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Economic growth in a time of even higher public debt in the European Union countries in the years of 2001–2015

Key words: public debt, EU, GDP

Introduction

The aim of the study was to analyze the direction and the strength of the correlation between the average level of GDP growth (%) and the average level of general government debt (% GDP) in the EU countries within the 2001–2015 period. On the basis of the statistical analysis of data with the use of Pearson's and Spearman's correlation coefficients and regression function, an international comparison was made with the use of the inductive reasoning methodology.

The results show quite strong negative correlation between analyzed values, i.e. the higher government debt, the slower GDP growth over a long period of time ($r = -0.72$). In the case of EU15 countries the correlation was weaker before outbreak of the 2008 crisis and much more weaker than in the Central and Eastern European countries. It seems to be connected to risk underestimation during bull market periods observed in some countries, also in some high indebted EU15 countries. In turn of Central and Eastern European countries the correlation is much more weaker after 2008, what is in line with empirical results that indicate the importance of market expectations about the economy's ability to return to growth path after shock.

Literature overview

Many empirical studies points out to the negative correlation between public debt and the economic growth, especially stronger when debt exceed 90–100% of GDP¹. It must be noted that correlation doesn't imply causation – it might be the case that slow economic growth increases debt². Panizza, Presbitero 2012³ do not find any evidence that high public debt hurts future growth, but they underline that it doesn't mean that there is no causal relationship. In turn Checherita, Rother 2010⁴ confirm (in the case of Eurozone coun-

¹ See e.g. Reinhart C.M., Rogoff K.S., *Growth in a Time of Debt*, "American Economic Review: Papers and Proceedings", 100(2), 2010, ss. 573–578, Reinhart C.M., Rogoff K.S., *Debt and Growth Revisited*, VoxEU.org, 11 August 2010, Kumar M.S., Woo J., *Public Debt and Growth*, "IMF Working Paper", No. 10/174, 2010, Cecchetti S., Mohanty M., Zampolli F., *The real effects of debt*, "BIS Working Paper", No. 352, 2011.

² Krugman P., *Reinhart and Rogoff Are Confusing Me*, "New York Times", 11 August 2010.

³ Panizza U., Presbitero A.F., *Public Debt and Economic Growth: Is There a Causal Effect?*, "MoFiR Working Paper", No. 65, 2012.

⁴ Checherita C., Rother P., *The impact of high and grow-*

tries) negative impact of high government debt-to-GDP ratio on long-term growth at about 90–100% of GDP (what is in line with above mentioned empirical results), they suggest additionally that the negative growth effect of high debt may start already from levels of around 70–80% of GDP. These conclusions are in line with Ahlborn, Schweickert 2016⁵, who argue that different degrees of fiscal uncertainty at comparable levels of public debt between economic systems constitute a major source of heterogeneity in the debt-growth relationship. They show the similarities in growth effects within three group of countries with distinct economic systems: Liberal (Anglo Saxon: United States, United Kingdom, Canada, Australia, Switzerland, Ireland, New Zealand), Continental (Core EU members: Germany, France, Italy, Netherlands, Austria, Belgium) and Nordic (Scandinavian: Norway, Sweden, Finland, Denmark). This indicates that the dominant economic paradigm, its stability in the long run and the degree of predictability of economic policy are of great importance for the effects of high and growing public debt on development prospects and economic growth. This is line with the market participants' expectations theory.

The effects of public debt in the case of economic growth are determined by market trust and the confidence of economic entities in a country's ability to achieve appropriate high level of economic growth which is the one that enables maintenance of high and growing debt without strengthening the investment risk, instability and limiting development possibilities^{6,7}. This is confirmed by the research Checherita, Rother 2010⁸, who indicated that high general government debt have the main negative impact on private saving, investment, total factor productivity, sovereign long-term interest rates. This is in line with empirical results, that are pointing out to the relationship between the situation of public finances and the public debt servicing cost⁹,

ing government debt on economic growth an empirical investigation for the Euro Area, "ECB Working Paper", No 1237, August 2010.

⁵ Ahlborn M., Schweickert R., *Public Debt and Economic Growth – Economic Systems Matter*, "CEGE Discussion Paper", No 281, March 2016.

⁶ Cochrane J.H., *Inflation and Debt*, "National Affairs", (9), 2011, pp. 56–78.

⁷ Cochrane J.H., *Understanding policy in the great recession: Some unpleasant fiscal arithmetic*, "European Economic Review", 55(1), 2011, pp. 2–30.

⁸ Checherita C., Rother P., *The impact of high and growing government debt...*

⁹ See e.g. Faini R., *Fiscal policy and interest rates in Eu-*

that determines the market cost of capital and access to finance, and thus the development possibilities and perspectives¹⁰. It must be noted that above mentioned empirical results are based on developed countries. Izák 2004¹¹ showed using an example of Hungary, the Czech Republic, Slovakia and Poland in the 90's of the 20th century, that in the case of developing countries, the level of economic growth is a much stronger determining factor than the situation in public finance. Thus, as long as there is economic growth, markets are willing to accept certain economical imbalances, especially in the case of developing countries¹². It may also explain the heterogeneity in the results.

The analysis of correlation between the average level of GDP growth (%) and the average level of general government debt (% GDP) in the EU countries within the 2001–2015 period

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¹⁰ See Redo M., *Bezpieczeństwo finansów publicznych – wpływ ekspansji fiskalnej na koszty obsługi długu publicznego w Polsce na tle państw Europy Środkowo-Wschodniej* [in] Jackowska A., Trzaskiewicz-Dmoch A., *Bezpieczeństwo ekonomiczne państwa. Uwarunkowania, procesy, skutki*, CeDeWu, Warszawa 2017, Redo M., *Sustaining government budget deficits as a cause for the cost of public debt service increase in Western European countries in the 1995–2015 period*, "Torun International Studies", No. 1 (9), 2016, pp. 57–65, December, DOI: <http://dx.doi.org/10.12775/TIS.2016.005>, Redo M., *Deficyty budżetowe zagrożeniem dla rynkowego kosztu kapitału? Analiza zależności pomiędzy rentownością skarbowych obligacji a saldem w finansach publicznych w państwach Europy Środkowo-Wschodniej należących do Unii Europejskiej w latach 2001–2015* [in] Leszczyński M., Molendowska M., Pawłuszko T. (ed.), *Wymiary bezpieczeństwa europejskiego*, Uniwersytet Jana Kochanowskiego w Kielcach, Kielce 2017.

¹¹ Izák V., *Public debt service, interest rates and fiscal variables in transition countries*, "Prague Economic Papers", No. 1, 2004, pp. 3–15, DOI: 10.18267/j.pep.227.

¹² Redo M., *Bezpieczeństwo finansów publicznych – wpływ ekspansji fiskalnej na koszty obsługi długu publicznego...*

2001–2015 period with the use of Pearson's correlation coefficient proves strong negative dependency between these values; it means that higher general government debt is accompanied by slower economic growth over the long period of time. Pearson's correlation coefficient for the dependency between the average general government debt (in relation to GDP) and average GDP growth in 28 EU countries over the entire research period amounted to -0.72 (tab. 1).

Tab. 1. Pearson's correlation coefficient for EU28 countries

	2001–2015	2001–2008	2009–2015
EU28	–0,7180	–0,6661	–0,4176
EU11	–0,6141	–0,7048	–0,2676
EU15	–0,5778	–0,4246	–0,5050

Source: own calculations.

It is worth noting that Pearson's correlation coefficient was higher before the crisis ($r=-0.67$ in the years 2001–2008) than after the crisis (-0.42 in the years 2009–2015), which can be explained by more tolerance for expansionary and unconventional economic policy in tough times. It is also interesting that Pearson's correlation coefficient in the Central and Eastern European countries was higher before the crisis, but in the Western European countries: after the outbreak of the crisis. This seems to be in line with the above mentioned findings about heterogeneity in the debt-growth relationship connected to economy's ability to return to growth path after shock. Investors seem to have more tolerance for higher public debts of advanced economies during bull market periods because of more risk appetite and risk underestimation in the case of some countries. They seem also to expect sooner economic recovery from the recession in the case of emerging markets.

These conclusions are confirmed by the analysis of dependency with the use of Spearman's correlation coefficient (tab. 2) which indicates also the negative relation between analyzed values in the EU countries ($-0,66$). Higher Spearman's correlation coefficient for the period before crisis (-0.73) confirms the relationship between the level of public debt and the economic growth rate especially in the absence of a crisis.

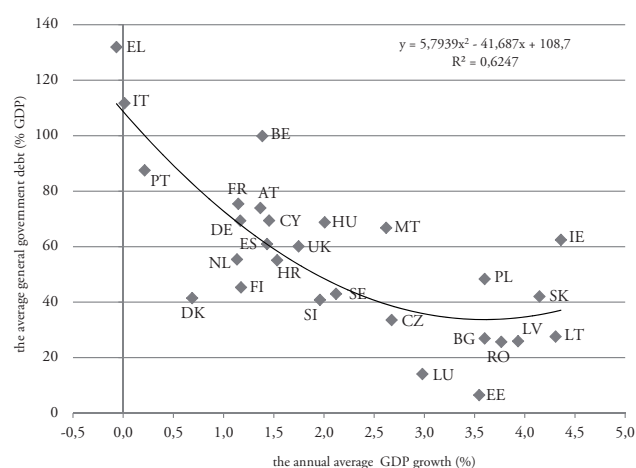
Tab. 2. Spearman's rho for EU28 countries

	2001–2015	2001–2008	2009–2015
EU28	–0,6630	–0,7341	–0,2913
EU11	–0,4477	–0,6636	–0,3205
EU15	–0,5036	–0,4643	–0,4214

Source: own calculations.

A scattergram of data for analyzed countries confirms strength of the above mentioned dependencies (fig. 1). Concentration of points around the negatively angled trend line reflects quite strong negative correlation between the average level of GDP growth (%) and the average level of general government debt (% GDP) within the 2001–2015 period in the EU countries.

Fig. 1. The average general government debt in relation to GDP and the annual average GDP growth in 28 EU countries within the 2001–2015 period.



Source: self-reported data.

The level of regression adjustment is moderate: the R^2 coefficient of determination amounts to $0,62$. As the indicated above regression function is a concave polynomial function (second degree) with negative angle in analyzed database, it might be concluded that the higher the level of general government debt with relation to GDP, the lower the economic growth over a long period of time.

The analysis of correlation between the level of GDP growth (%) and the level of general government debt (% GDP) separately for every EU country within the 2001–2015 period

Above presented conclusions are confirmed by the results of the second part of the correlation analysis conducted separately for every EU country: for the whole period of 2001–2015 and for two subperiods – before and after the 2008 crisis. The table 3 is a summary table of the results of Pearson's correlation analysis for every EU country given in table 4.

Tab. 3. Number of countries with given sign and strength of Pearson's r (according to J. Guilford classification)

	2001– –2015	2001– –2008	2009– –2015
Negative correlation:	24	19	4
• very strong [0,7–0,9]	1	7	0
• strong [0,5–0,7]	4	5	0
• moderate [0,3–0,5]	13	2	1
• weak [0,1–0,3]	5	4	3
• very weak [<0,1]	1	1	0
Positive correlation:	4	9	24
• almost perfect [0,9–1]	0	0	1
• very strong [0,7–0,9]	0	0	4
• strong [0,5–0,7]	0	1	5
• moderate [0,3–0,5]	1	1	8
• weak [0,1–0,3]	2	3	4
• very weak [<0,1]	1	4	2

Source: own calculations.

During the entire 15-year long analysis period (2001–2015), 24 EU countries demonstrated negative correlation between the average level of general government debt (% of GDP) and the average level of economic growth. 18 countries demonstrated either moderate or stronger correlation – tab. 3 (the strongest in the case of Greece: -0.70 , medium-strong in the case of Cyprus, Latvia and Hungary: about -0.6 and Croatia: -0.52 ; tab. 4). Up until the crisis outbreak (2001–2008), negative correlation was demonstrated among a lower number of countries: 19; however, it was a stronger negative correlation: in the case of 7 countries it was very strong (Latvia, Greece, United Kingdom, Bulgaria, Ireland, Slovakia, Hungary) and strong in the case of 5 (Luxembourg, Netherlands, Belgium, Croatia, Romania). As averaged data for the EU demonstrates, the correlation between the public debt level and economic growth decreased: only 4 EU countries demonstrated negative correlation between those values (in three of them: weak and in one: medium), whereas in the case

of 24 countries positive correlation was demonstrated (strong correlation in the case of 10 countries; tab. 3 and tab. 4).

Tab. 4. Pearson's correlation coefficient for EU28 countries in the years of 2001–2015

	2001–2015	2001–2008	2009–2015
Bulgaria	0,32	–0,81	0,60
Croatia*	–0,52	–0,55	0,79
Czech Republic	–0,45	0,41	0,36
Estonia	–0,29	0,00	0,15
Hungary	–0,58	–0,71	–0,26
Latvia	–0,59	–0,87	0,20
Lithuania	–0,35	0,16	0,83
Poland	–0,06	0,64	–0,27
Romania	–0,46	–0,53	0,95
Slovakia	–0,45	–0,76	0,46
Slovenia	–0,29	–0,31	0,62
Cyprus	–0,60	–0,23	–0,24
Malta	–0,32	–0,41	–0,49
Austria	–0,43	–0,27	0,50
Belgium	–0,43	–0,55	0,17
Denmark	–0,11	–0,19	0,48
Finland	–0,31	–0,01	0,35
France	–0,31	–0,17	0,35
Germany	0,10	0,25	0,55
Greece	–0,70	–0,85	0,33
Ireland	0,01	–0,77	0,04
Italy	–0,31	0,06	0,30
Luxembourg	–0,20	–0,60	0,73
Netherlands	–0,41	–0,58	0,40
Portugal	–0,39	0,07	0,16
Spain	–0,43	0,10	0,57
Sweden	0,18	0,20	0,03
United Kingdom	–0,20	–0,82	0,89

* excluded 2001.

Source: own calculations.

Conclusions

There is a new dimension for the discussion about the cause and effect relationship between the public debt level and economic growth. The unprecedented growth of public debt in many countries as a result of the crisis of 2008 questions future progress of civilization in the view of this correlation. Researches mostly agree on the presence of negative correlation between the public debt level and economic growth; that is, higher public debt is accompanied with slower economic growth.

There are ongoing doubts regarding diverse results of interaction of these values. However, it seems that, in the era of an increased wealth of financial markets, their transparency and strong competition strengthening investors' rationality, it is safe to say that the negative effect of public debt on economic growth, the strength of this phenomenon and the border debt level (when this effect starts increasing) are determined by market expectations in terms of economic capabilities of a given country to return on the path of relatively dynamic economic growth, meaning the one that enables maintenance of high and growing debt without limiting development possibilities – without strengthening instability and investment risk. The trust of investors and other economic entities regarding the effectiveness of economic policy and, in the case of ultra low interest rates – fiscal policy, seem to be the key in supporting the economy on its way back to stable growth. The above is reflected in ratings of individual economies, yields of treasury bonds or CDS spreads. Debt level, which has been growing for decades worldwide (not of governments only) creates, in the case of constantly increasing financial markets' wealth, the increase of an acceptable risk level and increases the appetite for risk as well as tolerance for continuously growing debt. This is also due to growing possibilities of global economy to roll over and maintain increasing debts without limiting development possibilities of global economy.

The results of a conducted correlation analysis are in coherence with the above, as they confirm the presence of a relatively strong negative correlation between the general government debt level and economic growth: in the case of the EU15 countries; weaker before the crisis of 2008 and significantly weaker than in the CEE countries (which seems to be in relations with the phenomenon of underestimated investment risk in some economies, including heavily indebted countries of the EU15), whereas in the case of CEE countries significantly weaker after 2008. It might be related to higher tolerance to fiscal expansion in the situation of crisis in the case of economies with lower public debt and, more importantly, in the case of developing economies – as those, as a rule, possess higher capabilities of obtaining higher rates of economic growth. It seems to confirm the importance of market expectations on capabilities of a given economy to return on the growth path.

In this case, the IMF's warning on low economic growth of countries that do not reduce public debt¹³

seems to refer only to those countries with high debt (not only public), strong dependence on external financing and unstable credibility. In the case of economies with higher investment trust it seems to be correct to state that the greatest threat to economic growth is policy inaction fueled by deficit fears¹⁴, especially in a low interest rate environment when expansionary fiscal policy is likely to be self-financing¹⁵ (DeLong, Summers 2012, Krugman 2011).

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