ONLINE APPENDIX: When Do Authoritarian Rulers Educate: Trade Competition and Human Capital Investment in Non-Democracies

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A Measuring trade competition

To capture competition among countries that target the same export markets with similar products, we calculate pair-wise structural equivalence based on sector-level bilateral trade data. Structural equivalence is calculated by taking the correlation between two countries' exports at both bilateral and sector levels. Therefore, a given country's "export profile" is composed of $k \times (n-1)$ elements in which n is the total number of countries, and k the number of trade sectors. Data for dyadic sector-level trade are from the United Nations' Comtrade database which covers international commerce at the dyadic level since 1962 and for commodities detailed to the level of five-digits Standard International Trade Classification (SITC). Aggregating bilateral trade to the one-digit SITC level yields ten broad sectors of trade: 1) food and live animals directly for food; 2) beverages and tobacco; 3) crude materials, inedible, except fuels; 4) mineral fuels, lubricants and related materials; 5) animal and vegetable oils, fats and waxes; 6) chemical and related products; 7) manufactured goods, classified chiefly by material; 8) machinery and transport equipment; 9) miscellaneous manufactured articles; 10) commodities and transactions not classified elsewhere.[1] A correlation matrix of each country's exports across the ten trade sectors and to all other countries in the world is then generated to capture this structural similarity.

The value of correlation capturing the structural equivalence between countries i and j in a given year t ($struc.equiv_{i,j,t}$) is bounded between -1 and 1, with 1 representing complete structurally equivalence of two countries. This means these countries have the exact profiles of bilateral exports to other countries across ten sectors of trade. The value of -1, on the other hand, captures the situation where two countries share the most dissimilar export profiles.[2]

To give a more intuitive view, 58 autocratic countries are chosen from year 2000 to illustrate the network of export competition: these are countries whose total exports in 2000 exceeded 500 million dollars — we choose not to include all 118 autocratic countries included in regression analysis because it will result in a figure with too many countries to observe any clear pattern. In the following figure, the distance between countries captures the degree of similarity in the ways in which they are connected to the rest of the export network: this is calculated based on structural equivalence between countries using bilateral and one-digit SITC level trade data -– in other words, a short distance between two countries indicates that they are selling same/similar products to a group of same/similar export destination countries. For instance, the lower right-hand side of the figure shows a small cluster of three countries, United Arabic Emirates (UAE), Qatar (QAT), and Oman (OMA), reflecting the fact that all three are essentially oil-exporting

[1] While we appreciate the advantages of dis-aggregating bilateral export data beyond sector level, the data quality decreases when one moves to higher-digits levels (for example, larger numbers of missing values).

[2] Arguably, some countries might have zero trade for all the $k \times (n-1)$ elements in export profile and this might inflate the structural equivalence measure. We checked the Comtrade data and we find that there are very few zero and much more missing values. When we take correlation between countries' export profiles to calculate structural equivalence, we only use complete pairs of observations, that is, those without missing values. Therefore, it is unlikely that zero or very low bilateral trade values inflate the structural equivalence measure.

economies and therefore competitors for one another.[3]

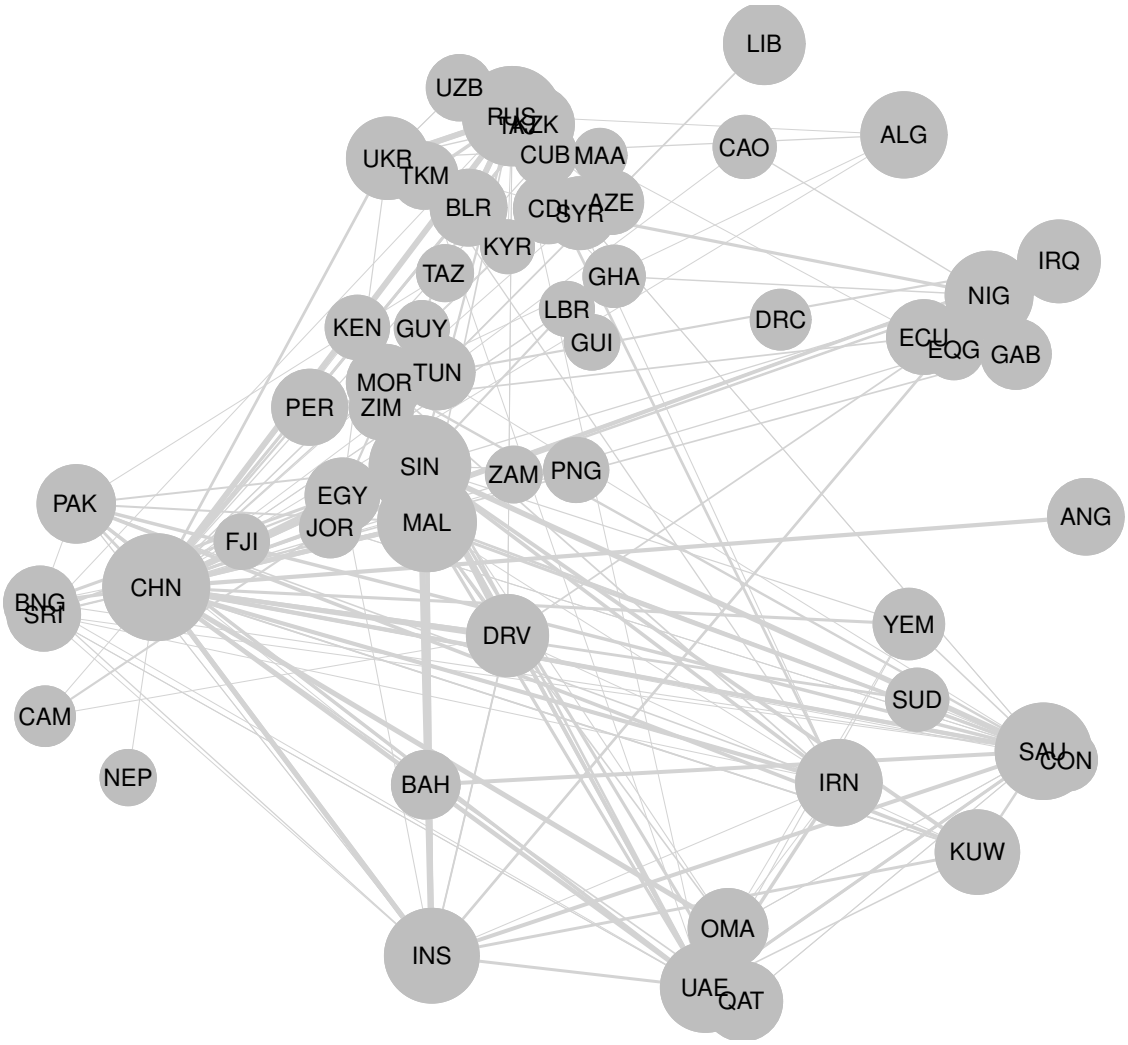


Figure 1: A Network of Export Competition among 58 Autocratic Countries, 2000.

While countries naturally compete in different export markets, only those exporting the same products to the same export market are likely to consider one another competitors. We assume, therefore, that for any country i, export-induced competitive pressures only come from countries that have a positive score of structural equivalence with i (only when $struc.equiv_{i,j,t} > 0$). For country i, the influence from a competing exporter j in year t can be summarized as $\frac{struc.equiv_{i,j,t}}{\sum_{j \neq i}^{n} struc.equiv_{i,j,t}}$. Note that we have standardized $struc.equiv_{i,j,t}$ by $\sum_{j \neq i}^{n} struc.equiv_{i,j,t}$, which is the sum of the total competitive pressure faced by country i from all its competitors.[4]

[3]Moreover, the size of gray dots are proportional to a country's total exports to the whole world. Finally, we show a gray line between two countries if export from one to another exceeded 100million dollars in 2000.

[4]$\sum_{j \neq i}^{n} struc.equiv_{i,j,t} = struc.equiv_{i,1,t} + struc.equiv_{i,2,t} + ... + struc.equiv_{i,n,t}, j \neq i$. In other words, we posit that j's influence on i is a relative term, defined by the relative importance of j's competitive pressure on i ($struc.equiv_{i,j,t}$) to the total competitive pressure faced by i from all its competitors

If country i's decision as to how much to invest in education is influenced by the decisions of its key trade competitor countries, we expect its education spending indicators are associated with the weighted average levels of these indicators in competitor countries We therefore use this standardized structural equivalence score to weigh the education expenditures in country i's competitor countries: $\sum_{j \neq i}^{n}(\frac{struc.equiv_{i,j,t}}{\sum_{j \neq i}^{n} struc.equiv_{i,j,t}} \times Ed.Spending_{j,t})$ is the weighted average of country i's competitor countries' education expenditures. Note that the weighted average of country i's competitor countries' education expenditures can be considered as a spatial lag in a spatial lag model. We could use a simpler notation $w_{i,j,t}^{Struc.Equiv.}$ for structural equivalence in trade. Further, the notation $\mathbf{y}_t$ can be thought of as a vector containing education expenditure levels, $Ed.Spending_{j,t}$, for all countries in year t. The pressure from competitor countries, as reflected in the weighted average of country i's competitor countries' expenditure levels, can therefore be expressed as a spatial lag term: $\mathbf{w}_{i,t}^{Struc.Equiv.}\mathbf{y}_t$.[5]

B Interdependence in human capital considering longer periods

As we have stressed in the main manuscript, educational investments take time to affect productivity and exports markets. If rulers react through an export market mechanism, it may be that their decision for investing in human capital due to international competition only takes place after a while. The World Bank data shows that the average theoretical time of primary and secondary education is 6 years in each level, and this value has remained constant over the period under analysis. We therefore consider this time length and re-estimate the effect of interdependence. Table 1 shows that lagging trade competitors' education spending by 6 years renders a larger effect than the one we report in the paper (the LRM in model 2 of Table 1 is 0.90). Using instead a longer lag of 10 years generates an effect that duplicates the size of what we report in the manuscript (the LRM in model 2 of Table 1 is 1.15). This suggests that the mechanism at work make take longer to fully realize and as a consequence we are only reporting "conservative" estimates in the manuscript.

$(\sum_{j \neq i}^{n} struc.equiv_{i,j,t})$.

[5] We can use a simple notation $\mathbf{W}_t^{Struc.Equiv.}$ to represent the whole weight/connectivity matrix to capture the effects of trade competition among countries for year t: $\mathbf{W}_t^{Struc.Equiv.}$ is a N by N weight/connectivity matrix (N equals the number of countries); $\mathbf{w}_{i,t}^{Struc.Equiv.}$ is therefore the ith row of the matrix.

	Model 1	Model 2
Education spending$_{t-1}$	-0.19 (0.01)***	-0.25 (0.02)***
$\left(\mathbf{W}_{t-1}^{struct.equiv}\mathbf{Ed.Spend}_{t-6}\right)$	0.17 (0.06)***	
Δ Education spending$_{t-6}$	-0.03 (0.06)	
$\left(\mathbf{W}_{t-1}^{struct.equiv}\mathbf{Ed.Spend}_{t-10}\right)$		0.28 (0.08)***
Δ Education spending$_{t-10}$		-0.21 (0.07)***
$\mathbf{W}_{t-1}^{regional}\mathbf{Ed.Spend}_{t-1}$	-0.11 (0.07)	-0.24 (0.09)***
$\Delta\left(\mathbf{W}_{t-1}^{regional}\mathbf{Ed.Spend}_{t-1}\right)$	-0.04 (0.07)	-0.06 (0.09)
Imports (log)$_{t-1}$	0.05 (0.06)	0.04 (0.07)
Δ Imports (log)	0.10 (0.07)	0.09 (0.08)
Exports (log)$_{t-1}$	-0.08 (0.05)	-0.07 (0.07)
Δ Exports (log)	-0.18 (0.07)***	-0.20 (0.08)**
Polity$_{t-1}$	0.00 (0.00)	0.00 (0.00)
Δ Polity	0.00 (0.01)	0.00 (0.01)
Population$< 14_{t-1}$	0.00 (0.01)	0.01 (0.01)*
Δ Population< 14	-0.08 (0.04)**	-0.12 (0.05)**
Urbanization$_{t-1}$	0.00 (0.00)	-0.01 (0.01)
Δ Urbanization	-0.08 (0.05)*	-0.07 (0.06)
Population (log)$_{t-1}$	-0.41 (0.16)***	-0.97 (0.21)***
Δ Population (log)	-0.40 (1.24)	-1.57 (1.38)
Real GDP p/c (log)$_{t-1}$	-0.00 (0.00)**	-0.00 (0.00)**
Δ Real GDP p/c (log)	-0.00 (0.00)	-0.00 (0.00)
Gov. consumption$_{t-1}$	0.02 (0.00)***	0.02 (0.00)***
Δ Gov. consumption	0.03 (0.00)***	0.03 (0.01)***
Output-gap$_{t-1}$	0.00 (0.00)**	0.00 (0.00)
Δ Output-gap	-0.00 (0.00)	-0.00 (0.00)
Adj. R^2	0.13	0.17
Num. obs.	2008	1523

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table 1: Trade Competition and Education Spending in Non-Democracies (1971-2009). Lagged effects considering theoretical duration of education

C Competition and education spending in democracies

Democracies do not follow education races due to trade competition. In developing countries, (sample used in models indicated by "LDC" in Table 1), interdependence has a negative and significant long-term effect on domestic education spending. This is also true for the regional spatial lag of education spending. See models 'LDCs 1' and 'LDC 2' from Table 2 below. If we look at the sample of developed democracies, the evidence is against long-run interdependence (only the short-run effects of the spatial lag are significant in the model "Developed 2"). These negative coefficients of interdependence may reflect that other mechanisms than trade competition are at play in democratic countries. Why developing country democracies would spend less on education when their trade competitor countries spend more? Our speculation is that when trade competitors invest in education which causes actual or perceived loss of competitiveness for a developing democracy, the country reacts by increasing compensation to trade losers using short-term-solution" policy instruments (e.g., subsidies) at the expense of the education spending.

	LDCs 1	LDCs 2	Developed 1	Developed 2
Education spending$_{t-1}$	-0.28 (0.02)***	-0.32 (0.02)***	-0.10 (0.01)***	-0.17 (0.02)***
$\mathbf{W}_{t-1}^{struct.equiv}\mathbf{Ed.Spend}_{t-1}$	-0.17 (0.10)*	-0.20 (0.10)**	-0.01 (0.12)	-0.12 (0.13)
$\Delta\left(\mathbf{W}_{t-1}^{struct.equiv}\mathbf{Ed.Spend}_{t-1}\right)$	-0.00 (0.10)	-0.12 (0.10)	-0.16 (0.15)	-0.27 (0.15)*
$\mathbf{W}_{t-1}^{regional}\mathbf{Ed.Spend}_{t-1}$		-0.17 (0.09)*		0.05 (0.05)
$\Delta\left(\mathbf{W}_{t-1}^{regional}\mathbf{Ed.Spend}_{t-1}\right)$		0.01 (0.09)		-0.01 (0.05)
Imports (log)$_{t-1}$		0.04 (0.12)		-0.39 (0.13)***
Δ Imports (log)		-0.09 (0.14)		-0.07 (0.20)
Exports (log)$_{t-1}$		-0.03 (0.10)		0.41 (0.13)***
Δ Exports (log)		-0.51 (0.13)***		0.09 (0.20)
Polity$_{t-1}$		0.02 (0.03)		0.00 (0.01)
Δ Polity		0.04 (0.05)		-0.04 (0.02)*
Population$<14_{t-1}$		0.03 (0.01)**		0.02 (0.01)*
Δ Population<14		-0.11 (0.08)		0.00 (0.07)
Urbanization$_{t-1}$		0.00 (0.01)		-0.01 (0.01)**
Δ Urbanization		-0.07 (0.08)		-0.03 (0.05)
Population (log)$_{t-1}$		-0.17 (0.28)		0.10 (0.33)
Δ Population<14		-0.32 (4.32)		3.32 (3.15)
Real GDP per capita $_{t-1}$		-0.00 (0.00)		-0.00 (0.00)**
Δ Real GDP per capita		-0.00 (0.00)		-0.00 (0.00)
Gov. consumption$_{t-1}$		0.02 (0.01)***		0.04 (0.01)***
Δ Gov. consumption		0.04 (0.01)***		0.10 (0.02)***
Output-gap$_{t-1}$		0.01 (0.00)*		0.01 (0.00)
Δ Output-gap		-0.00 (0.01)		0.00 (0.01)
Adj. R^2	0.14	0.21	0.05	0.13
Num. obs.	1119	1093	790	761

$^{***}p<0.01$, $^{**}p<0.05$, $^{*}p<0.1$. Country and year fixed effects are included in the models.

Table 2: Sample of democracies (subset(data, polity2>=7))

D Alternative measure for oil dependent countries

Regarding the conditional effect of natural resources, our theoretical argument is that from a ruler's point of view, the incentive to expand education depends on the revenue the ruler can extract from the working population relative to the "rents" from natural resources. This is the reason why we chose to use *rents* measures of natural resources in the paper: for instance, the *Oil rents* variable used in the paper is defined as the "difference between the value of crude oil production at world prices and total costs of production" as a percentage of GDP. Taking into account of production costs is very important for us given the significant cross-country variation in the costs of producing a barrel of oil and its impact on producing countries: for example, in the United Kingdom, it costs \$52.50 to produce a barrel of oil; in Brazil, it costs nearly \$49 per barrel while production costs are around \$41 a barrel in Canada; on the other hand, Saudia Arabia and Kuwait can pump a barrel of oil for less than \$10; Iraq can produce oil for about \$10.70 per barrel. Note that oil is trading now around \$42 per barrel, which means production in the UK and Brazil is actually losing money.

Ross (2012) offers an alternative measure of oil and gas wealth by dividing the total value of oil and gas production by a country's population. We think this is a very important measure for a country's overall oil and gas wealth. But it does not take into account the aforementioned cross-country and over-time variation in the cost of production which significantly affects the amount of rents that can be captured by an autocratic ruler. Therefore, our rents measures better capture our theoretical concepts. Nevertheless, we use Michel Ross' oil income per capita variable and re-estimate the effect of trade-induced interdependence in education spending conditional on oil resources. The Figure 2 plots the marginal long-run effects of interdependence across log per capita oil and gas production value (and vice-versa). We observe a very similar finding to what we have reported in the main paper. Rulers with no natural resources engage in education races; as oil and gas income per capita increases, the effect of interdependence becomes insignificant.

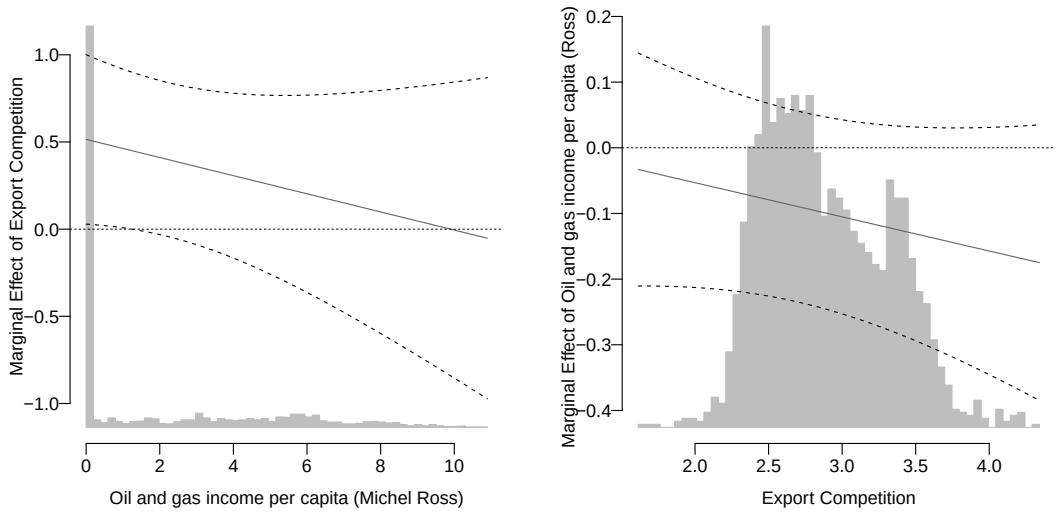


Figure 2: Interdependence conditional on oil and gas income

E Collective action mechanisms

Here we look at possible alternative explanations to our argument relating political institutions (i.e., authoritarian legislatures) and education spending induced by trade competition. First, legislatures may increase the amount of collective action in authoritarian countries. In particular, *elective* legislatures are thought to increase collective action due to mobilizing effects of electoral competition (Gehlbach and Keefer, 2011, 2012). We test whether autocrats with elective legislatures are more likely increase education spending due to competitor countries expansions in education policy. The first variable, "elective legislatures", takes the value 1 when the form of legislative selection is elective and current status of the legislature is elected (variables "legselec"=1 and "closed"=1, in Cheibub, Gandhi and Vreeland (2010)) and 0 otherwise. Alternatively, we also measure elective legislature with data from Gehlbach and Keefer (2012) that captures the existence of a legislature with competitive elections. It takes a value of 1 when the average value of LIEC (from DPI) is greater than 3.5, and 0 otherwise. Given the insignificant findings reported in the first two models from Table 3, we conclude that elective authoritarian legislatures seem to make no difference for trade-induced policy interdependence in education spending.

Another possible collective action mechanism affecting competition-induced education spending is ruling-party institutionalization. Institutionalized ruling-parties may increase collective action among regime supporters and therefore affect the demand side of education policy (Gehlbach and Keefer, 2012). We use the ruling-party institutionalization measure proposed by Gehlbach and Keefer (2012), which is the age of ruling party minus years in office. Findings in the "institutionalization" model from Table 3 offer no evidence in support for this type of collective action mechanism.

Finally, collective action may result from other mechanisms than authoritarian institutions. One possible proxy for realized collective action in autocracies could be mass-mobilization, namely, the number of strikes and demonstrations. The data are from the Cross-National Time-Series Data Archive (Banks, 2011). Despite the imperfect measures at hand, evidence in favor that mass-mobilization significantly mediates ruler's education spending choices would be problematic for our argument. Yet, we do not find evidence suggesting that collective action expressed by strikes and demonstrations mediates education policy interdependence. See models "Strikes" and "Demonstrations" form Table 3.

	Elective leg (spleg)	Elec.leg. (GehlbachKeefer)	Institutionalization	Strikes	Demonstrations
Education spending$_{t-1}$	$-0.19\ (0.01)^{***}$	$-0.22\ (0.01)^{***}$	$-0.22\ (0.01)^{***}$	$-0.19\ (0.01)^{***}$	$-0.18\ (0.01)^{***}$
$\mathbf{W}_{t-1}^{struct.equiv}\mathbf{Ed.Spend}_{t-1}$	0.10 (0.07)	0.03 (0.07)	$0.15\ (0.06)^{**}$	$0.09\ (0.05)^{*}$	$0.08\ (0.05)^{*}$
Elective Legislature$_{t-1}$	−0.07 (0.16)				
ΔElective Legislature	−0.02 (0.04)				
Elective Legislature$_{t-1}$*$\mathbf{W}_{t-1}^{struct.equiv}\mathbf{Ed.Spend}_{t-1}$)	0.01 (0.06)				
Elective Legislature (Gehlbach-Keefer)$_{t-1}$		−0.26 (0.18)			
ΔElective Legislature (Gehlbach-Keefer)		−0.06 (0.04)			
Elective Legislature (Gehlbach-Keefer)$_{t-1}$ * $\mathbf{W}_{t-1}^{struct.equiv}\mathbf{Ed.Spend}_{t-1}$)		0.08 (0.06)			
Ruling-party institutionalization$_{t-1}$			−0.00 (0.00)		
ΔRuling-party institutionalization			−0.00 (0.00)		
Ruling-party institutionalization$_{t-1}$ * $\mathbf{W}_{t-1}^{struct.equiv}\mathbf{Ed.Spend}_{t-1}$)			0.00 (0.00)		
Strikes$_{t-1}$				−0.09 (0.33)	
ΔStrikes				−0.00 (0.04)	
Strikes$_{t-1}$ * $\mathbf{W}_{t-1}^{struct.equiv}\mathbf{Ed.Spend}_{t-1}$)				0.03 (0.11)	
Demonstrations$_{t-1}$					−0.13 (0.13)
ΔDemonstrations					0.03 (0.02)
I(Demonstrations$_{t-1}$ * $\mathbf{W}_{t-1}^{struct.equiv}\mathbf{Ed.Spend}_{t-1}$)					0.05 (0.04)
$\mathbf{W}_{t-1}^{regional}\mathbf{Ed.Spend}_{t-1}$	−0.03 (0.06)	−0.01 (0.06)	−0.01 (0.07)	−0.03 (0.06)	−0.04 (0.06)
$\Delta\left(\mathbf{W}_{t-1}^{regional}\mathbf{Ed.Spend}_{t-1}\right)$	−0.01 (0.07)	−0.03 (0.07)	−0.03 (0.07)	−0.02 (0.07)	−0.03 (0.07)
Imports (log)$_{t-1}$	0.05 (0.05)	0.02 (0.06)	0.02 (0.06)	0.03 (0.05)	0.03 (0.05)
Δ Imports (log)	0.10 (0.06)	0.09 (0.07)	0.08 (0.07)	0.09 (0.06)	0.09 (0.06)
Exports (log)$_{t-1}$	$-0.08\ (0.04)^{*}$	−0.06 (0.05)	−0.07 (0.05)	−0.06 (0.04)	−0.06 (0.04)
Δ Exports (log)	$-0.22\ (0.06)^{***}$	$-0.23\ (0.06)^{***}$	$-0.24\ (0.07)^{***}$	$-0.21\ (0.06)^{***}$	$-0.21\ (0.06)^{***}$
Polity$_{t-1}$	−0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	−0.00 (0.00)	−0.00 (0.00)
Δ Polity	0.00 (0.01)	0.00 (0.01)	0.01 (0.01)	0.00 (0.00)	−0.00 (0.00)
Population< 14$_{t-1}$	−0.01 (0.00)	−0.00 (0.01)	−0.00 (0.01)	−0.00 (0.00)	−0.00 (0.00)
Δ Population< 14	$-0.08\ (0.04)^{**}$	$-0.10\ (0.04)^{**}$	$-0.10\ (0.04)^{**}$	$-0.08\ (0.04)^{**}$	$-0.08\ (0.04)^{**}$
Urbanization$_{t-1}$	−0.00 (0.00)	−0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Δ Urbanization	−0.05 (0.04)	−0.06 (0.05)	−0.07 (0.05)	−0.05 (0.04)	−0.05 (0.04)
Population (log)$_{t-1}$	$-0.30\ (0.13)^{**}$	$-0.42\ (0.15)^{***}$	$-0.49\ (0.15)^{***}$	$-0.35\ (0.14)^{***}$	$-0.34\ (0.14)^{**}$
Δ Population< 14	1.58 (1.09)	1.65 (1.16)	1.50 (1.15)	1.59 (1.13)	1.62 (1.14)
Real GDP per capita $_{t-1}$	$-0.00\ (0.00)^{*}$	$-0.00\ (0.00)^{**}$	−0.00 (0.00)	$-0.00\ (0.00)^{*}$	$-0.00\ (0.00)^{*}$
Δ Real GDP per capita	−0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	−0.00 (0.00)	−0.00 (0.00)
Gov. consumption$_{t-1}$	$0.01\ (0.00)^{***}$	$0.01\ (0.00)^{***}$	$0.01\ (0.00)^{***}$	$0.01\ (0.00)^{***}$	$0.01\ (0.00)^{***}$
Δ Gov. consumption	$0.03\ (0.00)^{***}$	$0.03\ (0.00)^{***}$	$0.03\ (0.00)^{***}$	$0.03\ (0.00)^{***}$	$0.03\ (0.00)^{***}$
Output-gap$_{t-1}$	0.00 (0.00)	0.00 (0.00)	−0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Δ Output-gap	−0.00 (0.00)	−0.00 (0.00)	−0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Adj. R^2	0.14	0.17	0.18	0.14	0.14
Num. obs.	2413	2158	1981	2419	2420

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$. Country and year fixed effects are included in the models.

Table 3: Elective authoritarian legislatures, ruling-party institutionalization, and mass-mobilization

We revisit our findings for partisan legislatures by controlling for institutional and political variables that capture different collective action mechanisms. Adding these control variables rather strengthen our findings regarding the presence partisan legislatures. See Table 4.

	Partisan legislature	Single/Multi-party legislature
Education spending$_{t-1}$	-0.24 (0.01)***	-0.24 (0.01)***
$\mathbf{W}_{t-1}^{struct.equiv}\mathbf{Ed.Spend}_{t-1}$	0.03 (0.08)	-0.01 (0.08)
Partisan Legislature$_{t-1}$	-0.50 (0.21)**	
ΔPartisan Legislature	-0.01 (0.05)	
Partisan Legislature$_{t-1}$ * $\mathbf{W}_{t-1}^{struct.equiv}\mathbf{Ed.Spend}_{t-1}$)	0.18 (0.07)**	
Single-Party Legislature$_{t-1}$		-0.56 (0.31)*
ΔSingle-Party Legislature		0.05 (0.06)
Single-Party Legislature$_{t-1}$ * $\mathbf{W}_{t-1}^{struct.equiv}\mathbf{Ed.Spend}_{t-1}$)		0.23 (0.11)**
Multy-Party Legislature$_{t-1}$		-0.66 (0.24)***
ΔMulty-Party Legislature		-0.06 (0.06)
Multy-Party Legislature$_{t-1}$ * $\mathbf{W}_{t-1}^{struct.equiv}\mathbf{Ed.Spend}_{t-1}$)		0.21 (0.08)***
Ruling-party institutionalization$_{t-1}$	-0.00 (0.00)	-0.00 (0.00)
ΔRuling-party institutionalization	-0.00 (0.00)	-0.00 (0.00)
Elective Legislature (Gehlbach-Keefer)$_{t-1}$	-0.05 (0.04)	-0.05 (0.04)
ΔElective Legislature (Gehlbach-Keefer)	-0.06 (0.06)	-0.06 (0.06)
Demonstrations$_{t-1}$	0.01 (0.03)	0.01 (0.03)
ΔDemonstrations	0.04 (0.02)*	0.04 (0.02)*
$\mathbf{W}_{t-1}^{regional}\mathbf{Ed.Spend}_{t-1}$	-0.03 (0.07)	-0.03 (0.07)
$\Delta\left(\mathbf{W}_{t-1}^{regional}\mathbf{Ed.Spend}_{t-1}\right)$	-0.05 (0.08)	-0.06 (0.08)
Imports (log)$_{t-1}$	0.03 (0.06)	0.02 (0.06)
Δ Imports (log)	0.08 (0.07)	0.08 (0.07)
Exports (log)$_{t-1}$	-0.10 (0.05)*	-0.11 (0.05)**
Δ Exports (log)	-0.24 (0.07)***	-0.24 (0.07)***
Polity$_{t-1}$	0.00 (0.00)	0.01 (0.00)**
Δ Polity	0.01 (0.01)	0.01 (0.01)
Population$< 14_{t-1}$	-0.00 (0.01)	-0.00 (0.01)
Δ Population$<$ 14	-0.12 (0.04)***	-0.13 (0.04)***
Urbanization$_{t-1}$	0.00 (0.00)	0.01 (0.00)
Δ Urbanization	-0.08 (0.05)	-0.07 (0.05)
Population (log)$_{t-1}$	-0.57 (0.18)***	-0.54 (0.18)***
Δ Population$<$ 14	1.82 (1.25)	1.75 (1.25)
Real GDP per capita $_{t-1}$	-0.00 (0.00)**	-0.00 (0.00)***
Δ Real GDP per capita	0.00 (0.00)	0.00 (0.00)
Gov. consumption$_{t-1}$	0.01 (0.00)***	0.01 (0.00)***
Δ Gov. consumption	0.03 (0.00)***	0.03 (0.00)***
Output-gap$_{t-1}$	0.00 (0.00)	0.00 (0.00)
Δ Output-gap	-0.00 (0.00)	-0.00 (0.00)
Adj. R^2	0.19	0.19
Num. obs.	1885	1885

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$. Country and year fixed effects are included in the models.

Table 4: Mediating Effects of partisan legislatures controlling for collective action institutions and mass-mobilization

F Education as cooptation

One concern is that education may serve for cooptation or clientelistic strategies to buy out supporters. Hence, two mechanisms or interpretations can be correct: education spending as ways to increase productivity — as we argue in the paper and further support below empirically — and education as a way to compensate supporters.

For the second mechanism, figuring out the key constituencies for each country and over time is admittedly complex, but at a very abstract level, this depends on who are the regime supporters and whether they benefit from education spending more than other groups in society. For instance, in a military regime, key constituencies are likely to be the military; in monarchies, expanded royal family and the military; in personalist regimes, the close circle of the leader plus the military; and in single party regimes, which include a much larger segment of the society, may involve groups like teachers' unions. Mexico under the PRI is one example. If this education as payoff to key constituencies mechanism is in place, we should observe single party regimes responding more to the education spending race, which is actually not the case in our empirical analysis. Admittedly, this is a very rough test. Hence, we investigate further using a variety of different variables to capture cooptation mechanisms more directly.

First, we use past education spending per pupil as a proxy for the strength of teachers' unions, and we interact this measure with the education race variable. High expenditure per pupil implies better teacher salaries and working conditions. Teacher unions' power may be correlated with such working conditions in the past. We use data on public spending in education per pupil by education level from the UNESCO Institute for Statistics (UIS). As shown in Table 5, rulers follow the education spending race irrespective of the level of spending per pupil lagged by ten years. This is the case in the three models corresponding to primary, secondary, and tertiary education. Moreover, we have tried different lag structures and also looked at these estimations only for a subsample of single-party regimes. Results remain the same and are available upon request. We interpret this information as lack of support for the argument that trade-induced education races work through a domestic cooptation mechanism.

Second, another proxy for teacher unions' strength is the amount government spending in teacher salaries relative to the overall economy. Unfortunately, this information is too sparse for conducting panel data analysis. Instead, we correlate teachers' salaries with the country specific coefficients of interdependence. Coefficients of interdependence per country are obtained by interacting the spatial lag of education spending with country dummies in the main model. The mean level of teachers' salaries as a percentage of GDP during the observed autocratic period in our sample comes from the UNESCO Institute for Statistics (UIS). Figure 3 plots the distribution of both variables. In the 'y' axis, the horizontal line at zero indicates no effect of interdependence. The 'x' axis represents teachers salaries over GDP. Different dots indicates salaries in primary and secondary education level. We observe no relationship between the size of trade competition interdependence in education spending and the share of teachers salaries in the overall economy. This would suggest that teachers' power power is unlikely to be correlated with rulers' decision to engage with trade-induced education races.

Third, we look at the effects of trade competitors' education spending on other domestic compensatory policies that may serve for cooptation strategies. Extant literature

	Primary	Secondary	Tertiary
Education spending$_{t-1}$	-0.22 (0.02)***	-0.21 (0.02)***	-0.21 (0.02)***
$\mathbf{W}_{t-1}^{struct.equiv}$**Ed.Spend**$_{t-1}$	0.19 (0.10)**	0.18 (0.10)*	0.13 (0.09)
Expenditure p/pupil primary$_{t-10}$	0.00 (0.01)		
$\mathbf{W}_{t-1}^{struct.equiv}$**Ed.Spend**$_{t-1}$*Expenditure p/pupil primary$_{t-10}$	0.00 (0.00)		
Expenditure p/pupil secondary$_{t-10}$		0.00 (0.00)	
$\mathbf{W}_{t-1}^{struct.equiv}$**Ed.Spend**$_{t-1}$*Expenditure p/pupil secondary$_{t-10}$		-0.00 (0.00)	
Expenditure p/pupil tertiary$_{t-10}$			0.00 (0.00)
$\mathbf{W}_{t-1}^{struct.equiv}$**Ed.Spend**$_{t-1}$*Expenditure p/pupil tertiary$_{t-10}$			-0.00 (0.00)
$\mathbf{W}_{t-1}^{regional}$**Ed.Spend**$_{t-1}$	0.01 (0.11)	-0.13 (0.11)	-0.12 (0.11)
$\Delta\mathbf{W}_{t-1}^{regional}$**Ed.Spend**	-0.04 (0.12)	-0.08 (0.11)	-0.05 (0.12)
Imports (log)$_{t-1}$	-0.04 (0.08)	-0.04 (0.09)	-0.08 (0.09)
Δ Imports (log)	0.04 (0.10)	-0.04 (0.10)	0.14 (0.11)
Exports (log)$_{t-1}$	0.01 (0.08)	-0.03 (0.08)	0.01 (0.09)
Δ Exports (log)	-0.15 (0.09)*	-0.10 (0.09)	-0.20 (0.10)**
Polity$_{t-1}$	0.01 (0.01)	0.01 (0.01)	0.00 (0.01)
Δ Polity	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)
Population$<14_{t-1}$	-0.00 (0.01)	-0.01 (0.01)	-0.00 (0.01)
Δ Population<14	-0.10 (0.06)*	-0.10 (0.06)*	-0.09 (0.06)
Urbanization$_{t-1}$	0.01 (0.01)	-0.00 (0.01)	0.01 (0.01)
Δ Urbanization	0.01 (0.07)	0.04 (0.08)	0.05 (0.08)
Population (log)$_{t-1}$	-0.30 (0.26)	-0.18 (0.26)	0.03 (0.25)
Δ Population<14	0.93 (1.67)	-3.46 (1.99)*	2.01 (1.89)
Real GDP per capita $_{t-1}$	-0.00 (0.00)	-0.00 (0.00)*	-0.00 (0.00)*
Δ Real GDP per capita	0.00 (0.00)*	-0.00 (0.00)	0.00 (0.00)
Gov. consumption$_{t-1}$	0.01 (0.01)	0.01 (0.01)**	0.01 (0.01)
Δ Gov. consumption	0.04 (0.01)***	0.03 (0.01)***	0.03 (0.01)***
Output-gap$_{t-1}$	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
Δ Output-gap	-0.00 (0.00)	-0.00 (0.00)	-0.01 (0.00)
Adj. R^2	0.20	0.13	0.17
Num. obs.	1022	992	991

$^{***}p<0.01$, $^{**}p<0.05$, $^{*}p<0.1$. Country and year fixed effects are included in the models.

Table 5: Mediating effects of past levels of spending per pupil

has emphasized that developing countries increase the size of the public sector after trade competition increases as a means of compensating trade losers (Rickard, 2012; Nooruddin and Rudra, 2014; Rodrik, 2000, 1998). This literature finds that the effects of trade have consequences for both public sector employment and total government spending. We have collected data on total public employment from the International Labour Organization using the current ILOSTAT database and previous LABORSTA, Labour Statistics Database (1985-2010)[6]. Data on general government total expenditure as a percentage of GDP comes from the Government Finance Statistics and World Economic Outlook of the International Monetary Found (IMF).

Table 6 includes four different models, estimating the effects education interdependence on public employment and total government spending for the complete sample of autocracies and a sub-sample of single-party regimes. In all models, increased trade competitor education spending has no effect on domestic public employment and domestic

[6]Public sector employment is the "total public sector employment covers all employment of general government sector as defined in System of National Accounts 1993 plus employment of publicly owned enterprises and companies, resident and operating at central, state (or regional) and local levels of government. It covers all persons employed directly by those institutions, without regard for the particular type of employment contract." See: Hammouya, Messaoud. "Statistics on public sector employment: methodology, structures and trends". No. 993362463402676. International Labour Organization, 1999.

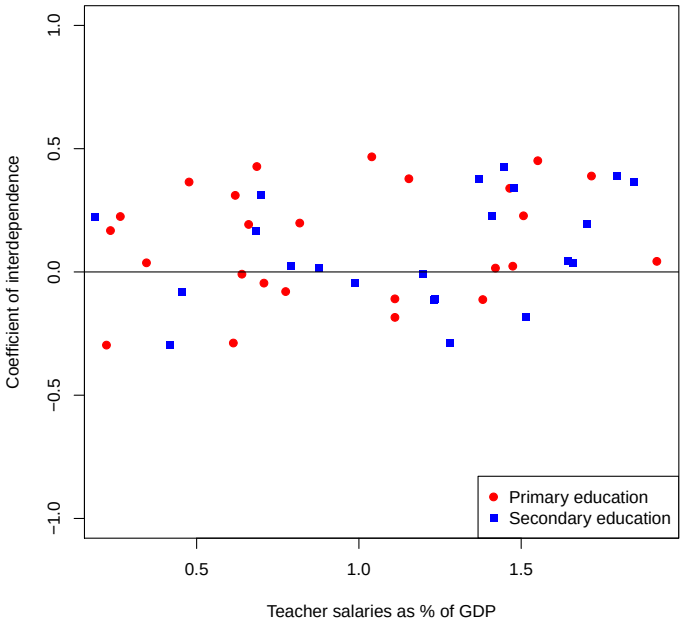


Figure 3: Effects of interdependence and teachers' salaries in primary and secondary education

total government spending. Note that we control for government consumption, but this has no impact on the result. Total imports, however, has a strong and significant effect on domestic government spending.

We have also conducted other several estimations with variables capturing public sector and executive corruption using data form the V-Dem project. We find no evidence that human capital induced trade competition increases domestic corruption in autocracies. If our results form the main paper were capturing a cooptation mechanism, one would also expect that the interdependence variable will affect more traditional forms of cooptation such as public sector employment or the size of government. Yet, we observe otherwise, giving additional confidence to the theoretical argument linking the expansion of education policy for higher productivity and government revenue.

	All autocracies		Single-party regimes	
	Public employment	Government Spending	Public employment	Government Spending
Public sector employment (log)$_{t-1}$	-0.27 (0.05)***		-0.45 (0.19)**	
Total government spending/GDP $_{t-1}$		-0.33 (0.02)***		-0.39 (0.03)***
$\mathbf{W}^{struct.equiv}_{t-1}\mathbf{Ed.Spend}_{t-1}$	0.01 (0.03)	-0.41 (0.39)	0.00 (0.11)	-0.36 (0.71)
$\mathbf{W}^{regional}_{t-1}\mathbf{Ed.Spend}_{t-1}$	0.04 (0.03)	-0.27 (0.43)	0.05 (0.15)	1.35 (0.98)
$\Delta\mathbf{W}^{regional}_{t-1}\mathbf{Ed.Spend}$	0.04 (0.03)	-0.49 (0.47)	0.06 (0.11)	0.21 (0.98)
Imports (log)$_{t-1}$	-0.01 (0.05)	1.19 (0.41)***	0.29 (0.23)	0.18 (0.82)
Δ Imports (log)	0.01 (0.05)	1.73 (0.52)***	0.16 (0.15)	1.74 (1.04)*
Exports (log)$_{t-1}$	0.01 (0.05)	0.37 (0.34)	-0.01 (0.25)	1.70 (0.71)**
Δ Exports (log)	0.02 (0.05)	-0.82 (0.44)*	0.00 (0.20)	0.80 (0.91)
Polity$_{t-1}$	-0.01 (0.00)	0.06 (0.03)**	-0.01 (0.02)	0.02 (0.07)
Δ Polity	-0.00 (0.00)	-0.02 (0.04)	-0.01 (0.02)	-0.08 (0.09)
Population$< 14_{t-1}$	0.04 (0.01)***	0.05 (0.04)	0.02 (0.04)	-0.00 (0.08)
Δ Population< 14	-0.02 (0.03)	0.46 (0.29)	-0.30 (0.21)	-0.37 (0.51)
Urbanization$_{t-1}$	0.02 (0.01)***	-0.06 (0.03)**	-0.00 (0.03)	-0.12 (0.04)***
Δ Urbanization	0.12 (0.10)	0.27 (0.35)	0.23 (0.37)	-0.15 (0.75)
Population (log)$_{t-1}$	-0.39 (0.16)**	1.26 (1.21)	-1.76 (1.90)	1.62 (3.39)
Δ Population< 14	0.10 (1.31)	-11.96 (7.60)	-4.43 (6.51)	-9.37 (21.82)
Real GDP per capita $_{t-1}$	-0.00 (0.00)*	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)
Δ Real GDP per capita	-0.00 (0.00)	-0.00 (0.00)**	0.00 (0.00)	-0.00 (0.00)
Gov. consumption$_{t-1}$	-0.00 (0.00)	0.23 (0.03)***	-0.02 (0.02)	0.21 (0.06)***
Δ Gov. consumption	0.01 (0.00)***	0.62 (0.03)***	-0.00 (0.01)	0.74 (0.06)***
Output-gap$_{t-1}$	0.00 (0.00)	0.03 (0.01)***	-0.02 (0.01)*	0.08 (0.02)***
Δ Output-gap	0.00 (0.00)**	0.01 (0.02)	0.00 (0.01)	0.07 (0.04)*
Adj. R^2	0.23	0.31	0.18	0.37
Num. obs.	236	2037	79	690

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$. Country and year fixed effects are included in the models.

Table 6: Effects education spending among trade competitors (interdependence) on public sector employment and total government spending

G Negative shocks of trade competition and increased domestic repression

We have discussed that single-party regimes may use education as a cooptation mechanism after a negative trade shock inspired by higher human capital in foreign trade competitor countries. Empirically, we reject such alternative explanation: see the last section of this online appendix. In a similar logic, other regimes may increment control over civil society and repression. Regimes based on smaller constituencies such as military regimes, personal regimes, and monarchies, may respond to trade competition with repression rather than cooptation.

To explore this possibility we estimate the effects of education spending in trade competitor countries on domestic military spending as a percentage of GDP taken from World Development Indicators (World Bank), and two measures of civil society control and repression taken from the V-Dem project (Varieties of Democracy). The V-Dem project has produced times series cross sectional data based country expert coding around the globe. The first measure are estimates of civil society "repression", using the following question: "does the government attempt to repress civil society organizations (CSOs)?". The choices run from zero to four. We inverted the scale so higher values are more repression. The choices are 'no' repression, 'weakly' (e.g., material sanctions), 'moderately' (material sanctions and minor legal harassment or restrictions to civil society organizations), 'substantially' (in addition the government arrests and imprisons leaders and participants from oppositional civil society organizations), 'severely' (violent repression of civil society). The second variable is a measure of "control" over the civil society: "To what extent does the government achieve control over entry and exit by civil society organizations (CSOs) into public life?". Choices are 'unconstrained','Minimal control' (constitutional provisions allow the government to ban organizations or movements that have a history of anti-democratic action in the past), 'moderate control' (partial or full government ban on independent CSOs, but some prohibited organizations manage to play an active political role), 'substantial control' (the government licenses all CSOs and uses political criteria to ban organizations that are likely to oppose the government), 'monopolistic control' (the government exercises an explicit monopoly over CSOs. The only organizations allowed to engage in political activity are government-sponsored organizations).[7]

Table 7 presents the results for the three dependent variables (military spending, government repression, and government control) using the entire sample of autocracies and a sub-sample that excludes single-party regimes (i.e., military, personal, and monarchies). Models for repression and control exclude the "polity" score as they are highly correlated measures. (Controlling for polity, however, does not affect the implication of this analysis for our main argument.) The spatial lag variable of education spending based on trade competition has no effect on military spending and government control over civil society. Trade interdependence has a *negative* effect on repression only for the sample excluding observations of single-party regimes.

In sum, single-party regimes do not use education as cooptation after enhanced human capital in trade competitor countries, while other regimes based on smaller constituencies,

[7]For more detail see: Coppedge, Michael, et.al., 2017., "V-Dem [Country-Year/Country-Date] Dataset v7.1", Varieties of Democracy (V-Dem) Project.

such as military an personal regimes, do not react with more repression after more trade competition.

	All autocracies			Military, personal, monarchies.		
	Military spending/GDP	Repression	Control	Military spending/GDP	Repression	Control
Military spending/GDP$_{t-1}$	-0.76 (0.01)***			-0.82 (0.01)***		
Government repression$_{t-1}$		-0.12 (0.01)***			-0.13 (0.01)***	
Government control over civil society$_{t-1}$			-0.12 (0.01)***			-0.13 (0.01)***
$\mathbf{W}^{struct.equiv}_{t-1}$**Ed.Spend**$_{t-1}$	0.03 (0.16)	-0.03 (0.03)	0.01 (0.03)	-0.00 (0.14)	-0.10 (0.04)**	-0.03 (0.04)
$\mathbf{W}^{regional}_{t-1}$**Ed.Spend**$_{t-1}$	-0.11 (0.17)	-0.02 (0.03)	-0.05 (0.03)*	0.15 (0.20)	-0.03 (0.06)	-0.08 (0.06)
$\mathbf{W}^{regional}_{t-1}$**Ed.Spend**	0.07 (0.19)	-0.10 (0.04)***	-0.09 (0.04)**	0.14 (0.21)	-0.06 (0.06)	-0.04 (0.06)
Imports (log)$_{t-1}$	0.11 (0.20)	-0.03 (0.03)	0.00 (0.03)	-0.14 (0.20)	-0.09 (0.04)**	-0.02 (0.04)
Δ Imports (log)	0.08 (0.23)	-0.05 (0.03)	-0.05 (0.03)	-0.10 (0.20)	0.01 (0.05)	-0.00 (0.05)
Exports (log)$_{t-1}$	-0.05 (0.18)	0.01 (0.02)	-0.02 (0.02)	0.67 (0.17)***	0.00 (0.04)	-0.02 (0.04)
Δ Exports (log)	-0.68 (0.22)***	0.00 (0.03)	0.00 (0.03)	0.14 (0.19)	-0.05 (0.05)	-0.03 (0.05)
Polity$_{t-1}$	-0.02 (0.01)			-0.01 (0.01)		
Δ Polity	-0.05 (0.02)***			-0.03 (0.02)*		
Population$< 14_{t-1}$	0.04 (0.02)*	-0.01 (0.00)***	-0.01 (0.00)***	0.18 (0.03)***	-0.01 (0.00)**	-0.01 (0.00)*
Δ Population$<$ 14	-0.23 (0.13)*	0.02 (0.02)	-0.00 (0.02)	-0.51 (0.14)***	0.01 (0.04)	-0.02 (0.04)
Urbanization$_{t-1}$	0.01 (0.02)	-0.00 (0.00)	-0.00 (0.00)	0.05 (0.02)**	-0.00 (0.00)	-0.00 (0.00)
Δ Urbanization	0.91 (0.22)***	0.00 (0.02)	0.00 (0.02)	0.44 (0.20)**	0.02 (0.03)	-0.02 (0.03)
Population (log)$_{t-1}$	-1.02 (0.59)*	0.22 (0.07)***	0.24 (0.07)***	-3.77 (0.65)***	0.48 (0.14)***	0.37 (0.14)***
Δ Population$<$ 14	0.09 (3.12)	-0.47 (0.53)	-0.68 (0.54)	-4.92 (3.32)	-0.73 (0.84)	-1.05 (0.84)
Real GDP per capita $_{t-1}$	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)***	-0.00 (0.00)	-0.00 (0.00)
Δ Real GDP per capita	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. consumption$_{t-1}$	0.15 (0.01)***	-0.00 (0.00)**	-0.00 (0.00)***	0.11 (0.01)***	-0.00 (0.00)	-0.01 (0.00)**
Δ Gov. consumption	0.23 (0.01)***	-0.00 (0.00)	-0.01 (0.00)***	0.14 (0.01)***	-0.00 (0.00)	-0.01 (0.00)***
Output-gap$_{t-1}$	0.01 (0.00)*	0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Δ Output-gap	0.02 (0.00)***	0.00 (0.00)**	0.00 (0.00)	0.01 (0.01)	0.00 (0.00)	0.00 (0.00)
Adj. R^2	0.76	0.06	0.06	0.81	0.08	0.07
Num. obs.	1237	2830	2830	730	1553	1553

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$. Country and year fixed effects are included in the models.

Table 7: Effects education spending among trade competitors (interdependence) on domestic military spending and civil society repression

H Autocratic regimes and developmental states

It could be argued that development strategies and domestic spending in human capital are likely to be related under stable autocratic regimes. One potential concern is that models of growth affects regime stability and the probability of engaging in education races. Regimes under export-led industrialization could be more prone to react to trade competition with higher education spending than regimes relying on import-substitution industrialization (ISI). We further investigate whether developmental strategies, instead of regime stability, matter for a ruler's propensity to engage in education races. First, as explained in the paper, the use of country fixed effects in the empirical analysis helps to control for heterogeneity in industrialization strategies such as export-led industrialization and import-substitution industrialization.

Second, we use a proxy variable for developmental strategies. Following Balassa (1981) and Wibbels and Ahlquist (2011), we measure the emphasis on inward-oriented development strategies as the proportion of total manufacturing output not exported – higher values here indicate a more domestically oriented manufacturing sector.[8] In Table 8 of online appendix, we first estimate the baseline model using this ISI variable as a control. Then we interact the interdependence in education spending variable with ISI. As shown in the two models, controlling for emphasis in import-substitution industrialization does not affect the main result concerning education races in autocracies. The ISI variable itself is not statically significant; it does not significantly mediates the effect of interdependence, either.

Lastly, we estimate the baseline model for Latin American and Asian countries separately (the last two model specifications of Table 8 in online appendix). Against the suspicion that only export-led growth regimes from Asia would purse education races, we find that Latin American autocracies strongly react to education among trade competitor countries.

[8]Data are from the World Bank, World Development Indicators.

	All autocracies	All autocracies	Latin America	Asia
Education spending$_{t-1}$	-0.20 (0.01)***	-0.20 (0.01)***	-0.16 (0.04)***	-0.39 (0.04)***
$\mathbf{W}_{t-1}^{struct.equiv}$**Ed.Spend**$_{t-1}$	0.14 (0.06)**	0.12 (0.15)	0.36 (0.16)**	0.10 (0.09)
Import substitution industrialization (ISI)$_{t-1}$	-0.00 (0.00)	-0.00 (0.01)		
$\mathbf{W}_{t-1}^{struct.equiv}$**Ed.Spend**$_{t-1}$*Import substitution ISI$_{t-1}$		0.00 (0.00)		
$\mathbf{W}_{t-1}^{regional}$**Ed.Spend**$_{t-1}$	-0.09 (0.07)	-0.09 (0.07)	-0.35 (0.33)	-0.17 (0.11)
$\mathbf{W}_{t-1}^{regional}$**Ed.Spend**	0.06 (0.07)	0.06 (0.07)	-0.01 (0.21)	0.04 (0.11)
Imports (log)$_{t-1}$	0.08 (0.06)	0.08 (0.06)	-0.02 (0.17)	-0.03 (0.14)
Δ Imports (log)	0.11 (0.08)	0.11 (0.08)	-0.10 (0.19)	-0.11 (0.18)
Exports (log)$_{t-1}$	-0.01 (0.05)	-0.01 (0.06)	-0.15 (0.18)	-0.00 (0.13)
Δ Exports (log)	-0.18 (0.07)**	-0.18 (0.07)**	-0.26 (0.20)	-0.04 (0.17)
Polity$_{t-1}$	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.01)	0.00 (0.01)
Δ Polity	-0.00 (0.01)	-0.00 (0.01)	0.01 (0.01)	-0.00 (0.01)
Population$< 14_{t-1}$	-0.01 (0.01)**	-0.01 (0.01)**	-0.01 (0.02)	-0.02 (0.01)*
Δ Population< 14	-0.05 (0.04)	-0.05 (0.05)	-0.00 (0.17)	-0.09 (0.09)
Urbanization$_{t-1}$	-0.00 (0.00)	-0.00 (0.00)	-0.03 (0.02)	-0.00 (0.00)
Δ Urbanization	-0.10 (0.05)**	-0.10 (0.05)**	-0.21 (0.20)	-0.23 (0.10)**
Population (log)$_{t-1}$	-0.09 (0.15)	-0.08 (0.15)	0.43 (0.49)	0.25 (0.23)
Δ Population< 14	4.14 (1.41)***	4.13 (1.41)***	15.87 (12.60)	3.10 (3.41)
Real GDP per capita $_{t-1}$	-0.00 (0.00)**	-0.00 (0.00)*	0.00 (0.00)**	-0.00 (0.00)**
Δ Real GDP per capita	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)
Gov. consumption$_{t-1}$	0.02 (0.00)***	0.02 (0.00)***	0.02 (0.01)**	0.04 (0.01)***
Δ Gov. consumption	0.04 (0.01)***	0.04 (0.01)***	0.04 (0.01)***	0.05 (0.02)***
Output-gap$_{t-1}$	0.00 (0.00)	0.00 (0.00)	0.00 (0.01)	-0.00 (0.00)
Δ Output-gap	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.01)	-0.00 (0.01)
Adj. R^2	0.16	0.16	0.12	0.21
Num. obs.	1752	1752	372	374

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$. Country and year fixed effects are included in the models.

Table 8: Interdependence conditional on development strategies

I Interdependence conditional on trade openness and time

Interdependence may depend on openness, or more simply, on time. The results are significant for the period 1990-2009 but not before 1990. However, neither openness variables (imports and exports) nor trade liberalization (KOF index) significantly mediates the effect of interdependence. See Table 9.

	1990	imports	exports	liberalization
Education spending$_{t-1}$	-0.19 (0.01)***	-0.19 (0.01)***	-0.19 (0.01)***	-0.20 (0.01)***
$\mathbf{W}_{t-1}^{struct.equiv}\mathbf{Ed.Spend}_{t-1}$		0.18 (0.13)	0.01 (0.17)	0.09 (0.16)
$\Delta\left(\mathbf{W}_{t-1}^{struct.equiv}\mathbf{Ed.Spend}_{t-1}\right)$		0.04 (0.05)	0.04 (0.05)	0.12 (0.06)*
Before 1990: $\Delta\left(\mathbf{W}_{t-1}^{struct.equiv}\mathbf{Ed.Spend}_{t-1}\right)$	0.04 (0.09)			
After 1990: $\Delta\left(\mathbf{W}_{t-1}^{struct.equiv}\mathbf{Ed.Spend}_{t-1}\right)$	0.03 (0.07)			
Before 1990:$\mathbf{W}_{t-1}^{struct.equiv}\mathbf{Ed.Spend}_{t-1}$	0.00 (0.08)			
After 1990: $\mathbf{W}_{t-1}^{struct.equiv}\mathbf{Ed.Spend}_{t-1}$	0.15 (0.06)***			
Exports (log)$_{t-1}$ * $\mathbf{W}_{t-1}^{struct.equiv}\mathbf{Ed.Spend}_{t-1}$)		-0.02 (0.04)		
Imports (log)$_{t-1}$ * $\mathbf{W}_{t-1}^{struct.equiv}\mathbf{Ed.Spend}_{t-1}$)			0.03 (0.04)	
KOF index$_{t-1}$				-0.00 (0.00)
Δ KOF index				-0.01 (0.00)**
KOF index$_{t-1}$ * $\mathbf{W}_{t-1}^{struct.equiv}\mathbf{Ed.Spend}_{t-1}$)				0.02 (0.04)
Imports (log)$_{t-1}$	0.02 (0.05)	0.04 (0.05)	-0.04 (0.14)	
Δ Imports (log)	0.09 (0.06)	0.09 (0.06)	0.09 (0.06)	
Exports (log)$_{t-1}$	-0.05 (0.04)	0.00 (0.11)	-0.06 (0.04)	
Δ Exports (log)	-0.21 (0.06)***	-0.21 (0.06)***	-0.21 (0.06)***	
$\mathbf{W}_{t-1}^{regional}\mathbf{Ed.Spend}_{t-1}$	-0.04 (0.06)	-0.02 (0.06)	-0.03 (0.06)	-0.03 (0.06)
$\Delta\left(\mathbf{W}_{t-1}^{regional}\mathbf{Ed.Spend}_{t-1}\right)$	-0.02 (0.07)	-0.02 (0.07)	-0.02 (0.07)	-0.00 (0.07)
Polity$_{t-1}$	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
Δ Polity	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
Population$< 14_{t-1}$	-0.01 (0.00)	-0.01 (0.00)	-0.00 (0.00)	-0.01 (0.00)
Δ Population$<$ 14	-0.08 (0.04)**	-0.07 (0.04)*	-0.08 (0.04)**	-0.07 (0.04)*
Urbanization$_{t-1}$	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)
Δ Urbanization	-0.05 (0.04)	-0.05 (0.04)	-0.04 (0.04)	-0.01 (0.04)
Population (log)$_{t-1}$	-0.28 (0.13)**	-0.29 (0.13)**	-0.31 (0.13)**	-0.02 (0.13)
Δ Population$<$ 14	1.61 (1.07)	1.49 (1.07)	1.50 (1.07)	1.94 (1.09)*
Real GDP per capita $_{t-1}$	-0.00 (0.00)*	-0.00 (0.00)	-0.00 (0.00)*	-0.00 (0.00)
Δ Real GDP per capita	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)
Gov. consumption$_{t-1}$	0.01 (0.00)***	0.01 (0.00)***	0.01 (0.00)***	0.01 (0.00)***
Δ Gov. consumption	0.03 (0.00)***	0.03 (0.00)***	0.03 (0.00)***	0.03 (0.00)***
Output-gap$_{t-1}$	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)
Δ Output-gap	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
Adj. R^2	0.14	0.14	0.14	0.14
Num. obs.	2468	2468	2468	2155

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$. Country and year fixed effects are included in the models.

Table 9: Interdependence conditional on openness and time

Figure 4 shows the effect of the spatial lag variable over time and 90% confidence intervals. The models corresponding to the plot, not shown here, simply interact interdependence with year and period dummies including all the control variables considered in the baseline model.

J Education spending and outcome variables

Spending variables are positively correlated with education outcomes. Education spending lagged 5 years correlates 0.36 with average year of schooling (Average Schooling) in

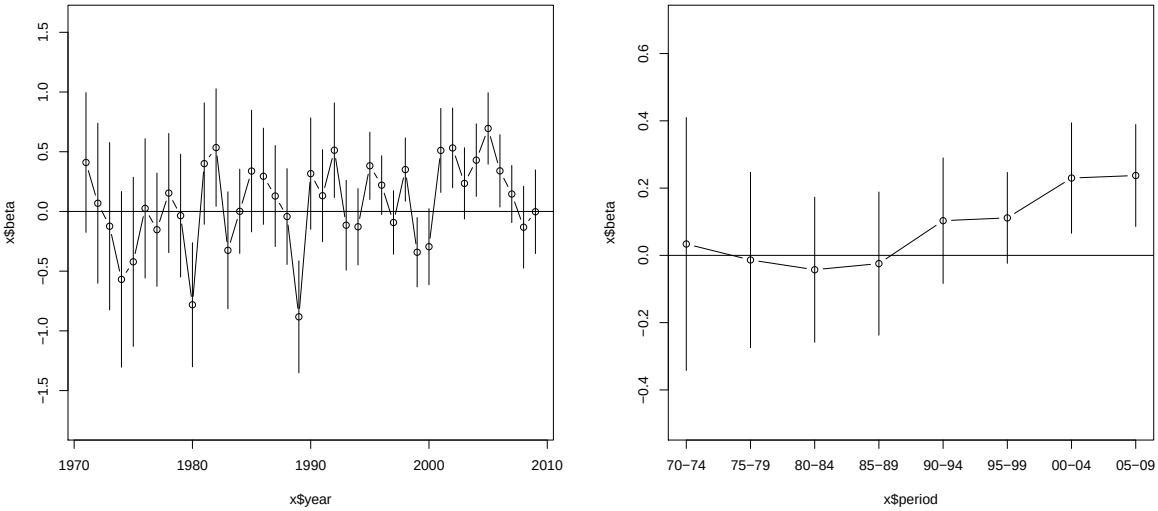


Figure 4: Interdependence over time

our sample of autocracies. When disaggregated by levels, higher cross-sectional correlations are at the secondary and tertiary education. Current education spending correlates 0.42 with secondary school gross enrollment and 0.28 with the percentage of population with complete secondary school. See Table 5.

Spending also correlates with labor productivity measures. Four different productivity variables from the 'Total Economy Database' are considered: Labor productivity/worker (1990 USD) "Labor productivity per person employed in 1990 USD (converted at Geary Khamis PPPs)"; Labor productivity/worker (2013 USD) "Labor productivity per person employed in 2013 USD (converted to 2013 price level with updated 2005 EKS PPPs)"; Labor productivity/hour (1990 USD) "Labor productivity per hour worked in 1990 USD (converted at Geary Khamis PPPs)"; Labor productivity/hour (2013 USD) "Labor productivity per hour worked in 2013 USD (converted to 2013 price level with updated 2005 EKS PPPs)". In a methodological note to this data, Labor productivity per hour worked is the said to be the best variable to capture productivity. The cross-sectional correlation between spending in 1990 and productivity in 1995 is between 0.43 and 0.51 in autocracies, and weaker in democracies. See Table 5.

Finally, spending in education seems to have positive effects on average years of schooling when using regression analysis. Spending-outcomes relationships vary by level of educational attainment. In line with the conclusions from pairwise correlations, current education spending has a positive and significant effect on the percentage of total population with completed secondary education (not completed primary and completed tertiary education). See Tables 6 to 8.

	Educ. Spending in Autocracies	Educ. Spending in Democracies
Polity 2	-0.29	0.33
Average Schooling	0.36	0.32
Population 15+ with primary education	0	-0.12
Population 15+ with secondary education	0.28	0.39
Population 15+ with tertiary education	0.19	0.05
Enrollment rate primary education	0.13	0.14
Enrollment rate secondary education	0.42	0.16
Enrollment rate tertiary education	0.25	0.16
Labor productivity/hour (1990 USD)	0.51	-0.05
Labor productivity/hour (2013 USD)	0.43	0.25
Labor productivity/worker (1990 USD)	0.13	0.12
Labor productivity/worker (2013 USD)	0.05	0.33

Table 10: Correlations between education spending in 1990 and outcome variables in 1995

	primary enrollment	secondary enrollment	tertiary enrollment
Enrollment$_{t-1}$	-0.09 (0.01)***	-0.11 (0.01)***	-0.03 (0.01)***
ΔEnrollment$_{t-1}$	0.17 (0.02)***	0.33 (0.02)***	0.43 (0.03)***
Education spending$_{t-1}$	0.07 (0.13)	0.09 (0.08)	0.01 (0.06)
ΔEducation spending	0.32 (0.22)	0.03 (0.13)	0.08 (0.10)
Imports (log)$_{t-1}$	0.77 (0.52)	0.40 (0.31)	-0.08 (0.24)
Δ Imports (log)	0.43 (0.64)	0.81 (0.38)**	0.14 (0.31)
Exports (log)$_{t-1}$	-0.50 (0.47)	-0.04 (0.28)	-0.31 (0.22)
Δ Exports (log)	-0.92 (0.58)	-0.88 (0.35)**	-0.45 (0.29)
Polity$_{t-1}$	0.13 (0.04)***	0.03 (0.02)	-0.00 (0.02)
Δ Polity	-0.01 (0.06)	0.00 (0.03)	0.02 (0.02)
Population$< 14_{t-1}$	0.21 (0.05)***	-0.05 (0.03)	0.02 (0.03)
Δ Population< 14	-0.80 (0.41)**	-0.38 (0.24)	-0.20 (0.19)
Urbanization$_{t-1}$	0.01 (0.04)	0.05 (0.02)**	0.06 (0.02)***
Δ Urbanization	-0.15 (0.41)	-0.12 (0.26)	-0.43 (0.18)**
Population (log)$_{t-1}$	-0.95 (1.66)	0.15 (0.98)	-3.32 (0.77)***
Δ Population< 14	-23.67 (12.81)*	-19.43 (7.56)**	-4.86 (6.80)
Real GDP per capita $_{t-1}$	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)
Δ Real GDP per capita	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)
Gov. consumption$_{t-1}$	0.03 (0.03)	0.00 (0.02)	0.00 (0.01)
Δ Gov. consumption	0.01 (0.04)	-0.00 (0.03)	-0.00 (0.02)
Output-gap$_{t-1}$	0.04 (0.01)***	-0.00 (0.01)	0.00 (0.01)
Δ Output-gap	0.08 (0.02)***	0.00 (0.01)	0.03 (0.01)***
Adj. R^2	0.09	0.19	0.18
Num. obs.	1958	1586	1401

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$. Country and year fixed effects are included in the models.

Table 11: Effects of education spending on enrollment rates in Autocracies

	Avg. years schooling	% primary	% secondary	% tertiary
Lagged level of DV	-0.02 (0.00)***	-0.01 (0.00)***	-0.01 (0.00)***	-0.02 (0.00)***
Δ Lagged DV	0.83 (0.01)***	0.85 (0.01)***	0.83 (0.01)***	0.84 (0.01)***
Education spending$_{t-1}$	0.00 (0.00)***	-0.01 (0.01)	0.01 (0.01)**	-0.00 (0.00)
Education spending	0.00 (0.00)	-0.02 (0.01)	0.02 (0.01)	0.00 (0.00)
Imports (log)$_{t-1}$	-0.00 (0.00)	0.01 (0.03)	-0.03 (0.03)	0.01 (0.01)
Δ Imports (log)	0.00 (0.00)	-0.02 (0.04)	-0.02 (0.03)	0.01 (0.01)
Exports (log)$_{t-1}$	-0.00 (0.00)	0.00 (0.03)	0.02 (0.02)	-0.02 (0.01)**
Δ Exports (log)	-0.00 (0.00)	0.03 (0.04)	-0.01 (0.03)	-0.01 (0.01)
Polity$_{t-1}$	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Δ Polity	0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)*	0.00 (0.00)*
Population$< 14_{t-1}$	-0.00 (0.00)**	0.00 (0.00)*	-0.00 (0.00)	-0.00 (0.00)***
Δ Population< 14	-0.00 (0.00)	-0.01 (0.02)	-0.00 (0.02)	0.00 (0.01)
Urbanization$_{t-1}$	0.00 (0.00)***	-0.00 (0.00)	0.00 (0.00)	0.00 (0.00)***
Δ Urbanization	0.01 (0.00)***	-0.02 (0.02)	0.10 (0.02)***	0.01 (0.01)
Population (log)$_{t-1}$	0.02 (0.01)***	0.08 (0.08)	0.11 (0.07)	-0.03 (0.02)
Δ Population< 14	-0.01 (0.07)	-0.88 (0.65)	0.59 (0.58)	-0.00 (0.18)
Real GDP per capita $_{t-1}$	0.00 (0.00)***	-0.00 (0.00)*	0.00 (0.00)	0.00 (0.00)***
Δ Real GDP per capita	0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Gov. consumption$_{t-1}$	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
Δ Gov. consumption	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)
Output-gap$_{t-1}$	0.00 (0.00)	0.00 (0.00)*	-0.00 (0.00)	-0.00 (0.00)
Δ Output-gap	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
Adj. R^2	0.67	0.66	0.63	0.65
Num. obs.	2119	2119	2119	2119

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$. Country and year fixed effects are included in the models.

Table 12: Effects of education spending on educational attainment in autocracies

K Foreign educational outcomes and domestic education spending

If rulers engage in education spending races to respond to increased productivity among trade competitor countries, then domestic education policy should be related not only to foreign levels of spending in education but also to its outcomes: i.e., schooling and productivity. Hence, we calculate spatial lag variables of average years of schooling and labor productivity based on the same connectivity matrices of structural equivalence of trade profiles. The findings confirm that increases in educational attainment and labor productivity among trade competitor countries are correlated with higher domestic spending in education. This supports our intuition that revenue maximizing rulers respond with domestic spending in education to foreign policies that affect the stock of human capital and labor productivity in trade competitor countries.

	avg. years schooling	labor productivity
Education spending$_{t-1}$	-0.17 (0.01)***	-0.17 (0.01)***
ΔEducation spending$_{t-1}$	0.03 (0.02)*	0.04 (0.02)*
$\mathbf{W}_{t-1}^{struct.equiv}\mathbf{AverageSchooling}_{t-1}$	0.08 (0.03)***	
$\Delta\left(\mathbf{W}_{t-1}^{struct.equiv}\mathbf{AverageSchooling}_{t-1}\right)$	0.06 (0.03)*	
$\mathbf{W}_{t-1}^{struct.equiv}\mathbf{LaborProductivity/hour}_{t-1}$		0.01 (0.01)
$\Delta\left(\mathbf{W}_{t-1}^{struct.equiv}\mathbf{LaborProductivity/hour}_{t-1}\right)$		0.04 (0.02)***
$\mathbf{W}_{t-1}^{regional}\mathbf{Ed.Spend}_{t-1}$	-0.06 (0.06)	-0.03 (0.06)
$\Delta\left(\mathbf{W}_{t-1}^{regional}\mathbf{Ed.Spend}_{t-1}\right)$	-0.05 (0.07)	-0.04 (0.07)
Imports (log)$_{t-1}$	0.06 (0.05)	0.08 (0.05)
Δ Imports (log)	0.06 (0.06)	0.06 (0.06)
Exports (log)$_{t-1}$	-0.10 (0.04)**	-0.09 (0.04)**
Δ Exports (log)	-0.19 (0.05)***	-0.19 (0.05)***
Polity$_{t-1}$	-0.00 (0.00)	-0.00 (0.00)
Δ Polity	-0.00 (0.00)	-0.00 (0.00)
Population$< 14_{t-1}$	-0.00 (0.00)	-0.00 (0.00)
Δ Population< 14	-0.08 (0.04)**	-0.08 (0.04)**
Urbanization$_{t-1}$	-0.00 (0.00)	-0.00 (0.00)
Δ Urbanization	-0.06 (0.04)	-0.05 (0.04)
Population (log)$_{t-1}$	-0.34 (0.13)***	-0.31 (0.13)**
Δ Population< 14	0.02 (1.07)	-0.07 (1.07)
Real GDP per capita $_{t-1}$	-0.00 (0.00)**	-0.00 (0.00)**
Δ Real GDP per capita	-0.00 (0.00)**	-0.00 (0.00)**
Gov. consumption$_{t-1}$	0.02 (0.00)***	0.02 (0.00)***
Δ Gov. consumption	0.03 (0.00)***	0.03 (0.00)***
Output-gap$_{t-1}$	0.00 (0.00)	0.00 (0.00)
Δ Output-gap	-0.00 (0.00)	-0.00 (0.00)
Adj. R^2	0.12	0.12
Num. obs.	2352	2352

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$. Country and year fixed effects are included in the models.

Table 13: Effects of spatial lags of schooling and labor productivity on domestic education spending in autocracies

L Robust covariance matrix and clustered standard errors

Here we replicate estimates from the main paper estimating a robust covariance matrix according to Beck and Katz (1995), and clustering standard errors to correct for potential time-wise heteroscedasticity and cross-sectional heteroscedasticity and correlation. As shown below in Table 14, there is no significant difference with spatial OLS models in the main paper as most of these potential problems seem to be very minor or simply absent in our specification of the data generating process.

	s.e. clustered by group		s.e. clustered by time	
	Model 1	Model 2	Model 3	Model 4
Education spending$_{t-1}$	-0.16 (0.01)***	-0.19 (0.01)***	-0.16 (0.02)***	-0.19 (0.02)***
$\mathbf{W}_{t-1}^{struct.equiv}$**Ed.Spend**$_{t-1}$	0.10 (0.06)*	0.11 (0.06)*	0.10 (0.05)*	0.11 (0.06)*
diff(w.edugdpWBas, 1)	-0.00 (0.05)	0.04 (0.06)	-0.00 (0.06)	0.04 (0.06)
$\mathbf{W}_{t-1}^{regional}$**Ed.Spend**$_{t-1}$		-0.03 (0.07)		-0.03 (0.05)
$\mathbf{W}_{t-1}^{regional}$**Ed.Spend**		-0.02 (0.07)		-0.02 (0.06)
Imports (log)$_{t-1}$		0.03 (0.06)		0.03 (0.05)
Δ Imports (log)		0.09 (0.06)		0.09 (0.06)
Exports (log)$_{t-1}$		-0.06 (0.05)		-0.06 (0.04)
Δ Exports (log)		-0.21 (0.05)***		-0.21 (0.06)***
Polity$_{t-1}$		-0.00 (0.00)		-0.00 (0.00)
Δ Polity		0.00 (0.00)		0.00 (0.00)
Population$<14_{t-1}$		-0.00 (0.01)		-0.00 (0.00)
Δ Population<14		-0.08 (0.04)*		-0.08 (0.04)*
Urbanization$_{t-1}$		-0.00 (0.00)		-0.00 (0.00)
Δ Urbanization		-0.05 (0.05)		-0.05 (0.04)
Population (log)$_{t-1}$		-0.30 (0.17)*		-0.30 (0.15)*
Δ Population<14		1.51 (1.15)		1.51 (1.06)
Real GDP per capita $_{t-1}$		-0.00 (0.00)		-0.00 (0.00)
Δ Real GDP per capita		-0.00 (0.00)		-0.00 (0.00)
Gov. consumption$_{t-1}$		0.01 (0.00)***		0.01 (0.00)***
Δ Gov. consumption		0.03 (0.00)***		0.03 (0.00)***
Output-gap$_{t-1}$		0.00 (0.00)		0.00 (0.00)
Δ Output-gap		-0.00 (0.00)		-0.00 (0.00)
Adj. R^2	0.09	0.14	0.09	0.14
Num. obs.	2693	2468	2693	2468

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$. Country and year fixed effects are included in the models.

Table 14: Interdependence with PCSE and clustered observations

M Panel unit root tests

Here we analyze the order of integration of the time series and check the existence of equation balance in the model (Grant and Lebo, 2016). Different panel unit root tests allow to test the structure of the time series for both the dependent variable (education spending) and the main independent variable (the spatial lag of education spending). We also performed these tests with unbounded time series data (Lebo and Grant, 2016; Grant and Lebo, 2016), by taking education spending measured in constant US dollars.

Levin, Lin and Chu (2002) designed a pooled statistic, in which the alternative hypothesis is Ha: "all of the series are I(0)." Another alternative test is that of Im, Pesaran and Shin (2003), which is based on a group-mean test averaging augmented Dickey-Fuller regressions for each time series. In this case the alternative is Ha: "at least one of the series is I(0)." Table 15 presents the test results. In both cases we find evidence against the existence of a unit root in our data. This evidence suggests we are dealing with stationary data on both sides of the equation.

	z	p-value
Education spending as % of GDP		
Levin-Lin-Chu	-2.7134	0.00666
Im-Pesaran-Shin	-2.4228	0.0154
Education spending in constant U.S.D		
Levin-Lin-Chu	4.2756	0.00002
Im-Pesaran-Shin	16.352	0.00000
Spatial lag of Education spending		
Levin-Lin-Chu	-15.318	0.00000
Im-Pesaran-Shin	4.2756	0.01769

Table 15: Panel unit root tests

N Sample of countries in the empirical analysis

Afghanistan, Albania, Algeria, Angola, Argentina, Armenia, Azerbaijan, Bahrain, Bangladesh, Belarus, Benin, Bhutan, Bolivia, Brazil, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, Central African Republic, Chad, Chile, China, Comoros, Congo, Democratic Republic of the Congo, Cote d'Ivoire, Cuba, Djibouti, Dominican Republic, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Fiji, Gabon, Gambia, Georgia, Ghana, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Hungary, Indonesia, Iran, Iraq, Jordan, Kazakhstan, Kenya, Republic of Korea, Kuwait, Kyrgyzstan, Lao People's Democratic Republic, Lesotho, Liberia, former Yugoslav Republic of Macedonia, Madagascar, Malawi, Malaysia, Mali, Mauritania, Mexico, Mongolia, Morocco, Mozambique, Myanmar, Namibia, Nepal, Nicaragua, Niger, Nigeria, Oman, Pakistan, Panama, Paraguay, Peru, Philippines, Qatar, Romania, Russian Federation, Rwanda, Saudi Arabia, Senegal, Sierra Leone, Singapore, Solomon Islands, Somalia, South Africa, Sri Lanka, Sudan, Swaziland, Syrian Arab Republic, Tajikistan, United Republic of Tanzania, Thailand, Togo, Tunisia, Turkey, Uganda, Ukraine, United Arab Emirates, Uruguay, Uzbekistan, Venezuela, Viet Nam, Yemen, Zambia, and Zimbabwe.

O Selection bias due to democratization

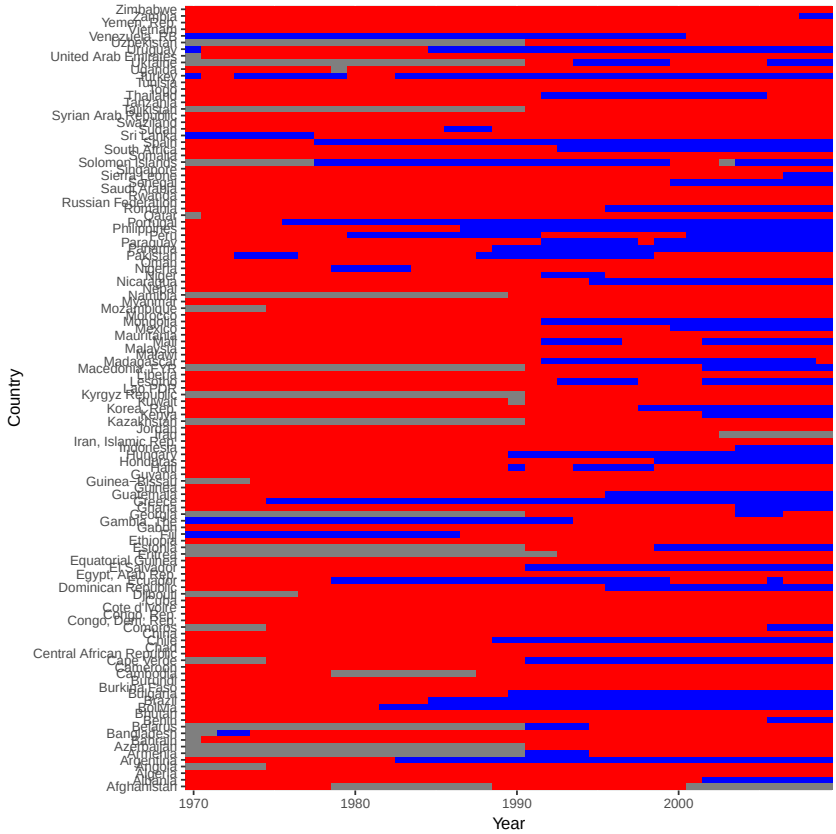
We have found that more resilient autocracies respond more to education races and we think this is evidence supporting our argument that rulers with shorter/longer time horizons are less/more likely to invest in education when facing trade competition (H2). However, we need to rule out one alternative explanation: if there are two types of states – resilient vs. fragile autocracies, at certain point of economic development, they both need more human capital and therefore more education spending; in other words, education spending increase is simply a function of stage in economic development; since democratization is more likely to happen in fragile autocratic regimes, with more education spending and development, many fragile autocracies drop out of our sample because they democratized. At the end, we see a difference in education spending between resilient autocracies and non-democratized fragile autocracies and conclude that regime resilience matters, but this is only because many fragile autocracies, despite also having increased their education spending, simply dropped out of our sample after democratization.

In the paper, we have controlled for variables such as real GDP per capita and urbanization which might capture levels of economic development. We have also controlled developmental strategies such as export-led industrialization and import-substitution industrialization (ISI) in section H of this online appendix. In this section, we further check the number countries that drop out from our sample, at which point they drop out, and more importantly, have they increased education spending after democratization – this is important because the aforementioned alternative explanation stipulates countries increase education spending around and after democratization.

Non-democracies are political regimes with polity scores lower or equal to six. Among the 118 countries entering the analysis, 49 countries drop of the analysis over time because their polity score became larger than 6 – they transitioned to democracies so we dropped them from the analysis. The following is a list of the countries in question (with the year from which we no longer observe the country in parenthesis): Albania (2002), Argentina (1983), Benin (2006), Bolivia (1982), Brazil (1985), Bulgaria (1990), Cape Verde (1991), Chile (1989), Comoros (2006), Dominican Republic (1996), Ecuador (1979), El Salvador (1991), Estonia (1999), Georgia (2004), Ghana (2004), Greece (1975), Guatemala (1996), Haiti (1990), Honduras (1999), Hungary (1990), Indonesia (2004), Kenya (2002), Korea, Republic of (1998), Lesotho (2002), Macedonia (2002), Madagascar (1992), Mali (2002), Mexico (2000), Mongolia (1992), Nicaragua (1995), Niger (1992), Nigeria (1979), Pakistan (1988), Panama (1989), Paraguay (1999), Peru (1980), Philippines (1987), Portugal (1976), Romania (1996), Senegal (2000), Sierra Leone (2007), South Africa (1993), Spain (1978), Sudan (1986), Thailand (1992), Turkey (1983), Ukraine (1994), Uruguay (1985), and Zambia (2008). Figure 5 shows periods in which we observe autocracies (in red) as well as democratic spells (in blue).

For countries dropping out of the sample we have looked at whether they increased their education spending dramatically after democratization. Figure 6 shows the over-time variation during the first 5 years following democratization: the y-axis shows the difference in education spending in % of GDP between year t and the year of democratization so positive/negative values indicate increased/decreased education spending after democratization. We find that the expected evolution of education spending as a percentage of GDP once that countries democratize is centered around zero. (A single

country standing out in the evolution of education spending is Lesotho, the gray line on top, whose increased spending over 3% GDP in year 1, 4, and 5 after democratization.) Yet, countries are well balanced in terms of education spending above and below the year of democratization. This is also captured by fitting the loess smoothing line and a 95% confidence interval represented by the shaded area. This suggests that there is no evidence supporting the aforementioned alternative causal mechanism because we do not see systematic trend of education spending increase after a country dropped out of our sample because of democratization.



Note: Autocratic spells in 'red'; democratic spells in 'bule'; missing data in 'grey'.

Figure 5: Countries dropping out of the sample due to democratization

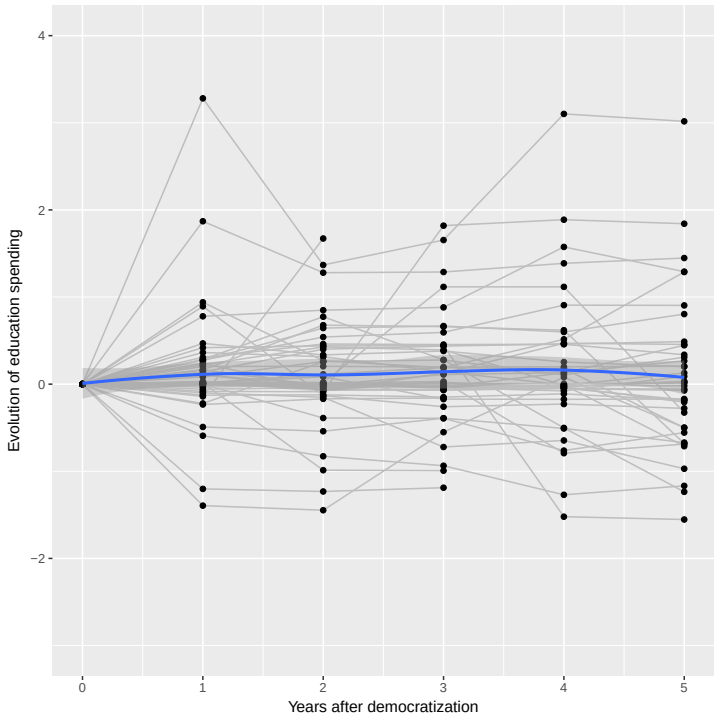


Figure 6: Evolution of education spending after democratization

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