

Supporting Information

to

“Tracing the Link between Government Size and Growth: The Role of Public Sector Quality”

by

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1. Supporting information to section IV.3. Robustness Check 2: Executive Constraints as a Proxy for Public Sector Quality

Table A1a
Alternative indicator of public sector quality: Executive constraints

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
		Trade	Ln (+ inflation)	Life expectancy	Number of conflicts	Institution. democracy	Religion (p-value)	Never a colony	Latitude	Natural resources	Shadow economy	Interpersonal trust	OECD dummy	Scandinavia dummy	Studentized Residuals	Cook's D
Ln GDP pc (initial year)	-0.791*** (0.21)	-0.772*** (0.2)	-0.817*** (0.24)	-1.134*** (0.2)	-0.761*** (0.24)	-0.781*** (0.2)	-0.768*** (0.22)	-0.841*** (0.21)	-0.865*** (0.18)	-0.566*** (0.2)	-0.82*** (0.21)	-0.558*** (0.25)	-0.861*** (0.21)	-0.792*** (0.21)	-0.674*** (0.18)	-0.472*** (0.17)
Secondary school enrollment	0.029*** (0.01)	0.029*** (0.01)	0.028*** (0.01)	0.016** (0.01)	0.028*** (0.01)	0.022** (0.01)	0.029*** (0.01)	0.029*** (0.01)	0.017*** (0.01)	0.021*** (0.01)	0.026*** (0.01)	0.006 (0.01)	0.023*** (0.01)	0.028*** (0.01)	0.026*** (0.01)	0.022*** (0.01)
Gross fixed capital formation	0.229*** (0.05)	0.236*** (0.05)	0.207*** (0.05)	0.166*** (0.04)	0.229*** (0.05)	0.246*** (0.05)	0.21*** (0.05)	0.223*** (0.05)	0.223*** (0.04)	0.252*** (0.04)	0.216*** (0.05)	0.219*** (0.05)	0.229*** (0.05)	0.23*** (0.05)	0.174*** (0.04)	0.201*** (0.04)
Government size (initial year)	-0.135*** (0.04)	-0.124*** (0.04)	-0.149*** (0.04)	-0.099** (0.04)	-0.134*** (0.04)	-0.112*** (0.04)	-0.137*** (0.04)	-0.139*** (0.04)	-0.112*** (0.03)	-0.119*** (0.04)	-0.138*** (0.04)	-0.137*** (0.03)	-0.125*** (0.03)	-0.133*** (0.04)	-0.144*** (0.03)	-0.162*** (0.03)
Executive constraints (initial year)	-0.135 (0.14)	-0.138 (0.14)	-0.159 (0.13)	-0.113 (0.14)	-0.148 (0.14)	-0.234 (0.15)	-0.101 (0.15)	-0.147 (0.14)	-0.009 (0.13)	-0.152 (0.14)	-0.149 (0.13)	-0.22 (0.14)	-0.12 (0.13)	-0.123 (0.14)	-0.174 (0.13)	-0.245* (0.14)
Gov. size x Ex. constraints (initial year)	0.024*** (0.01)	0.024*** (0.01)	0.026*** (0.01)	0.02*** (0.01)	0.024*** (0.01)	0.022*** (0.01)	0.025*** (0.01)	0.025*** (0.01)	0.017*** (0.01)	0.021*** (0.01)	0.023*** (0.01)	0.025*** (0.01)	0.02*** (0.01)	0.023*** (0.01)	0.024*** (0.01)	0.027*** (0.01)
Additional control variables		-0.004 (0.01)	-0.277** (0.13)	0.133*** (0.03)	0.13 (0.19)	0.152* (0.09)	[0.366]	0.549 (0.4)	3.863*** (0.9)	-0.049*** (0.01)	-0.029* (0.02)	3.005** (1.18)	1.068** (0.46)	0.383 (0.33)		
R ²	0.58	0.58	0.61	0.66	0.58	0.60	0.59	0.59	0.65	0.62	0.62	0.59	0.60	0.58	0.55	0.55
Number of observations	82	82	80	82	82	82	82	82	82	82	81	57	82	82	79	76

Notes: Dependent variable is growth. The variables represent the average over the period 1981-2005, unless stated otherwise. The estimations include a constant term, which is omitted for space considerations. All regressions are estimated with OLS. The definitions of the variables can be found in Appendix I. Robust standard errors are in parentheses. *, **, and *** denote significance at the 10, 5 and 1% levels, respectively. Outliers in column 15 are China, Congo (Dem.Rep.) and Ireland. Outliers in columns 16 United Arab Emirates, Australia, China, Congo (Dem.Rep.), Gabon and Zambia. The sample of countries appears in Appendix III.

Table A1b
Marginal effects of government size on growth depending on public sector quality

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Executive constraints = 1	-0.11*** (0.031)	-0.11*** (0.032)	-0.12*** (0.033)	-0.08*** (0.033)	-0.11*** (0.03)	-0.09*** (0.033)	-0.11*** (0.031)	-0.11*** (0.031)	-0.1*** (0.025)	-0.1*** (0.031)	-0.11*** (0.031)	-0.11*** (0.029)	-0.1*** (0.029)	-0.11*** (0.031)	-0.12*** (0.028)	-0.14*** (0.029)
Executive constraints = 2	-0.09*** (0.025)	-0.08*** (0.027)	-0.1*** (0.027)	-0.06*** (0.027)	-0.09*** (0.025)	-0.07*** (0.027)	-0.09*** (0.026)	-0.09*** (0.025)	-0.08*** (0.021)	-0.08*** (0.025)	-0.09*** (0.026)	-0.09*** (0.023)	-0.08*** (0.024)	-0.09*** (0.025)	-0.1*** (0.023)	-0.11*** (0.023)
Executive constraints = 3	-0.06*** (0.02)	-0.05*** (0.023)	-0.07*** (0.021)	-0.04* (0.022)	-0.06*** (0.02)	-0.05*** (0.022)	-0.06*** (0.022)	-0.06*** (0.02)	-0.06*** (0.017)	-0.06*** (0.02)	-0.06*** (0.02)	-0.06*** (0.019)	-0.06*** (0.019)	-0.06*** (0.02)	-0.07*** (0.018)	-0.08*** (0.019)
Executive constraints = 4	-0.04** (0.017)	-0.03 (0.019)	-0.05*** (0.017)	-0.02 (0.018)	-0.04** (0.017)	-0.03 (0.018)	-0.04** (0.02)	-0.04** (0.016)	-0.05*** (0.015)	-0.03** (0.017)	-0.04** (0.017)	-0.04** (0.016)	-0.04** (0.016)	-0.04** (0.017)	-0.05*** (0.014)	-0.05*** (0.015)
Executive constraints = 5	-0.01 (0.015)	-0.01 (0.019)	-0.02 (0.015)	0 (0.016)	-0.01 (0.016)	0 (0.017)	-0.01 (0.021)	-0.01 (0.015)	-0.03* (0.015)	-0.01 (0.016)	-0.02 (0.015)	-0.01 (0.016)	-0.02 (0.015)	-0.02 (0.015)	-0.02* (0.013)	-0.03* (0.014)
Executive constraints = 6	0.01 (0.017)	0.02 (0.02)	0.01 (0.016)	0.02 (0.018)	0.01 (0.018)	0.02 (0.018)	0.01 (0.024)	0.01 (0.016)	-0.01 (0.018)	0.01 (0.018)	0 (0.015)	0.01 (0.018)	0 (0.017)	0.01 (0.017)	0 (0.014)	0 (0.016)
Executive constraints = 7	0.04* (0.021)	0.04* (0.023)	0.03 (0.019)	0.04* (0.021)	0.04* (0.022)	0.04* (0.022)	0.04 (0.029)	0.03* (0.02)	0 (0.022)	0.03 (0.022)	0.03 (0.022)	0.04* (0.022)	0.02 (0.022)	0.03 (0.021)	0.03 (0.017)	0.03 (0.02)

Notes: The estimations correspond to regressions in Table A1a. Robust standard errors are in parentheses. *, **, and *** denote significance at the 10, 5 and 1% level, respectively.

2. Supporting information to section IV.4. Robustness Check 3: Instrumental Variables

Estimation

2.1. Instrumental Variables Estimation

In Tables 3a and 3b we controlled for the endogeneity of government size and bureaucracy quality using the initial values of both variables. Another widely used alternative to deal with the endogeneity problem is via 2SLS. This estimator requires finding variables that meet two conditions before they can be considered as good instruments: 1) relevance: to be relevantly related to the endogenous variable, and 2) exclusion restriction: to have no effect on growth, other than its effect through the endogenous variable. Finding valid instruments solves the endogeneity problem, but this is not an easy task. In fact, demonstrating that instruments fully meet the exclusion restriction is very difficult, if not impossible. In addressing these concerns, we check whether these two conditions are satisfied through the tests of overidentification and underidentification.

Based on previous studies that support the importance of legal traditions in the quality of institutions (e.g., La Porta *et al.*, 1999), in background work we employed legal origin as an instrument for our institutional variable under the assumption that different legal traditions contributed in different ways to build the public administrative system across countries.¹ In addition, we used the initial value of government size and its interaction with legal origin as instruments for government size and the interaction term, respectively. The results appeared in line with those obtained above and were robust to adding additional controls as well as to removing outliers. All regressions passed the underidentification and overidentification tests, thus supporting the validity of the instruments.

However, we were not totally convinced by the identification strategy since, for instance, legal origin may not only affect bureaucracy quality, but also some other omitted variable such as financial development, which is thought to be an important driver of economic growth. Under these circumstances, the exclusion restriction would not be met. A way to address this problem is by including an additional control variable –private credit over GDP²– as a proxy for financial development. As pointed out by Acemoglu (2005, p. 1031), it is recommended to include covariates in the first and second stages such that the covariance between the instruments and the error term in the second stage conditioned on the exogenous control set is zero, and the exclusion restriction may

¹ Many papers use legal origin as instrument for institutions (see, among others, Acemoglu and Johnson, 2005; Glaeser *et al.*, 2004; Ahlerup *et al.*, 2009).

² Private credit represents private credit by deposit money banks and other non-bank financial institutions over GDP and is obtained from Beck *et al.* (2010).

then be met. However, since it is questionable that financial development is strictly exogenous, we are not totally satisfied with this identification strategy either. Notwithstanding, the results from the estimation of these models are provided in Table A2 and appear totally in line with those obtained with OLS. Again, the underidentification and overidentification tests appear to back up the validity of the instruments.

The final avenue we took to deal with the endogeneity issue was to instrument for the average of government size, bureaucracy quality and their interaction over the period 1981-2005 with their initial values and respective interaction. Since initial values of government size and bureaucracy quality (which we use in OLS regressions) are likely to vary over time, these 2SLS regressions that incorporate the average of both variables as measures of their structural values will serve as a good complement to the baseline OLS regressions. Compared to the results from OLS estimations (Table 3b), Table A3b shows that the negative marginal effect of government size is now greater. For example, comparing column 1 of both tables (reference model), the coefficient changes from -0.11 to -0.24 when bureaucracy quality is 0 and from -0.07 to -0.18 when bureaucracy quality is 1. With a level of quality equal to 2, most regressions report a statistically significant negative coefficient. Still, we can confirm that the negative marginal effect of government size again becomes statistically insignificant as bureaucracy quality rises. In fact, Table A3b reports that for almost all specifications the marginal effect is not significant when bureaucracy quality is equal to 3. The same occurs for all specifications when the score is 4. It is worth noting that according to column 1 the effect becomes insignificant when going from a quality score of 2 to 3. More specifically, we calculate that the effect becomes insignificant when public sector quality is equal to 2.7 (coefficient= -0.06; Std. Err.= 0.04). Over 30% of the countries in our sample have higher bureaucracy quality than this value. Therefore, for these countries there is no statistically significant relationship between government size and growth. With regard to the validity of the instruments, Table A3a shows that all regressions pass the underidentification test, as we reject the null hypothesis that the equation is underidentified; so the excluded instruments are relevant.³

³ The overidentification test is omitted by default from Table A3a since the model is perfectly identified with the final set of instruments employed, as there are as many excluded instruments as included endogenous regressors (see Baum *et al.*, 2010).

Table A2a

2SLS using legal origins and initial values of government size as instruments

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Ln GDP pc (initial year)	-0.713*** (0.22)	-0.727*** (0.22)	-0.727*** (0.22)	-1.319*** (0.22)	-0.651*** (0.23)	-0.753*** (0.2)	-0.758*** (0.26)	-0.719*** (0.22)	-0.805*** (0.2)	-0.571** (0.22)	-0.666*** (0.22)	-0.551** (0.25)	-0.763*** (0.21)	-0.709*** (0.23)	-0.646*** (0.21)	-0.638*** (0.19)
Secondary school enrollment	0.021** (0.01)	0.021** (0.01)	0.023** (0.01)	0.004 (0.01)	0.022** (0.01)	0.013 (0.01)	0.022** (0.01)	0.022** (0.01)	0.015** (0.01)	0.011 (0.01)	0.022*** (0.01)	0.011 (0.01)	0.02** (0.01)	0.022** (0.01)	0.017** (0.01)	0.016** (0.01)
Gross fixed capital formation	0.163*** (0.05)	0.16*** (0.05)	0.152*** (0.05)	0.101** (0.05)	0.161*** (0.05)	0.173*** (0.05)	0.166*** (0.05)	0.16*** (0.05)	0.165*** (0.05)	0.188*** (0.05)	0.175*** (0.05)	0.138** (0.05)	0.165*** (0.05)	0.161*** (0.06)	0.126*** (0.04)	0.153*** (0.04)
Government size	-0.248** (0.1)	-0.265** (0.11)	-0.236** (0.1)	-0.215** (0.1)	-0.232** (0.1)	-0.197** (0.09)	-0.307** (0.12)	-0.238** (0.1)	-0.244** (0.11)	-0.214* (0.11)	-0.266** (0.11)	-0.234 (0.16)	-0.277** (0.11)	-0.237 (0.15)	-0.268*** (0.09)	-0.279*** (0.08)
Bureaucracy quality	-0.627 (1.02)	-0.617 (1.01)	-0.509 (0.98)	-0.002 (1.05)	-0.681 (1.06)	0.141 (0.91)	-1.05 (0.87)	-0.558 (0.99)	-0.218 (0.97)	0.258 (0.96)	-0.928 (1.07)	-0.65 (1.08)	-0.514 (0.98)	-0.573 (1.17)	-0.156 (0.77)	0.332 (0.82)
Gov.size x Bur. quality	0.074* (0.04)	0.078** (0.04)	0.069* (0.04)	0.064 (0.04)	0.072* (0.04)	0.05 (0.04)	0.107*** (0.04)	0.07* (0.04)	0.065 (0.04)	0.052 (0.04)	0.083** (0.04)	0.067 (0.06)	0.081** (0.04)	0.07 (0.06)	0.061* (0.05)	0.054* (0.03)
Private credit	1.205 (0.86)	1.106 (0.95)	0.987 (0.87)	0.815 (0.76)	1.038 (0.9)	0.18 (0.83)	1.042 (1.03)	1.175 (0.85)	0.486 (0.83)	-0.074 (0.75)	1.288 (0.81)	0.875 (0.92)	0.967 (0.79)	1.21 (0.86)	1.15* (0.66)	0.301 (0.65)
Control variables	0.002 (0)	-0.099 (0.18)	-0.099 (0.18)	0.145*** (0.03)	0.292 (0.21)	0.111* (0.06)	[0.720]	0.061 (0.4)	2.422** (0.95)	-0.042** (0.02)	-0.006 (0.02)	0.989 (1.35)	0.081 (0.84)	0.063 (0.56)		
Underidentification test	0.05	0.06	0.05	0.09	0.06	0.04	0.08	0.04	0.08	0.11	0.04	0.25	0.10	0.17	0.09	0.06
Overidentification test	0.90	0.91	0.86	0.55	0.93	0.71	0.66	0.89	0.25	0.57	0.89	0.71	0.77	0.9023	0.88	0.65
Centered R ²	0.51	0.51	0.52	0.62	0.51	0.55	0.48	0.51	0.57	0.55	0.51	0.53	0.51	0.51	0.59	0.63
Number of observations	80	80	79	80	79	77	79	80	79	80	79	56	80	80	76	73

First stage statistics:

- Government size

Partial R² of excluded instr.

Signif. test of excluded instr.

- Bureaucracy quality

Partial R² of excluded instr.

Signif. test of excluded instr.

- Gov.size x Bur. quality

Partial R² of excluded instr.

Signif. test of excluded instr.

Notes: Dependent variable is growth. The variables represent the average over the period 1981-2005, unless stated otherwise. The estimations include a constant term, which is omitted for space considerations. All regressions are estimated with 2SLS. The endogenous variables are Government size, Bureaucracy Quality and Gov.size x Bur. Quality, and the instrument are Government size in 1981, legal origin, and Gov.size in 1981 x legal origin. Small sample correction is applied. The definitions of the variables can be found in Appendix I. Legal origin variables come from La Porta et al. (1999) (in Teorell et al., 2011). Private credit represents private credit by deposit money banks and other non-bank financial institutions over GDP (from Beck, Demirgüç-Kunt, and Levine, 2010). Robust standard errors appear in parentheses. *, **, and *** denote significance at the 10, 5 and 1% level, respectively. Outliers in column 15 are Brunei, Switzerland, Congo (Dem. Rep.) and Ireland. Outliers in column 16 are Australia, Brunei, Switzerland, Gongo (Dem. Rep.), Gabon, Israel and Panama.

Table A2b
Marginal effects of government size on growth depending on public sector quality

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Bureaucracy quality = 0	-0.25** (0.101)	-0.26** (0.108)	-0.24** (0.102)	-0.22** (0.105)	-0.23** (0.097)	-0.2** (0.095)	-0.31** (0.122)	-0.24** (0.104)	-0.24** (0.109)	-0.21* (0.107)	-0.27** (0.107)	-0.23 (0.161)	-0.28** (0.106)	-0.24 (0.148)	-0.27** (0.086)	-0.28** (0.08)
Bureaucracy quality = 1	-0.17** (0.069)	-0.19** (0.077)	-0.17** (0.07)	-0.15** (0.07)	-0.16** (0.067)	-0.15** (0.063)	-0.2** (0.09)	-0.17** (0.071)	-0.18** (0.071)	-0.16** (0.07)	-0.18** (0.073)	-0.17 (0.106)	-0.2*** (0.07)	-0.17* (0.094)	-0.21*** (0.059)	-0.22*** (0.053)
Bureaucracy quality = 2	-0.1** (0.048)	-0.11* (0.056)	-0.1** (0.049)	-0.09* (0.045)	-0.09* (0.047)	-0.1** (0.038)	-0.09 (0.062)	-0.1** (0.048)	-0.11*** (0.041)	-0.11*** (0.039)	-0.1** (0.048)	-0.1* (0.056)	-0.12** (0.042)	-0.1* (0.052)	-0.15*** (0.036)	-0.17*** (0.034)
Bureaucracy quality = 3	-0.02 (0.052)	-0.03 (0.057)	-0.03 (0.052)	-0.02 (0.049)	-0.01 (0.052)	-0.05 (0.04)	0.01 (0.05)	-0.03 (0.052)	-0.05 (0.046)	-0.06 (0.04)	-0.02 (0.05)	-0.03 (0.037)	-0.03 (0.044)	-0.03 (0.058)	-0.09** (0.034)	-0.12*** (0.037)
Bureaucracy quality = 4	0.05 (0.078)	0.05 (0.079)	0.04 (0.077)	0.04 (0.077)	0.06 (0.076)	0 (0.065)	0.12* (0.063)	0.04 (0.078)	0.02 (0.078)	0 (0.071)	0.07 (0.077)	0.03 (0.078)	0.05 (0.073)	0.04 (0.104)	-0.03 (0.054)	-0.06 (0.059)

Notes: The estimations correspond to regressions in Table A2a. Robust standard errors are in parentheses. *, **, and *** denote significance at the 10, 5 and 1% level, respectively.

Table A2c

2SLS using legal origins and initial values of government size as instruments. First stage: Government Size

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Ln GDP pc (initial year)	1.342** (0.63)	1.361** (0.63)	1.09 (0.66)	1.998*** (0.74)	1.414** (0.61)	0.899* (0.45)	1.361** (0.6)	1.278* (0.65)	1.462** (0.63)	0.604 (0.44)	1.35** (0.65)	0.878 (0.88)	1.376** (0.66)	1.343** (0.64)	0.74 (0.48)	0.627 (0.55)
Secondary school enrollment	0.017 (0.02)	0.016 (0.02)	0.03 (0.02)	0.035* (0.02)	0.009 (0.02)	0.039** (0.02)	0.019 (0.02)	0.019 (0.02)	0.011 (0.02)	0.035* (0.02)	0.017 (0.02)	0.032 (0.03)	0.021 (0.02)	0.017 (0.02)	0.034** (0.02)	0.042** (0.02)
Gross fixed capital formation	0.021 (0.07)	0.029 (0.07)	-0.03 (0.08)	0.093 (0.08)	0.032 (0.08)	-0.04 (0.07)	-0.024 (0.08)	0.015 (0.07)	0.022 (0.08)	-0.083 (0.08)	0.002 (0.07)	-0.018 (0.12)	0.007 (0.07)	0.021 (0.07)	-0.02 (0.07)	-0.015 (0.09)
Government size (initial year)	0.987** (0.48)	1.006** (0.48)	1.079** (0.49)	0.985* (0.58)	0.981** (0.49)	0.874** (0.42)	0.944** (0.47)	0.985** (0.47)	0.972** (0.48)	0.875** (0.44)	0.97** (0.47)	0.909* (0.49)	0.922** (0.45)	0.988** (0.48)	0.902** (0.43)	0.896** (0.43)
English Common Law	8.496 (5.95)	8.651 (5.97)	8.828 (6.14)	8.209 (7.19)	8.698 (6.11)	5.782 (4.86)	7.247 (5.8)	8.502 (5.94)	8.145 (5.91)	5.815 (5.14)	8.543 (5.91)	6.399 (6.07)	7.511 (5.47)	8.487 (5.99)	5.646 (5.16)	5.741 (5.14)
French Commercial Code	4.442 (5.53)	4.516 (5.54)	6.201 (5.8)	4.237 (6.88)	4.228 (5.74)	4.295 (4.83)	4.927 (5.55)	4.407 (5.49)	3.557 (5.78)	3.252 (5.05)	3.985 (5.53)	3.095 (5.71)	3.565 (5.25)	4.438 (5.57)	3.896 (5.02)	4.126 (4.95)
German and Scandinavian Commercial Code	2.501 (5.87)	2.408 (5.83)	3.83 (6.12)	1.309 (7.12)	0.704 (6.05)	-0.483 (5.21)	0.625 (5.89)	2.532 (5.82)	0.271 (6.13)	1.166 (5.39)	2.703 (5.86)	1.642 (6.05)	2.09 (5.51)	2.742 (5.9)	2.874 (5.37)	3.19 (5.31)
Government size (initial year) x English Common Law	-0.551 (0.49)	-0.567 (0.49)	-0.625 (0.5)	-0.574 (0.59)	-0.578 (0.5)	-0.379 (0.42)	-0.516 (0.48)	-0.549 (0.49)	-0.566 (0.5)	-0.407 (0.44)	-0.54 (0.49)	-0.424 (0.5)	-0.473 (0.47)	-0.551 (0.5)	-0.368 (0.44)	-0.354 (0.43)
Government size (initial year) x French Commercial Code	-0.396 (0.48)	-0.41 (0.48)	-0.543 (0.49)	-0.404 (0.58)	-0.406 (0.49)	-0.354 (0.42)	-0.455 (0.47)	-0.396 (0.48)	-0.383 (0.49)	-0.306 (0.44)	-0.365 (0.48)	-0.284 (0.49)	-0.323 (0.46)	-0.396 (0.48)	-0.321 (0.43)	-0.32 (0.43)
Government size (initial year) x German and Scandinavian CC	-0.252 (0.48)	-0.261 (0.49)	-0.381 (0.5)	-0.236 (0.58)	-0.2 (0.49)	-0.074 (0.42)	-0.232 (0.48)	-0.274 (0.48)	-0.179 (0.49)	-0.137 (0.44)	-0.247 (0.48)	-0.162 (0.52)	-0.191 (0.46)	-0.274 (0.49)	-0.21 (0.44)	-0.21 (0.43)
Private credit	-1.821 (1.72)	-1.743 (1.66)	-2.222 (1.72)	-1.562 (1.6)	-0.736 (1.54)	0.847 (1.28)	-0.135 (1.48)	-2.02 (1.76)	-0.599 (1.53)	0.348 (1.37)	-1.849 (1.7)	-0.843 (2.34)	-1.568 (1.69)	-1.808 (1.74)	-0.767 (1.49)	-0.999 (1.72)
Control variables	-0.003 (0.01)	-0.523 (0.39)	-0.198*** (0.07)	-0.087 (0.33)	-0.087 (0.33)	-0.276* (0.15)	[0.102]	0.876 (1.11)	-1.384 (2.81)	0.104** (0.05)	0.009 (0.03)	-0.624 (4.4)	-0.776 (1.37)	0.384 (1.2)		
R ²	0.79	0.79	0.8	0.81	0.8	0.85	0.82	0.79	0.8	0.81	0.79	0.84	0.79	0.79	0.83	0.81
Number of observations	80	80	79	80	79	77	79	80	79	80	79	56	80	80	76	73
Partial R ² of excluded instr.	0.69	0.68	0.67	0.69	0.69	0.75	0.64	0.69	0.69	0.71	0.68	0.72	0.69	0.67	0.74	0.71
Signif. test of excluded intr.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Notes: Dependent variable is government size. The variables represent the average over the period 1981-2005, unless stated otherwise. The estimations include a constant term, which is omitted for space considerations. All regressions are estimated with OLS. The definitions of the variables can be found in Appendix I. Legal origin variables come from La Porta et al. (1999) (in Teorell et al., 2011). Private credit represents private credit by deposit money banks and other non-bank financial institutions over GDP (from Beck, Demirgüç-Kunt, and Levine, 2010). Robust standard errors: appear in parentheses; *, **, and *** denote significance at the 10, 5 and 1% level, respectively. Outliers in column 15 are Brunei, Switzerland, Congo (Dem. Rep.) and Ireland. Outliers in column 16 are Australia, Brunei, Switzerland, Congo (Dem. Rep.), Gabon, Israel and Panama.

Table A2d
2SLS using legal origins and initial values of government size as instruments. First stage: Bureaucracy quality

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	Trade	Ln(1+ inflation)	Life expectancy	Number of conflicts	Institution. democracy	Religion (p-value)	Never a colony	Latitude	Natural resources	Shadow economy	Interpersonal trust	OECD dummy	Scandinavia dummy	Studentized Residuals	Cook's D	
Ln GDP pc (initial year)	0.313*** (0.1)	0.346*** (0.09)	0.296*** (0.1)	0.308** (0.12)	0.374*** (0.09)	0.319*** (0.11)	0.334*** (0.09)	0.305*** (0.1)	0.309*** (0.09)	0.435*** (0.1)	0.255** (0.1)	0.163 (0.15)	0.266*** (0.08)	0.313*** (0.1)	0.324*** (0.11)	0.288** (0.13)
Secondary school enrollment	0.006 (0)	0.004 (0)	0.007 (0)	0.006 (0)	0.004 (0)	0.002 (0)	0.003 (0)	0.007 (0)	0.004 (0)	0.003 (0)	0.005 (0)	0.015*** (0.01)	0.001 (0)	0.006 (0)	0.006 (0.01)	0.006 (0.01)
Gross fixed capital formation	0.008 (0.02)	0.022 (0.02)	0.004 (0.02)	0.008 (0.02)	0.008 (0.02)	0.02 (0.02)	0.023 (0.02)	0.008 (0.02)	0.015 (0.02)	0.026 (0.02)	-0.003 (0.02)	0.001 (0.02)	0.027 (0.02)	0.008 (0.02)	0.009 (0.02)	-0.005 (0.02)
Government size (initial year)	-0.029 (0.13)	0.002 (0.14)	-0.019 (0.12)	-0.029 (0.13)	-0.03 (0.12)	-0.022 (0.12)	-0.021 (0.12)	-0.029 (0.13)	-0.025 (0.13)	-0.011 (0.12)	-0.016 (0.12)	-0.054 (0.13)	0.059 (0.08)	-0.029 (0.13)	-0.028 (0.13)	-0.042 (0.13)
English Common Law	0.323 (1.68)	0.583 (1.84)	0.372 (1.66)	0.325 (1.71)	0.16 (1.62)	0.434 (1.6)	0.621 (1.57)	0.324 (1.71)	0.628 (1.69)	0.768 (1.63)	0.514 (1.59)	0.427 (1.87)	1.651* (0.97)	0.325 (1.69)	0.364 (1.7)	0.14 (1.72)
French Commercial Code	-0.595 (1.67)	-0.471 (1.82)	-0.445 (1.65)	-0.593 (1.69)	-0.77 (1.61)	-0.721 (1.58)	-0.527 (1.59)	-0.599 (1.69)	-0.276 (1.63)	-0.397 (1.62)	-0.232 (1.58)	-0.476 (1.82)	0.588 (0.95)	-0.594 (1.68)	-0.594 (1.67)	-0.798 (1.67)
German and Scandinavian Commercial Code	0.091 (1.71)	-0.065 (1.84)	0.246 (1.69)	0.099 (1.75)	-0.261 (1.66)	-0.263 (1.62)	-0.146 (1.59)	0.095 (1.73)	0.033 (1.71)	0.312 (1.65)	0.222 (1.62)	-0.094 (0.89)	0.645 (0.98)	0.053 (1.73)	0.149 (1.7)	-0.01 (1.71)
Government size (initial year) x English Common Law	0.033 (0.13)	0.005 (0.14)	0.024 (0.12)	0.033 (0.13)	0.031 (0.12)	0.018 (0.12)	0.01 (0.12)	0.033 (0.13)	0.022 (0.13)	0.009 (0.12)	0.016 (0.12)	0.046 (0.14)	-0.072 (0.08)	0.033 (0.13)	0.029 (0.13)	0.042 (0.13)
Government size (initial year) x French Commercial Code	0.057 (0.13)	0.034 (0.14)	0.043 (0.12)	0.057 (0.13)	0.057 (0.12)	0.056 (0.12)	0.054 (0.12)	0.057 (0.13)	0.043 (0.13)	0.042 (0.12)	0.033 (0.12)	0.068 (0.13)	-0.041 (0.08)	0.057 (0.13)	0.056 (0.13)	0.072 (0.13)
Government size (initial year) x German and Scandinavian CC	0.052 (0.13)	0.037 (0.14)	0.037 (0.12)	0.052 (0.13)	0.059 (0.12)	0.054 (0.12)	0.038 (0.12)	0.049 (0.13)	0.047 (0.13)	0.033 (0.12)	0.036 (0.12)	0.068 (0.14)	-0.031 (0.08)	0.055 (0.13)	0.048 (0.13)	0.059 (0.13)
Private credit	0.509* (0.27)	0.64*** (0.24)	0.448 (0.29)	0.508* (0.27)	0.684*** (0.25)	0.573*** (0.27)	0.65*** (0.23)	0.485* (0.29)	0.607*** (0.25)	0.15 (0.27)	0.374 (0.31)	0.73*** (0.35)	0.169 (0.23)	0.507* (0.27)	0.497* (0.29)	0.7*** (0.31)
Control variables	-0.005*** (0)	-0.051 (0.09)	-0.051 (0.09)	0.001 (0.02)	0.244*** (0.07)	0.052* (0.03)	[0.060]	0.108 (0.18)	0.803 (0.53)	-0.017*** (0.01)	-0.021*** (0.01)	0.336 (0.69)	1.046*** (0.25)	-0.061 (0.23)		
R ²	0.76	0.78	0.76	0.76	0.78	0.77	0.78	0.76	0.77	0.77	0.79	0.82	0.81	0.76	0.73	0.74
Number of observations	80	80	79	80	79	77	79	80	79	80	79	56	80	80	76	73
Partial R ² of excluded instr.	0.22	0.26	0.18	0.21	0.21	0.23	0.15	0.21	0.22	0.26	0.19	0.21	0.25	0.19	0.21	0.19
Signif. test of excluded instr.	0.00	0.00	0.03	0.00	0.00	0.00	0.10	0.00	0.01	0.00	0.00	0.07	0.00	0.01	0.00	0.01

Notes: Dependent variable is bureaucracy quality. The variables represent the average over the period 1981-2005, unless stated otherwise. The estimations include a constant term, which is omitted for space considerations. All regressions are estimated with OLS. The definitions of the variables can be found in Appendix I. Legal origin variables come from La Porta et al. (1999) (in Teorell et al., 2011). Private credit represents private credit by deposit money banks and other non-bank financial institutions over GDP (from Beck, Demirgüç-Kunt, and Levine, 2010). Robust standard errors appear in parentheses. *, **, and *** denote significance at the 10, 5 and 1% level, respectively. Outliers in column 15 are Brunei, Switzerland, Congo (Dem. Rep.) and Ireland. Outliers in column 16 are Australia, Brunei, Switzerland, Congo (Dem. Rep.), Gabon, Israel and Panama.

Table A2e
2SLS using legal origins and initial values of government size as instruments. First stage: Government Size x Bureaucracy Quality

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	Trade	Ln(1+ inflation)	Life expectancy	Number of conflicts	Institution. democracy	Religion (p-value)	Never a colony	Latitude	Natural resources	Shadow economy	Interpersonal trust	OECD dummy	Scandinavia dummy	Scandinavia dummy	Studentized Residuals	Cook's D
Ln GDP pc (initial year)	8.235*** (2.2)	8.918*** (2.08)	7.304*** (2.53)	9.495*** (2.33)	9.564*** (1.94)	6.904*** (2.09)	8.877*** (2.04)	8.01*** (2.32)	8.358*** (2.14)	8.746*** (2.32)	7.28*** (2.35)	3.976 (2.44)	7.383*** (2.17)	8.234*** (2.22)	6.827*** (2.27)	5.857*** (2.47)
Secondary school enrollment	0.161* (0.1)	0.12 (0.09)	0.209* (0.11)	0.195* (0.1)	0.086 (0.09)	0.135 (0.09)	0.112 (0.1)	0.167* (0.1)	0.079 (0.09)	0.148 (0.1)	0.135 (0.09)	0.336*** (0.11)	0.06 (0.09)	0.161* (0.1)	0.196* (0.1)	0.219* (0.12)
Gross fixed capital formation	-0.227 (0.37)	0.066 (0.39)	-0.422 (0.41)	-0.089 (0.38)	-0.195 (0.36)	-0.172 (0.38)	-0.146 (0.38)	-0.245 (0.37)	-0.058 (0.37)	-0.155 (0.39)	-0.41 (0.36)	-0.439 (0.59)	0.113 (0.33)	-0.227 (0.37)	-0.308 (0.43)	-0.549 (0.46)
Government size (initial year)	1.432 (1.56)	2.073 (1.73)	1.799 (1.51)	1.429 (1.62)	1.402 (1.62)	1.233 (1.47)	1.318 (1.59)	1.425 (1.57)	1.511 (1.6)	1.51 (1.57)	1.647 (1.62)	0.816 (1.44)	3.035 (1.96)	1.432 (1.57)	1.235 (1.51)	0.952 (1.5)
English Common Law	20.161 (17.83)	25.553 (19.68)	21.563 (17.35)	19.611 (18.1)	17.727 (17.65)	13.986 (16.72)	20.826 (18.15)	20.183 (18.13)	26.973 (18.12)	22.02 (17.87)	23.292 (18.28)	13.115 (18.93)	44.243* (22.96)	20.163 (17.96)	12.893 (17.34)	13.07 (17.74)
French Commercial Code	-1.562 (16.58)	0.999 (18.41)	5.169 (16.41)	-1.958 (16.78)	-5.399 (16.82)	-4.566 (15.73)	0.669 (16.78)	-1.689 (16.76)	4.605 (16.91)	-0.737 (16.68)	4.524 (16.89)	-4.177 (17.17)	19.903 (21.8)	-1.562 (16.7)	-3.276 (16.37)	-6.72 (16.05)
German and Scandinavian Commercial Code	-12.867 (20.01)	-16.106 (20.72)	-7.519 (19.77)	-15.156 (20.15)	-24.407 (19.95)	-28.161 (18.78)	-23.305 (19.42)	-12.757 (20.16)	-18.361 (19.75)	-11.941 (20.01)	-10.758 (20.5)	-18.287 (19.97)	-2.817 (23.25)	-12.912 (20.43)	-8.631 (19.13)	-10.95 (19.35)
Government size (initial year) x English Common Law	-0.308 (1.62)	-0.891 (1.78)	-0.609 (1.58)	-0.354 (1.69)	0.306 (1.66)	-0.067 (1.54)	-0.472 (1.68)	-0.303 (1.64)	-0.6 (1.66)	-0.408 (1.64)	-0.58 (1.7)	0.432 (1.56)	-2.217 (2.01)	-0.308 (1.64)	0.13 (1.58)	0.11 (1.6)
Government size (initial year) x French Commercial Code	0.33 (1.6)	-0.151 (1.77)	-0.244 (1.56)	0.315 (1.65)	0.306 (1.65)	0.451 (1.51)	0.228 (1.63)	0.329 (1.61)	0.004 (1.63)	0.268 (1.61)	-0.081 (1.66)	0.903 (1.52)	-1.447 (2.05)	0.33 (1.61)	0.517 (1.55)	0.818 (1.864)
Government size (initial year) x German and Scandinavian CC	1.704 (1.61)	1.396 (1.75)	1.189 (1.59)	1.734 (1.67)	1.983 (1.67)	2.257 (1.52)	1.704 (1.66)	1.625 (1.63)	1.734 (1.65)	1.624 (1.62)	1.45 (1.68)	2.198 (1.49)	0.205 (1.98)	1.708 (1.67)	1.647 (1.54)	1.864 (1.51)
Private credit	3.174 (7.68)	5.881 (6.92)	1.467 (7.65)	3.671 (7.49)	9.439 (6.53)	11.879* (6.94)	10.206 (7.08)	2.474 (7.92)	7.786 (6.39)	1.67 (7.79)	0.941 (8.04)	10.165 (7.18)	-3.002 (7.15)	3.172 (7.77)	6.025 (6.98)	9.4 (7.37)
Control variables	-0.099*** (0.04)	-0.379 (1.73)	-2.042 (1.73)	-0.379 (0.3)	4.241*** (1.3)	0.278 (0.46)	[0.359]	3.084 (3.89)	17.1 (10.95)	-0.072 (0.19)	-0.352*** (0.14)	9.142 (11.83)	18.978*** (5.19)	-0.072 (7.96)		
R ²	0.84	0.85	0.84	0.84	0.87	0.86	0.86	0.84	0.86	0.84	0.85	0.89	0.87	0.84	0.84	0.84
Number of observations	80	80	79	80	79	77	79	80	79	80	79	56	80	80	76	73
Partial R ² of excluded instr.	0.57	0.61	0.53	0.55	0.60	0.60	0.46	0.56	0.58	0.57	0.56	0.59	0.58	0.52	0.58	0.55
Signif. test of excluded intr.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Notes: Dependent variable is government size x bureaucracy quality. The variables represent the average over the period 1981-2005, unless stated otherwise. The estimations include a constant term, which is omitted for space considerations. All regressions are estimated with OLS. The definitions of the variables can be found in Appendix I. Legal origin variables come from La Porta et al.(1999) (in Teorell et al., 2011). Private credit represents private credit by deposit money banks and other non-bank financial institutions over GDP (from Beck, Demirgüç-Kunt, and Levine, 2010). Robust standard errors appear in parentheses. *, **, and *** denote significance at the 10, 5 and 1% level, respectively. Outliers in column 15 are Brunei, Switzerland, Congo (Dem. Rep.) and Ireland. Outliers in column 16 are Australia, Brunei, Switzerland, Congo (Dem. Rep.), Gabon, Israel and Panama.

Table A3a

2SLS using initial values of government size and bureaucracy quality as instruments

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
		Trade	Ln (1+ inflation)	Life expectancy	Number of conflicts	Institution. democracy	Religion (p- value)	Never a colony	Latitude	Natural resources	Shadow economy	Interper- sonal trust	OECD dummy	Scandinavia dummy	Studentized Residuals	Cook's D
Ln GDP pc (initial year)	-0.844*** (0.24)	-0.851*** (0.23)	-0.761*** (0.26)	-1.373*** (0.22)	-0.87*** (0.26)	-0.866*** (0.21)	-0.918*** (0.25)	-0.869*** (0.24)	-0.876*** (0.2)	-0.566** (0.22)	-0.836*** (0.24)	-0.632** (0.24)	-0.859*** (0.23)	-0.842*** (0.24)	-0.583*** (0.21)	-0.457*** (0.16)
Secondary school enrollment	0.026*** (0.01)	0.026*** (0.01)	0.025** (0.01)	0.007 (0.01)	0.027*** (0.01)	0.018** (0.01)	0.025*** (0.01)	0.026*** (0.01)	0.018*** (0.01)	0.017** (0.01)	0.025*** (0.01)	0.005 (0.01)	0.023*** (0.01)	0.026*** (0.01)	0.018** (0.01)	0.018*** (0.01)
Gross fixed capital formation	0.212*** (0.05)	0.21*** (0.05)	0.21*** (0.05)	0.124*** (0.04)	0.212*** (0.05)	0.229*** (0.05)	0.209*** (0.05)	0.207*** (0.05)	0.2*** (0.04)	0.239*** (0.05)	0.21*** (0.05)	0.193*** (0.05)	0.214*** (0.05)	0.212*** (0.05)	0.173*** (0.03)	0.182*** (0.03)
Government size	-0.244*** (0.08)	-0.248*** (0.08)	-0.257*** (0.08)	-0.146* (0.09)	-0.259*** (0.08)	-0.196*** (0.07)	-0.266*** (0.08)	-0.244*** (0.08)	-0.175** (0.07)	-0.204*** (0.08)	-0.24*** (0.08)	-0.181** (0.08)	-0.225*** (0.07)	-0.24*** (0.08)	-0.256*** (0.05)	-0.257*** (0.06)
Bureaucracy quality	-0.211 (0.58)	-0.219 (0.57)	-0.454 (0.58)	0.273 (0.56)	-0.458 (0.56)	-0.145 (0.4)	-0.491 (0.57)	-0.213 (0.57)	0.056 (0.54)	-0.119 (0.49)	-0.263 (0.56)	0.067 (0.43)	-0.135 (0.54)	-0.18 (0.63)	-0.06 (0.45)	-0.173 (0.44)
Gov.size x Bur. quality	0.069** (0.03)	0.07** (0.03)	0.074** (0.03)	0.042 (0.03)	0.081** (0.03)	0.054** (0.02)	0.091*** (0.03)	0.066** (0.03)	0.039 (0.03)	0.052* (0.03)	0.065** (0.03)	0.045* (0.03)	0.057* (0.03)	0.066* (0.04)	0.058** (0.02)	0.06** (0.02)
Control variables	0.001 (0.01)	-0.156 (0.15)	0.168*** (0.04)	0.139 (0.17)	0.148** (0.06)	0.148** (0.06)	[0.297]	0.5 (0.37)	3.485*** (0.94)	-0.053*** (0.01)	-0.017 (0.02)	2.235 (1.36)	0.681 (0.48)	0.161 (0.5)		
Underidentification test	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Centered R ²	0.59	0.59	0.60	0.70	0.59	0.64	0.60	0.61	0.66	0.66	0.62	0.62	0.61	0.59	0.66	0.67
Number of observations	85	85	83	85	84	82	84	85	84	85	84	58	85	85	79	78
First stage statistics:																
- Government size																
Partial R ² of excluded instr.	0.66	0.65	0.64	0.65	0.65	0.75	0.62	0.65	0.65	0.70	0.66	0.73	0.67	0.64	0.75	0.75
Signif. test of excluded instr.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- Bureaucracy quality																
Partial R ² of excluded instr.	0.75	0.75	0.73	0.75	0.75	0.75	0.72	0.74	0.74	0.74	0.70	0.69	0.71	0.74	0.74	0.73
Signif. test of excluded instr.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- Gov.size x Bur. quality																
Partial R ² of excluded instr.	0.76	0.76	0.73	0.75	0.75	0.84	0.70	0.75	0.73	0.76	0.72	0.84	0.70	0.73	0.84	0.83
Signif. test of excluded instr.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Notes: Dependent variable is growth. The variables represent the average over the period 1981-2005, unless stated otherwise. The estimations include a constant term, which is omitted for space considerations. All regressions are estimated with 2SLS. The endogenous variables are Government size, Bureaucracy Quality and Gov.size x Bur. Quality, and the instruments are their initial values. Small sample correction is applied. The definitions of the variables can be found in Appendix I. Robust standard errors appear in parentheses. *, **, and *** denote significance at the 10, 5 and 1% level, respectively. Outliers in column 15 are Brunei, China, Congo (Dem. Rep.), Gabon, Ireland and Panama. Outliers in column 16 are United Arab Emirates, Australia, Brunei, China, Congo (Dem. Rep.), Gabon and Panama. The sample of countries appears in Appendix III.

Table A3b
Marginal effects of government size on growth depending on public sector quality

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Bureaucracy quality = 0	-0.24*** (0.075)	-0.25*** (0.077)	-0.26*** (0.077)	-0.15* (0.086)	-0.26*** (0.076)	-0.2*** (0.073)	-0.27*** (0.076)	-0.24*** (0.076)	-0.18** (0.068)	-0.2*** (0.076)	-0.24*** (0.077)	-0.18** (0.083)	-0.22*** (0.073)	-0.24*** (0.081)	-0.26*** (0.055)	-0.26*** (0.057)
Bureaucracy quality = 1	-0.18*** (0.05)	-0.18*** (0.054)	-0.18*** (0.051)	-0.1* (0.059)	-0.18*** (0.051)	-0.14*** (0.052)	-0.18*** (0.052)	-0.18*** (0.051)	-0.14*** (0.046)	-0.15*** (0.052)	-0.17*** (0.052)	-0.14** (0.06)	-0.17*** (0.049)	-0.17*** (0.052)	-0.2*** (0.037)	-0.2*** (0.038)
Bureaucracy quality = 2	-0.11*** (0.036)	-0.11*** (0.041)	-0.11*** (0.038)	-0.06 (0.039)	-0.1*** (0.036)	-0.09** (0.035)	-0.08* (0.042)	-0.11*** (0.037)	-0.1*** (0.035)	-0.1*** (0.035)	-0.11*** (0.037)	-0.09** (0.042)	-0.11*** (0.034)	-0.11*** (0.036)	-0.14*** (0.026)	-0.14*** (0.026)
Bureaucracy quality = 3	-0.04 (0.045)	-0.04 (0.048)	-0.04 (0.049)	-0.02 (0.04)	-0.02 (0.044)	-0.03 (0.03)	0.01 (0.056)	-0.04 (0.045)	-0.06 (0.042)	-0.05 (0.033)	-0.04 (0.045)	-0.05 (0.037)	-0.05 (0.04)	-0.04 (0.051)	-0.08** (0.031)	-0.08** (0.03)
Bureaucracy quality = 4	0.03 (0.069)	0.03 (0.07)	0.04 (0.074)	0.02 (0.061)	0.06 (0.067)	0.02 (0.041)	0.1 (0.081)	0.02 (0.068)	-0.02 (0.062)	0.01 (0.05)	0.02 (0.067)	0 (0.049)	0 (0.06)	0.03 (0.08)	-0.02 (0.047)	-0.02 (0.045)

Notes: The estimations correspond to regressions in Table A3a. Robust standard errors are in parentheses. *, **, and *** denote significance at the 10, 5 and 1% level, respectively.

Table A3c
2SLS using initial values of government size and bureaucracy quality as instruments. First stage: Government Size

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
		Trade	Ln (1+ inflation)	Life expectancy	Number of conflicts	Institution. democracy	Religion (p-value)	Never a colony	Latitude	Natural resources	Shadow economy	Interpersonal trust	OECD dummy	Scandinavia dummy	Studentized Residuals	Cook's D
Ln GDP pc (initial year)	0.436 (0.41)	0.426 (0.41)	0.241 (0.45)	0.949* (0.51)	0.498 (0.43)	0.234 (0.29)	0.528 (0.45)	0.394 (0.42)	0.524 (0.43)	-0.126 (0.33)	0.444 (0.41)	-0.276 (0.53)	0.521 (0.43)	0.436 (0.41)	0.031 (0.34)	-0.15 (0.4)
Secondary school enrollment	0.023 (0.01)	0.023 (0.01)	0.033** (0.02)	0.04** (0.02)	0.019 (0.01)	0.045*** (0.01)	0.028* (0.02)	0.023 (0.01)	0.022 (0.01)	0.043*** (0.01)	0.025* (0.01)	0.027 (0.02)	0.033** (0.01)	0.021 (0.01)	0.037*** (0.01)	0.044*** (0.01)
Gross fixed capital formation	-0.045 (0.06)	-0.047 (0.06)	-0.095 (0.07)	0.037 (0.06)	-0.037 (0.06)	-0.067 (0.06)	-0.08 (0.07)	-0.051 (0.06)	-0.035 (0.06)	-0.101 (0.06)	-0.026 (0.06)	-0.108 (0.09)	-0.052 (0.06)	-0.041 (0.06)	-0.072 (0.06)	-0.076 (0.07)
Government size (initial year)	0.576*** (0.06)	0.573*** (0.06)	0.569*** (0.05)	0.534*** (0.06)	0.581*** (0.06)	0.52*** (0.05)	0.568*** (0.07)	0.575*** (0.06)	0.574*** (0.06)	0.541*** (0.06)	0.576*** (0.06)	0.517*** (0.08)	0.559*** (0.05)	0.59*** (0.06)	0.548*** (0.05)	0.548*** (0.05)
Bureaucracy quality (initial year)	0.923 (0.76)	0.914 (0.74)	0.904 (0.76)	0.657 (0.73)	1.125 (0.79)	0.344 (0.47)	1.155 (0.74)	0.917 (0.78)	1.054 (0.73)	0.805 (0.59)	1.005 (0.77)	0.611 (0.55)	0.821 (0.7)	1.081 (0.79)	0.285 (0.45)	0.366 (0.46)
Gov. size x Bur. quality (initial ye	-0.016 (0.04)	-0.016 (0.04)	-0.021 (0.04)	-0.004 (0.04)	-0.026 (0.04)	0.024 (0.02)	-0.033 (0.04)	-0.018 (0.04)	-0.021 (0.04)	0.003 (0.03)	-0.012 (0.04)	0.036 (0.04)	0.002 (0.04)	-0.029 (0.04)	0.023 (0.02)	0.021 (0.02)
Control variables																
		0.001 (0.01)	-0.427 (0.29)	-0.164** (0.06)	-0.107 (0.27)	-0.271* (0.14)	[0.107]	0.713 (0.79)	-0.922 (2.35)	0.112** (0.05)	0.036 (0.03)	-0.276 (3.66)	-1.975 (1.31)	1.749** (0.83)		
R ²	0.75	0.75	0.76	0.77	0.76	0.83	0.78	0.76	0.76	0.79	0.75	0.84	0.76	0.76	0.82	0.82
Number of observations	85	85	83	85	84	82	84	85	84	85	84	58	85	85	79	78
Partial R ² of excluded instr.	0.66	0.65	0.64	0.65	0.65	0.75	0.62	0.65	0.65	0.70	0.66	0.73	0.67	0.64	0.75	0.75
Signif. test of excluded intr.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Notes: Dependent variable is government size. The variables represent the average over the period 1981-2005, unless stated otherwise. The estimations include a constant term, which is omitted for space considerations. All regressions are estimated with OLS. The definitions of the variables can be found in Appendix I. Robust standard errors appear in parentheses. *, **, and *** denote significance at the 10, 5 and 1% level, respectively. Outliers in column 15 are Brunei, China, Congo (Dem. Rep.), Gabon, Ireland and Panama. Outliers in column 16 are United Arab Emirates, Australia, Brunei, China, Congo (Dem. Rep.), Gabon and Panama.

Table A3d
2SLS using initial values of government size and bureaucracy quality as instruments. First stage: Bureaucracy Quality

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	Trade	Ln (1+ inflation)	Life expectancy	Number of conflicts	Institution. democracy	Religion (p-value)	Never a colony	Latitude	Natural resources	Shadow economy	Interpersonal trust	OECD dummy	Scandinavia dummy	Studentized Residuals	Cook's D	
Ln GDP pc (initial year)	0.035 (0.05)	0.048 (0.05)	0.041 (0.07)	0.024 (0.06)	0.068 (0.05)	0.016 (0.05)	0.062 (0.05)	0.035 (0.05)	0.039 (0.05)	0.067 (0.05)	0.034 (0.05)	0.011 (0.08)	0.012 (0.05)	0.035 (0.05)	0.005 (0.06)	-0.002 (0.07)
Secondary school enrollment	0.005** (0)	0.005** (0)	0.005** (0)	0.005** (0)	0.005** (0)	0.003 (0)	0.004* (0)	0.005** (0)	0.005** (0)	0.004* (0)	0.005** (0)	0.003 (0)	0.002 (0)	0.005** (0)	0.006** (0)	0.007** (0)
Gross fixed capital formation	0.02** (0.01)	0.023** (0.01)	0.021* (0.01)	0.019* (0.01)	0.021** (0.01)	0.026** (0.01)	0.026** (0.01)	0.021** (0.01)	0.021** (0.01)	0.024** (0.01)	0.018* (0.01)	0.002 (0.01)	0.022** (0.01)	0.02** (0.01)	0.02* (0.01)	0.019** (0.01)
Government size (initial year)	-0.008 (0.01)	-0.004 (0.01)	-0.007 (0.01)	-0.007 (0.01)	-0.006 (0.01)	-0.003 (0.01)	-0.008 (0.01)	-0.008 (0.01)	-0.006 (0.01)	-0.006 (0.01)	-0.008 (0.01)	-0.004 (0.02)	-0.003 (0.01)	-0.008 (0.01)	-0.008 (0.01)	-0.008 (0.01)
Bureaucracy quality (initial year)	0.47*** (0.09)	0.465*** (0.09)	0.46*** (0.09)	0.465*** (0.09)	0.462*** (0.09)	0.454*** (0.1)	0.454*** (0.09)	0.459*** (0.09)	0.482*** (0.1)	0.466*** (0.09)	0.448*** (0.09)	0.542*** (0.11)	0.487*** (0.08)	0.452*** (0.09)	0.455*** (0.1)	0.456*** (0.1)
Gov. size x Bur. quality (initial ye	0.009*** (0)	0.008* (0)	0.009* (0)	0.009* (0)	0.008* (0)	0.008* (0)	0.008* (0)	0.009* (0)	0.007 (0.01)	0.008* (0)	0.009* (0)	0.007 (0.01)	0.004 (0)	0.01** (0)	0.01** (0)	0.01** (0)
Control variables	-0.001 (0)	0.003 (0.04)	0.004 (0.01)	0.135*** (0.05)	0.037** (0.01)	0.008 (0.09)	[0.075]	0.008 (0.09)	0.172 (0.29)	-0.006 (0)	-0.004 (0)	0.38 (0.39)	0.54*** (0.12)	-0.081 (0.1)		
R ²	0.90	0.90	0.90	0.90	0.91	0.91	0.91	0.90	0.90	0.91	0.90	0.90	0.92	0.90	0.90	0.90
Number of observations	85	85	83	85	84	82	84	85	84	85	84	58	85	85	79	78
Partial R ² of excluded instr.	0.75	0.75	0.73	0.75	0.75	0.75	0.72	0.74	0.74	0.74	0.70	0.69	0.71	0.74	0.74	0.73
Signif. test of excluded intr.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Notes: Dependent variable is bureaucracy quality. The variables represent the average over the period 1981-2005, unless stated otherwise. The estimations include a constant term, which is omitted for space considerations. All regressions are estimated with OLS. The definitions of the variables can be found in Appendix I. Robust standard errors appear in parentheses. *, **, and *** denote significance at the 10, 5 and 1% level, respectively. Outliers in column 15 are Brunei, China, Congo (Dem. Rep.), Gabon, Ireland and Panama. Outliers in column 16 are United Arab Emirates, Australia, Brunei, China, Congo (Dem. Rep.), Gabon and Panama.

Table A3e
2SLS using initial values of government size and bureaucracy quality as instruments. First stage: Government Size x Bureaucracy Quality

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
		Trade	Ln (1+ inflation)	Life expectancy	Number of conflicts	Institution. democracy	Religion (p-value)	Never a colony	Latitude	Natural resources	Shadow economy	Interpersonal trust	OECD dummy	Scandinavia dummy	Studentized Residuals	Cook's D
Ln GDP pc (initial year)	2.165 (1.53)	2.387 (1.53)	2.11 (1.84)	3.337* (1.68)	2.876* (1.63)	0.802 (0.98)	2.999 (1.81)	2.059 (1.6)	2.412 (1.61)	1.199 (1.18)	2.171 (1.56)	0.316 (1.38)	1.986 (1.62)	2.163 (1.52)	0.503 (1.06)	0.191 (1.32)
Secondary school enrollment	0.15** (0.06)	0.144** (0.06)	0.16** (0.07)	0.189*** (0.06)	0.135** (0.06)	0.184*** (0.05)	0.135** (0.06)	0.151** (0.06)	0.139** (0.05)	0.185*** (0.05)	0.149*** (0.06)	0.101* (0.06)	0.127** (0.05)	0.142** (0.06)	0.209*** (0.05)	0.226*** (0.06)
Gross fixed capital formation	0.025 (0.21)	0.075 (0.21)	-0.035 (0.28)	0.21 (0.23)	0.05 (0.21)	0.084 (0.22)	0.015 (0.26)	0.008 (0.22)	0.048 (0.22)	-0.072 (0.24)	0.028 (0.23)	-0.373 (0.29)	0.04 (0.21)	0.039 (0.21)	-0.044 (0.24)	-0.044 (0.24)
Government size (initial year)	0.38 (0.27)	0.445 (0.27)	0.373 (0.27)	0.285 (0.27)	0.42 (0.28)	0.293 (0.23)	0.341 (0.26)	0.378 (0.28)	0.401 (0.26)	0.321 (0.27)	0.383 (0.27)	0.276 (0.27)	0.417 (0.26)	0.433 (0.27)	0.296 (0.24)	0.298 (0.24)
Bureaucracy quality (initial year)	1.453 (2.87)	1.649 (2.82)	1.409 (2.74)	0.844 (2.78)	1.893 (3.03)	-1.051 (1.66)	1.728 (2.94)	1.439 (2.93)	2.049 (2.83)	1.25 (2.51)	1.449 (2.98)	0.752 (1.67)	1.669 (2.85)	2.031 (3.06)	-0.926 (1.63)	-0.778 (1.66)
Gov.size x Bur. quality (initial ye	0.562*** (0.16)	0.544*** (0.15)	0.551*** (0.16)	0.59*** (0.15)	0.527*** (0.17)	0.697*** (0.08)	0.502*** (0.16)	0.558*** (0.16)	0.532*** (0.15)	0.595*** (0.12)	0.566*** (0.16)	0.718*** (0.09)	0.523*** (0.15)	0.517*** (0.17)	0.706*** (0.08)	0.699*** (0.08)
Control variables		-0.023 (0.02)	-0.615 (1)	-0.374* (0.19)	2.251** (1.09)	0.018 (0.32)	[0.061]	1.786 (2.36)	0.271 (8.82)	0.192 (0.19)	-0.012 (0.09)	6.965 (8.36)	4.198 (3.53)	6.379* (3.64)		
R ²	0.90	0.90	0.90	0.90	0.90	0.93	0.91	0.90	0.90	0.90	0.90	0.95	0.90	0.90	0.93	0.93
Number of observations	85	85	83	85	84	82	84	85	84	85	84	58	85	85	79	78
Partial R ² of excluded instr.	0.76	0.76	0.73	0.75	0.75	0.84	0.70	0.75	0.73	0.76	0.72	0.84	0.70	0.73	0.84	0.83
Signif. test of excluded instr.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Notes: Dependent variable is Gov.size x Bur. quality. The variables represent the average over the period 1981-2005, unless stated otherwise. The estimations include a constant term, which is omitted for space considerations. All regressions are estimated with OLS. The definitions of the variables can be found in Appendix I. Robust standard errors appear in parentheses. *, **, and *** denote significance at the 10, 5 and 1% level, respectively. Outliers in column 15 are Brunei, China, Congo (Dem. Rep.), Gabon, Ireland and Panama. Outliers in column 16 are United Arab Emirates, Australia, Brunei, China, Congo (Dem. Rep.), Gabon and Panama.

2.2. Panel data analysis: System GMM estimator

2.2.1 Panel data analysis: System GMM estimator (I). Baseline results

Thus far, all our empirical results are based on cross-section analysis. We now turn to panel estimation methods to further test the empirical regularity found above. This exercise is interesting for at least two reasons: first, panel estimations exploit the temporal variation in the data, thus improving efficiency; and second, better estimators are available to control for endogeneity by using lags of the variables as instruments. However, we must note that this constitutes a shift from the analysis of long-term growth (25-year average) to the analysis of medium-term growth (5-year averages).

The estimated model is similar to that of the previous section:

$$\begin{aligned} growth_{i,t} = & \beta_1 \cdot income_{0i,t-1} + \beta_2 \cdot enrol_{i,t} + \beta_3 \cdot invest_{i,t} + \beta_4 \cdot govsize_{i,t} + \\ & + \beta_5 \cdot bureaucracy_{i,t} + \beta_6 \cdot govsize \cdot bureaucracy_{i,t} + \alpha_i + \theta_t + \varepsilon_{i,t} \end{aligned}$$

where α_i is a set of unobserved country-specific effects (to account for time-invariant country-specific structural characteristics), θ_t is a set of time-specific effects (to account for common shocks affecting all countries in a given period) and the remaining variables are the same as in Section 4.1. We have a *small T, large N* unbalanced panel consisting of 5 periods of 5-year averages (from 1981-1985 to 2001-2005) and a maximum of 450 observations and 130 countries, depending on the specification.⁴

The difference GMM estimator (Arellano and Bond, 1991) eliminates the Nickel (1981) bias caused by the correlation between lagged output and country-specific effects and uses previous realizations of the regressors to instrument for their current values in the first-differenced specification. However, Arellano and Bover (1995) and Blundell and Bond (1998) show that in the case of persistent regressors –such as institutional variables– lagged levels of the variables are weak instruments for the first-differenced regressors. This leads to a fall in precision as well as to biased coefficients. To overcome these shortcomings, these authors recommend the use of the *system*

⁴ In the cross-section analysis, we confined ourselves to a sample of 85 countries, for which complete data were available for the reference model, so that changes in the coefficients across specifications were not driven by substantial changes in the number of countries included. In contrast, with panel methods we extend the number of countries to a maximum of 130 for the specification with bureaucracy quality, while the sample rises to 146 countries for the specification with executive constraints. See Section 2.2.4 of this appendix (Panel data analysis: samples) for the list of countries considered in each case. A further reason for including more countries in the panel data analysis than in cross-section regressions is that even though for some of the countries there is no data available for the first two 5-year periods, there is more data availability for the more recent 5-year periods. Thus, in the cross-section analysis, this would translate into missing values for some of the countries for which data were not available during the first half of the period under scrutiny, this being the reason for omitting such countries.

GMM estimator that utilizes instruments in levels and first-differences to improve in efficiency. Thus, we will estimate the model using this estimator.

The consistency of the *system estimator* depends on the validity of the instruments and the absence of serial correlation of second-order in the first-differenced error term. Therefore, we test these assumptions using the Hansen test for over-identifying restrictions and the test for second-order autocorrelation proposed by Arellano and Bond (1991). Failing to reject the null hypotheses of overall validity of the instruments and absence of second-order serial correlation in the first-differenced error for the respective tests would give support to the model.

Tables A4a and A4b present the results from the *system GMM estimator*. In addition to the usual *gmm-style* instruments, we use as excluded instruments the population dependency ratio and legal origin. The former is considered as a determinant (and instrument) of government size (Angelopoulos *et al.*, 2008), whereas legal origin acts as an instrument for institutional quality.⁵

Column 1 shows the reference model where government size has a negative coefficient while the interaction term has the expected positive sign. Again, the marginal effect of government consumption depends on the quality level of the public sector. In this case, the marginal effect is no longer statistically significant when bureaucracy quality is 4. These results differ slightly from those obtained in cross-sectional regressions, where a score of bureaucracy quality of 2 or 3 was sufficient to render the marginal effect of government size statistically insignificant. However, these differences are not surprising since we are analyzing the medium rather than the long term, and the effect of public sector size may vary from one horizon to another. More specifically, the results indicate that from values of bureaucracy quality above 3.3 the effect is not significant; so for 20% of the sample the marginal effects of government size is insignificant. Therefore, for the fraction of countries with the highest quality in public sector institutions, the size of government does not affect economic growth.

In columns 2-7 we show that the results are robust to the inclusion of several control variables.⁶ Column 8 drops OECD members and shows that the results are not driven by rich countries. Interestingly, Columns 2 to 8 of Table A4b show that the marginal effect of government size is not

⁵ The complete specification of the model is characterized as follows: the endogenous variables are *invest*, *govsize* and the interaction term *govsize·bureaucracy*, while the remaining variables are predetermined. The exogenous variables are the period dummies. For the first difference equation, second and previous lags of endogenous variables and first and previous lags of predetermined variables are used as instruments. For the level equation, the lagged first-difference of endogenous variables and the first-difference of predetermined variables are used as instruments. We shall see later that the results are robust to changes in the specification (Tables A6a and A6b).

⁶ See the motivation for the inclusion of these controls in Section 4.2.

statistically significant when institutional quality is relatively high (for scores greater than 2 or 3, depending on the specification). Moreover, it is important to note that the Hansen test for over-identifying restrictions and the test for second-order serial correlation are not rejected in any specification, thereby supporting the validity of the model.

Table A4a
Panel data analysis: *System GMM estimator* (I)

SYSTEM-GMM regressions	1	2	3	4	5	6	7	8
	Reference model							Drop OECD
Ln GDP pc _{t-1}	-1.235*** (0.37)	-1.504*** (0.35)	-1.146*** (0.35)	-1.337*** (0.36)	-1.357*** (0.36)	-1.465*** (0.38)	-1.369*** (0.37)	-1.01** (0.41)
Secondary school enrollment	0.07*** (0.02)	0.086*** (0.02)	0.07*** (0.02)	0.047** (0.02)	0.071*** (0.02)	0.077*** (0.02)	0.06*** (0.02)	0.063*** (0.02)
Gross fixed capital formation	0.151** (0.07)	0.224*** (0.06)	0.164*** (0.06)	0.158** (0.06)	0.158** (0.07)	0.145** (0.06)	0.154** (0.07)	0.168** (0.07)
Government size	-0.364*** (0.11)	-0.381*** (0.12)	-0.367*** (0.11)	-0.315*** (0.11)	-0.347*** (0.12)	-0.368*** (0.11)	-0.253** (0.11)	-0.375*** (0.12)
Bureaucracy quality	-0.551 (0.76)	-0.953 (0.67)	-0.974 (0.73)	-0.612 (0.72)	-0.377 (0.76)	-0.293 (0.72)	-0.437 (0.72)	-0.953 (0.87)
Gov.size x Bur. quality	0.078** (0.04)	0.075* (0.04)	0.09** (0.04)	0.081** (0.04)	0.071* (0.04)	0.075* (0.04)	0.063* (0.04)	0.117** (0.05)
Control variables		Ln (1+ inflation)	Trade	Life expectancy	Number of conflicts	Natural resources	Institution. democracy	
		-0.831*** (0.25)	-0.001 (0.01)	0.082 (0.06)	-0.348 (0.31)	0.013 (0.02)	0.127 (0.09)	
Number of observations	450	414	450	450	446	446	418	335
Arellano-Bond test for AR(2)	0.33	0.19	0.29	0.33	0.35	0.49	0.24	0.93
Hansen test of overid.	0.17	0.11	0.28	0.27	0.20	0.14	0.22	0.38

Notes: Dependent variable is growth. The variables are averages over the 5-year intervals during the period 1981-2005. The coefficients on the period dummies are not reported for space considerations. The definitions of the variables can be found in the Appendix I. Robust standard errors are in parentheses. *, ** and *** denote significance at the 10, 5 and 1% level, respectively. All regressions are estimated with the one-step *System GMM estimator* using the STATA program *xtabond2* (Roodman, 2006). Small sample correction is applied. For the first difference equation, second and previous lags of endogenous variables and first and previous lags of predetermined variables are used as instruments. For the level equation, lag first difference of endogenous variables and first difference of predetermined variables are used as instruments. The excluded instruments are population dependency ratio and legal origin, and the exogenous variables are the period dummies. The endogenous variables are gross fixed capital formation, government size and gov. size x bureaucracy quality, while the remaining variables are predetermined.

Table A4b

Marginal effects of government size on growth depending on public sector quality

SYSTEM-GMM regressions	1	2	3	4	5	6	7	8
Bureaucracy quality = 0	-0.36*** (0.114)	-0.38*** (0.116)	-0.37*** (0.114)	-0.31*** (0.114)	-0.35*** (0.116)	-0.37*** (0.109)	-0.25** (0.109)	-0.38*** (0.117)
Bureaucracy quality = 1	-0.29*** (0.084)	-0.31*** (0.085)	-0.28*** (0.083)	-0.23*** (0.086)	-0.28*** (0.084)	-0.29*** (0.078)	-0.19** (0.082)	-0.26*** (0.075)
Bureaucracy quality = 2	-0.21*** (0.064)	-0.23*** (0.062)	-0.19*** (0.06)	-0.15** (0.066)	-0.2*** (0.062)	-0.22*** (0.056)	-0.13* (0.065)	-0.14** (0.061)
Bureaucracy quality = 3	-0.13** (0.062)	-0.15** (0.06)	-0.1 (0.059)	-0.07 (0.063)	-0.13** (0.06)	-0.14** (0.057)	-0.06 (0.066)	-0.03 (0.088)
Bureaucracy quality = 4	-0.05 (0.08)	-0.08 (0.08)	-0.01 (0.079)	0.01 (0.078)	-0.06 (0.08)	-0.07 (0.079)	0 (0.085)	0.09 (0.133)

Notes: The estimations correspond to regressions in Table A4a. Robust standard errors are in parentheses. *, ** and *** denote significance at the 10, 5 and 1% level, respectively.

2.2.2 Panel data analysis: System GMM estimator (II). Alternative indicator of public sector quality: Executive constraints

In the previous paragraph we reported that our baseline result remains unaltered when we employ the *system GMM estimator* with our main proxy for public sector quality. We now proceed to check whether the results are essentially the same with executive constraints as the institutional variable. With panel data, this proxy for public sector quality is even more appealing because it is an objective indicator about the institutional features of government, with a very transparent coding method. This makes it a more suitable measure for accounting for the time series variation in public sector quality than perception-based indicators, because temporal variation of the indicator better reflects real changes (Arndt and Oman, 2006).

Tables A5a and A5b replicate the analysis conducted in the previous two tables but with executive constraints. They provide additional evidence for our main result: the marginal effect of government size on growth varies with the quality of public sector institutions. Focusing on the reference model, the marginal effect is not significant for values of executive constraints equal to or greater than 5, although the precise cut-off varies from one specification to another. The tests of overidentification and second-order serial correlation are satisfied, except for specification 8, for which the Hansen overidentification test rejects the null at the 5% level. We conclude that with executive constraints as an alternative indicator of institutional quality, the message that the paper tries to convey remains completely unaltered.

Table A5a

Panel data analysis: *System GMM estimator* (II). Alternative indicator of public sector quality: Executive constraints

SYSTEM-GMM regressions	1	2	3	4	5	6	7	8
	Reference model							Drop OECD
Ln GDP pc _{t-1}	0.161 (0.43)	-1.321*** (0.49)	0.25 (0.42)	-0.126 (0.44)	0.139 (0.38)	-0.31 (0.45)	0.352 (0.41)	0.489 (0.44)
Secondary school enrollment	-0.011 (0.02)	0.05** (0.02)	-0.016 (0.02)	-0.045* (0.02)	-0.011 (0.02)	-0.006 (0.03)	-0.012 (0.02)	-0.016 (0.02)
Gross fixed capital formation	0.304*** (0.1)	0.308*** (0.1)	0.266*** (0.08)	0.275** (0.12)	0.32*** (0.09)	0.267*** (0.08)	0.324*** (0.09)	0.353*** (0.09)
Government size	-0.643*** (0.23)	-0.717*** (0.19)	-0.506*** (0.15)	-0.598*** (0.21)	-0.624*** (0.21)	-0.633*** (0.21)	-0.636*** (0.2)	-0.569** (0.24)
Executive constraints	-1.144* (0.68)	-1.073 (0.65)	-0.794 (0.51)	-1.303** (0.63)	-1.074 (0.65)	-0.631 (0.6)	-1.183 (0.73)	-0.859 (0.79)
Gov.size x Ex. constraint	0.098** (0.04)	0.089** (0.03)	0.075** (0.03)	0.106*** (0.04)	0.092** (0.04)	0.096** (0.04)	0.093** (0.04)	0.067 (0.05)
Control variables		Ln (1+ inflation) -1.976*** (0.33)	Trade 0.008 (0.01)	Life expectancy 0.15** (0.07)	Number of conflicts -0.17 (0.44)	Natural resources 0.092*** (0.03)	Institution. democracy -0.055 (0.33)	
Number of observations	505	458	505	505	505	500	505	396
Arellano-Bond test for AR(2)	0.303	0.749	0.322	0.199	0.263	0.114	0.348	0.312
Hansen test of overid.	0.105	0.136	0.11	0.217	0.253	0.14	0.19	0.039

Notes: Dependent variable is growth. The endogenous variables are gross fixed capital formation, government size and gov. size x executive constraints, while the remaining variables are predetermined. See footnote to Table A4a for the rest.

Table A5b

Marginal effects of government size on growth depending on public sector quality

SYSTEM-GMM regressions	1	2	3	4	5	6	7	8
Executive constraints = 1	-0.54*** (0.195)	-0.63*** (0.163)	-0.43*** (0.129)	-0.49*** (0.176)	-0.53*** (0.177)	-0.54*** (0.176)	-0.54*** (0.167)	-0.5** (0.195)
Executive constraints = 2	-0.45*** (0.161)	-0.54*** (0.133)	-0.36*** (0.107)	-0.39** (0.15)	-0.44*** (0.144)	-0.44*** (0.145)	-0.45*** (0.136)	-0.44*** (0.155)
Executive constraints = 3	-0.35*** (0.13)	-0.45*** (0.106)	-0.28*** (0.09)	-0.28** (0.128)	-0.35*** (0.115)	-0.34*** (0.117)	-0.36*** (0.11)	-0.37*** (0.122)
Executive constraints = 4	-0.25** (0.106)	-0.36*** (0.086)	-0.2** (0.081)	-0.17 (0.114)	-0.26*** (0.093)	-0.25** (0.097)	-0.26*** (0.091)	-0.3*** (0.101)
Executive constraints = 5	-0.15 (0.095)	-0.27*** (0.076)	-0.13 (0.084)	-0.07 (0.111)	-0.16* (0.086)	-0.15* (0.09)	-0.17** (0.085)	-0.23** (0.102)
Executive constraints = 6	-0.06 (0.101)	-0.18** (0.081)	-0.05 (0.097)	0.04 (0.119)	-0.07 (0.095)	-0.06 (0.097)	-0.08 (0.094)	-0.17 (0.124)
Executive constraints = 7	0.04 (0.121)	-0.09 (0.1)	0.02 (0.117)	0.15 (0.137)	0.02 (0.117)	0.04 (0.117)	0.02 (0.115)	-0.1 (0.157)

Notes: The estimations correspond to regressions in Table A5a. Robust standard errors are in parentheses. *, ** and *** denote significance at the 10, 5 and 1% level, respectively.

2.2.3 Panel data analysis: System GMM estimator (III). Other specifications

In Tables A6a and A6b we examine whether the results are driven by a particular specification choice. The first column reproduces the reference model. The next three columns address whether the results depend on the introduction of any of the excluded instruments. Column 2 only uses legal origin as excluded instrument, while column 3 only employs the population dependency ratio. In both regressions our conclusion remains unchanged. Column 4 goes one step further and eliminates all excluded instruments. Again, the results are essentially the same. Column 5 uses orthogonal deviations rather than first differences, which maximizes the sample size in panels with gaps (Roodman, 2009). Model 6 additionally removes the excluded instruments. In both cases the results remain unchanged.

Following the suggestion of Roodman (2009), regressions 7 and 8 restrict the number of instruments to verify the robustness of the coefficients to a reduction in the instruments set. When we limit the instruments to lags 1 and 2, the results remain unaltered both with and without excluded instruments. Finally, specifications 9 and 10 employ the two-step estimator. Again, the results are unaffected by this change.⁷

To summarize, the panel data analysis of this section conducted with the *system GMM estimator* has provided additional strong evidence of heterogeneity in the relationship between government size and growth. The effect of government size depends on the quality of the public sector; the effect being negative at low quality levels, while vanishing when quality is high. The results are robust to the introduction of control variables, the use of executive constraints as an alternative indicator of public sector quality and to changes in the specification.⁸

⁷ Additionally, we have examined the robustness to considering all variables as endogenous (except for the period dummies). The results remain qualitatively unchanged, although in this case the test of overidentification is rejected.

⁸ A final point deserves comment. The proxy used for government size does not include investments in fixed capital and, therefore, much of the public spending commonly considered to be productive. The addition of public investment to our proxy “government consumption” presumably would increase the positive effect (or reduce the negative effect) of government size on growth. But this is not done here because public investment is already included in the variable gross fixed capital formation. Moreover, due to data unavailability, differentiating between public and private investment would imply a substantial reduction of the sample, both along the time and cross-section dimensions.

Table A6a

Panel data analysis: System GMM estimator (III). Other specifications

SYSTEM-GMM regressions	1	2	3	4	5	6	7	8	9	10
	Reference model	Excluded instr. Legal origin	Excluded instr. Dep. population	No excluded instrument	Orthogonal deviations	Orthog. dev. & no excl.instr.	Limited to lag (1 2)	Limited to lag (1 2) & no excl.	Two step estimator	Two step est. & no excl. instr.
Ln GDP pc _{t-1}	-1.235*** (0.37)	-1.146*** (0.4)	-1.072** (0.45)	-0.764 (0.5)	-1.185*** (0.36)	-0.696 (0.48)	-1.277*** (0.38)	-0.839 (0.51)	-1.388*** (0.44)	-1.023* (0.61)
Secondary school enrollment	0.07*** (0.02)	0.072*** (0.02)	0.065*** (0.02)	0.074*** (0.02)	0.069*** (0.02)	0.073*** (0.02)	0.072*** (0.02)	0.078*** (0.02)	0.072*** (0.02)	0.078*** (0.03)
Gross fixed capital formation	0.151** (0.07)	0.145** (0.07)	0.158** (0.07)	0.16** (0.07)	0.16** (0.07)	0.17** (0.07)	0.151** (0.07)	0.159** (0.07)	0.159** (0.08)	0.182** (0.09)
Government size	-0.364*** (0.11)	-0.357*** (0.12)	-0.512*** (0.13)	-0.49*** (0.13)	-0.352*** (0.11)	-0.453*** (0.12)	-0.394*** (0.11)	-0.543*** (0.13)	-0.384*** (0.11)	-0.458*** (0.14)
Bureaucracy quality	-0.551 (0.76)	-0.485 (0.78)	-1.845* (0.97)	-1.576 (0.99)	-0.583 (0.75)	-1.42 (0.95)	-0.625 (0.78)	-1.798* (1.01)	-0.998 (0.76)	-1.589 (1.03)
Gov.size x Bur. quality	0.078** (0.04)	0.071* (0.04)	0.156*** (0.06)	0.128** (0.06)	0.075** (0.04)	0.111** (0.06)	0.085** (0.04)	0.147** (0.06)	0.096** (0.04)	0.122** (0.06)
Number of observations	450	450	450	450	450	450	450	450	450	450
Arellano-Bond test for AR(2)	0.327	0.335	0.239	0.277	0.352	0.322	0.324	0.263	0.292	0.286
Hansen test of overid.	0.167	0.15	0.115	0.102	0.136	0.071	0.229	0.195	0.167	0.102

Notes: Dependent variable is growth. The variables are averages over 5-year intervals during the period 1981-2005. The coefficients on the period dummies are not reported for space considerations. The definitions of the variables can be found in Appendix I. Robust standard errors are in parentheses. *, ** and *** denote significance at the 10, 5 and 1% level, respectively. All regressions are estimated with the *system GMM estimator* using the STATA program *xtabond2* (Roodman, 2006). Small sample correction is applied. The reference regression corresponds to column 1 in Table A4a.

Table A6b

Marginal effects of government size on growth depending on public sector quality

SYSTEM-GMM regressions	1	2	3	4	5	6	7	8	9	10
Bureaucracy quality = 0	-0.36*** (0.114)	-0.36*** (0.116)	-0.51*** (0.135)	-0.49*** (0.134)	-0.35*** (0.108)	-0.45*** (0.125)	-0.39*** (0.114)	-0.54*** (0.133)	-0.38*** (0.113)	-0.46*** (0.136)
Bureaucracy quality = 1	-0.29*** (0.084)	-0.29*** (0.084)	-0.36*** (0.09)	-0.36*** (0.089)	-0.28*** (0.08)	-0.34*** (0.083)	-0.31*** (0.084)	-0.4*** (0.089)	-0.29*** (0.082)	-0.34*** (0.099)
Bureaucracy quality = 2	-0.21*** (0.064)	-0.22*** (0.063)	-0.2*** (0.069)	-0.23*** (0.07)	-0.2*** (0.06)	-0.23*** (0.066)	-0.22*** (0.064)	-0.25*** (0.073)	-0.19*** (0.061)	-0.21** (0.087)
Bureaucracy quality = 3	-0.13** (0.062)	-0.15** (0.066)	-0.04 (0.088)	-0.11 (0.095)	-0.13** (0.06)	-0.12 (0.09)	-0.14** (0.064)	-0.1 (0.1)	-0.09 (0.062)	-0.09 (0.11)
Bureaucracy quality = 4	-0.05 (0.08)	-0.08 (0.09)	0.11 (0.131)	0.02 (0.142)	-0.05 (0.079)	-0.01 (0.134)	-0.05 (0.084)	0.04 (0.149)	0 (0.083)	0.03 (0.152)

Notes: The estimations correspond to regressions in Table A6a. Robust standard errors are in parentheses. *, ** and *** denote significance at the 10, 5 and 1% level, respectively.

2.2.4 Panel data analysis: samples

Panel data analysis: samples.

Angola (BQ/ EX), Argentina (BQ/ EX), Armenia (BQ/ EX), Azerbaijan (BQ/ EX), Bahamas (BQ), Belarus (BQ/ EX), Benin (EX), Bhutan (EX), Botswana (BQ/ EX), Burkina Faso (BQ/ EX), Burundi (EX), Cambodia (EX), Central African Republic (EX), Chad (EX), Comoros (EX), Congo, Rep. (BQ/ EX), Croatia (BQ/ EX), Cuba (BQ/ EX), Cyprus (BQ/ EX), Czech Republic (BQ/ EX), Djibouti (EX), Equatorial Guinea (EX), Eritrea (EX), Estonia (BQ/ EX), Ethiopia (BQ/ EX), Fiji (EX), Gambia (BQ/ EX), Georgia (EX), Germany (BQ/ EX), Guinea (BQ/ EX), Guinea-Bissau (BQ/ EX), Kazakhstan (BQ/ EX), Kuwait (BQ/ EX), Kyrgyz Republic (EX), Lao PDR (EX), Latvia (BQ/ EX), Lebanon (BQ), Lesotho (EX), Libya (BQ/ EX), Lithuania (BQ/ EX), Luxembourg (BQ), Macedonia (EX), Madagascar (BQ/ EX), Malta (BQ), Mauritania (EX), Mauritius (EX), Moldova (BQ/ EX), Mongolia (BQ/ EX), Mozambique (BQ/ EX), Namibia (BQ/ EX), Nepal (EX), Niger (BQ/ EX), Oman (BQ/ EX), Poland (BQ/ EX), Qatar (BQ/ EX), Russian Federation (BQ/ EX), Rwanda (EX), Sierra Leone (BQ/ EX), Slovak Republic (BQ/ EX), Slovenia (BQ/ EX), Solomon Islands (EX), Suriname (BQ), Swaziland (EX), Tajikistan (EX), Tanzania (BQ/ EX), Uganda (BQ/ EX), Ukraine (BQ/ EX), Uzbekistan (EX), Vietnam (BQ/ EX) and Yemen (BQ/ EX).

Notes : BQ indicates that the country is included in the regressions with bureaucracy quality, and EX indicates that the country is included in the regressions with executive constraints.

3. Supporting information to section IV.5. Robustness Check 4: Total Government Expenditure as a Proxy for Government Size

Table A7a
Alternative indicator of government size: Total expenditure

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
		Reference model for the same sample	Trade	Ln (1+ inflation)	Life expectancy	Number of conflicts	Institution democracy	Religion (p-value)	Never a colony	Latitude	Natural resources	Shadow economy	Interpersonal trust	OECD dummy	Scandinavia dummy	Studentized Residuals	Cook's D
Ln GDP pc (initial year)	-0.465 (0.28)	-0.467 (0.3)	-0.465 (0.28)	-0.511* (0.29)	-1.036*** (0.22)	-0.336 (0.3)	-0.614** (0.24)	-0.381 (0.28)	-0.426 (0.31)	-0.544** (0.26)	-0.31 (0.25)	-0.481* (0.28)	-0.382 (0.24)	-0.521* (0.3)	-0.465 (0.28)	-0.287 (0.23)	-0.448** (0.22)
Secondary school enrollment	0.028* (0.01)	0.021* (0.01)	0.028* (0.01)	0.03** (0.01)	0.011 (0.01)	0.026* (0.01)	0.02 (0.01)	0.028* (0.01)	0.027* (0.01)	0.023** (0.01)	0.022* (0.01)	0.026* (0.01)	0.011 (0.01)	0.026* (0.01)	0.028* (0.01)	0.022** (0.01)	0.03*** (0.01)
Gross fixed capital formation	0.251*** (0.05)	0.231*** (0.05)	0.252*** (0.05)	0.227*** (0.05)	0.174*** (0.04)	0.252*** (0.05)	0.261*** (0.04)	0.231*** (0.05)	0.253*** (0.05)	0.26*** (0.04)	0.276*** (0.04)	0.246*** (0.05)	0.213*** (0.04)	0.251*** (0.05)	0.251*** (0.05)	0.266*** (0.04)	0.255*** (0.04)
Total expenditure (initial year)	-0.075*** (0.03)	-0.075*** (0.03)	-0.075*** (0.03)	-0.078*** (0.02)	-0.05* (0.03)	-0.072** (0.03)	-0.064** (0.03)	-0.075** (0.03)	-0.075*** (0.03)	-0.074*** (0.03)	-0.07** (0.03)	-0.076*** (0.03)	-0.06** (0.03)	-0.074** (0.03)	-0.075** (0.03)	-0.088*** (0.02)	-0.099*** (0.02)
Bureaucracy quality (initial year)	-0.511 (0.39)	-0.43 (0.36)	-0.513 (0.39)	-0.583* (0.33)	-0.123 (0.37)	-0.564 (0.37)	-0.51 (0.37)	-0.472 (0.41)	-0.504 (0.39)	-0.515 (0.4)	-0.565 (0.36)	-0.559 (0.39)	-0.518 (0.36)	-0.508 (0.39)	-0.511 (0.39)	-0.751*** (0.27)	-0.788*** (0.27)
Total expend. x Bur. quality (initial year)	0.024** (0.01)	0.024** (0.01)	0.024** (0.01)	0.024*** (0.01)	0.017* (0.01)	0.024** (0.01)	0.022** (0.01)	0.023** (0.01)	0.024** (0.01)	0.021** (0.01)	0.022** (0.01)	0.024** (0.01)	0.021** (0.01)	0.022** (0.01)	0.024** (0.01)	0.027*** (0.01)	0.028*** (0.01)
Government size (initial year)	-0.119** (0.04)	-0.119** (0.04)	-0.119** (0.04)	-0.119** (0.04)	-0.119** (0.04)	-0.119** (0.04)	-0.119** (0.04)	-0.119** (0.04)	-0.119** (0.04)	-0.119** (0.04)	-0.119** (0.04)	-0.119** (0.04)	-0.119** (0.04)	-0.119** (0.04)	-0.119** (0.04)	-0.119** (0.04)	-0.119** (0.04)
Gov.size x Bur. quality (initial year)	0.046*** (0.02)	0.046*** (0.02)	0.046*** (0.02)	0.046*** (0.02)	0.046*** (0.02)	0.046*** (0.02)	0.046*** (0.02)	0.046*** (0.02)	0.046*** (0.02)	0.046*** (0.02)	0.046*** (0.02)	0.046*** (0.02)	0.046*** (0.02)	0.046*** (0.02)	0.046*** (0.02)	0.046*** (0.02)	0.046*** (0.02)
Additional control variables:	0	0	0	-0.236 (0.01)	0.149*** (0.03)	0.349** (0.14)	0.165*** (0.06)	[0.459]	-0.267 (0.35)	2.556** (1.03)	-0.047*** (0.02)	-0.014 (0.02)	2.064** (0.84)	0.484 (0.54)	0.055 (0.34)	0.69 (0.69)	0.69 (0.69)
R ²	0.60	0.59	0.60	0.62	0.73	0.62	0.65	0.61	0.60	0.64	0.64	0.60	0.57	0.60	0.60	0.69	0.69
Number of observations	60	60	60	59	60	60	59	60	60	60	60	60	45	60	60	56	56

Notes: Dependent variable is growth. The variables represent the average over the period 1981-2005, unless stated otherwise. The estimations include a constant term, which is omitted for space considerations. All regressions are estimated with OLS. The definitions of the variables can be found in Appendix I. Total expenditure measures central government total expenditure as a percentage of GDP, from the Government Finance Statistics (IMF, 2012). Robust standard errors are in parentheses. *, ** and *** denote significance at the 10, 5 and 1% levels, respectively. Outliers in column 16 are Congo (Dem. Rep.), Gabon, Ireland and Pakistan. Outliers in column 17 are Australia, Congo (Dem. Rep.), Gabon and Ireland. The sample for this table is: Australia, Austria, Belgium, Bahrain, Brazil, Canada, Switzerland, Chile, Cameroon, Congo (D.R.), Colombia, Costa Rica, Denmark, Dominican Rep., Egypt, Spain, Finland, France, Gabon, UK, Greece, Guatemala, Guyana, Hungary, Indonesia, India, Ireland, Iran, Iceland, Israel, Italy, Jamaica, Japan, Korea (R.), Liberia, Sri Lanka, Morocco, Mexico, Mali, Malaysia, Nicaragua, Netherlands, Norway, Pakistan, Panama, Portugal, Romania, Senegal, Sweden, Syria, Togo, Thailand, Trinidad and Tobago, Tunisia, Uruguay, US, Venezuela, South Africa, Zambia and Zimbabwe.

Table A7b

Marginal effects of government size on growth depending on public sector quality

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Bureaucracy quality = 0	-0.08*** (0.028)	-0.12** (0.045)	-0.07** (0.03)	-0.08*** (0.025)	-0.05* (0.027)	-0.07** (0.027)	-0.06** (0.027)	-0.08** (0.028)	-0.08*** (0.027)	-0.07*** (0.027)	-0.07** (0.026)	-0.08*** (0.028)	-0.06** (0.029)	-0.07** (0.028)	-0.08** (0.028)	-0.09*** (0.019)	-0.1*** (0.019)
Bureaucracy quality = 1	-0.05*** (0.02)	-0.07** (0.031)	-0.05** (0.023)	-0.05*** (0.019)	-0.03 (0.02)	-0.05** (0.02)	-0.04** (0.02)	-0.05** (0.021)	-0.05*** (0.02)	-0.05*** (0.02)	-0.05** (0.019)	-0.05** (0.021)	-0.04* (0.021)	-0.05** (0.021)	-0.05** (0.021)	-0.06*** (0.014)	-0.07*** (0.015)
Bureaucracy quality = 2	-0.03* (0.015)	-0.03 (0.021)	-0.03 (0.017)	-0.03* (0.015)	-0.02 (0.014)	-0.03* (0.015)	-0.02 (0.015)	-0.03* (0.016)	-0.03* (0.015)	-0.03** (0.015)	-0.03* (0.014)	-0.03* (0.015)	-0.02 (0.014)	-0.03* (0.016)	-0.03* (0.016)	-0.03*** (0.012)	-0.04*** (0.012)
Bureaucracy quality = 3	0 (0.015)	0.02 (0.022)	0 (0.016)	-0.01 (0.016)	0 (0.012)	0 (0.014)	0 (0.014)	-0.01 (0.016)	0 (0.015)	-0.01 (0.014)	0 (0.014)	0 (0.015)	0 (0.013)	-0.01 (0.016)	0 (0.015)	-0.01 (0.012)	-0.01 (0.012)
Bureaucracy quality = 4	0.02 (0.019)	0.06* (0.033)	0.02 (0.019)	0.02 (0.021)	0.02 (0.016)	0.02 (0.019)	0.02 (0.019)	0.02 (0.02)	0.02 (0.02)	0.01 (0.019)	0.02 (0.019)	0.02 (0.019)	0.02 (0.018)	0.02 (0.019)	0.02 (0.02)	0.02 (0.015)	0.01 (0.016)

Notes: The estimations correspond to the regressions in Table A7a. Robust standard errors are in parentheses. *, **, and *** denote significance at the 10, 5 and 1% level, respectively.

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