Structural Public Balance Adjustment and Relative Poverty in the Eurozone Countries: An Empirical Investigation

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Abstract

The aim of the paper is to evaluate, through panel data dynamic models, the effects of structural public balance adjustment on relative poverty in 16 Eurozone countries from 2005 till 2013. The estimates are conducted by using the mean group (MG), the pooled mean group (PMG) and the dynamic fixed effects (DFE) estimators. The first two yield estimates of the long-run coefficients without the implausible assumption of identical dynamics in each country allowing to detect a stable relationship even in presence of reduced explanatory variables. They all – through the error correction form – allow for considering the relation between the variables in their level and the dynamic of adjustment in the short-run. All the techniques generate outcomes supporting the conclusion that fiscal retrenchments increase relative poverty both in the short and in the long-run.

Keywords: *relative poverty, fiscal consolidation, Eurozone, dynamic panel data*

JEL Classification: I32, E62, C23

Introduction

The Eurozone policy prescriptions suggest maintaining a sustainable public finance. The underlying idea is that, without fiscal consolidation programs, growth will be compromised, and although fiscal retrenchment might have adverse effects in the short-run, the alternative would be a long-run decline (Berti, De Castro

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and Salto, 2013). These prescriptions follow the prevailing theoretical paradigm according to which fiscal contraction, especially in the form of structural balance adjustments, has positive effects on growth and employment. The effects of fiscal consolidation are assured by a kind of "super-Barro" effect, according to which fiscal contraction has a more than proportional effect on permanent income (these are called Keynesian effects of non-Keynesian fiscal policies and are discussed in Canale et al., 2008).

In recent times these conclusions appear to be not so obvious and the existence of a "zero lower bound" raised questions concerning the effects of fiscal consolidation on unemployment and households income (IMF, 2010; Blanchard and Leigh, 2013). In the absence of effective monetary policy measures, fiscal retrenchment is said to have greater-than-expected adverse effects upon growth (Christiano, Einchenbaum and Rebelo, 2011; Delong and Summers, 2012; IMF, 2010; Blanchard and Leigh, 2013), and hence upon employment and households' income.

As in the case of the effects on growth and unemployment, the question whether or not the implementation of structural adjustment programs causes an increase of the number of those who experience the worsening of the economic conditions in respect to others remains open. The issue of inequality is receiving among academics an ever increasing interest, especially in these times of crisis. Fiscal consolidation could have a direct effect on living conditions through the reduction of specific public budgetary components and an induced effect due to the positive value of the Keynesian multiplier. In regard to the Eurozone, some studies have tried to dissolve these doubts trough descriptive data analysis (Petmesidou and Guillèn, 2015 and through the specific analysis of the case of Greece (Matsaganis and Leventi, 2014; and Mitrakos, 2014). The most recent contribution is Darvas et al. (2014), who conclude that in times of crisis co-movements of fiscal consolidation programs and adverse social condition are registered. However none of them can be considered as supporting the existence of a stable relationship between structural adjustment programs and conditions of relative poverty in the Eurozone.

The aim of this paper is to further deepen these studies and to investigate the relationship between structural adjustment and relative poverty in 16 EU countries from 2005 till 2013. The objective is to explore this link in order to individuate the dimension and the sign of it whatever the composition and the nature of fiscal consolidation programs are. Even though the sample contains a time span in which some countries did not yet belong to the Eurozone, they all share have been sharing similar constraints requested to respect the fiscal parameters of the currency union which they entered in the following years.

As an indicator of structural adjustment, the change in structural balance is used. The decomposition of the public budget into current, cyclical and structural components is aimed at separating cyclical influences on the budget balance – resulting from the divergence between actual and potential output (the output gap) – from those that are non-cyclical. As a consequence, changes in the structural budgets "can be seen as a cause rather than an effect of output fluctuations and may be interpreted as indicative of discretionary policy adjustments" (OECD, 2014). As an indicator of relative poverty, the percentage of people having an income below the 60% of national median equalized disposable income is used. This is the indicator the European statistics adopt to quantify the percentage of people at risk of poverty rate and has the advantage of a country-specific measure. The Eurostat's glossary states that "this indicator does not measure wealth or poverty, but low income in comparison to other residents in that country, which does not necessarily imply a low standard of living" (Eurostat, 2014). It is rather a measure of inequality. As Darvas et al. (2014) show, there is a very strong association between the at-risk-of-poverty rate and the Gini-coefficient.[1] The aim is to individuate a general relationship without considering the nature and composition of fiscal adjustment.

The estimations are conducted by using the dynamic panel data econometric techniques and in particular the mean group (MG), the pooled mean group (PMG) and the dynamic fixed effect (DFE) estimators. The first two yield estimates of the long-run coefficients without the implausible assumption of identical dynamics in each country (Pesaran and Smith, 1995; Pesaran, Shin and Smith 1997; 1999). They all – through the error correction form (ECM) – allow considering the relationship between the variables in their level and the dynamic of adjustment in the short-run.

Although two out of three of the empirical models (MG and PMG) do not require as preliminary the co-integration analysis, this is implemented in order to reinforce the estimation linkages in presence of just one dependent variable and a reduced number of observations. All the techniques generate outcomes both in the long and in the short-run consistent with the same sign effect of discretionary fiscal policy measures of the percentage of people at risk of poverty rate. This conclusion provides a first straightforward glance at the relationship between fiscal retrenchments and inequality.

[1] For the period 2007 – 2012, the average values of the indicators show a correlation coefficient of about 0.90, implying a 0.82 R^2 for the regression. High levels of income inequality can be identified as having adverse implications for society, but should not be mixed with poverty (Darvas et al., 2014, pp. 28 – 29).

The remainder of this paper is organized as follows. Section 1 contains the empirical analysis and is divided into two sub-sections: 1.1. Methodology and 1.2. Results. Last section draws some conclusions.

1. Econometrical Analysis

The data on the percentage of people having an income below the 60% of national median equalized disposable income are available on the Eurostat website. The structural balance is available at the IMF outlook database and is transformed to obtain the structural adjustment in the following way: structural adjustment is the difference between the structural balance SB of time *t* and time $t - 1$: $SA_{i,t} = SB_{i,t} - SB_{i,t_{t-1}}$. A positive value of $SA_{i,t}$ means that the country has been implementing, over the whole time interval, a reduction in its structural deficit or an increase of the structural surplus if this is the case, i.e. a restrictive discretionary fiscal policy and vice versa.[2] The annual data from 2005 till 2013 for sixteen Eurozone countries are used. The countries are Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Luxembourg, Malta, Netherlands, Portugal, Slovakia, Slovenia and Spain.[3] For Latvia the data are available from 2008: it was worth including it in the sample in order to maintain the representativeness and observations.[4] The total number of observations is 141, reduced to 125 because of the dynamic techniques.

A preliminary data inspection provides a first glance at the link between the variables. In Figure 1, the percentage of people having an income below the 60% of national median equalized disposable income and the change in structural balance from 2005 till 2013 are presented for the countries considered. In almost all the graphs we observe a common trend of the two variables as they grow together. It is worth noting two contrasting cases: Greece, where the same sign relationship is particularly evident and Slovakia, where the variables appear to move, at least in the first years, in the opposite directions.

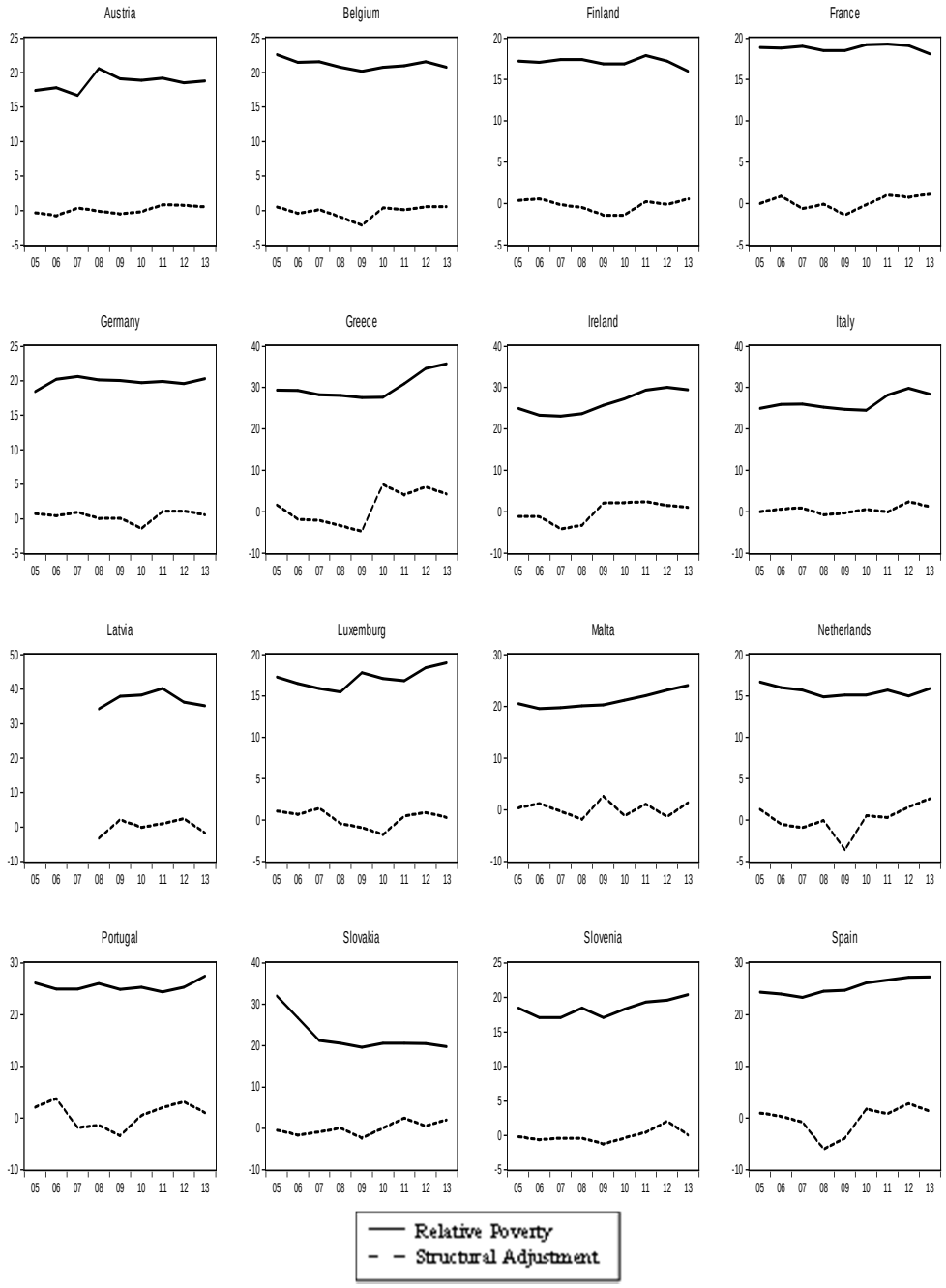
[2] The European Commission uses as an alternative indicator the *Cyclically Adjusted Budget Balance* (CAB), which is inferior to the *Structural Balance* (SB), since it includes one-time measures and also includes interest payments (which can increase as public debt explodes or interest rates rise, but such increase in interest expenditures should not be regarded as a discretionary fiscal stimulus) Darvas et al. (2014), p. 14.

[3] Austria, Belgium, Finland, France, Germany, Italy, Ireland, Luxembourg, Netherlands, Portugal and Spain are original members of the Euro Area formed in 1999. Later other member states joined the single currency in different periods. In particular, Greece entered the Eurozone in 2001, Slovenia in 2007, Malta in 2008, Slovakia in 2009 and finally Latvia in 2014.

[4] The estimations on a sample excluding Latvia do not provide very different results.

F i g u r e 1

Relative Poverty and Structural Adjustment in the Eurozone: Time Dynamics 2005 – 2013

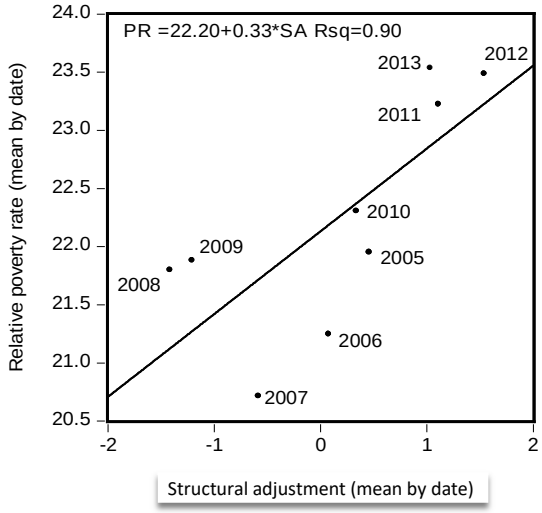


Source: Own calculation on IMF and Eurostat data.

More evidence is provided in Figure 2, where the relationship between the panel mean values for each period of the two variables considered is presented in the form of a scatter plot. The coefficient of structural adjustment is positive and equal to 0.33 and $R^2 = 0.90$.

Figure 2

Relative Poverty and Structural Adjustment in the Eurozone: Scatter Plot 2005 – 2013



Source: Own calculation on IMF and Eurostat data.

The regression line is upwardly sloped and the panel means values stand near it.

1.1. Methodology

The econometrical techniques adopted are a special subset of dynamic panel data models according to which it is possible to estimate simultaneously the long and the short-run effects of the independent on the dependent variable. As a matter of fact, the DFE, the MG and PMG estimators, through the ECM, allows for considering the relation between the variables in their level and the dynamic of adjustment in the short-run. They allow, since they imply co-integration, to individuate the eventual presence of a stable relationship, even in presence of a reduced number of explanatory variables. The DFE estimator constrains the coefficient both in the long and in the short-run to be equal across groups and just the intercept to differ across countries. However if the coefficient dynamic are not equal across groups this estimator could produce misleading results. The MG methodology (see Pesaran and Smith, 1995) estimates the *N* time series regressions

and averages the coefficients. This model, therefore, relies on separate estimates for each group, and calculates a simple arithmetic average of the coefficients of each group (Pesaran and Smith, 1995). With this estimator, the intercepts, slope coefficients both in the short and in the long-run, and error variances are all allowed to differ across groups. In an intermediate position between the DFE and the MG estimator stands the PMG model. In the PMG short-run coefficients are allowed to vary across groups, while long-run dynamics are constrained to be equal (Pesaran, Shin, and Smith, 1997; 1999. For a pedagogical explanation see Brackburne and Frank, 2007).

The features of both MG and PMG are considered to be consistent in particular to estimate dynamic panels in which parameters are heterogeneous across groups. This fits the case of the 16 Eurozone countries in which different long--run dynamics and heterogeneous speeds of convergence in each country could bring to misleading results. However in small samples (few time and individual observations), the MG estimator, being an unweighted average, is very sensitive to outlying country estimates and may release distorted outcomes. The PMG estimator performs better than MG in case of small samples because it produces estimates that are similar to weighted averages of the restrictive country specific estimates, where the weights are given according to their precision (Loayza and Rancière, 2006). The equations to be estimated assume the long and the short-run form.

The long-run equation follows the ADRL process using current and past values of the explanatory variables and is described by:

$$PR_{i,t} = \alpha_i + \lambda_i PR_{i,t-1} + \beta_{i,0} SA_{i,t} + \beta_{i,1} SA_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

This is the long-run specification equation where PR is the poverty rate indicator, while SA is the change in structural balance, or structural adjustment, *i* represents the country and *t* the time. According to the ECM form the residuals coming out of the long-run equation are then used to verify the long-run convergence toward the equilibrium value or to verify, as it is called, the speed of adjustment. So that in the short-run changes in the dependent variable should depend on changes in the independent variables plus an error term measuring if they converge. Therefore the error correction equation describing the short-run speed of adjustment is:

$$\Delta PR_{i,t} = \phi_i (PR_{i,t-1} - \vartheta_i - \vartheta_{1,i} SA_{i,t}) - \beta_{i,1} \Delta SA_{i,t} + \mu_{i,t} \quad (2)$$

Where, with simple transformations, it is easy to verify that:

$\vartheta_i = \frac{\alpha_i}{1-\lambda_i}, \vartheta_{1,i} = \frac{\beta_{i,0} + \beta_{i,1}}{1-\lambda_i}$ are the long-run coefficient calculated as a weighted average of the coefficient of the independent variables.

The weight is given by the coefficient of the dynamic dependent variable. And $\phi_i = -(1 - \lambda_i)$ is the error-correction speed of adjustment.

The parameter ϑ_{1i} for the long-run, $\beta_{1,i}$ for the short-run and ϕ_i for the speed of adjustment are of primary interest. In the MG estimator all parameters vary across countries and the results are averages of the panel members. In the PMG and DFE estimator the constraint of homogeneity of long-run coefficients is imposed so that $\vartheta_i = \vartheta$. In the short-run for the PMG estimator parameters vary, while for the DFE an homogeneous dynamic of adjustment is supposed and it holds $\beta_{1,i} = \beta_1$.

Since all the models assume different hypotheses on both the long and the short-run coefficient and the estimates can be considered consistent and efficient if the restrictions are true, the result coming out of the application of all the three techniques are presented. This will allow verifying the sign and the dimension of the relationship between the variables, whatever the constraints and limits of each technique.

1.2. Results

Even though the MG and PMG models do not require as preliminary tests the stationarity and co-integration analysis, prior to conducting the estimations. They were conducted with the objective of investigating the variable proprieties. This was meant to help establishing a long-run relationship between them and to support the results validity even in presence of a reduced number of explanatory variables and observations.

The first step was to detect the presence in the series of cross sectional dependence in order to avoid misleading results with the use of inappropriate methodologies.

Panel A in Table 1 shows the absence of cross sectional dependence according to both Pesaran (2004) and Friedman (1937) tests, indicating that the standard instruments to test stationarity and co-integration can be used. In panel B the results of LLC (Levin, Lin and Chu, 2002), ADF and PP (Maddala and Wu, 1999) tests are presented. It should be noted that these tests have a high power in small samples in the absence of cross sectional dependence (Lopez, 2009). The variables appear to be non-stationary in their level and I(1).

Finally in panel C the co-integration tests are presented. The Kao (1999) test on residuals rejects the null hypothesis of no co integration and the Johansen--Fisher (see Johansen, 1991) both trace and eigen-tests support the existence of one co integrating vector.

T a b l e 1

Cross Sectional Independence, Unit Root and Co-integration

Panel A. Cross sectional Independence			
Test	*Test statistics*		
CSD Pesaran CSD Friedman	1.354 (0.1756) 3.350 (0.9992)		
Panel B. Panel unit root test			
	LLC	*ADF*	*PP*
PR SA DPR DSA	3.328 –0.644 –11.110*** –9.020***	13.322 23.506 140.427*** 92.608***	18.485 50.566 123.527*** 173.581***
Panel C. Panel co-integration test			
Kao			
–2.108**			
Johansen-Fisher			
	Trace test	*eigen test*	
R = 0 R ≤ 1	42.11** 17.82	44.88** 17.82	

Note:***, **, and * reject the null at 1%, 5% and 10% respectively.

The tests are; Levin, Lin and Chu (2002); (LLC); ADF Fisher $\chi 2$ (ADF) and PP Fisher χ^2(PP) because of Maddala and Wu (1999).

After having highlighted the presence of co-integration according to which the number of people below the 60% of the median equalized disposable income and structural adjustment are stably related in the long-run, we can proceed with the presentation of the results of the estimation of the dynamic panel models.

In Table 2 long-run and short-run coefficients, estimated according to the three techniques, are presented, together with the speed of adjustment. Following the MG, PMG and DFE, the long-run coefficient is positive and significant (0.985, for MG, 1.126 for PMG and 0.737 for DFE) confirming the initial hypothesis that restrictive discretionary policy measures increase the percentage of people that are below the 60% of national median equalized disposable income. In all three cases the value is not far from one and in the PMG results, it exceeds this value.

The speed of adjustment or the way in which the two variables reach the long-run equilibrium is negative and highly significant, confirming the validity of the models adopted.[5]

[5] The ECM requires that the coefficient representing the adjustment process has to be lower than zero and greater than one.

T a b l e 2

People at Risk of Poverty Rate and Structural Adjustment: Panel Co-integration Results (eq. 1 and 2)

Dependent variable	***MG***	***PMG***	***DFE***
Long-run: SA	0.985** (0.381)	1.126*** (0.145)	0.737*** (0.163)
ϕ_i : speed of adjustment	–0.565*** (0.148)	–0.371*** (0.129)	–0.439*** (0.064)
Short-run: ΔSA	–0.001 (0.189)	0.235*** (0.089)	0.201*** (0.056)
Intercept	10.962*** (3.569)	9.154*** (3.244)	9.772*** (1.421)
Observations	125	125	125
Number of countries	16	16	16
Hausman Test[a]	0.15		
Hausman Test[b]	7.80***		

Note:***, **, and * reject the null at 1%, 5% and 10% respectively.
Standard errors are presented below the estimated coefficients:
a) PMG is preferred to MG under null Hypothesis; b) DFE is preferred to PMG under null hypothesis.

In the short-run the link between relative poverty and structural adjustment is again positive and highly significant for two out of three of the models (0.235 for PMG and 0.201 for DFE) while for the MG model nothing can be stated on the matter. According to these results, the same relationship individuated in the long-run is reproduced when considering the differenced variables. This means that an increase in the change of structural adjustment increases the change in the relative poverty rate (and vice versa), reinforcing the long-run results.

To improve the consistency of the estimate and to individuate the model that fits best the features of the series, the Hausman test is performed. The last line of Table 2 shows that the best choice to be adopted is the PMG model, according to which the long-run effect of fiscal retrenchments on relative poverty is higher.

Concluding Remarks

During the 1980s, the growing budget deficit and very high public debt pushed many countries to adopt general criteria of spending constraints. Academics agreed that there was the need to consolidate public finances due to the instability effects of real, monetary and financial markets. In Europe, the institutional claims coming from the existing monetary union assigned further impetus for the implementation of fiscal retrenchments.

The aim of the paper was to investigate the relationship between structural adjustment and a relative measure of poverty using data from 2005 till 2013 in 16 Eurozone countries. Using the panel data estimators allowing for different

dynamics in each country, the paper supports the conclusion that there is the same sign link between structural adjustment policies and the percentage of people below the 60% of the median equalized income.

Following the MG, the PMG and DFE econometrical estimations it has been found out that the restrictive $\Delta SA > 0$ discretionary fiscal policy actions increase relative poverty irrespectively of their nature and composition. This relation is confirmed both in the long and in the short-run.

The results suggest, therefore, that if the reduction of structural balance has to be considered as an objective to be achieved per se, in order to reduce financial market instability and face increasing health and pension expenditures, policy makers should take into account that the increase of relative poverty is a very probable outcome.

References

BERTI, K. – DE CASTRO, F. – SALTO, M. (2013): Effects of Fiscal Consolidation Envisaged in the 2013 Stability and Convergence Programs on Public Debt Dynamics in EU Member States. European Economy. [Economic Papers, No. 504: September]. Brussel: European Commission.

BLANCHARD, O. – LEIGH, D. (2013): Growth Forecast Errors and Fiscal Multipliers. [IMF Working Paper, January.] Washington, DC: International Monetary Fund.

BLACKBURNE, E. F. – FRANK, M. W. (2007), Estimation of Non-stationary Heterogeneous Panels. The Stata Journal, *7*, No. 2, pp. 197 – 208.

CANALE, R. R. – FORESTI, P. – MARANI, U. – NAPOLITANO, O. (2008): On Keynesian Effects of (apparent) Non-Keynesian Fiscal Policies. Politica Economica, XXIV, No. 1, pp. 5 – 46.

CHRISTIANO, L. – EINCHENBAUM, M. – REBELO, S. (2011): When is the Government Spending Multiplier Large? Journal of Political Economy, *119*, No. 1, pp. 78 – 121.

DARVAS, Z. – HVETTL, P. – DE SOUSA, C. – TERZI, A. – TSCHENKASSIN, O. (2014): Austerity and Poverty in the EU. Brussel: European Commission Department of Employment and Social Affairs.

DELONG, J. B. – SUMMERS, L. H. (2012): Fiscal Policy in a Depressed Economy. Brookings Papers on Economic Activity, Economic Studies Program, The Brookings Institution, *44*, No. 1, pp. 233 – 297.

EUROSTAT (2014): Glossary: At risk of Poverty Rate. Available at: <http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Glossary:At-risk-of-poverty_rate>.

FRIEDMAN, M. (1937): The Use of Ranks to Avoid the Assumption of Normality in the Analysis of Variance. Journal American Statistics Association, *32*, No. 200, pp. 675 – 701.

IMF (2010): Will It hurt? Macroeconomic Effects of Fiscal Consolidations. The World Economic Outlook. Chapter 3, October. Washington, DC: International Monetary Fund .

JOHANSEN, S. (1991): Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models. Econometrica, *59*, No. 6, pp. 1551 – 1580.

KAO, C. (1999): Spurious Regression and Residual Based Tests for Cointegration in Panel Data. Journal of Econometrics, *90*, No. 1, pp. 1 – 44.

LEVIN, A. – LIN, C. F. – CHU, C. J. (2002): Unit Root Tests in Panel Data: Asymptotic and Finite-sample Properties. Journal of Econometrics, *108*, No. 1, pp. 1 – 24

LOPEZ, C. (2009): A Panel Unit Root Test with Good Power in Small Samples. Econometric Reviews, *28*, No. 4, pp. 295 – 313.

LOAYZA, N. V. – RANCIÈRE, R. (2006): Financial Development, Financial Fragility, and Growth. Journal of Money, Credit and Banking, *38*, No. 4, pp. 1051 – 1076.

MADDALA, G. S. – WU, S. (1999): A Comparative Study of Unit Root Tests with Panel Data and a New Simple Test. Oxford Bulletin of Economics and Statistics, *61*, S1, pp. 631 – 652.

MATSAGANIS, M. – LEVENTII, Ch. (2014): The Distributional Impact of Austerity and Recession in Southern Europe. [Special Issue, edited by Petmesidou, M. and Guillén, A.] South European Society & Politics, *19*, No. 3, pp. 393 – 412.

MITRAKOS, T. (2014): Inequality, Poverty and Social Welfare in Greece: Distributional Effects of Austerity. [Working Paper, No. 174.] Athens: Bank of Greece.

OECD (2014): Glossary of Statistical terms: General Government Structural Balance Available at: <http://stats.oecd.org/glossary/detail.asp?ID=3343>.

PESARAN, M. H. (2004): General Diagnostic Tests for Cross Section Dependence in Panels. [CESIFO Working Paper, No. 1229.] Munich: CeSIFO.

PESARAN, M. H. – SMITH. R. P. (1995): Estimating Long-run Relationships from Dynamic Heterogeneous Panels. Journal of Econometrics, *68*, No. 1, pp. 79 – 113.

PESARAN, M. H. – SHIN, Y. – SMITH, R. P. (1997): Estimating Long-run Relationships in Dynamic Heterogeneous Panels. [DAE Working Papers Amalgamated Series, No. 9721.] Cambridge, UK: Cambridge University Press.

PESARAN, M. H. – SHIN, Y. – SMITH, R. P. (1999): Pooled Mean Group Estimation of Dynamic Heterogeneous Panels. Journal of the American Statistical Association, *94*, No. 446, pp. 621 – 634.

PETMESIDOU, M. – GUILLÈM, A. (2015): Economic Crisis and Austerity in Southern Europe: Threat or Opportunity for a Sustainable Welfare State? [OSE Research Paper, No. 18 – January 2015.] Brussel: Observatory Social Europe.