GOVERNMENT EXPENDITURES COMPOSITION AND GROWTH IN EU15: A DYNAMIC HETEROGENEOUS APPROACH

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Abstract

The goal of this paper is to investigate the long-run effect of government size and composition on growth in EU15 countries during 1995-2014. Unlike previous studies, this paper employs a more adequate and sophisticated econometric technique which allows the joint occurrence of dynamics and parameter heterogeneity as well as addresses the problem of unobserved common factors. The obtained results indicate that high aggregate spending levels are an impediment for growth in developed economies, while the single most important government expenditure item is education. In quantitative terms the impact of education expenditures is, however, significantly lower than that found by other papers.

Keywords: government size, expenditures composition, GDP growth, heterogeneity, unobserved common effects, EU15

JEL classification: C23, H1, H50, O4

1. Introduction

For decades there has been an intense debate on whether or not a large government sector hinders economic performance. Existing literature suggests that it is rather difficult to identify an unambiguous connection between economic performance, generally measured by GDP growth rates, and the extent of government involvement in the economy, generally measured by government expenditure shares in GDP. Much of the current dissatisfaction with the alleged large government size stems from concerns about the long-term sustainability of public finances. The global financial crisis of 2008/09 has put the issue of government size in the economy at the centre of political debate.

Whatever the causes of this global crisis, the reaction of many developed economies' governments has been to step in to offset substantially shrunken private-sector demand, and to rescue potentially insolvent financial institutions and other companies that were judged too important to fail. Consequently, due to bail-outs, fiscal stimuli, tax cuts and recession many countries have witnessed a significant increase in the share of government in the economy coupled with large government deficits and debts. Concerned with these unfavourable fiscal positions, as well as with possible adverse effects of government size on economic growth, many economists and policy makers vigorously insist on downsizing the government sector. They insist on rigorous checks of government programs, strict lending proposals, balanced budgets, and even suggest imposing ceilings of government expenditure shares in GDP. But which component of government expenditure should be cut? The answer lies in, among other, the contribution of these components to economic growth (Devarajan et al., 1996). Economic literature is, hence, increasingly paying attention to the impact of the composition of government expenditures on long-term economic growth, and recommendations to change the composition of public outlays towards items considered as productive are gaining more and more importance.

Against this background, the main purpose of this paper is to contribute to the empirical literature on growth effects of government size and composition in EU15 by employing sophisticated empirical methods, particularly suited for tackling some important methodological issues which impair the findings of previous empirical studies. Namely, a consistent estimation of the relationship between economic growth and government sector size and structure requires that all; dynamics, parameter heterogeneity and unobserved common factors are allowed for in the model. Since the evolution of economic growth is likely to be a dynamic process, necessity to introduce dynamics in the model is apparent. Apart for dynamics, a special attention should be paid to heterogeneity between countries as well as common shocks and their harmful effect on identifying the aforementioned relationship. The problem of "parameter heterogeneity" results from the fact that different countries differ from each other in many respects, such as their political-economic systems, their respective cultures, history, geographical features and so on. Additionally, in today's globalised world countries are cross-correlated due to their economic and financial integration and/or common macroeconomic shocks. Ignoring these issues leads to inconsistent estimates, size distortions of conventional tests of significance and incorrect results.

The rest of this paper proceeds as follows. Section 2 reviews the relevant empirical literature, Section 3 introduces our empirical approach and presents the data, Section 4 gives the results of the basic growth model exploring the effects of government size and composition on economic growth, while Section 5 concludes.

2. Literature review

Kneller et al. (1999) investigate a set of 22 OECD countries during 1970-1995. After taking full account of the implicit financing assumptions related with the government budget constraint, they find that a one percentage point increase in productive expenditures raises GDP growth rate by 0.27 percentage points, while a one percentage point increase in distortionary taxes decreases growth by 0.41 percentage points. This is true in case the above changes are financed by some combination of non-distortionary taxes and non-productive expenditures.

Nijkamp and Poot (2004) undertake meta-analysis to investigate the effect of fiscal policies on long-run growth. Their sample includes 93 papers that have been published between 1983 and 1998 in refereed journals, and pay special attention to five areas of government policy: general government consumption, tax rates, defence, education expenditures and public infrastructure. They find that spending on education and infrastructure is associated with higher GDP growth.

Baldacci et al. (2004) use a system of equations and investigate direct and indirect channels between social spending, human capital and economic growth. In their empirical specification they analyse 120 developing countries during the period 1975-2000, and focus primarily on the impact of education and health spending by the government on growth. They argue that since education and health (as key pillars of human capital) are interlinked they should be analysed together, taking into account feedback effects. They find that both types of spending have a significant and positive direct impact on economic growth; more precisely, a one percentage point increase in education spending is associated with an increase in growth of 1.4 percentage points in 15 years, while the same increase in health spending raises annual per capita GDP growth by 0.5 percentage points.

Bose et al. (2007) explore the impact of disaggregated government expenditures on growth in 30 developing economies over the two decades: 1970-1979, and 1980-1989. They find that education is the key sector for growth; whereby a one percentage point increase in central government investment in education (as percentage of GDP) is found to be associated with an increase in real GDP per capita of 1.5 percentage points.

Sanz (2011) explores the link between 10 components of government spending and government size during the period 1970-2007 in 25 OECD countries. Starting from a premise that a government size reduction does not necessarily lead to a proportionate reduction in all its components Sanz (2011) sets out to investigate which components are cut first. Using a pooled mean group (PMG) approach he finds that reductions in overall government expenditures increase the share of education and transport and communication. On the other hand, social welfare spending reduces its share in aggregate government spending in times of budgetary cuts. Finally, economic affairs, defence, housing and cultural affairs are affected the most when faced with fiscal adjustments.

Acosta-Ormaechea and Morozumi (2013) investigate how government expenditures compositional changes affect long-run growth. Their analysis of 56 low-, medium- and high-income countries during the period 1970-2010 reveals that only education has statistically significant growth-enhancing effects. This is quantitatively important mainly in the case a rise in spending on education is financed by a proportionate fall in spending on health or social protection. More precisely, a one percentage point increase in education spending is found to lead to 0.22 percentage points increase in annual growth if it is offset by a one percentage point fall in social protection spending, and 0.31 increase in annual growth if it is offset by a one percentage point fall in health spending.

Afonso and Jalles (2014) analyse fiscal composition-growth nexus in a set of 155 developed and developing countries during the period 1970-2008. They find that total government expenditures have statistically significant negative effect on growth, while the impact of revenues is insignificant. As regards functional decomposition, government spending on education and health are found to be growth enhancing, while expenditures on social security and welfare growth retarding.

Gemmell et al. (2016) investigate the influence of total government expenditures as well as of government expenditures composition on long-run GDP levels in (17) OECD countries. Using a pooled mean group (PMG) approach, and analysing the period 1972-2008, they find that, firstly, total government expenditures affect GDP negatively when financed by budget deficits. As for expenditures composition, they find that, under the assumption that total spending remains unchanged, increases in the share of transport and communication and education in GDP (offset by pro-rata reduction in other types of spending) lead to increases in GDP per capita in the long-run. Precisely, a one percentage point increase in the share of transport and communication in GDP is associated with an increase in GDP per capita of 2.2%. Similarly, a one percentage point increase in the share of education in GDP is associated with an increase in GDP per capita of 2%.

The above literature review suggests that the impact of government expenditures and its composition has been extensively investigated. However, the presented literature suffers from several methodological weaknesses. None of the studies reviewed, apart from Sanz (2011) and Gemmell et al. (2016), takes into account a problem known in the econometric literature as "parameter heterogeneity". The problem results from the fact that different countries differ from each other in many aspects, and if not corrected for, this problem can lead to inconsistent estimates, thus leading to incorrect results. Moreover, none of the reviewed studies takes account of unobserved common factors which may arise from global macroeconomic shocks and/or omitted variables. Ignoring these issues leads to inconsistent estimates and incorrect results.

We, however, adopt an empirical specification which allows for both heterogeneity and unobservable determinants in the government expenditures-growth relationship. Our approach, discussed in more detail in the methodological part of this paper, straightforwardly addresses these issues; hence improving the quality of the analysis and reliability of findings.

3. Methodological approach and data

The main goal of this paper is to establish the direction of the impact of government size on growth in a set of 15 developed EU countries during the period 1995-2014, and then to analyse which government expenditure items are growth enhancing and which are growth retarding. Following Ditzen (2016) a starting point is dynamic panel data model with heterogeneous coefficients:

$$y_{it} = \beta_{0i} + \beta_{1i} y_{it-1} + x_{it}\beta_{2i} + u_{it} \quad (1)$$

$$u_{it} = g_i f_t + e_{it}$$

whereby unobserved common factors (with country-specific factor loadings, g_i) are captured via f_t, x_{it} is a vector of explanatory variables and β_{2i} the coefficient vector. The error e_{it} is *iid* and the heterogeneous coefficients are randomly distributed around a common mean.

Empirically we estimate equation (1) using dynamic common correlated effects estimator (DCCE). At this point let us just note that equation (1) can be empirically estimated in several ways – via mean group estimator (MG), pooled mean group estimator (PMG) and/or pooled dynamic common correlated effects estimator (PDCCE). Our preferred specification is, as stated above, DCCE, because it accounts for both; heterogeneity and unobserved common factors. Other specifications either assume some degree of (PMG) or full homogeneity (PDCCE) of the countries in the sample, or do not account for unobserved common factors (MG and PMG). Hence, we will use them to draw comparative conclusions only. Namely, the assumption behind the mean group and pooled mean group estimation is that the disturbances in equations are independently distributed across countries and years. However, it is to be expected that countries are cross-correlated due to international integration and/or common macroeconomic shocks. Ignoring these cross-correlations results in inefficient parameter estimates and may lead to size distortions of conventional tests of significance. In order to solve this issue Pesaran (2006) proposed the common correlated effects (CCE) estimator, which is invariant to the (unknown but finite) number of unobserved common factors and allows estimation and inference in panel data models where the unobserved common factors are correlated with regressors (Pesaran, 2006). In this approach standard panel regressors are augmented with the (weighted) cross section averages of the dependent variable and individual specific regressors. CCE model, thus, accounts for unobserved common factors between units. In order to make it dynamic, a lag of the dependent variable should be added. However, in this case endogeneity occurs and adding solely contemporaneous cross-sectional averages is not sufficient any longer to achieve consistency. Chudik and Pesaran (2015) show that consistency is gained if lags of the cross sectional averages are added. DCCE is, therefore, given as:

$$y_{it} = \beta_{0i} + \beta_{1i} y_{it-1} + x_{it}\beta_{2i} + \sum_{s=t}^{t-pT} d_i z_{is} + e_{it} \quad (2)$$

where z_{is} is a vector that includes cross-sectional means at time s.

In order to empirically investigate government expenditure-growth relationship we start with a standard neoclassical production function of the Cobb-Douglas type augmented with government expenditure term. More precisely, y_{it} represents the difference in log GDP (*rgdpo*), while vector x_{it} consists of physical capital (*ck*), population growth rate (*ngd*) and government expenditures (*g_in_gdp*). Later on, we replace the overall government expenditures variable with one of the ten expenditure shares in turn, thus estimating growth effects of General public services (*pubserv*), Defence (*def*), Economic affairs (*ecaffairs*), Health (*health*), Education (*edu*), Social protection (*socprotection*), Public order and safety (*order*), Environment protection (*envir*), Housing and community amenities (*house*) and Recreation, culture and religion (*recreation*). A model thus formulated suggests that an increase in one of the expenditure components happens at the expense of the remaining nine components, i.e. that it is offset by a fall in other types of spending, while the overall spending remains unchanged.

3.1. Data description

Table 1 describes variables used in terms of definition, construction and data source. The available data is annual and the time period covered is from 1995 to 2014. The cross-sectional dimension of the panel includes 15 EU countries.

Table 1 Definitions and sources of the variables

Variable	Indicator(s)	Source
rgdpo	Output-side real GDP at chained PPPs (in mil. 2011US$)	PWT 9.0
ck	Capital stock at current PPPs (in mil. 2011US$)	PWT 9.0
ngd	Rate of growth of population (*n*) + technology growth (*g*) + rate of	PWT 9.0

Variable	Indicator(s)	Source
	capital depreciation (*d*) assuming d=0.05 and g=0.018	
g_in_gdp	Total nominal general government expenditure (% of GDP)	Eurostat
pubserv	Percentage of expenditures on General public services in total general government expenditures	Eurostat
def	Percentage of expenditures on Defence in total general government expenditures	Eurostat
order	Percentage of expenditures on Public order and safety in total general government expenditures	Eurostat
ecaffairs	Percentage of expenditures on Economic affairs in total general government expenditures	Eurostat
house	Percentage of expenditures on Housing and community amenities in total general government expenditures	Eurostat
health	Percentage of expenditures on Health in total general government expenditures	Eurostat
envir	Percentage of expenditures on Environment protection in total general government expenditures	Eurostat
recreation	Percentage of expenditures on Recreation, culture and religion in total general government expenditures	Eurostat
edu	Percentage of expenditures on Education in total general government expenditures	Eurostat
socprotection	Percentage of expenditures on Social protection in total general government expenditures	Eurostat

4. Results

We start by carrying out cross-sectional dependence test (CD) (Pesaran, 2004) for each variable. As indicated before, countries might be cross-correlated due to a number of factors, such as: economic and financial integration of countries, common macroeconomic shocks and/or omitted variables. Ignoring these cross-correlations would lead to inefficient parameter estimates and size distortions of conventional tests of significance. The results of CD-test are unreported but available upon request, and indicate the existence of cross-sectional dependence.

A starting point is the assessment of the impact of overall government expenditures on growth. The results are given in Table 2. All the results are obtained through Stata command *xtdcce2* written by Ditzen (2016), whereby equations are estimated by OLS.

Table 2 Baseline specification

	DCCE D.log_rgdpo
L.log_rgdpo	-0.732^{***}
	(0.145)
log_ck	0.348^{***}
	(0.0808)
log_ngd	0.251
	(0.278)
log_g_in_gdp	-0.297^{***}
	(0.0885)
_cons	5.268^{*}
	(2.756)
N	314
CD	-0.231

Source: author's calculations

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The results given in Table 2 are in line with expectations. Lagged dependent variable is found to exert a negative impact on growth, thus suggesting the existence of conditional convergence. The coefficient on capital variable is significant and positive, while the one on population variable is insignificant. As for our variable of interest - government size, the results indicate that it exerts a negative influence on GDP growth. This means that, ceteris paribus, larger government is associated, on average, with lower rates of growth. To illustrate the size of the estimated effect, increasing shares of government expenditures in GDP by 1% lowers annual growth by approximately 0.003 percentage points or 0.115%, whereas increasing shares of government expenditure in GDP by 1 percentage point decrease growth by 0.006 percentage points. In other specifications (results are given in Table 4 in the Appendix) the results are the same in terms of coefficient significances (apart from PDCCE where only the impact of government size is found to be significant), while their sizes differ.

We next turn to investigating the impact of government expenditures components (functional distribution) on growth, by replacing the overall government expenditures variable with one of the ten expenditure shares in turn.

Table 3 Dynamic common correlated effects estimation

DCCE	(1) D.log_rgdpo	(2) D.log_rgdpo	(3) D.log_rgdpo	(4) D.log_rgdpo	(5) D.log_rgdpo	(6) D.log_rgdpo	(7) D.log_rgdpo	(8) D.log_rgdpo	(9) D.log_rgdpo	(10) D.log_rgdpo
L.log_rgdpo	-0.562***	-0.552***	-0.543***	-0.515***	-0.637***	-0.515***	-0.471***	-0.672***	-0.497***	-0.551***
	(0.111)	(0.141)	(0.108)	(0.101)	(0.114)	(0.126)	(0.113)	(0.152)	(0.125)	(0.173)
log_ck	0.155***	-0.0150	0.260***	0.0958	0.208**	0.193**	0.167	-0.126	0.186*	0.161*
	(0.0547)	(0.0951)	(0.0903)	(0.0831)	(0.0836)	(0.0920)	(0.110)	(0.290)	(0.102)	(0.0841)
log_ngd	-0.143	-0.0502	0.539	0.170	-0.364	-0.217	-0.225	0.243	0.0283	0.323
	(0.383)	(0.616)	(0.328)	(0.430)	(0.437)	(0.443)	(0.425)	(0.567)	(0.444)	(0.522)
log_edu	0.161*									
	(0.0852)						--			
log_def		-0.0281								
		(0.0369)								
log_pubserv			0.0959							
			(0.0659)							
log_health				0.0854						
				(0.0945)						
log_order					0.00572					
					(0.114)					
log_envir						0.000714				
						(0.0499)				
log_house							-0.0159			
							(0.0263)			
log_recreation								0.0930*		
								(0.0500)		
log_socprotection									-0.435	
									(0.293)	
log_ecaffairs										-0.0325
										(0.0256)
_cons	2.575*	4.428	3.105	4.589**	2.392	3.559**	2.702	7.842	6.499*	5.541
	(1.389)	(2.742)	(2.231)	(1.830)	(1.951)	(1.523)	(1.711)	(4.833)	(3.590)	(3.863)
N	271	271	271	271	271	271	271	271	271	271
CD	2.965	2.100	1.994	2.860	1.699	1.785	1.823	2.778	2.302	3.051

Source: author's calculations

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The results in Table 3 suggest that only Education (edu) and Recreation, culture and religion (recreation) have positive and statistically significant growth effects. Our results are comparable to previous studies in that we, like most of them, find education expenditures to be significant in their impact on growth. Quantitatively, our results suggest that an increase in government education expenditures by 1% (compensated by a decrease in other types of expenditures) leads to an increase in GDP growth of 0.0016 percentage points, while an increase by 1 percentage point leads to an increase in GDP growth of 0.0133 percentage points. This is significantly lower than findings of Acosta-Ormaechea and Morozumi (2013), who find this impact to be between 0.22-0.31 percentage points in 56 countries of various levels of development. Given that mean growth rate in our sample is 2.62% this result suggests that a 1 percentage point increase in government education expenditures in EU15 increases GDP growth by 0.51% annually. Gemmell et al. (2016), on the other hand, find that a one percentage point increase in education in 17 OECD countries is associated with an increase in GDP per capita of 2%. Baldacci et al. (2004) find that the resulting increase in growth would be 1.4 percentage points in 15 years, while our results suggest that the effect on growth after 15 years would be only 0.19 percentage points. Overall, our results suggest a lot lower effect of education expenditures than previously found.

As for Recreation, culture and religion (recreation), our results suggest that an increase in this type of expenditures by 1% leads to an increase in GDP growth of 0.00093 percentage points. Other papers typically do not find this component to be significant in its impact on growth; Kneller et al. (1999) classify it (theoretically) as either unproductive or unclassified expenditures.

As indicated earlier we also apply MG, PMG and PDCCE estimators to draw comparative conclusions. The results are given in Tables 5-7 in the Appendix. When MG estimator is used (Table 5), which assumes complete heterogeneity of countries but takes no account of common shocks, only Public order and safety (order) exerts statistically significant and positive effect on growth. If we assume that the impact of government expenditures types should be the same across countries in the long run (and heterogeneous only in the short-run), i.e. if we apply PMG estimator (Table 6), then neither type of government expenditures is found to be statistically significant. Pooled version of DCCE model (PDCCE), which accounts for unobserved common factors but assumes homogeneity of the coefficients, finds Defence (def), General public services (pubserv) and Health (health) to be significant in their impact on growth, and of positive, positive and negative signs, respectively. Overall, our results show that different estimators give very different results, hence it is important to account for both; heterogeneity and common factors. Addressing these issues leads to an improved quality of the analysis and reliability of findings.

5. Conclusion

The relationship between government size and growth is one of the mostly debated topics in economics and the global financial crisis of 2008/09 has put it back on the agenda. Despite recent advances in the field of public sector economics, there is still much more to be learnt and much more work to be done to improve our understanding of the nature and growth effects of the size of government in the economy, and more importantly, of its structure. This paper aims to contribute to the literature by examining how strong growth rates respond to government expenditure changes and which expenditure items have the strongest impact, after accounting for dynamics, heterogeneity and common factors.

While the early studies in this field are rather inconclusive, recent studies mostly suggest that there is a negative relationship between total government size and growth in developed economies. The main findings of our study lie within that strand of the empirical literature - we find that in developed (15) EU countries, ceteris paribus, larger government sector is associated, on average, with lower rates of growth. Moreover, our findings suggest that government expenditures on education are one of the two expenditures items (together with expenditures on Recreation, culture and religion), which have statistically significant and positive growth effect. To arrive at precise estimates of the growth effects of government size from a methodological point of view, in comparison to other studies, our paper advances particularly in terms of addressing the issue of parameter heterogeneity and unobserved common factors. Namely, majority of studies in this field use models which impose cross-country parameter homogeneity. The failure to account for parameter heterogeneity in a dynamic panel model, however, can produce inconsistent and potentially very misleading estimates of the average values of the parameters (Pesaran and Smith, 1995). Additionally, it is to be expected that countries are cross-correlated due to international linkages and world-wide common shocks that influence all cross-sectional units. Likely sources of these dependencies might be changes in technology and/or oil prices, which affect GDP growth, but to different degrees across countries. Neglecting these dependencies generates inefficient parameter estimates.

In this paper we, therefore, employ dynamic common correlated effects estimator, which is particularly adequate given our sample characteristics, as it allows heterogeneity across countries and accounts for unobserved common factors. Our results suggest that an increase in government education expenditures by 1% (compensated by a decrease in other types of expenditures) leads to an increase in GDP growth of 0.0016 percentage points. An increase in government education expenditures by 1 percentage point, on the other hand, leads to an increase in GDP growth of 0.0133 percentage points or 0.51%. In quantitative terms this is significantly lower than findings of some other papers (see, for example, Acosta-Ormaechea and Morozumi, 2013; Baldacci et al., 2004 and Gemmell et al., 2016). Comparison of our preferred specification with those that constrain (all or some) coefficients to be the same across countries (PMG and PDCCE) or do not account for unobserved common factors (MG and PMG) suggests that these give fundamentally different results.

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Appendix

Table 4 Baseline specification with estimators MG, PMG and PDCCE

	(1) **MG** D.log_rgdpo	(2) **PMG** D.log_rgdpo	(3) **PDCCE** D.log_rgdpo
L.log_rgdpo	-0.397***	-0.207***	-0.0164
	(0.0463)	(0.0490)	(0.0147)
LD.log_rgdpo		-0.00877	
		(0.0930)	
log_ck	0.194***	0.0928***	0.0150
	(0.0296)	(0.0284)	(0.0153)
log_ngd	-0.00154	-0.157*	-0.0305
	(0.202)	(0.0936)	(0.0340)
log_g_in_gdp	-0.407***	-0.184**	-0.0502*
	(0.0784)	(0.0732)	(0.0299)
D.log_ck		0.415***	
		(0.0803)	
D.log_ngd		0.418	
		(0.345)	
D.log_g_in_gdp		-0.189**	
		(0.0840)	
_cons	4.008***	2.371	0.136
	(0.856)	(1.747)	(0.164)
N	323	308	314
CD	8.859	0.884	2.081

Source: author’s calculations

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5 Mean group estimation

MG	(1) D.log_rgdpo	(2) D.log_rgdpo	(3) D.log_rgdpo	(4) D.log_rgdpo	(5) D.log_rgdpo	(6) D.log_rgdpo	(7) D.log_rgdpo	(8) D.log_rgdpo	(9) D.log_rgdpo	(10) D.log_rgdpo
L.log_rgdpo	-0.408***	-0.398***	-0.396***	-0.485***	-0.465***	-0.418***	-0.447***	-0.539***	-0.332***	-0.332***
	(0.0971)	(0.118)	(0.120)	(0.127)	(0.138)	(0.0717)	(0.106)	(0.184)	(0.0958)	(0.0957)
log_ck	0.103**	0.0383	0.114*	0.106***	0.0613	0.105**	0.0761	0.0807	0.0805**	0.0443
	(0.0410)	(0.0544)	(0.0603)	(0.0346)	(0.0540)	(0.0516)	(0.0612)	(0.0681)	(0.0399)	(0.0508)
log_ngd	0.252	0.171	0.617	0.483	0.351	0.0666	0.180	0.632	0.231	0.309
	(0.508)	(0.676)	(0.653)	(0.661)	(0.764)	(0.460)	(0.594)	(0.990)	(0.552)	(0.582)
log_edu	0.132									
	(0.0957)									
log_def		-0.0301								
		(0.0333)								
log_pubserv			0.0590							
			(0.0758)							
log_health				0.114						
				(0.0897)						
log_order					0.157**					
					(0.0674)					
log_envir						0.0594				
						(0.0492)				
log_house							-0.0387			
							(0.0284)			
log_recreation								0.0453		
								(0.0638)		
log_socprotection									-0.240	
									(0.172)	
log_ecaffairs										-0.0149
										(0.0243)
_cons	4.079	4.860	5.029	5.788*	5.669	3.951**	5.008*	7.222	4.596*	4.454
	(2.729)	(3.213)	(3.618)	(3.447)	(3.802)	(1.851)	(2.890)	(5.317)	(2.746)	(2.988)
N	280	280	280	280	280	280	280	280	280	280
CD	16.30	16.83	15.63	17.16	16.78	14.77	16.43	17.21	16.79	15.74

Source: author’s calculations

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6 Pooled mean group estimation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
PMG	D.log_rgdpo	D.log_rgdpo	D.log_rgdpo	D.log_rgdpo	D.log_rgdpo	D.log_rgdpo	D.log_rgdpo	D.log_rgdpo	D.log_rgdpo	D.log_rgdpo
L.log_rgdpo	-0.343***	-0.350***	-0.224***	-0.296***	-0.310***	-0.294***	-0.265***	-0.253***	-0.270***	-0.264***
	(0.0798)	(0.0822)	(0.0798)	(0.0714)	(0.0898)	(0.0779)	(0.0717)	(0.0669)	(0.0681)	(0.0688)
log_ck	0.116***	0.0935***	0.0651*	0.0776**	0.0955**	0.0950**	0.0630*	0.0803**	0.0863**	0.0737**
	(0.0400)	(0.0338)	(0.0350)	(0.0330)	(0.0370)	(0.0360)	(0.0358)	(0.0336)	(0.0363)	(0.0345)
log_ngd	-0.0535	-0.205	-0.165	-0.170	-0.151	-0.158	-0.138	-0.0855	-0.0556	-0.123
	(0.150)	(0.152)	(0.145)	(0.148)	(0.160)	(0.161)	(0.148)	(0.145)	(0.156)	(0.154)
LD.log_rgdpo	0.0143	-0.109	0.00474	0.0217	-0.00806	0.0206	-0.0695	0.117	0.00485	0.0634
	(0.0930)	(0.0966)	(0.0865)	(0.0852)	(0.0814)	(0.0953)	(0.115)	(0.188)	(0.0975)	(0.0977)
D.log_ck	0.318***	0.272***	0.350***	0.323**	0.329***	0.351***	0.402***	0.441***	0.478**	0.404***
	(0.0866)	(0.0831)	(0.0953)	(0.125)	(0.0809)	(0.107)	(0.106)	(0.164)	(0.192)	(0.120)
D.log_ngd	0.0999	0.00585	0.312	0.254	0.250	0.0998	0.217	-0.0580	0.0354	0.116
	(0.268)	(0.295)	(0.295)	(0.235)	(0.210)	(0.255)	(0.264)	(0.254)	(0.219)	(0.227)
log_edu	0.195									
	(0.154)									
D.log_edu	-0.220***									
	(0.0740)									
log_def		-0.0531								
		(0.0427)								
D.log_def		0.0283								
		(0.0433)								
log_pubserv			0.0124							
			(0.0597)							
D.log_pubserv			-0.0304							
			(0.0731)							
log_health				0.0340						
				(0.0665)						
D.log_health				-0.124						
				(0.105)						
log_order					0.0431					
					(0.118)					
D.log_order					-0.0271					
					(0.0459)					
log_envir						0.0176				
						(0.0408)				
D.log_envir						-0.0121				
						(0.0281)				
log_house							-0.0358			
							(0.0268)			
D.log_house							0.0194*			
							(0.0115)			
log_recreation								0.00879		
								(0.0450)		
D.log_recreation								0.0410		
								(0.0340)		
log_socprotection									-0.00463	
									(0.125)	
D.log_socprotection									-0.190***	
									(0.0610)	
log_ecaffairs										-0.0103
										(0.0403)
D.log_ecaffairs										0.0434
										(0.0338)
_cons	2.080*	5.032**	1.144	1.517	1.035	1.350	4.625***	3.628*	0.446	1.715
	(1.159)	(2.051)	(1.024)	(1.068)	(0.900)	(0.815)	(1.294)	(1.944)	(1.065)	(1.177)
N	265	265	265	265	265	265	265	265	265	265
CD	3.114	3.359	3.351	3.575	4.165	1.998	1.924	2.936	2.390	3.550

Source: author's calculations

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7 Pooled dynamic common correlated effects estimation

PDCCE	(1) D.log_rgdpo	(2) D.log_rgdpo	(3) D.log_rgdpo	(4) D.log_rgdpo	(5) D.log_rgdpo	(6) D.log_rgdpo	(7) D.log_rgdpo	(8) D.log_rgdpo	(9) D.log_rgdpo	(10) D.log_rgdpo
L.log_rgdpo	0.00294	-0.0111	0.00311	-0.00669	0.00443	0.00451	0.00172	0.00274	0.00635	0.00447
	(0.0168)	(0.0184)	(0.0160)	(0.0172)	(0.0167)	(0.0166)	(0.0168)	(0.0166)	(0.0166)	(0.0170)
log_ck	-0.00545	0.00307	-0.00285	0.00880	-0.00509	-0.00601	-0.00256	-0.00511	-0.00949	-0.00603
	(0.0174)	(0.0178)	(0.0167)	(0.0184)	(0.0180)	(0.0172)	(0.0176)	(0.0172)	(0.0174)	(0.0176)
log_ngd	0.00311	-0.0475	-0.0386	-0.00957	-0.0135	-0.0169	-0.0270	0.0178	-0.0255	-0.0140
	(0.0436)	(0.0423)	(0.0380)	(0.0383)	(0.0388)	(0.0477)	(0.0409)	(0.0458)	(0.0392)	(0.0388)
log_edu	-0.0279									
	(0.0338)									
log_def		0.0234^{*}								
		(0.0123)								
log_pubserv			0.0711^{***}							
			(0.0219)							
log_health				-0.0658^{**}						
				(0.0329)						
log_order					-0.00516					
					(0.0217)					
log_envir						-0.000749				
						(0.00759)				
log_house							0.0102			
							(0.0107)			
log_recreation								0.0261		
								(0.0207)		
log_socprotection									-0.0533	
									(0.0364)	
log_ecaffairs										0.000925
										(0.0145)
_cons	0.148	-0.0234	-0.262	0.135	0.0150	0.0116	-0.0356	0.0896	0.206	0.0179
	(0.205)	(0.140)	(0.160)	(0.150)	(0.142)	(0.162)	(0.150)	(0.148)	(0.187)	(0.140)
N	271	271	271	271	271	271	271	271	271	271
CD	2.470	2.161	1.467	3.227	2.351	3.095	2.912	2.627	3.089	3.876

Source: author's calculations

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$