

## THE MYTH OF AUSTERITY. EMPIRICAL EVIDENCE FROM THE EUROZONE COUNTRIES

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### Abstract

The paper discusses the impact of austerity policy on economic performance in the eurozone countries after the global crisis that occurred in 2007-08. The undertaken fiscal consolidation efforts to cut government expenditure and increase government taxes which begun in 2010, aimed to return sustainability in public finance as the rapid growth in sovereign debt was observed in many economies, especially in the South Europe. The implemented austerity policy under the external pressure not only amplified recession but also caused the further deterioration of public finance characterized by large deficits and increasing public debt. Based on the literature and empirical findings, the issue of austerity policy and its potential consequences on growth is examined. The research aim is to explore both advantages and disadvantages of austerity, focusing on the macroeconomic conditions which accompanied it and the impact of such policy on economic growth in the eurozone countries. The hypothesis of the negative influence of austerity on economic performance is verified on the basis of recent economic literature and conducted empirical research. Both descriptive analysis and dynamic panel regression based on two-step Generalized Method of Moments was used. Data from 2010-17 for the eurozone countries served to prove the existence of a key negative relationship between austerity policy and economic growth in economies that experienced deep great recession. The conducted analysis confirmed that austerity initiated to reduce the public debt to GDP doesn't contribute to macroeconomic stabilization, adversely affecting potential output. Contrary to widely held opinion, this allows us to claim that austerity is not a good remedy for economies suffering from recession.

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## INTRODUCTION

The most severe world recession post-World II which also affected by its range the euro area in 2007-08 seemed to have rediscovered the virtue of state intervention. In the face of the global great depression and deteriorating public finance, both economists and politicians sought the appropriate policy response to the crisis. At the begun of the recession in 2008-09 the vast majority of states returned to Keynesian fiscal instruments, introducing fiscal stimulus and expanding government expenditures as a countercyclical measure to cushion the impact of global crisis. As public debt increased exponentially, and potentially became unsustainable, the governments of most euro area countries, particularly Greece, Spain, Portugal or Italy, had to reduce it, deciding on fiscal contraction after 2010, despite the fragile state of economic recovery. In the second phase of the crisis, the gradual shift towards austerity in fiscal policy took place due to the market pressure and recommendation of international institutions (called the Troika), such as the International Monetary Fund, European Central Bank and the European Commission. The deficit reduction policy, which refers to austerity based on budget cuts or tax increases, was seen as the remedy to combat irresponsible fiscal policy and restoration of debtors' credibility. However, the effectiveness of austerity policy implemented in many countries which experienced debt explosion is contested, given the poor macroeconomic conditions caused by the deep economic depression that occurred at the same time.

The author formulated a hypothesis that the austerity policy implemented during the recession in the conditions of short-term nominal interest rates at the zero boundary is ineffective in stimulating economic activity and detrimental to economic growth. In addition, if the economy is in depression, austerity doesn't bring positive benefits in the form of improved public finance, but inevitably leads to large deficits and increase in public debt. This hypothesis seems to be in line with the recent debate on austerity and economic growth, which was initiated by opponents of the theory of expansionary austerity policy (EAT), such as DeLong and Summers (2012); Herndon et al. (2014); Krugman (2015) or Fatas and Summers (2016).

The main aim of the paper is to present the problem of austerity against theoretical and empirical background.

The conducted dynamic panel data analysis is based on the sample of 19 euro area countries that introduced austerity policy after 2010. For this purpose, data referring to public finance from AMECO and the Eurostat database was used. The weaknesses of the theory of expansionary austerity were indicated by the content analysis and empirical research. It should be also emphasized that according to the EAT literature, the author used the concept of cyclically adjusted primary balance (CAPB) as a measure of austerity (Alesina & Perotti, 1997; Alesina & Ardagna, 2010; 2012).

The paper is structured as follows. Section 1 presents austerity theory and its empirical critique in favors of Keynesian fiscal policy. The next section characterizes fiscal policy of the euro area countries which were forced to implement austerity in the face of debt crisis along with its macroeconomic consequences. In section 3 the overview of recent empirical research and the implemented methodology is presented, while section 4 describes the results of dynamic panel analysis. Section 5 summarizes the conducted research indicating the possible avenues and limits of the approach used in this study.

## THE ARGUMENTS FOR AUSTERITY

The recent European debt crisis provoked public debate on austerity as a way of combating unsustainability of public finance. In the case of fiscal imbalances in many eurozone countries, a substantial fiscal prudence was commonly recommended by most economists and policymakers. The concept of austerity is associated with budget cuts or increasing taxes enough to generate budget surpluses that reduce indebtedness. Austerity is understood as fiscal adjustments, the effect of which is to improve the cyclically adjusted primary balance (CAPB). Alesina and Ardagna (2010) defined major fiscal adjustments as episodes during which the CAPB improved by at least 1,5% of GDP. However, the IMF counts as fiscal adjustment deficit reduction measures of a certain scale even when they do not lead to budget deficit decrease of the size intended (Dellas & Niepelt, 2015, p. 12). It is worth highlighting that the idea of austerity has its solid theoretical foundations. The theory of expansionary austerity emerged at the beginning of the 1990s. In the light of the opinion of EAT supporters, discretionary fiscal policy may have non-Keynesian effects, in other words, is ineffective to stimulate economic activity, and at the same

time such policy may put at risk the solidity of public finance and of the whole financial system (Giavazzi & Pagano, 1990; 1996; Alesina & Perotti, 1997; Alesina & Ardagna, 2010; 2012). The above-mentioned economists using some specific case studies claimed that well-conceived fiscal restrictions might stimulate private consumption and investment, as well as improve export dynamics, so that the overall economic activity might eventually expand rather than contract. Fiscal adjustments that took place in Denmark and Ireland in the 1980s were used to first investigate the possibility of expansionary fiscal policy. How can contractionary fiscal policy be expansionary?

To answer this question, it should be stressed that EAT is based on the expectations, of financial and external channels. Firstly, successful fiscal consolidation may positively affect the behavior of private economic entities, both households and enterprises, through the so-called “expectational channel”. This observation is consistent with the Ricardian equivalence theorem which assumes that government expenditure cuts may induce economic agents to elaborate optimistic expectations by anticipating future tax reductions and as a result, increasing their permanent income. The optimistic attitudes of business entities would encourage them to immediately raise current consumption and investment, having positive impact on economic activity in the short-term. Secondly, if contractionary fiscal policy proves to be effective in reducing public deficits and public debt stocks, it can stimulate investment and growth by reestablishing bond creditors’ trust in public finance solvency. The reduction of government borrowing requirements diminishes the risk premium associated with public debt issue, bringing additional benefits, mainly the decrease in real interest rates which enhance the effect of crowding-in of private investment, contrary to the crowding-out effect appearing along with the increase in public spending. Lower real interest rates will stimulate the long-term consumption, investment and economic growth (Giavazzi & Pagano (1990)). Finally, it is also worth mentioning that aside from the expectational channel, an “external channel” may occur in situations where public wage cuts identified with austerity policy that helps moderate wages in the labour market, may cause internal devaluation which may contribute to external competitiveness improvement (Botta, 2015, pp. 1-3). Taking it into consideration, Alesina and Perotti (1997) defined two types of fiscal adjustments. The first one is related to fiscal contraction based on social expenditure cuts (unemployment subsidies, minimum

income subsidies) and public sector wage cuts, while the second type of fiscal adjustment refers to the increase of labour income taxes and public investment expenditure cuts. According to these authors, the fiscal episode of Ireland in 1987-1989 represented the first type of fiscal adjustment, but fiscal episodes in Denmark in 1983-1986 could be classified as the second type adjustment (Afonso, 2006, p. 10).

It should be simultaneously emphasized that Alesina & Ardagna (2010) and Reinhart & Rogoff (2010) have an important contribution to the EAT development. Alesina & Ardagna in their study titled “Large changes in fiscal policy. Taxes versus Spending” drew two conclusions on austerity policies in advanced economies. First, expenditure-based adjustments identified with cutting spending and not raising taxes, or relying less on tax increases than on spending cuts, were found to be much less costly in terms of output losses than tax-based approaches. Second, expenditure-based adjustments along with an appropriate set of related policies can be expansionary, even in the short run. In turn, Reinhart and Rogoff (2010) published a hotly debated paper “Growth in a time of debt”, demonstrating that for the developed economies, the increase of the public debt over 90% of GDP determines a 1 % decrease of GDP. Moreover, the negative impact of public debt upon the economic growth tends to be lower in advanced economies compared to developing economies.

### **WHY CAN AUSTERITY BE SELF-DEFEATING?**

The debate regarding the use of austerity policy in response to the increasing government deficits in the aftermath of the global financial crisis has encouraged the overview of the studies supporting the expansionary contraction hypothesis. When Europe experienced a sovereign debt crisis at the beginning of 2010 which led to the increase in interest rates on government debt in some countries (particularly Greece, Portugal and Ireland), austerity seemed to be inevitable. On the one hand, the IMF supported fiscal consolidation, being strongly convinced that austerity was the right remedy after the financial crisis which was experienced significantly by some of the eurozone countries. On the other hand, there was simultaneously a consensus among economists that the temporary fiscal stimulus which took place in the first phase of the crisis in 2008-09 was really needed in recessionary and slow economic growth conditions to

return the economy to its full capacity. However, too fast implementation of significant austerity measures, including both spending and tax increases, proved to be ineffective to reduce public debt, and what is more to calm financial markets due to the fact that the economy was still in recession. As a result, undesirable short-term Keynesian effects of fiscal policy emerged, mainly the negative demand effects of lower public spending or higher taxes which were especially harmful for a depressed economy. It has shed a new light on austerity policy, which aims to ensure the sustainability of public finance but sometimes could be self-defeating. Why and when is fiscal austerity not good for the economy? To answer these questions, it is worth mentioning recent economic research devoted to austerity policy and its negative macroeconomic consequences. Perotti (2012) stated that the expansionary fiscal consolidations hypothesis, and its applicability to many countries, seems questionable in the current circumstances. The author concluded that given the channels through which growth was realised, the past experience of Denmark (1982-6), Ireland (1987-90), Finland (1992-8) and Sweden (1993-8) is not a useful guide to the present. Firstly, depreciation is not available to EMU members. Secondly, expansion based on exports is not available to the world as a whole. Thirdly, a further decline in interest rates is unlikely in the case of short-term nominal rates at their zero lower boundary when the Central Bank cannot perform its full stabilization function to combat the economic crisis. In a severe downturn a discretionary fiscal policy is required, contrary to fiscal consolidation which is more likely to contract economic activity, reduce aggregate demand and ultimately increase unemployment (Guajardo et al., 2011). This opinion is in line with the Keynesian approach as Keynes (1936) wrote “the boom, not the slump, is the right time for austerity at the Treasury”. Many contemporary economists agree with this claim. In addition, Delong and Summers (2012) paid attention to the fact that the absence of supply constraints in the short-term, together with a binding zero lower boundary on interest rates means that the Keynesian multiplier is likely to be substantially greater than in normal times. It allows us to explain why fiscal consolidation is “clearly a drag on demand, and it is a drag on growth” (Blanchard, 2012). If an economy is in deep depression, Keynesian multipliers are large, so that austerity has large costs in lost output and unemployment (Krugman, 2015). Under the conditions of a liquidity trap, fiscal consolidation seems to be self-defeating, contributing to

the current output shortfalls which affect the economy’s future potential. This phenomenon is called the hysteresis effects of fiscal policy and is an important argument against austerity policy in times of crisis. According to Stiglitz (2011) “job creation, not austerity, should be a policy goal” in a depressed economy. A policy of austerity may well be counterproductive and any attempt to reduce debt via fiscal consolidation has very likely resulted in a higher debt to GDP ratio through their long-term negative impact on output (Fatas & Summers, 2016).

### **AUSTERITY POLICY AFTER 2010. THE CASE OF PIGS COUNTRIES**

The sovereign debt crisis in 2010 which spread from Greece to other countries of the Eurozone, particularly Portugal, Italy and Spain (PIGS) forced their governments – under the pressure of the so-called ‘Troika’ (EU-ECB-IMF) – to introduce sizeable austerity measures (Blyth, 2013; Ortiz & Cummins, 2013). Regarding the austerity measures implemented since 2010 many governments have decided on various adjustment strategies that included: elimination and reduction of subsidies, wage cuts in the public sector, increasing consumption taxes (mainly VAT), pension and healthcare reform or labour flexibilization (Ortiz et al., 2015, pp. 15-16). Table 1 summaries the main austerity measures adopted in the South Europe countries that have been severely hit by the crisis.

The austerity measures aimed at fiscal consolidation were the response to government deficits and sovereign debt, which seemed to be under control. At the same time, it was assumed that the implemented austerity packages, based on both expenditure and revenue measures should improve fiscal balance, even though fiscal adjustments were made in a depressed economy. The results of fiscal consolidation is presented in Table 2.

Sharp fiscal contractions should bring a sustainable debt reduction. It is worth stressing that fiscal austerity measured by cyclically adjusted budget balance (%GDP) contributed to the improvement of current fiscal balances in the Eurozone, but finally did not lead to the reduction in average public debt, which increased from 84,6% in 2010 to 87,2% in 2018. In addition, the austerity policy was not expansionary, negatively affecting the Eurozone economy, as real GDP decreased from 2,1% in 2010 to 0,3% in 2013. Similarly, unemployment rates increased from 10,2% in 2010 to 12% in 2013. Moreover, the effects of austerity policy and its main macroeconomic consequences are

**Table 1: Austerity policy in PIGS countries after 2010**

Portugal	Italy	Greece	Spain
increase in PIT top rates (from 42% to 56,2%)* and top CIT rates (from 26,5% to 29,5%)*; reduction of tax credits	increase in PIT top rates (from 44,9% to 47,2%)*	increase in top income tax rates (from 40% to 55%)* along with lowering bottom income tax rates; broadening of the income tax base through changes of tax credits and allowances	increase of personal income top tax rate from 43% to 52% in 2012
increase in the standard rate of VAT (from 20% to 23%)*	increase in the standard rate of VAT (from 20% to 22%)*	increase in the standard rate of VAT (from 19% to 24%)* and introduction of two reduced rates of VAT (from 6,5% to 13% in 2011)*	increase in the standard (from 16% to 21%)* and reduced rate of VAT (from 7% to 10%)*
freezing of nearly all insurance benefits and pensions	public sector pensions cuts	public sector pension cuts; introduction of a one-off additional tax on incomes and a special tax on pensions	freezing of public pensions
reduction of means-tested unemployment assistance, family benefit and social assistance	cuts in social benefits	shorter granted periods of regular unemployment benefits and reduction of special seasonal unemployment benefits	cuts in, and freezing of cash benefits
public sector pay cuts	wage freezing in public sector	public sector pay cuts	public sector pay cuts

\* comparison of 2009 with 2017

Source: Hespanha and Portugal, 2015, p. 1122 and European, 2018

more evident on the case of PIGS countries. The impact of austerity policy on the PIGS countries was especially devastating in 2010-2013. The second contractionary phase seemed detrimental to economies suffering from financial crisis. The further shock which occurred after 2010 contributed to the significant decline in economic growth and sudden rise in unemployment. The worsening macroeconomic conditions had a negative impact on the effect of fiscal consolidation, leading to the higher levels of public debt in PIGS countries. This observation allows us to conclude that changing course too quickly from fiscal stimulus to fiscal austerity in times of severe economic downturn was the wrong decision due to the appearance of hysteresis effects in fiscal policy. The implementation of restrictive austerity programs weakened the initial positive effects of fiscal stimulus for short-term economic growth. In addition, many researchers suggest that it may also negatively influence medium-term economic growth capacity.

## DESCRIPTION OF RESEARCH METHODOLOGY BASED ON THE EMPIRICAL STUDIES

There are two conceptual issues related to the impact of fiscal austerity on economic growth. The first issue is

that a policy can only be said to be austere relative to some benchmark. The second issue is the endogeneity of fiscal policy to the economy. Did government expenditure cuts adversely affect output? (House et al., 2017, p. 6). Austerity can be gauged through the use of at least three approaches. One usually identifies periods of austerity on the basis of fiscal indicators, such as structural primary budget balance (SPBB) or cyclically adjusted budget balance (CABB). Both are calculated in terms of potential GDP and they are available from the IMF, the OECD or AMECO databases. A second narrative approach proposed by Romer and Romer (2004) is based on a subjective assessment of historical policy record to identify policy changes that are motivated by the long-term fiscal consolidation rather than the need for the short-term fiscal stimulus. According to a third approach, implemented by Blanchard and Leigh (2013), austerity is examined by forecast errors in government purchases and their relationship with associated forecast errors in economic output. It is worth highlighting that the author has decided to choose the first approach, based on the CABB measure, which is called fiscal stance, and used as the standard method for measuring discretionary fiscal policy.

Fiscal adjustment is usually identified as an improvement of CAPB in excess of a chosen threshold

**Table 2: Effects of Fiscal adjustments in PIGS countries against the background of the euro area (% of GDP)**

	2010	2011	2012	2013	2014	2015	2016	2017	2018
<b>Euro area</b>									
Cyclically Adjusted Budget Balance (CABB)	-4.3	-3.6	-2,1	-1,3	-0.9	-0.9	-1	-0.8	-0.7
Gross debt	84.6	86.6	89.7	91.6	91.8	89.9	89.1	86.8	87.2
Real GDP (percentage changes)	2.1	1.7	-0.4	0.3	1.8	2.3	2	2.4.	n.a.
Unemployment rate	10.2	10.2	11.4	12	11.6	10.9	10	9.1	8.4
<b>Portugal</b>									
Cyclically Adjusted Budget Balance (CABB)	-8.5	-6.7	-3.6	-3	-1.8	-2.3	-2.1	-1.3	-0.9
Gross debt	96.2	111.4	126.2	129	130.6	128.8	129.2	124.8	
Real GDP (percentage changes)	1.9	-1.8	-4	-1.1	0.9	1.8	1.9	2.8	
Unemployment rate	12	12.9	15.8	16.4	14.1	12.6	11.2	9	7.1
<b>Italy</b>									
Cyclically Adjusted Budget Balance (CABB)	-3.4	-3.3	-1.3	-0.6	-0.8	-0.5	-1.5	-1.8	-1.8
Gross debt	115.4	116.5	123.4	129	131.8	131.6	131.4	131.2	
Real GDP (percentage changes)	1.7	0.6	-2.8	-1.7	0.1	0.9	1.1	1.6	
Unemployment rate	8.4	8.4	10.7	12.1	12.7	11.9	11.7	11.2	10.7
<b>Greece</b>									
Cyclically Adjusted Budget Balance (CABB)	-9.4	-5.4	0.9	3	2.9	2.8	5.1	4.6	4
Gross debt	146.2	172.1	159.6	177.4	178.9	175.9	178.5	176.1	
Real GDP (percentage changes)	-5.5	-9.1	-7.3	-3.2	0.7	-0.4	-0.2	1.5	
Unemployment rate	12.7	17.9	24.5	27.5	26.5	24.9	23.6	21.5	19.6
<b>Spain</b>									
Cyclically Adjusted Budget Balance (CABB)	-7.1	-6.3	-3.2	-1.8	-1.5	-2.5	-3.3	-2.9	-3.1
Gross debt	60.1	69.5	85.7	95.5	100.4	99.3	99	98.1	
Real GDP (percentage changes)	0	-1	-2.9	-1.7	0.1	0.9	1.1	1.6	
Unemployment rate	19.9	21.4	24.8	26.1	24.5	22.1	19.6	17.2	15.6

Source: AMECO database, European Commission. Economic and Financial Affairs [http://ec.europa.eu/economy\\_finance/ameco/user/serie/SelectSerie.cfm](http://ec.europa.eu/economy_finance/ameco/user/serie/SelectSerie.cfm), Eurostat database, Government Finance Statistics, <https://ec.europa.eu/eurostat/data/database>

over a given period. Two aspects of fiscal adjustments are mainly taken into account. First, the factors that ensure that fiscal adjustments are expansionary. Second, the effects of fiscal adjustments on macroeconomic outcomes. There is a large empirical literature devoted to the expansionary fiscal adjustments based on a descriptive analysis of the characteristics of fiscal components and other related macroeconomic variables, such as GDP and interest rate before, during, and after the fiscal adjustment period (Alesina & Ardagna, 1998; 2010; 2012; Alesina & Perotti, 1995; 1997; Giudice et al., 2007; McDermott & Wescott, 1996). The authors often used binary dependent variable

models, such as logit or probit to analyze which factors determine the success of fiscal consolidations (McDermott & Wescott, 1996; Afonso et al., 2006) and confirm their expansionary effects (Alesina & Ardagna, 1998; Giudice et al., 2007). The majority of authors claimed that better effects of fiscal consolidations are achieved through sharp reductions in government expenditure than tax increases. Similarly, Blanchard & Perotti (2002) using a mixed structural VAR/event study approach, showed positive effects of government expenditure cuts on U.S. economic growth in the post-war period.

It is worth emphasizing that the focus on

macroeconomic effects of fiscal adjustment is less common. Adam & Bevan (2005) examined the relationship between fiscal deficits and growth for panel data of 45 developing countries. Their analysis confirmed the negative impact of tax increases on economic growth, while the implications of the deficit seemed to be complex, depending on the financing mix and the outstanding debt stock. Afonso (2010), based on panel models for private consumption, tried to assess expansionary fiscal consolidation in the EU-15 in the years 1970-2005. He found that that fiscal consolidations tend to have long-term expansionary effects, but no significant effects in the short-run. Taking into consideration the significance of the size of fiscal multipliers when the economy is recession, Auerbach & Gorodnichenko (2012) employed a regime switching the VAR model. By imposing the restriction that the U.S. economy is in recession 20 % of the time, the authors estimated that the total spending multiplier is 0.57 during expansions and 2.45 during recessions, while the defence spending multiplier is 0.8 during expansions and 3.56 during recessions. Next, Arin et al. (2015) used a non-linear model within a Markov-switching framework to assess the size of fiscal multiplier. According to their estimates, the spending multiplier is 2.91 for periods of low growth and 0.13 for periods of high growth, while the tax multiplier is 0.19 for periods of low growth and 0.66 for periods of high growth. After the global crisis of 2007-08, the aim of many empirical studies was to prove that fiscal contraction is not expansionary as supporters of EAT suggested. Macroeconomic effects of fiscal adjustments of 20 OECD countries from 1970 to 2009 were assessed by Yang et al. (2015). Based on results of a panel logit model, the authors confirmed that fiscal contraction always has contractionary effects on economic activity in the short-term and there is no evidence of expansionary (non-Keynesian) fiscal adjustments. In turn, Fragetta and Tamborini (2017) using two-way fixed effects models and dynamic panel models, with the Arellano-Bond difference panel estimator, proved the contractionary effects of fiscal austerity, although the results should be reconsidered carefully, because there is also evidence that debt over GDP has grown in all countries, despite austerity. An equally interesting study on the permanent effects of fiscal policy was conducted by Fatas & Summers (2016). Their estimates suggest that the fiscal contraction in European economies in 2010-11 reduced output not only in the short term but also in the medium term and possibly on a permanent basis. This reduction in output

makes achieving the goal of the fiscal consolidation harder as it raises the ratio of debt to GDP. The drawn conclusions support the previous arguments made by DeLong and Summers (2012) who stated that in a depressed economy a fiscal consolidation can be self-defeating, and it can lead to the increase in debt level.

The overview of empirical studies made it possible both to choose the appropriate econometric model and select key control variables which can determine the relationship between fiscal austerity and economic growth in the Eurozone. The panel dataset contains yearly data over the period of 2010-17 which refers to 19 members of the euro area. Data has been collected from international databases, such as the Annual Macro-Economic database (AMECO) and EUROSTAT.

The author used the following econometric specification to examine whether austerity measure contributes to the eurozone countries recovery after 2010:

$$\Delta GDP_{it} = \alpha + \beta \Delta F_{it} + \gamma' x_{it} + \varepsilon_{it} \quad (1)$$

where  $\Delta GDP$  – the absolute change in GDP growth rate,  $\Delta F_t$  – independent variable called the fiscal stance (austerity) expressed by the absolute change of the cyclically adjusted budget balance in year  $t$  ( $\Delta CAB$ ),  $x_{it}$  is a vector of  $k$  control variables,  $\varepsilon_t$  – random error,  $t$  – time variable,  $\alpha, \beta, \gamma$  are model parameters,  $i$  – the cross-sectional unit.

The above equation ignores country-specific effects as well as time-fixed effects. It also doesn't include lags of both dependent and independent variables. Due to the occurrence of lags in fiscal policy, the dynamic specification was necessary to capture the effect of austerity on economic growth over time. As a result, estimation was based on a dynamic formulation of the equation with an autoregressive distributed lag structure (ARDL), adding the first lag of dependent and independent variables (Baltagi, 2008):

$$\Delta GDP_{it} = \alpha + \beta_1 \Delta F_{it} + \beta_2 \Delta F_{it-1} + \delta \Delta GDP_{it-1} + \gamma_1' x_{it} + \gamma_2' x_{it-1} + \varepsilon_{it} \quad (2)$$

where  $\Delta GDP$  – the absolute change in GDP growth rate,  $\Delta F$  – fiscal stance (austerity) expressed by the absolute change of the cyclically adjusted budget balance ( $\Delta CAB$ ),  $x_{it}$  – vector of  $k$  control variables,  $\alpha, \beta_1, \beta_2, \gamma_1, \gamma_2$  and  $\delta$  represent vector of parameters on the corresponding current and lagged variables considered in the first equation,  $\varepsilon_t$  – random error,  $t$  – time variable,  $i$  – the cross-sectional unit.

The control variables were identified on the basis of the literature review (Fragetta & Tamborini, 2017). The author has chosen the following indicators: government debt to GDP (Debtt), relative unit labour costs (RULC) that affect country's competitiveness, real interest rates (RIR) and unemployment rates (Unemploy) as many empirical studies suggest that the increase in both of these variables affects economic growth negatively.

In the study two types of Generalized Method of Moments (GMM) were applied: first-differenced GMM (FDGMM) proposed by Arellano & Bond (1991) and the system GMM (SGMM) developed by Blundell & Bond (1998). The expanded SGMM estimator includes lagged levels as well as lagged differences. By adding the second equation additional instruments can be obtained. Thus, the variables in levels in the second equation are instrumented with their own first differences and it may increase the efficiency.

The need for the Arellano-Bond GMM estimator can be explained by the presence of the lagged variables which give rise to autocorrelation. It suggests that these regressors may be correlated with the error term. The problem of potential endogeneity is also much easier to address in the dynamic panel models than in the static and OLS models that do not allow the use of internally generating instruments. One of the advantages of the dynamic GMM estimation is that all variables from the regression that are not correlated with the error term (both lagged and differenced variables) can be potentially used as valid instruments (Greene, 2008). The analysed panel dataset has also a short time dimension ( $t=8$ ) and a larger country dimension ( $n=19$ ). Many authors argue that in this case the dynamic panel model is specially designed for a situation where “T” is smaller than “N” in order to control for dynamic panel bias (Baltagi, 2008). Due to the short panel (relatively small number of observations), the SGMM method is usually preferred compared to its sister method. The SGMM estimate has an advantage over FDGMM in variables that are “random-walk” variables (Bond, 2002; Roodman, 2006). Since the analysed model specification includes macroeconomic variables known in economics for the presence of random walk statistical generating mechanisms, the SGMM approach seems to be the more appropriate choice.

It has to be added that the results of the FDGMM and SGMM model were evaluated on the basis of basic tests, such as: Sargan test, AR(1) and AR(2) tests. To check the consistency of the FDGMM and SGMM estimator,

the Sargan test (on the joint validity of instruments) and AR(2) test (checking if the error term is not second-order serially correlated) are reported. Failure to reject the null hypothesis of the Sargan test suggests that the instrumental variables used in the model are valid, while in the case of the AR(2) test the null hypothesis of absence of second-order serial correlation of the differenced error term is examined. If the test fails to reject it, then it means no serial correlation of the original error term in levels.

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The final econometric specification of the model extended by control variables is as follows:

$$\begin{aligned} \Delta GDP_{it} = & \alpha + \beta_1 \Delta CABB_{it-1} + \beta_2 \Delta CABB_{it-2} + \quad (3) \\ & + \delta_1 \Delta GDP_{it-1} + \delta_2 \Delta GDP_{it-2} + \\ & + \gamma_1 \Delta DEBT_{it} + \gamma_2 \Delta RULC_{it-1} + \\ & + \phi_1 \Delta RIR_{it-1} + \lambda_1 \Delta Unemploy_{it-1} + \\ & + \zeta Time\_Dum_{it} + \varepsilon_{it} \end{aligned}$$

where  $\Delta GDP$  – the absolute change in GDP growth rate,  $\Delta CABB$  – fiscal stance (austerity) expressed by the absolute change of the cyclically adjusted budget balance,  $\Delta DEBT$  – the absolute change in government debt,  $\Delta RULC$  – the absolute change in relative unit labour costs,  $\Delta RIR$  – the absolute change in real interest rate,  $\Delta Unemploy$  – the absolute change in unemployment rate,  $\alpha$ ,  $\beta_1$ ,  $\beta_2$ ,  $\delta_1$ ,  $\delta_2$ ,  $\gamma_1$ ,  $\gamma_2$ ,  $\phi_1$ ,  $\lambda_1$ ,  $\zeta$  represent vector of parameters on the corresponding current and lagged variables considered in the first equation,  $\varepsilon_{it}$  – random error,  $t$  – time variable,  $i$  – the cross-sectional unit.

The model estimations are presented in Table 3. As one can see, all variables included in the equation, except GDP(-1) and DEBT, are significant in the two-step FDGMM and SGMM. A negative impact of austerity measured as a cyclically adjusted budget balanced on economic output was confirmed. In addition, the estimations of controlled lagged variables proved that unemployment and relative labour unit costs affect economic output negatively. In turn, the influence of interest rates on economic growth turned out to be positive and significant. It can be explained by the fact that global economy, including the euro area, has experienced a fall in real interest rates since 2010.

The Sargan test enables testing of over-identifying restrictions (Blundell et al., 2000, pp. 53–91). The results of the obtained tests confirmed the null hypothesis that the included instruments are valid in both models. However,

**Table 3: Estimation of two-step dynamic panel model**

	FDGMM			SGMM		
	Coefficients	p-value	Significance	Coefficients	p-value	Significance
GDP(-1)	-0,152880	0,1143		-0,141021	0,1463	
GDP(-2)	-0,179165	<0,0001	***	-0,165374	0,0015	***
const	-2,24113	0,1290		3,44446	0,0128	**
DEBT	-0,00664441	0,3208		-0,0109960	0,4258	
RULC(-1)	-0,281042	<0,0001	***	-0,294474	<0,0001	***
CABB(-1)	-0,281883	0,0027	***	-0,203691	0,0740	*
CABB(-2)	-0,294184	<0,0001	***	-0,261446	0,0036	***
RIR(-1)	0,459363	0,0002	***	0,516930	<0,0001	***
Unemploy(-1)	-0,318006	<0,0001	***	-0,350913	<0,0001	***
time dummies	included			included		
no. of observations	76			95		
no. of instruments	24			30		
Sargan (p-value)	0,5011			0,8515		
diff-Sargan				0,9666		
AR1	z = -2,1176 [0,0342]			z = -2,17135 [0,0299]		
AR2	z = 1,26091 [0,2073]			z = 0,916397 [0,3595]		

\*dependent variable (Y):  $\Delta$ GDP; model with asymptotic standard deviation;  
 \*\*\*, \*\*, \* - statistical significance at the level of 1%, 5% and 10% threshold respectively  
 Source: Own calculations

the results of Sargant tests should be considered carefully, as the number of instruments exceeds the number of countries.

Moreover, in the results of the AR (1) test for first-order serial correlation, as well as the AR (2) test for the second differences no correlations are significant. In addition, the difference Sargan test indicates that the SGMM model is well specified and the SGMM estimator is more preferable to the FDGMM estimator.

The assumption of a steady-state in the sense that deviations from long-term values are not systematically related to the fixed effects is also confirmed. According to this assumption the estimated coefficient on the lagged dependent variable in the model should indicate convergence by having a value less than (absolute) unity, otherwise SGMM is invalid (Roodman, 2007, p. 12). This condition is met.

## CONCLUSIONS

Against a background of intense debate over the expansionary versus contractionary effects of austerity, the study provides empirical evidence which is in contrast

with the expansionary austerity theory. Fiscal adjustments were responsible for deepening and prolonging recession both through the sizeable government expenditure and taxes initiated after 2010 at the height of a global financial crisis in the Eurozone, in particular in periphery countries such as Greece, Spain, Portugal and Italy (PIGS). It has to be underlined that the negative effects of austerity on economic output was much larger than had been expected in debtor states due to the larger size of multiplier and the appearance of hysteresis effects of fiscal policy. Contractional fiscal policy could not have been simultaneously neutralized by expansionary monetary policy under the conditions of short-term nominal interest rates at their zero lower boundary. As a result, austerity amplified economic downturn, leading to the further government debt explosion.

The econometric study of a panel of the euro area in years 2010-17 showed that fiscal austerity affected the poor post-crisis growth of these countries after 2010. The results of empirical research confirm the hypothesis of the negative influence of austerity on growth, but only if an economy is in recession. The austerity-growth relationship was tested along with four control variables,

such as: government debt, relative unit labour costs, real interest rates and unemployment rates. All control variables were also statistically significant. In general, the positive verification of the formulated hypothesis is in line with the Keynesian short-term effects of fiscal policy. However, the obtained results should be reconsidered carefully as there is evidence about debt growth in the analysed period, despite austerity. What is more, it seems that the sources of the recent economic crisis are the macroeconomic imbalances within Member States which have intensified even further due to fiscal austerity, which was to reduce fiscal imbalances. To sum up, the presented theoretical and empirical arguments allow us to claim that

austerity in a depressed economy is counterproductive, although its implementation is required in the medium-term to achieve public finance sustainability.

The author is simultaneously conscious of certain limits of the applied method related to the implemented measure of austerity, as many empirical studies favour structural primary balance over cyclically budget balance. The effect of austerity on GDP path over time could also be estimated using the decomposition of cyclically adjusted budget balance on the basis of expenditure as well revenue. This suggestion indicates the future possible research avenues.

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