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SOCIO-ECONOMIC DETERMINANTS OF SOCIAL SPENDING IN THE EU

Biljana Tashevska
Ss. Cyril and Methodius University in Skopje, Faculty of Economics-Skopje
E-mail: biljana@eccf.ukim.edu.mk

Marija Trpkova-Nestorovska
Ss. Cyril and Methodius University in Skopje, Faculty of Economics-Skopje
E-mail: marija.trpkova-nestorovska@eccf.ukim.edu.mk

Borce Trenovski
Ss. Cyril and Methodius University in Skopje, Faculty of Economics-Skopje
E-mail: borce@eccf.ukim.edu.mk

Abstract

The rise in social spending during the last century brought about a significant increase in the total government expenditures and according to many studies, also contributed to the rising public debt. The intent of social spending is reducing and alleviating inequality and poverty and enhancing social cohesion. Empirical evidence shows that countries that make greater efforts in social spending manage to reduce income inequality. However, it should not be on the account of endangering sustainability In this paper we examine whether certain socio-economic variables influence the level of social expenditure in the EU countries in the last two decades. More specifically, we try to tackle the following questions: Do governments reduce social spending when debt rises, in order to avoid fiscal unsustainability? Do countries spend more on welfare in times of an economic down-turn, i.e. is social expenditure counter-cyclical? Do countries with larger income inequality also have higher social expenditures aimed at reducing the larger gap?

Keywords: public debt, social expenditures, EU countries
JEL codes: H53, I38, H6.

1. Introduction:

There is a vast interest in academic and policy circles regarding the welfare state and in particular social expenditure as a measure of the welfare state effort. The decades after the Second World War marked the golden age of capitalism and the rise of the welfare state, resulting from industrialization, expansion of social rights, demographic changes etc. Social spending became an important component of the socioeconomic landscape in developed countries and have significantly influenced economic processes and outcomes since then.

The expanding role of the welfare state and the population ageing have led to a continuous rise in social expenditures. In today's developed economies more than half public spending is devoted to the welfare state. In the European Union, expenditure on social protection, education and health account for 66% of the general government expenditure on average. Europe's welfare states stand out as more generous compared to the welfare states in other developed countries, but are threatened to become unaffordable without any recasting. European countries have developed a more or less comprehensive welfare model, with a central role of the state in providing a range of social benefits (pensions, support for the poor, social housing, health-care being the largest). One of the most complex challenges currently facing European governments and societies is to reconcile these commitments to welfare provision, which are widely supported politically, with pressures that may make them unsustainable economically. They undeniably face a range of demographic, fiscal and other pressures, exacerbated by weak economic growth or recession during the recent economic crisis. (Begg et al., 2015) It is obvious that old-age related expenditures will continue to increase in the EU member countries, due to the 'greying population'. Critics of the welfare state regularly argue that population aging renders existing social welfare programs unsustainable. Hence adjustments will be needed to accommodate the predicted growth of spending on pensions and other old-age related expenditures. In Germany, for example, pension spending is projected to increase from 10 to 12.5 percent of gross domestic product (GDP) by 2050 unless the country makes adjustments to the system.

The rise in social spending during the last century brought about a significant increase in the total government expenditures and according to many studies, also contributed to the rising public debt. "Welfare spending became a promising target when seeking for the sources of poor growth and soaring debt as well as identifying the factors that hold back the recovery." (Czech and Tusinska, 2016) The intent of social spending is reducing and alleviating inequality and poverty and enhancing social cohesion. Empirical evidence shows that countries that make greater efforts in social spending manage to reduce income inequality (Sanchez and Perez-Corral, 2018). However, it should not be on the account of endangering sustainability (Schuknecht and Zemanek, 2018). The narrative of retrenchment is present in the debate around the welfare state nowadays, due to the economic crisis of 2008 and the European debt crisis. However, Tullock and Buchanan (1962) argue that social expenditures tend to have a high political, at least in the short-term, cost and it is hard to cut or even restructure social benefits. This might explain the reluctance to cutting social spending and the crowding-out of other public expenditure by social expenditure, such as for public investments, defense or economic affairs (Castles, 2007; Begg et al., 2015). This goes in line with some findings on the resilience of social expenditure to fiscal retrenchment measures (Castles, 2007; Lora and Olivera, 2007). This, however, does not mean that there haven't been cuts in social expenditure, especially in countries with less fiscal space.

In this paper we examine whether certain socio-economic variables influence the level of social expenditure in the EU countries in the last two decades. More specifically, we try to tackle the following questions: Do governments reduce social spending when debt rises, in order to avoid fiscal unsustainability? Do countries spend more on welfare in times of an economic downturn, i.e. is social expenditure counter-cyclical? Do countries with larger income inequality also have higher social expenditures aimed at reducing the larger gap? The rest of the paper is structured as follows. Section 2 explains the dynamics of social expenditure and public debt in the European Union. A brief overview of the empirical literature is provided in section 3. Section 4 explains the data and empirical model, followed by a discussion of the results in section 4. Finally, concluding remarks are given in section 5.

## 2. Social expenditure in the European Union

Social spending in the European Union has grown during the last few decades. Looking at the period from the turn of the century, however, they were pretty stable (even showing a small decline) in the pre-crisis period (see figure 1). Figure 1 also demonstrates that the dynamics of total government expenditure in the EU-28 is dominated by the movement of social expenditure (comprising in this case spending on social protection, health and education) and follows the same pattern. In a period of positive economic outcomes, when

normally social protection expenditure for example drops as there are normally less people in need and when the denominator has a positive trend. Total government spending decreased in the same period by more than social expenditure, implying that the rising social expenditures had crowded out other public expenditures. In most countries social spending was falling or staying largely at the same level, except for most Mediterranean countries, where social spending grew at the rate between 1.1% and 2.8% yearly in the period 1995-2007. It is worth noting though, that social expenditures were usually growing where they were the lowest (Mediterranean and Anglo-Saxon countries), contributing to some extent of convergence in the level of social spending. Yet, social spending in these countries, although it reached an average level of most developed countries, has not reached the spending levels of most Nordic and Continental countries.

The Great Recession interrupted the favourable economic, social and fiscal trends. Real rates of economic growth declined though some countries were affected more than others. In response to the recession, most countries implemented expansionary policies. As is expected during a recession, social expenditures increased in the immediate aftermath as a natural consequence of governments spending more on unemployment benefits. As a share of GDP, social spending jumped in 2009 when GDP, the denominator of the ratio, fell sharply and social expenditures accounted for a larger proportion of national income. Figure 2 clearly shows the resulting drastic rise in social and total general government expenditure in the EU-28. Social protection expenditure rose by 3.5 p.p. in the period 2007-2009 and reached a peak in 2009, standing at 31.9 % of GDP. The dynamics of this growth was not that differentiated as in the case of public debt, but we can point to countries with relatively low rate of growth (Sweden, Germany, Poland, Austria) and relatively high rate of growth (Ireland, Finland, Belgium, Spain, Hungary, Slovakia). (Savage, 2019)

The following period was marked by cuts in government expenditures (part of the Fiscal compact) as a response to the rising public debts in EU countries. However, figure 2 and 3 show once more that social expenditure is far more resilient to reductions than government spending in other public policy areas, even in periods when austerity is the pervasive narrative. This however does not mean that there have not been any cutbacks in social benefits, as can be seen in the figures. A note should be taken that this is also a period of recovery from the crisis.

Eurostat (2019) confirm that expenditure on 'social protection', which reflects government's core function to redistribute income and wealth, financed by compulsory payments, was by far the most important COFOG[91] division in 2017 in the EU, reaching and average ratio of 18,8% of GDP. They also argue that the rise in social protection expenditure by 0.9 p.p. of GDP from 2003 to 2017 was compensated partially by a decrease in all other government expenditure functions except health. Begg et al. (2015) find it striking that the shares of old-age outlays were so stable up to the crisis and how they appear to have been protected (and have indeed increased) since 2008. Healthcare, similarly, has been gently increasing its share, while spending on unemployment benefits jumped after 2007 due to the larger number of unemployed people.
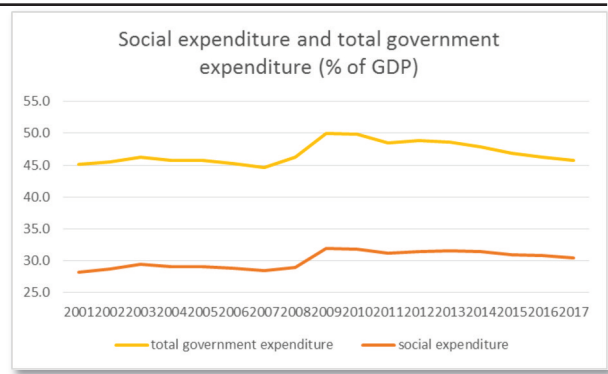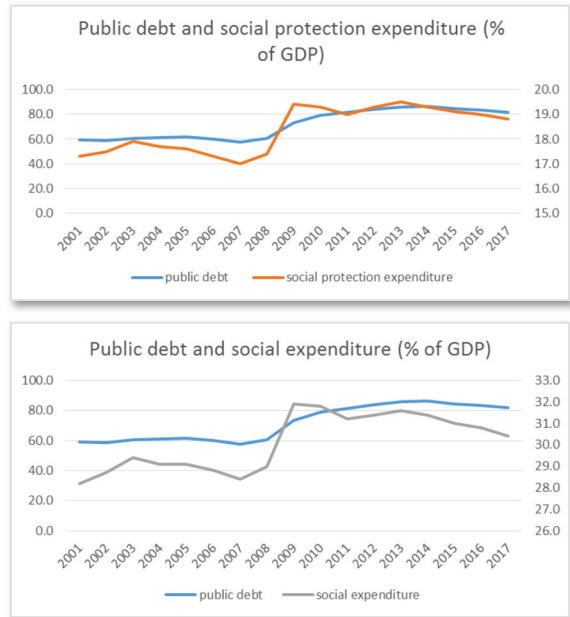

Source: Eurostat.

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91) COFOG stands for Classification of expenditures by government function (developed by the Organisation for Economic Co-operation and Development and published by the United Nations Statistical Division).
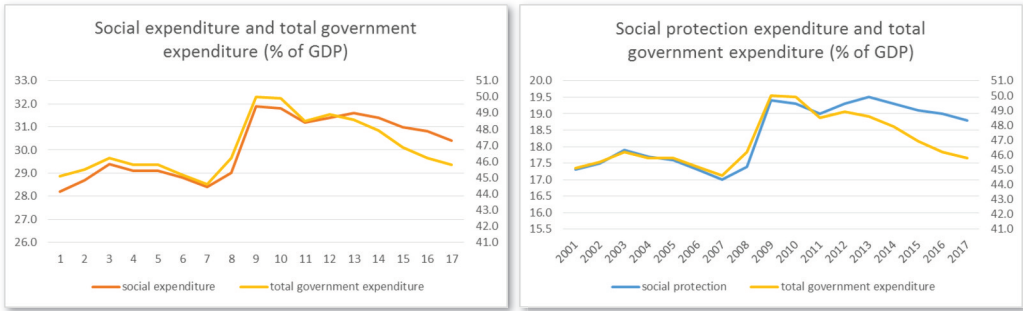
Source: Eurostat.

Along with social spending, public debt of the countries was also falling in the pre-crisis period, but its trend changed direction with the onset of the economic and the debt crisis in the EU, which became quite sever in certain countries (PIIGS). The rate of growth of debt, however, was much higher than the rate of growth of social spending. Moreover, social expenditure shows a faster reduction than debt (see figure 4) The rate of growth of public debt was, however, very differentiated among countries. There were countries with relatively slow debt growth (like Sweden, Belgium, Austria, Germany, Italy, Poland and Hungary) and countries with a fast pace of debt growth (Ireland, Slovenia, the UK, Spain, Portugal, Czech Republic). Many countries have also reached or exceeded the barrier of 100% of GDP.

Figure 5.
Welfare expenditure and public debt

Source:
Eurostat and IMF WEO (April 2019) database.

However, the policy solutions differed among countries in terms of types of benefits, universality and generosity of allowances etc. For example, countries with Bismarckian welfare systems are generally less generous than the countries with a Beveridgean welfare system. Hence, we cannot argue the existence of a single European social model, but rather the EU contains a group of several different types of a welfare state (see Arts and Gelissen, 2012 for a short explanation of the welfare state models / regimes). Welfare spending per capita is lower in the lowest-income EU countries. Social protection expenditure as a proportion to

GDP also varies across EU Member States (see figure 6). It ranged from less than 10 % in Ireland (9.5 %) to nearly a quarter in Finland (24.9 %) in 2017. Six Member States – Finland, France, Denmark, Italy, Austria and Sweden - devoted at least 20 % of GDP to social protection, while Ireland, Lithuania, Malta, Latvia, Romania, Czech Republic and Bulgaria each spent less than 13 % of GDP on social protection. Welfare expenditure as measured in this paper (social protection, health and education) varied from above 35% of GDP in France, Finland and Denmark to less than 20% of GDP in Romania and Ireland.

Figure 6.
Welfare expenditure by country in the EU
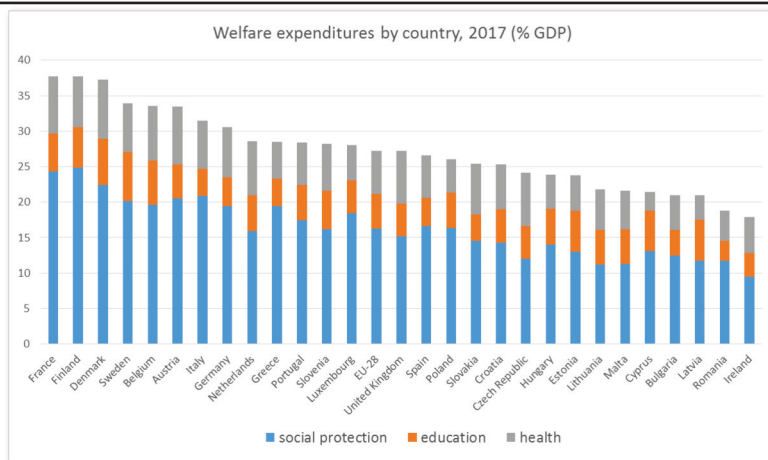
Source: Eurostat.

3. Literature review

Measuring the cross-national variation in welfare effort across countries has a long history, beginning with studies like Wilensky, 1975. The early studies emphasized the importance of wealth, economic growth, demographics and the age of the social security system.

Later on, in the 1970s and 1980s, political factors were found to be also of great importance (see for example Hicks and Swank, 1992; Schmidt, 1997; Castles, 2004). However, more recent studies, especially when analyzing changes in social expenditure, since 1980s, find a weaker impact of political parties (e.g. Kittel and Obinger, 2003) more recently, there are ambiguous results concerning the impact of political factors (for example, Schuknecht and Zemanek (2018) find the political ideology to be relevant). Another topic of study has been the influence of institutional and political variables in social expenditure, which is the focus of the paper by Baqir. His main conclusion is that democratization tends to be followed by important increases in social expenditure. Other authors who have explored how public expenditures may be affected by institutional and political variables have concluded that corruption reduces the share of education expenditures in total expenditures (Mauro, 1998) and that education and health expenditures grow faster in more democratic countries (Snyder and Yackovlev, 2000). Some researchers argue that for example left and right wing parties tend to move more toward the middle and respond to social requirements of the voters in a similar manner.

Many studies find that a crucial determinant is the socio-economic pressure. Obinger and Waschal (2012) conclude that in the aftermath of the golden age, main determinants found in research are population ageing, economic growth, GDP, unemployment, deindustrialization (Castles, 2004; Kittel and Obinger, 2003; Iversen and Cusack, 2000; Schuknecht and Zemanek, 2018). Molina-Morales et al. (2013) point that the three variables that most empirical studies use in explaining welfare spending are GDP, unemployment rate and the percentage of elderly people form the total population. Hicks and Swank, 1992; Swank, (2002) find a positive correlation between these three variables and social expenditure. Schuknecht and Zemanek (2018) investigate what caused the rise in social expenditure over the last few decades in OECD countries and find that the business cycle (automatic stabilizing effect of social spending), structural unemployment, population ageing are statistically significant. The demographic context has an impact on the social protection system's depend-

ency ratio, that is to say on the number of beneficiaries in the system compared to the number of people The demographic context has an impact on the social protection system's dependency ratio, that is to say on the number of beneficiaries in the system compared to the number of people. Income inequality has also been examined as a determining factor of social spending (see Molina-Morales et al., 2013)

The relationship between public debt and social expenditures has attracted much attention in the past decades. Namely, the rising social expenditures triggered a wide debate about their impact on fiscal sustainability, creating a heavier fiscal burden. A few studies have been concerned with the possible impact of fiscal adjustment measures on social expenditure. In other words, whether countries react to rising debt levels by cutting social expenditure. For instance, Hicks and Kubisch (1984) and Hicks (1989) found that social expenditures tended to be well-protected in a small sample of highly indebted countries during periods of fiscal retrenchment in the 1970s and early 1980s, a finding that is confirmed by Baqir (2002) with a panel of over 100 countries for the period 1985-1998. Some recent studies have found that financing constraints, represented by net lending and public debt ratio (they show that they do have a marginal effect on social) influence social expenditure (Schuknecht and Zemanek (2018; Chang et al., 2016; Lora and Olivera, 2007; Fosu, 2007). Lora and Olivera (2007) using an unbalanced panel of around 50 countries for the period 1985-2003 find that higher debt ratios do reduce social expenditures, as popular opinion holds. Fosu (2007) and Chang (2016) reach similar conclusions. On the other hand, Schuknecht and Zemanek (2018) find a strong correlation between rising public debt ratios and the rise in social expenditure. Using an error correction model they find that in the long-term, an increase in GDP and in revenues increase social expenditure, implying a risk of unsustainability if those trends continue. Considering a government's policy reaction to excessive debts, Lora and Olivera (2007) argue that those higher debt ratios will reduce social expenditures. If the government succeeds, then in the longer run (at lower frequencies) an increase in debts will lead to a decrease in social expenditures (negative correlation). The above simple example shows that both a causality and comoved correlation between government debts and social spending may differ at different levels of frequencies and change over time. (Chang et al., 2016)

Chang et al. (2016) argue that it is reasonable to speculate that higher government debts will be linked with higher social spending as fiscal deficits are typical for a recession, when also a greater demand for social expenditure exists. For instance, Dewan and Ettlinger (2009) argue that fiscal deficits are inevitable and appropriate during a recession, because a slow economy commonly creates greater demand for social expenditure such as social assistance and unemployed benefits. This also matches the observations of Adema, Fron, and Ladaique (2011), who propose that many OECD countries initially increased social support to job losers or provided income support associated with shortened working hours in response to the financial crisis in 2008. Sanz and Velázquez (2007) discover that increasing government debts may be linked to an increase in social spending using the case of a panel of 26 OECD countries in the period 1970–1997. There are other alternative arguments, such as tax revenue suffers from an economic recession and most government spending is financed by debt being issued, while social welfare and health demand are the main driving force for the growth in government spending (Sanz and Velázquez 2007). This leads to the co-existence of high debt and high social expenditure

Schuknecht and Zemanek (2018) also explore the structure of their financing and find that the increase in social expenditure is financed largely through a reduction of other spending, confirming the 'social dominance' theory. They also find a strong correlation between rising public debt ratios and the rise in social expenditure. Using an error correction model they find that in the long-term, an increase in GDP and in revenues increase social expenditure, implying a risk of unsustainability if those trends continue. Lora and Olivera (2007) also find that some fiscal flow variables directly affect social expenditures. They estimate that a reduction in the overall or the primary fiscal deficit by $1 is associated with an average decline in social expenditures of around 3 cents in the current year (or nearly 5.5 cents in the long run).

4. Methodology and data

In order to investigate the effect of public debt and other socio-economics variables on social expenditure in the European Union we estimate a panel regression. Due to data availability, the model is estimated for the period 2000-2017 meaning that it captures the link between social expenditure and the observed explanatory variables in the twenty-first century. The model also excludes Cyprus, due to missing data. Social expenditure in its broadest term (social protection, health and education) is used here as a proxy for the welfare state effort of the countries. We use a fixed effect panel regression model, as indicated by the Hausman test, in all our model specifications. We employ the OLS estimator, being aware of possible problems with endogeneity since social expenditure is regressed on public debt and other fiscal variables. However, Lora and Olivera (2016) find no significant differences in estimated coefficients with OLS and Arellano-Bond estimators.

described in the following general equation:

$$y_{i,t} = \beta_0 + \beta_i x_{i,t} + u_i + e_{i,t}$$

where $y_{i,t}$ is the dependent variable, β_0 captures the country effect, β_1 is a kx1 vector of parameters to be estimated on the explanatory variables, and $x_{i,t}$ is a vector of observations on the explanatory variables, u_i are the country fixed effects and $e_{i,t}$ is the idiosyncratic noise term. In the model, i=1,...,N, and it stands for the cross-sectional unit (number of countries), while t=1,...,T and it stands for the time period. Specifically, we use the following model:

$$se_{i,t} = \beta_0 + \beta_1 se_{i,t-1} + \beta_2 d_{i,t-1} + \beta_3 Z_{i,t} + u_i + e_{i,t}$$

Where $se_{i,t}$ is the dependent variable - social expenditure in country i in period t; $se_{i,t-1}$ is the lagged social expenditure; $d_{i,t-1}$ is lagged public debt of county i in period t; $X_{i,t}$ is a vector of other relevant factors, u_i are the country fixed effects and $e_{i,t}$ is the error term.

Social expenditure and public debt are expressed as ratio to GDP. Social expenditure is represented by a wider scope than only on social protection and it includes general government expenditures on social protection, health and education, all of them important in providing welfare to the population. We use the lagged dependent variable to see if there is inertia in its dynamics. Public debt is represented by general government debt, as % of GDP. Public debt is expected to have a negative coefficient if the fiscal reaction function of social expenditure indicates a reaction of the authorities in terms of sustainability. We also use a set of other socio-economic and fiscal variables that are found to be relevant in the literature. We use tax revenues (as a percentage of GDP), to see if improvement in the revenues causes further increase in social spending (implying a revenue-expenditure nexus) or the additional revenues are used for other purposes. The GDP growth rate captures the economic condition of the economy. If the economy is improving, it could be expected that less people are unemployment and in need for social assistance and more people pay taxes and contributions that are used to finance social benefits. The unemployment rate is expected to be correlated with social spending and to have a positive coefficient. The same logic applies as in the case of low growth (except in opposite direction), since in bad times unemployment rises. We include the Gini coefficient that captures the distribution of income within a country in order to check whether countries with larger inequality tend to have higher social spending aimed to battle inequality or not. The old age dependency ratio (ratio of people at the age of 65 or older to people at working age) expresses the burden of the ageing population on the workforce.

Before proceeding with estimation of the model, the stationarity of the data series for the variables was checked. The results of the panel unit root test (Panel Levin, Lin and Chu) are presented in table 1. All series are stationary in levels, except for old-age dependency which is integrated of order 2 and total tax receipts which are difference stationary. Thus, these two variables were differenced before estimation of the model.

Table 1 Panel Levin, Lin and Chu unit root test

Variable	Probability for level	Probability for 1st difference	Probability for 2nd difference
SE - Social expenditure (% of GDP)	0.0000	/	/
PB - General government primary net lending/borrowing (% of GDP)	0.0000	/	/
DEBT - Government consolidated gross debt (% GDP)	0.0001	/	/
GDP – GDP growth (Percent change)	0.0000	/	/
UNEMP - Unemployment rate (Percent of total labor force)	0.0000	/	/
OAD - Old age dependency	0.9774	0.3496	0.0000
TAX (% of GDP)	0.2517	0.0000	/
GINI - Gini coefficient of equalized disposable income	0.0074	/	/

Note: Test specification: individual intercept.
Source: Authors' calculations.

The data on general government expenditures on social protection, education and health, data on population and Gini coefficient are extracted from the Eurostat database, while data on public debt, tax revenues, primary balance, GDP growth rate, unemployment rate are taken from the IMF (April 2019) World Economic Outlook database.

5. Discussion of empirical results

The results from the estimated fixed effects panel regressions are presented in table 2 and table 3. We estimated several equations. In the first equation all variables form the model are estimated (the non-stationary variables were previously differenced). Next, we excluded the non-stationary variables. However, this did not change the results for the other variables and for the model as a whole, as can be seen from Equation 3 where old-age dependency ratio is included again. Model 4 is a modified version of model 3 where primary general government balance is lagged for on period, same as the public debt, to account for the financial restraints of the government. We also estimated regressions for the change in social expenditure compared to the previous year as a dependent variable in models 5-8.

Table 2. Panel regression results - Dependent variable - social expenditure

	Model 1		Model 2		Model 3		Model 4	
	Dependent variable - SE							
Variable	Coef.	Prob.	Coef.	Prob.	Coef.	Prob.	Coef.	Prob.
C	23.85072	0.0000	23.70637	0.0000	23.65211	0.0000	24.58857	0.0000
PB	-0.339707	0.0000	-0.339860	0.0000	-0.325288	0.0000		
PB (-1)							-0.281523	0.0000
DEBT(-1)	0.036283	0.0000	0.038533	0.0000	0.037322	0.0000	0.024866	0.0000
GDP	-0.186305	0.0000	-0.189432	0.0000	-0.190012	0.0000	-0.256332	0.0000
UNEMP	0.107784	0.0000	0.106465	0.0000	0.112666	0.0000	0.105570	0.0000
OAD1	19.62180	0.3947	/	/	15.95157	0.4935	35.98415	0.1415
TAX1	0.208479	0.0013	/	/			-0.128391	0.0602
GINI	0.035039	0.0561	0.035186	0.0579	0.039263	0.0340	0.039494	0.0428
Adj Rsquared	0.961		0.954		0.956868		0.952372	
DW	0.677		0.640		0.654055		0.701258	
Obs	432		432		432		432	

Table 3. Panel regression results – Dependent variable – change in social expenditure

	Model 5		Model 6		Model 7		Model 8	
			Dependent variable - ΔSE					
Variable	Coef.	Prob.	Coef.	Prob.	Coef.	Prob.	Coef.	Prob.
C	1.951352	0.0000	2.182895	0.0000	2.281773	0.0000	1.951352	0.0000
PB					-0.030695	0.0591		
PB (-1)	0.069715	0.0000					0.069715	0.0000
DEBT(-1)	-0.020083	0.0000	-0.019291	0.0000	-0.018678	0.0000	-0.020083	0.0000
GDP	-0.249945	0.0000	-0.245089	0.0000	-0.237031	0.0000	-0.249945	0.0000
UNEMP	-0.040315	0.0146	-0.066876	0.0000	-0.076547	0.0000	-0.040315	0.0146
OAD[1]	45.61055	0.0062	43.10158	0.0116	42.75077	0.0125	45.61055	0.0062
TAX[1]	-0.068095	0.1417	-0.102994	0.0282			-0.068095	0.1417
GINI	0.008601	0.5149	0.005139	0.7037	0.002007	0.8821	0.008601	0.5149
Adj Rsquared	0.589270		0.568565		0.567205		0.589270	
DW	1.767067		1.764985		1.737137		1.767067	
Obs	432		432		432		432	

Note:[1] *Differenced data series due to presence of unit root.*

Source: Authors' calculations.

The results from the first model in table 2 indicate that social expenditure reacts to changes in the general government primary balance in the expected way. When the primary balance improves, social expenditures fall. On the other hand, a rise in general government gross debt does not affect social expenditures much. The coefficient is actually opposite of what is expected considering the fiscal reaction function. This means that when debt grows, social expenditures also increase, although the reaction is very small. This is consistent with the argument that social expenditure is more resilient to spending cuts than other public expenditures. The influence of GDP growth is in line with the theory. When countries achieve better economic performances, social expenditure declines. This is confirmed in all the model specifications. The unemployment rate is significantly and positively linked to social expenditure. More unemployed persons normally require higher government spending. This especially refers to the part of expenditure on social protection. The old-age dependency ratio is found to be statistically insignificant in the equations. It does become significant when used in level and normally increases the social expenditure. The results for the tax revenues are inconclusive. When we apply the contemporary primary balance in the equation, tax revenues exhibit a positive influence on social expenditures. One way to interpret this result is that higher tax revenues improve the fiscal space for maneuver and governments have more funds. It could also reflect the notion that even in austerity periods when government took measures to increase revenues and reduce expenditures, social expenditures were more resilient to those cuts and perhaps even rose at some points. On the other hand, once we include the lagged primary balance, the coefficient of tax revenues changes its sign and now the result indicate that increasing revenues go along with falling expenditure. This could very well simply reflect their response to GDP, as they act counter-cyclically. In times of prosperity, tax revenues grow, while social expenditure falls (as indicated in the results) and vice versa. The response of the social expenditure on the Gini coefficient is only significant at the 0,1 confidence level and has a positive sign, indicating that higher inequality induces government action. However, the Scandinavian countries that have low Gini coefficients also have high social expenditures, while there are some Central European countries that do not spend as much in the social area, but still achieve low Gini coefficients, such as the Czech Republic, Slovenia and Slovakia. Yet, in general countries with higher inequality have lower welfare expenditures, so we take this result with caution.

Once we replace the dependent variable for its change (as in Schuknecht and Zemanek 2018), the regression loses some of the goodness of fit, but the Durbin-Watson is improved. The change in the response to the independent variables is that public debt has a negative coefficient, indicating that governments take account of the indebtedness, i.e. social expenditure grow by a smaller amount or fall when debt increases. The Gini coefficient becomes insignificant, as well as the tax revenues. The unemployment now has a negative sign

We additionally estimated the models for two sub-periods: pre-crisis period (2000-2007) and the period during and after the crisis (2008-2017). Generally the regressions are better in the second period in terms of goodness of fit and DW statistics. Also, one of the coefficients that are in our focus, the debt coefficient is more significant in the second period. It, however, still has a positive sign. Thus, the reduction of debt is more attributable to revenue improvements or cuts in other types of spending. Also, we can see that the change in social expenditures falls when debt rises. GDP remains significant and with a negative sign in all specifications and in both periods. The Gini coefficients is insignificant, so we cannot provide a robust conclusion about the reaction of social expenditures to inequality.

6. Conclusion

In order to investigate the effect of public debt and other socio-economics variables on social expenditure in the European Union we estimate a panel regression. Due to data availability, the model is estimated for the period 2000-2017 meaning that it captures the link between social expenditure and the observed explanatory variables in the twenty-first century. Social expenditure in its broadest term (social protection, health and education) is used here as a proxy for the welfare state effort of the countries. We use a fixed effect panel regression model, as indicated by the Hausman test, in all our model specifications. The results from the first model indicate that social expenditure reacts to changes in the general government primary balance in the expected way. When the primary balance improves, social expenditures fall. On the other hand, a rise in general government gross debt does not affect social expenditures much. The coefficient is actually opposite of what is expected considering the fiscal reaction function. This means that when debt grows, social expenditures also increase, although the reaction is very small. The influence of GDP growth is in line with the theory. When countries achieve better economic performances, social expenditure declines. This is confirmed in all the model specifications. The unemployment rate is significantly and positively linked to social expenditure. More unemployed persons normally require higher government spending. The old-age dependency ratio is found to be statistically insignificant in the equations. It does become significant when used in level and normally increases the social expenditure. The results for the tax revenues are inconclusive. When we apply the contemporary primary balance in the equation, tax revenues exhibit a positive influence on social expenditures. One way to interpret this result is that higher tax revenues improve the fiscal space for maneuver and governments have more funds. It could also reflect the notion that even in austerity periods when government took measures to increase revenues and reduce expenditures, social expenditures were more resilient to those cuts and perhaps even rose at some points. The response of the social expenditure on the Gini coefficient is only significant at the 0,1 confidence level and has a positive sign, indicating that higher inequality induces government action.

There are of course other factors that also influence the level of welfare expenditure. The literature highlights the importance of political and institutional factors. This may be included in a further analysis.

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ANNEX

Robustness check – Division into two sub-periods

	Model 1				Model 2			
	Dependent variable - SE							
	2002-2007		2008-2017		2002-2007		2008-2017	
Variable	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
SE					SE		SE	
C	24.53164	0.0000	27.76112	0.0000	24.82264	0.0000	27.61038	0.0000
SE(-1)								
PB	-0.269935	0.0000	-0.326260	0.0000				
PB((-1)					-0.134888	0.0119	-0.253857	0.0000
DEBT(-1)	0.022057	0.1344	0.035198	0.0000	0.015391	0.3341	0.017796	0.0047
GDP	-0.110568	0.0190	-0.156015	0.0000	-0.167452	0.0008	-0.222138	0.0000
UNEMP	0.123374	0.0048	0.134548	0.0000	0.137566	0.0042	0.125658	0.0002
OAD1	21.61963	0.3729	25.37174	0.3387	10.59107	0.6850	57.59305	0.0443
TAX1	0.174155	0.0685	0.131488	0.0552	-0.064396	0.5309	-0.151972	0.0511
GINI	0.011756	0.4363	-0.098250	0.1000	0.016422	0.3184	-0.048770	0.4520
Adj Rsquared	0.981002		0.967782		0.977775		0.962383	
DW	1.297069		0.993913		1.329144		0.977470	
Obs	162		270		189		270	

	Model 3				Model 4			
	Dependent variable - SE							
	2002-2007		2008-2017		2002-2007		2008-2017	
Variable	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
SE								
C	24.49279	0.0000	27.13944	0.0000	24.78075	0.0000	28.43189	0.0000
SE(-1)								
PB	-0.241732	0.0000	-0.323609	0.0000				
PB((-1)					-0.124696	0.0142	-0.238065	0.0000
DEBT(-1)	0.024280	0.1016	0.037749	0.0000	0.014683	0.3544	0.013732	0.0210
GDP	-0.130065	0.0052	-0.160836	0.0000	-0.164149	0.0009	-0.215994	0.0000
UNEMP	0.113352	0.0095	0.137285	0.0000	0.145276	0.0017	0.132689	0.0001
OAD1	15.08013	0.5332	26.47303	0.3208	12.51308	0.6286	56.51518	0.0497
TAX1								
GINI	0.015777	0.2959	-0.083357	0.1614	0.016047	0.3281	-0.069516	0.2804
Adj Rsquared	0.980652		0.967413		0.977879		0.961932	
DW	1.323848		0.986801		1.318582		0.973882	
	162		270		162		270	

	Model 5				Model 6			
	Dependent variable - ΔSE							
	2002-2007		**2008-2017**		**2002-2007**		**2008-2017**	
Variable	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**
SE								
C	0.907966	0.3663	0.337522	0.8046	1.423275	0.1501	-0.447118	0.7510
SE(-1)								
PB								
PB((-1)	0.117577	0.0392	0.081452	0.0000	-0.001951	0.9094	-0.010223	0.0184
DEBT(-1)	0.000894	0.9580	-0.015893	0.0003	-0.247598	0.0000	-0.302518	0.0000
GDP	-0.260669	0.0000	-0.294961	0.0000	-0.043645	0.3785	-0.136622	0.0000
UNEMP	-0.017295	0.7319	-0.091386	0.0001	35.97299	0.2039	52.96297	0.0106
OAD1	35.42579	0.2051	52.05384	0.0089	-0.150292	0.1566	-0.129556	0.0155
TAX1	-0.080326	0.4642	-0.052745	0.3273	0.000916	0.9581	0.096306	0.0388
GINI	0.008025	0.6475	0.070905	0.1154				
Adj Rsquared	0.135212		0.740915		0.135212		0.719213	
DW	2.442059		1.930396		2.442059		1.828692	
Periods	162		270		162		270	

	Model 7				Model 8			
	Dependent variable - ΔSE							
	2002-2007		**2008-2017**		**2002-2007**		**2008-2017**	
Variable	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**
SE								
C	1.659555	0.0785	0.137669	0.9223	0.907966	0.3663	0.622643	0.6404
PB	-0.211356	0.0001	-0.006220	0.7649				
PB((-1)					0.117577	0.0392	0.086933	0.0000
DEBT(-1)	0.000281	0.9862	-0.012339	0.0105	0.000894	0.9580	-0.017303	0.0000
GDP	-0.189312	0.0003	-0.297314	0.0000	-0.260669	0.0000	-0.292828	0.0000
UNEMP	-0.075974	0.1116	-0.140773	0.0000	-0.017295	0.7319	-0.088945	0.0001
OAD1	45.98967	0.0860	51.55607	0.0143	35.42579	0.2051	51.67974	0.0094
TAX1					-0.080326	0.4642		
GINI	-0.009572	0.5642	0.082017	0.0795	0.008025	0.6475	0.063705	0.1515
Adj Rsquared	0.358074		0.712276		0.135212		0.740955	
DW	2.497044		1.771855		2.442059		1.921028	
Periods	162		270		162		270	