neo-Keynesians point to the importance of proper regulation and the significant role of the state in the economy, for example to ensure the implementation of the full employment policy. Numerous economic analyses and econometric models have been devoted to examining which policy was, is or will be more rational, but the changeability of the external circumstances makes it impossible to settle this theoretical dispute. However, regardless of which economic doctrine we consider to be a leading one, each of them involves issues related to public debt and the optimal level of this value for a given country. In the period between 2004 and 2016, only 11 out of 28 European Union member states complied with the public debt criterion set out in the Stability and Growth Pact. It must be emphasised that as many as eight of those 11 countries are economies undergoing an economic transformation: Estonia, Lithuania, Latvia and Slovakia, eurozone members, and Bulgaria, Czech Republic, Poland and Romania, which are still outside it. In 2016, in as many as 17 countries the public debt stood above 60% of GDP. Record-breakers in this respect are Greece and Italy, where this indicator exceeded the allowed limit three times and more than twice, respectively. In 2017, the situation was similar, though both countries came closer to the debt limit, while recording a slight budget deficit. These data clearly indicate that the public debt criterion does not fulfil its intended role and its revision should be considered, though it cannot be done hastily and consequences of such a move should be borne in mind.

The research problematics presented in this article focuses on analysing the impact of the public debt size on the socio-economic development of the selected countries. **The authors wish to examine whether, and if so, to what extent, the European public debt criterion has no impact on the real socio-economic development.**

A mixed methodology combining the results of qualitative and quantitative research is used to empirically verify the hypotheses related to the research problem presented. Qualitative research is based on descriptive analysis, and the quantitative research will include the method of statistical information systemization, based on statistical source data analysis, static dependence methodology, including Pearson's linear correlation coefficient, regression analysis and the logit model developed.

1. Challenges of the Contemporary Economy

The last crisis (2007–2008) laid bare the weakness of the existing economic theories, including financial instruments. This is quite an unoriginal statement as the analysis of modern economics shows a number of insurmountable crises over the last couple of centuries. One of the first crises, for example, as indicated by J.K. Galbraith, was the crisis involving interrelations between factors such as demand, employment and depression. This crisis was consequently the one to lead to the Keynesian revolution, and, after its next manifestation, to the neo-classical counterrevolution. Another crisis we are dealing with is related to the inherent limitations of the phenomena taking place, “of which special attention should be given to the cost of resources, the discipline imposed by climate change, and the institutional failures associated with an uncontrolled, reckless, and often fraudulent financial system” (Giza, 2016). The crisis that came upon us in the 21st century was not only caused by the financial slump; researchers (Kolodko, Galbraith, 2016) suppose that this slump was not one-off in nature. Accordingly, it is important to indicate which new trends in economics address the contemporary multi-aspect challenges faced by public finance (Pescatori *et al.*, 2014). Similarities can be drawn between the thought of Kolodko, Galbraith also in other issues relating to the background of the crisis. Both researchers, in their current publications, criticise the social development mechanism based solely on the claim that the purpose of economic activities is to maximise production, which helps satisfy individuals’ need to a greater extent. Kolodko and Galbraith are critical of the consumer sovereignty and consumer rationality concepts, the key tenets of neoclassical economics, and emphasise the importance of the cultural context and of the mechanism of producers generating consumer needs (Giza, 2016). They also criticise (and they are not the only ones to do so) the GDP fetishism, or the claim that maximising GDP is justified by consumers’ interest (Cecchetti, 2011; Pattillo, 2011; Checherita-Westphal, Rother, 2012).

Meanwhile, A. Nekipelov believes that other symptoms of the crisis of the economic theory, related to micro- and microscale economics, are the problems emerging at the stage of presenting and analysing the data necessary for complex collective economic entities to take decisions. Nekipelov rightly says that for a long time economists believed that the social choice hardly differs from the individual one because, “as it seems, in both cases the purpose is to maximise the utility of needs satisfied in the context of specific preferences and limited resources” (Nekipelov, 2016). However, as K. Arrow said many years ago in his famous “impossibility theorem” (Arrow, 1963), there cannot be a law of social choice that ensures proper development, which is rightly invoked by Nekipelov in his publications.

Irrespective of research aimed to settle the dispute from the point of view of the economic theory, it is desirable to focus on the actually implemented economic policy and to consider the problem based on the principal parameters of the fiscal policy, involving the size of GDP distribution and the growth rate achieved, while taking account of qualitative factors of this policy, resulting from local customs, procedures, legal regulations and their application. (Schick 2010; Schaechter *et al.*, 2012). The choice of proper volume of redistribution, measured by the revenue and public spending to GDP ratio, and the achievement of the desired growth rate represent a fundamental problem for politicians responsible for mid-term social and economic development of a given country, regardless of the political faction represented.

In the light of so many objective elements and processes requiring in-depth analyses, and in view of the last crisis, it is, therefore, necessary to examine its underlying causes rather than focusing only on ad-hoc investigation of that phenomenon – also in the area of finance

and the consolidation activities implemented. Maybe one of those causes is European Union member states' overly restrictive approach to the public debt level set out in Maastricht criteria.

When considering public authorities' efforts to maintain public finance stability, attention should be paid to the need for public sector to always fulfil its principal functions as well as prevention of long-term imbalance in public finance (Marneffe *et al.*, 2011). This can be achieved by developing an effective public spending and revenue system for public finance sector. Another thing that matters is the level of fiscalism, measured with the ratio of public finance revenues and expenditures to GDP. In the light of the above deliberations, a question arises *as to whether the fiscal rules currently applied at the national and European level enable using this fiscal instrument to achieve the objectives that are inherent in the concept of sustainability development*. In this context, it is important to examine not only whether the instruments applied as part of fiscal rules adopted at the EU and national level, limited, for the purposes of this article, to the rules relating to public debt, contribute to fiscal sustainability and public finance stability, but also whether they take account of elements that are required to achieve sustainability development and finance sustainability.

2. Overview of the Impact of the Fiscal Policy on the Economic Growth

Striving to limit the public debt and budget deficit levels, countries undertake consolidation efforts. Finance consolidation should be understood as a policy aimed to improve public finance by reducing budget deficit and maintaining the public debt to GDP ratio at a safe level. In European Union member states, the level of public finance deficit, in line with Maastricht criteria, should be limited to 3% of GDP, and the debt-to-GDP ratio should be below 60% (Ostry *et al.*, 2015). Few countries manage to maintain such levels in the mid-term horizon. Unfortunately, the public finance deficit lingering for a longer period, as encountered in many countries, mainly in the Southern Europe, causes damage to public finance, and the lingering budget deficit results in a high public debt and high cost of its servicing. To avoid such situations, consolidation measures are undertaken as part of the fiscal policy (Obstfeld, Kenneth, 1996). In addition, applying the consolidation policy in public finance sector also contributes to a greater credibility of a given country. In turn, to increase credibility, one needs to lower the debt level or at least not to increase it. This means the need to limit the deficit and, in addition, to gain a surplus to enable debt servicing. To achieve it in practice, selected consolidation packages (consolidation episodes) are used.

As part of measures undertaken in the field of fiscal policy, three types of consolidation packages, or defined sets of measures aimed at public finance consolidation, can be distinguished:

- tax package – it brings together measures aimed to increase public revenues, mainly those based on tax increase. This package of measures based on increasing the tax burden brings a positive fiscal outcome in the short run, but its long-term effects are not so spectacular anymore and thus it's not considered effective. This happens because increasing taxes in an open economy leads to a transfer of investments, production and revenues to economies with lower tax burden. This results in a new budget deficit, generally higher than the original one, which was the point of departure for the tax increase.

- expenditure package – this means all measures leading to reducing the expenditure. The outcomes of expenditure package measures are more effective and long-lasting. However, to achieve that, it is necessary to restrict fixed and unproductive expenses while protecting pro-growth expenses. Pro-growth expenses are those earmarked for purposes that,

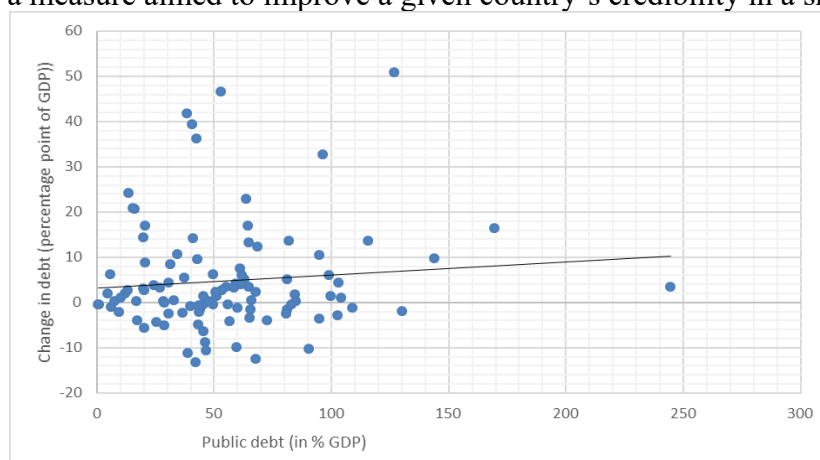
in a long-term horizon, contribute to improved competitiveness and may be a source of potential revenues (expenditure on science, health, R&D and environmental protection). The outcomes of expenditure package measures are more far-reaching and involve wider areas of the economy as they result from structural reforms of the labour and product market, which helps maintain the salary growth rate at an appropriate level.

- mixed package – it involves changes both on the revenue and expenditure side of the budget.

The effectiveness of a given consolidation strategy should be assessed not only in terms of how much the public finance deficit has been reduced, but also in terms of whether the consolidation achieved has a lasting effect – these are the elements that will be analysed in depth further in the article. Budget consolidation at the time of crisis causes recession so, to make it effective and long-lasting, it should be conducted during economic growth and lead to producing a surplus, which will help finance stimulus measures during economic slowdown. (Rito *et al.*, 2012).

OECD report published at the end of 2012, and evaluating the condition of public finance of the member states, presents a classification of respective states in terms of fiscal consolidation needs (from the highest to the lowest or none) (OECD, 2012).

An economic approach to fiscal policy should include the element of aiming for a stable economic growth and long-term public finance sustainability, as discussed in part I of this paper. The shift towards a neutral fiscal policy for the Eurozone as a whole in the period between 2015 and 2016, in the context of historically low interest rates and high external surplus, indicates a need for measures to boost demand. However, it is necessary to aim for balance, also with the help of special legal norms intended to reduce public debt, especially when the economy is performing well. The economic literature and political experience reveal that the best strategy is to rebuild the necessary fiscal buffers to enable an effective countercyclical policy in case of future crises. In a nutshell, there is only space and thus a chance for countercyclical policy at a time of adversity, if we use it consistently at a time of prosperity. This is one of major conclusions to be drawn from the financial crisis: crisis was not fiscal in origin; the lack of fiscal buffer in many countries made it impossible to actively use this fiscal instrument when and where it was most needed. Therefore, it is important to examine when fiscal consolidation conducted in a given country creates such a buffer, and when it's only a measure aimed to improve a given country's credibility in a short time.



Source: own compilation based on: OECD (2007), OECD Economic Outlook 100 database, International Monetary Fund (2016), European Commission (2015), World Economic Outlook Database.

Figure 1. Consolidation Episodes. Change in Debt vs Public Debt Primary Balance

What was especially interesting from the perspective of this article was to find the correlation between the amount of consolidation and debt-to-GDP ratio, in the period before launching the consolidation (see *Figure 1*), which, consequently, turned out to be a significance factor having an impact on the success of the consolidation process as a whole. Those results were obtained using a specially built logit econometric model; the available data on consolidation packages and their potential effects for a period of the last 20 years will be provided.

The data presented in the figure illustrate the opposing economic theories: one that recognises the major role of the state, and those having a completely opposite view.

2002 saw the publication of a new concept of the effects of public expenditure on economic growth (European Commission, 2012), developed based on data on the actual increase and size of public spending in European Union countries in the 1990s. The key dilemma, that of the effects of the change in the total public spending on economic growth, was not solved. It was assumed that the positive impact of publicly funded programmes on economic growth depends on the type of those expenditures and their adequate proportions. Public expenditures help deliver public goods as well as products and services intended to fix market imperfections and improve efficiency. Some social expenditures can also contribute to improved efficiency, provided, however, that they do not exceed a reasonable level. As part of this concept, expenditure was divided into four groups having a different impact on the economic growth. Expenditure on public debt servicing has a negative impact on growth and employment, while using resources for other purposes is usually more productive. Disbursements of old-age and disability pensions, and expenditure on collective consumption and public sector employees' wages have a positive impact on growth up to a specific, relatively high level. An excessive level of spending, for example due to overly high wage growth in the public sphere, may have the opposite effect, crowding out other, more efficient expenditures. Meanwhile, a very high level of spending on old-age pensions may have a negative impact on savings and capital accumulation. Both high and early old-age pensions can have a negative impact on employment. High costs of labour in the public sector may have a negative impact on inflation, and a real impact on the functioning of the labour market (imitation effect in the wage negotiation process etc.). Another group is public spending on social transfers for the disabled, for counteracting social exclusion, for housing, for the unemployed and for family benefits. This type of spending may have a positive impact on efficiency provided it is kept within reasonable limits.

The consequences of the growing public spending for the economic growth are not clear-cut. Pondering on that issue has been the key dilemma of the principal economic schools. The direction and consequences of income redistribution by the state, especially of public spending, vary depending on the economic growth theory assumed. A positive impact of deficit spending is a tenet of the effective demand theory, while a neutral or negative impact of spending on the economic growth is indicated by the New Neoclassical Synthesis. The aforementioned economic schools provide theoretical foundation for making the political choice between a greater dose of interventionism or liberalism. The model studies conducted have not demonstrated that the choice of the consolidation method i.e. whether it is an expenditure or tax consolidation, had any impact on its final success. Most likely, this stems from the fact that the authorities, when selecting the consolidation method, try to adapt, to the greatest extent possible, to the situation in a given country and to the final sensitivity to respective elements.

Hence a question arises as to whether the activities aimed at limiting the fiscal imbalance and debt has a negative effect on the population's living standards and social

development level (Herndon *et al.*, 2013). The possibility of such situation occurring will be the object of further quantitative research. However, the following should be noted and considered in the first place: is the European debt criterion an opportunity or a threat?

3. Identification and Importance of the European Public Debt Criterion in the Changing External Environment

The perception of the role of public debt, especially of its desirable and admissible size as part of public finance, has been a historically determined process. It involved spectacular examples of states going bankrupt due to their debt becoming unserviceable and then taking painstaking effort to rebuild their public finance. These developments unfolded amid changes in the social system and in laws, which are the product of the historical process. It is the historically evolving social system and its transformation that determine the changes in the area of state forms and law. As the state apparatus developed and its function grew in importance, the population's obligations diversified and increased. A complicated system was created to settle amounts payable in kind and by way of personal performance, to satisfy the increasingly diverse needs of the government apparatus. That's why French minister of finance under Louis XIV, Colbert, is quoted as saying that public finance is the most important element of statehood, which plays an increasingly important role in public life. His opinion indicates an inextricable link between public finance and the institution of state. The institution of public finance, same as that of state, developed back in antiquity (Egypt, Greece, Roman Empire), but reached its full bloom at a time commodity and monetary relations became more elaborate, with the advent of capitalism. In antiquity and in the era of feudalism, the state typically had a lot of income from property, with main expenditure incurred for the maintenance of the ruler and his army, and for waging wars.

Adam Smith, the first classic of economic theory, greatly contributed to the modern approach to public finance. The last, fifth book of his work "An Inquiry into the Nature and Causes of the Wealth of Nations" (Smith, 2007) deals with treasury matters. In his deliberations, he saw the state's role in economy as that of a provider of classical public functions; meanwhile, he advocated the use of fees for public services in the area of judiciary and education so that state activities would be the least possible burden on taxpayers. He treated taxes as the necessary evil, intended for financing the four principal areas of state activities, such as: external defence, protection of ownership, judiciary and organisation of public works. Another economics classic, David Ricardo, in his comprehensive textbook "On the Principles of Political Economy and Taxation" (Ricardo, 1817) developed, among others, the theory on financing government expenditure, or the choice between taxation and incurring debt. A theory known as Ricardian equivalence and its consequences are virtually a constant focus of attention of the theory of economics and public finance. Examples of the contemporary discussion of Ricardian equivalence can be found in works by Robert J. Barro (Barro, 1996). Assuming an infinite time horizon of a household and state, tax cuts financed by issuing public debt only mean a change of time-structure of tax burdens. The total sum of savings in the economy remains unchanged as the increase of private savings is balanced by the decrease in public savings. The investment and interest rate levels do not change. Issues described with Ricardian equivalence, regardless of whether the related assumptions and conclusions are adequate, remain key elements of the theory and practice of public finance.

As held by classical economics, financing of government spending by issuing debt helps postpone the burden of spending until the maturity date of the obligations. This meant that an older generation would reap benefits and the younger one would bear the brunt of the

growing public duties (Reinhart, Rogoff, 2010; Irons, Bivens, 2010). Of course, depending on the type of spending financed with debt, also the younger generation could take advantage of the benefits. In consequence, deficits were tolerated only under extraordinary circumstances; in Smith's opinion this was the case of financing war expenditure. Deficits resulted in a growing public debt, which, even upon discontinuing war expenditure financing, was not eliminated (i.e. definitely paid off with budget surplus).

Throughout the 19th century and until the Great Depression of 1929–1935, the orthodox orientation was predominant in the theory of public finance. Its recommendation was that state budget should be as small as possible and absolutely and (which is worth noting) continuously balanced. Further guidance of the orthodox theory of public finance included, among others, the acceptable use of the government borrowing. Proponents of this theory believed that if averting a budget deficit is impossible, it must be absolutely used to finance economic growth. Borrowing for such purposes should be incurred as part of long-term operations so not to reduce the current capitals needed by private enterprises. Moreover, the orthodox fiscalism ruled out the possibility of using taxes for non-fiscal purposes. The consequence was tax neutrality meaning that the tax system cannot change the society's income distribution resulting from the operation of market mechanisms.

In addition to extraordinary war expenditure, at the turn of the 20th century the increase of the redistributive function of public finance was thought to be a potential source of public finance deficit and growing debt. 19th century saw the first attempts at state interventionism (Findlay, Lundahl, 1999), due to the fact that with the growing social development, public authorities started to demand growing income as a result of increasing public spending. Initially, the calls for state intervention were limited to the sphere of national income distribution, but, as time went by, the state's involvement in solving social problems could be observed. The law of increasing state spending, known as Wagner's law, played a major role both in the theory of finance and in economic policy in the 20th century (Shrithongrung, Kriz, 2014). Wagner's law described and supported the concept of welfare state, where social spending such as, for example, social insurance expenditure was in place on a large scale. The Great Depression disproved the belief that the economy can be driven by a self-propelling market mechanism and revealed that the same leads to recession and that economic processes follow a cycle (Boris, 2014). State intervention in that mechanism proved necessary. Theoretical foundations of state interventionism were laid by the British economist John Maynard Keynes.

The key point of his thought is rejecting the classical economic thesis that free market naturally tends to move towards equilibrium of demand and supply and that, by adopting a policy of fast changes to base interest rates, in line with the natural demand for money, a nearly full employment can be secured. According to Keynes, there is no strong correlation between the interest rate policy and the unemployment rate, which is expressed in his famous adage "money does not matter". In Keynes's opinion, budget deficit can stabilise the business cycle by increasing the insufficient aggregate demand. The burden of public debt is directly carried at the time it is issued as the current generation is the one that has to buy the debt issued at the expense of its consumer spending or savings. This is coupled with the assumption that debt is acquired by the domestic, not foreign, sector (Patillo *et al.*, 2002). In those circumstances, debt issuance, rather than postponing the burden, only changes its nature from a mandatory duty to a voluntary lending.

Keynesian idea of placing the debt burden on the present generation was again called into question by James M. Buchanan (1999). In his opinion, public debt issuance means passing the burden on future taxpayer generations. It is of no consequence whether the debt is

acquired domestically or internationally. Debt buyers take voluntary decisions to postpone their consumption, following their own preference. The burden of current expenditure is passed on, using debt issuance, to the future generation, which must bear the costs of its servicing and pay-off, financed by increased taxes.

Centuries of experience in using fiscal instruments suggest that it's impossible to clearly determine universal standards of fiscal policy (Megersa, Cassimon, 2015). It is necessary in this respect to be guided by relativism, or the principle of adapting fiscal instruments to the existing economic, political, historical, religious and other conditions. The development of the institution of the state or, more broadly speaking, of public authorities, and the human development make it necessary for the state to use fiscal instruments such as taxes and public spending. At the same time, findings from the often painful experiences of a country's own past or that of other countries (though, oftentimes, both for individuals and for bodies politic, personal experience works most effectively) suggest it makes sense to use procedures and rules of conduct worked out based on a set of fiscal rules which are consistent with the contemporary economic theory and adequate to the changing internal and external conditions. Proper use of rules in the public management process brings outcomes in the form of high quality of public finance in a given state and has a major impact on economic processes. Experience of the period between 2008 and 2009 shows, however, that the correlations between internal economic processes and those occurring outside of national economies accumulate in the area of debt. The level of optimal debt, its sources (internal and external, with special focus on the government bond market) and the way it is managed are constantly evolving factors, which need constant updating. A perfect example here, strictly linked to the topic of this paper, would be European Union's activities taken in the second half of 2009 to stabilise the financial situation, and to aid the most crisis-affected countries, i.e. Greece, Ireland and Portugal. The crisis on world financial markets and the undermined trust on the debt (bond) market entailing a long-term sale of government bonds made it virtually impossible for those countries to finance their activities by themselves. As a result, the EU introduced two aid packages for countries threatened with bankruptcy, first of which was launched on 2 May 2010, and the second, on 21 July 2011. For Greece alone, it meant receiving funds in the total amount of EUR 260 billion: the first Greek Loan Facility of EUR 110 billion and the second one of EUR 150 billion. The disbursement of subsidy started on March 2012 and was to continue for two years. Due to the escalation of the crisis and the risk of contagion, the term was extended. In total, the European Union lent as much as EUR 240 billion to Greece, which had positive effect on the indicators related to public debt amount and the cost of its servicing. The second aid programme ended when the International Monetary Fund suspended disbursement of subsequent tranches as a result of the failure to meet the loan requirements. The funds from the European Union and International Monetary Fund were to be earmarked for implementing reforms aimed to limit fiscal spending and rein in debt growth. Debt restructuring and management became a priority. The importance of the bond market for the functioning of a state is well reflected by the fact that Greece's credit rating was downgraded after the second aid programme was announced¹.

An abrupt fall in the demand for V4 countries' debt securities was observed in that period, caused, to a great extent, by the lower demand from international financial institutions (a major portion of the entire buyer base), made governments, after 2013, focus on the local market as the main source to finance the needs of state budget. Such measures were aimed to

¹Moody's downgraded it from Ca to Caa1, S&P from CCC to CC, and Fitch informed that when Greece, in line with the plan's assumptions, starts converting its short-term bonds to 30 year treasury bonds, it would downgrade its credit rating to D and announce "selective default" of Greece.

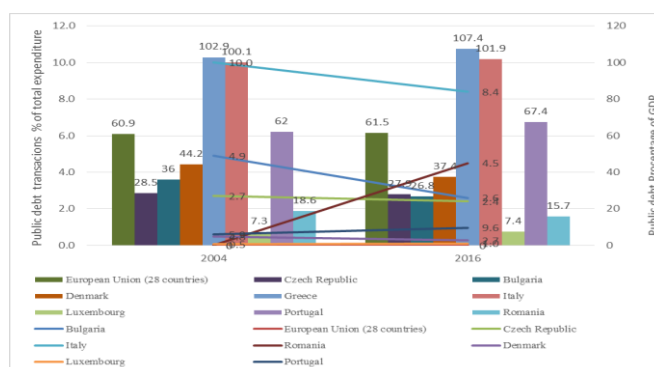
limit the risk of high volatility of foreign investor demand, determined by unstable international situation. Another significant factor contributing to the stability of debt financing system was building large and liquid bond issuances dedicated to long time intervals: 5–10 years, though another factor that played a role here was the maturity level of the national financial market, including the liquidity of the debt market. In the context of free movement of capital, a developed and deep national market helps absorb external shocks and foreign capital outflow. Debt management measures are implemented from time to time through a specific and approved strategy. Therefore, in a broader sense, it's nothing other than an element of fiscal policy, which involves decisions on which part of state expenditure should be financed with borrowing. In a narrower sense, it means a way the state's borrowing needs are financed, and the debt structured, namely the choice of markets, currencies, instruments and issue dates of debt securities (bonds). One of the principal goals is always to minimise the cost of debt servicing in the long-time horizon in the context of the adopted restrictions related to market and non-market risks. The best diagnosed risks include: refinancing risk, exchange rate risk, interest rate risk, liquidity risk as well as credit risk, operational risk and the distribution of debt servicing cost over time. The scale and cyclical nature of the measures in place mean that they are not without consequences for local debt markets. As a rule, such measures always take account of the efficiency and transparency of the government securities market, strengthening institutional investors' trust in this type of investment. Measures involving the distribution of debt securities and the attendant terms and conditions serve to effectively manage state budget liquidity.

4. Methodology and Data Used in the Research

In order to demonstrate the hypothesis, put forward at the beginning, and taking account of the above theoretical considerations, a decision has been made to choose for the analysis EU member states with extremely high and extremely low debt-to-GDP ratio. This will help conduct quantitative research indicating if the debt-to-GDP ratio has an impact on:

- the condition of public finance,
- selected components that drive economic growth, and, equally importantly, on the social life conditions measured with Human Development Index (HDI).

A decision has been made to conduct the research using Pearson's correlation method and the mean change index model. It's quite an atypical model as two extremely different groups of states are considered (group I: Greece, Italy, Portugal and group II: Luxembourg, Bulgaria, Czech Republic, Romania and Denmark) as part of the total research sample. In classical models, we usually deal with a random selection and one research sample. In the model proposed by the Authors, the two-component research sample defined this way indicates that extreme variables will be analysed (see *Figure 2*). The purpose of such model structure is to ensure a more detailed examination of the issue analysed.



Source: own compilation based on Eurostat data.

Figure 2. Public Debt Level and Costs of its Servicing in the Period between 2004 and 2016 in the Countries Analysed

An additional non-standard model element is the clearly marked division into two periods: period I: 2004–2008 and period II: 2009–2016. It must be emphasised here that such a division is not random, either as it results from abrupt changes in the external environment: the period between 2008 (August) and 2009 (March) saw the main impact of the financial crisis. Such time axis selection requires a non-standard approach to the results obtained. Consequently, as part of the model, we examine countries with extreme financial conditions at a time of peace and prosperity, as well as in the period of unrest and very different socio-economic environment. That's why the identification of success for both country groups will be classified differently. Such an approach, in our opinion, guarantees a fully objective examination of the phenomenon identified, and a proper definition of final conclusions for the entire collective of countries.

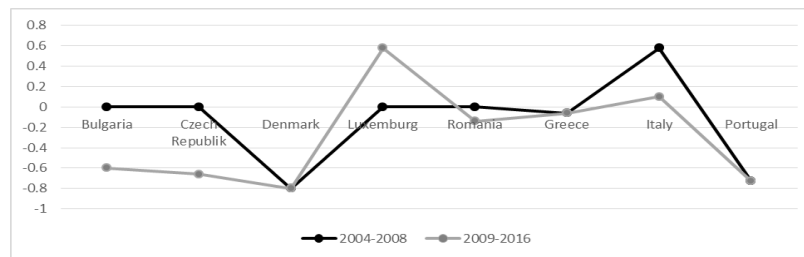
As part of the research activities undertaken, Pearson's r correlation analysis was first conducted. It is a parametric method to study the relationship between two variables measured on a quantitative scale. Statistically significant results mean there is a relationship between variables. Relationships between variables can be positive (when one variable increases, so does the other one) or negative (when one variable increases, the other one decreases). Pearson's r coefficient may have values ranging from -1 to 1. Results close to 0 mean no correlation, while results close to -1 and 1 mean a strong correlation, a negative and positive one, respectively. The strength of the relationship may be measured with the following intervals: 0-0.1 no correlation, 0.1-0.3 weak, 0.3-0.5 moderate, 0.5-0.7 strong, 0.7-0.9 very strong, 0.9-1 nearly full correlation. Results of the correlation analysis between:

- cost of public debt servicing and the share of investment in the aggregate economic growth measured with GDP;

- debt-to-GDP ratio and HDI.

The correlation between the cost of debt servicing and the share of investment in the GDP growth was analysed for the entire 2004–2016 period and broken down into Period I and Period II.

The correlation analysis has demonstrated (Figure 3) that there was a statistically significant and negative correlation between the cost of debt servicing and the share of investment in the GDP growth for Czech Republic $r=-0.65$; $p<0.05$, Denmark $r=-0.67$; $p<0.05$, Romania $r=-0.76$; $p<0.05$ and Portugal $r=-0.96$; $p<0.001$. The relationship for Portugal was the strongest one.

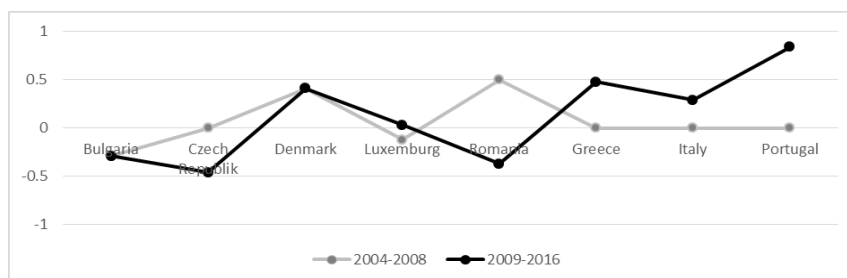


Source: own compilation based on the results of Pearson's r correlation.

Figure 3. Correlation between the Costs of Debt Servicing and the Share of Investment in GDP Growth

Then, analogical analysis was conducted for Period I only. In the period between 2004 and 2008, a statistically significant and negative correlation was demonstrated between the cost of debt servicing and the share of investment in the GDP growth for Bulgaria $r=-0.90$; $p<0.05$. Positive relationships between those variables were demonstrated for Czech Republic $r=0.89$; $p<0.05$ and Luxembourg $r=0.92$; $p<0.05$. In the period between 2008 and 2016, statistically significant and negative correlations were demonstrated between the cost of debt servicing and the share of investment in the GDP growth for Denmark $r=-0.80$; $p<0.05$ and Portugal $r=-0.94$; $p<0.01$. Positive relationships between those variables were demonstrated for Greece $r=0.82$; $p<0.01$. In summary, it can be noted that the strongest negative relationship between the cost of debt servicing and the share of investment in the GDP growth was recorded for Portugal and it was negative in both periods. Negative relationships in both periods were also demonstrated for Denmark, and positive relationships, for Luxembourg. Meanwhile, for Czech Republic, the relationship was positive in Period I, and negative in Period II.

The analysis of the correlation between the behaviour of parameters such as debt-to-GDP ratio and HDI was conducted for the entire 2004–2016 period and broken down into Period I and Period II.



Source: own compilation based on the results of Pearson's r correlation.

Figure 4. Correlation between the Cost of Debt Servicing and the Share of Investment in the GDP Growth

The correlation analysis has demonstrated (Figure 4) that there was a statistically significant and positive correlation between the debt-to-GDP ratio and HDI for Czech Republic $r=0.82$; $p<0.01$, Greece $r=0.77$; $p<0.01$, Italy $r=0.89$; $p<0.001$ and Portugal $r=0.96$; $p<0.001$. The relationship for Portugal was the strongest one. In the 2004–2008 period, a statistically significant and negative correlation was demonstrated between debt-to-GDP ratio and HDI for Bulgaria $r=-0.97$; $p<0.01$ and Denmark $r=-0.93$; $p<0.05$.

In the 2009–2016 period, a statistically significant and positive correlation was demonstrated between debt-to-GDP ratio and HDI for Bulgaria $r=0.90$; $p<0.01$, Denmark $r=0.72$; $p<0.05$, Italy $r=0.85$; $p<0.05$ and Portugal $r=0.92$; $p<0.01$.

In summary, also in this case, the relationship for Portugal was the strongest one. The relationship for Czech Republic broken down into periods turned out to be statistically insignificant because in Period I the relationship was negative, and in Period II, positive. For Bulgaria and Denmark, it has been also demonstrated that the relationship between debt-to-GDP ratio and HDI was negative in Period I and positive in Period II.

The next step to conduct a more in-depth analysis was to use mean change index model, which shows period-to-period changes in the value of a given characteristic.

$$\bar{i}_G = \sqrt[n-1]{\frac{y_n}{y_1}} = \sqrt[n-1]{\prod_{t=2}^n i_{t/t-1}}$$

Where:

$(\bar{i}_G - 1) \cdot 100\%$ tells us by which percentage the values of a given characteristic changed, on average, from one period to another.

Authors defined success in Period I as all relevant factors occurring together, assuming that weights are equal for all those factors:

2nd group of countries

- Public debt growth rate is \leq average growth rate for all EU member states.
- HDI growth (for the entire group) is 5% higher than HDI growth to GDP growth ratio in 2004.
- Growth rate of the public debt servicing cost is \leq growth rate of investment in the economy.

1st group of countries

- Public debt growth rate is $\leq 90\%$ of the average growth rate for all EU member states.
- HDI growth (for the entire group) is 5% higher than HDI growth to GDP growth ratio in 2004 for the Group.
- Growth rate of the public debt servicing cost is \leq growth rate of investment in the economy.

Success in Period II is similarly defined as all relevant factors occurring together:

2nd group of countries

- Public debt growth rate is \leq average growth rate for all EU member states.
- HDI growth (for the entire group, mean for the entire period) is at least $10\% \geq$ than average HDI growth for all EU member states in the period.
- Growth rate of the public debt servicing cost is \leq growth rate of investment in the economy.

1st group of countries

- Public debt growth rate is $\leq 25\%$ of the average growth rate for all EU member states. Those countries underwent deleveraging, therefore, the growth rate should be lower for this group than for the EU.
- HDI growth (for the entire group, mean for the entire period) is \geq average HDI growth for all EU member states in the period.
- Growth rate of the public debt servicing costs is at least $10\% \leq$ growth rate of investment in the economy.

Growth rate is the ratio of the current year to the previous year (so called chain index). It's worth remembering that the average change rate is not a simple arithmetic mean; it is a $(n-1)$ root of the product of increments (average index change rate). Hence, if we have a change

rate for a five-year period, then we have a fourth root of products of changes from those 5 years.

Upon determining the average rate of changes for respective values analysed, the success or failure was established based on calculation of conditional functions from the available databases. If (HDI growth \leq average HDI growth; 1; 0) for example if HDI is lesser than average, then it's 1, success, otherwise, it's 0, failure.

Each of the three conditions yielded 0 or 1. In the end, scoring more than one 1 meant a success.

Table 1. Fulfilment of the conditions and success for respective Group I and Group II countries broken down into periods

	Condition1		Condition2		Condition3		Success	
	2004– 2008	2009– 2016	2004– 2008	2009– 2016	2004– 2008	2009– 2016	2004– 2008	2009– 2016
Group I	+	+	+	-	-	+	Yes	Yes
Greece	+	+	-	-	-	+	No	Yes
Italy	-	+	+	-	+	+	Yes	Yes
Portugal	+	-	+	+	-	-	Yes	No
Group II	-	-	-	-	+	-	No	No
Bulgaria	+	-	-	+	+	-	Yes	No
Czech Republic	-	+	-	-	+	-	No	No
Denmark	+	+	+	-	+	-	Yes	No
Luxembourg	-	-	-	-	-	-	No	No
Romania	-	-	-	-	+	-	No	NO

Source: own compilation based on the model research conducted.

When analysing the success grid map as part of this structured model, it's worth paying special attention to the distribution of partial successes, determined by the number of conditions analysed and the time axis division as part of two research groups selected (*Table 1*). The analysis of the first extreme group of countries, or those having extremely high debt-to-GDP ratio, showed the highest partial success rate for the conditions analysed (10 out of 18, or 56%). Generally speaking, it can be consequently assumed that countries characterised by a high debt-to-GDP ratio confirm the above indicated relationships or clearly depend on them. For the second group of countries analysed, the situation is reversed, namely we are dealing there with a clearly predominant lack of such correlations (10 out of 30, or 33%). In the authors' opinion, such structure of partial results confirms the model structure has been chosen well.

5. Research Results and Recommendations

From the perspective of socio-economic policy, an important tenet of the orthodox theory of public finance was the clear definition of the source and acceptable purpose of government borrowing. Proponents of this theory believed that if averting a budget deficit is impossible, it must be absolutely used to finance expenditure that stimulates economic growth. If a need arises for borrowing, it should be long-term in nature so not to reduce the current capitals needed by private enterprises. Capital expenditure financed from public funds contributes directly to economic growth. It must be remembered, however, that the increase in public spending, including capital expenditure on infrastructure, often goes hand in hand with budget deficit growth, as it's hard to give up on some of the social spending at the same time (Kellerman, 2007; Romp, de Haan, 2007). Moreover, social spending is often highly desirable

and grows at a time of a crisis and business downturn, which stems from the soaring unemployment rate and disturbances on the labour market. In turn, the growth of deficit or debt sends negative messages to economic actors, and thus can influence trends relating to private investment. Hence, state financial policy always faces harsh budgetary constraints, especially that specific expenditures must be incurred, and only once they are financed, it may be possible to earmark funds to development purposes (which are legitimate, by the way), especially to infrastructure development.

The results obtained reveal that, when it comes to the criterion and level of public debt and the cost of its servicing, several interesting aspects can be observed. The research conducted clearly indicates that in the period between 2004 and 2008, no clear correlation can be found in the countries analysed between the scale of investment and the cost of public debt servicing, with the exception of Portugal. There is no correlation, either in the pre-crisis period or in the years following the crisis. In the pre-crisis period, it is observable that for Czech Republic, Denmark, Romania and Portugal, spending related to debt servicing had a negative impact on investment level and crowded out development spending. In the same context, it was most notable in Portugal, where the fall in investment was inversely proportional to with direct correlation between falling investment and increasing cost of debt. This was due, for example, to the fact that in Portugal's public debt structure, the expenditure on debt servicing is 9.6%. For most countries, except Portugal, the situation in the 2009–2016 periods was quite different: in the context of favourable external phenomena, they changed their debt structure, and some of them, for example Greece, benefited from measures under ECB's aid package to reduce their debt, which gave an impetus to development measures. The analysis of relationships between those variables was also conducted for Period II.

However, leaving aside the classical model of GDP and its components, the research demonstrated that HDI increases in proportion to the growing scale of debt and expenditure on the cost of its servicing, meaning, for example, that the availability and quality of public services improves. In the years between 2004 and 2008, such correlation was recorded in Czech Republic, Greece, Italy and Portugal, i.e. in most countries with high debt. Meanwhile, for countries with a relatively low debt-to-GDP ratio, i.e. Bulgaria and Denmark, it was found that despite the situation, HDI was inversely proportionate, which may be caused by an overly liberal and restrictive fiscal policy based on badly chosen consolidation models. These countries drew the right conclusions in the 2009–2016 periods, when the correlation reversed itself. For the remaining countries it was no longer possible to find a clear correlation. Such situation could be due to internal factors and European Commission's intervention in consolidation processes in countries with high debt, a decision to reduce the debt etc.

Conclusions

Sustainability finance includes basically two main lines of action. The first one is improving the structure used to finance sustainable economic growth favouring social inclusion, especially to finance the society's long-term demand for innovation and infrastructure, and speeding up the transition to low-emission and resource-efficient economy. In this convention, of key importance is to maintain long-term stable sources of finance. It is obvious that the main determinant in this area is developing proper relationships between demand and supply. In this context, it was important to analyse whether the criterion set out in Maastricht criteria helps fulfil this goal of socio-economic policy. Research results presented in the article indicate that in the period under analysis the existence of the following relationships can be identified for European countries:

- a low level of public debt does not have a positive impact on respective countries' socio-economic development;
- the defined public debt criterion is unenforceable by the European Union because limiting public debt may have a negative impact on a stable economic development;
- the public debt criterion should not be based on debt-to-GDP ratio; instead, it should take account of indicators such as: cost of debt servicing, public investment ratio and human development index.

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EUROPOS VALSTYBĖS SKOLOŠ KRITERIJŲ POVEIKIS REALIAI SOCIALINEI IR EKONOMINEI PLĖTRAI

Marian Noga, Marta Postula, Jarosław Klepacki

SANTRAUKA

Nuo 2004 iki 2016 metų tik 11 iš 28 Europos Sąjungos narių laikėsi Stabilumo ir augimo paktuose numatytų kriterijų dėl valstybės skolų. Šie duomenys aiškiai rodo, kad valstybės skolos kriterijai neatitinka numatyto lygmens ir turėtų būti atsižvelgta į jų persvarstymą. Tačiau tai negali būti daroma skubotai, reikėtų atsižvelgti į tokio žingsnio pasekmes. Remiantis kokybiniu tyrimu, susistemintu aprašomuoju metodu, straipsnyje aiškinamasi, koku mastu Europos valstybės skolos kriterijai neturi įtakos realiai socialinei ir ekonominei plėtrai. Tyrimai, atlikti pasirinkus šalių grupes, rodo, kad žemas valstybės skolos lygis neigiamai veikia atitinkamų šalių socialinę ir ekonominę plėtrą.

REIKŠMINIAI ŽODŽIAI: valstybės skola, fiskalinė politika, fiskalinės taisyklės, socialinė ir ekonominė plėtra.