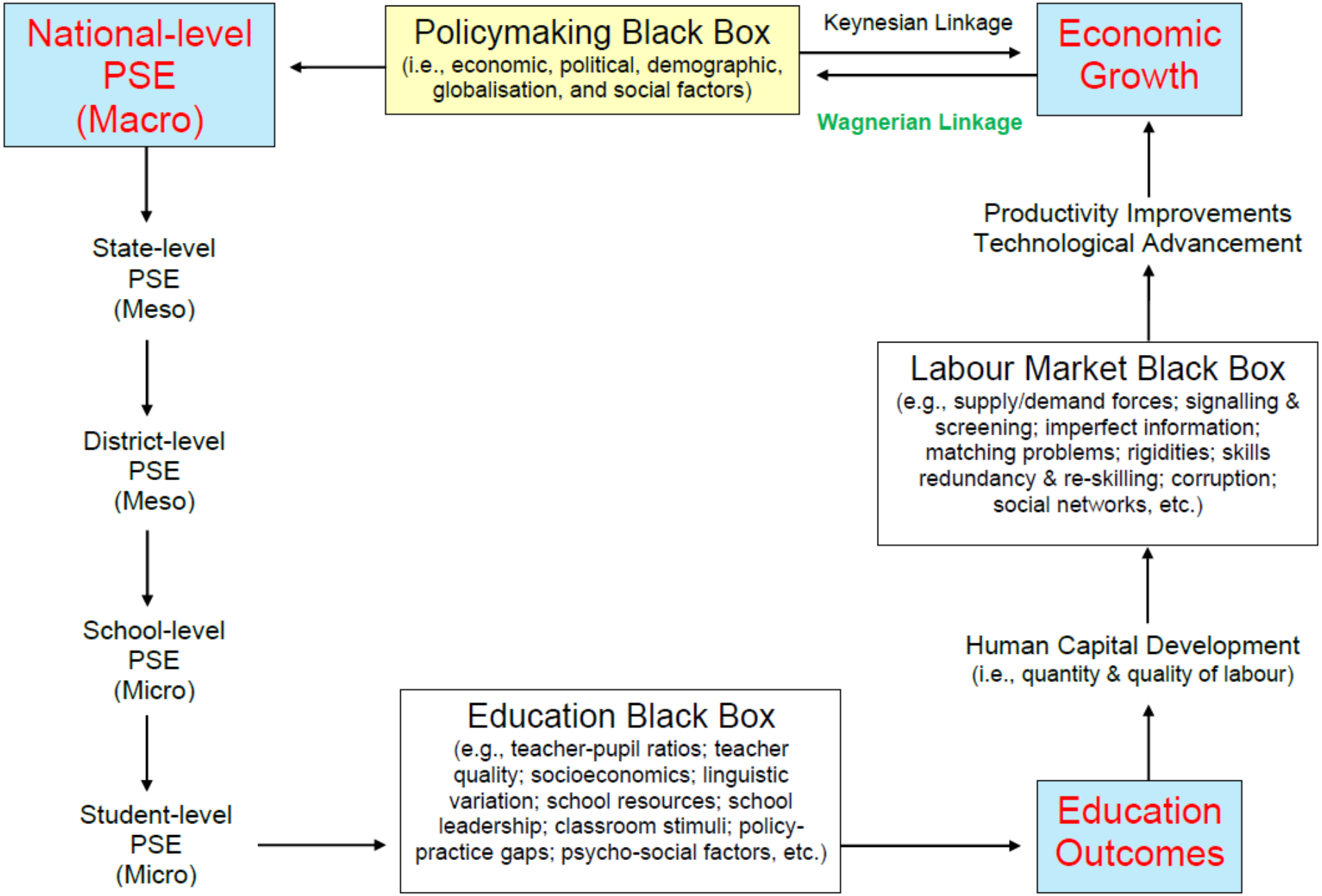
Education Spending, Economic Development, and the Size of Government

Locating the Study: The Spending-Education-Growth Nexus



Overview of the Study

This is a large-scale, country-comparative study over an extended number of years, which focuses on heterogeneity (*differences* in the mean levels of public spending on education).

Two measures of national-level education spending are considered: the “national effort” (E/Y) and “budget share” (E/G).

The primary method employed is a two-way factorial analysis of covariance, which aims for a more descriptive characterisation of *average* differences between broad groupings of countries.

Question Is there something interesting about these two education spending measures?

A Theoretical Snapshot

Wagner's Law (after Adolph Wagner, 1835-1917) postulates that, as countries grow and develop, the size of their respective public sectors are likely to grow, too. This law of increasing state activity points to an apparent empirical regularity in which total public spending (the size of government) is positively related to national income or national income per capita (Wagner, 1892; 1958). The reasons for public sector expansion relate to economic, social, and cultural forces (Kuckuck, 2014).

Baumol's Law (after William Baumol, 1922-2017) essentially postulates that growth of the public sector stems from rising costs in the private sector, which are mirrored by cost increases in the public sector, hence, Baumol's "cost disease" hypothesis (Baumol, 1967; Baumol and Bowen, 1966).

Wagner did not expressly consider the role of the 'political machinery' in shaping bigger governments (Peacock and Scott, 2000). However, although subsequent work (post-1970s) in the realms of Comparative Public Policy and Political Science has largely addressed this very point, there is still ample scope to consider how the combination of economic and political forces shape various public-sector outcomes.

Research Problem and Question

Hitherto, a dearth of evidence exists which examines the empirical patterns of the two level-form (ratio) measures of total education spending across many countries and over an extended number of years.

Do richer countries spend more than poorer countries for both measures?

Question Is there an intuitive answer to this question?

Synthesising Some of the Empirical Literature

Author/s (Year)	Method(s)	Sample Size	Number of Countries	Time Period	National Effort		Budget Share	
					Economic	Political	Economic	Political
Zymelman (1976)	Cross-sectional regression	8 to 69	69 developing countries	Circa 1973	+	n/a	n/a	n/a
Verner (1979)	Cross-sectional correlation	102	102 countries	1964-1965	+	+	ns	+
Castles (1989)	Cross-sectional regression	18	18 OECD countries	1960; 1981	ns	n/a	n/a	n/a
Tilak (1989)	Cross-sectional regression	16-20	20 Latin American countries	1965; 1970; 1980; 1985	+	n/a	n/a	n/a
Ram (1995)	Cross-sectional regression	18	18 OECD countries	1985	+	n/a	n/a	n/a
Baqir (2002)	Cross-sectional regression & panel-data methods	Various	59 to 106 countries	1985-1998	+	+	+	+
Avelino et al. (2005)	Panel-data methods	312; 314	19 Latin American countries	1980-1999	ns	+	n/a	n/a
Stasavage (2005)	Pooled regression & panel-data methods	365; 247; 191	44 African countries	1980-1996	+	+	+	+
Busemeyer (2007)	Panel-data methods	421	21 OECD countries	1980-2001	+ or –	n/a	n/a	n/a
Huber et al. (2008)	Panel-data methods	446	18 Latin American countries	1970-2000	+	+	n/a	n/a
Iversen & Stephens (2008)	Panel-data methods	336; 138	18 OECD countries	1960-2003	–	ns	n/a	n/a
Akanbi & Schoeman (2010)	Panel-data methods	135	15 African countries	1995-2004	+	+	n/a	n/a
Fosu (2010)	Panel-data methods	79	35 Sub-Saharan countries	1975-1994	n/a	n/a	ns or +	ns
Potrafke (2011)	Panel-data methods	552; 247	23; 20 OECD countries	1970-1997; 1990-2006	–	n/a	n/a	n/a
Cockx & Francken (2016)	Panel-data methods	320 to 349	129 to 140 countries	1995-2009	+	n/a	n/a	n/a
Garritzmann & Seng (2016)	Panel-data methods	245	21 OECD countries	1995-2010	ns or –	+	n/a	n/a

Summary of the Key Hypotheses

Dependent Variables	**Explanatory Variables**	
	GNI per capita	Political Democracy
National Effort	+	+
Budget Share	?	+

The Data

Variable name	Description of the variable	Source
	Dependent variables	
pse/gdp	Public spending on education, total (% of GDP)	World Bank EdStats
pse/gov	Public spending on education, total (% of total government spending)	World Bank EdStats
	Explanatory variables	
ypc2015	GNI per capita country grouping in 2015, 21 OECD countries	World Bank (Atlas Method)
region	Richer (versus poorer) country regions	Authors' compilation
poldemoc	Political democracy classification: yes; no	Freedom House
	Control variables	
pop024	Population aged 0-24 (% of total population)	World Bank EdStats
urban	Urban population (% of total population)	World Bank WDI
trade	Exports plus imports of goods and services (% of GDP)	World Bank WDI
hci	Human capital index	Penn World Table 9.0
pop65	Population aged 65 and above (% of total population)	World Bank WDI
military	Military expenditure (% of GDP)	World Bank WDI
fiscbal	Fiscal balance (% of GDP)	World Bank DPG
debt	General government gross debt (IMF, % of GDP)	World Bank TCdata360
	Other variables	
gdppc	GDP per capita, PPP (constant 2011 international $)	World Bank WDI
gini	Gini index (World Bank Estimate)	World Bank WDI

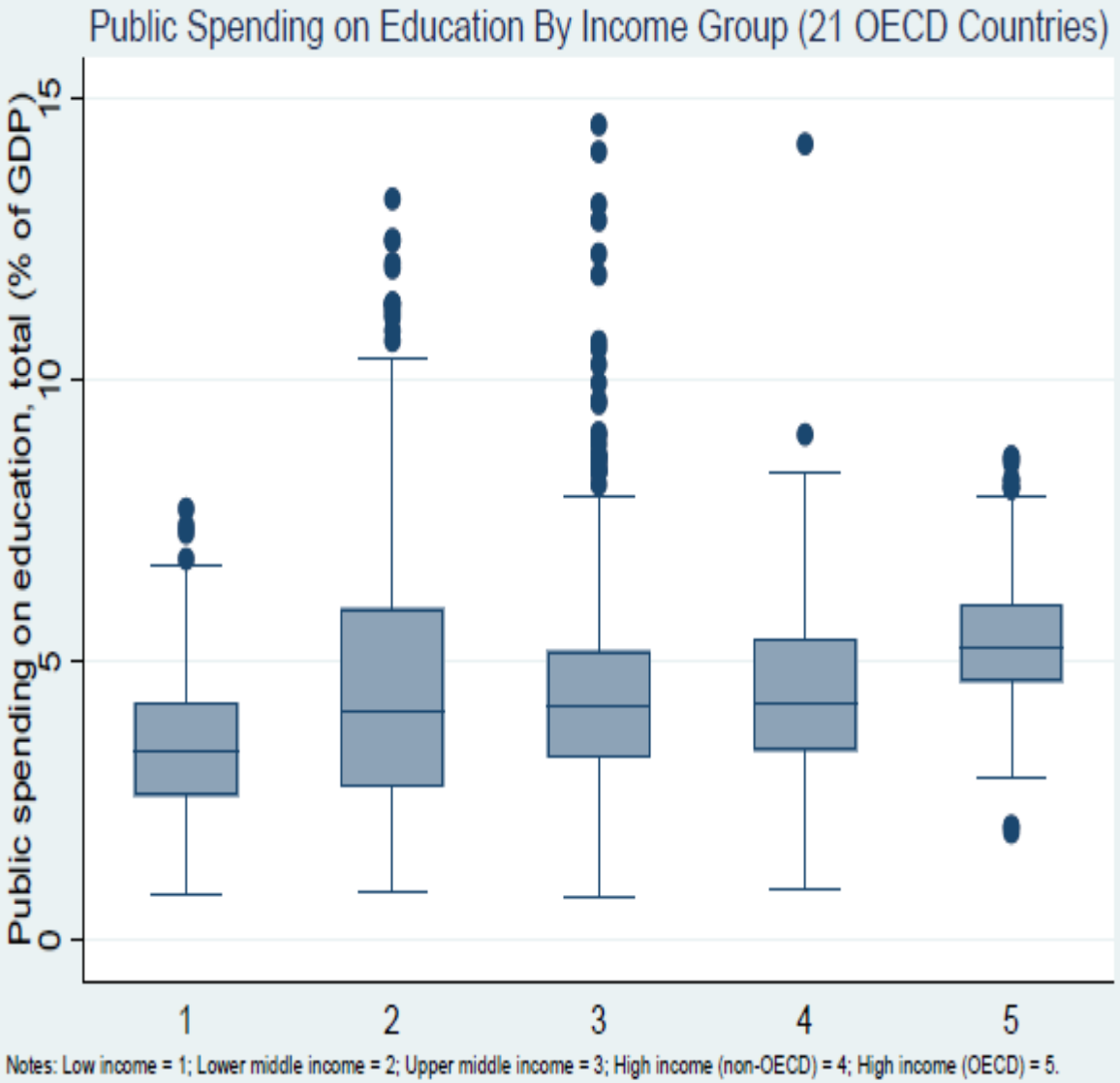
Notes: EdStats refers to the World Bank's Education Statistics database (World Bank, 2017a). TCdata360 refers to the World Bank's TCdata360 database (World Bank, 2017b). WDI refers to the World Bank's World Development Indicators database (World Bank, 2017c). DPG refers to the World Bank's Development Prospects Group: A Cross-Country Database of Fiscal Space (World Bank, 2017d). The pop024 variable is the sum of pop014 and pop1524 variables from the World Bank EdStats database. Freedom House refers to the Freedom in the World survey data (Freedom House, 2016). See Feenstra, Inklaar and Timmer (2015) for the Penn World Table 9.0.

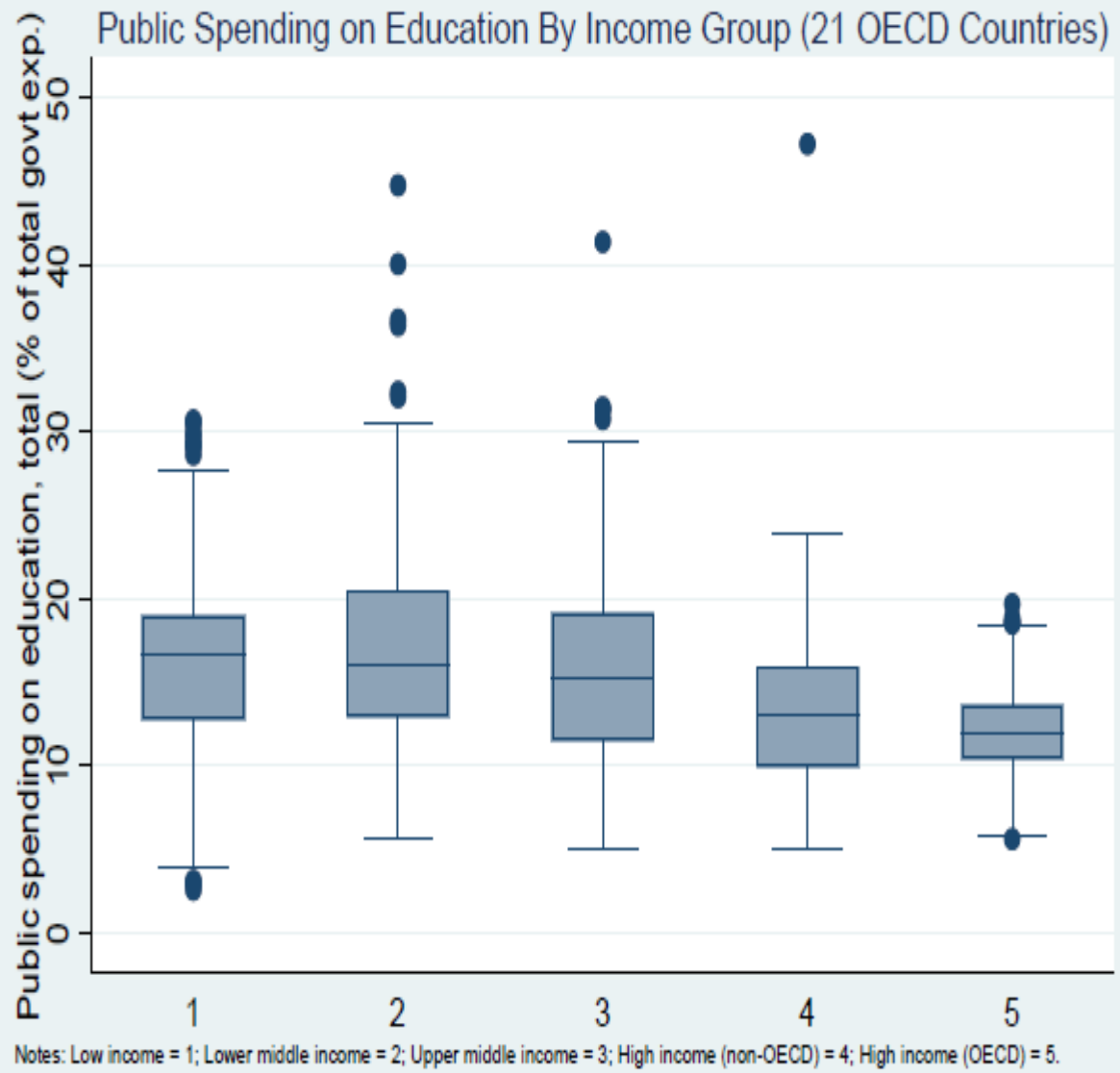
Descriptive Statistics

Variable name	Data coverage	*N*	Countries	Years	Mean	Std. dev.	Min.	Max.
pse/gdp	1989-2015	2551	193	13.2	4.505	2.007	0.781	44.334
pse/gov	1989-2015	2255	181	12.5	14.849	5.036	2.563	47.279
ypc2015	1989-2015	5859	217	27.0	n/a	n/a	n/a	n/a
region	1989-2015	3024	112	27.0	n/a	n/a	n/a	n/a
poldemoc	1989-2015	5105	193	26.5	n/a	n/a	n/a	n/a
pop024	1990-2015	4714	184	25.6	49.977	13.687	20.160	73.288
urban	1989-2015	5799	215	27.0	55.788	24.901	5.342	100.000
trade	1989-2015	4785	193	24.8	86.996	52.290	0.021	531.737
hci	1989-2014	3703	143	25.9	2.342	0.694	1.028	3.734
pop65	1989-2015	5234	195	26.8	7.073	4.814	0.697	26.342
military	1989-2015	3870	166	23.3	2.433	3.210	0	117.388
fiscbal	1990-2015	4184	191	21.9	-2.299	13.715	-505.442	122.188
debt	1989-2015	3796	186	20.4	57.015	49.714	0	789.833
gini	1989-2014	1188	155	7.7	39.875	9.871	16.23	65.76
gdppc	1990-2015	4803	195	24.6	15111	18507	247	137164

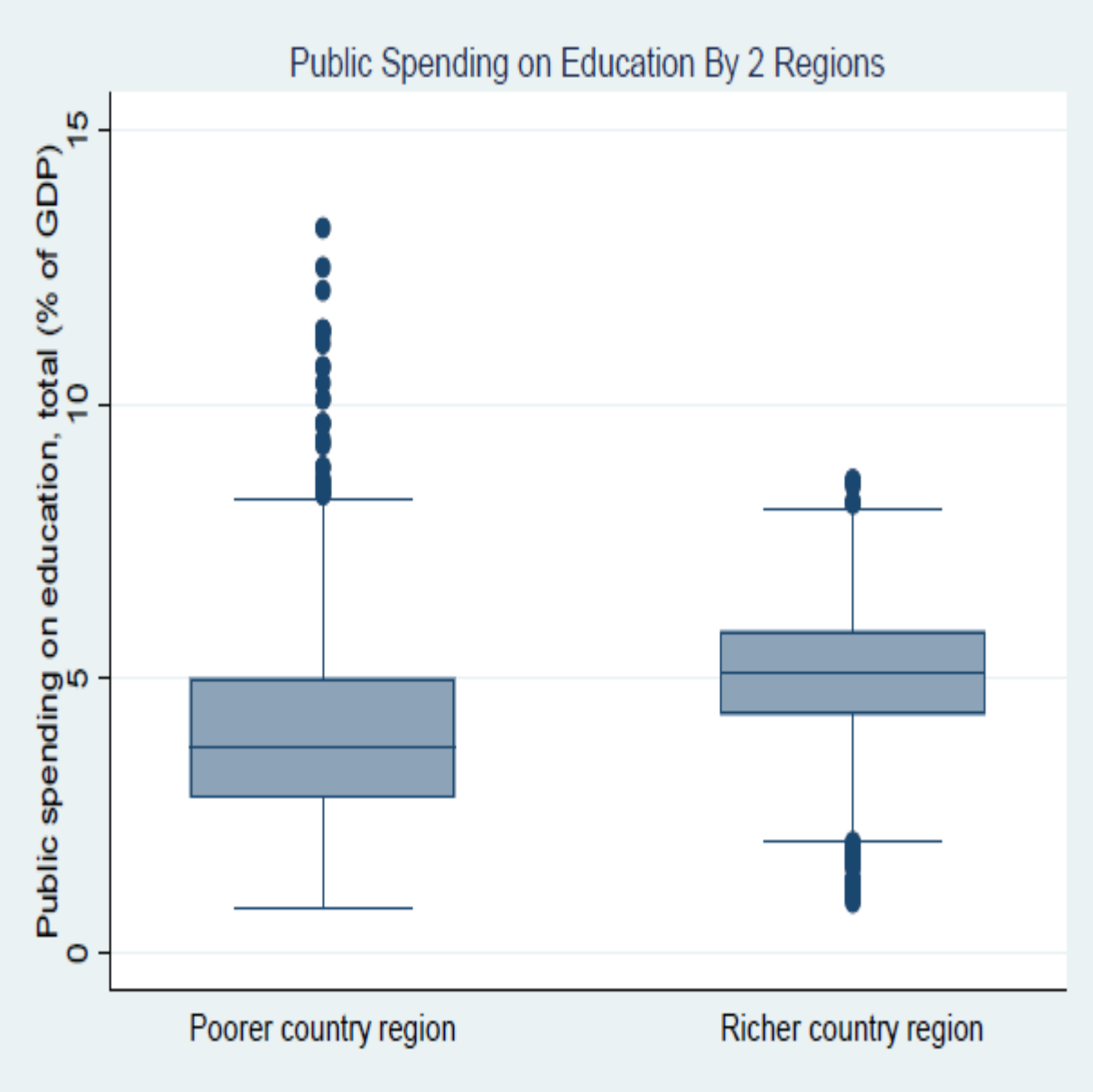
Notes: Years refers to the average number of years (time-series observations) for each country. Std. dev. refers to the overall standard deviation. Two changes were made to the original data for the pse/gdp variable. The zero observation for Turkey in 1998 was deleted (because there were no other 0% values in the dataset; nil or negligible appeared in the original UNESCO source data for this observation) and the observation for Tuvalu in 1997 (3730833.5%) was deleted as an obvious mistake; the extreme value for this observation also appeared in the original UNESCO source data. It was subsequently noted that this observation was deleted from the World Bank's Education Statistics (EdStats) data as of the update dated 21 May 2018. Descriptive results are not reported for ypc2015 (21 OECD countries), region and poldemoc because these are sets of binary variables used to characterise broad political and economic categories.

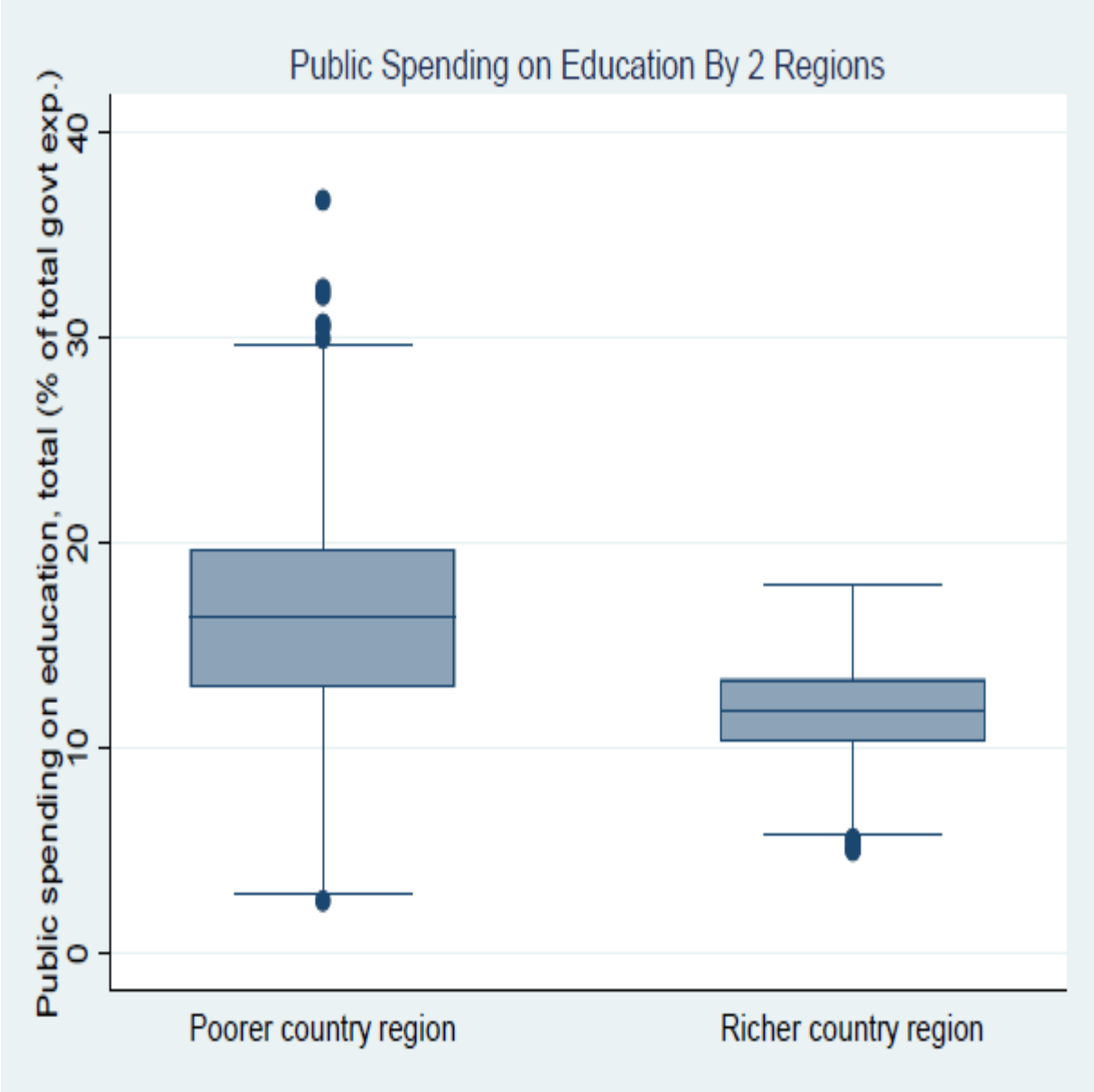
Data Visualisation (1 of 3)



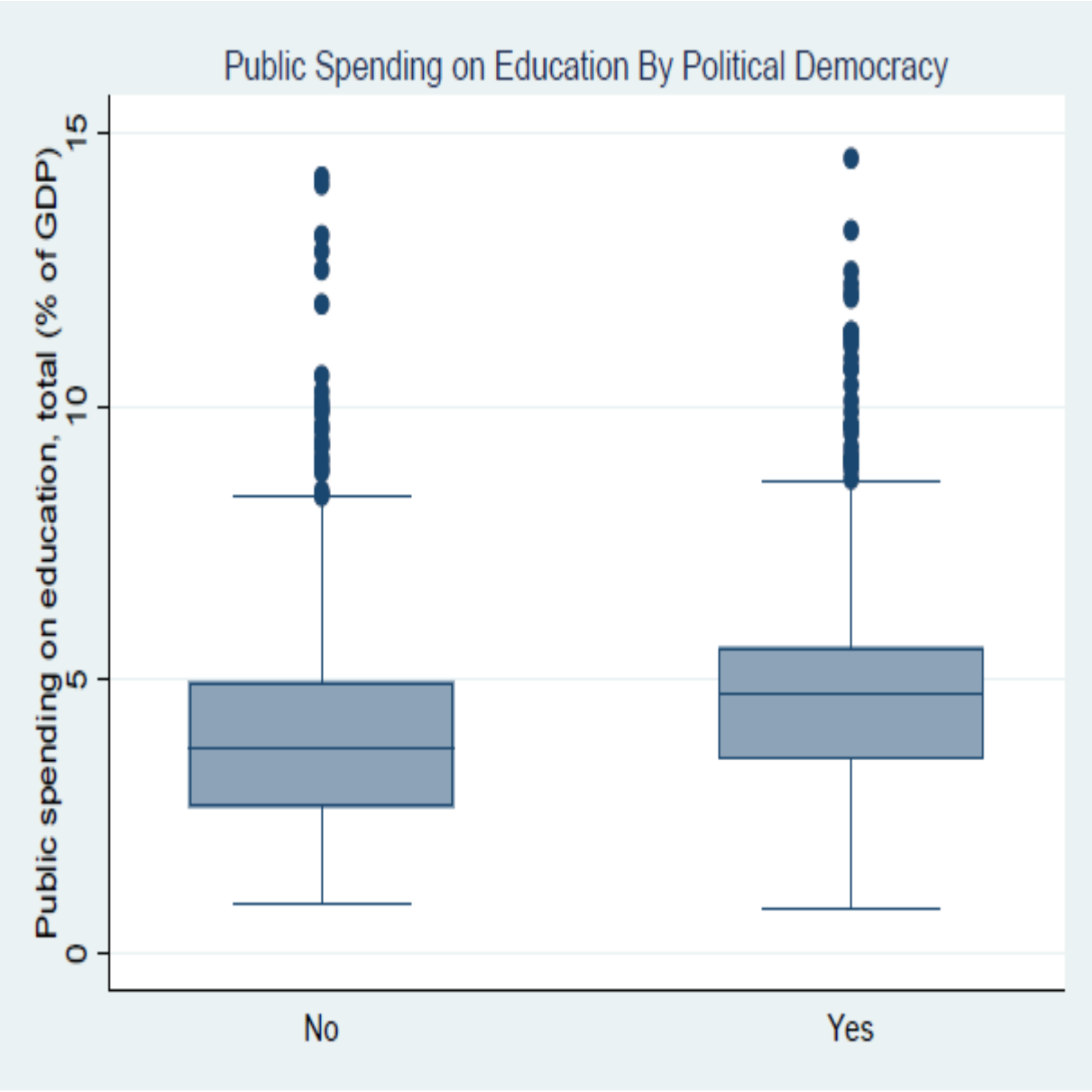


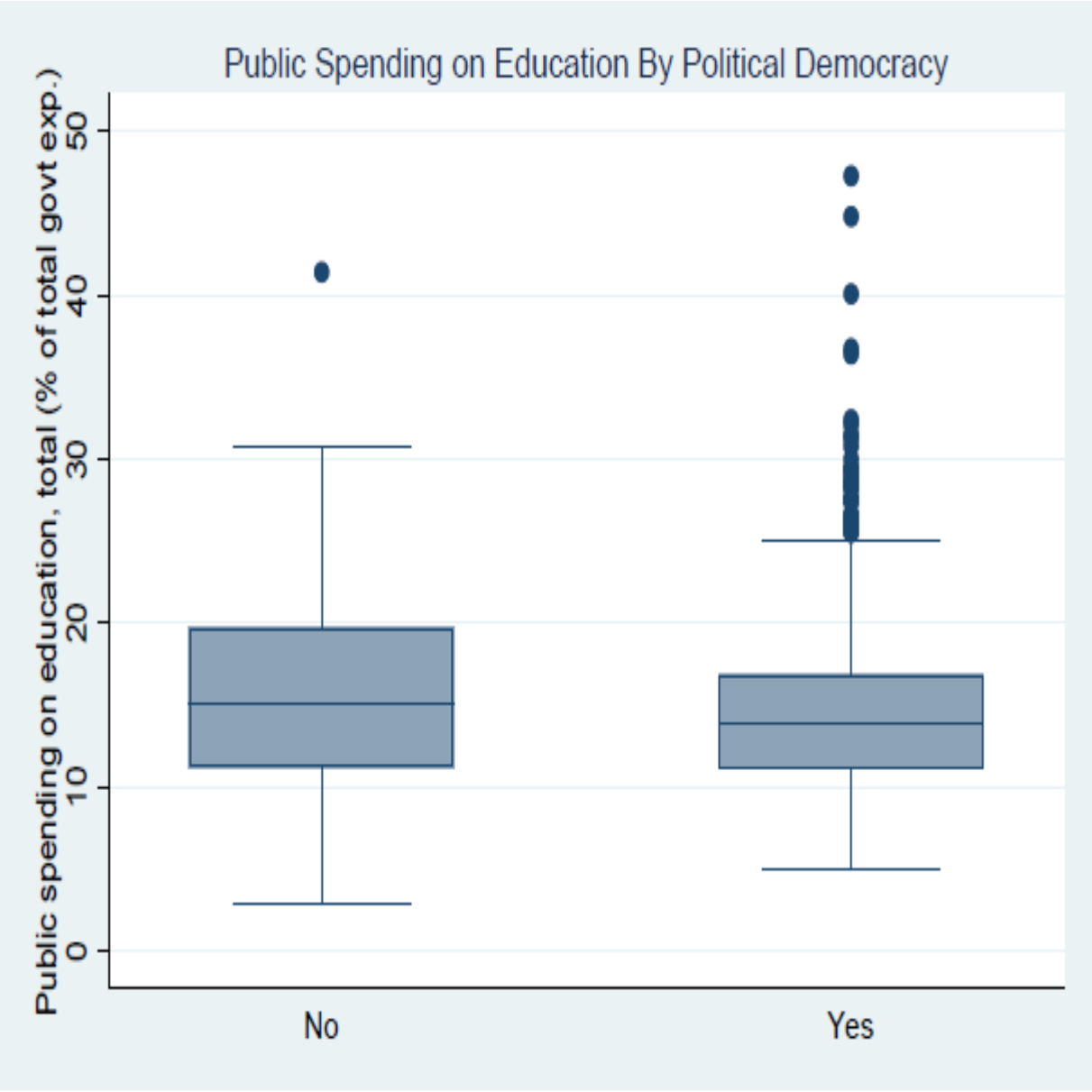
Data Visualisation (2 of 3)





Data Visualisation (3 of 3)





The Model

$$Y_{it} = \sum_{j=1}^{5} \sum_{m=0}^{1} \alpha_{jm} (E_{jit} \times P_{mit}) + \sum_{n=1}^{N} \beta_n X_{nit} + \varepsilon_{it} \qquad (1)$$

$$Y_{it} = \sum_{r=0}^{1} \sum_{m=0}^{1} \alpha_{rm} (R_{rit} \times P_{mit}) + \sum_{n=1}^{N} \beta_n X_{nit} + \varepsilon_{it} \qquad (2)$$

Robustness Checks

1. Although expressly catered for in the model, using a two-way factorial approach, nonetheless, shows the mediating effect of political forces on differences in education spending by level of economic development or regional economic status.
2. Examining the effects of different estimators of the standard errors.
3. Examining the effects of different estimators of the coefficients.
4. Using time dummies to control for year effects.
5. Using additional control variables (over-and-above the 3 key variables used).
6. Examining the effects of a continuous measure of GDP per capita.
7. Examining the effects of a Gini index measure.
8. Using human capital development lagged by one period.
9. Examining different quantiles using the quantile estimator.
10. Note that different combinations of high-income (OECD) countries were tested in earlier research work, but these did not confound the substantive patterns.

Sidebar: Education Spending and the Size of Government

$$\frac{\frac{E}{Y}}{\frac{E}{G}} \equiv \frac{E}{Y} \times \frac{G}{E} \equiv \frac{G}{Y}$$

Illustrative Results

Mean differences in the national effort and budget share by country region and regime type

Dependent Variable: pse/gdp	LSDV		Quantile		Robust	
	(A)	(B)	(A)	(B)	(A)	(B)
0#0. Poorer country regions, not democratic	-1.298***	-2.031***	-1.633***	-1.756***	-1.681***	-1.760***
0#1. Poorer country regions, democratic	-0.804***	-1.412***	-1.163***	-1.235***	-1.110***	-1.178***
1#0. Richer country regions, not democratic	n/a	n/a	n/a	n/a	n/a	n/a
1#1. Richer country regions, democratic BASE	5.169***	2.095***	5.114***	2.047***	5.213***	2.520***
Covariates	No	Yes	No	Yes	No	Yes
R-squared	0.057	0.167	0.090	0.170	0.154	0.313
F-value	52.61***	63.60***	n/a	n/a	135.10***	125.25***
Countries	102	97	102	97	102	97
Years	27	26	27	26	27	26
Observations	**1486**	**1382**	**1486**	**1382**	**1486**	**1382**
Dependent Variable: pse/gov	**LSDV**		**Quantile**		**Robust**	
	(A)	(B)	(A)	(B)	(A)	(B)
0#0. Poorer country regions, not democratic	3.880***	1.492**	4.046***	0.726	3.757***	1.108*
0#1. Poorer country regions, democratic	5.077***	3.321***	4.833***	2.284***	4.923***	2.945***
1#0. Richer country regions, not democratic	n/a	n/a	n/a	n/a	n/a	n/a
1#1. Richer country regions, democratic BASE	11.944***	5.333***	11.849***	2.093**	11.943***	3.705***
Covariates	No	Yes	No	Yes	No	Yes
R-squared	0.195	0.222	0.140	0.171	0.189	0.247
F-value	270.00***	113.21***	n/a	n/a	158.19***	84.82***
Countries	99	96	99	96	99	96
Years	27	26	27	26	27	26
Observations	**1360**	**1299**	**1360**	**1299**	**1360**	**1299**

*Notes: BASE group is high-income (OECD) and democratic countries. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.*

Discussion: Three Inequality Propositions

Description	Richer Countries		Poorer Countries
Proposition 1 (national effort)	$\left(\frac{E}{Y}\right)_R$	$>$	$\left(\frac{E}{Y}\right)_P$
Proposition 2 (budget share)	$\left(\frac{E}{G}\right)_R$	$<$	$\left(\frac{E}{G}\right)_P$
Proposition 3 (public sector)	$\left(\frac{G}{Y}\right)_R$	$>$	$\left(\frac{G}{Y}\right)_P$

Policy Implications and/or Avenues for Further Research

Question Are there any policy implications or further research work emerging from this study?

Policy Implications and/or Avenues for Further Research

Some possible suggestions:

1. Public policy analysis could focus on testing the inequality propositions with respect to other components of the government's budget allocation (e.g., health, military, or welfare spending).

2. Do the national effort and budget share measures of education spending 'cycle'?

3. Is education a 'luxury' or 'necessity' good (estimating the income elasticity of education spending) and does the income elasticity vary in 'good' times versus 'bad' times?

4. Examining the relationship between education spending and the size of government with respect to comparative statics and comparative dynamics, some of which has been tackled in Millin (2019).

References

Akanbi, O. A. and Schoeman, N. J., 2010. The determinants of public expenditure and expenditure on education in particular in a selection of African countries. *South African Journal of Economic and Management Sciences*, 13(1), pp. 50-61. https://doi.org/10.4102/sajems.v13i1.196

Avelino, G., Brown, D. S. and Hunter, W., 2005. The effects of capital mobility, trade openness, and democracy on social spending in Latin America, 1980-1999. *American Journal of Political Science*, 49(3), pp. 625-641. https://doi.org/10.1111/j.1540-5907.2005.00146.x

Baqir, R., 2002. Social sector spending in a panel of countries. *IMF Working Paper*, No. 02/35. https://doi.org/10.5089/9781451845365.001

Baumol, W. J., 1967. Macroeconomics of unbalanced growth: The anatomy of urban crisis. *American Economic Review*, 57(3), pp. 415-426. https://www.jstor.org/stable/1812111

Baumol, W. J. and Bowen, W. G., 1966. *Performing arts – The economic dilemma. A study of problems common to theater, opera, music and dance*. New York, NY: The Twentieth Century Fund.

Busemeyer, M. R., 2007. Determinants of public education spending in 21 OECD democracies, 1980-2001. *Journal of European Public Policy*, 14(4), pp. 582-610. https://doi.org/10.1080/13501760701314417

Castles, F. G., 1989. Explaining public education expenditure in OECD nations. *European Journal of Political Research*, 17(4), pp. 431-448. https://doi.org/10.1111/j.1475-6765.1989.tb00202.x

Cockx, L. and Francken, N., 2016. Natural resources: A curse on education spending? *Energy Policy*, 92, pp. 394-408. https://doi.org/10.1016/j.enpol.2016.02.027

Feenstra, R. C., Inklaar, R. and Timmer, M. P., 2015. The next generation of the Penn World Table. *American Economic Review*, 105(10), pp. 3150-3182. https://doi.org/10.1257/aer.20130954

References

Fosu, A. K., 2010. The external debt-servicing constraint and public-expenditure composition in sub-Saharan Africa. *African Development Review*, 22(3), pp. 378-393. https://doi.org/10.1111/j.1467-8268.2010.00252.x

Freedom House, 2016. *Freedom in the world survey data*. https://freedomhouse.org/report/freedom-world/freedom-world-2016

Garritzmann, J. L. and Seng, K., 2016. Party politics and education spending: Challenging some common wisdom. *Journal of European Public Policy*, 23(4), pp. 510-530. https://doi.org/10.1080/13501763.2015.1048703

Huber, E., Mustillo, T. and Stephens, J. D., 2008. Politics and social spending in Latin America. *Journal of Politics*, 70(2), pp. 420-436. https://doi.org/10.1017/S0022381608080407

Iversen, T. and Stephens, J. D., 2008. Partisan politics, the welfare state, and three worlds of human capital formation. *Comparative Political Studies*, 41(4/5), pp. 600-637. https://doi.org/10.1177/0010414007313117

Kuckuck, J., 2014. Testing Wagner's law at different stages of economic development. *FinanzArchiv/Public Finance Analysis*, 70(1), pp. 128-168. https://doi.org/10.1628/001522114X679183

Millin, M.W., 2019. *An analysis of public spending on education*. Unpublished Doctoral Thesis, University of Otago, Dunedin. https://ourarchive.otago.ac.nz/handle/10523/9710

Peacock, A. and Scott, A., 2000. The curious attraction of Wagner's law. *Public Choice*, 102(1-2), pp. 1-17. https://doi.org/10.1023/A:1005032817804

Potrafke, N. 2011. Does government ideology influence budget composition? Empirical evidence from OECD countries. *Economics of Governance*, 12(2), 101-134. https://doi.org/10.1007/s10101-010-0092-9

Ram, R., 1995. Public educational expenditures in the United States: An analytical comparison with other industrialized countries. *Economics of Education Review*, 14(1), pp. 53-61. https://doi.org/10.1016/0272-7757(94)00029-6

References

Stasavage, D., 2005. Democracy and education spending in Africa. *American Journal of Political Science*, 49(2), 343-358. https://doi.org/10.1111/j.0092-5853.2005.00127.x

Tilak, J. B. G., 1989. The recession and public investment in education in Latin America. *Journal of Interamerican Studies and World Affairs*, 31(1-2), pp. 125-146. https://doi.org/10.2307/165914

Verner, J.G. 1979. Socioeconomic environment, political system, and educational policy outcomes: A comparative analysis of 102 countries. *Comparative Politics*, 11(2), 165-187. https://doi.org/10.2307/421754

Wagner, A., 1883, 1958. Three extracts on public finance. In R. A. Musgrave and A. T. Peacock, eds, *Classics in the theory of public finance.* London: Palgrave Macmillan, pp. 1-15.

Wagner, A., 1892. *Grundlegung der politischen ökonomie* (3rd ed.). Leipzig: Winter

World Bank, 2017a. *Education statistics: Education expenditure*. http://databank.worldbank.org/data/reports.aspx?source=Education-Statistics:-Education-Expenditure

World Bank, 2017b. *TCdata360 database*. http://tcdata360.worldbank.org/

World Bank, 2017c. *World development indicators*. http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators

World Bank. 2017d. *World Bank development prospects group: A cross-country database of fiscal space*. http://www.worldbank.org/en/research/brief/fiscal-space

Zymelman, M. 1976. *Patterns of educational expenditures*. World Bank Staff Working Paper No. 246, International Bank for Reconstruction and Development, World Bank, Washington, D.C. http://documents.worldbank.org/curated/en/899691468766202748/Patterns-of-educational-expenditures