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# **The Size and Composition of Government Spending in Europe and Its Impact on Well-Being**

Zohal Hessami\*

## **Abstract**

This paper analyses whether large governments in Europe reflect efficient responses to a changing social and economic environment ('welfare economic view') as opposed to wasteful spending ('public choice view'). To this end, the effect of government size on subjective well-being is estimated in a micro dataset covering twelve EU countries from 1990 to 2000. The estimations provide evidence for (i) an inversely U-shaped relationship between public sector size and well-being. (ii) The effect of government size on well-being depends on levels of corruption and decentralization as well as people's ideological preferences and their position in the income distribution. Finally, (iii) higher levels of well-being could have been achieved by spending more on education and less on social protection.

**Keywords:** Life satisfaction, well-being, public spending, government size

**JEL codes:** H11, H40, H50, I31

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## I. INTRODUCTION

The fact that European governments have grown dramatically since World War II cannot be questioned. In 1960, government expenditures on average amounted to 27 percent of output, while in recent years their average size has reached almost half of the GDP (Mueller 2003; Persson 2002). In light of the heavy tax burden that a representative European citizen is consequently facing, it needs to be established why the government can raise and enforce a claim to such a considerable part of people's incomes. The benefit principle of taxation provides an answer to this question by stating that tax collection by a public entity is justified if society at large receives an adequate reimbursement in the form of publicly provided goods and services (Lindahl 1919). Consequently, it is important to test whether people do benefit from the public sector in terms of higher well-being or whether governments have become excessively large.

With regard to this research question the objectives and motives of politicians and bureaucrats play a decisive role. The traditional welfare economic view, assumes the existence of a benevolent and omniscient social planner who exclusively seeks to maximize social welfare and ensures the achievement of a first-best allocation of resources (Pareto 1906). However, this view has been challenged by the public choice school, which emphasizes agency problems as the source of inefficient outcomes. One of the main ideas of this school of thought is that politicians and/or bureaucrats pursue personal interests that give rise to a deviation from the optimal size of the state sector (Mueller 2003). Thus, by testing the impact of government size on life satisfaction one is indirectly testing whether this kind of selfish behavior is actually observed in reality.

In order to analyze the general impact of the size and functional composition of public spending on people's subjective well-being, life satisfaction is regarded as a proxy for well-being. This is in line with the field of Happiness Research that has successively gained more attention and acceptance over the past few decades (Di Tella and MacCulloch 2006; Frey and Stutzer 2002). More specifically, the empirical analysis in this paper draws on a rich micro dataset based on the Eurobarometer Survey Series and covers twelve EU countries<sup>1</sup> from 1990 to 2000.

To date, only few researchers have investigated the relationship between public spending and well-being. Firstly, Bjørnskov, Dreher and Fischer (2007) conduct a worldwide cross-country study and find that life satisfaction decreases with government consumption, whereas government capital formation and social spending appear to have no effect. Hence, their analysis suggests that the aforementioned benefit principle of taxation is violated with respect to government consumption.<sup>2</sup>

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1. The countries included in the dataset are Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Sweden and the UK.
  2. On the other hand, the benefit principle concerning social transfers and capital formation is fulfilled according to the study by Bjørnskov et al. (2007). With regard to aggregate spending it might as well be that marginal costs and marginal benefits are approximately equal. However, the authors do not include total spending in the estimations.

This is contradicted by Di Tella and MacCulloch (2005)<sup>3</sup> who find a positive but insignificant effect of government consumption on life satisfaction in a panel dataset covering 10 OECD countries. The investigation at hand employs total public spending divided by GDP as a proxy for government size and regards a relatively homogeneous set of European countries similar to Di Tella and MacCulloch (2005). It is certainly doubtful that the heterogeneity in a world-wide cross-sectional study of 74 countries such as Venezuela, Vietnam, Zimbabwe, Tanzania and Uganda can be captured by just a few control variables as in Bjørnskov et al. (2007). Besides, it is questionable whether the dependent variable of subjective well-being can be compared among such a heterogeneous set of countries as pointed out by Diener and Oishi (2006)<sup>4</sup>. In the analysis at hand, however, this problem is solved by using country fixed effects.

There are also a number of papers that analyze the impact of specific types of government expenditures on well-being. For instance, Veenhoven (2000) investigates the relationship between social security expenditures and well-being for a worldwide set of countries and finds no significant correlation between the two. Ouweneel (2002) investigates the hypothesis that at least the unemployed should have higher average well-being in nations that spend a large percentage of GDP on welfare. However, he finds that while larger welfare states generally do achieve lower levels of income inequality, this does not have any significant effect on the subjective well-being of the unemployed. On the other hand, this contradicts Alesina, Di Tella and MacCulloch (2004) who find a significant effect of inequality on well-being, especially for European countries. In addition, Radcliff (2001) does find a statistically significant positive effect of generous welfare spending on average happiness, while Di Tella, MacCulloch and Oswald (2003) provide evidence that higher unemployment benefits increase national well-being. Finally, Kotakorpi and Laamanen (2010) exclusively focus on health expenditures in Finland and find a positive effect on well-being. Summarizing, it seems that not only the total level of public spending but also the magnitudes of individual components matter.

This paper suggests that there is an inversely U-shaped relationship between government expenditures and well-being. We also find that the effect of public sector size on well-being depends positively on the extent of decentralization and negatively on the level of corruption. In addition, left-wing voters and low-income earners appear to be the main beneficiaries of a large public sector. Further insights are gained by considering components of public spending that characterize the welfare state in a wider sense: education, health and social protection expenditures

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3. Di Tella and MacCulloch (2005) use government consumption as a control variable when they investigate the impact of inflation and unemployment on the well-being of left- and right-wingers.
  4. This paper points out that cultural factors such as the desirability of pleasant emotions or self-criticism influence reports of subjective well-being. Thus, nations such as Japan have lower scores than one might expect based on observable factors such as income.

(Blomquist and Christiansen 1995; Boadway and Marchand 1995<sup>5</sup>). We provide evidence that governments in the EU could have achieved higher levels of well-being by spending more on education and less on social protection. Summarizing, this paper makes a contribution to the existing literature by providing a comprehensive analysis on the impact of both the size and the composition of public expenditures on life satisfaction while taking into account the role of people's individual characteristics and of institutional factors.

The analysis is structured as follows: Section II gives an overview of theoretical considerations and states four hypotheses. Section III describes the dataset and presents the empirical strategy, while section IV reports the results for the estimations and four robustness checks. Finally, section V concludes the analysis.

## II. THEORETICAL CONSIDERATIONS

According to the welfare economic view a benevolent social planner representing the government ensures a first-best allocation of resources. For instance, Pigou (1947) describes how the government would levy an optimal corrective tax in the presence of externalities, whereas Samuelson (1954) states the condition that determines the optimal quantity of a public good. If public decision-makers comply with these optimality conditions, marginal costs and marginal benefits of government size just outweigh each other in equilibrium. These considerations are summarized in the following *ceteris paribus* statement:

**H1a: Well-being is not affected by government size.**

The underlying assumptions of perfect information and an absence of selfish motives that characterize the welfare economic view are discarded by proponents of the public choice school. Instead, they highlight inefficiencies and suboptimal outcomes caused by the propensity of politicians and bureaucrats to maximize their personal utility. As a result, the public choice school suggests that the public sector is excessively large and that resources are misallocated. The literature describes several causes for these inefficiencies. Many of them can be attributed to specific interest groups and the ways in which they succeed in pushing through their interests. In his seminal contribution on this issue Tullock (1959) points out the existence of the logrolling phenomenon, which may lead to the implementation of public projects that benefit specific interest groups but not society at large. In addition, Persson and Tabellini (2000) discuss models focusing on legislative

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5. Both groups of authors argue that governments primarily seek to achieve their redistributive goals through public expenditures on education, health care and pensions.

bargaining, lobbying and electoral competition that illustrate additional mechanisms for an inefficient and asymmetric allocation of publicly provided goods and services.

The behavior of bureaucrats and politicians provides another cause for excessive and inefficient public spending. Firstly, Niskanen (1971) puts forward a theoretical model illustrating that bureaucrats have an incentive to expand their budgets beyond the social optimum since bureaucrats' non-pecuniary goals such as prestige and power are positively correlated with larger budgets for the provision of public goods. Hence, in the presence of an information asymmetry concerning the cost function of the public good the bureaucrat demands the largest budget, which the politician would approve of. As an alternative to this, Brennan and Buchanan (1980) depict the government as a Leviathan that maximizes its revenue by exploiting the tax base to the full extent. Eventually, this leads to excessively large budgets. Finally, Nordhaus (1975) discusses the existence of political business cycles where politicians - presented as selfish maximizers of re-election probabilities – implement expansionary fiscal policies (such as increases in government spending) before elections in order to boost their popularity. Since it is unpleasant for politicians and voters to pursue fiscal consolidation after the elections, public sector size remains excessively large.<sup>6</sup> It follows that:

**H1b: Well-being is negatively affected by government size.**

Of course, the effect of public sector size on well-being is likely to differ across the population. The most important individual characteristics in this context are ideology and relative income.<sup>7</sup> Firstly, a large public sector is more likely to be welcomed by individuals who express a preference for left-wing policy, i.e. large government size. Secondly, people who have a relatively low income should benefit more from a large public sector as they are more likely to receive transfers and bear a comparably lower tax burden than high-income earners. Both propositions can be traced back to Meltzer and Richard's (1981) theoretical explanation for the size of government by means of a median voter model. In sum, these considerations motivate the following hypothesis:

**H2: Government size has a more positive impact on well-being for people who have left-wing ideological preferences or who rank low in the income distribution.**

Additionally, it is worthwhile to take into account the role of institutional factors. In particular, the analysis incorporates two factors, which are related to the efficient allocation of public resources.

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6. Empirical evidence for political business cycles in government spending can be found in Persson (2002) and Schuknecht (2000).

7. Another individual characteristic to look at is gender. For instance, Svaleryd (2009) provides evidence that women's representation in Swedish local councils affects the allocation of public expenditures with more being spent on education and childcare. We restrict the analysis to ideology and relative income due to space limitations.

The first one is corruption, which is defined as the ‘misuse of public office for private gain’ (Svensson 2005, p. 20). As an example, one may imagine how public officials are bribed and in return assign contracts for public projects to private firms, which are either unnecessary or relatively overpriced.

Secondly, expenditure decentralization is likely to play a role in the relationship between government size and well-being even though the effect may go either way. Positive effects are usually attributed to an increase in efficiency through ‘yardstick competition’ (Besley and Case 1995) and a better targeted satisfaction of people's preferences (Oates 1972), whereas opponents of decentralization emphasize a more difficult coordination of efforts (Prud'homme 1995). In hypothesis 3, the dominance of the benefits of decentralization is presumed since there is previous evidence on the positive effect of decentralization and local autonomy on well-being (Bjørnskov, Dreher and Fischer 2008; Frey and Stutzer 2000a<sup>8</sup>). These considerations imply:

**H3: Government size has a more positive impact on well-being in countries characterized by a high extent of expenditure decentralization or a low level of corruption.**

The final hypothesis investigates whether the composition of the public budget matters. Previous investigations of this question (Di Tella et al. 2003; Ouweneel 2002; Radcliff 2001; Veenhoven 2000) have only considered the effect of social transfers, while we embrace a wider definition of the welfare state by also taking into account the public provision of private goods such as education and health. These certainly create a strong amount of redistribution and can be viewed as indirect or in-kind transfers to low-income earners. We formulate the following hypothesis:

**H4: For a given size of the public sector higher well-being can be observed when a large share of the budget is spent on education, health and social protection.**

To summarize, the objective for the rest of the paper is to test four hypotheses, which relate to the impact of the public sector on well-being. To allow for more depth in the analysis we make a distinction between several population groups and factor in different characteristics of the government and the share of public spending that is allocated to redistributive purposes.

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8. Frey and Stutzer (2000a) find that local autonomy of Swiss cantons leads to higher well-being through political outcomes that are closer to people's preferences and procedural utility from political participation possibilities.

### III. DATA AND MODEL SPECIFICATION

#### 1. *Data description*

In order to test the hypotheses stated in the previous section, the empirical analysis relies on a dataset covering 12 EU countries over the time period between 1990 and 2000<sup>9</sup>. The data for the individual-level variables are derived from the Eurobarometer Survey Series. Next to the dependent variable (life satisfaction) this includes a number of control variables: gender, age, ideological preferences, relative income, marital status, education level, employment status and the number of children. The sampling is based on a multi-stage, random probability procedure and is hence designed to convey a representative picture of the population of the EU member states aged fifteen years and over. The interviews were conducted in a face-to-face setting in people's homes and in the appropriate national language by research firms under the direction of the European Commission.

The data for the the life satisfaction variable is based on the question 'On the whole, are you very satisfied, fairly satisfied, not very satisfied or not at all satisfied with the life you lead?' (the small number of respondents answering 'Don't know' and 'No answer' is ignored) measured on a scale that runs from 1 to 4 where a higher value indicates a higher level of satisfaction. Several findings in the economic and psychological literature give reason to believe that the use of answers to these kinds of questions are justified. First, there is scant evidence that self-reported well-being is correlated with physical reactions such as the frequency of smiling (Pavot et al. 1991; Ekman et al. 1990) or heart rate and blood pressure reactions to stress (Shedler et al. 1993). Second, people's perceptions of their own well-being coincide with recall of positive events in life (Seidlitz et al. 1997) and reports of relatives and friends (Diener 1984; Sandvik et al. 1993). Third, experimental studies reject the hypothesis that subjects bias their response upwards due to social desirability (Konow and Earley 2008). Finally, data on subjective well-being has been shown to be negatively correlated with suicide in individual-level multivariate regressions (Daly and Wilson 2009).

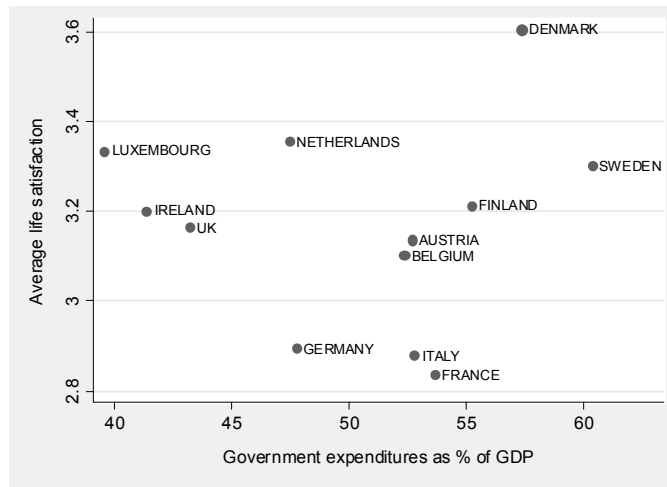
Figure 1 displays values for life satisfaction and government size for the 12 EU countries in the sample averaged across the time period from 1990 to 2000 (and the individuals in a particular country). Denmark is clearly identified as the country where people are on average most satisfied with their lives with an average value of 3.6 on a scale that runs from 1 to 4. At the lower end of the distribution are Germany, Italy, and France with averages of at most 2.9. The order in which the countries appear in the barchart is quite stable over time and across other surveys such as the World Values Survey or the European Social Survey.

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9. The analysis is limited to this time period for several reasons. First, OECD data on government spending is not available before 1990. Second, some individual variables in the Eurobarometer Survey Series are not available for later time periods: The number of children is not recorded from 2001 to 2003, while the same applies to relative income from 2004 to 2007.



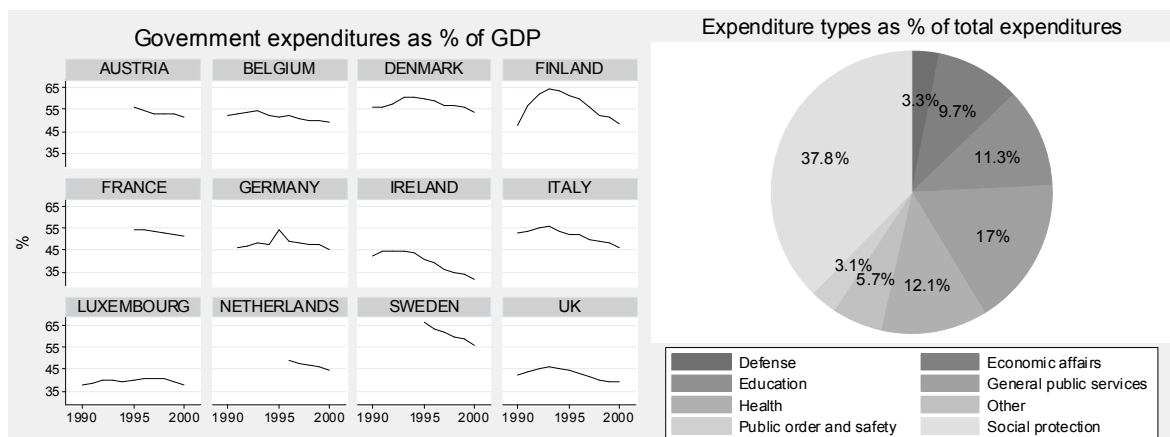
Figure 1: Averages of life satisfaction and government size, 1990 - 2000



Sources: Eurobarometer, OECD National Accounts

In addition, figure 1 illustrates the large cross-country variation in terms of government size across the 12 EU countries in the sample. More specifically, it becomes evident that there are two extreme types of government in the EU: Scandinavian welfare states and Anglo-Saxon governments with an average of about 57 and 42 percent of GDP, respectively. Luxembourg as a particularly small country can be regarded as an exception to this classification. Figure 2 provides an overview with respect to the size and functional composition of public expenditures for the 12 countries included in the sample. The time series plots on the left reveal that there is also some variation over time in the degree of government involvement. For Finland, Sweden and Ireland this variation amounts to up to 10 percentage points in the time period considered here.

Figure 2: Size and composition of government expenditures, 1990 - 2000



[1] The time-series plots on the left-hand side illustrate the evolution of government size over the period from 1990 to 2000 for each of the 12 EU countries included in the sample. The pie chart on the right-hand side depicts shares of the respective expenditure categories averaged over both the 12 EU countries in the sample and the period from 1990 to 2000.

Source: OECD National Accounts

The pie chart on the right of figure 2 disaggregates total public expenditures according to the purposes on which they are spent and displays unweighted averages for the 12 countries across the relevant time period. Obviously, social protection expenditures represent the highest share of public spending with about 38 percent, followed by expenditures on general public services, health and education. Smaller categories with a share of less than 10 percent include economic affairs, public order and safety and defense. The residual category sums up expenditures on recreation, culture and religion, environmental protection and housing and community amenities which amount to 2.2, 1.3 and 2.1 percent, respectively. Tables 7 to 10 in the appendix provide a more detailed overview of the data and its sources as well as further information on how the expenditure categories are defined according to the classification of the European Commission (2007). In the estimations in section IV the focus is on education, health and social protection expenditures which on average sum up to more than 60% of the total budget.

On top of the individual-level control variables, three macroeconomic control variables are considered in the analysis. First, all estimations include the log of GDP per capita owing to the long tradition of investigations of a nation's prosperity on well-being (Easterlin 1974; Oswald 1997). Moreover, since the individual-level variables only contain relative income it is necessary to take into account levels of income. Second, unemployment rates are incorporated into the regression analysis given that Lucas et al. (2004) find a large and persistent effect of unemployment on life satisfaction. It appears that even people, who find a job after being unemployed for a while, do not return to their initial level of life satisfaction. In this context, one has to keep in mind that the unemployment rate also captures negative effects on well-being through social problems such as crime (Edmark 2005)<sup>10</sup> and social exclusion. Blanchflower and Oswald (2004) additionally find that unemployment has played a significant role with respect to life satisfaction over a long time period in the United States and Great Britain.

The third macroeconomic control variable to be found in all estimations is inflation. Di Tella, MacCulloch and Oswald (2001) provide evidence that high inflation depresses well-being both in the United States as well as in Europe, even if the effect is lower than for unemployment. We measure inflation as the growth rate of the consumer price index as part of the OECD Key Economic Indicators, while GDP per capita and unemployment rates are taken from the OECD Economic Outlook report. One of the robustness checks in section IV.2 includes an additional macro-level control variable, in order to investigate whether results are affected when economic openness is additionally controlled for in the regressions. Generally, globalization can be beneficial due to a specialization in the production process and the possibility to consume more diverse goods

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10. Using a panel of Swedish counties ranging from 1988 to 1999, she finds that unemployment has a significantly positive effect on property crimes such as burglary, car and bike theft.

(Krugman and Obstfeld 2006). This might especially be important in the context of the European integration process, which accelerated at the end of the 1990s with the introduction of the Euro. The data is taken from the OECD Macro Trade Indicators.

The political and institutional environment related to the efficient satisfaction of voters' preferences is also likely to have an impact on well-being as suggested by Hudson (2006) and Wagner et al. (2009).<sup>11</sup> The first variable of interest is corruption which is measured by means of the Corruption Perceptions Index (CPI)<sup>12</sup> and for which data is available on an annual basis. In the original dataset a value of 10 indicates that there is no corruption. However, in order to facilitate the interpretation of the slope coefficients in the estimations we rescale this measure as Corruption = 10 – CPI score. The second institutional variable that we consider is the extent of decentralization measured as the share of subnational expenditures in total public expenditures. Data on expenditure decentralization is provided by the World Bank as part of the Fiscal Decentralization Indicators.

## 2. Empirical strategy

The regression model that is best suited to this analysis is an ordered response model, where the dependent variable - people's observable satisfaction with life - is discrete and defined on a finite ordinal scale, i. e.  $Lifesat_{itc} \in \{1, 2, 3, 4\}$ . The first part of the ordered response model consists of a structural equation with respect to the latent, continuous dependent variable:

$$Lifesat_{itc}^* = \alpha + \beta Individual_{itc} + \gamma Expenditures_{itc} + \delta Macro_{itc} + \omega_t + \mu_c + \varepsilon_{itc}, \quad (1)$$

where the subscripts represent individuals, time periods and countries.  $Expenditures_{itc}$  represents both total government expenditures as a share of GDP as well as expenditure subcategories as a share of total expenditures, while  $\varepsilon_{itc}$  represents the error term which we assume to be i.i.d. and normally distributed. Therefore, we are estimating an ordered probit model.  $Individual_{itc}$  includes a number of characteristics of the respondents such as gender, age, relative income, ideological preferences, marital status, education level, employment status and the number of children.

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11. Hudson (2006) provides evidence that institutional performance and the resulting level of trust in institutions has a direct impact on subjective well-being in EU countries, while Wagner et al. (2009) find that institutional quality measured by the rule of law, well-functioning regulation and low corruption has a positive effect on people's satisfaction with democracy. This may lead to higher subjective well-being in general.
  12. The CPI is a 'poll of polls' using information from up to 12 individual surveys and ratings. Country scores correlate strongly across years and also quite highly with other available indexes. For further details on its construction see Treisman (2007). Data reaching back to 1995 for a large number of countries are available for free at [http://www.transparency.org/policy\\_research/surveys\\_indices/cpi](http://www.transparency.org/policy_research/surveys_indices/cpi).

On a country level  $Macro_{itc}$  includes the log of GDP per capita, unemployment rates and inflation rates. In addition, all regressions include time fixed effects  $\omega_t$  in order to control for common exogenous shocks, an intercept  $\alpha$ , and country fixed effects  $\mu_c$ . Country fixed effects are included due to the existing evidence that measures of subjective well-being are not internationally comparable (Diener and Oishi, 2006). In some of the regressions nonlinear relationships between government expenditures and life satisfaction are tested by means of interactions with institutional factors and a quadratic government expenditures term. These are not explicitly illustrated in equation (1) to save space.

The second part of the ordered response model is an observation rule for the ordinal dependent variable, which relates the observable dependent variable to the latent variable. It simply spells out how  $Lifesat_{itc}$  changes its value if  $Lifesat_{itc}^*$  crosses a fixed given threshold  $\tau_j$ :

$$Lifesat_{itc} = \begin{cases} 1 & \text{if } Lifesat_{itc}^* \leq \tau_1 \\ 2 & \text{if } \tau_1 < Lifesat_{itc}^* \leq \tau_2 \\ 3 & \text{if } \tau_2 < Lifesat_{itc}^* \leq \tau_3 \\ 4 & \text{if } \tau_3 < Lifesat_{itc}^* \end{cases} \quad (2)$$

The estimation of these models in section IV.1 is followed by five robustness checks that involve the exclusion of outliers, the inclusion of additional control variables and OLS estimations (section IV.2). The least-squares estimations have the advantage that the interpretation of the coefficients is more straightforward than in an ordered probit model or any other nonlinear model.

## IV. EMPIRICAL RESULTS

### 1. Estimations

The empirical analysis is subdivided into three main parts: estimations for total public spending including nonlinear effects, regressions with regard to expenditure subcategories and finally four robustness checks. The results for the first set of estimations are summarized in table 1, where the estimations differ in the sense that the nonlinear terms are added consecutively. To begin with, model 1a represents a baseline estimation without any nonlinear terms, while models 2a to 7a each take into account different combinations of interaction and quadratic terms.<sup>13</sup> Since there are some

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13. Expenditure decentralization and corruption do not enter any of the models simultaneously, since there is a strong negative correlation between the two with  $\rho = -0.6$ .

missing observations for the expenditure decentralization variable and since corruption data is only available as of 1995, models 3a to 7a have a lower number of observations than models 1a and 2a.

We start the interpretation of table 1 by pointing out that the coefficients of the control variables are almost always significant and that the signs are largely in line with our expectations. On an individual level people's gender, age, relative income, ideological preferences, marital status, education level, employment status and their number of children have a significant impact on subjective well-being as pointed out in previous studies. In this respect models 1a to 7a provide a very coherent and robust picture. With regard to the variables at the country level, the log of GDP per capita and government expenditures have a positive linear impact on well-being. In addition, a higher unemployment or inflation rate both have a significantly negative impact on well-being, while the former even goes beyond the effect of a person being unemployed himself. Thus, unemployment reduces well-being even for employed people as their own job might be at stake in the presence of high unemployment rates.

Now let us turn to the interaction terms at the top of table 1. First of all, relative income does not have a significant effect on the relationship between public sector size and well-being since the coefficient for the relevant interaction term is insignificant in models 2a, 5a, 6a and 7a. On the other hand, the interaction terms with regard to ideological preferences and expenditure decentralization are strongly significant and have the correct signs with respect to hypotheses 2 and 3. The former result shows that ideology and income need not be two congruent dimensions, while the latter result confirms previous evidence by Bjørnskov et al. (2008). Finally, the interaction term with regard to corruption has the expected negative sign and is significant at the 10% or 1% level, respectively. Model 7a additionally reveals a highly significant negative quadratic term for government expenditures. This suggests an inversely U-shaped relationship and diminishing returns to government size in terms of well-being.

The statements made so far only refer to statistical significance, while we have not been able to say anything about the coefficients' economic significance. This has to do with the fact that the magnitudes of the coefficients have no meaningful interpretation in microeconomic estimations. The usual procedure would then be to calculate marginal effects which would for instance tell us how an increase in government expenditures affects a person's probability to be 'very satisfied' with his or her life. However, for several reasons we abstain from making these calculations and resort to the coefficients of the OLS estimations in section IV.2. The first justification for this approach is that Ferrer-i-Carbonell and Frijters (2004) provide overwhelming evidence that results barely differ between OLS and ordered probit estimations in the context of happiness research. After all, the only difference between these two estimation techniques is that the former assumes a

cardinal interpretation of life satisfaction data, while the latter is more conservative and only presumes an ordinal ranking.

Secondly, the marginal effects that we are interested in refer to the interaction terms at the top of table 1. The calculation of marginal effects in the context of nonlinear estimations with interaction terms is much more difficult than assumed by many researchers. In this context, Ai and Norton (2003) have identified 72 articles published between 1980 and 1999 in the economics journals listed on JSTOR that use interaction terms in nonlinear models. However, none of them provides a correct interpretation of the interaction term's marginal effect. In fact, the reported results often diverge strongly from the true results. As Ai and Norton (2003) point out, these marginal effects are not calculated by standard statistical software packages such as Stata.<sup>14</sup>

To conclude, hypothesis 3 stating that government size has a more positive impact on well-being with high expenditure decentralization and low corruption cannot be rejected. Moreover the hypothesis that government size has more positive effect on well-being for left-wing voters cannot be rejected (first part of hypothesis 2). Hypotheses 1a and 1b are both rejected in terms of statistical significance given that we neither find that well-being is not affected by government size nor that government size has a negative effect on well-being. Statements on economic significance follow in section IV.2 in the context of OLS estimations.

Table 1: Ordered probit estimation results (Total government expenditures)

	Model 1a	Model 2a	Model 3a	Model 4a	Model 5a	Model 6a	Model 7a
Government expenditures	0.020*** (7.710)	0.021*** (7.415)	-0.044*** (-3.866)	0.055*** (8.745)	-0.045*** (-3.890)	0.056*** (8.686)	0.230*** (8.850)
Relative income		-0.001 (-1.128)			-0.000 (-0.716)	-0.000 (-0.863)	-0.001 (-1.029)
* Government expenditures							
Ideological preferences		-0.003*** (-3.992)			-0.004*** (-5.254)	-0.002*** (-2.991)	-0.002*** (-2.579)
* Government expenditures							
Expenditure decentralization			0.003*** (7.189)		0.003*** (7.263)		
* Government expenditures							
Corruption				-0.002* (-1.823)		-0.002* (-1.733)	-0.006*** (-4.581)
* Government expenditures							
Government expenditures <sup>2</sup>							-0.001*** (-6.870)
Relative income	0.131*** (42.877)	0.156*** (6.956)	0.128*** (36.800)	0.147*** (35.195)	0.147*** (5.674)	0.172*** (6.017)	0.177*** (6.222)
Ideological preferences	0.073*** (18.259)	0.206*** (6.158)	0.088*** (19.336)	0.038*** (7.248)	0.290*** (7.491)	0.163*** (3.873)	0.146*** (3.463)
Expenditure decentralization			-0.113*** (-6.035)		-0.114*** (-6.099)		
Corruption				0.041 (0.776)		0.037 (0.690)	0.230*** (3.790)
Log of GDP per capita	0.281* (1.810)	0.298* (1.915)	0.803*** (2.781)	0.074 (0.231)	0.754*** (2.607)	0.140 (0.435)	1.767*** (4.404)
Unemployment rate	-0.018*** (-4.313)	-0.018*** (-4.264)	-0.025*** (-4.372)	-0.044*** (-4.101)	-0.025*** (-4.494)	-0.043*** (-4.001)	-0.028** (-2.571)
Inflation rate	-0.013*** (-3.314)	-0.014*** (-3.499)	-0.017*** (-2.937)	-0.028*** (-2.796)	-0.017*** (-3.048)	-0.030*** (-2.982)	-0.036*** (-3.477)

14. Ai and Norton have in the meantime made available the *inteff* module for Stata which does calculate these marginal effects for the binary case. For the ordered response case, no such module has become available yet (Norton, Wang and Ai 2004).

Male	-0.075*** (-11.672)	-0.074*** (-11.609)	-0.089*** (-12.152)	-0.084*** (-10.061)	-0.088*** (-12.050)	-0.084*** (-10.011)	-0.084*** (-10.001)
Age	-0.028*** (-23.022)	-0.028*** (-23.112)	-0.026*** (-19.141)	-0.029*** (-18.338)	-0.026*** (-19.278)	-0.029*** (-18.388)	-0.029*** (-18.415)
Age <sup>2</sup>	0.000*** (24.491)	0.000*** (24.560)	0.000*** (21.148)	0.000*** (19.056)	0.000*** (21.260)	0.000*** (19.088)	0.000*** (19.070)
<i>Marital status</i>							
Married	0.148*** (15.657)	0.148*** (15.685)	0.131*** (12.204)	0.176*** (14.336)	0.132*** (12.240)	0.177*** (14.365)	0.176*** (14.324)
Divorced	-0.202*** (-13.155)	-0.202*** (-13.154)	-0.226*** (-12.916)	-0.158*** (-8.257)	-0.226*** (-12.924)	-0.158*** (-8.235)	-0.159*** (-8.276)
Separated	-0.305*** (-11.678)	-0.305*** (-11.655)	-0.333*** (-11.215)	-0.225*** (-6.581)	-0.332*** (-11.181)	-0.224*** (-6.554)	-0.222*** (-6.510)
Widowed	-0.100*** (-6.430)	-0.099*** (-6.400)	-0.131*** (-7.371)	-0.054*** (-2.637)	-0.131*** (-7.360)	-0.053*** (-2.594)	-0.052*** (-2.550)
<i>Education till age</i>							
16 to 19 yrs	0.084*** (10.992)	0.084*** (11.027)	0.086*** (9.948)	0.077*** (7.776)	0.086*** (10.015)	0.078*** (7.820)	0.078*** (7.817)
> 19 yrs	0.137*** (13.910)	0.138*** (13.961)	0.144*** (12.242)	0.143*** (10.128)	0.145*** (12.363)	0.144*** (10.168)	0.136*** (9.572)
<i>Employment status</i>							
Unemployed	-0.609*** (-50.993)	-0.609*** (-50.972)	-0.637*** (-48.574)	-0.590*** (-37.899)	-0.637*** (-48.561)	-0.590*** (-37.871)	-0.591*** (-37.918)
School	0.108*** (8.012)	0.107*** (7.937)	0.114*** (7.391)	0.143*** (7.846)	0.112*** (7.291)	0.142*** (7.794)	0.139*** (7.664)
Retired	-0.028** (-2.313)	-0.028** (-2.299)	-0.050*** (-3.604)	0.009 (0.551)	-0.050*** (-3.590)	0.009 (0.584)	0.011 (0.693)
Home	-0.017 (-1.447)	-0.016 (-1.389)	-0.006 (-0.467)	-0.029* (-1.843)	-0.006 (-0.419)	-0.028* (-1.788)	-0.023 (-1.497)
Self-employed	-0.015 (-1.287)	-0.015 (-1.227)	-0.021 (-1.549)	-0.007 (-0.451)	-0.020 (-1.462)	-0.006 (-0.400)	-0.006 (-0.386)
<i>Number of children &lt;= 15 yrs</i>							
1	-0.047*** (-5.309)	-0.047*** (-5.314)	-0.041*** (-4.048)	-0.042*** (-3.575)	-0.041*** (-4.065)	-0.042*** (-3.570)	-0.043*** (-3.621)
2	-0.026*** (-2.691)	-0.026*** (-2.694)	-0.022** (-2.013)	-0.024* (-1.846)	-0.022** (-2.023)	-0.024* (-1.853)	-0.026** (-1.973)
>= 3	-0.068*** (-4.849)	-0.068*** (-4.836)	-0.070*** (-4.419)	-0.029 (-1.512)	-0.069*** (-4.397)	-0.030 (-1.520)	-0.031 (-1.575)
Observations	153,268	153,268	118,763	89,017	118,763	89,017	89,017

[1] Hypothesis tests are based on standard errors that are robust to heteroscedasticity [2] t-statistics are in parentheses  
[3] Stars indicate significance at 10% (\*), 5% (\*\*) and 1% (\*\*\*) [4] Regressions include time and country fixed-effects

Table 2 provides an extension of the estimations in table 1 through the inclusion of three types of expenditures that are measured as a share of total public expenditures. This allows us to investigate the validity of hypothesis 4, which did not play a role in the previous estimations. The general structure of this new set of estimations is as follows: Models 8a to 11a analyse the linear effect of expenditure categories on well-being, while model 12a adds squared terms. In the linear specifications, education and social protection expenditures have a significantly positive impact, while health expenditures have a significantly negative effect. The positive effect of social protection expenditures contradicts previous findings by Veenhoven (2000) and Ouweneel (2002) and confirms those by Di Tella and MacCulloch (2004) and Radcliff (2001), while the negative impact of health expenditures stands in opposition to evidence by Kotakorpi and Laamanen (2010). This negative effect can be most likely attributed to the fact that the dataset does not include information on individual health status and therefore, there might be a spurious correlation at work: Higher levels of health expenditures are correlated with a lower average health status in a society leading to lower levels of well-being.

Table 2: Ordered probit estimation results (Expenditure subcategories)

	Model 8a	Model 9a	Model 10a	Model 11a	Model 12a
Government expenditures	0.019*** (7.658)	0.020*** (7.752)	0.018*** (7.109)	0.018*** (6.935)	0.024*** (7.396)
Education expenditures	0.033*** (3.296)			0.051*** (4.759)	0.253*** (2.681)
Social protection expenditures		0.008** (2.085)		0.009** (2.509)	0.080*** (3.671)
Health expenditures			-0.026*** (-3.288)	-0.032*** (-3.918)	-0.158*** (-4.051)
Education expenditures <sup>2</sup>					-0.008** (-2.165)
Social protection expenditures <sup>2</sup>					-0.001*** (-3.502)
Health expenditures <sup>2</sup>					0.005*** (3.235)
Log of GDP per capita	0.300* (1.929)	0.335** (2.115)	0.413** (2.566)	0.540*** (3.306)	0.319 (1.486)
Unemployment rate	-0.016*** (-3.673)	-0.020*** (-4.667)	-0.018*** (-4.369)	-0.017*** (-3.954)	-0.021*** (-4.551)
Inflation rate	-0.016*** (-3.980)	-0.009** (-2.070)	-0.015*** (-3.748)	-0.015*** (-3.312)	-0.012*** (-2.652)
Male	-0.075*** (-11.681)	-0.075*** (-11.680)	-0.075*** (-11.656)	-0.075*** (-11.676)	-0.075*** (-11.658)
Age	-0.028*** (-23.015)	-0.028*** (-23.041)	-0.028*** (-23.028)	-0.028*** (-23.043)	-0.028*** (-23.062)
Age <sup>2</sup>	0.000*** (24.476)	0.000*** (24.510)	0.000*** (24.496)	0.000*** (24.511)	0.000*** (24.511)
Relative income	0.131*** (42.882)	0.131*** (42.897)	0.131*** (42.916)	0.131*** (42.960)	0.131*** (42.993)
Ideological preferences	0.074*** (18.291)	0.073*** (18.226)	0.073*** (18.203)	0.073*** (18.200)	0.073*** (18.198)
<i>Marital status</i>					
Married	0.148*** (15.685)	0.148*** (15.632)	0.148*** (15.617)	0.148*** (15.622)	0.147*** (15.595)
Divorced	-0.202*** (-13.143)	-0.202*** (-13.163)	-0.202*** (-13.165)	-0.202*** (-13.158)	-0.202*** (-13.150)
Separated	-0.305*** (-11.670)	-0.305*** (-11.685)	-0.305*** (-11.680)	-0.305*** (-11.678)	-0.305*** (-11.665)
Widowed	-0.099*** (-6.399)	-0.100*** (-6.442)	-0.100*** (-6.442)	-0.099*** (-6.413)	-0.099*** (-6.398)
<i>Education till age</i>					
16 to 19	0.085*** (11.105)	0.084*** (10.956)	0.083*** (10.883)	0.084*** (10.995)	0.082*** (10.767)
> 19	0.137*** (13.880)	0.137*** (13.900)	0.136*** (13.802)	0.135*** (13.718)	0.137*** (13.868)
<i>Employment status</i>					
Unemployed	-0.609*** (-50.991)	-0.609*** (-51.014)	-0.609*** (-51.010)	-0.610*** (-51.037)	-0.610*** (-51.049)
School	0.108*** (8.003)	0.107*** (7.969)	0.108*** (8.009)	0.107*** (7.942)	0.107*** (7.947)
Retired	-0.028** (-2.296)	-0.028** (-2.325)	-0.028** (-2.319)	-0.028** (-2.311)	-0.028** (-2.300)
Home	-0.016 (-1.427)	-0.017 (-1.447)	-0.016 (-1.395)	-0.016 (-1.352)	-0.015 (-1.276)
Self-employed	-0.015 (-1.273)	-0.015 (-1.300)	-0.015 (-1.281)	-0.015 (-1.275)	-0.015 (-1.293)
<i>Number of children &lt;= 15 yrs</i>					
1	-0.047*** (-5.335)	-0.047*** (-5.293)	-0.047*** (-5.303)	-0.047*** (-5.323)	-0.047*** (-5.314)
2	-0.027*** (-2.737)	-0.026*** (-2.685)	-0.026*** (-2.685)	-0.027*** (-2.747)	-0.027*** (-2.807)
>=3	-0.069*** (-4.901)	-0.068*** (-4.827)	-0.068*** (-4.823)	-0.068*** (-4.869)	-0.069*** (-4.933)
Observations	153,268	153,268	153,268	153,268	153,268

[1] Hypothesis tests are based on standard errors that are robust to heteroscedasticity [2] t-statistics are in parentheses  
 [3] Stars indicate significance at 10% (\*), 5% (\*\*) and 1% (\*\*\*) [4] Regressions include time and country fixed-effects  
 [5] Government expenditures are measured as a share of GDP, while expenditure types are divided by total expenditures



The estimation results for model 12a reveal that the effects of public spending on education and social protection expenditures on well-being have an inverted U-shape. This makes sense as this shape simply expresses the diminishing benefit of higher expenditures on these two purposes. Overall, we can conclude that the hypothesis that for a given public sector size people on average report higher well-being when a larger share of the budget is spent on education and health expenditures (hypothesis 4) cannot be rejected. Unfortunately, we cannot make a meaningful statement on the validity of hypothesis 4 with regard to health expenditures given that the dataset does not include information on respondents' health status in the time period considered.

## 2. Sensitivity analysis

In this section, we discuss four robustness checks that are well-suited to the investigation at hand. First, we take into account the potential influence of outlying observations on estimation results. From figure 1 in section III.1, it is more than obvious that Denmark stands out from the rest of the sample given that Denmark is isolated in the top right corner of the figure. Therefore, the first robustness check excludes observations on Denmark. The underlying question is whether previous estimation results are driven by the peculiarity of the Danish public sector and Danish society.

Table 3 reports the estimation results for six models that already appeared in tables 1 and 2. To be more exact, models 2a to 4a and 7a from the table relating to total government expenditures and models 11a and 12a from the table on expenditure subcategories are re-estimated. Since we have excluded Denmark from the sample, the maximum number of observations drops to 132,945.

Table 3: Robustness check I: Exclusion of Denmark

	Model 2b	Model 3b	Model 4b	Model 7b	Model 11b	Model 12b
Government expenditures	0.013*** (3.753)	-0.085*** (-5.595)	0.053*** (7.999)	0.241*** (9.077)	0.013*** (3.802)	0.022*** (4.766)
Relative income * Government expenditures	-0.001** (-2.019)			-0.001* (-1.772)		
Ideological preferences * Government expenditures	-0.004*** (-4.791)			-0.002** (-2.260)		
Expenditure decentralization * Government expenditures		0.005*** (8.495)				
Corruption * Government expenditures			-0.001 (-1.291)	-0.005*** (-4.247)		
Government expenditures <sup>2</sup>				-0.002*** (-7.190)		
Education expenditures					0.057*** (4.106)	-0.055 (-0.285)
Health expenditures					-0.033*** (-3.655)	-0.133*** (-3.246)
Social protection expenditures					0.006 (1.538)	0.088*** (3.390)
Education expenditures <sup>2</sup>						0.005 (0.591)
Health expenditures <sup>2</sup>						0.005*** (2.805)

Social protection expenditures <sup>2</sup>						-0.001*** (-3.323)
Log of GDP per capita	0.780*** (3.954)	0.950*** (3.008)	0.112 (0.331)	1.790*** (4.356)	0.729*** (3.648)	0.422* (1.799)
Unemployment rate	0.001 (0.145)	-0.038*** (-3.595)	-0.043*** (-3.851)	-0.028** (-2.454)	-0.007 (-0.957)	-0.016** (-2.127)
Inflation rate	-0.030*** (-5.594)	-0.010 (-1.409)	-0.033*** (-2.924)	-0.036*** (-3.193)	-0.024*** (-3.768)	-0.014* (-1.945)
Expenditure decentralization		-0.209*** (-7.630)				
Corruption			0.018 (0.325)	0.215*** (3.504)		
Male	-0.068*** (-9.919)	-0.082*** (-10.350)	-0.077*** (-8.761)	-0.076*** (-8.694)	-0.068*** (-9.955)	-0.068*** (-9.942)
Age	-0.028*** (-21.648)	-0.026*** (-17.318)	-0.030*** (-18.063)	-0.030*** (-18.141)	-0.027*** (-21.569)	-0.028*** (-21.588)
Age <sup>2</sup>	0.000*** (23.013)	0.000*** (19.308)	0.000*** (18.772)	0.000*** (18.785)	0.000*** (22.946)	0.000*** (22.961)
Relative income	0.182*** (7.347)	0.129*** (34.274)	0.146*** (33.724)	0.200*** (6.661)	0.132*** (40.925)	0.132*** (40.930)
Ideological preferences	0.247*** (6.715)	0.091*** (18.202)	0.042*** (7.524)	0.141*** (3.176)	0.073*** (16.853)	0.073*** (16.840)
<i>Marital status</i>						
Married	0.139*** (13.657)	0.114*** (9.687)	0.170*** (13.195)	0.170*** (13.166)	0.138*** (13.583)	0.138*** (13.579)
Divorced	-0.208*** (-12.784)	-0.242*** (-12.743)	-0.161*** (-8.037)	-0.162*** (-8.068)	-0.209*** (-12.833)	-0.209*** (-12.824)
Separated	-0.312*** (-11.414)	-0.350*** (-11.086)	-0.225*** (-6.386)	-0.222*** (-6.310)	-0.314*** (-11.444)	-0.313*** (-11.429)
Widowed	-0.107*** (-6.480)	-0.148*** (-7.721)	-0.061*** (-2.878)	-0.059*** (-2.787)	-0.107*** (-6.515)	-0.107*** (-6.503)
<i>Education till age</i>						
16 to 19 yrs	0.088*** (11.071)	0.095*** (10.411)	0.083*** (7.958)	0.082*** (7.891)	0.088*** (10.992)	0.087*** (10.850)
> 19 yrs	0.138*** (13.008)	0.143*** (10.881)	0.143*** (9.621)	0.135*** (9.036)	0.136*** (12.797)	0.137*** (12.875)
<i>Employment status</i>						
Unemployed	-0.629*** (-49.414)	-0.666*** (-46.988)	-0.607*** (-37.214)	-0.607*** (-37.229)	-0.630*** (-49.514)	-0.630*** (-49.525)
School	0.121*** (8.161)	0.133*** (7.583)	0.152*** (7.858)	0.149*** (7.685)	0.120*** (8.104)	0.120*** (8.113)
Retired	-0.010 (-0.763)	-0.030** (-1.976)	0.016 (0.968)	0.019 (1.129)	-0.010 (-0.815)	-0.010 (-0.805)
Home	-0.007 (-0.602)	0.003 (0.199)	-0.022 (-1.356)	-0.016 (-0.976)	-0.007 (-0.614)	-0.007 (-0.555)
Self-employed	-0.007 (-0.573)	-0.012 (-0.875)	-0.001 (-0.090)	-0.000 (-0.024)	-0.008 (-0.658)	-0.008 (-0.666)
<i>Number of children &lt;= 15 yrs</i>						
1	-0.053*** (-5.594)	-0.048*** (-4.413)	-0.040*** (-3.244)	-0.041*** (-3.277)	-0.053*** (-5.622)	-0.053*** (-5.624)
2	-0.035*** (-3.392)	-0.034*** (-2.853)	-0.026* (-1.891)	-0.028** (-2.015)	-0.036*** (-3.463)	-0.037*** (-3.541)
>= 3	-0.075*** (-5.100)	-0.079*** (-4.668)	-0.025 (-1.213)	-0.026 (-1.263)	-0.076*** (-5.165)	-0.077*** (-5.232)
Observations	132,945	98,440	80,179	80,179	132,945	132,945

[1] Hypothesis tests are based on standard errors that are robust to heteroscedasticity [2] t-statistics are in parentheses  
[3] Stars indicate significance at 10% (\*), 5% (\*\*) and 1% (\*\*\*) [4] Regressions include time and country fixed-effects  
[5] Government expenditures are measured as a share of GDP, while expenditure types are divided by total expenditures

Compared to the results in tables 1 and 2, the results for the individual characteristics and the macroeconomic variables are in principle unchanged. There are, however, some small differences with regard to the interaction terms and the expenditure subcategories. First, the interaction term between relative income and government expenditures is now significant at the 5 or 10% level, while the interaction term between corruption and government expenditures is only significant in

model 7b. Second, the squared term for education expenditures is not significant anymore in model 12b suggesting a positive linear impact of education expenditures on well-being. To conclude, most of our results are not sensitive to the inclusion of observations on Denmark, while some interesting changes emerge.

As an alternative to dropping observations for Denmark in order to take into account the role of outlying observations, the second robustness check excludes all observations with a studentized residual whose absolute value is larger than 1.5. For this reason, the number of observations in table 4 drop to a maximum value of 133,757. Again, very few changes to the results in table 1 can be observed. First, the coefficient for the interaction term in model 4c is again significant, which is, however, a minor change given that it is still significant in the more complete model 7c. Second, as in the first robustness check the coefficient for squared education expenditures is not significant. Finally, the coefficient for squared health expenditures is now insignificant. However, as argued before this coefficient does not have a meaningful interpretation as long as the estimations do not control for individual health status. Summarizing the first two robustness checks, we can state that the results in tables 1 and 2 are not driven by the existence of outlying observations.

Table 4: Robustness check II: Exclusion of outlying observations ( $|\text{studentized residual}| > 1.5$ )

	Model 2c	Model 3c	Model 4c	Model 7c	Model 11c	Model 12c
Government expenditures	0.050*** (14.826)	-0.002 (-0.151)	0.058*** (7.714)	0.219*** (7.123)	0.042*** (13.307)	0.045*** (12.028)
Relative income * Government expenditures	-0.002*** (-4.504)			-0.003*** (-4.711)		
Ideological preferences * Government expenditures	-0.005*** (-7.113)			-0.005*** (-5.884)		
Expenditure decentralization * Government expenditures		0.002*** (4.961)				
Corruption * Government expenditures			0.000 (0.262)	-0.003* (-1.773)		
Government expenditures <sup>2</sup>				-0.001*** (-5.189)		
Education expenditures					0.045*** (3.572)	-0.113 (-1.044)
Health expenditures					-0.039*** (-3.956)	-0.043 (-0.944)
Social protection expenditures					0.007* (1.650)	0.055** (2.096)
Education expenditures <sup>2</sup>						0.006 (1.469)
Health expenditures <sup>2</sup>						0.001 (0.351)
Social protection expenditures <sup>2</sup>						-0.001* (-1.814)
Log of GDP per capita	0.666*** (3.756)	0.924*** (2.718)	1.013*** (2.752)	2.608*** (5.597)	0.920*** (4.952)	1.039*** (4.237)
Unemployment rate	-0.026*** (-5.399)	-0.036*** (-5.433)	-0.046*** (-3.604)	-0.030** (-2.352)	-0.026*** (-5.132)	-0.024*** (-4.557)
Inflation rate	-0.032*** (-6.819)	-0.037*** (-5.491)	-0.046*** (-3.903)	-0.056*** (-4.699)	-0.034*** (-6.324)	-0.033*** (-6.126)
Expenditure decentralization		-0.096*** (-4.532)				
Corruption			-0.069 (-1.096)	0.083 (1.174)		

Male	-0.149*** (-19.156)	-0.163*** (-18.598)	-0.157*** (-15.559)	-0.156*** (-15.408)	-0.150*** (-19.303)	-0.150*** (-19.292)
Age	-0.046*** (-32.260)	-0.044*** (-27.144)	-0.045*** (-23.799)	-0.045*** (-23.986)	-0.046*** (-32.028)	-0.046*** (-32.044)
Age <sup>2</sup>	0.001*** (35.134)	0.001*** (30.019)	0.001*** (25.581)	0.001*** (25.692)	0.001*** (34.921)	0.001*** (34.935)
Relative income	0.337*** (12.981)	0.207*** (49.880)	0.233*** (46.419)	0.387*** (11.801)	0.221*** (60.250)	0.221*** (60.236)
Ideological preferences	0.392*** (10.237)	0.132*** (24.229)	0.089*** (14.036)	0.369*** (7.702)	0.121*** (24.947)	0.121*** (24.923)
<i>Marital status</i>						
Married	0.232*** (20.381)	0.221*** (17.239)	0.242*** (16.363)	0.245*** (16.555)	0.229*** (20.175)	0.229*** (20.184)
Divorced	-0.388*** (-20.084)	-0.402*** (-18.355)	-0.349*** (-14.566)	-0.349*** (-14.550)	-0.388*** (-20.086)	-0.388*** (-20.073)
Separated	-0.664*** (-19.344)	-0.705*** (-18.002)	-0.532*** (-12.120)	-0.526*** (-12.035)	-0.666*** (-19.359)	-0.666*** (-19.359)
Widowed	-0.224*** (-12.021)	-0.244*** (-11.564)	-0.181*** (-7.431)	-0.176*** (-7.229)	-0.226*** (-12.114)	-0.226*** (-12.097)
<i>Education till age</i>						
16 to 19 yrs	0.172*** (18.563)	0.175*** (16.851)	0.146*** (12.079)	0.147*** (12.148)	0.172*** (18.498)	0.172*** (18.509)
> 19 yrs	0.264*** (22.201)	0.262*** (18.740)	0.237*** (13.972)	0.230*** (13.533)	0.261*** (21.962)	0.262*** (21.961)
<i>Employment status</i>						
Unemployed	-1.102*** (-70.066)	-1.135*** (-65.496)	-1.097*** (-53.865)	-1.097*** (-53.844)	-1.103*** (-70.034)	-1.102*** (-69.986)
School	0.183*** (11.354)	0.146*** (7.996)	0.240*** (11.072)	0.235*** (10.809)	0.186*** (11.537)	0.186*** (11.541)
Retired	-0.001 (-0.073)	-0.017 (-1.015)	0.054*** (2.915)	0.054*** (2.930)	0.001 (0.042)	0.001 (0.052)
Home	0.015 (1.097)	0.023 (1.447)	0.013 (0.726)	0.021 (1.116)	0.015 (1.107)	0.015 (1.116)
Self-employed	0.036** (2.526)	0.037** (2.316)	0.034* (1.828)	0.034* (1.834)	0.036** (2.497)	0.036** (2.492)
<i>Number of children &lt;= 15 yrs</i>						
1	-0.079*** (-7.382)	-0.075*** (-6.167)	-0.088*** (-6.104)	-0.088*** (-6.104)	-0.080*** (-7.435)	-0.080*** (-7.433)
2	-0.060*** (-5.096)	-0.054*** (-4.100)	-0.070*** (-4.390)	-0.072*** (-4.504)	-0.061*** (-5.160)	-0.061*** (-5.188)
>= 3	-0.117*** (-7.041)	-0.118*** (-6.376)	-0.113*** (-4.891)	-0.114*** (-4.964)	-0.117*** (-7.078)	-0.118*** (-7.085)
Observations	133,757	104,140	78,172	78,172	133,757	133,757

[1] Hypothesis tests are based on standard errors that are robust to heteroscedasticity [2] t-statistics are in parentheses  
[3] Stars indicate significance at 10% (\*), 5% (\*\*) and 1% (\*\*\*) [4] Regressions include time and country fixed-effects  
[5] Government expenditures are measured as a share of GDP, while expenditure types are divided by total expenditures

The third robustness check includes additionally a measure of economic openness in order to take into account the effect of increasing economic integration on well-being. Again, only few changes as compared to estimations results in table 1 and 2 emerge. First, in model 3d the coefficient for the log of GDP per capita is negative and significant at the 5% level. This counterintuitive result can most likely be attributed to multicollinearity. Economic openness is defined as the sum of imports and exports divided by GDP. Hence, by construction there is a high negative correlation of  $-0.46$  that is significant at the 1% level. For this reason we have abstained from including this variable in the estimations in tables 1 and 2. However, the coefficients for our main variables of interest at the top of table 5 are unaffected and therefore, we can conclude that the estimation results in section IV.1 are not sensitive to the inclusion of economic openness.

Table 5: Robustness check III: Inclusion of economic openness

	Model 2d	Model 3d	Model 4d	Model 7d	Model 11d	Model 12d
Government expenditures	0.021*** (7.284)	-0.044*** (-3.870)	0.047*** (7.246)	0.207*** (7.577)	0.018*** (6.822)	0.024*** (7.119)
Relative income * Government expenditures	-0.001 (-1.124)			-0.001 (-1.094)		
Ideological preferences * Government expenditures	-0.003*** (-3.992)			-0.002*** (-2.617)		
Expenditure decentralization * Government expenditures		0.003*** (7.187)				
Corruption * Government expenditures			-0.002* (-1.716)	-0.005*** (-4.161)		
Government expenditures^2				-0.001*** (-5.947)		
Education expenditures					0.051*** (4.651)	0.252*** (2.668)
Health expenditures					-0.032*** (-3.812)	-0.157*** (-3.993)
Social protection expenditures					0.009** (2.454)	0.081*** (3.642)
Education expenditures^2						-0.008** (-2.157)
Health expenditures^2						0.005*** (3.144)
Social protection expenditures^2						-0.001*** (-3.466)
Log of GDP per capita	0.315 (1.348)	0.763** (2.007)	-1.051** (-2.541)	0.912* (1.749)	0.564** (2.235)	0.372 (1.159)
Unemployment rate	-0.018*** (-3.523)	-0.025*** (-4.085)	-0.071*** (-5.713)	-0.046*** (-3.523)	-0.017*** (-3.217)	-0.020*** (-3.557)
Inflation rate	-0.014*** (-3.481)	-0.016*** (-2.881)	-0.049*** (-4.346)	-0.047*** (-4.210)	-0.015*** (-3.314)	-0.012*** (-2.654)
Economic openness	-0.000 (-0.095)	0.000 (0.158)	0.005*** (4.245)	0.003** (2.496)	-0.000 (-0.124)	-0.000 (-0.222)
Expenditure decentralization		-0.113*** (-6.036)				
Corruption			0.043 (0.804)	0.210*** (3.445)		
Male	-0.074*** (-11.610)	-0.089*** (-12.152)	-0.084*** (-10.069)	-0.084*** (-10.005)	-0.075*** (-11.677)	-0.075*** (-11.659)
Age	-0.028*** (-23.113)	-0.026*** (-19.140)	-0.029*** (-18.356)	-0.029*** (-18.423)	-0.028*** (-23.043)	-0.028*** (-23.063)
Age^2	0.000*** (24.561)	0.000*** (21.148)	0.000*** (19.060)	0.000*** (19.074)	0.000*** (24.498)	0.000*** (24.513)
Relative income	0.156*** (6.949)	0.128*** (36.801)	0.148*** (35.324)	0.180*** (6.294)	0.131*** (42.946)	0.131*** (42.981)
Ideological preferences	0.206*** (6.158)	0.088*** (19.335)	0.038*** (7.232)	0.147*** (3.500)	0.073*** (18.200)	0.073*** (18.198)
<i>Marital status</i>						
Married	0.148*** (15.686)	0.131*** (12.203)	0.176*** (14.310)	0.176*** (14.316)	0.148*** (15.624)	0.147*** (15.598)
Divorced	-0.202*** (-13.154)	-0.226*** (-12.915)	-0.158*** (-8.235)	-0.158*** (-8.258)	-0.202*** (-13.158)	-0.202*** (-13.149)
Separated	-0.305*** (-11.655)	-0.333*** (-11.215)	-0.225*** (-6.583)	-0.223*** (-6.515)	-0.305*** (-11.677)	-0.305*** (-11.664)
Widowed	-0.099*** (-6.399)	-0.131*** (-7.371)	-0.054*** (-2.634)	-0.052** (-2.550)	-0.099*** (-6.412)	-0.099*** (-6.398)
<i>Education till age</i>						
16 to 19 yrs	0.084*** (11.025)	0.086*** (9.948)	0.078*** (7.806)	0.078*** (7.835)	0.084*** (10.988)	0.082*** (10.760)
> 19 yrs	0.138*** (13.962)	0.144*** (12.241)	0.142*** (9.993)	0.136*** (9.548)	0.135*** (13.720)	0.137*** (13.870)
<i>Employment status</i>						
Unemployed	-0.609*** (-50.971)	-0.637*** (-48.574)	-0.590*** (-37.914)	-0.591*** (-37.921)	-0.610*** (-51.037)	-0.610*** (-51.049)
School	0.107*** (7.937)	0.114*** (7.391)	0.142*** (7.812)	0.139*** (7.655)	0.107*** (7.942)	0.107*** (7.947)
Retired	-0.028** (-2.299)	-0.050*** (-3.603)	0.009 (0.589)	0.011 (0.702)	-0.028** (-2.312)	-0.028** (-2.301)

Home	-0.016 (-1.390)	-0.006 (-0.465)	-0.028* (-1.771)	-0.023 (-1.482)	-0.016 (-1.354)	-0.015 (-1.280)
Self-employed	-0.015 (-1.227)	-0.021 (-1.549)	-0.007 (-0.462)	-0.006 (-0.397)	-0.015 (-1.275)	-0.015 (-1.293)
<i>Number of children &lt;= 15 yrs</i>						
1	-0.047*** (-5.314)	-0.041*** (-4.048)	-0.042*** (-3.580)	-0.043*** (-3.617)	-0.047*** (-5.323)	-0.047*** (-5.314)
2	-0.026*** (-2.693)	-0.022** (-2.013)	-0.025* (-1.877)	-0.026** (-1.979)	-0.027*** (-2.745)	-0.027*** (-2.806)
>= 3	-0.068*** (-4.835)	-0.070*** (-4.420)	-0.029 (-1.505)	-0.031 (-1.565)	-0.068*** (-4.868)	-0.069*** (-4.930)
Observations	153,268	118,763	89,017	89,017	153,268	153,268

[1] Hypothesis tests are based on standard errors that are robust to heteroscedasticity [2] t-statistics are in parentheses  
[3] Stars indicate significance at 10% (\*), 5% (\*\*) and 1% (\*\*\*) [4] Regressions include time and country fixed-effects  
[5] Government expenditures are measured as a share of GDP, while expenditure types are divided by total expenditures

The fourth and final robustness check involves a re-estimation of the baseline models with OLS, where observations on Denmark are included as in tables 1 and 2. The rationale behind this robustness check has been mentioned before: the interpretation of the coefficients is more straightforward and the results between linear and nonlinear estimations in most cases barely differ in the context of subjective well-being (see section IV.1). In general, we find a strong confirmation for our previous results and only few differences emerge: social protection expenditures do not have a significant linear effect on well-being anymore, while the inverted U-shape in model 7f for this expenditure category is significant as before.

Table 6: Robustness check IV: OLS estimation results

	<b>Model 2f</b>	<b>Model 3f</b>	<b>Model 4f</b>	<b>Model 7f</b>	<b>Model 11f</b>	<b>Model 12f</b>
Government expenditures	0.012*** (7.680)	-0.026*** (-4.289)	0.031*** (9.014)	0.127*** (8.933)	0.009*** (6.152)	0.012*** (6.858)
Relative income * Government expenditures	-0.001*** (-3.471)			-0.001** (-2.487)		
Ideological preferences * Government expenditures	-0.002*** (-5.088)			-0.001*** (-2.660)		
Expenditure decentralization * Government expenditures		0.001*** (7.636)				
Corruption * Government expenditures			-0.001 (-1.326)	-0.003*** (-4.032)		
Government expenditures ^2				-0.001*** (-6.877)		
Education expenditures					0.024*** (4.244)	0.142*** (2.986)
Health expenditures					-0.019*** (-4.258)	-0.090*** (-4.225)
Social protection expenditures					0.003 (1.516)	0.040*** (3.208)
Education expenditures^2						-0.005** (-2.557)
Health expenditures^2						0.003*** (3.294)
Social protection expenditures^2						-0.000*** (-3.196)
Inflation rate	0.195** (2.326)	0.463*** (2.847)	-0.018 (-0.106)	0.909*** (4.195)	0.328*** (3.703)	0.197* (1.680)
Unemployment rate	-0.009*** (-4.144)	-0.013*** (-4.149)	-0.027*** (-4.676)	-0.019*** (-3.118)	-0.009*** (-3.746)	-0.010*** (-4.365)
Economic openness	-0.009*** (-4.294)	-0.011*** (-3.499)	-0.017*** (-3.208)	-0.021*** (-3.933)	-0.011*** (-4.393)	-0.009*** (-3.755)
Expenditure decentralization		-0.060*** (-6.371)				

Corruption			0.009 (0.290)	0.110*** (3.271)		
Male	-0.042*** (-11.822)	-0.051*** (-12.576)	-0.046*** (-10.106)	-0.046*** (-10.012)	-0.043*** (-11.933)	-0.043*** (-11.915)
Age	-0.016*** (-23.367)	-0.015*** (-19.349)	-0.016*** (-18.537)	-0.016*** (-18.609)	-0.016*** (-23.253)	-0.016*** (-23.271)
Age <sup>2</sup>	0.000*** (24.859)	0.000*** (21.413)	0.000*** (19.343)	0.000*** (19.357)	0.000*** (24.750)	0.000*** (24.762)
Relative income	0.115*** (9.585)	0.072*** (37.240)	0.082*** (35.600)	0.119*** (7.885)	0.074*** (43.540)	0.074*** (43.569)
Ideological preferences	0.129*** (7.221)	0.047*** (18.670)	0.020*** (6.800)	0.078*** (3.506)	0.039*** (17.506)	0.039*** (17.503)
<i>Marital status</i>						
Married	0.079*** (14.913)	0.069*** (11.439)	0.092*** (13.523)	0.093*** (13.560)	0.079*** (14.778)	0.078*** (14.747)
Divorced	-0.126*** (-13.617)	-0.141*** (-13.297)	-0.100*** (-8.777)	-0.100*** (-8.796)	-0.126*** (-13.614)	-0.126*** (-13.610)
Separated	-0.195*** (-11.734)	-0.212*** (-11.192)	-0.148*** (-6.942)	-0.146*** (-6.863)	-0.196*** (-11.777)	-0.196*** (-11.766)
Widowed	-0.060*** (-6.711)	-0.078*** (-7.669)	-0.034*** (-2.951)	-0.032*** (-2.818)	-0.061*** (-6.788)	-0.060*** (-6.775)
<i>Education till age</i>						
16 to 19 yrs	0.050*** (11.480)	0.051*** (10.352)	0.045*** (8.115)	0.045*** (8.152)	0.050*** (11.454)	0.049*** (11.211)
> 19 yrs	0.078*** (14.121)	0.080*** (12.355)	0.078*** (10.212)	0.074*** (9.611)	0.076*** (13.894)	0.077*** (14.044)
<i>Employment status</i>						
Unemployed	-0.385*** (-50.496)	-0.404*** (-48.139)	-0.367*** (-37.800)	-0.367*** (-37.799)	-0.386*** (-50.551)	-0.386*** (-50.565)
School	0.057*** (7.866)	0.060*** (7.427)	0.078*** (8.103)	0.076*** (7.895)	0.057*** (7.988)	0.057*** (7.989)
Retired	-0.017** (-2.525)	-0.029*** (-3.691)	0.004 (0.411)	0.004 (0.499)	-0.017** (-2.460)	-0.017** (-2.451)
Home	-0.011* (-1.678)	-0.005 (-0.705)	-0.017** (-1.995)	-0.014 (-1.628)	-0.011* (-1.658)	-0.010 (-1.583)
Self-employed	-0.009 (-1.351)	-0.012 (-1.562)	-0.004 (-0.427)	-0.003 (-0.409)	-0.009 (-1.367)	-0.009 (-1.384)
<i>Number of children &lt;= 15 yrs</i>						
1	-0.025*** (-5.050)	-0.022*** (-3.874)	-0.022*** (-3.315)	-0.022*** (-3.338)	-0.025*** (-5.095)	-0.025*** (-5.081)
2	-0.014*** (-2.617)	-0.012** (-2.020)	-0.013* (-1.800)	-0.014* (-1.924)	-0.014*** (-2.685)	-0.015*** (-2.737)
>= 3	-0.038*** (-4.779)	-0.039*** (-4.347)	-0.016 (-1.479)	-0.016 (-1.537)	-0.038*** (-4.811)	-0.039*** (-4.873)
Observations	153,268	118,763	89,017	89,017	153,268	153,268
<i>Marginal effects at mean values</i>						
$\partial \text{Lifesat} / \partial \text{Govtexp}$	0.010*** (7.089)	0.016*** (6.348)	0.029*** (9.154)	0.041*** (11.339)	$\partial \text{Lifesat} / \partial \text{Eduexp}$	0.035*** (4.453)
$\partial \text{Lifesat} / \partial \text{Relative income}$	0.074*** (43.508)			0.082*** (35.837)	$\partial \text{Lifesat} / \partial \text{Socexp}$	0.003 (1.109)
$\partial \text{Lifesat} / \partial \text{Ideological preferences}$	0.040*** (17.801)			0.020*** (6.955)	$\partial \text{Lifesat} / \partial \text{Healthexp}$	-0.022*** (-4.166)
$\partial \text{Lifesat} / \partial \text{Decentralization}$		0.009*** (3.386)				
$\partial \text{Lifesat} / \partial \text{Corruption}$			-0.032*** (-4.351)	-0.027*** (-3.649)		

[1] Hypothesis tests are based on standard errors that are robust to heteroscedasticity [2] t-statistics are in parentheses  
[3] Stars indicate significance at 10% (\*), 5% (\*\*) and 1% (\*\*\*) [4] Regressions include time and country fixed-effects  
[5] Government expenditures are measured as a share of GDP, while expenditure types are divided by total expenditures

Since so far we have not been able to make any statements with regard to economic significance, this is done in the following. As an example, the coefficients for the unemployed dummy are at around -0.4 in all six models of table 7. This means that all else equal, an unemployed person has a life satisfaction that is on average 0.4 units lower than for someone who is employed. This makes up

10% of the overall scale from 1 to 4 and can be regarded as a quite sizable effect in line with previous findings in this field (Lucas et al. 2004).

Given that all models in table 7 except for model 11f include either interaction terms or squared terms, we have reported the marginal effects at mean values at the bottom of table 7.<sup>15</sup> This indicates that the effect of government size on well-being fluctuates between 0.010 (model 2f) and 0.041 (model 7f). Hence, all else equal a government that is 10 percentage points larger leads to higher average well-being by 0.1 to 0.41 units (For example, Belgium and Sweden have on average government sizes of around 51% and 61% over the considered period, respectively). With respect to the institutional variables, an increase in corruption by one unit and an extension of expenditure decentralization by 10 percentage points would lead to a change in well-being by  $-0.03$  and  $0.1$ , respectively. Admittedly, the effect for corruption is rather small. However, in countries with large governments such as Denmark or Sweden this effect would be larger.

With regard to types of government expenditures in model 12f, it can be concluded that in a country that spends 5 percentage points more of its total budget on education people's well-being is on average 0.18 units higher (To give an example, in 1999 Germany and Denmark have spent 9% and 14% of the public budget on education, respectively). In addition, the optimum of the inversely U-shaped relationship between education expenditures and well-being occurs at 14.5%. Consequently, all countries in our dataset spend too little on education compared to this benchmark. On the other hand, we find an insignificant marginal effect of social expenditures at mean values in model 12f, while the optimum in the calculations for model 12f occurs at 41.1%. The only countries that spend more in the considered time period are Finland (42.5%) and Germany (42.9%).

Additional calculations of breakeven points for the marginal effects imply that government size has a positive marginal impact on life satisfaction if the share of subnational expenditures in total expenditures amounts to at least 18.7% (fulfilled for all countries except for Belgium, France and Luxembourg) and no matter what the extent of corruption is. Decentralization has a positive impact on well-being if government expenditures are at least 43.6%, i.e. for all countries except Ireland, Luxembourg and the UK, while the marginal effect for corruption requires a government size of 40.4% to turn negative, which is fulfilled for all of the 12 countries except for Ireland and Luxembourg. Finally, government size only has a negative impact on well-being for out-of-sample ideological preferences and relative income suggesting that the effect of government expenditures on well-being is always positive regardless of these individual characteristics.

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16. If the original model is represented by  $y = \alpha + \beta_1 x + \beta_2 z + \beta_{12} xz + \varepsilon$ , the overall marginal effect of  $x$  on  $y$  is given by  $\partial y / \partial x = \beta_1 + \beta_{12} z$ . As a next step, we have evaluated this effect at the sample average  $\bar{z}$ . Finally, the variance of the estimated marginal effect is given by  $Var(\partial y / \partial x) = Var(\beta_1) + \bar{z}^2 Var(\beta_{12}) + 2\bar{z} Cov(\beta_1, \beta_{12})$ . The formula for the calculation of marginal effects in the presence of squared terms can be derived in a similar fashion.



A breakeven analysis for government expenditures in model 7f reveals that the peak of the inversely U-shaped relationship with well-being occurs at a government size of 76.5%. This means that given average values for relative income, ideological preferences and corruption, the marginal benefit and the marginal cost of a larger government just outweigh each other at this level as summarized in hypothesis 1a. In our sample, the largest government size is recorded for Sweden in 1995 with 66.3%. None of the countries in our sample has any experience with a government of more than 70% in the time period considered here. Therefore, it is difficult to say whether such a large government would in fact contribute to people's wellbeing.

There are several reasons why the numerical value for the optimal government size based on the preceding analysis should be interpreted with caution. First, it is quite sensitive to the exclusion of certain countries. If Finland or Ireland are dropped from the sample, the peak shifts down to 69.2% and 70.0%, respectively. Second, even though there seems to be evidence that governments could be larger, the economic significance of the effect may be as low as 0.1 given an increase of government size by 10 percentage points. What matters is that there is indeed a curvilinear relationship that indicates diminishing returns to government size in terms of well-being. Third, one should generally be aware of the potential problems that may emerge with a larger government or more specifically with a more generous welfare state. In this context, Heinemann (2008) provides evidence for deteriorating welfare state ethics in the presence of generous benefits which may lead to a self-destruction of the welfare state.

When taking the results from tables 1 to 6 together, the following conclusions can be drawn: Hypotheses 1a and 1b are rejected which is not surprising as they represent very extreme views on the government. In reality, there are neither omniscient social planners who can determine the optimal government size nor do politicians exclusively follow their selfish interests given that they want to be re-elected. What we can conclude is that enlargements of government size in the past have been in the best interest of citizens in the EU as one would expect in democratic societies. In addition, neither hypothesis 2 nor hypothesis 3 can be rejected. At average levels of expenditures in our sample, hypothesis 4 cannot be rejected with respect to education expenditures, but with respect to social protection expenditures.

## V. CONCLUSION

The preceding sections have analysed the impact of the size and composition of government expenditures on life satisfaction and have brought to light several interesting insights. The first finding is an inversely U-shaped relationship between government size and well-being and the fact that enlargements of government expenditures in the past have not occurred against the interests of citizens in the EU. Secondly, the effect of public sector size on life satisfaction depends on the extent of decentralization and corruption. Thus, the quality of institutions has a significantly positive impact on well-being given current sizes of governments in the EU. Thirdly, people with any ideological preferences and position in the income distribution benefit from a larger government, while people with a low income and a left-wing ideology benefit the most. Finally, the composition of public spending also matters: most governments in the EU could have increased well-being in the period from 1990 to 2000 by spending more on education and less on social protection.

Certainly, the analysis can be further extended in the future. First of all, a more detailed disaggregation of the public budget and data on respondents' health status would be advantageous with regard to the impact of health expenditures. In addition, some restrictions with respect to the policy implications of the findings are in order. As pointed out by Frey and Stutzer (2000b), entrusting government officials with the task of maximizing people's well-being would most likely give rise to manipulations and some degree of arbitrariness in the public decision-making process. Therefore, the results in this paper should be regarded as an informative piece of evidence with regard to well-being effects of the public sector. These should be supplemented by other kinds of analyses that rely on alternative well-being indicators. The combination of results thus obtained can then guide policy-makers in their decision-taking process.

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## APPENDIX

**Table 7: Definitions and Sources of Variables**

Variable	Description	Source
<b>Dependent variable</b>		
Life satisfaction	Measured on a reversed scale from 1 (not satisfied at all) to 4 (very satisfied)	Eurobarometer
<b>Individual control variables</b>		
Male	Gender dummy (1: Male, 0: Female)	} Eurobarometer
Age	Age in years	
Relative income	Income quartile that applies to the respondent measured on a scale from 1 (lowest quartile) to 4 (highest quartile)	
Ideological preferences	Measured on a transformed scale from -1 (left) to +1 (right)	
Marital status	Dummies for married, divorced, separated and widowed (single is the base category)	
Education till age	Dummies for 16–19 years and >19 years indicating the respondent's age when he finished his education (≤ 15 years is the base category)	
Employment status	Dummies for unemployed, school, retired, home and self-employed (employed is the base category)	
Number of children ≤ 15 years	Dummies for 1, 2 or more than 3 children (no children is the base category)	
<b>Macroeconomic control variables</b>		
Government expenditures	Total public expenditures as a share of GDP	} Own calculations based on OECD National Accounts - Volume IV
Education expenditures	Public expenditures on education as a share of total public expenditures	
Health expenditures	Public expenditures on health as a share of total public expenditures	
Social protection expenditures	Public expenditures on social protection as a share of total public expenditures	
Log of GDP per capita	Logarithmic transformation of real GDP in PPP-adjusted US dollars (in thousands) divided by population size	OECD Econ. Outlook No. 86
Unemployment rate	Standardized unemployment rates	OECD Econ. Outlook No. 86
Inflation rate	Growth rate of the Consumer Price Index	OECD Key Econ. Indicators
Economic openness	Exports plus imports divided by GDP	OECD Macro Trade Indicators
<b>Institutional control variables</b>		
Expenditure decentralization	Subnational public expenditures as a share of total public expenditures	World Bank - Fiscal Decentralization Indicators
Corruption	Corruption Perceptions Index (CPI) on a transformed scale from 10 (very corrupt) to 0 (not corrupt at all)	Transparency International

[1] All OECD data have been downloaded with the OECD.Stat interface providing access to different OECD databases.

[2] Eurobarometer data have been obtained from GESIS Mannheim.

Table 8: Summary Statistics for Variables at the Individual Level

Variable	Mean	Minimum	Maximum	Std. dev.	Observations
Life satisfaction	3.143	1	4	0.712	153,268
Male	0.508	0	1	0.500	153,268
Age	44.068	15	99	17.310	153,268
Relative income	2.509	1	4	1.119	153,268
Ideological preferences	-0.115	-1	1	0.767	153,268
Married	0.625	0	1	0.484	153,268
Divorced	0.054	0	1	0.226	153,268
Separated	0.015	0	1	0.120	153,268
Widowed	0.078	0	1	0.269	153,268
Education till age 16 - 19	0.409	0	1	0.492	153,268
Education till > 19 years	0.234	0	1	0.424	153,268
Unemployed	0.079	0	1	0.270	153,268
School	0.081	0	1	0.273	153,268
Retired	0.204	0	1	0.403	153,268
Home	0.106	0	1	0.308	153,268
Self-employed	0.074	0	1	0.262	153,268
1 child <= 15 years	0.158	0	1	0.365	153,268
2 children <= 15 years	0.131	0	1	0.338	153,268
At least 3 children <= 15 years	0.057	0	1	0.232	153,268

[1] In the sample there are indeed four people aged 99 years. Hence, the value 99 does not indicate a missing value, as is often the case with Stata.

Table 9: Summary Statistics for Variables at the Country Level

Variable		Mean	Minimum	Maximum	Std. dev.	Observations
Government expenditures / GDP	Overall	48.768	31.563	64.031	7.115	86
	Between		39.132	60.066	6.683	12
	Within		41.199	55.075	2.612	7.167
Education expenditures / Government expenditures	Overall	11.286	8.879	14.715	1.215	86
	Between		9.074	13.186	1.110	12
	Within		10.283	12.815	0.444	7.167
Health expenditures / Government expenditures	Overall	12.178	6.808	17.895	1.850	86
	Between		7.876	15.288	1.917	12
	Within		10.060	14.785	0.728	7.167
Social protection expenditures / Government expenditures	Overall	37.762	24.828	47.661	4.791	86
	Between		27.855	43.561	4.405	12
	Within		32.849	41.936	1.598	7.167
GDP per capita (in thousands)	Overall	29.294	17.659	60.694	7.971	86
	Between		23.441	50.093	6.974	12
	Within		21.856	39.895	2.914	7.167
Unemployment rate	Overall	7.664	1.633	15.633	3.333	86
	Between		2.326	11.762	2.972	12
	Within		1.003	12.387	1.834	7.167
Inflation rate	Overall	2.328	-0.267	7.533	1.539	86
	Between		0.457	3.868	0.928	12
	Within		-0.135	6.612	1.280	7.167
Economic openness	Overall	97.020	35.710	278.990	55.412	86
	Between		43.237	215.726	51.275	12
	Within		64.625	160.285	14.553	7.167
Expenditure decentralization	Overall	27.538	10.709	46.388	11.286	59
	Between		10.959	44.798	10.256	12
	Within		25.060	29.755	1.027	4.917
Corruption	Overall	2.073	0	6.580	1.600	59
	Between		0.186	5.530	1.595	12
	Within		1.011	3.543	0.388	4.917

Table 10: OECD Government spending categories

Category	Included items
Education	Pre-primary, primary, secondary, post-secondary but non-tertiary, tertiary education, and subsidiary services to education
Health	Medical products, appliances and equipment, outpatient, hospital and public health services
Social protection	Sickness, disability, old age, survivors, family, children, unemployment and housing
Defense	Military defense, civil defense and foreign military aid
Public order and safety	Police services, fire-protection services, law courts and prisons
Economic affairs	Economic, commercial and labor affairs, agriculture, forestry, fishing and hunting, fuel and energy, mining, manufacturing and construction, transport and communication
General public services	Executive and legislative organs, financial, fiscal and external affairs, basic research, transfers between different levels of government, foreign economic aid, general services and public debt transactions
Environmental protection	Waste and waste water management, pollution abatement, protection of biodiversity and landscape
Recreation, culture and religion	Recreational and sporting services, cultural services, broadcasting and publishing services, religious and other community services
Housing and community amenities	Housing development, community development, water supply and street lighting

Source: European Commission (2007)

## REFERENCES

- Ai, Chunrong and Edward C. Norton (2003). Interaction terms in logit and probit models, *Economics Letters*. 80: 123–129.
- Alesina, Alberto, Rafael Di Tella, and Robert MacCulloch (2004). Inequality and Happiness: Are Europeans and Americans Different?, *Journal of Public Economics*. 88: 2009–2042.
- Besley, Timothy and Anne Case (1995). Incumbent behavior: vote-seeking, tax-setting, and yardstick competition, *American Economic Review*. 85(1): 25–45.
- Bjørnskov, Christian, Axel Dreher, and Justina A. V. Fischer (2007). The Bigger the Better? Evidence of the Effect of Government Size on Life Satisfaction Around the World, *Public Choice*. 130: 267–292.
- Bjørnskov, Christian, Axel Dreher, and Justina A. V. Fischer (2008). On decentralization and life satisfaction, *Economics Letters*. 99: 147–151.
- Blanchflower, David G. and Andrew J. Oswald (2004). Well-Being Over Time in Britain and the USA, *Journal of Public Economics*. 88: 1359–1386.
- Blomquist, Sören and Vidar Christiansen (1995). Public Provision of Private Goods as a Redistributive Device in an Optimum Income Tax Model, *Scandinavian Journal of Economics*. 97(4): 547–567.
- Boadway, Robin and Maurice Marchand (1995). The Use of Public Expenditures for Redistributive Purposes, *Oxford Economic Papers*. 47(1): 45–59.
- Brennan, Geoffrey and James Buchanan (1980). *The Power to Tax: Analytical Foundations of Fiscal Constitution*. Cambridge: Cambridge University Press.
- Daly, Mary C. and Daniel J. Wilson (2009). Happiness, Unhappiness, and Suicide: An Empirical Assessment, *Journal of the European Economic Association*. 7(2-3): 539–549.
- Diener, Ed (1984). Subjective well-being, *Psychological Bulletin*. 93: 542–575.
- Diener, Ed and Shigehiro Oishi (2006). Are Scandinavians Happier than Asians? Issues in Comparing Nations on Subjective Well-Being, in: Frank H. Columbus (ed.), *Politics and Economics of Asia*. Hauppauge, NY: Nova Science: 1–25.
- Di Tella, Rafael and Robert J. MacCulloch (2005). Partisan Social Happiness, *Review of Economic Studies*. 72: 367–393.

- Di Tella, Rafael and Robert J. MacCulloch (2006). Some Uses of Happiness Data in Economics, *Journal of Economic Perspectives*. 20(1): 25–46.
- Di Tella, Rafael, Robert J. MacCulloch, and Andrew J. Oswald (2001). Preferences over inflation and unemployment: evidence from surveys of happiness, *American Economic Review*. 91: 335–341.
- Di Tella, Rafael, Robert J. MacCulloch, and Andrew J. Oswald (2003). The Macroeconomics of Happiness, *Review of Economics and Statistics*. 85(4): 809–27.
- Easterlin, Richard A. (1974). Does Economic Growth Improve the Human Lot?, in: Paul A. David and Melvin W. Reder (eds.), *Nations and Households in Economic Growth: Essays in Honor of Moses Abramovitz*. New York: Academic Press.
- Edmark, Karin (2005). Unemployment and Crime: Is There a Connection?, *Scandinavian Journal of Economics*. 107(2): 353–373.
- Ekman, Paul, Richard J. Davidson, and Wallace V. Friesen (1990). The Duchenne Smile: Emotional Expression and Brain Physiology II, *Journal of Personality and Social Psychology*. 58(2): 342–353.
- European Commission (2007). *Manual on Sources and Methods for the Compilation of COFOG Statistics: Classification of the Functions of Government (COFOG)*. Luxembourg: Office for Official Publications of the European Communities.
- Ferrer-i-Carbonell, Ada and Paul Frijters (2004). How important is methodology for the estimates of the determinants of happiness?, *Economic Journal*. 114: 641–659.
- Frey, Bruno S. and Alois Stutzer (2000a). Happiness, Economy and Institutions, *Economic Journal*. 110: 918–38.
- Frey, Bruno S. and Alois Stutzer (2000b). Maximizing happiness?, *German Economic Review*. 1: 145–167.
- Frey, Bruno S. and Alois Stutzer (2002). What Can Economists Learn From Happiness Research?, *Journal of Economic Literature*. XL: 402–435.
- Heinemann, Friedrich (2008). Is the Welfare State Self-Destructive? A Study of Government Benefit Morale, *Kyklos*. 61(2): 237–57.
- Hudson, John (2006). Institutional Trust and Subjective Well-Being Across the EU, *Kyklos*. 59(1): 43–62.
- Konow, James and Joseph Earley (2008). The Hedonistic Paradox: Is Homo Economicus Happier?, *Journal of Public Economics*. 92(1-2): 1–33.
- Kotakorpi, Kaisa and Jani P. Laamanen (2010). Welfare State and Life Satisfaction: Evidence from Public Health Care, forthcoming in *Economica*.
- Krugman, Paul and Maurice Obstfeld (2006). *International Economics: Theory and Policy* (7th ed.). Boston: Pearson Addison Wesley.
- Lindahl, Erik R. (1919). *Die Gerechtigkeit der Besteuerung*. Lund: Gleerup (Translated in English as Just Taxation: A Positive Solution in Classics in the Theory of Public Finance, edited by Richard A. Musgrave and Alan T. Peacock (London: Macmillan, 1958)).
- Lucas, Richard E., Andrew E. Clark, Yannis Georgellis, and Ed Diener (2004). Unemployment Alters the Set Point for Life Satisfaction, *Psychological Science*. 15(1): 8–13.
- Meltzer, Allan H. and Scott F. Richard (1981). A Rational Theory of the Size of Government, *Journal of Political Economy*. 89: 914–927.
- Mueller, Dennis C. (2003). *Public Choice III* (3rd ed.). Cambridge: Cambridge University Press.
- Niskanen, William A. (1971). *Bureaucracy and Representative Government*. Chicago: Aldine-Atherton.
- Nordhaus, William (1975). The Political Business Cycle, *Review of Economic Studies*. 42: 169–190.
- Norton, Edward C., Hua Wang and Chunrong Ai (2004). Computing interaction effects and standard errors in logit and probit models, *Stata Journal*. 4(2): 154–67.
- Oates, Wallace E. (1972). *Fiscal Federalism*. New York: Harcourt Brace Jovanovich.
- Oswald, Andrew J. (1997). Happiness and economic performance, *Economic Journal*. 107: 1815–1831.

- Ouweneel, Piet (2002). Social Security and Well-Being of the Unemployed in 42 Nations, *Journal of Happiness Research*. 3: 167–92.
- Pareto, Vilfredo (1906). *Manuale di Economia Politica*. Milan: Societa Editrice Libreria (Translated to English as Manual of Political Economy (New York: Macmillan, 1971)).
- Pavot, William, Ed Diener, C. Randall Colvin, and Ed Sandvik (1991). Further Validation of the Satisfaction With Life Scale: Evidence for the Cross-Method Convergence of Well-Being Measures, *Journal of Personality Assessment*. 57: 149–161.
- Persson, Torsten (2002). Do Political Institutions Shape Economic Policy?, *Econometrica*. 70(3): 883–905.
- Persson, Torsten and Guido Tabellini (2000). *Political Economics: Explaining Economic Policy*, Chapter 7. Cambridge: MIT Press.
- Pigou, Arthur C. (1947). *A Study in Public Finance* (3rd ed.). London: MacMillan.
- Prud'homme, Rémy (1995). The Dangers of Decentralization, *The World Bank Research Observer*. 10(2): 201–220.
- Radcliff, Benjamin (2001). Politics, Markets, and Life Satisfaction: The Political Economy of Human Happiness, *American Political Science Review*. 95(4): 939–952.
- Samuelson, Paul A. (1954). The Pure Theory of Public Expenditure, *Review of Economics and Statistics*. 36: 387–389.
- Sandvik, Ed, Ed Diener, and Larry Seidlitz (1993). Subjective Well-Being: The Convergence and Stability of Self-Report and Non-Self-Report Measures, *Journal of Personality* 61(3), 317–342.
- Schuknecht, Ludger (2000). Fiscal policy cycles and public expenditure in developing countries, *Public Choice*: 54, 19–25.
- Seidlitz, Larry, Robert S. Wyer, Jr., and Ed Diener (1997). Cognitive Correlates of Subjective Well-Being: The Processing of Valenced Events by Happy and Unhappy Persons, *Journal of Research in Personality*. 31(1): 240–256.
- Shedler, Jonathan, Martin Mayman, and Melvin Manis (1993). The Illusion of Mental Health, *American Psychologist*. 48(11): 1117–1131.
- Svaleryd, Helena (2009). Women's Representation and Public Spending, *European Journal of Political Economy*, 25(2): 186–98.
- Svensson, Jakob (2005). Eight Questions About Corruption, *Journal of Economic Perspectives*. 19(3): 19–42.
- Treisman, Daniel (2007). The Causes of Corruption: A Cross-National Study, *Journal of Public Economics*. 76(3): 399–457.
- Tullock, Gordon (1959). Some Problems of Majority Voting, *Journal of Political Economy*. 67: 571–579.
- Veenhoven, Ruut (2000). Well-Being in the Welfare State: Level Not Higher, Distribution Not More Equitable, *Journal of Comparative Policy Analysis*. 2: 91–112.
- Wagner, Alexander F., Friedrich Schneider, and Martin Halla (2009). The Quality of Institutions and Satisfaction with Democracy in Western Europe – A Panel Analysis, *European Journal of Political Economy*. 25(1): 30–41.

## SUMMARY

This paper empirically analyses whether large governments in Europe reflect efficient responses to a changing social and economic environment ('welfare economic view') as opposed to wasteful spending ('public choice view'). To this end, the effect of government size on subjective well-being is estimated in a micro dataset covering twelve EU countries from 1990 to 2000. The first finding is that there is an inversely U-shaped relationship between government size and well-being. In addition, the analysis suggests that given the high institutional quality as compared to other parts of the world there might be scope for a further enlargement of governments in the EU from a well-being perspective. However, one must acknowledge that the effect on well-being may be quite small and that we have little experience in democratic societies with even larger governments. The investigation also reveals that the impact of government size on well-being depends negatively on levels of corruption and positively on the extent of decentralization. In addition, left-wing voters and low-income earners are the main beneficiaries of a large public sector. Finally, the composition of public spending is also relevant from a well-being perspective: in some EU countries higher levels of well-being could have been achieved by allocating a higher share of the budget to education and less to social protection.