

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

Santiago López-Cariboni
Universidad Católica del Uruguay

Xun Cao
Penn State University

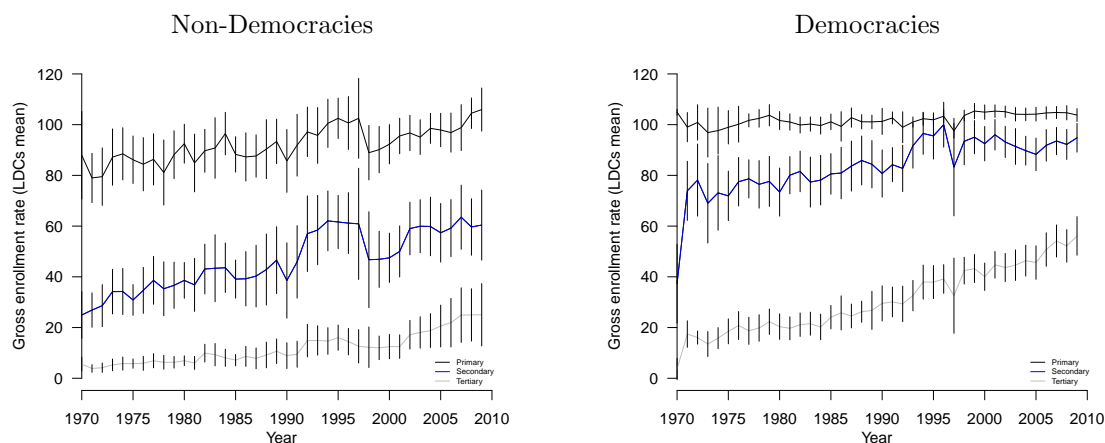
April 5, 2018

Abstract

This paper explains variations in education spending among non-democracies, focusing on policy interdependence by trade competition. Facing pressures from spending changes in competitor countries, rulers calculate the costs and benefits associated with increased education spending: education increases labor productivity; it also increases civil engagement and chances of democratization. Therefore, we expect that rulers in countries whose revenues depend less on a productive labor force and those with shorter time horizons are less likely to invest because of lower expected benefits; rulers with single-party regimes, authoritarian legislatures, and especially partisan authoritarian legislatures are more likely to invest because such institutions enable them to better survive the threats associated with increased human capital. We find empirical support for policy interdependence and the conditional effects of government revenue source, time horizon, and partisan legislatures.

INTRODUCTION

Education and human capital are important. Numerous studies have shown a robust effect of education on economic growth.¹ Governments, especially those in the developing world, have been advised to invest in education. The average level of education in developing countries has indeed increased over the past several decades. Secondary school attendance grew 2.7 times between 1970 and 2009, while attendance at tertiary level is now 7.4 times higher than at the beginning of that period (Figure 1). Governments have also increased their budgets allocated to public education. Average spending levels in developing countries increased from 3.2 to 4.9 percent of the GDP between 1970 and 2009 (Figure 2). However, significant variation remains. Education spending in 2009 is still below 1 percent of GDP in Sudan, as low as 1.8 and 2.4 percent of GDP in China and Bangladesh, and as high as 5.8 percent of GDP in Brazil and Malaysia. One important research question is to explain such variation.



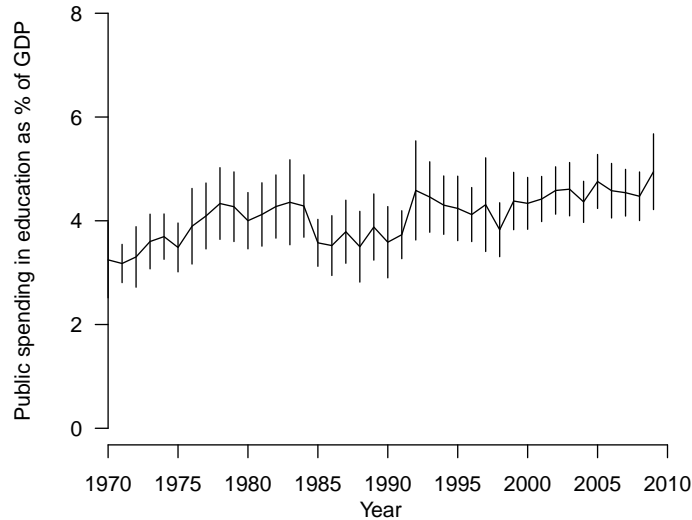
Notes: Vertical lines denote the 95% confidence interval of the year sample means. Gross enrollment rate means the number of people attending to primary school over the population in primary school age. In developing countries, because many kids lag behind, the gross rate can be higher than 100%. *Source:* Data from the World Bank (2012).

Figure 1: Mean gross enrollment rate in non-democracies and democracies (1970-2009)

The differences in political regime types and the effects of globalization, with trade openness in particular, have often been the focuses of recent research. For instance, many find that democracies expand public education in developing countries (Ansell, 2008; Brown and Hunter, 2004; Stasavage, 2005; Hecock, 2006).² However, we know little about what explains variations in education spending among non-democracies. We

¹See, for example, Baum and Lake (2003), Krueger and Lindahl (2001), Glaeser, La Porta, Lopez-de Silanes and Shleifer (2004), Sala-i Martin, Doppelhofer and Miller (2004), Sianesi and Reenen (2003), Mankiw, Romer and Weil (1992), Romer (1990), Lucas Jr (1988), Helliwell (1994), Feng (1997), Levine and Renelt (1992), and Webber (2002).

²However, recent work has started to question the importance of the democracy vs. non-democracy dimension in understanding distributive policymaking in general. For instance, Mulligan, Gil and Sala-i



Notes: Vertical lines denote the 95% confidence interval of the year sample means.
Source: Data from UNESCO Institute for Statistics, and the Edstats dataset from the World Bank.

Figure 2: Total government spending in education in developing countries (1970-2009)

believe this is an important gap in the study of education and human capital. Indeed, Gift and Wibbels (2014), in their review on the politics of education literature, show that although most of the literature has centered on education politics in democracies, autocracies display even greater variation in educational efforts. They argue that this is a puzzling fact because many would predict that autocratic elites oppose government spending in general and are particularly resistant to policies that empower the poor (Boix and Stokes, 2003; Acemoglu and Robinson, 2006; Bourguignon and Verdier, 2000).

Gift and Wibbels (2014) raise three questions for further research: “Under what conditions are educational investments consistent with the survival incentives of authoritarian leaders? When are autocrats hostile to the accumulation of human capital? How are their decisions affected by institutional structures and the broader economic and political climate?” Our paper helps to answer these questions. It shows that variations in education spending among non-democracies can be partly explained by policy interdependence triggered by trade competition. Moreover, facing trade competition, rulers in countries whose revenues depend less on a productive labor force and with shorter time horizons are less likely to invest because of lower expected benefits associated with educational investments; rulers with partisan authoritarian legislatures are more likely to invest because such institutions enable them to better survive threats associated with increased

Martin (2004) find no difference in public policies between economically similar democracies and non-democracies. Ross (2006) shows that in policy outcomes such as infant and child mortality rates, democracies are not better than non-democracies despite more money spent on education and health.

human capital of the population.

Indeed, studying education politics in authoritarian states is important first because of the sheer number of people living under authoritarian rules. In 1980, 55.9 percent of the world population lived under some form of authoritarian rule. By 2000, after waves of democratization, this number was still as high as 42.1 percent.³ Secondly, education and human capital have profound policy implications for non-democratic countries. For instance, better educated citizens are often associated with more active political engagement.⁴ A few studies have demonstrated a positive connection between education and the chances for democratic transition and consolidation.⁵

To explain variations in education spending in non-democracies, we first consider the effects of globalization and we focus on the mechanism of trade competition. One country's investment in education increases its human capital and therefore its competitiveness in the global market. As a result, competitor countries are likely to lose their shares in the global market, which might incentivize them to reconsider human capital investment. Increases in education spending in trade competitor countries therefore provide an exogenous shock for a ruler in a non-democratic country to reconsider education policies. The massive expansion of primary and secondary education expenditures in countries such as Malaysia and Indonesia – in the latter case, via the famous INPRES program (Duflo, 2001) – was partly motivated by government incentive to compete in the global market with enhanced human capital. The Malaysian case, discussed in detail by Ansell (2010), shows vividly how the desire to compete in the global market – first in apparel and new electronics and later on in heavy and microelectronics industries – motivated the government to heavily invest in education. For example, the two-decade Malaysian New Economic Program (NEP, 1970-1990) had one key aim, which is the development of a strong human resource to be internationally competitive (Ansell, 2010). The INPRES program in Indonesia involved a massive expansion of schooling since 1973 which coincides with the shift toward an export-led growth. The political strategy of the Suharto regime was to shield a group of technocrats (the so-called 'Berkeley mafia') with the clear mandate of securing export competitiveness and long-term growth (Zagha and Nankani, 2005).

Facing trade competition, whether a ruler will also increase education spending, we argue, is based on his calculation of the costs and benefits associated with such policy

³Percentages are calculated by authors, using Wright 2008's extension of Geddes' data of authoritarian regime types (Geddes, 1999). These numbers are likely to underestimate the actual number, because there are non-democratic regimes that are not yet classified by the data set.

⁴See, for example, Wantchekon, Novta and Klašnja (2012), Galston (2001), Campante and Chor (2012), Finkel (2002), Evans and Rose (2012), and Aldomd and Verba (1963).

⁵See Glaeser, Ponzetto and Shleifer (2007), Castelló-Climent (2008), Gibson, Duch and Tedin (1992), Glaeser et al. (2004), Papaioannou and Siourounis (2008), and Sanborn and Thyne (2013).

change. On the one hand, education increases labor productivity therefore potential future revenue. On the other hand, education increases civil engagement in politics and potentially chances of democratization. Therefore, we expect that facing trade competition, rulers in countries whose revenues depend less on a productive labor force (that is, more on natural resources/non-tax revenues) and those with shorter time horizons are less likely to invest in education because of lower expected benefits. Moreover, rulers in single-party regimes, with authoritarian legislatures, especially with partisan (vs. non-partisan) legislatures are more likely to invest in education because of lower expected costs of a better educated disenfranchised population:⁶ single-party regimes are often associated with large distributional coalitions, deep and broad organizational networks, and strong institutional capacities that make them more resilient to the threat of mass mobilization; authoritarian legislatures help rulers solicit the cooperation of outsiders, deter the threat of rebellion, and broaden the support basis for autocrats; partisan legislatures in particular enable a ruler to better use two important instruments for authoritarian regime survival: policy concessions and cooptation of the opposition leadership by offering rent-seeking positions in a legislature.

We explain education spending for 118 authoritarian states between 1970 and 2009. Empirical results show that there exists considerable interdependence in education spending: non-democracies follow the spending choices of trade competitor countries, i.e., those exporting similar export products to same destination countries. However, not all rulers react in the same manner. We find that natural resources and non-tax revenues significantly decrease the likelihood of observing interdependence in education spending. Furthermore, rulers with longer time-horizons react more to their competitors' education expenditures than rulers with a higher risk of losing power. We find no support for the conditional effects of single-party regimes and authoritarian legislatures. We further explore the differences in authoritarian legislature types and find that rulers with *partisan* legislature (multi-party and single-party legislatures) react more to competitors' education expenditure changes. In short, authoritarian rulers competing in human capital are those who depend on their population to collect revenue, feel secure in power, and are equipped with partisan legislatures.

⁶Note that the two aforementioned examples – Malaysia and Indonesia – were both stable authoritarian regimes, the former ruled by a dominant party and the latter a military dictator.

Recent research suggests that democracy increases government education spending and improves educational outcomes.⁷ Electoral competition often explains the higher level of education spending in democracies. An incumbent in democracies has strong incentives to increase spending on popular programs to achieve electoral victories. More channels for interest articulation associated with democratic systems also help to make the incumbent more accountable and responsive to popular demand (Hecock, 2006). The empirical findings in the literature often support the positive connection between democracies and public primary education spending (Ansell, 2008; Stasavage, 2005).⁸

Despite a near consensus that democracies expand public education, a few recent studies have moved beyond this democracy non-democracy dichotomy. For instance, Kosack (2013) focuses on political entrepreneurs who help poor citizens organize and achieve poor public goods including public education. Elis (2011) also focuses on the incentives of important political actors. He argues that Argentina's heavy investment in free, public primary schools in the second half of the nineteenth century is part of the oligarchy's liberal project to emulate the institutions and social composition of the United States and Europe.⁹ Glaeser et al. (2004) argue that human capital formation has been mainly a consequence of different policy choices by institutionally unconstrained rulers rather than the effect of constraining (more democratic) political institutions. Our theoretical framework departs from the aforementioned studies that focus on the role of *agency* as we put more emphasis on the *structural constraints* faced by authoritarian rulers: many, if not all of them, are subject to competitive pressures from the global market;¹⁰ they need to consider the costs and benefits of increased education investment by taking into account their sources of revenue, chances of losing power, and the characteristics of domestic political institutions.

Within today's non-democratic countries, enough variation exists in government investment in education. Some non-democracies like Central African Republic, Cambodia, Nigeria, and the United Arab Emirates only spend between 0.8 and 1.5 percent of GDP in education, while others like Saudi Arabia, Uzbekistan, and Cuba devote 7.4, 9.3, and 13.4 percent of GDP respectively. Public education is an important component of govern-

⁷See Ansell (2008), Brown and Hunter (1999), Brown and Hunter (2004), Nooruddin and Simmons (2009), Kaufman and Segura-Ubierno (2001), Avelino, Brown and Hunter (2005), Stasavage (2005), Hecock (2006), Ames (1987), Rudra and Haggard (2005), and Huber, Mustillo and Stephens (2008).

⁸However, evidence on the connection between democracy and tertiary education is often mixed.

⁹As pointed out by Elis (2011), the origins of public education among many advanced countries predate democratization by a significant amount of time. These examples include Japan, Austria, Germany, and Denmark (Galor and Moav, 2006; Lindert, 2004).

¹⁰The exceptions could be countries that monopolize a certain sector of the global market such as some large oil-exporting countries.

ment social spending which is strongly linked to economic globalization. Many theories focus on the impacts of global market on social policies. Efficiency hypothesis and race to the bottom argument posit that relying more on trade and foreign investments, a government is under increasing pressure to cut social spending to stay competitive. The compensation hypothesis, on the other hand, associates globalization with more social spending because with increased instability associated with the global market, governments face higher pressures to compensate globalization losers through social spending programs (Cameron, 1978).¹¹ Moreover, Ansell (2008) argues that trade openness is associated with more government education spending partly because in an open economy, educated individuals can sell their products to foreign buyers; an expansion of education does not necessarily reduce skilled wages; as a result, the rich is less adverse to education expansion.

Despite the aforementioned potential causal mechanisms connecting economic globalization and education spending, empirical analysis from previous studies often correlates trade openness with measures of education expenditures.¹² Trade openness is conceptually important as it reflects the actual and perceived economic conditions and levels of insecurities associated with the global market which, in turn, affect the chances to unleash changes through domestic political processes. However, this is also an undifferentiated way to conceptualize globalization forces.¹³ Governments do not just look at indicators of overall trade exposure and adjust policies. They are more sensitive to their specific export markets and key competitors in the global market.

Recent policy diffusion literature, on the other hand, focuses on policy interdependence. The key question is how one country's education policy changes affect other countries to which she is closely connected to. Various mechanisms have been proposed, including coercion, competition, learning, emulation (Simmons, Dobbin and Garrett, 2006), and migration (Franzese and Hays, 2008).¹⁴ Positive externalities induce strategic-

¹¹Education spending, given its direct effect on human capital, is different from other components of social spending. Take primary education as an example, on the one hand, there is unlikely to be pressure for more spending on primary education to compensate citizens facing increased insecurity due to globalization (compensation hypothesis). On the other hand, the efficiency hypothesis might not work, either, because governments are likely to be pressured by business leaders to improve human capital via education spending. The effects of globalization on education spending might also depend on government development strategies and the comparative advantage of the economy: those specializing in labor intensive production might try to cut social spending while those requiring increased human capital or upgrading might need further investment in education (Hecock, 2006).

¹²Many studies show a positive effect of trade openness (Kaufman and Segura-Ubiergo, 2001; Avelino, Brown and Hunter, 2005). Moving to a lower, sub-national level of analysis, Hecock (2006) finds that maquila exports positively affect education spending.

¹³Our empirical analysis finds that trade openness has no effect on education spending in authoritarian states; nor does it mediate the effect of the trade competition variable defined as the weighted average level of education spending in trade competitor countries.

¹⁴Recent studies show that diffusion mechanisms are present in a variety of areas such as social welfare

substitute relations, such as *free-riding*. Negative externalities, on the other hand, induce strategic complementarity with policies moving in the same direction — this is, competition. It refers to “interdependence stemming from economic pressures that the actions of each unit place on others as competition with, substitutes for, or complements to it.” (Franzese and Hays, 2008, 745)

Competition is a key mechanism that captures the calculations of governments: business sectors need an educated labor force and governments have strong incentives to invest in education to improve human capital, especially when foreign competition is fierce. One country’s investment in education increases its human capital and therefore competitiveness in the global market. As a result, competitor countries might lose their shares in the global market, which incentivizes them to also increase investment in human capital.¹⁵ Here, we assume competitive pressures work through market mechanisms. Given the fact that there is a significant time lag between education investment and increased human capital, this mechanism might take years to have any observable effect. However, another mechanism might also work: one country’s investment will be observed by peer countries which follow suit in order to prevent future losses.

WHEN EXTERNAL PRESSURES MEET DOMESTIC CALCULATIONS

Increased human capital often implies more productive labor force which would increase domestic production from which a ruler can extract fiscally. This can be considered the benefit of education and human capital investment in an authoritarian country (Sanborn and Thyne, 2013; Bourguignon and Verdier, 2000). However, for a ruler, there are also costs associated with education. De Mesquita and Smith (2010) differentiate between “productive” and “coordination” types of public goods. Productive public goods improve economic productivity, which in turn increases government revenues. Coordination public goods such as freedom of information and assembly help people to coordinate and organize politically, and ultimately increase the likelihood that a revolutionary mass movement succeeds. It is in the interest of an authoritarian ruler to provide productive public goods but limit the coordination type.

Public education can be considered both productive and coordination public good. Education is productive public goods because education induces people to work harder

policies (Brooks, 2005, 2007; Gilardi, 2010; Cao, 2012), economic liberalization (Way, 2005; Simmons and Elkins, 2004; Elkins, Guzman and Simmons, 2006), financial regulations (Brooks and Kurtz, 2012), and environmental policies (Busch, Jörgens and Tews, 2005; Ward and Cao, 2012; Cao and Prakash, 2010, 2012).

¹⁵We focus on export competition in this study. On how import competition creates policy diffusion between a country and its import-competitor countries, see Lopez-Cariboni and Cao (2015).

and become more productive, which would increase government revenues.¹⁶ Public education also has certain coordination public goods elements. According to Glaeser, Ponzetto and Shleifer (2007), educated people are better at overcoming the collective action problem to organize and fight collaboratively. For democratization or revolution to succeed, the dispersed population needs to have the skills and motivation to work collaboratively to defeat dictatorial coups.¹⁷ Education teaches skills such as reading and writing that enable people to work collaboratively. For instance, numerous studies reveal that in the United States, education is strongly linked to civic engagement and membership in social groups (Campbell, 2006; Dee, 2004; Brady, Verba and Schlozman, 1995; Verba, Nie and Kimw, 1978). In an African context, Wantchekon, Novta and Klačnja (2012) find that human capital increases citizens' political engagement. Most recently, Dahlum and Wig (Forthcoming) shows that more educated populations have higher levels of protest activity in Africa.

Though rulers might always prefer economic growth to stagnation, they evaluate the costs and benefits of adopting technological and institutional change (Acemoglu and Robinson, 2006) and subsidizing the education of the poor (Castelló-Climent, 2008; Bourguignon and Verdier, 2000; Campante and Chor, 2012; Sanborn and Thyne, 2013). Students of development and innovation have long been intrigued by the question of why some ruling elites actively pursue economic development while others choose to block innovation. Acemoglu and Robinson (2006) argue that technological and institutional change may erode the political advantages and future economic rents of incumbent groups. Elites subject to intense political competition prefer to innovate because they are likely to be replaced otherwise. In noncompetitive political markets, highly entrenched elites are also willing to promote economic development as they are not afraid of losing power.¹⁸ Importantly, the same conditions determining rulers' incentives to block change also apply when rulers decide whether to invest in human capital:

“a greater human capital of the labor force is likely to increase output, but may make it easier for the masses to organize against the ruler, and hence may erode the incumbency advantage of the ruler. Therefore, the political replacement effect may also serve to discourage rulers from investing in human capital or even block initiatives to increase the human capital of the masses” (Acemoglu and Robinson, 2006, 128).

¹⁶As De Mesquita and Smith (2010) summarized: “educated people with access to transport and knowledge of the market are more productive than ignorant and isolated people.”

¹⁷See, for example, Glaeser et al. (2004), Glaeser, Ponzetto and Shleifer (2007), Przeworski, Alvarez, Cheibub and Limongi (2000), Castelló-Climent (2008), Sanborn and Thyne (2013), and Feng and Zak (1999)

¹⁸“Economic backwardness” is more likely when the ruling elite is somewhat entrenched but still fears replacement (Acemoglu and Robinson, 2006).

Bourguignon and Verdier (2000) show that the ruling elites benefit from subsidizing the education of the poor as increasing education for the non-educated may raise output due to a technological externality. At the same time, they risk losing office because political participation increases with mass education. Miller (2012) argues that development is a regime-strengthening force when rulers' are already secure in power, but it promotes democratization in politically unstable autocracies. Therefore, public education is a double-edged sword for the ruler: on the one hand, it increases the base of government fiscal extraction therefore potential revenue – the expected benefits for a ruler; on the other hand, it increases the possibility of revolution and democratization – the expected costs.¹⁹ The expected benefits and costs are not constant across space and time for authoritarian states; rather, they are a function of domestic conditions. More specifically, the expected benefits, deriving from an increase in future human capital, productivity, and output, matters more for countries that depend more on a productive population (that is, less on natural resources and non-tax revenues) and for rulers who expect to stay in power for a longer period of time (that is, with a longer time horizon) to reap the benefits of future increase in productivity. This expected benefits side of the argument build on an existing literature on the economic gains of human capital formation for authoritarian rulers (Galor, Moav and Vollrath, 2009; Bourguignon and Verdier, 2000; Campante and Chor, 2012; Acemoglu and Robinson, 2006; Sanborn and Thyne, 2013; Elis, 2011) and is especially close to that of Acemoglu and Robinson (2006) who look at how the level of “rents” conditions development strategies within autocracies.

The expected costs of education investment side of the theoretical argument builds on the recent literature on comparative authoritarian institutions, especially those focusing on features of authoritarian institutions that affect regime survival (Wright, 2008; Wright and Escriba-Folch, 2012; Gandhi and Przeworski, 2006, 2007). Education increases the likelihood of a mass movement. The recent authoritarian regime survival literature suggest a few institutional features that are expected to increase the chances that an authoritarian ruler can better withstand such threats. These features are single-party regimes, the existence of authoritarian legislatures, and especially partisan legislatures.

Domestic Factors Affecting Expected Benefits of Increased Education

First, for countries that have abundant natural resources, the benefits of increased education are smaller, because government revenue depends less on a productive population. Everything else equal, there is a lower chance to increase government education spending

¹⁹The causal chain is a long one: education spending improves productivity, which in turn increases competitiveness in global markets and ultimately increase government revenue. We acknowledge the presence of intermediate variables along the causal chain, but the fact that we find significant results shows that our theory works despite potential intermediate conditions.

given with the same level of trade competition.²⁰ Note that the extraction of natural resources such as oil and natural gas often requires certain levels of human capital and technologies as well. Kurtz and Brooks (2011) argue that the developmental consequences of oil wealth are strongly conditioned by domestic human capital resources, which, where sizeable, make possible the management of resources in ways that encourage the absorption of technology and development of valuable new economic sectors. However, the experience of many resource-rich developing countries suggested that domestic technologies and know-how for natural resource extraction can be substituted at least in part by various forms of collaboration with foreign firms. We are not making an argument that there is no benefit of human capital increase for the resource-based sector of the economy. We do assume, however, that the marginal benefit of human capital investment is higher for the sector of the economy that is based on a productive population (Gylfason, 2001; Blanco and Grier, 2012).²¹ Therefore, we expect that:

H1: authoritarian states that depend more on natural resources and non-tax revenues are less likely to respond to education investment races triggered by trade competition.

Second, there is often a significant time lag between government's education investment and actual increase in labor productivity. The expected time to observe an impact of education investment depends on the education level. While expanded tertiary education may increment labor productivity in the mid-term, primary and secondary spending have arguably larger time-lags. Yet, this does not mean that rulers are necessarily better-off by investing in higher education. To improve external competitiveness of domestic products in international markets, governments need to exploit their comparative advantages. Many developing countries compete in low-skill products. Thus, rulers may not need to wait an entire generation for the effect of expanded education to kick in. For instance, changes in literacy are rather fast and make a large difference in labor productivity. Successful experiences of export-promotion development in East Asia after the Second World War required large investments in public education to reduce the dramatic illiteracy rates (Ansell, 2010). The time horizon of a ruler is a key determinant of government efforts in

²⁰For instance, in a sub-national context, Hong (Forthcoming) shows that Chinese local governments with a large natural resource sector have few incentives to invest in labor productivity enhancing social services because abundant resources decrease the need to attract outside investments which often favor higher labor quality.

²¹We make a simplifying distinction between sectors of the economy that are resources-based and those that depend more on a productive population. However, oil, natural gas, and mineral extraction industries are different from agriculture and other primary activities based on relatively large land-endowment. We focus on the former type of natural resources because oil and minerals usually are geographically concentrated and easier for the state to control. They are often important components of non-tax government revenue.

education in authoritarian states, because many non-democratic, developing countries compete in sectors that require basic primary and secondary education that is associated with some time lags of investment. Therefore, we expect:

H2: rulers with shorter time horizons are less likely to invest in education when facing trade competition.

Domestic Institutional Features and Expected Costs of Education

Rulers worry about losing power. Education increases human capital which increases civil engagement and chances of democratization. Therefore, a ruler is more likely to respond to competitor countries' education policy changes if he is likely to survive such a potential threat. What are the factors that can give the ruler such an assurance? We focus on institutional characteristics of authoritarian states: single-party regimes, authoritarian legislatures, and partisan authoritarian legislatures in particular.

Wright (2008) suggests that rulers with large distributional coalitions are more likely to democratize because even with democratization, they are more likely to be elected thanks to the size of their loyal supporters. He uses authoritarian regime types as proxies for distributional coalition size and argues that single-party regimes are associated with largest distributional coalitions. Moreover, single party regimes are also often associated with deep and broad organizational networks and strong institutional capacities — the very attributes that make them more resilient to the threat of mass mobilization and help them secure a larger claim of power in case of democratization. Wright and Escriba-Folch (2012) argue that in dominant party regimes (for instance, the PRI in Mexico), the incumbent party often has deep and broad distributional networks to reach their large-scale mass support. Such mass support can be translated into voter mobilization with the aforementioned institutional frameworks and organizational capacities. The ruler himself might not be elected,²² but the party can and does win the election after democratization. Wright and Escriba-Folch (2012) provide a list of former dominant party regimes that won elections after democratic transition: for instance, cases in which the party, during the post-transition democratic period, succeeded in securing at least once the highest (plurality) share of seats in lower house elections include Albania, Bulgaria, El Salvador, Hungary, Indonesia, Mexico, Mongolia, Nicaragua, Paraguay, Poland, Romania, and Taiwan.²³

²²However, Jerry J. Rawlings of Ghana and Joaquim A. Chissano of Mozambique actually won two presidential elections after democratization of the country.

²³See <http://www.personal.psu.edu/jgw12/blogs/josephwright/WrightEscribaBJPSAppendix.pdf>, accessed on May 30, 2013.

H3: Single-party regimes are more likely to respond to education races because they are more resilient to internal threats and they survive “better” in the event of democratization.

Authoritarian legislatures also affect the survival of authoritarian regimes. Legislative institutions in authoritarian states are more than window dressing. They can help to sustain the ruler in power by making his promises more credible to societal actors, including potential authoritarian rivals (Wright and Escriba-Folch, 2012). Focusing on threats that come from outsiders within society,²⁴ Gandhi and Przeworski (2007) argue that when authoritarian rulers need to solicit the cooperation of outsiders or deter the threat of rebellion, they rely on legislatures that incorporate potential opposition forces and give them a stake in the ruler’s survival. By broadening the basis of support for autocrats, these institutions lengthen their tenures. Note that authoritarian legislatures are particularly important for rulers to neutralize the type of threats brought by increased human capital of the poor, that is, those from regime outsiders within the society.

Finally, we suspect that the differences between different types of authoritarian legislatures may be more important than the difference between having and not having an authoritarian legislature. Recent literature discusses the difference between partisan and non-partisan legislatures. For instance, Gandhi and Przeworski (2007) argue that “Partisan legislatures incorporate potential opposition forces, investing them with a stake in the ruler’s survival.” In autocracies with non-partisan legislatures, legislative candidates are forced to run as non-partisan agents, because the regime allows for a legislature, but no political parties. Partisan legislatures, on the other hand, include single-party and multi-party legislatures: in the former, candidates are forced to stand as representatives of the single regime party; in the latter, autonomous organizations from the regime in the form of an official “opposition” party or several groupings are allowed.

The current literature does not provide a straightforward answer on why the partisan dimension of authoritarian legislatures strengthens ruler’s power.²⁵ We suspect that this has to do with the ways by which authoritarian legislatures lengthen the tenure of autocrats – by policy concessions and by sharing spoils: for the former, authoritarian legislatures provide institutionalized policy concessions to different groups represented by political parties (Gandhi and Przeworski, 2007); for the latter, they enable cooptation of the opposition leadership by offering rent-seeking positions in a legislature (Reuter and

²⁴The other type of threats for the ruler are those that emerge from within the ruling elite. They are often dealt by establishing narrow institutions such as consultative councils, juntas, and political bureaus (Gandhi and Przeworski, 2007).

²⁵How authoritarian legislature works still is an ongoing research topic, for an online discussion from experts, see <http://themonkeycage.org/2012/12/what-do-legislatures-in-authoritarian-regimes-do/>.

Robertson, 2015).²⁶ Note that the partisan nature of a legislature strengthens the effects of both mechanisms. For instance, policy concessions are more credible if opposition parties are allowed in the legislature. Sharing spoils do not necessarily requires a legislature (Gandhi and Przeworski, 2007); but having a legislature to incorporate regime outsiders, especially to the regime party, is more likely to make such rent-sharing institutionalized and effective. Partisan legislatures therefore are more effective at securing a ruler’s power than non-partisan legislatures.

H4: rulers equipped with authoritarian legislatures, especially partisan legislatures, are more likely to respond to education spending changes in competitor countries.

The interaction of domestic costs and benefits with export competitive pressures is highly complex. Other than the domestic factors that we focus on – resources rents, time horizon of the ruler, single-party regime, authoritarian legislature, and especially partisan authoritarian legislature – it is likely that such interaction depends on other factors such as economic specialization and growth strategies. In the following empirical analysis, we focus on countries that are in direct competition with each other, thus avoiding this concern assuming such specialization and growth strategies would be reflected in countries’ export profiles, that is, which types of commodities and to which countries they sell.

EMPIRICAL ANALYSIS

Data

We have assembled an unbalanced panel of 118 non-democratic countries between 1970 and 2009. Non-democracies are political regimes with polity scores lower or equal to six. This is a standard cutoff point used in the literature (Rudra and Haggard, 2005; Rudra, 2004; Morrison, 2009; Rousseau, Gelpi, Reiter and Huth, 1996; Kadera, Crescenzi and Shannon, 2003; Reiter, 2001). Note that we also find evidence of export competition in non-democracies when regimes are coded by alternative cutoff points in the polity2 variable (i.e., from +3 to +5) or when employing the democracy-autocracy classification by Cheibub, Gandhi and Vreeland (2010).

The dependent variable is current government spending allocated to education in public and private institutions as a percentage of GDP.²⁷ *Current education expenditure* refers to the current operating expenditures in education, including wages and salaries,

²⁶Legitimizing the authoritarian regime through popular mobilization in legislative elections could be an additional potential mechanism (Levitsky and Way, 2002; Schedler, 2006).

²⁷Data on education spending are from the UNESCO Institute for Statistics, the Edstats dataset from the World Bank. Results for spending as a percentage of total government spending are similar and available upon request.

excluding capital investments in buildings and equipment.²⁸ One might question whether education spending would translate into better education outcomes and even to increased productivity. We have conducted extra analysis in Section J of the Online Appendix and we find that cross-sectional correlations between education outcomes (various indicators of educational attainment and labor productivity) and time-lagged education spending are moderately strong. For example, education spending (lagged by 5 years) correlates at 0.36 with average year of schooling in our sample of autocracies; correlations between education spending in 1990 and productivity measures in 1995 are between 0.43 and 0.51 in autocracies. Moreover, spending seems to increase attainment when using regression analysis.

To capture competition among countries that target the same export markets with similar products, we calculate pair-wise structural equivalence which is calculated by taking the correlation between two countries' exports at both bilateral and sector levels. 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. 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 . Hence, positive values of $struc.equiv_{i,j,t}$ indicate the level of trade competition between countries i and j in a given year t . 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 weight 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 this variable can be considered as a spatial lag in a spatial lag model.²⁹

The data are analyzed in an error correction model (ECM) framework building on the idea that long-term trends in the independent variables are causally related to long-term trends in the dependent variable, and that short-term effects in the data are empirically

²⁸While excluding capital expenditures, this variable provides information for a large number of countries over time. An alternative measure is *current and capital public education expenditure*. This data is however very sparse and provides a much smaller number of observations with shorter country time series: for 1970-2009, almost half of the countries have less than 10 observations and almost 30% of countries have fewer than 5 observations. As robustness checks, we did run the same analysis using current and capital public education expenditure as the dependent variable. We find strong evidence for policy interdependence.

²⁹For a more detailed explanation of the spatial lag variable, see Section A of the Online Appendix.

distinguishable dynamics. The ECM framework helps to understand how dynamics work shedding some light on the mechanisms operating behind policy interdependence. Rulers may engage in education races because they directly observe policy change in trade competitor countries; they then respond after short time periods. Other indirect mechanisms are also possible: rulers may react only after detecting a decline in the external competitiveness of their domestic products due to long periods of increased investment in education among competitor countries. In this later case interdependence would be captured by the long-term relationship between one country’s domestic education spending and its competitors’ weighted education spending. The general specification uses the first differences of the education spending as the dependent variable and includes lagged levels and differences operators on the right-hand side variables.³⁰

$$\begin{aligned} \Delta(\text{Ed.Spend}_{i,t}) = & \phi (\text{Ed.Spend}_{i,t-1}) + \rho_1 (\mathbf{W}_{t-1}^{\text{struct.equiv}} \mathbf{Ed.Spend}_{t-1}) \\ & + \rho_2 \Delta (\mathbf{W}_{t-1}^{\text{struct.equiv}} \mathbf{Ed.Spend}_{t-1}) \\ & + \mathbf{X}_{t-1} \boldsymbol{\beta}_1 + \Delta \mathbf{X}_t \boldsymbol{\beta}_2 + \mathbf{T}_t + \mathbf{C}_i + \epsilon_{i,t} \end{aligned} \quad (1)$$

The ρ parameters capture the size of interdependence: a domestic government’s reaction in education spending due to changes in education expenditures in trade competitor countries. All independent variables and the spatial lags are lagged by one year. This helps to mitigate simultaneity bias in spatial models, and is a feasible solution that allows estimation of parameters by simple Least Squares, provided that the disturbances are not serially correlated.³¹ All estimations include a set of years \mathbf{T}_t and country dummies \mathbf{C}_i .

All models include the log of imports and exports as a percentage of GDP.³² We also

³⁰Note that the ECM is arithmetically equivalent to a general ADL specification (De Boef and Keele, 2008; Keele, Linn and McLaughlin Webb, 2016), and that the spatio-temporal autoregressive model (STAR) is in fact an ADL model with spatial lags. Model selection for TSCS depends on both theoretical and empirical considerations. Potential concerns are the order of integration and whether there exists equation balance in the model (Grant and Lebo, 2016). We performed different panel unit root tests for both the education spending data and the spatial lag of education spending. The tests are panel unit root test either based on a pooled statistic (Levin, Lin and Chu, 2002), or a group-mean test averaging augmented Dickey-Fuller regressions for each time series (Im, Pesaran and Shin, 2003). The evidence suggests we are dealing with stationary data on both sides of the equation. 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. Again, unit root tests confirm that our data is most likely to be I(0). This strengthens our confidence in reporting reliable hypothesis testing and long-run multipliers for the substantive interpretation size effects (Grant and Lebo, 2016; Keele, Linn and McLaughlin Webb, 2016).

³¹In some of our specifications where we still observe serially correlated disturbances due to the the persistence of education spending data and different sample sizes, we include lagged differences of the dependent variable as a means of purging the remaining autocorrelation.

³²Results remain unchanged after controlling for aggregate signs of external competitiveness like the external trade balance and consumption prices.

control for variation in the degree of authoritarianism that may potentially affect the provision of public goods and services within the autocracies by including the “polity2” variable from the PolityIV database (Marshall, Jaggers and Gurr, 2011).³³ We control for a regional spatial lag of education spending. This helps to rule out the sharing of information, or the experience of common shocks, among countries with geographic proximity.

The real GDP per capita controls for Wagner’s law, which holds that the size of government increases with the size of the economy. Additionally, since human capital spending is the most cyclic type of social spending (Kaufman and Segura-Ubiergo, 2001), we control for the output gap to avoid spurious correlation with the business cycles.³⁴ The effects of demographics are controlled by including the share of the population aged under 14 years, the log of the total population size, and the levels of urbanization.³⁵ Finally, we also take into account government spending levels and include government consumption expenditures as a percentage of GDP.³⁶

Interdependence and Domestic Mediating Factors

Table 1 reports standard regression coefficients and long-run multipliers (LRM) of interdependence in current education expenditures.³⁷ Trade competitors’ education expenditures exert a significant and positive effect on domestic education spending. Interestingly, this effect operates only in the long-term (i.e., the $\mathbf{W}_{t-1}^{struct.equiv} \mathbf{Ed.Spend}_{t-1}$ variable instead of $\Delta(\mathbf{W}_{t-1}^{struct.equiv} \mathbf{Ed.Spend}_{t-1})$). (For this reason, in the following analysis, we only consider interactive effects between domestic conditional variables and the long-term interdependence, that is, $\mathbf{W}_{t-1}^{struct.equiv} \mathbf{Ed.Spend}_{t-1}$.³⁸) The estimated policy interdependence is substantively sizable and robust to the inclusion and exclusion of control variables. The unconstrained model reveals that for every additional average point in education spend-

³³Including the Polity score in specifications with other institutional variables such as legislatures or authoritarian regime types might be redundant, because for some countries, it might pick up certain level of the same information contained in other institutions variables. Excluding the Polity score, however, does not change the main results: regression tables are available upon request from authors.

³⁴The per capita income data comes from expanded times series by Gleditsch (2002), updated in 2013. The output gap is estimated as the difference between real GDP per capita and the underlying growth trends, as a percentage of the trend. A Hodrick-Prescott filter (H-P) is used to estimate the underlying growth trend. The H-P filter implements long-run moving average to de-trend the output series. See: Kaufman and Segura-Ubiergo (2001, 584).

³⁵Data are from the World Bank, *World Development Indicators* (The World Bank, 2012).

³⁶Using total government spending does not changes the results, but it significantly shrinks the sample size. Data are from the IMF-GFS and the *World Development Indicators* (The World Bank, 2012).

³⁷We follow the standard Bewley transformation of error correction model to calculate the long-run multipliers and their corresponding standard errors. See De Boef and Keele (2008).

³⁸Adding changes and their interactions with domestic conditional variables makes no difference to the conclusions we arrive from the empirical analysis.

ing in trade competitor countries, a ruler is expected to increase its current education spending by 0.58% of the GDP in the long-run. Moreover, this is the case even after considering the effects of increased trade exposure (log imports and exports). We find no effect for the trade flows variables, suggesting that the mechanism linking economic globalization and the educational public goods in non-democracies is more related to the competitive incentives that rulers face than other domestic political processes triggered by increased openness.³⁹

We now turn to the analysis of the conditions under which rulers engage in human capital competition. First, rulers' utility from the provision of productive public goods decreases with the availability of revenue sources that do not require taxing the population. We consider the effects of oil, natural resources in general, and non-tax government revenues. Oil rents are the difference between the value of crude oil production at world prices and total costs of production as percentage of GDP. We also construct a natural resource rents variable adding oil, mineral and coal rents as a percentage of GDP.⁴⁰ The non-tax revenue variable is taken from Morrison (2009).

Estimations from Table 2 show that rulers are less prone to make competitive investments in human capital when they have access to oil, natural resources and non-tax revenues in general. For instance, the effect of competition (competitors' weighted education spending) on the domestic education spending decreases with oil and natural resource rents, as indicated by the significant interaction terms. When oil or natural resource rents are zero, a one percent increase in trade competitors' education spending

³⁹Another way that trade openness could affect education spending is through its mediating effect with trade competitors' education expenditures. Not all countries are equally open to trade. The same level of spending increase in competitor countries might have a larger impact on a more open economy. We need to test an interactive effect between trade openness and trade competitors' education expenditure changes. We have tried various openness variables (imports, exports, and total trade) and trade liberalization index (e.g., the KOF index (Dreher, 2006; Gygli and Sturm, 2018)); they do not mediate the effect of interdependence. However, we do find that our results regarding education spending races among trade competitor countries more important for the period of 1990-2009 (high global economic integration) than for the period of 1970s and 1980s (low economic integration) for developing nations. See Section I of the Online Appendix for more details.

⁴⁰Oil and natural resource rents data are from the World Bank, *World Development Indicators*. Since both variables are highly skewed, we log transform the data before estimating the models. Taking into account of production costs is very important given the significant cross-country variation in the cost of producing a barrel of oil: in the United Kingdom, it costs \$52.50 to produce a barrel of oil; in Brazil, it costs nearly \$49; on the other hand, Saudia Arabia and Kuwait can pump a barrel of oil for less than \$10 – see <http://money.cnn.com/2015/11/24/news/oil-prices-production-costs/index.html>, accessed on November 30, 2017. 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 variation in the cost of production which significantly affects the amount of rents that can be captured by an autocratic ruler. Nevertheless, we conducted robustness checks using this oil income per capita variable. The detailed results are in Section D of the online appendix: we observe a very similar finding – rulers with no natural resources engage in education races; as oil and gas income per capita increases, the effect of interdependence becomes insignificant.

	Model 1	LRM	Model 2	LRM
Education spending _{t-1}	-0.16 (0.01)***		-0.19 (0.01)***	
$\mathbf{W}_{t-1}^{struct.equiv} \mathbf{Ed.Spend}_{t-1}$	0.10 (0.05)**	0.61 (0.30)**	0.11 (0.05)**	0.58 (0.28)**
$\mathbf{W}_{t-1}^{regional} \mathbf{Ed.Spend}_{t-1}$			-0.03 (0.06)	-0.15 (0.31)
Imports (log) _{t-1}			0.03 (0.05)	0.19 (0.26)
Exports (log) _{t-1}			-0.06 (0.04)	-0.32 (0.23)
Polity _{t-1}			-0.00 (0.00)	-0.01 (0.02)
Population < 14 _{t-1}			-0.00 (0.00)	-0.03 (0.02)
Urbanization _{t-1}			-0.00 (0.00)	-0.01 (0.02)
Population (log) _{t-1}			-0.30 (0.13)**	-1.63 (0.69)**
Real GDP per capita _{t-1}			-0.00 (0.00)*	-0.00 (0.00)*
Gov. consumption _{t-1}			0.01 (0.00)***	0.07 (0.01)***
Output-gap _{t-1}			0.00 (0.00)	0.00 (0.01)
$\Delta (\mathbf{W}_{t-1}^{struct.equiv} \mathbf{Ed.Spend}_{t-1})$	-0.00 (0.05)		0.04 (0.05)	
$\Delta (\mathbf{W}_{t-1}^{regional} \mathbf{Ed.Spend}_{t-1})$			-0.02 (0.07)	
Δ Imports (log)			0.09 (0.06)	
Δ Exports (log)			-0.21 (0.06)***	
Δ Polity			0.00 (0.00)	
Δ Population < 14			-0.08 (0.04)**	
Δ Urbanization			-0.05 (0.04)	
Δ Population (log)			1.51 (1.07)	
Δ Real GDP per capita			-0.00 (0.00)	
Δ Gov. consumption			0.03 (0.00)***	
Δ Output-gap			-0.00 (0.00)	
Adj. R ²	0.09		0.14	
Observations	2693		2468	
Countries	118		113	
Year dummies	Yes		Yes	
Country dummies	Yes		Yes	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

LRM: Long-run multipliers calculated from the Bewley transformation of error-correction model.

Countries: For a list of sample units see the online appendix.

Table 1: Trade Competition and Education Spending in Non-Democracies (1970-2009)

increases domestic education spending by 0.57% and 0.72% respectively in the long run. As oil and natural resources become more important relative to the size of the economy, rulers reduce their propensity to compete in human capital. In the case of natural resources rents (top middle plot in Figure 3), it is somewhere close to 1.3 in log % of GDP or 3.7 in % of GDP, the marginal effect of trade competition loses statistical significance.

The same pattern occurs when considering non-tax revenue. Autocracies compete less in education spending as non-tax revenues grow larger. Figure 3 displays the marginal effects of competition on education spending across the values of the three conditional variables considered: all three cases suggests that authoritarian rulers in resource-rich countries are much less likely to respond to education spending changes in other countries. The bottom row of Figure 3 offers an additional piece of information: the marginal effects of natural resources and non-tax revenue on education spending are almost always negative.⁴¹

Moreover, we expect that rulers' propensity to react in the face of trade competition increases with their time horizons. This is a function of the time needed for human capital investments to materialize into economic growth. We use two measures to capture rulers' time-horizons. First, we use the predicted probability of regime failure from Wright (2008).⁴² These probabilities are estimated with the observable causes of regime failure, and can therefore be used as a measure of how likely an autocrat is to be replaced in any given year. The greater the perceived probability of failure, the shorter the time horizon.

However, measures of predicted probability/hazard rates for regime/leadership failure are simply point estimates: they cannot account for the degree of uncertainty from prediction models. Ideally, we should also take into account of uncertainties associated with prediction models, for example, by 95% confidence intervals associated with predictions; but this would make hypothesis testing much more complicated. This partly motivates the use of our second measure on time horizon, which is regime duration under the assumption that leaders in long-lasting regimes tend to have a long time horizon. We use the commonly used Polity IV regime durability measure (the DURABLE variable) which captures the length of time since a three-point change in the Polity score over a three-year period.

Table 3 suggests that rulers with shorter time-horizons (higher values of regime failure and lower values in regime duration) are less likely to spend in education, suggesting that

⁴¹The results here need to be interpreted with caution regarding the substantive effect, especially for areas around extreme values such as those close to the maximum value of the oil variable, because on the maximum side, there are not many observations in the data. As a function of this, the confidence intervals of coefficient estimates when the resource variables approach their maximum values are often large and overlap with the confidence intervals when the values of the resource variables are close to 0 (Figure 3).

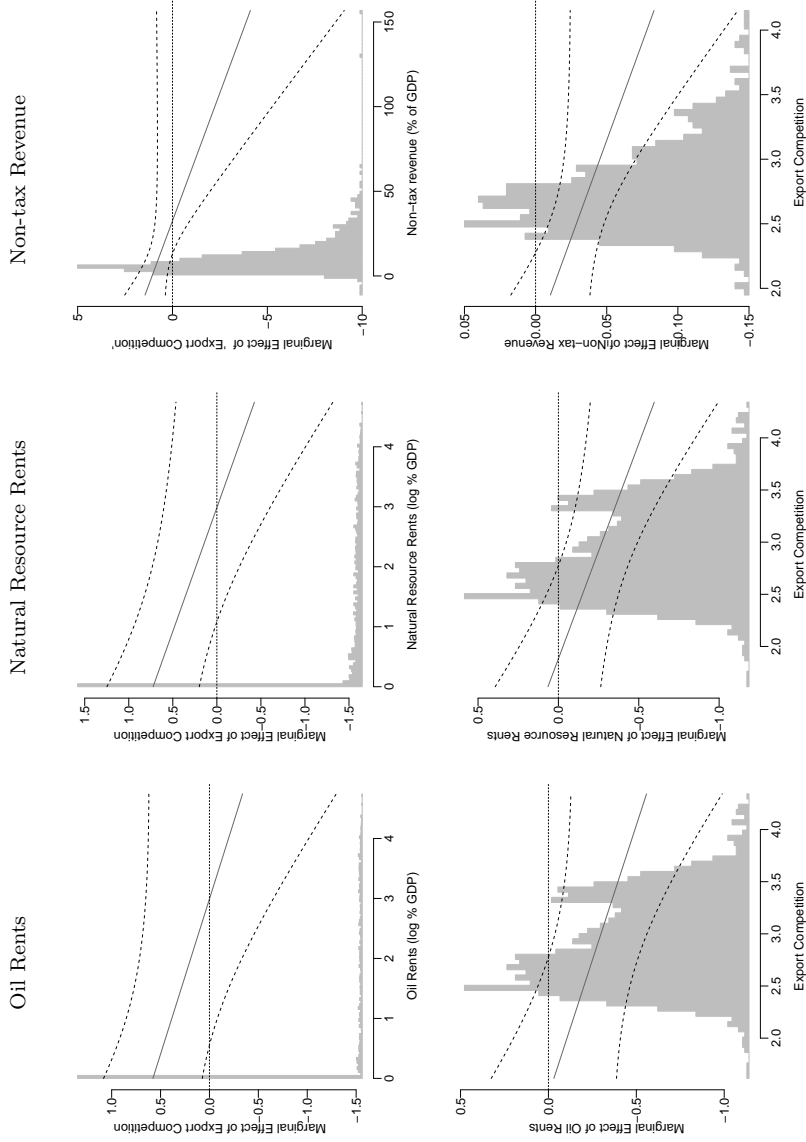
⁴²See also Cheibub (1998) who uses predicted hazard rates for leadership failure.

	Oil	LRM	Nat. Resources	LRM	Non-tax Revenue	LRM
Education spending $_{t-1}$	-0.20 (0.01)***		-0.20 (0.01)***		-0.30 (0.03)***	
$(W_{t-1}^{struct.equiv} \mathbf{Ed.Spend}_{t-1})$	0.11 (0.05)**	0.58 (0.26)**	0.14 (0.05)***	0.72 (0.27)***	0.33 (0.12)***	1.08 (0.41)***
Oil rent $_{t-1}$	0.05 (0.07)	0.28 (0.33)				
$(W_{t-1}^{struct.equiv} \mathbf{Ed.Spend}_{t-1}) \times \text{Oil rent}_{t-1}$	-0.04 (0.02)*	-0.19 (0.11)*				
Nat. resource rent $_{t-1}$			0.09 (0.06)	0.46 (0.32)		
$(W_{t-1}^{struct.equiv} \mathbf{Ed.Spend}_{t-1}) \times \text{Nat. resource rent}_{t-1}$			-0.05 (0.02)**	-0.24 (0.11)**		
Non-tax revenue $_{t-1}$					0.02 (0.01)	0.05 (0.05)
$(W_{t-1}^{struct.equiv} \mathbf{Ed.Spend}_{t-1}) \times \text{Non-tax revenue}_{t-1}$					-0.01 (0.01)*	-0.03 (0.02)*
Imports (log) $_{t-1}$					-0.13 (0.10)	-0.44 (0.33)
Exports (log) $_{t-1}$	0.03 (0.05)	0.17 (0.25)	0.03 (0.05)	0.16 (0.25)	-0.00 (0.09)	-0.01 (0.30)
Polity $_{t-1}$	-0.04 (0.04)	-0.20 (0.23)	-0.04 (0.04)	-0.18 (0.23)	0.00 (0.01)	0.01 (0.02)
Population < 14 $_{t-1}$	-0.00 (0.00)	-0.01 (0.02)	-0.00 (0.00)	-0.01 (0.02)	-0.02 (0.01)	-0.05 (0.03)
Urbanization $_{t-1}$	-0.01 (0.00)	-0.03 (0.02)	-0.01 (0.00)	-0.03 (0.02)	-0.01 (0.01)	-0.02 (0.02)
Population (log) $_{t-1}$	-0.00 (0.00)	-0.00 (0.02)	-0.00 (0.00)	-0.00 (0.02)	-0.48 (0.41)	-1.57 (1.36)
Real GDP per capita $_{t-1}$	-0.23 (0.13)*	-1.20 (0.66)*	-0.23 (0.13)*	-1.19 (0.66)*	-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)**	0.03 (0.01)***	0.11 (0.02)***
Output-gap $_{t-1}$	0.01 (0.00)***	0.07 (0.01)***	0.01 (0.00)***	0.07 (0.01)***	0.01 (0.00)***	0.03 (0.01)***
$W_{t-1}^{regional} \mathbf{Ed.Spend}_{t-1}$	0.00 (0.00)	0.00 (0.01)	0.00 (0.00)	0.00 (0.01)	-0.12 (0.10)	-0.39 (0.32)
Δ Oil rent	-0.02 (0.05)	-0.12 (0.26)	-0.02 (0.05)	-0.11 (0.26)		
Δ Nat. resource rent	-0.12 (0.05)**					
Δ Imports (log)	0.09 (0.06)		-0.09 (0.04)**		0.06 (0.11)	
Δ Exports (log)	-0.17 (0.06)***		0.09 (0.06)		-0.21 (0.10)**	
Δ Polity	-0.00 (0.00)		-0.18 (0.06)***		0.01 (0.01)	
Δ Population < 14	-0.07 (0.04)**		-0.00 (0.00)		-0.02 (0.08)	
Δ Urbanization	-0.05 (0.04)		-0.07 (0.04)**		0.07 (0.09)	
Δ Population (log)	1.32 (1.08)		-0.05 (0.04)		2.98 (2.01)	
Δ Real GDP per capita	0.00 (0.00)		1.28 (1.08)		0.00 (0.00)	
Δ Gov. consumption	0.03 (0.00)***		-0.00 (0.00)		0.04 (0.01)***	
Δ Output-gap	-0.00 (0.00)		0.03 (0.00)***		0.00 (0.00)	
Adj. R ²	0.15		-0.00 (0.00)		0.28	
Num. obs.	2452		0.15		846	
Countries	113		2452		59	
Year dummies	Yes		113		Yes	
Country dummies	Yes		Yes		Yes	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 2: Conditional Competition in Education Spending: Oil, Natural Resources, and Non-tax Revenue.

Figure 3: Interaction Effects of Competition in Education Spending with Oil Rents, Natural Resource Rents, and Non-Tax Revenue.



Note: Plots display the marginal, long-run effects and 95% confidence intervals of competition in education spending conditional on oil rents, natural resource rents, and non-tax revenue (upper row), as well as the marginal effects of oil rents, natural resource rents, and non-tax revenue conditional on export competition (lower row). Results correspond to the long run multipliers from Table 2.

rulers engage in human capital competition only when they feel secure in power. Top row of Figure 4 plots the marginal effects of trade competition across the values of predicted probability of regime failure (and vice-versa): autocracies compete in education spending when regime failure is a very unlikely event, and once the expected risk of regime change increases, rulers no longer react to trade competitors' education spending changes.⁴³ Furthermore, the lower left plot of Figure 4 shows that export competition only causes policy interdependence for regimes that have lasted more than 20 years.

We have argued that single-party regimes and authoritarian legislatures reduce the ruler's cost associated with education. The single-party regime variable comes from Geddes, Wright and Frantz (2014), and is a binary indicator capturing whether the control over policy, leadership selection, and the security apparatus is in the hands of one party. Empirically, we evaluate the difference in human capital competition between single-party regimes and other non-democracies. Table 4 indicates no significant difference in trade competition between single-party regimes and other autocratic regimes: this is indicated by the lack of statistical significance of the interaction term. We can also see a significant overlap in the 95% confidence intervals of coefficient estimates of the export competition variable for other regimes and single-party regimes in Figure 5.

To test the conditional effect of authoritarian legislatures, we use data from Cheibub, Gandhi and Vreeland (2010), from which we code existing legislatures in a given year. There is no large comparative data on the identity of actors represented in autocratic legislatures, and therefore we lack evidence about the inclusiveness of these legislative bodies. Hence, we employ data on the existence of legislatures in non-democratic settings. Results are similar to those obtained in the case of single-party regimes: dictators equipped with a legislature are no more likely to follow human capital races than those without a legislature as indicated by the significance level of the interaction term in Table 5 (as well as overlapping confidence intervals in Figure 6).

So far, we do not find evidence supporting conditional effects associated with single-party regimes and authoritarian legislatures. We have argued that a few underlying variables — distributional coalition size, breadth of organizational networks, and institutional capacities — help to explain the fact that single-party regimes are more resilient. It is likely that not all single-party regimes are associated with large coalition, broad networks, and strong capacities. Indeed, Smith (2005) further differentiates single-party regimes. He argues that those created by elites that faced organized opposition in the form of highly institutionalized social groups (e.g., mass-mobilizing parties or dedicated foreign or colonial armies) and that had little or no access to rent sources are likely to respond to

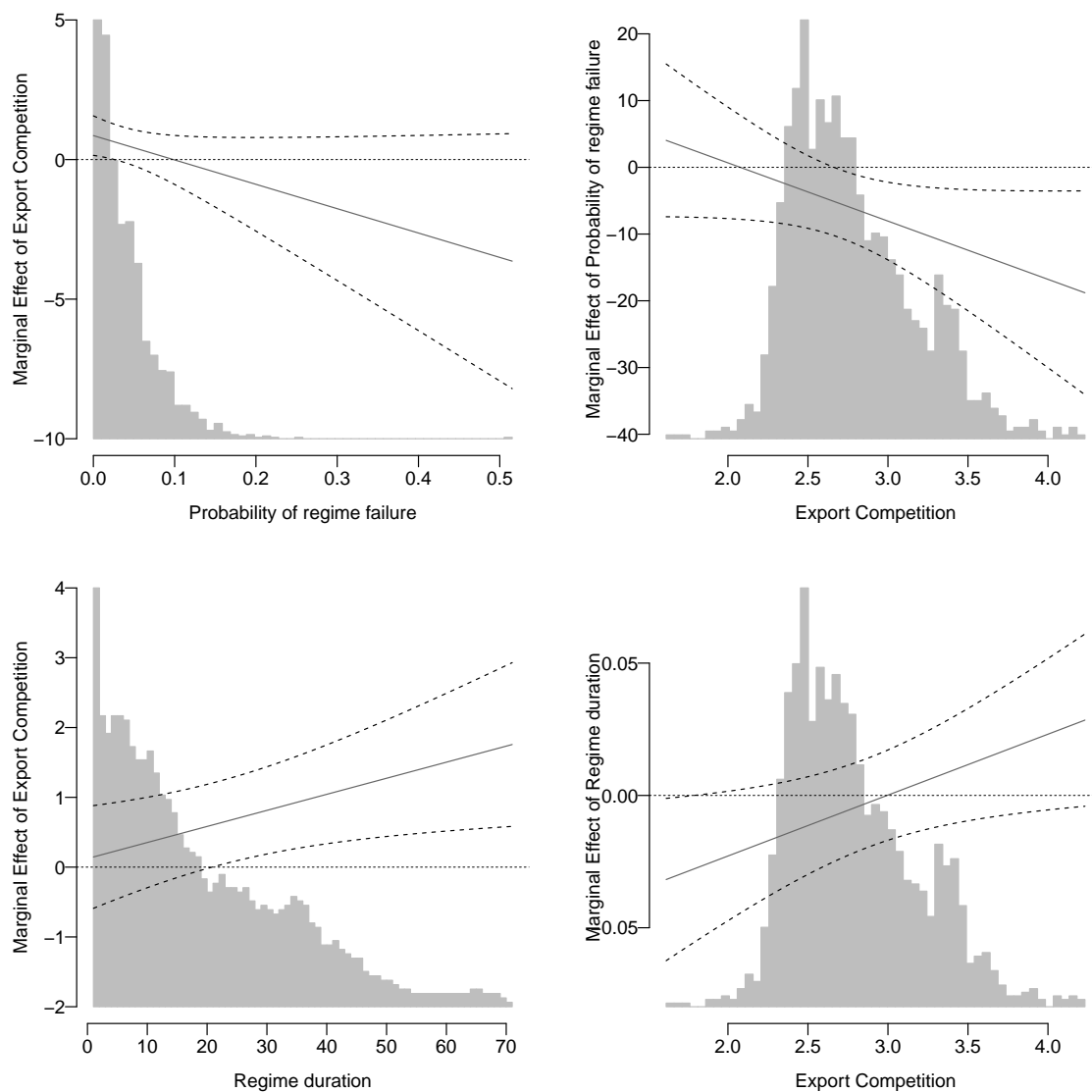
⁴³Also, shortened time-horizons may affect education spending negatively if education spending among trade competitor countries is high.

	Model 1	LRM	Model 2	LRM	Model 3	LRM	Model 4	LRM
Education spending _{<i>t-1</i>}	-0.15 (0.01)***		-0.18 (0.01)***		-0.15 (0.01)***		-0.18 (0.01)***	
$\mathbf{W}_{t-1}^{struct,equiv} \mathbf{y}_{t-1}$	0.16 (0.06)***	1.13 (0.43)***	0.16 (0.06)***	0.86 (0.36)**	0.04 (0.07)	0.26 (0.46)	0.02 (0.07)	0.12 (0.38)
Fail _{<i>t-1</i>}	4.07 (2.19)*	27.94 (15.08)*	3.32 (2.42)	18.12 (13.24)				
$\mathbf{W}_{t-1}^{struct,equiv} \mathbf{y}_{t-1} \times \text{Fail}_{t-1}$	-1.87 (0.79)**	-12.82 (5.46)**	-1.60 (0.87)*	-8.73 (4.80)*				
Regime duration _{<i>t-1</i>}								
$\mathbf{W}_{t-1}^{struct,equiv} \mathbf{y}_{t-1} \times \text{Duration}_{t-1}$					-0.01 (0.01)*	-0.07 (0.04)*	-0.01 (0.01)**	-0.07 (0.03)**
Imports (log) _{<i>t-1</i>}			0.13 (0.05)**	0.71 (0.29)**	0.00 (0.00)*	0.02 (0.01)**	0.00 (0.00)**	0.02 (0.01)**
Exports (log) _{<i>t-1</i>}			-0.13 (0.05)***	-0.69 (0.26)***			0.10 (0.05)*	0.54 (0.28)*
Polity _{<i>t-1</i>}			-0.00 (0.00)	-0.02 (0.03)			-0.11 (0.05)**	-0.58 (0.25)**
Population < 14 _{<i>t-1</i>}			-0.01 (0.01)**	-0.07 (0.03)**			-0.00 (0.00)	-0.02 (0.02)
Urbanization _{<i>t-1</i>}			-0.00 (0.00)	-0.02 (0.02)			-0.01 (0.01)**	-0.07 (0.03)**
Population (log) _{<i>t-1</i>}			-0.01 (0.19)	-0.03 (1.03)			-0.00 (0.00)	-0.01 (0.02)
Real GDP per capita _{<i>t-1</i>}			-0.00 (0.00)**	-0.00 (0.00)**			0.03 (0.18)	0.17 (0.98)
Gov. consumption _{<i>t-1</i>}			0.01 (0.00)***	0.06 (0.01)***			-0.00 (0.00)**	-0.00 (0.00)**
Output-gap _{<i>t-1</i>}			0.00 (0.00)	0.00 (0.01)			0.00 (0.00)	0.01 (0.01)
$\mathbf{W}_{t-1}^{regional} \mathbf{Ed.Spend}_{t-1}$			-0.06 (0.07)	-0.31 (0.37)			-0.02 (0.07)	-0.13 (0.36)
Δ Fail	-0.79 (0.50)		-1.41 (0.58)**					
Δ Regime duration					-0.00 (0.00)		-0.00 (0.00)	
Δ Imports (log)			0.03 (0.06)				0.02 (0.06)	
Δ Exports (log)			-0.17 (0.06)***				-0.16 (0.06)***	
Δ Polity			0.00 (0.01)				0.00 (0.01)	
Δ Population < 14			-0.13 (0.05)***				-0.12 (0.04)***	
Δ Urbanization			-0.01 (0.04)				-0.01 (0.04)	
Δ Population (log)			-0.40 (1.28)				-0.15 (1.23)	
Δ Real GDP per capita			-0.00 (0.00)*				-0.00 (0.00)*	
Δ Gov. consumption			0.03 (0.00)***				0.03 (0.00)***	
Δ Output-gap			-0.00 (0.00)				0.00 (0.00)	
Adj. R ²	0.09		0.15		0.08		0.14	
Num. obs.	1636		1571		1769		1658	
Countries	92		91		93		91	
Year dummies	Yes		Yes		Yes		Yes	
Country dummies	Yes		Yes		Yes		Yes	

****p* < 0.01, ***p* < 0.05, **p* < 0.1

Table 3: Conditional Competition in Education Spending: Rulers' Time-horizons

Figure 4: Interaction Effect of Competition in Education Spending with Time-horizons.



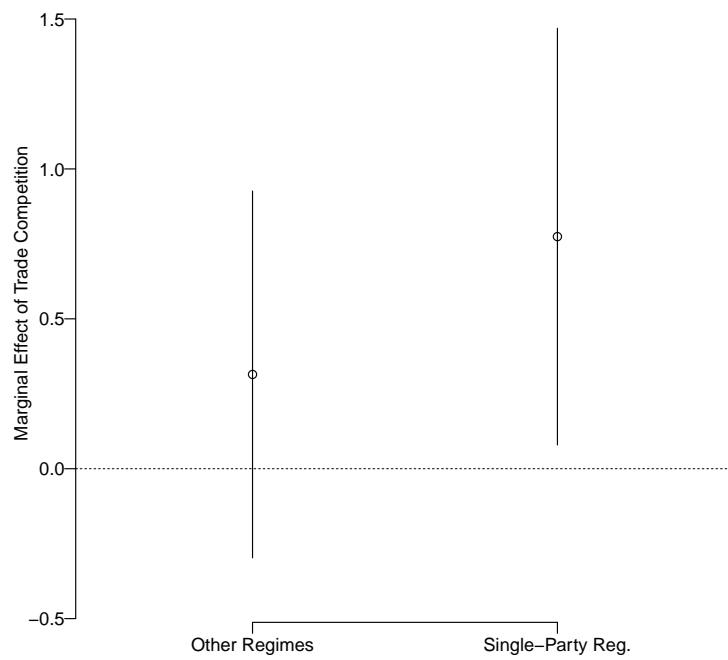
Note: Plots display the marginal, long-run effects and 95% confidence intervals of competition in education spending conditional on time-horizons (probability of regime failure), and vice-versa. Results correspond to the long-run multipliers from Table 3.

	Model 1	LRM	Model 2	LRM
Education spending _{t-1}	-0.13 (0.01)***		-0.16 (0.01)***	
$\mathbf{W}_{t-1}^{struct.equiv} \mathbf{y}_{t-1}$	0.05 (0.05)	0.41 (0.36)	0.05 (0.05)	0.31 (0.31)
Single-Party _{t-1}	-0.15 (0.14)	-1.15 (1.11)	-0.17 (0.16)	-1.06 (0.97)
$\mathbf{W}_{t-1}^{struct.equiv} \mathbf{y}_{t-1} \times \text{Single-Party}_{t-1}$	0.05 (0.05)	0.40 (0.38)	0.07 (0.05)	0.46 (0.33)
Imports (log) _{t-1}			0.06 (0.05)	0.37 (0.29)
Exports (log) _{t-1}			-0.08 (0.04)*	-0.48 (0.26)*
Polity _{t-1}			0.00 (0.00)	0.01 (0.02)
Population < 14 _{t-1}			-0.00 (0.00)	-0.02 (0.03)
Urbanization _{t-1}			-0.00 (0.00)	-0.01 (0.02)
Population (log) _{t-1}			-0.28 (0.14)**	-1.73 (0.86)**
Real GDP per capita _{t-1}			-0.00 (0.00)**	-0.00 (0.00)**
Gov. consumption _{t-1}			0.02 (0.00)***	0.10 (0.01)***
Output-gap _{t-1}			0.00 (0.00)	0.00 (0.01)
$\mathbf{W}_{t-1}^{regional} \mathbf{Ed.Spend}_{t-1}$			-0.04 (0.06)	-0.27 (0.34)
Δ Education spending _{t-1}	0.05 (0.02)**		0.05 (0.02)**	
Δ Single-Party	0.10 (0.08)		0.05 (0.08)	
Δ Imports (log)			0.03 (0.06)	
Δ Exports (log)			-0.15 (0.05)***	
Δ Polity			-0.00 (0.00)	
Δ Population < 14			-0.10 (0.04)**	
Δ Urbanization			-0.05 (0.04)	
Δ Population (log)			0.03 (1.08)	
Δ Real GDP per capita			-0.00 (0.00)**	
Δ Gov. consumption			0.03 (0.00)***	
Δ Output-gap			-0.00 (0.00)	
Adj. R ²	0.06		0.12	
Num. obs.	2407		2214	
Countries	106		102	
Year dummies	Yes		Yes	
Country dummies	Yes		Yes	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 4: Conditional Competition in Education Spending: Single-Party Regimes

Figure 5: Effect of Competition in Education Spending in Single-Party Regimes.



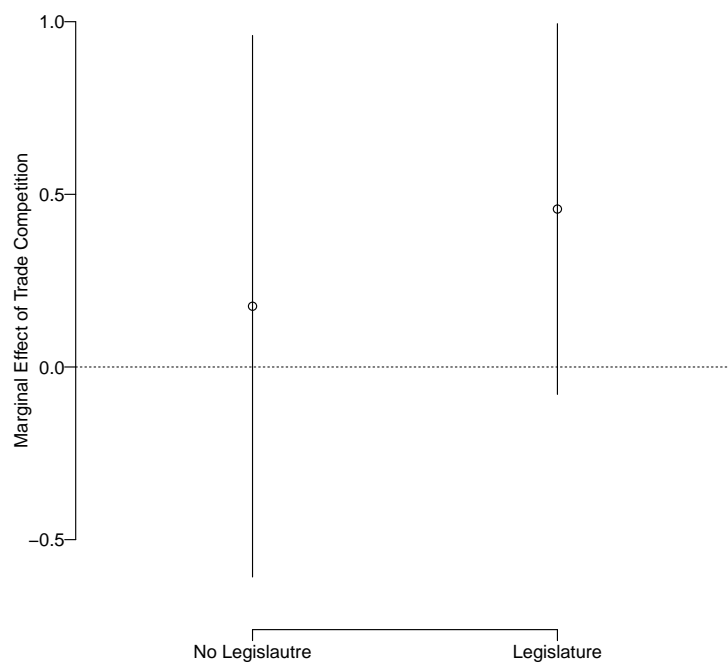
Note: Marginal effects and 95% confidence intervals of competition in education spending in Single-Party Regimes. Results correspond to the LRM of model 2 in Table 4.

	Model 1	LRM	Model 2	LRM
Education spending $_{t-1}$	-0.15 (0.01)**		-0.18 (0.01)**	
$\mathbf{W}_{t-1}^{struct.equiv} \mathbf{y}_{t-1}$	0.02 (0.07)	0.15 (0.45)	0.03 (0.07)	0.18 (0.40)
Legislature $_{t-1}$	-0.16 (0.17)	-1.06 (1.14)	-0.16 (0.18)	-0.88 (1.01)
$\mathbf{W}_{t-1}^{struct.equiv} \mathbf{y}_{t-1} \times \text{Legislature}_{t-1}$	0.06 (0.06)	0.39 (0.42)	0.05 (0.07)	0.28 (0.37)
Imports (log) $_{t-1}$			0.09 (0.05)*	0.48 (0.28)*
Exports (log) $_{t-1}$			-0.11 (0.04)**	-0.60 (0.25)**
Polity $_{t-1}$			0.00 (0.00)	0.00 (0.02)
Population < 14 $_{t-1}$			-0.00 (0.00)	-0.01 (0.03)
Urbanization $_{t-1}$			-0.00 (0.00)	-0.00 (0.02)
Population (log) $_{t-1}$			-0.34 (0.13)**	-1.91 (0.77)**
Real GDP per capita $_{t-1}$			-0.00 (0.00)**	-0.00 (0.00)**
Gov. consumption $_{t-1}$			0.02 (0.00)***	0.09 (0.01)***
Output-gap $_{t-1}$			0.00 (0.00)	0.01 (0.01)
$\mathbf{W}_{t-1}^{regional} \mathbf{Ed.Spend}_{t-1}$			-0.04 (0.05)	-0.25 (0.30)
Δ Education spending $_{t-1}$	0.04 (0.02)*		0.04 (0.02)*	
Δ Legislature $_{t-1}$	-0.01 (0.04)		-0.00 (0.04)	
Δ Imports (log)			0.06 (0.06)	
Δ Exports (log)			-0.19 (0.06)***	
Δ Polity			-0.00 (0.01)	
Δ Population < 14			-0.09 (0.04)**	
Δ Urbanization			-0.05 (0.04)	
Δ Population (log)			-0.04 (1.10)	
Δ Real GDP per capita			-0.00 (0.00)*	
Δ Gov. consumption			0.03 (0.00)***	
Δ Output-gap			-0.00 (0.00)	
Adj. R ²	0.07		0.12	
Num. obs.	2493		2298	
Countries	116		111	
Year dummies	Yes		Yes	
Country dummies	Yes		Yes	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 5: Conditional Competition in Education Spending: Authoritarian Legislatures

Figure 6: Effect of Competition in Education Spending in Regimes with Authoritarian Legislatures.



Note: Marginal effects and 95% confidence intervals of competition in education spending in Regimes with Authoritarian Legislatures. Results correspond to the LRM from model 2 in Table 5.

constraints by building effective party institutions to mobilize their own constituencies. They are, therefore, more resilient. The binary variables that we used to differentiate single-party regimes from the rest of the authoritarian regimes simply cannot pick up the aforementioned underlying variables. Future research should move beyond dummy variables of authoritarian regime types and test these underlying variables directly.

Regarding the effect of authoritarian legislatures, an empirical problem is that legislative institutions are present in most of the authoritarian regimes in our sample. Similarly, Gandhi and Przeworski (2006) find that autocracy with legislatures constitutes 92.5% of the autocratic country-year from 1946 to 1996. In this context, the differences between different types of authoritarian legislatures may be as important as or even more important than the difference between having and not having an authoritarian legislature. We have argued that partisan (vs. non-partisan) legislatures are more effective at securing a ruler's power and therefore rulers equipped with such legislatures should be more likely to respond to education spending changes in competitor countries. To test the effect of partisan legislature, we created a indicator variable that equals to 1 if either a single party or multiple parties are represented in an existing legislature; and 0 if either no legislature exists, or parties are not allowed or do not exist. Results are reported in Model 1 and 2 of Table 6 which indicate that partisan legislatures have a significant positive mediating effect: regimes with partisan legislatures are more responsive to human capital competition.

In addition to testing the differences between partisan and non-partisan legislatures, we further divide partisan legislatures into its subcategories: single-party vs. multi-party legislatures. Multiparty legislatures often institutionalize non-regime parties and provide resources to opposition groups. We suspect that this is more likely to enhance the policy concession mechanism, because more societal groups are represented in the legislature which makes concessions more credible. Single-party legislatures, on the other hand, by incorporating regime outsiders into the regime party, might have more to do with the spoil/rent sharing mechanism.

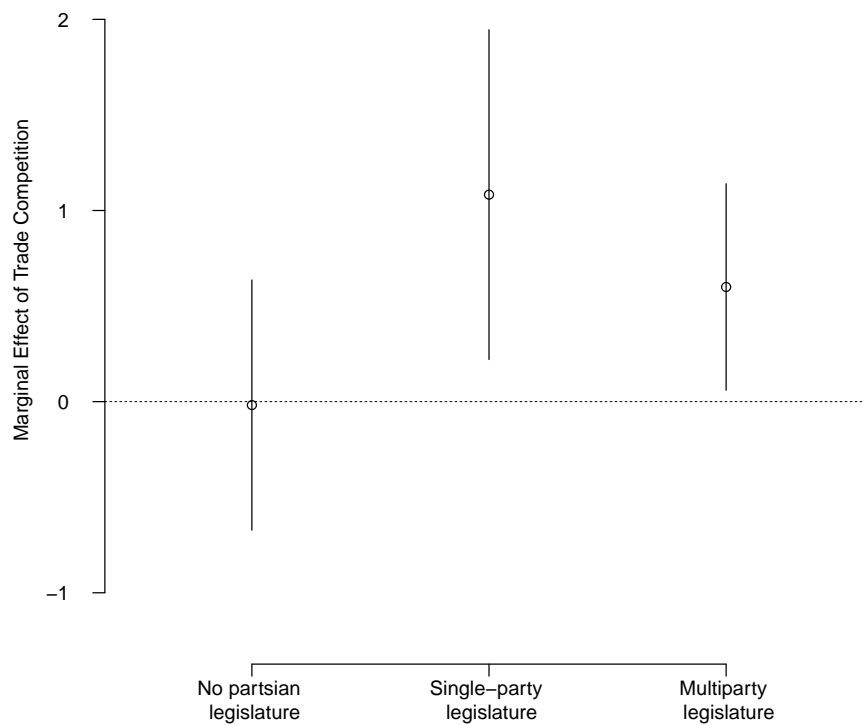
We create two dummy variables and interacting them with the trade competition variable. Results are reported in Model 3 and 4 of Table 6. Both variables have a significant, positive mediating effect. In Figure 7, we plot the 95% confidence intervals of coefficient estimates of the export competition variable across three scenarios: no partisan legislature, single-party legislature, and multi-party legislature. Authoritarian states without partisan legislature do not respond to human capital competition while those with partisan legislatures do. The mean coefficient estimate of the export competition variable is larger in the case of single-party legislatures than in multi-party legislatures. But their 95% confidence intervals overlap, suggesting that there is no statically difference

	Model 1	LRM	Model 2	LRM	Model 3	LRM	Model 4	LRM
Education spending $_{t-1}$	-0.15 (0.01)***		-0.19 (0.01)***		-0.17 (0.01)***		-0.19 (0.01)***	
$W^{struct, eqn}$ $_{t-1}$	-0.01 (0.06)	-0.08 (0.40)	0.00 (0.06)	0.00 (0.33)	0.02 (0.06)	0.14 (0.35)	-0.00 (0.06)	-0.02 (0.33)
Partisan Legislature $_{t-1}$	-0.29 (0.15)*	-1.95 (1.05)*	-0.39 (0.16)**	-1.99 (0.86)**				
$W^{struct, eqn}$ $_{t-1} \times$ Legislature $_{t-1}$	0.11 (0.05)**	0.75 (0.38)**	0.14 (0.06)**	0.70 (0.31)**				
Single-Party Legislature $_{t-1}$								
$W^{struct, eqn}$ $_{t-1} \times$ Single-Party Legislature $_{t-1}$								
Multy-Party Legislature $_{t-1}$								
$W^{struct, eqn}$ $_{t-1} \times$ Multi-Party Legislature $_{t-1}$								
Imports (log) $_{t-1}$			0.05 (0.05)	0.24 (0.25)				
Exports (log) $_{t-1}$			-0.08 (0.04)*	-0.44 (0.22)**				
Polity $_{t-1}$			-0.00 (0.00)	-0.01 (0.02)				
Population < 14 $_{t-1}$			-0.01 (0.00)	-0.03 (0.02)				
Urbanization $_{t-1}$			-0.00 (0.00)	-0.00 (0.02)				
Population (log) $_{t-1}$			-0.29 (0.13)**	-1.47 (0.69)**				
Real GDP per capita $_{t-1}$			-0.00 (0.00)*	-0.00 (0.00)*				
Gov. consumption $_{t-1}$			0.01 (0.00)***	0.07 (0.01)***				
Output-gap $_{t-1}$			0.00 (0.00)	0.00 (0.01)				
$W^{regional}$ $_{t-1}$			-0.03 (0.05)	-0.14 (0.27)				
Δ Partisan Legislature	-0.03 (0.04)							
Δ Single-Party Legislature								
Δ Multy-Party Legislature								
Δ Imports (log)			0.10 (0.06)					
Δ Exports (log)			-0.22 (0.06)***					
Δ Polity			0.00 (0.01)					
Δ Population < 14			-0.08 (0.04)**					
Δ Urbanization			-0.04 (0.04)					
Δ Population (log)			1.53 (1.09)					
Δ Real GDP per capita			-0.00 (0.00)					
Δ Gov. consumption			0.03 (0.00)***					
Δ Output-gap			-0.00 (0.00)					
Adj. R ²	0.07		0.15		0.10		0.15	
Num. obs.	2493		2413		2623		2413	
Countries	116		113		118		113	
Year dummies	Yes		Yes		Yes		Yes	
Country dummies	Yes		Yes		Yes		Yes	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 6: Conditional Competition in Education Spending: Partisan Legislatures

Figure 7: Effect of Competition in Education Spending in Regimes with Partisan Legislatures.



Note: Marginal effects and 95% confidence intervals of competition in education spending in Regimes with Partisan Legislatures. Results correspond to the LRM of model 4 in Table 6.

between the mediating effect of single-party (partisan) legislature and that of multi-party (partisan) legislature.

Alternative Explanations and Robustness Checks

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, 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.⁴⁴ 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 pursue education races, we find that Latin American autocracies strongly react to education among trade competitor countries.⁴⁵

Education spending may help to increase regime stability in authoritarian states as it serves as clientelistic exchanges and “cooptation.” In other words, after a negative shock due to enhanced human capital in trade competitor countries, a ruler may use education spending as a cooptation strategy instead of as a way to improve labor productivity and export competitiveness. Moreover, single party regimes are more likely to reliant on this mechanism, because they rely more on mass support; many of them have opted for election-related clientelism as a cooptation strategy. Other types of authoritarian regimes

⁴⁴Data are from the World Bank, World Development Indicators.

⁴⁵Section H of the online appendix has more detailed discussion on model estimates.

might instead rely on overt repression and the threat of violence.⁴⁶

In order to test this alternative, “competition triggers cooptation and repression,” causal mechanism, in our online appendix, we first test the effects of trade-induced interdependence in education spending on classical manifestation of cooptation such as public employment and size of government. We find no evidence for cooptation due to trade competition, not even among single-party regimes (online appendix: section F). We also use two proxies variables to measure the strength of teachers’ unions (an organized interest group that benefits directly from increased education spending): past education spending per pupil and the amount government spending in teacher salaries relative to the overall economy.⁴⁷ We find that teachers’ unions’ power is unlikely to be correlated with rulers’ decision to engage with trade-induced education races (online appendix: section F). We also test the effect of interdependence on military spending, government repression, control over civil society, and corruption. We find no observed increase in military spending, repression and control among small non-single-party authoritarian regimes (online appendix: section G). While education in autocracies may well serve for political ends other than productivity increase (Larreguy, Montiel Olea and Querubin, 2017), the consequences of trade competition from competitor countries are unrelated to them. At the same time, we do observe strong correlations between education spending and education outcomes (online appendix: section J), suggesting that at least part of the increased investment in education is translated into increased human capital.⁴⁸

Finally, increasing education spending to compete in foreign markets may also be part of an upgrading strategy by which the export profile of a given country may change from low- to high-skill goods. Upgrading therefore causes changes in a country’s export profile and its set of trade competitor countries. However, empirically, upgrading is mostly observed in high-income countries while autocracies are mostly low- and middle-income countries: for these countries, upgrading by changing the export profile is hard to achieve. For instance, Doner, Ritchie and Slater (2005) show that very few developing countries have managed to upgrade into high value-added and high quality production. Indeed, most of the upgrading in developing countries is through product quality change in a given product line, not through switches to new high-tech industries.⁴⁹ Moreover,

⁴⁶We thank one reviewer for raising this interesting alternative causal mechanism.

⁴⁷It is possible that these two proxies might not be able to pick up enough variation in the political strength of teachers’ unions, especially in cross-country context.

⁴⁸We have also replicated estimates from the main paper clustering standard errors to correct for potential time-wise heteroscedasticity and cross-sectional heteroscedasticity and correlation. As shown by Section L and Table 14 of the online appendix, there is no significant difference compared to spatial OLS models in the main paper.

⁴⁹This type of quality improvements can happen in relatively short periods, which allow for increased market shares in export destinations by selling better quality products with only moderate changes in

exports at the intensive margin (i.e., growth of old products in old markets) account for the most important share of overall trade growth, especially for developing countries (Amurgo-Pacheco and Pierola, 2008). Even though product change upgrading could take place in some developing countries, most of the effects of human capital increase are correlated with gains of foreign market shares at the intensive margin of trade, that is, old products in old markets.⁵⁰ Lastly, improved human capital often well explains product quality upgrading (rather than upgrading to a different, higher value-added product). For instance, Henn, Papageorgiou and Spatafora (2015) show that much of the quality upgrading in the manufacturing sector is a function of secondary education completion rates.

CONCLUSIONS

This paper is a first attempt to understand the political economy of education politics in authoritarian states. It moves beyond current education literature's focus of trade openness by bringing in a policy interdependence perspective. It also studies the conditional effects of domestic factors. The empirical analysis reveals strong evidence for education races induced by trade competition among authoritarian states. Moreover, rulers competing in human capital are those who depend on their population to collect revenue and feel secure in power. Rulers equipped with single-party regimes and authoritarian legislatures are no more likely to respond to education races. Further differentiating types of authoritarian legislatures, we find that rulers who respond to education races are those with *partisan* legislatures.⁵¹

Our theoretical model fits the context of authoritarian states. We argue that increases in education spending in competitor countries provide an exogenous shock for a ruler to reconsider his education policies. Whether the ruler will increase education spending is based on his calculation of the costs and benefits associated with such a policy change: education increases labor productivity and potential future revenue; however, as a coordination public good, education increases civil political engagement and chances of democratization. In a democratic setting, we expect that the nature of politics concerning education policies is different. For instance, with competitive elections, some might argue that the preference of the median voter, which might be different from that of the ruler, would prevail in affecting government policies. Moreover, if we consider education,

price.

⁵⁰Even at the extensive margin, geographic diversification is more important than the upgrading process that leads to product diversification.

⁵¹We have argued that partisan legislatures matter because they better enable the two important instruments for authoritarian regime survival: policy concessions and cooptation. Future analysis should look at via which instrument(s) partisan legislature affects regime survival.

especially primary education, as a redistributive policy and if we conceptualize democracy as an institution for the redistribution of wealth from the rich to the poor, education policies in democracies would likely be driven by variables that explain redistributive politics such as electoral rules, strength of interest groups, and partisan politics.⁵² To check whether our theoretical model also works in a democratic context, we have run our empirical analysis based on the sample of democratic countries: we find no evidence for an education spending race.⁵³

Our theoretical model of education politics in an authoritarian state context does not have a collective action component which also often plays a very important role in a democratic context. Preferences and strengths of organized interest groups and opposition parties in the legislature should matter greatly for education policies. Here, the theoretical prediction would be that the ruler would need to increase education spending when the supporters of such policy changes are organized. In an authoritarian state context, we have first considered the mass mobilization potential of a society by counting the number of strikes and demonstrations. These variables aim at capturing mass mobilization events, which may pick up some existing variation in collective action capacities.⁵⁴ We find that these mass mobilization event variables are not associated with education spending (Online Appendix, Section E). In addition to strikes and demonstrations, we have also considered some institutional variables that might affect collective action in authoritarian states. First, elective legislatures are thought to increase collective action due to mobilizing effects of electoral competition. Second, institutionalized ruling-parties may increase collective action among regime supporters and therefore affect the demand of education policy. We tested the effects of both elective legislature and ruling-party institutionalization variables and find none of them affects education spending in authoritarian states (Online Appendix, Section E). However, we suspect that none of these variables can sufficiently capture collective action abilities of organized interest groups (e.g., teachers' unions) and the mass public in authoritarian states. Future research should come up with better measures to further test whether collective action affects education policies in non-democracies.

⁵²For instance, Boix (1997) finds that left-wing governments spend heavily in physical and human capital formation to raise the productivity of factors and the competitiveness of the economy.

⁵³Interestingly, we find no evidence for an education spending race in *developed* country democracies and a *negative* and significant long-term effect of trade competition in *developing* country democracies. Details are reported in the Online Appendix, Section C. 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.

⁵⁴Of course, mass mobilization is not a perfect measure of collective action. But in autocracies, mass mobilization is probably among the few ways for the public to express political demands.

Furthermore, we focus on total education spending with no distinction between primary, secondary, and tertiary education. Depending on a country's comparative advantage, increased investment is unlikely to be evenly distributed between different sectors of education. An obvious next step is on theories and empirical tests that help to differentiate different types of education spending. Also, we assume that education increases population's ability to organize and to challenge the ruler. However, chances are that education might also indoctrinate people so that they become more loyal to the regime. Countries like North Korea are good examples. More research is needed to ensure that our assumption that education increases civil engagement and chances of democratization is realistic.

Finally, government spending is an input in human capital formation. We have assumed that today's spending in education always renders a larger human capital stock and a more productive labor force in future. More research is needed to disentangle the effect of spending races on different observable outputs related to human capital. For instance, we should provide an answer to the question of whether trade competition effectively increases educational attainment in non-democracies. Other lines of research should also look at the distributive effects of trade competition in terms of human capital inequality (Castelló and Doménech, 2002).⁵⁵ Such a line of research is likely to make an important contribution to the long debate regarding the causal mechanisms linking economic globalization and income inequality in developing countries (Goldberg and Pavcnik, 2007).

⁵⁵This shift in focus to educational inequality is also raised by a recent review essay by Gift and Wibbels (2014).

REFERENCES

- Acemoglu, D. and J. A. Robinson. 2006. "Economic backwardness in political perspective." *American Political Science Review* 100(1):115–131.
- Aldomd, Gabriel and Sidney Verba. 1963. *The Civic Culture: Political Attitudes and Democracy in Five Nations*. Princeton, NJ: Princeton University Press.
- Ames, Barry. 1987. *Political Survival: Politicians and Public Policy in Latin America*. Vol. 12 Berkeley: University of California Press.
- Amurgo-Pacheco, Alberto and Martha Denisse Pierola. 2008. *Patterns Of Export Diversification In Developing Countries : Intensive And Extensive Margins*. Policy Research Working Papers The World Bank.
- Ansell, Ben W. 2008. "Traders, teachers, and tyrants: democracy, globalization, and public investment in education." *International Organization* 62(02):289–322.
- Ansell, Ben W. 2010. *From the Ballot to the Blackboard: the Redistributive Political Economy of Education*. New York: Cambridge University Press.
- Avelino, G., D. S. Brown and W. Hunter. 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):625–641.
- Balassa, Bela. 1981. *The Newly Industrializing Countries in the World Economy*. New York: Pergamon Press.
- Baum, M. A. and D. A. Lake. 2003. "The political economy of growth: Democracy and human capital." *American Journal of Political Science* 47(2):333–347.
- Blanco, Luisa and Robin Grier. 2012. "Natural resource dependence and the accumulation of physical and human capital in Latin America." *Resources Policy* 37(3):281–295.
- Boix, Carles. 1997. "Political parties and the supply side of the economy: The provision of physical and human capital in advanced economies, 1960-90." *American Journal of Political Science* 41(3):814–845.
- Boix, Carles and Susan C. Stokes. 2003. "Endogenous Democratization." *World Politics* 55(4):pp. 517–549.
- Bourguignon, François and Thierry Verdier. 2000. "Oligarchy, Democracy, Inequality and Growth." *Journal of Development Economics* 62(2):285–313.
- Brady, Henry E., Sidney Verba and Kay Lehman Schlozman. 1995. "Beyond Ses: A Resource Model of Political Participation." *The American Political Science Review* 89(2):pp. 271–294.
- Brooks, Sarah M. 2005. "Interdependent and Domestic Foundations of Policy Change: The Diffusion of Pension Privatization around the World." *International Studies Quarterly* 49(2):273–294.

- Brooks, Sarah M. 2007. "When Does Diffusion Matter? Explaining the Spread of Structural Pension Reforms Across Nations." *The Journal of Politics* 69:701–715.
- Brooks, Sarah M. and Marcus J. Kurtz. 2012. "Paths to Financial Policy Diffusion: Statist Legacies in Latin America's Globalization." *International Organization* 66(1):pp. 95–128.
- Brown, David S. and Wendy Hunter. 1999. "Democracy and Social Spending in Latin America, 1980-92." *American Political Science Review* 93(4):779–790.
- Brown, David S. and Wendy Hunter. 2004. "Democracy and Human Capital Formation." *Comparative Political Studies* 37(7):842–864.
- Busch, Per-Olof, Helge Jörgens and Kerstin Tews. 2005. "The Global Diffusion of Regulatory Instruments: The Making of a New International Environmental Regime." *Annals of the American Academy of Political and Social Science* 598:pp. 146–167.
- Cameron, David R. 1978. "The Expansion of the Public Economy: A Comparative Analysis." *American Political Science Review* 72(4):1243–1261.
- Campante, Filipe R and Davin Chor. 2012. "Schooling, Political Participation, and the Economy." *Review of Economics and Statistics* 94(4):841–859.
- Campbell, David E. 2006. *Why we vote: How schools and communities shape our civic life*. Princeton University Press.
- Cao, Xun. 2012. "Global Networks and Domestic Policy Convergence: A Network Explanation of Policy Changes." *World Politics* 64(3):375–425.
- Cao, Xun and Aseem Prakash. 2010. "Trade Competition and Domestic Pollution: A Panel Study, 1980–2003." *International Organization* 64(03):481–503.
- Cao, Xun and Aseem Prakash. 2012. "Trade Competition and Environmental Regulations: Domestic Political Constraints and Issue Visibility." *The Journal of Politics* 74(01):66–82.
- Castelló, Amparo and Rafael Doménech. 2002. "Human Capital Inequality and Economic Growth: Some New Evidence." *The Economic Journal* 112(478):C187–C200.
- Castelló-Climent, Amparo. 2008. "On the Distribution of Education and Democracy." *Journal of Development Economics* 87(2):179–190.
- Cheibub, J. Antonio. 1998. "Political Regimes and the Extractive Capacity of Governments: Taxation in Democracies and Dictatorships." *World Politics* 50:349–376.
- Cheibub, José Antonio, Jennifer Gandhi and James Raymond Vreeland. 2010. "Democracy and Dictatorship Revisited." *Public Choice* 143(1-2):67–101.
- Dahlum, Sirianne and Tore Wig. Forthcoming. "Educating Demonstrators: Education and Mass Protest in Africa." *Journal of Conflict Resolution* .

- De Boef, Suzanna and Luke Keele. 2008. "Taking Time Seriously." *American Journal of Political Science* 52(1):184–200.
- De Mesquita, Bruce Bueno and Alastair Smith. 2010. "Leader Survival, Revolutions, and the Nature of Government Finance." *American Journal of Political Science* 54(4):936–950.
- Dee, Thomas S. 2004. "Are there civic returns to education?" *Journal of Public Economics* 88(9-10):1697–1720.
- Doner, Richard F., Bryan K. Ritchie and Dan Slater. 2005. *Systemic Vulnerability and the Origins of Developmental States: Northeast and Southeast Asia in Comparative Perspective*. Vol. 59.
- Dreher, Axel. 2006. "Does Globalization Affect Growth? Evidence from a new Index of Globalization." *Applied Economics* 38(10):1091–1110.
- Duflo, Esther. 2001. "Schooling and Labor Market Consequences of School Construction in Indonesia: Evidence from an Unusual Policy Experiment." *American Economic Review* 91(4):795–813.
- Elis, Roy. 2011. "Redistribution Under Oligarchy: Trade, Regional Inequality, and the Origins of Public Schooling in Argentina, 1862'1912."
- Elkins, Zachary, Andrew Guzman and Beth A. Simmons. 2006. "Competing for Capital: the Diffusion of Bilateral Investment Treaties, 1960-2000." *International Organization* 60:811–846.
- Evans, Geoffrey and Pauline Rose. 2012. "Understanding Education's Influence on Support for Democracy in Sub-Saharan Africa." *Journal of Development Studies* 48(4):498–515.
- Feng, Yi. 1997. "Democracy, Political Stability and Economic Growth." *British Journal of Political Science* 27(3):pp. 391–418.
- Feng, Yi and Paul J. Zak. 1999. "The Determinants of Democratic Transitions." *The Journal of Conflict Resolution* 43(2):pp. 162–177.
- Finkel, Steven E. 2002. "Civic Education and the Mobilization of Political Participation in Developing Democracies." *The Journal of Politics* 64(4):pp. 994–1020.
- Franzese, Robert J. and Jude C. Hays. 2008. "Interdependence in Comparative Politics: Substance, Theory, Empirics, Substance." *Comparative Political Studies* 41(4-5):742–780.
- Galor, Oded and Omer Moav. 2006. "Das Human Kapital: A Theory of the Demise of the Class Structure." *The Review of Economic Studies* 73(1):85–117.
- Galor, Oded, Omer Moav and Dietrich Vollrath. 2009. "Inequality in Landownership, the Emergence of Human-Capital Promoting Institutions, and the Great Divergence." *Review of Economic Studies* 76(1):143–179.

- Galston, W. A. 2001. "Political knowledge, political engagement, and civic education." *Annual Review of Political Science* 4:217–234.
- Gandhi, Jennifer and Adam Przeworski. 2006. "Cooperation, cooptation, and rebellion under dictatorships." *Economics & Politics* 18(1):1–26.
- Gandhi, Jennifer and Adam Przeworski. 2007. "Authoritarian Institutions and the Survival of Autocrats." *Comparative Political Studies* 40(11):1279–1301.
- Geddes, Barbara. 1999. Authoritarian breakdown: Empirical test of a game theoretic argument. In *annual meeting of the American Political Science Association, Atlanta*. Vol. 2.
- Geddes, Barbara, Joseph Wright and Erica Frantz. 2014. "Autocratic Breakdown and Regime Transitions: A New Data Set." *Perspectives on Politics* 12(1).
- Gibson, J. L., R. M. Duch and K. L. Tedin. 1992. "Democratic Values And The Transformation Of The Soviet-Union." *Journal of Politics* 54(2):329–371.
- Gift, Thomas and Erik Wibbels. 2014. "Reading, Writing, and the Regrettable Status of Education Research in Comparative Politics." *Annual Review of Political Science* 17(1):291–312.
- Gilardi, Fabrizio. 2010. "Who Learns from What in Policy Diffusion Processes?" *American Journal of Political Science* 54(3):pp. 650–666.
- Glaeser, Edward L, Giacomo AM Ponzetto and Andrei Shleifer. 2007. "Why does democracy need education?" *Journal of Economic Growth* 12(2):77–99.
- Glaeser, Edward L., Rafael La Porta, Florencio Lopez-de Silanes and Andrei Shleifer. 2004. "Do Institutions Cause Growth?" *Journal of Economic Growth* 9(3):271–303.
- Gleditsch, Kristian Skrede. 2002. "Expanded trade and GDP data." *Journal of Conflict Resolution* 46(5):712–724.
- Goldberg, P. and N. Pavcnik. 2007. "Distributional Effects of Trade Liberalization in Developing Countries." *Journal of Economic Literature* 45(1):39–82.
- Grant, Taylor and Matthew J. Lebo. 2016. "Error correction methods with political time series." *Political Analysis* 24(1):3–30.
- Gygli, Savina, Florian Haelg and Jan-Egbert Sturm. 2018. "The KOF Globalisation Index: Revisited." *KOF Working Paper, No. 439*.
- Gylfason, T. 2001. "Natural resources, education, and economic development." *European Economic Review* 45(4-6):847–859.
- Hecock, R. Douglas. 2006. "Electoral competition, globalization, and subnational education spending in Mexico, 1999–2004." *American Journal of Political Science* 50(4):950–961.

- Helliwell, J. F. 1994. "Empirical Linkages Between Democracy And Economic-Growth." *British Journal Of Political Science* 24:225–248.
- Henn, Christian, Chris Papageorgiou and Nikolas Spatafora. 2015. Export quality in advanced and developing economies: Evidence from a new dataset. Technical report World Trade Organization (WTO), Economic Research and Statistics Division.
- Hong, Ji Yeon. Forthcoming. "How Natural Resources Affect Authoritarian Leaders' Provision of Public Services: Evidence from China." *The Journal of Politics* .
- Huber, Evelyne, Thomas Mustillo and John D Stephens. 2008. "Politics and social spending in Latin America." *The Journal of Politics* 70(2):420–436.
- Im, Kyung So, M.Hashem Pesaran and Yongcheol Shin. 2003. "Testing for unit roots in heterogeneous panels." *Journal of Econometrics* 115(1):53–74.
- Kadera, Kelly M., Mark J. C. Crescenzi and Megan L. Shannon. 2003. "Democratic survival, peace and war." *American Journal of Political Science* 47(2):234–247.
- Kaufman, Robert R. and Alex Segura-Ubiergo. 2001. "Globalization, domestic politics, and social spending in Latin America." *World Politics* 53(4):553–87.
- Keele, Luke, Suzanna Linn and Clayton McLaughlin Webb. 2016. "Erratum for Keele, Linn, and Webb (2016)." *Political Analysis* .
- Kosack, Stephen. 2013. "The Logic of Pro-Poor Policymaking: Political Entrepreneurship and Mass Education." *British Journal of Political Science* pp. 1–36.
- Krueger, Alan B. and Mikael Lindahl. 2001. "Education for Growth: Why and For Whom?" *Journal of Economic Literature* 39(4):pp. 1101–1136.
- Kurtz, Marcus J and Sarah M Brooks. 2011. "Conditioning the Resource Curse: Globalization, Human Capital, and Growth in Oil-Rich Nations." *Comparative Political Studies* 44(6):747–770.
- Larreguy, Horacio, Cesar E. Montiel Olea and Pablo Querubin. 2017. "Political Brokers: Partisans or Agents? Evidence from the Mexican Teachers' Union." *American Journal of Political Science* 61(4):877–891.
- Lebo, Matthew J. and Taylor Grant. 2016. "Equation balance and dynamic political modeling." *Political Analysis* 24(1):69–82.
- Levin, Andrew, Chien Fu Lin and Chia Shang James Chu. 2002. "Unit root tests in panel data: Asymptotic and finite-sample properties." *Journal of Econometrics* 108(1):1–24.
- Levine, Ross and David Renelt. 1992. "A Sensitivity Analysis of Cross-Country Growth Regressions." *The American Economic Review* 82(4):pp. 942–963.
- Levitsky, Steven and Lucan Way. 2002. "The rise of competitive authoritarianism." *Journal of democracy* 13(2):51–65.

- Lindert, Peter H. 2004. *Growing Public. Social Spending and Economic Growth Since the Eighteenth Century*. New York: Cambridge University Press.
- Lopez-Cariboni, Santiago and Xun Cao. 2015. "Import Competition and Policy Diffusion." *Politics & Society* 43(4):471–502.
- Lucas Jr, Robert E. 1988. "On the mechanics of economic development." *Journal of monetary economics* 22(1):3–42.
- Mankiw, N. Gregory, David Romer and David N. Weil. 1992. "A Contribution to the Empirics of Economic Growth." *The Quarterly Journal of Economics* 107(2):pp. 407–437.
- Marshall, Monty G., Keith Jagers and Ted Robert Gurr. 2011. *Polity IV Project: Dataset Users' Manual*. Center for Systemic Peace: Polity IV Project.
- Miller, Michael K. 2012. "Economic Development, Violent Leader Removal, and Democratization." *American Journal of Political Science* 56(4):1002–1020.
- Morrison, Kevin M. 2009. "Oil, Nontax Revenue, and the Redistributive Foundations of Regime Stability." *International Organization* pp. 107–138.
- Mulligan, Casey B., Ricard Gil and Xavier Sala-i Martin. 2004. "Do Democracies Have Different Public Policies than Nondemocracies?" *Journal of Economic Perspectives* 18(1):51–74.
- Nooruddin, Irfan and Joel W. Simmons. 2009. "Openness, Uncertainty, and Social Spending: Implications for the Globalization-Welfare State Debate." *International Studies Quarterly* 53(3):841–866.
- Papaioannou, Elias and Gregorios Siourounis. 2008. "Economic and social factors driving the third wave of democratization." *Journal of Comparative Economics* 36(3):365–387.
- Przeworski, Adam, Michael E. Alvarez, José Antonio Cheibub and Fernando Limongi. 2000. *Democracy and Development: Political Institutions and Well-Being in The World, 1950-1990*. Cambridge: Cambridge University Press.
- Reiter, Dan. 2001. "Does Peace Nurture Democracy?" *The Journal of Politics* 63(3):935–948.
- Reuter, Ora John and Graeme B Robertson. 2015. "Legislatures, cooptation, and social protest in contemporary authoritarian regimes." *The Journal of Politics* 77(1):235–248.
- Romer, Paul M. 1990. "Endogenous Technological Change." *Journal of Political Economy* 98(5):pp. S71–S102.
- Ross, Michael. 2006. "Is democracy good for the poor ?" *AMERICAN JOURNAL OF POLITICAL SCIENCE* 50(4):860–874.
- Ross, Michael L. 2012. *The Oil Curse. How Petroleum Wealth Shapes the Development of Nations*. Princeton: Princeton University Press.

- Rousseau, David L, Christopher Gelpi, Dan Reiter and Paul K Huth. 1996. "Assessing the Dyadic Nature of the Democratic Peace, 1918-88." *American Political Science Review* 90(03):512–533.
- Rudra, Nita. 2004. "Openness, Welfare Spending, and Inequality in the Developing World." *International Studies Quarterly* 48(3):683–709.
- Rudra, Nita and Stephan Haggard. 2005. "Globalization, Democracy, and Effective Welfare Spending in the Developing World." *Comparative Political Studies* 38(9):1015–1049.
- Sala-i Martin, Xavier, Gernot Doppelhofer and Ronald I. Miller. 2004. "Determinants of Long-Term Growth: A Bayesian Averaging of Classical Estimates (BACE) Approach." *The American Economic Review* 94(4):pp. 813–835.
- Sanborn, Howard and Clayton L. Thyne. 2013. "Learning Democracy: Education and the Fall of Authoritarian Regimes." *British Journal of Political Science* FirstView:1–25.
- Schedler, Andreas. 2006. "Electoral authoritarianism: The dynamics of unfree competition."
- Sianesi, Barbara and John Van Reenen. 2003. "The returns to education: Macroeconomics." *Journal of Economic Surveys* 17(2):157–200.
- Simmons, Beth A., Frank Dobbin and Geoffrey Garrett. 2006. "Introduction: The International Diffusion of Liberalism." *International Organization* 60:781–810.
- Simmons, Beth A. and Zachary Elkins. 2004. "The Globalization of Liberalization: Policy Diffusion in the International Political Economy." *American Political Science Review* 98:171–189.
- Smith, Benjamin. 2005. "Life of the party: The origins of regime breakdown and persistence under single-party rule." *World Politics* 57(03):421–451.
- Stasavage, David. 2005. "Democracy and Education Spending in Africa." *American Journal of Political Science* 49(2):pp. 343–358.
- The World Bank. 2012. *World Development Indicators*. Washington, D.C.: The World Bank (producer and distributor).
- Verba, Sidney, Norman H. Nie Nie and Jae-on Kimw. 1978. *Participation and political equality: A seven-nation comparison*. University of Chicago Press.
- Wantchekon, Leonard, Natalija Novta and Marko Klašnja. 2012. "Education and Human Capital Externalities: Evidence from Colonial Benin."
- Ward, Hugh and Xun Cao. 2012. "Domestic and International Influences on Green Taxation." *Comparative Political Studies* 45(9):1075–1103.
- Way, Christopher R. 2005. "Political Insecurity and the Diffusion of Financial Market Regulation." *Annals of the American Academy of Political and Social Science* 598:pp. 125–144.

- Webber, Don. 2002. "Policies to stimulate growth: should we invest in health or education?" *Applied Economics* 34(13):1633–1643.
- Wibbels, Erik and John S. Ahlquist. 2011. "Development, Trade, and Social Insurance." *International Studies Quarterly* 55(1):125–149.
- Wright, Joseph. 2008. "Do Authoritarian Institutions Constrain? How Legislatures Affect Economic Growth and Investment." *American Journal of Political Science* 52(2):322–343.
- Wright, Joseph and Abel Escriba-Folch. 2012. "Authoritarian Institutions and Regime Survival: Transitions to Democracy and Subsequent Autocracy." *British Journal of Political Science* 42:283–309.
- Zagha, Roberto and Gobind T. Nankani. 2005. *Economic Growth in the 1990s: Learning from a Decade of Reform*. World Bank Publications.