Kiel

Working Papers

Government Activity and Economic Growth – One Size Fits All?

by Joscha Beckmann, Marek Endrich and Rainer Schweickert

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Abstract

This study investigates the role of government activity in economic growth, arguing that economic systems are important and that, therefore, one size of government does not fit all countries. Taking a panel of 111 countries over the years from 1971 to 2010, we consider clusters of economic systems as predicted by an extended Varieties of Capitalism (VoC) approach. The empirical growth impact of government activity is positive but u-shaped and depends on both the quality of institutions and the institutional setting. For the polar cases of liberal economies and Scandinavian coordinated market economies, the potential growth impact is quite similar and superior to other clusters of countries. However, the maximum growth effect is realized for above-average levels of government activity in the Scandinavian countries, while this would be detrimental to growth in liberal countries. Hence, high levels of government activity are consistent with growth but only in economic systems consistently rooted in a high level of government activity.

Keywords: Government spending, regulation, economic growth, economic systems, institutions

JEL codes: H10, P10, P51

Joscha Beckmann
Kiel Institute for the World Economy
& University Duisburg-Essen
E-mail: joscha.beckmann@ifw-kiel.de

Marek Endrich
DFG - Graduate School in Law and
Economics, University of Hamburg
marek.endrich@ile-graduateschool.de

Rainer Schweickert (corresponding author)
Kiel Institute for the World Economy
24100 Kiel, Germany
Telephone: +49(0)431-8814
E-mail: rainer.schweickert@ifw-kiel.de

1. Introduction

Since endogenous growth theories challenged the neoclassical theory of Solow (1956), stating that national policies can be one of the factors that have implications for long-run growth (e.g. Barro 1990, Devarajan 1996), numerous empirical studies have tried to come up with conclusive evidence of this. Basically, investigations of government policy have led to the categorization of productive and unproductive state expenditures and the respective structures of taxes. Approaches varying in the specification, the method and the country selection have resulted in a wide array of observations concerning the impact of public policy on growth and do not allow for a general conclusion on government activity (see, e.g., Nijkamp & Poot 2004, Tabellini 2005).

While it is certainly true that some categories of government spending (taxation) are more likely to support (distort) long-term growth than others, the empirical investigation of government activity in growth empirics based on specific government budget categories may be misleading because government activity usually comes as a package. This implies that the overall mix of spending and taxation matters for the growth implications. In addition, government activity covers more than spending because government regulations may be complements to or substitutes for budgetary action. Hence, a look at the implications of the overall package of government activity seems to be worthwhile.

We also suggest that a proper consideration of the institutional framework is of importance when analyzing the growth implications of overall government activity:

- We hypothesize that the impact of government activity on growth depends on *institutional complementarities*, as given by a country's economic system. Institutional complementarities described in the Varieties of Capitalism (VoC) literature (e.g. Hall & Soskice 2001) predict different roles for governments in Liberal Market Economies (LMEs; mainly the Anglo-Saxon countries) and Coordinated Market Economies (CMEs; mainly the Scandinavian and Continental European countries). While this theory focuses in the first place on regulations, the literature on Worlds-of-Welfare-States (e.g. Esping-Andersen 1990, Amable 2003) provides an extension to government spending and taxation. We attempt to provide a first test on the relevance of this literature in determining the growth effects of *overall* government activity.

- We also hypothesize that the *quality of institutions* is important through government activity. The literature on institutions and growth is rather conclusive on the positive role of better institutions (see, e.g., Rodrik et al. 2004, Acemoglu et al. 2006). Government activity is embedded in a framework of institutional constraints, and the effectiveness of government policy as well as the innovative capabilities of an economy depend on the institutional design (Acemoglu et al. 2001, Hall 2001).

However, indirect effects of institutions through government activity are not explicitly tested for and important information on the role of economic development and location-specific context is excluded by the limitation of samples to developed or developing nations (Rodrik 2008, Bose et al. 2007). We attempt to provide an empirical test based on a worldwide sample, in which we allow for the direct as well as the indirect effects of institutions.

Hence, we argue that the institutional framework has to be included in any analysis of the impact of government activity on economic growth. Our paper hypothesizes that the impact of overall government activity on growth is conditional on the quality of the institutions and differs between clusters of countries characterized by different economic systems. If one size of government activity is actually unlikely to fit all, this may explain the inconclusive results from empirical research on the growth effects of government policy.

The rest of this paper is organized as follows. In order to detail our hypothesis, Section 2 provides an outline of the literature; Section 3 discusses the empirical framework and presents the results; Section 4 presents our conclusions. We are able to show that the impact of government activity on growth is (i) u-shaped with low impact at the extreme ends, (ii) increases with the quality of institutions, and, most importantly, (iii) depends on institutional complementarities. Polar cases of LMEs and Scandinavian CMEs exhibit the highest growth rates but this is reached by above-average government activity in CMEs and below-average government activity in LMEs. To some extent, the same divide is evident between developing and Eastern European countries.

2. Government, Institutions and Growth

Easterly & Levine (2002) summarize the findings of the first wave of empirical papers on endogenous growth following first versions of Barro & Sala-i-Martin (1992) and Mankiw et al. (1992). They already adopt a rather broad view of government activity when discussing its impact on economic growth.[1] Nevertheless, later papers look rather into details than at the broad picture. At least, two strands of the literature focus either on expenditure/taxation or on regulation.

With respect to *government expenditure and taxation*, theory predicts a formal categorization into (non-) productive expenditures and (non-) distortive taxes, and studies have found supporting evidence of this theory-based approach (Kneller et al. 1999, Angelopoulos et al. 2007).[2] The positive contribution of expenditure on education and

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[1] According to Easterly & Levine (2002), national policies consist not only of fiscal policy but also of openness to international trade, financial development and macroeconomic policies.
[2] Government activity is classified according to the criteria of whether tax measures have an influence on saving and investment decisions and whether government expenditures are included as arguments in private production functions (Kneller et al. 1999).

infrastructure is also commonly identified as growth-enhancing (Easterly & Rebelo 1993, Blankenau et al. 2007, Bose et al. 2007, Gemmell & Sanz 2009), but Nijkamp & Poot (2004) show in their metastudy that results vary a lot, depending on the model specification, the country sample and the econometric methodology. For developing countries, capital expenditure is considered the mainstay of development (Gupta et al. 2005, Bose et al. 2007), but expenditures may be too excessive, turning the evidence around (Devarajan et al. 1996).[3] Despite the introduction of more sophisticated methods, and accounting for the offsetting effects of taxation, the evidence has not become more conclusive on budgetary government activity and growth (Nijkamp & Poot 2004).

With respect to *regulation*, Schumpeterian models of endogenous growth show how different forms of competition and entry regulations can benefit countries that are at different stages of development. The effects of deregulation on efficiency are ambiguous. Aghion et al. (2005) and Alesina (2005) show that deregulation leads to greater investment. However, according to Acemoglu et al. (2006), the appropriate regulation depends on the position of a country in relation to the world technology frontier and, hence, on the level of development. At the frontier, innovation requires open systems, while imitation requires regulations of competition in order to generate the necessary dividends for investment. Indeed, the necessary change from investment to innovation-appropriate institutions to avoid a growth trap depends on the vulnerability of politicians to bribery, which is similar to the previously-regarded political economy arguments on the growth-hindering effect of extractive institutions. In the same vein, Rodrik (2008) argues that developing countries that export subsidies and tariffs may help achieve efficient outward orientation (see also Freund & Bolaky 2008).

Hence, the literature on spending and regulation is not conclusive with respect to the overall effect of government activity, and there are authors who suggest the *quality of institutions* as the factor conditioning the effects on growth. Tabellini (2005), for example, argues that the inconclusiveness stems from the fact that it is a question of the political purpose or, more specifically, of the quality of government. Despite the fact that institutions are shown to have a positive direct effect on growth,[4] the quality of government is decisive for the efficacy of public policy, which is shown to be positively significant in relation to public spending on health and education (Rajkumar & Swaroop 2008), to government spending in

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[3] The approach has evolved to combine the expenditure side and the tax side with a budget constraint to prevent a mis-specification of the model.

[4] We do not include the implementation of institutions into our definition of government activity, so as to distinguish between the institutional framework and concrete economic policies. For papers on the positive growth effect of institutions, see, e.g., Acemoglu et. al. (2005), Rodrik et. al. (2004) and Beck & Leaven (2006) for macro studies, and Greif (2003) and Fafchamps (2011) for micro studies. Coe et. al. (2009) and Manca (2010) analyze the positive effects on innovation activity.

general (Cooray 2009, Oto-Peralias & Romero-Avila 2013), regulation (Jalilian et al. 2007) and consumption expenditure in developing countries (Butkiewicz & Yanikkaya 2011).[5]

Persson et al. (1997, 2000) and Persson and Tabellini (1999) show that more competition between policymakers leads to more efficient government. However, their conclusion that the level of political accountability is negatively related to the provision of public goods and social services may have to be qualified when widening the perspective towards developing countries. Elites in autocratic regimes may instrumentalize the provision of public goods in order to stabilize their power base (Acemoglu & Robinson 2006). However, in a semi-democratic context they may also have incentives to limit parliamentary power by restricting public spending (see, e.g., Shugart & Haggard 2001). Hence, rather independently from categories of government activity, over- as well as under-spending and -regulation are possible in the case of bad institutions. Indeed, Plumper & Martin (2003) observe an inverse u-shaped relationship between democracy and growth. In their model, an opportunistic government chooses an optimal level of rent and public goods provision for political support under the constraint of different democratic regimes. Hence, political economy arguments suggest that better institutions improve government effectiveness but that this is limited by a u-shaped relationship because of tendencies toward overspending and overregulation.

In contrast to the literature on institutions and growth, the literature on *economic systems* focuses rather on the consistency of alternative approaches than on differing growth effects. As described and analyzed with the VoC approach (see, e.g., Hall and Soskice 2001), different market regimes, i.e. capitalist variation, are characterized by different institutional matrices in the economy.[6] These institutional environments and arrangements provide incentive structures for the behavior of firms, households and policymakers. Moreover, these different institutional settings reflect, influenced by distinct incentive patterns, different economic and societal preferences with respect to the role of the government in the economy.

The VoC literature classifies market economies into two polar types of capitalism. In liberal market economies (LMEs, mainly Anglo-Saxon countries), coordination is primarily characterized by price signals and formal contracting in competitive markets. By contrast, coordinated market economies (CMEs, mainly Scandinavian and Continental European countries) are largely driven by specific non-market institutions which play critical roles and influence processes of strategic interaction. This analytical division is conceived as a bipolar continuum on which countries cluster into these broad categories. What matters for growth effects in this framework is the consistency.

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[5] In a recent study, Kotera et al. (2012) observed the interesting result that an increase in government size leads to a higher or lower level of corruption, depending on the endowment of a country with a high or low level of democracy. This shows that the relationship between institutions and government spending is even more intertwined and complex.

[6] For more literature on the Variety-of-Capitalism approach see, e.g., Estevez-Abe & Soskice (2001), Hall & Gingerich (2009), Hall & Thelen (2009), Hancke (1999), Höppner (2005), Streeck (1991).

Only a few papers have begun to widen the focus from regulations to a broader understanding of government activity. Amable & Azizi (2011) and Schustereder (2010) observe that LMEs usually exhibit more limited social protection, while CMEs and particularly social-democratic (Nordic or Scandinavian) welfare regimes provide significantly more generous social protection, both in kind and in monetary terms. The link is provided by the interplay between labor market institutions and the welfare state (Amable & Azizi 2011). The competitiveness of LMEs relies on activities which require workers to acquire general skills. Because of these non-specific skills, workers are understood to switch relatively easily between jobs. Hence, there is no specific need for protection. On the other hand, the competitiveness of CMEs is typically based on activities which favor the appropriation of firm- or sector-specific skills. In such an environment, a generous social protection system may act (ex-ante) as an incentive for workers to acquire the required specific skills.

More generally, the related literature on the world of welfare states inspired by the seminal work of Esping-Andersen (1990) can be integrated into a broader picture of economic systems (see, e.g., Amable 2003). Following the line of argumentation of Hall & Gingerich (2009), government activity, i.e. spending and regulation, has to be consistent ('complementary' in the wording of the VoC literature) in order to achieve innovation and welfare. Indeed, the implications for potential growth in economic systems started to feature in the literature on economic systems:

- The process of innovation is a core characteristic of endogenous growth models. Acemoglu et al. (2012) assume that fluid labor markets, flexible equity markets and the market orientation of firms in LMEs are highly conducive to radical innovation, while training systems and dense networks provide what is required to support incremental innovation in CMEs. They model an asymmetric world equilibrium in which globalization allows CMEs to benefit from innovation in LMEs and to end up with higher welfare. However, empirical studies suggest that the process of innovation follows comparative advantages, with CMEs being advantaged in medium high-tech and disadvantaged in high-tech, as compared to LMEs (Schneider & Paunescu 2012).

- The conduciveness to growth in economic systems is tested on the basis of political economic models. Hall & Gingerich (2009), in what is probably the closest to our study, implement a growth regression. They detect a u-shaped relationship between regulatory complementarities and growth, with the highest growth effect for the highest *and* lowest levels of coordination. However, they do not extend this analysis to government spending, nor do they explicitly consider the fact that belonging to a cluster may moderate the growth effects of government activity in general. The empirical literature on VoC is still relatively new, and existing studies offer contradictory results. For example, the study by Kenworthy (2006) finds little support

for the growth effect of institutional coherence.[7]

Overall, the literature suggests that 'government activity' does not mean the same in different economic systems and that the impact of the same level of activity on growth may differ. Hence, our approach in analyzing the role of government is to allow both the quality of institutions as well as institutional complementarities, i.e. the type of economic system, to moderate any growth effect of government activity. As will be shown in Section 3, this allows for more conclusive results on the growth impact of government activity without disaggregating government activity into budgetary or regulatory items.

3. Empirical framework and results

3.1 Econometric methodology

In order to test our hypothesis on the relevance of economic systems and institutional quality to the effectiveness of government activity, we use panel data for OECD and developing countries, described in the next section, to implement growth regressions. The pooled regression approach assumes equal and stable production functions for all countries. As a first step, a test for the stability of the regression functions over time rejects the hypothesis of no time effects. This implies that both Pooled OLS (POLS) and Fixed Effects with time effects (FE) should be implemented.

Testing the relevance of economic systems, which are assumed to be stable over time, requires adopting the POLS model. The POLS model

$$\gamma_i = \beta \log\big(\hat{y}_i(0)\big) + \psi X_i + a_t + \varepsilon_{it}, \text{ t= 1,2,...T} \tag{1}$$

contains the endogenous variable GDP per capita growth rate γ_i, the initial level of GDP per capita $\hat{y}_i(0)$, the exogenous variables X_i, the time fixed effect a_t and the error term ε_{it}. For a consistent estimation by OLS the orthogonality condition must be satisfied.

$$(X_{it}{}'\varepsilon_{it}) = 0, \text{ t= 1,2,...T} \tag{2}$$

However, the assumption of an uncorrelated error in the same time period as the regressors is often hardly valid so that an omitted variable bias might be expected. Indeed, the Hausman test confirms the advantage of the fixed-effects against the random-effects estimation by rejecting the hypothesis of no correlation between the regressors and the individual effects (Table 1).

(Table 1 about here)

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[7] Concerning the performance effects of economic systems, see also Hall & Jones (1999) and Iversen (2007).

In a fixed effects model

$$\gamma_i = \beta \log(\hat{y}_i(0)) + \psi X_i + a_t + u_i + \varepsilon_{it}, \; t= 1,2,...T \quad (3)$$

u_i is the country fixed effect, and the strict exogeneity assumption of the explanatory variables conditioning on a_i,

$$E(\varepsilon_{it}|X_i, a_i) = 0, \; t= 1,2,...T \quad (4)$$

holds. The fixed effects estimation uses the within-transformation to deal with biased and inconsistent POLS due to the correlation, albeit at the cost of eliminating all time-invariant variables.

We argue that the heterogeneity in the POLS model is not treated as unobserved, as in the fixed effects model, but biases associated with omitted variables are alleviated by including regional dummies. This substitution of country-specific intercepts allows a retaliation of the between variation and provides information about the sources of growth differences (Durlauf et al. 2005).[8]

Nevertheless, we check for robustness by estimating a basic model without regional dummies using both FE and POLS, while we refer to POLS when estimating an extended model with regional dummies. We are able to show that the basic model is robust with respect to the estimation method and also when extended by regional dummies. Hence, a potential omitted variable bias should not be relevant to the growth regressions implemented in this context.

To increase the robustness of our findings, we considered some regressors, namely investment and FDI, to be endogenous and implemented 2-stage least squares as robustness checks. Since the results did not change to a significant degree, the detailed findings along with other robustness checks are provided in the Appendix.[9] Panel-corrected standard errors are implemented in all versions of the econometric model to account for the prevalence of heteroskedasticity and serial correlation.

3.2 Data and empirical specification

The panel comprises 111 countries. The observations for the years 1971 to 2010 are averaged over five-year periods to take account of business cycle volatility. A full data overview is provided in Table 2. As described above, we start with a basic model for testing using an FE estimator with time effects and POLS. This model allows for a first test of the

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[9] In line with the literature, we assume the exogeneity of government activity (see, e.g., Kneller et. al. (1999), Angelopoulos et. al. (2006), Jalilian et. al. (2007)).
[9] In line with the literature, we assume the exogeneity of government activity (see, e.g., Kneller et. al. (1999), Angelopoulos et. al. (2006), Jalilian et. al. (2007)).

effectiveness of government activity, considering the impact of institutional quality as well as non-linearities.

(Table 2 about here)

The basic model is shown in Equation (5):

$$\gamma = \beta_0 + \beta_1 \cdot pol + \beta_2 \cdot fraser + \beta_3 \cdot fraser2 + \beta_4 \cdot pol * fraser + \beta_6 \Psi \qquad (5)$$

With respect to government activity, we applied the following definitions and assumptions:

- *fraser* is the sum of government size and regulation, obtained from the Economic Freedom of the World index (EFW) of the Fraser Institute (Gwartney & Hall (2012)). A high value of *fraser* represents an economy with a low level of government interference. The inclusion of a squared term of *fraser* (*fraser2*) allows for a non-linear relationship between government activity and economic growth. The index covers a large cross-country selection and is based on the compilation of scores and data from various established sources. The score for government size is a composite of the subcategories of government consumption, transfers and subsidies, government enterprises and investment and the top marginal income tax. The score for regulation is a composite of the subcategories of credit market regulation, labor market regulation and business regulation. In each category, the indicators evaluate government size and regulation on a scale from 0 to 10, with 10 reflecting the least interference in the economy. Hence, the values for overall government activity measured by *fraser* range from 0 to 20.

- *pol* is the Polity IV index, measuring the quality of democracy. We take this as an indicator of the quality of institutions in general. This is necessary because more comprehensive and internationally comparable measurements of institutional quality, such as the World Bank Governance Indicators, have been available only since the mid-1990s. It has been shown, however, that components of institutional quality are highly correlated (see, e.g., Kaufmann et al. 2007). We expect higher-quality institutions to have a positive impact on growth. The source of the variable is the Polity IV Project, which provides the combined Polity Score. It is a combination of scores for democracy and autocracy and runs from 0 for completely autocratic regimes, i.e. the worst quality of institutions, to 20 for perfectly democratic regimes, i.e. the best quality of institutions. In line with the literature, this variable has to be assumed to be potentially endogenous. Therefore, we consider both the original variable and, as an alternative, the residual of pol regressed on income, i.e. *pol_res.*[10]

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[10] The result for the regression of polity on the level of income for annual average values over the full sample is *pol* = -3.672 (-3.56) + 1.954 (15.28)*lgdppc, where the numbers in brackets represent t-statistics.

- *pol*fraser* is the interaction of *fraser* and *pol*, and accounts for the effect of institutions on government policy. We assume that a higher institutional quality implies a more effective government activity.

The variable Ψ comprises various other factors which represent a standard set of economic controls. *log(GDPpcini)* covers the generally-observed catch-up process of poor countries, and we expect the convergence factor β_6 to be negative for the implication of convergence. Population growth *popg*, investment *gfcf* as gross fixed capital formation in percentage of GDP, as well as foreign direct investments *FDI* as a percentage of GDP are internal and external economic factors and we expect them to be growth-enhancing. The same effect is predicted for the openness variable *open_res,* which is cleared for country size effects by regressing the trade-to-GDP ratio on population size.[11] The inflation measure *inf* acts as a proxy for macroeconomic stability and is obtained from the WDI database, while the indicator for financial crises *fin_cr* is compiled from the Laeven & Valencia (2012) database on banking crises and takes a value of 1 for a year in which banking crises occur. Both inflation and financial crises should exhibit negative influence on growth.

The extended model to be estimated with POLS examines the complementarity of government activity within clusters.

$$\gamma = \beta_0 + \beta_1 \cdot fraser + \beta_2 \cdot cme\_all + \beta_3 \cdot lib\_all + \beta_4 \cdot lib\_all \cdot fraser + \beta_5 \cdot cme\_all \cdot fraser + \beta_6 \Psi$$

(6)

The model includes dummies representing regional clusters of different economies.

The cluster dummies are determined on the basis of an extended VoC approach (see Amable 2003 and Bohle & Greskovits 2012). The composite dummy for LME (*lme_all)* and CME (*cme_all)* shown in Equation (6) is based on clusters allowing for a high extent of heterogeneity within clusters. We also implement variants of Equation (6) with the disaggregated clusters. Following Amable (2003) and Bohle & Greskovits (2012),

- *cme_all* consists of Scandinavian European countries (*nordic*), mixed market economies of Southern Europe (*mme*), Continental European countries (*cont*), CME Eastern Europe (*cme_ee*);

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[11] The respective regression on the openness of a country for annual average values over the full period yields open = 197.1741 (26.70) - 13.506 (-16.86) *lpop, with the large t-statistics in brackets underlining the large effect of country size on openness.

- *lib_all* consists of liberal countries (*lib*) and liberal Eastern European countries (*lib_ee*).[12]

Other countries are clustered according to geographic region (*Latin, Asia, Africa*) because as yet no papers are available which analyze a clear convergence towards OECD clusters. The interaction of the regional dummies with government activity, e.g., *lib_all*fraser* and *cme_all*fraser* in Equation (6), aims to identify the different growth effects of government activity in the two different clusters. According to the complementarity argument, we expect CMEs to require a large State role to ensure efficiency, innovation and growth in the economy, while a small government is coherent within the institutional regime of LMEs.

3.3   Econometric results

Our approach in the econometric analysis of government activity is based on a general-to-specific method. We begin by including all relevant variables, then remove, step by step, the least significant, until we are left with only significant variables. The regression results for the basic model are presented in Table 3 for both FE (Eq. 1 and 2) and POLS (Eq. 3 and 4) estimations. The coefficients of the standard growth factors are in line with the theoretical and empirical predictions and are stable throughout variations in the econometric model. The coefficient of the initial level of GDP per capita is consistently negative and significant, which indicates a catch-up process in poor countries. Population growth has a positive impact on economic growth, and countries which enjoy a high investment rate exhibit a considerable advantage in growth rates. As expected, a higher level of inflation, signaling macroeconomic instability, has a diminishing effect on growth, and, correspondingly, the emergence of financial crises leads to a reduction in growth. Regarding the external factors, we find that trade openness, after accounting for size effects, exhibits a positive effect on growth, as does the inflow of FDI.[13]

(Table 3 about here)

The results for the growth effect of government activity are in line with our hypothesis that the relationship is u-shaped and that institutional quality matters. As is revealed by the positive coefficient of *fraser* and the negative coefficient for *fraser2*, the growth effect of government activity follows an inverse u-shaped function, i.e. it decreases towards extreme ends on both sides. Not considering the influence of institutions, to be discussed below, the

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[12] In the terminology of Amable (2003: 14): market-based model (*lib*), social-democratic model (*nordic*), Continental European model (*cont*), and Mediterranean model (*mme*). Bohle and Greskovits (2012) distinguished between nation builders and neoliberals (Baltic states), countries with welfare problems (Visegrád group), and weak states (Southeast Europe). We match Slovakia (nation builder and neoliberal reforms) as well as Romania and Bulgaria (state builders in a sense) with the Baltics to form our *lib_ee* group. The Visegrád group plus Slovenia then constitute a group of more advanced countries with substantial welfare states, i.e *cme_ee* (results from cluster analysis supporting our definition of clusters are available upon request).
[13] In other regressions we have included an indicator of education as a proxy for human capital as well as variables for political crises, but they turned out to be insignificant and did not change the results.

maximum impact (based on the point estimates) ranges between *fraser* values of 8.1 (Eq. 3) and 10.5 (Eq. 4). In the latter case, the u-shape is almost symmetrical with respect to the possible values of *fraser*, and the growth impact ranges between 0.9 percentage points at the (theoretical) extremes and 5.0 percentage points at the maximum. In the case of an asymmetric u-shape, as in Eq. 3, the implication would be of a negative growth impact for extremely small governments (high values of *fraser*).

Interestingly, government activity, measured by the sum of government size and regulation, is higher than 9.0 for the most recent year. This implies that, nowadays, almost all countries fall within a certain range, where a higher level of government activity would rather improve growth performance. Looking at countries representing the traditional VoC cases of LME and CME, even Sweden, with a *fraser* value of 12.0, could not be blamed for running a government that is too large, concerning the growth impact. Other countries, like Germany (13.0), the US (14.7) and Singapore (17.1), have lower government activity compared with Sweden. However, not considering the impact of institutions, would lead to biased conclusions.

Indeed, the basic relationship is modified by institutional quality and its interaction with government activity (Table 3). We test two versions of our polity variable *pol* and its residual, not explained by the income level, *pol_res*. A first important result is that we do not observe a direct positive effect of institutions on growth if we model government activity allowing for non-linearity and interaction with institutions. However, the positive coefficient of the cross-term indicates that, for any given value of *fraser*, good institutions do increase the growth effect of government activity.

In addition, this shifts the u-shaped growth impact discussed above. Taking the point estimates from Eq. 3, which is run with initial values for *pol*, the level of government activity that allows for the maximum growth impact lies at a *fraser* value of 10.1 for countries with an institutional quality at the mean value of the score (*pol* = 10) and at a *fraser* value of 12.0, i.e. lower government activity, for countries with the best score for institutional quality (*pol* = 20). The fact that, at the same time, the growth impact increases from 4.5 to 6.5 percentage points implies that government activity in well governed countries is clearly more effective.

The insights gained from the basic model remain valid when we extend it to include regional dummies representing groups of countries with similar economic systems. As shown in Table 3, the results are slightly more stable when comparing the FE and POLS estimations for the *pol_res* variable, which, at the same time, avoids potential problems with the endogeneity of the variable. Hence, we rely on this variable in the following, when examining the regime-specific effects of government activity. The results are given in Table 4.

(Table 4 about here)

As a first result, splitting the OECD sample countries into the broad categories of liberal (*lib_all*) and coordinated (*cme_all*) countries does not yield a significant coefficient for the dummies (Eq. 1). This is an indication that clustering all countries into only two broad categories is not appropriate because heterogeneity with respect to the growth impact of government activity within clusters is too high. This changes, however, when we reduce the heterogeneity of country clusters. Most importantly, *nordic* (Scandinavian countries) and *lib* (Anglo-Saxon countries) do in fact also create extreme cases with respect to the effectiveness of government activity (Eq. 2). *nordic* countries reveal a higher average growth rate (positive coefficient for *nordic*), but a lower impact of government activity on growth as compared with the sample average (negative coefficient for *nordic*fraser*). The reverse is true for the *lib* countries. It is important to note that these regional effects are relative because the overall coefficient of *fraser*, including the region-specific difference, remains positive and, hence, the basic u-shaped relationship discussed above remains in place.

This result is confirmed by including other groups of countries, as we do in Eq. 3 and 4.[14] In addition, Eq. 3 shows that the Continental European countries (*cont*) are strikingly different from the Scandinavian countries. They experience lower average growth but no significant balancing effect through government activity. Eq. 4 even shows that this is quite similar to the performance of Southern European countries (*mme*), which are marked as inconsistent by the traditional VoC literature. While this does not prove the optimality of the *nordic* model, it is in line with the fact that Scandinavian countries are able to combine equity and innovation with a lower level of regulation as compared with Continental European countries. Looking at Eastern Europe, the countries with a more liberal economic system require relatively less government interference for more growth, which is quite similar to the performance of the *lib* countries. Again, this confirms our priors with respect to the differences in economic systems.

As regards the other regional clusters, we observe that the institutional structures of the African and the Latin American groups are coherent with less government activity, and in the Asian group we find a positive growth effect in general. Except for the fact that we do not find a positive coefficient for *asia_fraser*, these results indicate that Asian countries tend rather towards a CME role model, while African and Latin American countries are more similar to the LME role model. Yet, as argued above, the literature on economic systems in developing countries does not yield deeper insights and future research would have to confirm our tentative results in this respect.

If we look at the region-specific growth impact, i.e. regional dummies, government activity and the related cross-terms, for the two role models of *nordic* and *lib* (point estimates taken

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[14] Eq. 4 does not include *nordic* because of the number of regions considered; *nordic* has to provide the benchmark, as shown by the estimate for the constant.

from Eq. 2), results in maximum growth effects for *fraser* values of 6.7 (*nordic*) and 13.3 (*lib*), while the maximum of the full sample is at 10.4.[15] Again, government activity in the US (14.7), and especially in Sweden (12.0), seems to be too low rather than too high. However, the negative value for *nordic*fraser* implies that the growth impact in *nordic* countries is less sensitive to variations in government activity. Indeed, the resulting growth impact for the two countries is rather similar: 5.2 percentage points for Sweden vs. 6.0 for the US in the most recent values of *fraser*.

Of course, calculations neglecting confidence bands based on results from a highly stylized model do not allow for straightforward policy conclusions. However, there is no indication that overall government activity is too high or even produces a negative contribution to economic growth. Rather, the opposite seems to be true. In addition, optimum government activity with respect to its impact on economic growth is strikingly different in clusters of countries characterized by different economic systems.

Overall, we provide a model of general government activity which considers spending as well as regulation, a non-linear growth effect, the impact of institutional quality and, most importantly, the role of institutional consistency as reflected in economic systems. The results are highly robust with respect to the implementation of fixed effects or pooled OLS estimators. The results are also consistent with the basic explanatory factors traditionally employed in growth models. This also holds for robust checks considering potential endogeneity problems in the underlying growth model.

Our findings are remarkably congruent with our predictions of the role of government activity within different institutional structures. We observe that institutional quality increases the effectiveness of government activity and acts as a requirement for the positive growth effects of government policy. In addition, in line with the results of Hall and Gingerich (2009), growth effects depend on compatibility with institutional design. In particular, the distinct clusters of *nordic* and *lib* countries reflect a clear comparative institutional advantage. Despite their differing institutional structures and the varying roles of government policy, the induced incentive structures produce quite similar growth effects, which are superior to those in other clusters.

4. Conclusion

We have argued that the literature on the impact of government spending on growth has neglected the quality and variety of institutions under which policies are implemented, and have provided robust evidence that the effect on growth of government activity through both regulation and government size depends on the institutional structure.

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[15] In this calculation, we have assumed that institutional quality, on average, fits the level of development (*pol_res* is zero).

From a panel of 111 OECD and developing countries covering the years from 1971 to 2010, we confirm that government activity, broadly defined, has a positive impact on growth. The growth impact is u-shaped and ranges between 1 (for the theoretical extremes of government activity) and about 5-6 percentage points (at the maximum) if the impact of institutions is not considered. This growth effect increases with the quality of the institutional environment. This result is even slightly more robust when considering the quality of institutions above what would be expected, given the level of development, which rules out endogeneity effects. For the whole sample, the maximum is reached at the level of government activity, which almost all sample countries do not reach nowadays. Hence, there is no indication that government activity is too high.

In addition, government activity has a varying effect in different institutional settings. The observation of a congruence of less government activity for the institutional structure of Liberal Market Economies (LMEs) and of more government activity for Coordinated Market Economics (CMEs) follows the predictions of an extended theory on varieties of capitalism (VoC). The finding of the best growth performance for LME and Scandinavian CME countries and the observed most distinguished role for government activity in these two role models supports the notion of the complementarity of government policy. For the Scandinavian CMEs, the maximum impact of government activity on growth is found to be above sample average while it remains clearly below for the LMEs. At the same time, growth is found to be less sensitive with respect to variations in government activity in the Scandinavian CMEs.

Overall, the results support the hypothesis that one size of government is unlikely to fit all, a fact which may explain the inconclusive results in the literature on government effectiveness, which neglects the effects explicitly modeled in our paper. A high level of government activity is more likely to enhance growth effects in economic systems consistently built on the basis of a strong government role. In this context, it is quite striking that the growth performance of Continental European countries is rather similar to that in Southern European crisis countries, which have been marked in the literature as inconsistent and likely to perform worse than both LME and CME types of regimes.

Our results also raise various issues for future research. Firstly, the reasons for the different extents of government activity and the stability of regimes need to be elaborated. In particular, the interplay between political regimes, institutional structures and the structural conditions and interests behind the evolution of economic systems deserves more attention. Secondly, the relationship between economic systems and economic development also needs to be looked at more closely. With regard to the growth impact of government activity, there is obviously a divide between a group of Eastern European and Asian countries, which perform similarly to the CME role model, while less advanced Eastern European, African, and Latin American countries rather follow the LME role model. Hence, the role of institutional development and government activity in economic development needs to be modeled more explicitly.

Finally, the fact that Scandinavian and Anglo-Saxon countries exhibit similar growth effects raises the question of potential trade-offs. Growth performance only provides a first approximation of the well-being of citizens. A thorough evaluation would provide an endogenous variable that includes information on the social safety net, the welfare state and the distribution of income. The results from the Scandinavian countries rather suggest that there need not be a large trade-off when trying to achieve growth and equity. An endogenous variable covering multiple targets might even reveal a superiority in high but efficient government activity.

References

Acemoglu, D. & Robinson, J.A. (2006). *Economic Origins of Dictatorship and Democracy*. Cambridge: University Press.

Acemoglu, D., Aghion, P. & Zilibotti, F. (2006). Distance to Frontier, Selection, and Economic Growth. *Journal of the European Economic Association* 4(1): 37-74.

Acemoglu, D., Johnson, S. & Robinson, J.A. (2001). The Colonial Origins of Comparative Development: An Empirical Investigation. American Economic Review 91(5): 1369-1401.

Acemoglu, D., Johnson, S. & Robinson, J.A. (2005). Institutions as a Fundamental Cause of Long-run Growth. In P. Aghion & S. Durlauf (eds), *Handbook of Economic Growth*, Vol. 1 of *Handbook of Economic Growth*, Elsevier, chapter 6: 385-472.

Acemoglu, D., J.A. Robinson & T. Verdier (2012). Can't We All Be More Like Scandinavians? Asymmetric Growth and Institutions in an Interdependent World. NBER Working Papers 18441, National Bureau of Economic Research, Inc.

Aghion, P., Bloom, N., Blundell, R., Griffith, R. & Howitt, P. (2005). Competition and Innovation: An Inverted U Relationship. *The Quarterly Journal of Economics* 120(2): 701-728.

Alesina, A., Ardagna, S., Nicoletti, G. & Schiantarelli, F. (2005). Regulation and Investment. *Journal of the European Economic Association* 3(4): 791-825.

Amable, B. (2003). The Diversity of Modern Capitalism. Oxford: Oxford University Press.

Amable, B. & Azizi, K. (2011). Varieties of Capitalism and Varieties of Macroeconomic Policy: Are Some Economies More Procyclical Than Others? MPIfG Discussion Paper 11/6.

Angelopoulos, K., Economides, G. & Kammas, P. (2007). Tax-spending Policies and Economic Growth: Theoretical Predictions and Evidence from the OECD. *European Journal of Political Economy* 23(4): 885-902.

Barro, R.J. (1990). Government Spending in a Simple Model of Endogenous Growth. *Journal of Political Economy* 98(5): 103-126.

Barro, R. J. & Sala-i-Martin, X. (1992). Convergence. *Journal of Political Economy* 100(2): 223-251.

Beck, T. & Laeven., L. (2006). Institution Building and Growth in Transition Economies. *Journal of Economic Growth* 11(2): 157-186.

Blankenau, W.F., Simpson, N.B. & Tomljanovich, M. (2007). Public Education Expenditures, Taxation, and Growth: Linking Data to Theory. *American Economic Review* 97(2): 393-397.

Bohle, D. & B. Greskovits (2012). *Capitalist Diversity on Europe's Periphery*. Ithaca and London: Cornell University.

Bose, N., Haque, M.E. & Osborn, D.R. (2007). Public Expenditure and Economic Growth: A Disaggregated Analysis for Developing Countries. *The Manchester School* 75(5): 533-556.

Butkiewicz, J.L. & Yanikkaya, H. (2011). Institutions and the Impact of Government Spending on Growth. *Journal of Applied Economics* 14(2): 319-341.

Coe, D. T., Helpman, E. & Hoffmaister, A. W. (2009). International R&D Spillovers and Institutions. *European Economic Review* 53(7): 723-741.

Cooray, A. (2009). Government Expenditure, Governance and Economic Growth. *Comparative Economic Studies* 51(3): 401-418.

Devarajan, S., Swaroop, V. & Heng-fu, Z. (1996). The Composition of Public Expenditure and Economic Growth. *Journal of Monetary Economics* 37(2): 313-344.

Durlauf, S. N., Johnson, P.A. & Temple, J.R.W. (2005). Growth Econometrics. In P. Aghion and S.N. Durlauf (eds) *Handbook of Economic Growth*, Volume 1A, North-Holland: Amsterdam, 2005: 555-677.

Easterly, W. & Levine, R. (2002). It's Not Factor Accumulation: Stylized Facts and Growth Models. In N. Loayza, Soto, R. & Schmidt-Hebbel, K. (series eds), *Economic Growth: Sources, Trends, and Cycles*, Vol. 6 of Central Banking, Analysis, and Economic Policies Book Series, Central Bank of Chile, chapter 3: 061-114.

Easterly, W. & Rebelo, S. (1993). Fiscal Policy and Economic Growth: An Empirical Investigation. *Journal of Monetary Economics* 32(3): 417-458.

Esping-Andersen, G. (1990). *Three Worlds of Welfare Capitalism*. Princeton: Princeton University Press.

Estevez-Abe, M., T. I. & Soskice, D. (2001). Social Protection and the Formation of Skills: A Reinterpretation of the Welfare State. In *Varieties of Capitalism: The Institutional Foundations of Comparative Advantage*, Oxford: Oxford University Press: 145-183.

Fafchamps, M. (2011). Development, Social Norms, and Assignment to Task. *Proceedings of the National Academy of Sciences* 108(Supplement 4): 21308-21315.

Freund, C. & Bolaky, B. (2008). Trade, Regulations, and Income. *Journal of Development Economics* 87(2): 309-321.

Gemmell, N., Kneller, R. & Sanz, I. (2009). The Composition of Government Expenditure and Economic Growth: Some Evidence from OECD Countries. In *The quality of public finances and economic growth: Proceedings to the annual Workshop on public finances*. Luxembourg: Office for Official Publications of the European Communities, 17-45.

Greif, A. (1993). Contract Enforceability and Economic Institutions in Early Trade: The Maghribi Traders' Coalition. *American Economic Review* 83(3): 525-548.

Gupta, S., Clements, B., Baldacci, E. & Mulas-Granados, C. (2005). Fiscal Policy, Expenditure Composition, and Growth in Low-income Countries. *Journal of International Money and Finance* 24(3): 441-463.

Gwartney, J.R.L. & Hall, J. (2012). 2012 Economic Freedom Dataset. Economic Freedom of the World: 2012 Annual Report.

Hall, P.A. & Soskice, D. (2001). *Varieties of Capitalism: The Institutional Foundations of Comparative Advantage*. Oxford/New York: Oxford University Press.

Hall, P.A. & Gingerich, D.W. (2009). Varieties of Capitalism and Institutional Complementarities in the Political Economy: An Empirical Analysis. *British Journal of Political Science* 39: 449-482.

Hall, P. & Thelen, K. (2009). Institutional Change in Varieties of Capitalism. *Socio-Economic Review* 7(1): 7-34.

Hall, R.E. & Jones, C.I. (1999). Why Do Some Countries Produce So Much More Output per Worker than Others? *The Quarterly Journal of Economics* 114(1): 83-116.

Hancke, R. (1999). Varieties of capitalism revisited: Globalisation and Comparative Institutional Advantage. *La Lettre de la regulation* 30: 1-4.

Höppner, M. (2005). What Connects Industrial Relations with Corporate Governance? Explaining Complementarity. *Socio-Economic Review* 3(2): 331-388.

Iversen, T. (2007). Economic Shocks and Varieties of Government Responses. In B. Hancke, M. Rhodes and M. Thatcher (eds), *Beyond Varieties of Capitalism: Conflict, Contradiction, and Complementarities in the European Economy*. Oxford: Oxford University Press.

Jalilian, H., Kirkpatrick, C. & Parker, D. (2007). The Impact of Regulation on Economic Growth in Developing Countries: A Cross-Country Analysis. *World Development* 35(1): 87-103.

Kaufmann, D., A. Kraay & M. Mastruzzi (2007). Governance Matters VI: Governance Indicators for 1996-2006. World Bank Policy Research Working Paper 4280, Washington D.C.

Kenworthy, L. (2006). Institutional Coherence and Macroeconomic Performance. *Socio Economic Review* 4(1): 69-91.

Kneller, R., Bleaney, M.F. & Gemmell, N. (1999). Fiscal policy and growth: evidence from OECD countries. *Journal of Public Economics* 74(2): 171-190.

Kotera, G., Okada, K. & Samreth, S. (2012). Government Size, Democracy, and Corruption: An Empirical Investigation. *Economic Modelling* 29(6): 2340-2348.

Laeven, L. & Valencia, F. (2012). Systemic Banking Crises Database: An Update. IMF Working Papers 12/163.

Manca, F. (2010). Technology Catch-up and the Role of Institutions. *Journal of Macroeconomics* 32(4): 1041-1053.

Mankiw, N.G., Romer, D. & Weil, D.N. (1992). A Contribution to the Empirics of Economic Growth. *The Quarterly Journal of Economics* 107(2): 407-437.

Nijkamp, P. & Poot, J. (2004). Meta-analysis of the Effect of Fiscal Policies on Long-run Growth. *European Journal of Political Economy* 20(1): 91-124.

Oto-Peralías, D. & Romero-Ávila, D. (2013). Tracing the Link between Government Size and Growth: The Role of Public Sector Quality. *Kyklos* 66(2): 229-255.

Persson, T., G. Roland & Tabellini, G.E. (1997). Seperation of Powers and Political Accountability. *Quarterly Journal of Economics* 112: 1163-1202.

Persson, T., Roland, G. & Tabellini, G.E. (2000). Comparative Politics and Public Finance. *Journal of Political Economy* 108: 1121-1161.

Persson, T. & Tabellini, G.E. (1999). The Size and Scope of Government: Competitive Politics with Rational Politicians. *European Economic Review* 43 (4/6): 699-735.

Plumper, T. & Martin, C.W. (2003). Democracy, Government Spending, and Economic Growth: A political-economic explanation of the Barro-effect. *Public Choice* 117(1-2): 27-50.

Rajkumar, A.S. & Swaroop, V. (2008). Public Spending and Outcomes: Does Governance Matter? *Journal of Development Economics* 86(1): 96-111.

Rodrik, D. (2008). Second-best Institutions. *American Economic Review* 98(2): 100-104.

Rodrik, D., Subramanian, A. & Trebbi, F. (2004). Institutions Rule: The Primacy of Institutions over Geography and Integration in Economic Development. *Journal of Economic Growth* 9(2): 131-165.

Schneider, M.R. & Paunescu, M. (2012). Changing Varieties of Capitalism and Revealed Comparative Advantages from 1990 to 2005: A Test of the Hall and Soskice Claims. *Socio Economic Review* 10(4): 731-753.

Schustereder, I. (2010). *Welfare State Change in Leading OECD Countries. The Influence of Post-Industrial and Global Economic Developments*. Wiesbaden: Gabler.

Shugart, M.S. & Haggard, S. (2001). Institutions and Public Policy in Presidential Regimes. In S. Haggard & M.D. McCubbins (eds), *Presidents, Parliaments, and Policy*, Ch. 3. Cambridge: University Press.

Solow, R.M. (1956). A Contribution to the Theory of Economic Growth. *The Quarterly Journal of Economics* 70(1): 65-94.

Staiger, D. & Stock, J.H. (1997). Instrumental Variables Regression with Weak Instruments. *Econometrica* 65: 557-586.

Streeck, W. (1991). On the Institutional Conditions of Diversified Quality Production. In *Beyond Keynesianism: The Socio-Economics of Production and Full Employment*. London: Edward Elgar: 21-61.

Tabellini, G. (2005). The Role of the State in Economic Development. *Kyklos* 58(2): 283-303.

Valencia, F. & Laeven, L. (2012). Systemic Banking Crises Database: An Update. IMF Working Papers 12/163, International Monetary Fund.

Tables and figures

Table 1: Data description and sources

Name	Variable	Source	Description
fdi	FDI flows and stock	UNCTAD	Expressed in percent of GDP
fin_cr	financial crisis indicator	Systemic Banking Crises Database (Laeven et al., 2012)	
fraser	"interference by government"	EFW (Gwartney & Hall 2012)	Sum of regulation and size of government
gdpg	GDP per capita growth	UNCTAD	
gfcf	Investment rate	UNCTAD	Gross fixed capital formation in percent of GDP
inf	inflation	WDI	
lgpdppcini	log initial GDP per capita	UNCTAD	
lme_all, cme_all, lib, nordic, cont, mme, lib_ee, cme_ee	VoC dummies		
open	Openness	UNCTAD	Defined as (im+ex)/GDP
pol	democracy	Polity 4	

Note: The table provides a description of the main variables included in our study

Table 2: Hausman test – fixed vs. random effects, 1971 - 2010

	(a)	(b)	(a-b)
lgdppcini	-5,004	-0,486	-4,518
popg	0,604	0.3411	0.2633
gfcf	0,144	0.1523	-0,008
inf	-0,038	-0,003	-0,006
open_res	0,019	0,0083	0,011
fdi	0.147	0.1516	-0,004
fin_cr	-2,373	-2,790	0.4162
fraser	0,712	0.947	-0,235
fraser2	-0,340	-0,465	0,122
pol_res	-0,227	-0,244	0,163
pol-res_fr	0,176	0,227	-0,005
lyears_1980	0,750	0,129	0,622
lyears_1985	-0,659	-2,093	1,434
lyears_1990	-0,565	-0,933	1,498
lyears_1995	.051	-0,847	1,898
lyears_2000	1,379	-0,733	2,111
lyears_2005	1,872	-0,617	2,490
lyears_2010	1,923	-0,967	2,881

Chi(2)18: 123,70   P-Value: (0,000)

Note: The Ho is that the difference in coefficients is not systematic. (a) denotes consistent under Ho and Ha while (b) corresponds to inconsistent under Ha and efficient under Ho.

Table 3: Government activity, institutions and growth – basic model (fixed effects with time effects and pooled OLS, 1971 – 2010)

Variables	(1) gdpg	(2) gdpg	(3) gdpg	(4) gdpg
lgdppcini	-4.969***	-5.004***	-0.435***	-0.383***
	(-9.242)	(-9.120)	(-5.624)	(-3.962)
popg	0.582**	0.605**	0.309*	0.326**
	(2.148)	(2.254)	(1.888)	(1.984)
gfcf	0.148***	0.144***	0.166***	0.163***
	(5.470)	(5.320)	(7.281)	(7.145)
inf	-0.00403***	-0.00388***	-0.00276**	-0.00257*
	(-3.287)	(-3.160)	(-2.058)	(-1.946)
open_res	0.0184***	0.0191***	0.00798***	0.00818***
	(2.863)	(2.966)	(3.240)	(3.327)
fdi	0.146***	0.148***	0.113**	0.123**
	(3.122)	(3.157)	(2.186)	(2.291)
fin_cr	-2.397***	-2.374***	-2.844***	-2.802***
	(-7.050)	(-7.095)	(-6.558)	(-6.540)
fraser	0.577**	0.712**	0.729*	0.954**
	(1.977)	(2.454)	(1.915)	(2.446)
fraser2	-0.0344***	-0.0344***	-0.0449**	-0.0456***
	(-2.658)	(-2.653)	(-2.566)	(-2.685)
pol	-0.145		-0.181*	
	(-1.627)		(-1.842)	
pol*fraser	0.0123		0.0174**	
	(1.544)		(2.154)	
pol_res		-0.227**		-0.278***
		(-2.102)		(-2.630)
pol_res*fraser		0.0177*		0.0247***
		(1.872)		(2.785)
constant	36.65***	35.36***	1.333	-1.291
	(7.626)	(7.592)	(0.555)	(-0.536)
Observations	654	654	654	654
R-squared	0.466	0.470	0.396	0.400
Number of country	111	111		

 Note: The table provides fixed effects (Eq. 1 and 2) and pooled OLS (Eq. 3 and 4) estimations for the basic model (see text). Robust t-statistics in parentheses. *** Indicates significance at 1% level, ** at 5% level, * at 10% level. Source: see Table 2.

Table 4: Government activity, economic systems and growth – extended model (fixed effects with time effects and POLS, 1971 – 2010)

Variables	(1) gdpg	(2) gdpg	(3) gdpg	(4) gdpg
lqdppcini	-0.299**	-0.437***	-0.378***	-0.518***
	(-2.569)	(-3.842)	(-3.116)	(-4.459)
popg	0.277	0.326*	0.317*	0.380**
	(1.489)	(1.975)	(1.916)	(2.143)
pfcf	0.160***	0.167***	0.161***	0.140***
	(7.322)	(7.344)	(7.159)	(6.638)
inf	-0.00294**	-0.00248*	-0.00269**	-0.00189
	(-2.147)	(-1.874)	(-2.009)	(-1.310)
open_res	0.00892***	0.00889***	0.00950***	0.00419
	(3.598)	(3.543)	(3.626)	(1.312)
fdi	0.125**	0.123**	0.126**	0.162***
	(2.563)	(2.342)	(2.606)	(3.219)
fin_cr	-2.645***	-2.802***	-2.837***	-2.581***
	(-6.019)	(-6.544)	(-6.615)	(-6.247)
fraser	1.145***	1.097***	1.168***	1.197***
	(2.776)	(2.659)	(2.914)	(3.555)
fraser2	-0.0567***	-0.0528***	-0.0568***	-0.0674***
	(-3.288)	(-2.939)	(-3.251)	(-4.471)
pol_res	-0.253**	-0.270**	-0.276**	-0.201*
	(-2.262)	(-2.494)	(-2.588)	(-1.968)
pol_res*fraser	0.0231**	0.0240***	0.0248***	0.0175*
	(2.448)	(2.632)	(2.777)	(1.959)
cme_all	1.491			
	(0.855)			
lib_all	-2.550			
	(-1.496)			
nordic		4.157**	3.799**	
		(2.610)	(2.349)	
lib		-4.127**	-4.678**	-7.260***
		(-2.233)	(-2.492)	(-3.718)
cont			-0.770**	-0.914***
			(-2.057)	(-2.753)
mme				-0.778***
				(-3.076)
cme_ee				-1.086**
				(-2.194)
lib_ee				-3.094*
				(-1.797)
afr				-6.108***
				(-4.982)
asia				1.540***
				(2.905)
latin				-6.178***
				(-2.976)
cme_all*fraser	-0.225			
	(-1.514)			
lib_all*fraser	0.191			
	(1.495)			
nordic*fraser		-0.378**	-0.367**	
		(-2.563)	(-2.491)	
lib*fraser		0.345**	0.372***	0.601***
		(2.464)	(2.646)	(4.136)
cont*fraser				
mme*fraser				
cme_ee*fraser				
lib_ee*fraser				0.235*
				(1.957)
afr*fraser				0.434***
				(4.609)
asia*fraser				
latin*fraser				0.500***
				(2.919)
constant	-2.194	-1.627	-2.071	0.600
	(-0.814)	(-0.638)	(-0.823)	(0.264)
Observations	654	654	654	654
R-squared	0.410	0.406	0.409	0.464

Note: The table provides pooled OLS estimations for the extended model (see text). Robust t-statistics in parentheses.

*** Indicates significance at 1% level, ** at 5% level, * at 10% level

Appendix

Robustness checks

As a main robustness check, a 2-stage least squares (2sls) estimation was carried out. Our main motivations was the idea of using appropriate instrumental variables to consistently estimate an equation in which the regressors are possibly correlated with the error term owing to endogeneity in the regressor, measurement error or omitted variables. In our case, the investment share measured by gross fixed capital formation (*gfcf*) and foreign direct investment (*fdi*) are prone to be affected by the growth rate of GDP, and in order to account for the possible endogeneity bias we adopt an instrumental variable approach. Within 2SLS we use both the one-period lagged average value of the investment rate and foreign direct investment as instruments, while the F-statistics of the test for weak instruments show that the correlation between the endogenous variables and the instrument is strong enough. Concerning the assumed endogeneity of the investment and the FDI variable, the robust Hausman test-statistics indeed validate the expectation and confirm the advantage of the IV approach relative to OLS. According to Staiger and Stock (1997), the F-statistics of instrumental variables (first stage) should be larger than 10 to ensure that the maximum bias in IV estimators is less than 10%. This requirement is fulfilled in each estimation. The detailed results are provided in the Appendix, Tables 1 and 2, below. Our main findings regarding government activity and economic growth continue to hold.

Further robustness checks have been carried out to validate our results. Firstly, to estimate a balanced model, we have limited the period to observations after 1995. Since we follow a general-to-specific approach in our main estimations, we have also considered a comparison of the econometric results with an inclusion of a full set of regional dummies, a full set of VoC dummies and a full set of all dummies as benchmark models. In both cases, in order to save space the estimation results are not provided but are available upon request.

Appendix Table 1: Government activity, institutions and growth – basic model (two-stage least squares, 1971 – 2010) basic model – IV estimation

Variables	(1) gdpg	(2) gdpg	(3) gdpg	(4) gdpg
lgdppcini	-5.094***	-5.033***	-0.380***	-0.300***
	(-6.47)	(-6.10)	(-4.65)	(-2.79)
popg	0.738**	0.785***	0.285*	0.305*
	(2.57)	(2.90)	(1.67)	(1.78)
gfcf	-0.136*	-0.164**	0.0428	0.0378
	(-1.81)	(-2.05)	(1.16)	(1.01)
inf	-0.00390**	-0.00357**	-0.00376***	-0.00355**
	(-2.19)	(-1.98)	(-2.58)	(-2.47)
open_res	0.0318***	0.0336***	0.0177***	0.0178***
	(2.89)	(2.98)	(3.79)	(3.77)
fdi	0.0122	0.0192	0.00498	0.0236
	(0.06)	(0.10)	(0.05)	(0.22)
fin_cr	-3.007***	-2.991***	-3.158***	-3.109***
	(-6.58)	(-6.55)	(-7.34)	(-7.34)
fraser	0.666*	0.897**	0.795**	1.062***
	(1.80)	(2.26)	(2.05)	(2.67)
fraser2	-0.0353**	-0.0375**	-0.0507***	-0.0512***
	(-2.18)	(-2.24)	(-2.94)	(-3.02)
pol	-0.170		-0.213**	
	(-1.41)		(-2.06)	
*pol*fraser*	0.0175*		0.0214**	
	(1.68)		(2.54)	
pol_res		-0.376**		-0.323***
		(-2.41)		(-2.79)
*pol_res*fraser*		0.0338**		0.0296***
		(2.54)		(3.08)
Observations	617	617	621	621
R-squared	0.2610	0.2610	0.3342	0.3362
F-Test	13.96	14.22		
Wald chi2			285.80	298.28
Number of country	107	107	111	111
Kleibergen-Paap F	5.779	5.779		
1st Stage F gfcf			47.48	48.09
1st Stage F fdi			31.43	36.94

Note: The table provides fixed effects estimations (Eq. 1 and 2) and pooled OLS estimations (Eq. 3 and 4) for the basic model (see text, Section 3). Lagged values for *gfcf* and *fdi* were used as instruments (see text). Robust t-statistics in parentheses.
*** Indicates significance at 1% level, ** at 5% level, * at 10% level.

Appendix Table 2: Government activity, economic systems and growth – extended model (two-stage least squares with IV, 1971 – 2010)

Variables	(1) gdpg	(2) gdpg	(3) gdpg	(4) gdpg
lgdppcini	-4.865***	-4.999***	-0.232*	-0.305**
	(-5.93)	(-6.05)	(-1.71)	(-2.16)
popg	0.832***	0.798***	0.293*	0.388**
	(2.99)	(2.88)	(1.70)	(2.11)
gfcf	-0.184**	-0.171**	0.0273	-0.0143
	(-2.18)	(-2.12)	(0.71)	(-0.37)
inf	-0.00297*	-0.00348*	-0.00386***	-0.00338**
	(-1.65)	(-1.91)	(-2.64)	(-2.04)
open_res	0.0365***	0.0334***	0.0196***	0.0126**
	(3.13)	(2.94)	(4.03)	(2.35)
fdi	0.0882	0.0234	0.0257	0.0861
	(0.46)	(0.12)	(0.25)	(0.80)
fin_cr	-2.663***	-2.973***	-3.163***	-2.961***
	(-5.96)	(-6.52)	(-7.43)	(-7.08)
fraser	1.484***	1.000**	1.290***	1.346***
	(3.23)	(2.38)	(3.19)	(3.50)
fraser2	-0.0608***	-0.0419**	-0.0633***	-0.0721***
	(-3.23)	(-2.33)	(-3.66)	(-4.24)
pol_res	-0.440**	-0.388**	-0.334***	-0.230**
	(-2.52)	(-2.43)	(-2.92)	(-2.04)
pol_res*fraser	0.0397***	0.0348**	0.0311***	0.0220**
	(2.69)	(2.57)	(3.28)	(2.31)
cme_all	-0.607***			
	(-3.29)			
lib_all				
Nordic			4.345**	2.910
			(2.22)	(1.23)
Lib			-3.555*	-5.241**
			(-1.78)	(-2.23)
Cont			-1.352***	-1.558***
			(-3.34)	(-3.16)
Mme				-0.872**
				(-2.14)
cme_ee				-0.863
				(-1.63)
lib_ee				-2.914
				(-1.26)
afr				-4.642***
				(-2.91)
asia				7.955***
				(3.86)
latin				-4.249**
				(-2.03)
cme_all*fraser				
lib_all*fraser	-0.0331			
	(-0.21)			
nordic*fraser		-0.636***	-0.454**	-0.350*
		(-2.96)	(-2.52)	(-1.68)
lib*fraser		0.117	0.267*	0.408**
		(0.81)	(1.81)	(2.42)
cont*fraser				
mme*fraser				
cme_ee*fraser				0.242
				(1.48)
lib_ee*fraser				
afr*fraser				0.301**
				(2.43)
easia*fraser				-0.447***
				(-2.67)
latin*fraser				0.330*
				(1.92)
Observations	617	617	621	621
R-squared	0.2490	0.2336	0.3407	0.3918
F-Test	14.13	13.28		
Wald chi2			340.44	766.36
Number of country	107	107	111	111
Kleibergen-Paap F	5.855	6.175		
1st Stage F gfcf			41.85	55.49
1st Stage F fdi			37.70	38.42

Note: The table provides pooled OLS estimations for the extended model (see text, Section 3). GFCF and FDI were used as instruments. Robust t-statistics in parentheses.

*** Indicates significance at 1% level, ** at 5% level, * at 10% level