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Exploring the sample of random leadership transitions attest to the baseline results. We also show the robustness of estimates by considering partisan affiliation, political institutions, public opinion, and geopolitics as alternative channels.

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1 Introduction

The paradigm of political economy assumes politicians to be agents of interests, and the policy divergence among politicians reflect conflictual political and economic interests in the society. In democratic systems, politicians and parties compete on platforms to maximize electoral gains (Downs, 1957; Grossman and Helpman, 1996; Meltzer and Richard, 1981). Officials may also sell policies to interest groups in exchange for political rents under weak institutional environments (Acemoglu and Verdier, 2000; Krueger, 1974; Frye and Shleifer, 1997). In turn, it is a pervasive view that the primary role of political institutions should be constraining the power of policy makers. Institutions, rather than political leaders, are believed to be the subject of “preventing ‘bad’ people from doing harm as of enabling ‘good’ people to do good”, as Milton Friedman (1962) asserted.

A limit along this line of reasoning is that good policies are not made automatically. To be able to initiate a policy, politicians need to have visions for necessary reforms and form reasonable expectations about the policy consequences. Ideas guide politicians even when they are motivated by material interests. For example, politicians may support or oppose certain trade policies based on the expectations about changes in their economic rents and political powers resulting from these policies. Yet the calculations about the rents and power are shaped by ideas about how economic systems work. A left wing politician may ease trade barriers if he or she believes that the economic benefits will be overwhelmingly high, thus producing sufficient revenues to cover the losses of the Left’s political constituents, say trade unions and infant industries. In this case, ideas may indeed trump interests (Rodrik, 2014).

In this paper, we investigate the effects of national leaders’ educational backgrounds, which we interpret as a major source of their ideas, on economic liberalization, a policy paradigm prominent around the world in the recent several decades. Conventional explanations for policy choices on liberalization hinge on partisan interests or geopolitics (Berger et al., 2013; Dutt and Mitra, 2005; Rodrik, 1995; Trefler, 1993), or emphasize the role of political institutions (Giavazzi and Tabellini, 2005; Giuliano, Mishra, and Spilimbergo, 2013). The history from the First World War, however, offers abundant cases in which ruling parties from opposing ideological spectrums converged on liberalizations (Przeworski, 2014). Moreover, a large number of reforms seemed to be implemented without external political pressure. Political leaders often approach international organizations such as the IMF to pursue policy liberalizations even when the countries were far from a currency crisis (Barro and Lee, 2005; Przeworski and Vreeland, 2000).

We rely on two data sets to empirically examine the effects of leaders' education on economic liberalization. The information about education is from an originally collected data set on national leaders, which we identify as the head of the executive branch. For the measurement of liberalization, we rely on a recent data set constructed by the Research Department of International Monetary Fund on structural reforms in nearly 140 countries from 1960 to 2005 (Giuliano, Mishra, and Spilimbergo, 2013). We find a robust relationship between educational attainments of leaders and the annual increase in the level of economic liberalization. The effects are particularly strong for leaders with a degree of higher education in economics, social sciences, and natural sciences, but not for leaders from other majors. Meanwhile, education seems to be a more fundamental determinant in shaping leaders' policy preference about liberalization when compared with other aspects of personal characteristics, such as age, term, the length of tenure, and the previous career path in the public and private sectors.

We address the concern about non-random selection in national leaders by a set of falsification tests. It is possible that the majority of voters had strong preference for liberalization and they voted for highly educated leaders out of the hope for reforms. Countries being swamped in currency or debt crises may seek helps from the international organizations such as the IMF and agreed to implement structural reform as a precondition of relief programs. The effect being estimated of leaders' education then originates from the ability of leaders in making deals with the international organizations. We first test whether liberalization is "predicted" by (1) the pre-existing growth trajectories, and (2) the educational attainments of forthcoming leaders. There is no evidence to support either liberalization is caused by economic recessions or that the increasing trend of liberalization precedes the selection of highly educated leaders. We then assess whether leaders' education is explained by the pre-existing growth rates and liberalization. If the results are indeed due to any reverse causality, we should expect liberalization or growth in the preceding years to have some impacts on leaders' education. We also do not find such a link. Thus, highly educated leaders are not selected *because of* a country's fundamental need for structural reforms.

In addition to the falsification tests using the full sample, we deal with the selection problem by focusing on the sample of quasi random leadership transitions. Following the ideas of Jones and Olken (2005) and Besley, Montalvo, and Reynal-Querol (2011), we investigate liberalizations during five-year windows before and after leadership transitions due to accidental or natural death. We find that transitions to leaders with higher education are associated with strong increase in liberalization, and the magnitudes of this effect are

considerably larger than in the baseline results obtained from the full sample. Interestingly, transitions in the opposition direction do not leave a negative impact on liberalization.

We also take into account a set of alternative channels which may confound the effects of leaders' education. We find that (1) The results are not driven by a superficial correlation between the educational attainment of political leaders and their partisan affiliation; (2) The effects of leaders' education are robust to the inclusion of institutional variables, such as political democracy, the constitutional constraint on the executive, and the presence of presidential systems; (3) The preferences of more educated leaders for economic liberalization are unlikely to be due to pandering to the strong pro-market sentiment in public opinions; and (4) The results are driven by radical policy changes due to geopolitical politics. Altogether, the results suggest a robust causality between the educational backgrounds of political leaders and economic policies that exists independently from the influence of political institutions and interest politics.

Our paper contributes to the recent literature on the role of political leaders in driving policy outcomes. Based on cross-country evidence from the 1960s, Glaeser et al. (2004) find that some successful take-offs in developing countries followed from growth-enhancing policies imposed by their political leaders. Jones and Olken (2005) argue that leader effects are a fundamental driver for the discrepancy in long term economic growth among countries, using random leadership transitions as an identifying source. Echoing with their finding, Besley, Montalvo, and Reynal-Querol (2011) adopt a similar strategy to establish that more educated leaders promote economic performance. Neither Jones and Olken (2005) nor Besley, Montalvo, and Reynal-Querol (2011), however, place the relationship between leaders' personal backgrounds and the policy making in the central place of their studies. By focusing on leaders' educational attainment and their majors, we provide a refined channel to further understand how political leaders shape economic policies and performance.

The existing researches on leaders' effect on economic policy making have mostly dealt with fiscal and monetary policies. Based on a panel of 71 democracies, Brender and Drazen (2013) document that leadership turnover give rise to fluctuations in the composition of fiscal expenditures. Dreher et al. (2009) find that leaders with previous career in business sectors increase the degree of economic freedom, which is measured by the security of property rights. Hayo and Neumeier (2014) focus on Germany and find that public debts were higher when prime ministers came from families with lower social status. On ministerial positions, Göhlmann and Vaubel (2007) find that central bankers who had made their career path from inside the bank preferred lower inflation rates than former politicians do. Jochimsen and

Thomasius (2014) come to a similar conclusion for German finance ministers. Our paper assesses the leader effect through the lens of education, which we interpret as a source of ideas as opposed to other instrumental motives.

Our paper also relates to the political science researches on leaders' characteristics. The idea that leadership matters can be retrieved to classical authors such as Machiavelli (2005), who argues that knowledge in the military combat is a necessary condition for the political leadership. Related to this, Horowitz and Stam (2014) find that leaders' previous career in the military sector increases the likelihood of wars. Dube and Harish (2015) find that female monarchs, rather than kings, are more likely to participate in wars without jeopardizing domestic stability by using their spouses' political networks. Strong leaders, however, may play a counter-productive role in deterring reforms, as Besley, Persson, and Reynal-Querol (2014) argue. By contrast, higher education may be useful in fostering liberal ideas on many issues from economic openness to war and peace (Kant, 1983). Two recent pieces in line with this are Gift and Krmaric (2015) and Spilimbergo (2009), who find that leaders with a background of overseas study in democracies tend to promote democratization domestically. The findings in our paper reinforces the link between education as a source of liberal ideas and policy making.

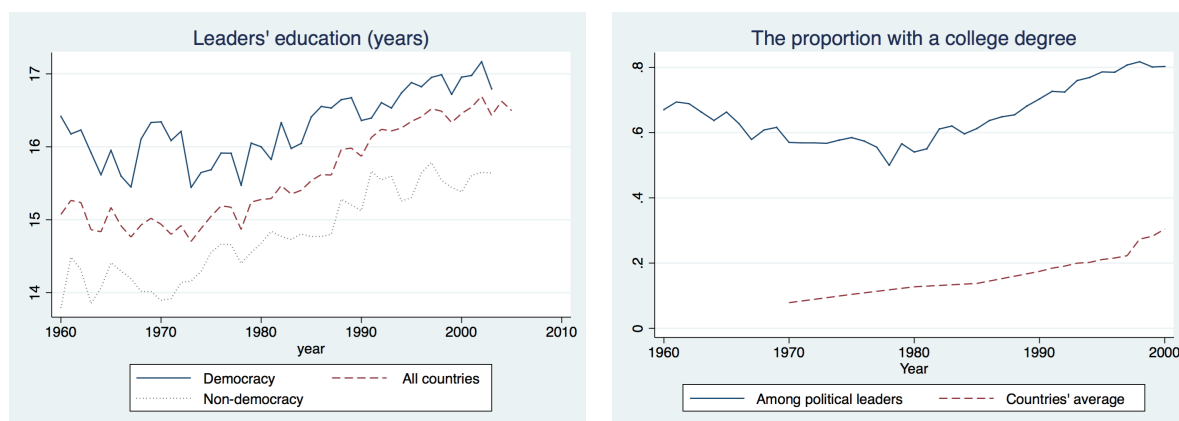
The remainder of the paper is organized as the following. Section 2 provides a summary about aggregate patterns of leaders' education and economic liberalization from the 1960s. Section 3 introduces the data. Section 4 discusses the empirical strategy. Baseline results are reported in Section 5. It is followed by a set of falsification tests and the exploration over the sample of random leadership transitions in Section 6. Section 7 provides additional robustness checks. The Section 9 concludes.

2 Background

During the course of post WWII years, the average educational attainment of national leaders assumed a stable increasing trend. Heads of government in the New Millennium on average received 16.4 years of school education, contrasting with 14.5 years for those led in the 1960s. By a similar token, 42 percent of national leaders did not have a college degree in the 1960s; that ratio dropped to 28 percent in the New Millennium. Figure 1 provides a straightforward summary about the average educational attainment of national leaders over time.

The distribution of majors from higher education also transformed over time. As Figure

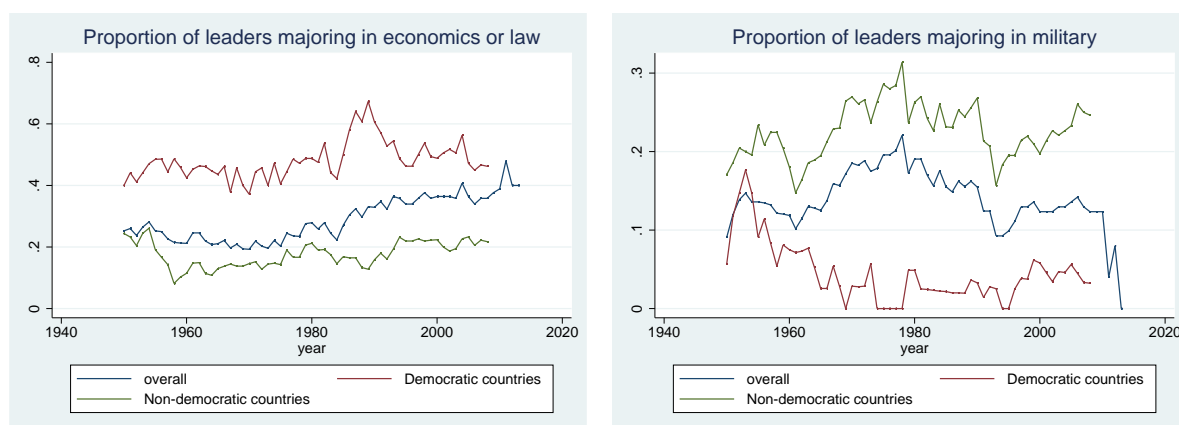
Figure 1: The trends of educational attainments by political leaders



Note: The left panel presents the trends of average educational attainment, measured by the years of formal education received by political leaders, respectively in democratic, non-democratic, and all countries from the 1960s. The right panel presents the proportion of national leaders with a college degree versus all countries' average.

2 shows, in the 1960s a national leader has a probability of 0.22 to hold a degree in economics or law, and this probability increased to more than 0.4 by 2010. Decomposition shows that the change was both due to the presence of more leaders majoring in economics and law in democracies and the growing number of democracies. At the same time, the ratio of leaders who had received formal education in military institutes had significantly dropped from the 1960s through 2010. The decline was most telling in democratic countries.

Figure 2: Majoring in economics versus majors in military



Note: The left panel presents the proportions of national leaders with majors in economic, business, or law. The right panel presents the proportions of national leaders with majors in the military.

Along with the rise in the level of leaders' education, the world we live in has become increasingly more liberalized in terms of economic policies. Figure 3 plots annual changes in

the country-average liberalization index along six policy dimensions, the specific definitions of which are to be discussed in the next section. Significant increases are registered on all dimensions over time. The similarity among these temporal trends gives rise to the natural conjecture that leaders' education and economic liberalization may have related to each other. But it is possible that we observe two independent trends with similar patterns. Before turning to systematic econometric analyses, in what follows we sketch two mechanisms that might help establish a causal link between the two.

Figure 3: Changes in the liberalization indexes: world average



This graph shows the country average of annual changes along the six policy dimensions: domestic financial market, capital account, product market, agriculture market, trade, and current account. Details are provided in Sector 3.

First, we hold formal education to be a primary source of ideas for economic policies. Although partisan affiliation of leaders is widely believed to be a first order determinant of policies, more educated leaders tend to have more sophisticated understandings about the market. Even when their campaigns were motivated under partisan agendas, the platforms still need a base of economic viability. For example, a responsive left wing government is bound to carry the mandate of the voters, especially the poor voters, to increase redistribution and spending. Such goals, however, need to be traded off against efficiency loss. Literatures on public opinions suggest that the public are more tolerant of welfare losses due to structural reforms during economic downturns. Thus, if efficiency concerns superseded equality, left wing governments may and did break campaign promises to adopt what conventional wisdoms would consider as “right leaning” policies, such as fiscal audacity and

economic liberalization (Przeworski, 1996; Stokes, 1996).

History witnessed a number of breakthroughs in liberalization following the entry of a new leader with higher education. Table 1 offers a glance at some noticeable cases. The Indian prime minister Manmohan Singh (2004-14) was known as a prominent figure in pushing forward market oriented reforms in India since the 1990s. Being educated by Joan Robinson and Nicholas Kaldor at Cambridge, Singh holds a PhD degree in economics. Although he was once in charge of the Planning Commission in the 1980s, he succeeded in implementing structural reforms as the Minister of Finance and later as the Prime Minister. Another case is Greece under the tenure of Prime Minister Andreas Papandreu (1981-89, 1993-96), who obtained the PhD in economics at Harvard and later taught at economics departments of Minnesota, Northwestern, and Berkeley. Significant increases in the liberalization index are registered during Papandreu's tenure despite his own affiliation with the left wing Panhellenic Socialist Movement. Similar comovements in leaders' education and economic liberalization can also be found in Philippines under Diosdado Macapagal (Liberal Party, 1961-65), Colombia under Ernesto Samper (Liberal Party, 1994-98), Brazil under Fernando Henrique Cardoso (Social Democratic Party, 1996-2003), and Singapore under GOH Chok Tong (People's Action Party, 1990-2004). Note that except for the People's Action Party in Singapore, the ruling parties in all the other cases are attributable to either the left wing or center-left positions.

Secondly, the link between leaders' education and liberalization may be reinforced by leaders' personal network. Highly educated leaders are likely to appoint technocrats with similar educational, professional, and career backgrounds. They may often seek counsels from experts when they themselves do not have a background in economics. The most notable example of this is the appointment of "Chicago Boys", the University of Chicago trained economists, for designing reforms in Latin American countries. Our data is only focused on the head of government, hence we cannot use the information of ministers to directly test this mechanism. We attempt to address this issue by controlling for the major and previous political careers of leaders in Section 4.

3 Data

3.1 Economic Liberalization

The set of dependent variables used in our paper is identical to the one on liberalization indexes adopted by Giuliano, Mishra, and Spilimbergo (2013). The data are originally col-

Table 1: Leaders' education and economic liberalization: some examples

country	leader	education	year leaving office	agriculture	product markets	trade	capital account	current account	domestic financial
Greece	Georgios Rallis	College	1980	N.A.	0.00	72.74	33.33	35.71	16.67
Greece	Andreas Papandreou	Ph.D.	1988	N.A.	0.00	89.62	33.33	42.86	22.22
Philippines	Carlos P. Garcia	College	1961	100.00	N.A.	0.00	N.A.	7.14	N.A.
Philippines	Diosdado Macapagal	Ph.D.	1965	100.00	N.A.	46.66	N.A.	64.29	N.A.
India	Atal Bihari Vajpayee	Master	2003	0.00	45.45	45.00	66.67	50.00	55.56
India	Manmohan Singh	Ph.D.	2005	N.A.	54.55	69.50	100.00	57.14	55.56
Colombia	Cesar Gaviria	College	1993	33.33	0.00	80.83	66.67	78.57	50.00
Colombia	Ernesto Samper	Ph.D.	1997	33.33	63.64	80.50	66.67	85.71	61.11
Brazil	Itamar Franco	College	1994	100.00	0.00	80.17	0.00	14.29	38.89
Brazil	Fernando Henrique Cardoso	Ph.D.	2001	100.00	90.91	78.00	66.67	14.29	50.00
Turkey	Suleyman Demirel	College	1992	0.00	0.00	53.61	100.00	71.43	50.00
Turkey	Tansu ciller	Ph.D.	1995	0.00	18.18	83.29	100.00	71.43	55.56
Singapore	LEE Kuan Yew	College	1990	N.A.	0.00	99.33	100.00	100.00	77.78
Singapore	GOH Chok Tong	Master	2004	N.A.	63.64	100.00	100.00	100.00	94.44

lected by economists from the Research Department of IMF to evaluate structural reform for its member countries in both the real and financial sectors. Structural reform refers to policy changes which according to the conventional wisdom will help erase institutional frictions and enhance the efficient allocation of resources through market mechanisms. As Spilimbergo, Prati, and Ostry (2009) make it clear, attentions are paid particularly to “policies that increase the role of market forces and competition in the economy, while maintaining appropriate regulatory frameworks to deal with market failures”. Importantly, the documentation of structural policies is primarily based on formal regulatory rules and legal statutes, rather than on outcomes. Hence, compared with macroeconomic variables such as interest rates or the budget deficit, these reform indexes should better reflect the intention of policy makers, and the executives in particular, of pushing forward economic liberalization. We refer the readers to Giuliano, Mishra, and Spilimbergo (2013) for a more thorough documentation of all coding schemes and data sources. Next we only sketch the definitions of economic liberalization indexes to be used for the empirical analyses.

The data consists of six policy categories ranging from the real to financial sectors. The *domestic financial market liberalization* is constructed on the basis of policies in the banking sector and securities market. A policy change is registered as liberalization whenever a new policy is adopted to promote market competition with regard to any of the six sub-categories: interest rate controls, entry barriers, private ownership, proper supervision and regulation, domestic bond and equity markets, and the extent of credit controls. The *capital account liberalization* deals with policy restrictions on financial transactions between residents and non-residents, external borrowing and lending, and approval requirements for foreign direct investment. The category *production market reforms* concerns entry barriers and the independence of regulatory agencies in industrial sectors, using telecommunication and electricity as two representative cases. The liberalization in *agriculture market* is a categorical variable capturing (the reduction in) state monopoly and monopsony over agricultural production with a particular focus on agricultural export commodities. In turn, *trade liberalization* is based mainly on average tariff rates in each country. Finally, *current account liberalization* reflects a country’s commitment to the freedom with regard to proceeds from international trade under IMF’s Article VIII. Each category is normalized to the range $[0, 1]$, with a positive change corresponding to an increase in the level of liberalization.

The data have a coverage of as many as 142 countries at maximum for a particular liberalization index (*trade liberalization*) between 1960 and 2005. The structures of these indexes are unbalanced. The size of available countries for *trade liberalization* falls to a

minimum of 47 countries in some years. For other policy dimensions, the coverage ranges from 50 to 108 countries, with the liberalization indexes missing for different countries in different years. The unbalanced feature of the data creates a difficulty for aggregation, as the sample size will dramatically shrink if we focus on the sample in which all six categories are commonly observed. This renders inefficiency of estimation using aggregated liberalization indexes at the country-year level. Instead, we follow Giuliano, Mishra, and Spilimbergo (2013) to treat each category out of the six policy dimensions as a separate panel and stack them together in estimations.

3.2 Leaders' Education

Our data on political leaders is part of the data project on the backgrounds of national leaders and the rules for the leadership selection in the post WWII period (Xi and Yao, 2015). There have been a cluster of data collection efforts on national leaders in the literature of political science and economics (Besley and Reynal-Querol, 2011; Besley, Montalvo, and Reynal-Querol, 2011; Goemans, Gleditsch, and Chiozza, 2009; Jones and Olken, 2005). We are inspired by the previous literature in designing our project, and we make important revisions in defining and the coding leaders' characteristics for our purpose of interests.

First, we largely follow the definition by Przeworski (2013) to identify the head of the executive branch of the government (as opposed to the head of state) as national leaders. Economic policy making often involves deliberation, debate, and bargaining among many different ministries within the cabinet, on which chief executives have more direct impacts than the head of state does. Although the ultimate political power (such as the power to nominate and dismiss chief executives, or to declare a state of emergency) may reside in the head of state, these are not executive powers. It will be impractical, and prohibitively costly, even for dictators to intervene in all policy dimensions and rule single-handedly. Previous data on political leaders constructed by Goemans, Gleditsch, and Chiozza (2009) identify only the "effective leader", that is, "the person that de facto exercised power in a country." In practice, our codings for political leaders are the same as in Goemans, Gleditsch, and Chiozza (2009) for most cases in which the chief executive can be unambiguously identified: political regimes that are parliamentary, presidential, or monarchical. For the premier-presidential system, we code in favor of the former if constitutions grant power of presiding domestic economic affairs to the premier. Like Goemans, Gleditsch, and Chiozza (2009), we make exceptions for the Soviet Union and other communist countries to identify the general party secretaries as national leader. We do not make exceptions, however, for hidden figures as

that inevitably involves ad-hoc judgments¹.

Following Besley and Reynal-Querol (2011), we code the level of formal education for political leaders into an eight-way variable. The category *education_leader* ranges from 1, which means the leader is illiterate, to the maximum value of 8, which corresponds to the case of a leader with a doctoral degree. Between the minimum and maximum, the value of *education_leader* increases along the ladder of formal education: literate but no formal education (2), elementary school (3), secondary school (4), any professional school or special training beyond the secondary school (5), college (6), and graduate study with Master degree (7). Because a leader may have multiple degrees at the same level, and because obtaining degrees at the same level can take different lengths of time, we also work with the variable *education_year*, the total years of formal education a political leader received. The coding for *education_year* is based on the biographical information of political leaders whenever feasible. Where the precise information is unfeasible, we supplement the variable *education_year* with manual calculation: 6 years for the elementary school, 12 years for the secondary school, 14 years for the professional school, 16 years for the college, 18 years for the graduate study with a Master degree - plus one year with each additional Master degree, and finally, 23 years for a doctoral degree. This coding scheme provides us an alternative measure of leaders' educational attainment with richer variation. We also binary variables *college*, *master*, and *PhD* to respectively measure levels of higher education. The results are qualitatively the same using alternative measures for leaders' education.

In addition to the level of education, we are also interested in studying whether different majors have heterogeneous effects. A background in economics or finance, for example, is likely to nurture pro-market ideas. By contrast, leaders with background in engineering or the military may be less keen in openness and more supportive of overtaking development strategies. Hence they may accommodate centrally planned economy and regulations. In our data we respectively specify whether a leader's major in college education was in the field of economics and business, social science, natural science, humanity, engineering, or the military. Leaders' majors are controlled together with the dummy *overseas study*, which takes value 1 if a political leader had studied abroad.

¹For example, the head of privy council or the spiritual leader, such as Juan Peron in 1973 and Deng Xiaoping in 1996.

3.3 Leaders' Other Characteristics

Aside from education, we also control other characteristics of leaders that may confound their incentive and ability to push forward economic liberalization. Leaders' *age* captures several different factors with regard to their resolution to reform. On the one hand, younger leaders may have a higher degree of political will to seek changes. They are, however, sometimes short on experience and political allies to get through legislative impasse. By contrast, older leaders with more inside experience may be able to garner more support, but they face a shorter time horizon and hence may have lower incentives to press forward reforms (Bowen et al., 2016). Following this reasoning, we add two more variables along with *age* to account for leaders' incentives. The dummy variable *first term* indicates whether a leader was in his or her first term as the head of government. The inside experience is additionally controlled by *years in office*, which documents the number of cumulative years a leader had already served in office.

A set of variables on the career path of leaders is included to further control leaders' characteristics that may be correlated with liberalization. These variables deal with work experience of leaders in the public and private sectors prior to a term. A set of dummy variables, respectively, indicate whether a leader had any previous experience of serving in the *public sector*, as a state *legislator*, as *governor* (which means chief executive of a local government), as leader of political *party*, in the *central government*, in the *military*, and in the *private sector*.

3.4 Political and Economic Variables

We control for political and economic variables that may potentially drive liberalization. The variables for GDP per capita and growth rate are from the recent version of Penn World Table 8. The construction of dummy *democracy* follows the routine in economics literature to use the Polity IV score, with zero being the cut-off value for democracy. The *constraint on the executive power* is also based on the Polity Score. We follow Przeworski (2013) to identify whether a political regime is *presidential* or not. Because the support for economic openness tends to be positively correlated with education in general, we control for the human capital index based on secondary education following Barro and Lee (2013). In Section 7 we study the interaction between leaders' education and their partisan affiliations, for which purpose we manually collect information about incumbent political parties. We also employ a set of indicators of public opinion with regard to the state and market from World Value Survey

to study how political leaders interact with the attitude of the public. Table 2 provides a summary of key variables to be used in the econometric analyses.

Table 2: Summary statistics

variable	N	mean	standard error	min	max
liberalization_index	20395	42.96	37.04	0	100
change_liberalization_index (Δy_{ijt})	19779	1.16	8.13	-100	100
growth	5173	0.02	0.06	-0.44	0.77
gdp per capita(PWT 8.0)	5073	7164	7450	227.3	52414
human capital (Barro&Lee, 2013)	4444	2.11	0.62	1.02	3.57
education_year	5133	15.64	3.62	0	27
education_level	5194	5.8	1.36	1	8
college	5194	0.67	0.47	0	1
leader's age	5047	56.5	10.96	18	91
first term	5279	0.69	0.46	0	1
years in office	5279	7.65	7.68	0	48
democracy	5091	0.48	0.5	0	1
overseas study	5621			0	1
education_economics	5621	0.114	0.317	0	1
education_social_science	5621	0.108	0.310	0	1
education_engineer	5621	0.075	0.263	0	1
education_humanity	5621	0.090	0.285	0	1
education_military	5621	0.163	0.369	0	1
education_science	5621	0.023	0.149	0	1
party_left	5621	0.120	0.324	0	1
party_right	5621	0.269	0.443	0	1

4 Specification

Our empirical analyses deal with the effects of leaders' education on the liberalization for sectors being considered above. Following Giuliano, Mishra, and Spilimbergo (2013), we measure reform with regard to sector s for country i in year t as the first difference in the liberalization index:

$$\Delta y_{ist} = y_{i,s,t} - y_{i,s,t-1}$$

The degree of reform, Δy_{ist} , is then estimated as a function of leaders' education, together with other political and economic variables:

$$\Delta y_{ist} = \theta \cdot EDU_{it} + \alpha \cdot y_{i,s,t-1} + X_{it}\beta + \mu_{i,s} + \zeta_t + \epsilon_{i,s,t} \quad (1)$$

EDU_{it} in equation (1) refers to leaders' education, the main variables of interest through-

out this paper. $y_{i,s,t-1}$ is the lagged liberalization index, which we include to address the temporal dependence in policy liberalization. X_{it} is a set of political and economic variables, such as the level of GDP per capita and the presence of democratic institutions, together with leaders' personal characteristics. $\mu_{i,s}$ is the country-sector fixed effects identified for each country over a particular policy dimension (sector). ζ_t represents year fixed effects. Finally, $\epsilon_{i,s,t}$ represents the term of random disturbance.

Figure 1 has demonstrated increasing secular trends for policy liberalization around the world. Although the temporal patterns of liberalization for different countries can be quite different, it remains possible that the disturbance term is serially correlated even if the lagged policy liberalization is controlled. When this is the case our estimates for θ may be biased as $y_{i,s,t-1}$ is correlated with $\epsilon_{i,s,t}$. Giuliano, Mishra, and Spilimbergo (2013) allow the first-order serial correlation in the error term and a Durbin-Watson test for AR(1) is rejected by a large margin. Our approach is to cluster the standard error at the country-sector level so as to allow for arbitrary correlations over time within each country-sector. In Table A3 of the appendix, we replicate the baseline results in Table 3 with error terms being AR(1). The results are significant and quantitatively close.

5 Main Results

5.1 Leaders' educational backgrounds

Table 3 presents the estimates for various measures of leaders' educational backgrounds based on equation (1). Leaders' education has consistently strong effects on promoting liberalization. Column 1 reports the baseline results, in which we control only the lagged dependent variable, country-sector fixed effects, and year fixed effects. It is shown that one additional year in educational attainment received by national leaders is associated with 0.09 percentage points of the annual increase in liberalization indexes. Note that one standard deviation in years of education for leaders is 3.6 years. This translates into 0.33 percentage points difference, or, 28 percent of the annual change of liberalization on average ($\overline{\Delta y_{ist}}$).

In column 2, we include a set of control variables in regard to countries' socioeconomic conditions and leaders' personal characteristics. Both the lagged indexes of liberalization (y_{ist}) and lagged GDP per capita are associated with negative effects on liberalization, suggesting a mean reversion pattern in liberalization (countries already with a higher level of economic development and economic openness are slower in terms of increase in liberalization). The country average of human capital measured by Barro and Lee (2013) has positive,

Table 3: Leaders' education and liberalization: benchmark results

dependent variable: Δy_{ijt}					
	(1)	(2)	(3)	(4)	(5)
education_year	0.092*** (0.026)	0.090*** (0.032)			
education			0.188** (0.079)		
≥college				0.460** (0.230)	0.016 (0.436)
(≥college)×economics					0.967** (0.452)
(≥college)×law					[137, 2508] 0.532 (0.430)
(≥college)×social science					[221,4652] 0.867* (0.472)
(≥college)×engineer					[80,2405] -0.118 (0.530)
(≥college)×humanity					[64,1514] -0.082 (0.477)
(≥college)×military					[73,291] -0.161 (1.010)
(≥college)×science					[15,503] 2.154*** (0.670)
lag liberalization	-0.120*** (0.007)	-0.118*** (0.007)	-0.117*** (0.007)	-0.117*** (0.007)	-0.118*** (0.007)
lag log gdp per capita		-1.150** (0.452)	-1.216*** (0.453)	-1.195*** (0.453)	-1.076** (0.456)
lag human capital		1.037 (1.027)	0.945 (1.023)	0.925 (1.025)	0.849 (1.012)
first term		0.201 (0.176)	0.208 (0.176)	0.215 (0.177)	0.24 (0.180)
years in office		-0.017 (0.017)	-0.015 (0.017)	-0.015 (0.017)	-0.014 (0.017)
leader's age		0.003 (0.011)	0.002 (0.011)	0.003 (0.011)	0.003 (0.011)
overseas study		0.123 (0.206)	0.143 (0.210)	0.193 (0.206)	0.051 (0.215)
legislator		-0.017 (0.208)	-0.044 (0.207)	-0.091 (0.211)	-0.082 (0.214)
governor		0.114 (0.286)	0.077 (0.287)	0.291 (0.293)	0.067 (0.292)
party		-0.171 (0.170)	-0.189 (0.170)	-0.193 (0.171)	-0.107 (0.173)
R^2	0.074	0.074	0.073	0.073	0.075
# country	139	108	108	108	107
observations	18659	15480	15484	15484	15325
country-sector fixed effects	✓	✓	✓	✓	✓
year fixed effects	✓	✓	✓	✓	✓

Standard errors clustered at the country-sector level are reported in the parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The two numbers in the brackets report the number of leaders and leader-years with corresponding majors.

albeit statistically insignificant, coefficients for liberalization. Meanwhile, the level of economic liberalization slightly increases during the first term, in the early years of national leaders' tenures, or when leaders are relatively young. Leaders' personal characteristics, however, are not statistically significant predictor for the increase in policy liberalization. In addition, we control for whether the leader had any experience of overseas study, as well as variables about leaders' career experiences, such as the previous career of serving as a state legislator, a governor, or leader of a political party. The exposure to the western culture and institutions in youth tends to make one more sympathized with market-oriented principles. It may also help leaders enhance their network with business sectors, from which they are likely to make hirings of technocrats with experiences in the business. In regard to the political career, diverse experiences in government branches may help leaders better build a large coalition to garner the political support necessary for the passage of reform legislations. Yet, it may also be the case that leaders with more diverse experiences in the public sector are more susceptible to be influences by vested interests, which undermines the resolution for reform. As column 2 shows, neither overseas study nor the diverse experiences of leaders in the high political offices promotes or hinders economic liberalization. On top of that leaders' education remains to have strong and significant impacts on promoting liberalization.

In column 3 and 4, we use the same specification as in column 2 and replace the years of education respectively with the categorical variable for the level of education and the dummy variable indicating whether a leader had received college education or not. The results for leaders' education remain strong and significant. Having a college degree translates into an annual increase in liberalization index by 0.46 percentage points, which is about five times the effect estimated for the years of education.

The estimates for leaders' education in the baseline models attest to the premise that educational attainments of leaders play an important role in promoting economic liberalization. Yet it remains unclear whether all kinds of educational backgrounds indiscriminately promote liberalization or rather that different fields of study shape leaders' ideas about economic policies differently. For this purpose we estimate the heterogeneous effects of majors in higher education. In column 5, we interact the dummy variable *college* with a set of indicators for leaders' major in higher education. Evidently, majors matter for liberalization. Leaders with a degree in economics are able to produce an annual increase in policy liberalization by 0.967 percentage points, or, 83 percent of the annual change. The effects are similar for leaders with background in social science and get even stronger for leaders majoring in natural science. By contrast, educational backgrounds in law, humanities, engineering, and the

military are not associated with a higher rate of increase in policy liberalization compared with the default group, which is leaders without college education.

5.2 Estimates by sector

Table 4: Heterogeneous effects of leaders' education on liberalization, by sector

Dependent variable: $\Delta y_{it(j)}$ for a sector j						
	agriculture	product markets	trade	capital account	current account	domestic financial
education_year	0.188*** (0.061)	0.008 (0.035)	-0.001 (0.064)	0.208 (0.138)	0.123* (0.064)	0.138*** (0.051)
lag liberalization	-0.095*** (0.009)	-0.041*** (0.007)	-0.163*** (0.010)	-0.216*** (0.014)	-0.118*** (0.010)	-0.141*** (0.011)
R^2	0.074	0.125	0.116	0.136	0.117	0.16
# country	80	94	103	74	62	74
observations	2657	3385	2973	2036	2393	2036
country fixed effects	✓	✓	✓	✓	✓	✓
year fixed effects	✓	✓	✓	✓	✓	✓

Standard errors clustered at the country-sector level are reported in the parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All are estimated by linear regressions with fixed effects. For each estimation, control variables are the lagged logarithm of GDP per capita, lagged human capital index, first term, years in office, leader's age, overseas study, experience as legislator, governor, and party leader.

In the baseline estimation we stack the six sectors together and do not take into account sector heterogeneity. It is possible that education has larger influences on leaders' ideas over some policies than does on others, and the significant results we find in Table 3 are driven by one particular sector. Following Giuliano, Mishra, and Spilimbergo (2013), we regress the liberalization indexes against leaders' education separately by each sector. As Table 4 reports, the effect of leaders' education is positive and significant for the liberalization in three out of the six sectors: agriculture, current account, and the domestic financial market. The coefficients for these sectors are larger compared with baseline results. The capital account liberalization is an issue lacking consensus even among economists and policy makers. This probably explains why we do not observe a strong effect for capital account liberalization. The index for product market is constructed based on two particular industries: electricity and telecommunication. We attribute the insignificance for product market to the imperfect measure for real policy changes.

6 Endogeneity

6.1 Falsification Test

The main challenge to identification is the non-random assignment of leaders' education. As Figure 2 shows, some countries may select more educated leaders than other countries do, and over time national leaders have become more educated regardless of the regime type. Including country-sector and year fixed effects eliminates the endogeneity problem due to time-invariant effects and common temporal trends. Yet our estimates can still be biased if the trends of economic liberalization are mechanically correlated with time-variant effects in some particular countries.

Table 5: Is liberalization affected by the growth trajectory ?

	Dependent variable: Δy_{ijt}				
	(1)	(2)	(3)	(4)	(5)
education_year	0.106*** (0.033)				
education_year(t+1)			0.037 (0.082)		
education_year(t+2)				0.033 (0.050)	
education_year(t+3)					0.019 (0.041)
lag liberalization	-0.121*** (0.007)	-0.120*** (0.007)	-0.122*** (0.015)	-0.133*** (0.012)	-0.127*** (0.011)
lag growth	0.913 (2.625)	0.924 (2.613)			
lag2 growth	-0.057 (2.111)	-0.045 (2.096)			
lag3 growth	1.916 (1.985)	2.107 (1.963)			
R^2	0.075	0.074	0.093	0.089	0.082
# country	105	105	103	103	103
observations	14425	14511	2748	4814	6378
country-sector fixed effects	✓	✓	✓	✓	✓
year fixed effects	✓	✓	✓	✓	✓

Standard errors clustered at the country-sector level are reported in the parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. For each estimation, control variables are the lagged logarithm of GDP per capita, lagged human capital index, first term, years in office, leader's age, overseas study, experience as legislator, governor, and party leader.

One possibility of such omitted variable bias stems from economic shocks that simultaneously force a country to adopt liberalization and select more educated leaders. National governments amidst economic crisis are likely to push forward structural reforms they otherwise would not have adopted as part of deals with international organizations such as the IMF. Highly educated and pro-market leaders were only selected because of their capability

in working out the reform plans with the international organizations². In this case, liberalization is a mandate from voters in response to urgent economic circumstances rather than resulting from leaders' own aspiration. While we cannot completely rule out these potential channels of influence, the question to be considered is whether this could have qualitatively biased our estimates.

We offer two falsification tests to address the above concerns about identification assumption. First, we test whether liberalization is triggered by the pre-existing (downward) growth trajectory rather than anything inherent features about political leaders. If this happens to be the case we should expect the effect of leaders' education to vanish once the lagged growth rates are controlled³. On top of that the lagged growth should have significant effects on liberalizations. In opposition to this hypothesis, in the Column 1 of Table 5 leaders' education remains to have a significantly positive effect on liberalization when we control for the three time-lags of growth in GDP per capita. By contrast, the lagged growth rates do not appear to have any impacts. In Column 2, we regress liberalization against the lagged growth only. Again, pre-existing growth does not affect liberalization.

We further conduct an intention-to-treat analysis to determine whether highly educated leaders can "predict" policy liberalizations in the preceding years before they assumed the offices. The underlying logic of this test is that countries selecting leaders with more education (the treated) should not have assumed a trend of increasing reforms before these leaders came into power. For that purpose we regress liberalization indexes at year t respectively against leaders' education from year $t + 1$ to $t + 3$. Because education does not change for the same leader, we include only the observations followed by a leadership transition with the three-year time window. Column 3 to 5 shows that liberalization is not affected by intentions-to-treat: that is, the estimates for new leaders' education in the following years are not statistically significant.

Table 6 presents a second set of falsification tests using the education of newly elected leaders as a dependent variable. The purpose is to provide a straightforward test for the hypothesis of reverse causality that leaders' education depends on policy liberalization or

²Note that countries not in an urgent need for crisis relief may sign into IMF programs as well. This occurs when reform-minded leaders want to use IMF agreements to shield from domestic political criticisms (Przeworski and Vreeland, 2000). A country's entry into IMF programs also depends on its connection to the US and major European countries (Barro and Lee, 2005). Hence, crisis may be one of the many triggers of liberalization.

³Alternatively we may use the trends of inflation or sovereign debt. We use the growth rate in GDP per capita because liberalization measures also include domestic policies such as agriculture and product markets, which are not directly tied to balance-of-payments. Another advantage of using growth rate is its wide coverage of the sample.

Table 6: Is leaders' education predicted by growth and liberalization trajectories?

Dependent variable: education_year			
	(1)	(2)	(3)
lag growth	-1.172 (3.120)		
lag2 growth	2.436 (2.002)		
lag3 growth	0.118 (2.501)		
lag negative growth		0.239 (0.400)	
lag positive growth		0.259 (0.306)	
Δy_{it-1}			0.324 (0.330)
lag log gdp per capita	-0.324 (0.831)	-0.300 (0.876)	-0.508 (0.801)
lag human capital	2.363** (0.998)	2.541** (1.101)	2.254** (0.935)
R^2	0.036	0.039	0.031
# country	101	100	104
observations	656	630	690
country fixed effects	✓	✓	✓

Standard errors clustered at the country-sector level are reported in the parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Each observation is a newly elected political leader.

the pre-existing trend of growth. In the Column 1, we estimate the effects of lagged growth on the years of education received by leaders and find no significant results. In the Column 2, we obtain a qualitatively similar result using an alternative measure indicating whether average economic growth in the three preceding years is negative, or robustly positive, which corresponds to an annual rate larger than 2%. In Column 3 we regress leaders' education against the pre-existing trend of liberalization, Δy_{it-1} . Liberalization in the preceding year has no effect on leaders' education. These results are consistent with our identification assumption that leaders' education is not causally affected by economic growth and the demand for liberalization.

6.2 Random Leadership Transitions

To further deal with the bias due to non-random selection of leaders, we follow the method in Jones and Olken (2005) and Besley, Montalvo, and Reynal-Querol (2011) to causally identify the effect of leaders' education on liberalization within a relatively small sample of quasi-random leadership transitions. We define a transition as random in case the predecessor died in office by accidental or natural causes. Following this definition we are able to identify 38 cases of random transition between 1950 and 2010 with observations

for liberalization data⁴. Among all the cases thirteen feature a transition to leaders with a higher level of education, and they all register a positive change in the liberalization index for each policy sector. By contrast, among the cases where leaders' education became lower or stayed at the same level, the change in liberalization index was negative or close to zero.

To further quantify the effect of leaders' education, we estimate the changes in liberalization indexes with the following difference-in-difference model.

$$\Delta y_{ist} = \gamma_1(\textit{transition higher})_{it} + \gamma_2(\textit{transition lower})_{it} + \alpha y_{i,s,t-1} + X_{it}\beta + \mu_{i,s} + \zeta_t + \epsilon_{i,s,t} \quad (2)$$

Note that the estimation is restricted to the sample of five-year windows around the transitions. *transition higher* is a dummy variable indicting the post-transition period with the new leader being more educated compared with the predecessor. Accordingly, *transition lower* indicates the post-transition period with the new leader being less educated. Thus γ_1 and γ_2 capture the effects of leaders' education on liberalization for different kinds of transitions. As Table 7 shows, transitions to more educated leaders is associated with a more sizable increase in liberalization index compared with baseline results. Meanwhile transition to less educated leader does not seem to deter the process of economic liberalization. Because the estimation based on random leadership transitions eliminates unobservable effects such as political networks and leaders' rent-seeking motives, the coefficients we obtain in Table 7 should better reflect the causal impacts of leaders' education.

7 Robustness

In this section, we consider whether our estimates for leaders' education are robust to several alternative channels which may have promoted economic liberalization. First, liberalization may have been implemented as the agendas of political parties, which in turn select highly educated leader with pro-market ideas to better pursue these reforms. Second, democracies tend to select more educated leaders compared with autocratic regimes, and democracies are associated with a higher degree of liberalization. Third, liberalization may reflect the ideology of voters, and highly educated leaders may do a better job at pandering to voters' ideal positions. Fourth, it is possible that our estimates are driven by the geopolitical

⁴Because of missing vales for policy liberalization in Giuliano, Mishra, and Spilimbergo (2013), our sample for random leadership transitions is smaller than the one used by Besley, Montalvo, and Reynal-Querol (2011). See the appendix for for the documentation of the differences.

Table 7: Random transitions: a difference-in-difference approach

Dependent variable: Δy_{ijt}			
	(1)	(2)	(3)
post-transition \times education_higher	1.158** (0.576)	1.142** (0.529)	1.485** (0.703)
post-transition \times education_lower	0.366 (1.027)	0.782 (1.221)	0.189 (1.223)
lag liberalization	-0.191*** (0.040)	-0.203*** (0.053)	-0.218*** (0.058)
R^2	0.134	0.142	0.159
# country	38	31	31
observations	2346	1855	1643
year fixed effects	✓	✓	✓
country-sector fixed effects	✓	✓	✓

Standard errors clustered at the country-sector level are reported in the parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. For each estimation, control variables are the lagged logarithm of GDP per capita, lagged human capital index, years in office, leader's age, overseas study, experience as legislator, governor, and party leader.

dynamics in some countries and regions, such as the rise of Neoliberalism in Latin America and the structural reforms among post-communist countries in Europe.

7.1 Partisan Affiliation

We first examine the interaction between leaders' education and partisan politics in jointly determining liberalization. Given the ideological division between the left and right wing parties, it is likely that left wing parties are composed of more populist politicians with less education, and the politicians from right wing parties tend to receive more education. Moreover, right wing parties are more likely to include liberalization in the policy platforms than left wing parties do. Although the anecdotic evidences presented in Section Two suggest that left wing politicians often cross partisan lines to advocate liberalization, it remains possible that the leaders' effectiveness in pursuing the reforms is limited by their partisan base. To disentangle the channel of partisan politics from leaders' own effects, we manually collect information about national leaders's partisan affiliation and codify the parties into the left and right categories⁵.

Column 1 through 4 in Table 8 present the estimates based on the years of education received by leaders. In Column 1 and 2 we respectively control for the left and right partisan identification of political leaders. It is shown that politicians from left wing parties are associated with a significantly lower rate of economic liberalization, while such effects do

⁵The default category corresponds to parties without a clear left-right identification.

Table 8: Party

	dependent variable: Δy_{ijt}							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
education_year	0.091*** (0.031)	0.091*** (0.032)	0.089*** (0.033)	0.106*** (0.036)				
college					0.430* (0.225)	0.460** (0.230)	0.399* (0.234)	0.366 (0.256)
left	-1.650*** (0.634)		-2.046 (1.656)		-1.589** (0.629)		-1.831* (0.949)	
right		-0.045 (0.190)		0.804 (0.877)		-0.034 (0.190)		-0.302 (0.393)
education_year \times left			0.026 (0.101)					
education_year \times right				-0.052 (0.052)				
college \times left							0.375 (0.795)	
college \times right								0.339 (0.457)
lag liberalization	-0.118*** (0.007)	-0.118*** (0.007)	-0.118*** (0.007)	-0.118*** (0.007)	-0.118*** (0.007)	-0.117*** (0.007)	-0.118*** (0.007)	-0.117*** (0.007)
R^2	0.074	0.074	0.074	0.074	0.074	0.073	0.074	0.073
# country	108	108	108	108	108	108	108	108
observations	15480	15480	15480	15480	15484	15484	15484	15484
time fixed effects	✓	✓	✓	✓	✓	✓	✓	✓
country-sector fixed effects	✓	✓	✓	✓	✓	✓	✓	✓

Standard errors clustered at the country-sector level are reported in the parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. For each estimation, control variables are the lagged logarithm of GDP per capita, lagged human capital index, first term, years in office, leader's age, overseas study, experience as legislator, governor, and party leader.

not exist for right wing politicians. On top of partisan effects, leaders' education remains as a significant determinant for liberalization and the coefficients being obtained are almost the same as the baseline results in Table 3. In Column 3 and 4 we control for the interaction between leaders' education and the partisan affiliation of leaders. The estimates for leaders' education are unchanged. The signs of partisan affiliation are consistent with the conventional wisdom about the left and right wing ideologies on economic policies, however neither is statistically significant. The interaction terms are insignificant, either. In Column 5 through 8 we use the dummy variable of *college* to replace the years of education. In accordance with the previous estimates, leaders with education at or beyond the college level produce a higher rate of liberalization. By contrast, the left wing parties seem to deter the process of liberalization. Similar to the estimates using years of education, we do not find the effect of leaders' education to be different when interacting with left or right wing parties. Overall, the robustness of our estimates to the inclusion of political parties reassures education as a primary determinant of liberalization.

7.2 Political Institutions

Table 9: Democracy versus autocracy

Dependent variable: Δy_{ijt}						
	(1)	(2)	(3)	(4)	(5)	(6)
education_year	0.137*** (0.034)	0.142*** (0.035)	0.150*** (0.034)	0.129** (0.050)	0.082 (0.067)	0.187*** (0.045)
democracy	0.932*** (0.319)			0.702 (1.152)		
executive constrain		0.124 (0.081)			-0.083 (0.226)	
presidential			0.241 (0.432)			1.505 (0.944)
education_year \times democracy				0.014 (0.066)		
education_year \times constrain					0.013 (0.013)	
education_year \times presidential						(0.085) (0.060)
lag liberalization	-0.104*** (0.007)	-0.104*** (0.007)	-0.104*** (0.007)	-0.104*** (0.007)	-0.104*** (0.007)	-0.104*** (0.007)
R^2	0.056	0.055	0.056	0.056	0.056	0.056
# country	106	106	108	106	106	108
observations	14495	14307	14263	14495	14307	14263
country-sector fixed effects	✓	✓	✓	✓	✓	✓
year fixed effects	✓	✓	✓	✓	✓	✓

Standard errors clustered at the country-sector level are reported in the parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. For each estimation, control variables are the lagged logarithm of GDP per capita, lagged human capital index, first term, years in office, leader's age, overseas study, experience as legislator, governor, and party leader.

The results we have obtained provide new insights for understanding the relationship between political institutions and economic reforms. Because democracies tend to select more educated leaders (Besley and Reynal-Querol, 2011), and because more educated leaders are in favor of liberalization, it follows that democratic countries should be associated with more liberalization. This reasoning is consistent with the findings in Giuliano, Mishra, and Spilimbergo (2013). But it could also be the case that leaders' education appears to matter only because it is correlated with the presence of democracy. To disentangle the channel of democracy, we need to ascertain (1) whether the two effects absorb each other when being estimated together; and (2) does the effect of education depends on democracy as an intermediate channel. In the meantime, we are interested in the interaction between leaders' education and other aspects of political institutions, such as the constitutional constraint on the chief executive and the presidential system. The constraint on the chief executive is often used as a proxy of pro-market institutions (Acemoglu, Johnson, and Robinson, 2001). The literature also shows that the economic policy making under presidential systems is more conservative (Persson, Roland, and Tabellini, 2000). Hence, constitutional constraints and the presidential system can constitute an intermediate channel for the role of national leaders in liberalizing the economy.

Column 1 and 2 of Table 9 present the estimates with political democracy being included as a channel together with leaders' education⁶. Consistent with the findings in Giuliano, Mishra, and Spilimbergo (2013), the presence of democracy has a positive and statistically significant effect on liberalization. Yet the magnitude of its coefficient is considerably lower than the coefficients obtained in Giuliano, Mishra, and Spilimbergo (2013). At the same time, the estimates for leaders' education has a sizable effect. When we include the interaction term between democracy and the years of leaders' education, the result for the latter remain robust but the significance for democracy disappears. The constitutional constraint and the presidential system do not have a large impact on the outcomes of liberalization. In Column 3 through 6, leaders' education has significant effects on liberalization except for Column 5, where leaders' education is interacted with the constraint on the chief executive. Hence, the effect of leaders' education on liberalization is robust to the variation in political institutions.

⁶A country-year is classified as democracy if the polity score is greater than zero. Otherwise it is classified as autocracy.

7.3 Public Opinion

Another possible intermediate channel for economic liberalization is the pro-market sentiment among the public. It is possible that highly educated leaders liberalize more because they are more inclined to, and more effective in, pandering to the public opinion. When that is the case, we should expect to see a significant effect for the interaction term between leaders' education and the pro-market opinions. Lacking systematic information about citizens' attitudes on these policies (e.g. from polls or referenda), we use the responses to questions about market and state in the *World Value Survey* as a proxy⁷. The individual responses are aggregated at the country level and re-scaled on the range $[0, 1]$. We rely on interpolation to fill in missing values within a country's spell.

In Table 10, the public opinion variables are controlled and interacted with leaders' education in estimating its effects on liberalization. Because the WVS only has these questions surveyed in a limited number of countries, this exercise immediately cuts the country size to less than 30. Hence, the results we get are suggestive. Nevertheless, leaders' education has a statistically significant and stronger effect than in the baseline results. We do not find evidence that more politicians' pander to the pro-market views of the public. The only category that seems to promote liberalization is the public's confidence in companies. This effect, however, is neutralized by a negative coefficient of its interaction term with leaders' education, as Column 6 shows.

7.4 Region heterogeneity and diffusion

We further account for region heterogeneity to assure our findings are not due to policy dynamics in specific countries. One possible scenario may have been the transitions to the market-oriented system in post-communist countries. It is possible that both economic liberalization and the selection of highly educated leaders (sometimes with a background in economics) were simultaneously driven by the regime changes in these countries. Another source of regional heterogeneity arises from Latin America, where massive structural reforms may have been the outcomes of electoral cycles and the prevalence of neoliberalism (Remmer, 1993).

We first exclude the post-communist countries in estimating the determinants for liberalization. The results are presented in Column 1 of Table 11. In Column 2, we exclude all Latin American countries. Finally, we exclude both post-communist and Latin American

⁷In Table A.4 of the appendix we provide contents of all questions.

Table 10: Do educated leaders pander to public opinion? Interactive effects

Dependent variable: Δy_{ijt}						
	(1)	(2)	(3)	(4)	(5)	(6)
education_year	0.189*	0.196**	0.207**	0.247**	0.154	0.236**
political scale	(0.104)	(0.096)	(0.102)	(0.106)	(0.117)	(0.103)
income equal	-1.671	-1.586				
	(1.662)	(1.067)				
government responsible			-2.414**			
			(1.124)			
competition good				-3.973*		
				(2.285)		
confidence in government					0.84	
					(1.049)	
confidence in company						3.338***
						(1.169)
(education_year)×(poli_scale)	0.075					
	(0.095)					
(education_year)×(income equal)		0.110*				
		(0.065)				
(education_year)×(gov_responsible)			0.157**			
			(0.068)			
(education_year)×(competition)				0.22		
				(0.138)		
(education_year)×(confidence_gov)					-0.035	
					(0.059)	
(education_year)×(confidence_company)						-0.186**
						(0.073)
lag liberalization	-0.197***	-0.194***	-0.200***	-0.202***	-0.194***	-0.200***
	(0.011)	(0.011)	(0.011)	(0.012)	(0.012)	(0.011)
R^2	0.135	0.133	0.134	0.135	0.135	0.135
# country	23	25	24	23	22	24
observations	2725	2984	2842	2700	2660	2842
country-sector fixed effects	✓	✓	✓	✓	✓	✓
year fixed effects	✓	✓	✓	✓	✓	✓

Standard errors clustered at the country-sector level are reported in the parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. For each estimation, control variables are the lagged logarithm of GDP per capita, lagged human capital index, first term, years in office, leader's age, overseas study, experience as legislator, governor, and party leader.

Table 11: Region heterogeneity

	(1)	(2)	(3)
	Exclude eastern Europe	Exclude Latin America	Exclude Both
education_year	0.079** (0.032)	0.098*** (0.036)	0.085* (0.048)
lag liberalization	-0.114*** (0.007)	-0.112*** (0.008)	-0.122*** (0.011)
R^2	0.071	0.071	0.078
# country	100	89	57
observations	14932	11881	7736
country-sector fixed effects	✓	✓	✓
year fixed effects	✓	✓	✓

Standard errors clustered at the country-sector level are reported in the parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. For each estimation, control variables are the lagged logarithm of GDP per capita, lagged human capital index, first term, years in office, leader's age, overseas study, experience as legislator, governor, and party leader.

countries, leading to a shrinking in the sample size by half. For all estimations, however, leaders' education remain to have significant impacts on liberalization and the size of coefficients are unchanged. Thus, leaders' education matters globally for the promotion of liberalization.

8 Conclusion

Policy reforms are determined by their economic rationales as well as the constraints faced by policy makers. These constraints include political institutions and economic interests, primary subjects of focus in political economy. But at the same time, ideas and knowledge drive politicians to form beliefs in recognizing where their best interests lie in. We argue that education is a main source of politicians' beliefs and ideas, and consequently, leaders' education makes a positive contribution to economic reforms toward liberalization. We empirically investigate the effects of leaders' education on policy liberalization based on the information of over 140 countries from 1960 to 2006. It is found that leaders' education significantly promotes liberalization. The effects are robust to a number of different specifications and the inclusion of leaders' career path, partisan affiliation, and political institutions. We also rule out the possibility of reverse causality driven by pre-existing trends of growth and intentions to reform.

It is attempting to associate the findings to the previous findings in the literature about leader effects on economic performance. It has been found that leaders matter for economic growth (Jones and Olken, 2005) and highly educated leaders help promote economic growth

(Besley, Montalvo, and Reynal-Querol, 2011). Thus a logical extension of our findings would be that more educated leaders help economy grows faster by implementing liberalization reforms. While this mechanism is plausible in theory, it should be interpreted with caveats. The previous findings about leaders' effects on growth are partial effects identified on the relatively small sample of random leadership transitions. Although we also obtain positive and significant results using the sample of random transitions, our main estimates are based on panel date regressions. As a matter of fact, the effects of liberalization on economic growth in panel data regressions are ambiguous, as the previous literature suggests. Our conjecture is that the growth effects of leaders may be channeled through political incentives as well as other backgrounds correlated with, but not restricted to, education. This question leaves room for future researches.

References

- Acemoglu, Daron, Simon Johnson, and James Robinson. 2001. "The Colonial Origins of Comparative Development: An Empirical Investigation." *American Economic Review* 91 (5):1369–1401.
- Acemoglu, Daron and Thierry Verdier. 2000. "The choice between market failures and corruption." *American economic review* :194–211.
- Barro, Robert and Jong-Wha Lee. 2005. "IMF programs: Who is chosen and what are the effects." *Journal of Monetary Economic* 52 (7):1245–1269.
- . 2013. "A new data set of educational attainment in the world, 1950–2010." *Journal of development economics* 104:184–198.
- Berger, Daniel, William Easterly, Nathan Nunn, and Shanker Satyanath. 2013. "Commercial imperialism? Political influence and trade during the Cold War." *The American Economic Review* 103 (2):863–896.
- Besley, Timothy, Jose G Montalvo, and Marta Reynal-Querol. 2011. "Do Educated Leaders Matter?" *The Economic Journal* 121 (554):F205–227.
- Besley, Timothy, Torsten Persson, and Marta Reynal-Querol. 2014. "Resilient leaders and institutional reform: theory and evidence." *Unpublished manuscript* .
- Besley, Timothy and Marta Reynal-Querol. 2011. "Do democracies select more educated leaders?" *American political science review* 105 (03):552–566.

- Bowen, Renee, Jackie Chan, Oeindrila Dube, and Nicolas Lambert. 2016. "Reform Fatigue." *Working paper* .
- Brender, Adi and Allan Drazen. 2013. "Elections, leaders, and the composition of government spending." *Journal of Public Economics* 97:18–31.
- Downs, Anthony. 1957. *An economic theory of democracy*.
- Dreher, Axel, Michael J Lamla, Sarah M Lein, and Frank Somogyi. 2009. "The impact of political leaders' profession and education on reforms." *Journal of Comparative Economics* 37 (1):169–193.
- Dube, Oeindrila and S.P. Harish. 2015. "Queens." *Working paper, New York University* .
- Dutt, Pushan and Devashish Mitra. 2005. "Political ideology and endogenous trade policy: an empirical investigation." *Review of Economics and Statistics* 87 (1):59–72.
- Friedman, Milton. 1962. "Capitalism and freedom." Tech. rep.
- Frye, Timothy and Andrei Shleifer. 1997. "The Invisible Hand and the Grabbing Hand." *The American Economic Review* 87 (2):354–358.
- Giavazzi, Francesco and Guido Tabellini. 2005. "Economic and political liberalizations." *Journal of monetary economics* 52 (7):1297–1330.
- Gift, Thomas and Daniel Krmaric. 2015. "Who democratizes? Western-educated leaders and regime transitions." *Journal of Conflict Resolution* :0022002715590878.
- Giuliano, Paola, Prachi Mishra, and Antonio Spilimbergo. 2013. "Democracy and Reforms: Evidence From a New Dataset." *American Economic Journal: Macroeconomics* 5 (4):179–204.
- 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.
- Goemans, Henk E, Kristian Skrede Gleditsch, and Giacomo Chiozza. 2009. "Introducing Archigos: A dataset of political leaders." *Journal of Peace research* 46 (2):269–283.
- Göhlmann, Silja and Roland Vaubel. 2007. "The educational and occupational background of central bankers and its effect on inflation: An empirical analysis." *European Economic Review* 51 (4):925–941.

- Grossman, Gene and Elhanan Helpman. 1996. "Electoral competition and special interest politics." *The Review of Economic Studies* 63 (2):265–286.
- Hayo, Bernd and Florian Neumeier. 2014. "Political leaders' socioeconomic background and fiscal performance in Germany." *European Journal of Political Economy* 34:184–205.
- Horowitz, Michael C and Allan C Stam. 2014. "How prior military experience influences the future militarized behavior of leaders." *International Organization* 68 (03):527–559.
- Jochimsen, Beate and Sebastian Thomasius. 2014. "The perfect finance minister: Whom to appoint as finance minister to balance the budget." *European Journal of Political Economy* 34:390–408.
- Jones, Benjamin F and Benjamin A Olken. 2005. "Do Leaders Matter? National Leadership and Growth Since World War II." *The Quarterly Journal of Economics* 120 (3):835–864.
- Kant, Immanuel. 1983. *Perpetual Peace and Other Essays: On Politics, History, and Morals*. Hackett Publishing.
- Krueger, Anne O. 1974. "The political economy of the rent-seeking society." *The American economic review* 64 (3):291–303.
- Machiavelli, Niccolò. 2005. *The prince*. OUP Oxford.
- Meltzer, Allan and Scott Richard. 1981. "A rational theory of the size of government." *The Journal of Political Economy* :914–927.
- Persson, Torsten, Gerard Roland, and Guido Tabellini. 2000. "Comparative politics and public finance." *Journal of political Economy* 108 (6):1121–1161.
- Przeworski, Adam. 1996. "Public Support for Economic Reforms in Poland." *Comparative Political Studies* 29:520–43.
- . 2013. "Political Institutions and Political Events (PIPE): Version 2." .
- . 2014. "Choices and echoes: stability and change of policy regimes." In *Economic Crises and Policy Regimes: The Dynamics of Policy Innovation and Paradigmatic Change.*, edited by Hideko Magara. Cheltenham: Edward Elgar.
- Przeworski, Adam and James R Vreeland. 2000. "The effect of IMF programs on economic growth." *Journal of Development Economic* 62 (2):385–421.

- Remmer, Karen. 1993. "The Political Economy of Elections in Latin America, 1980–1991." *American Political Science Review* 87 (02):393–407.
- Rodrik, Dani. 1995. "Political economy of trade policy." *Handbook of international economics* 3:1457–1494.
- . 2014. "When Ideas Trump Interests: Preferences, Worldviews, and Policy Innovations." *Journal of Economic Perspectives* 28 (1):189–208.
- Spilimbergo, Antonio. 2009. "Democracy and Foreign Education." *The American Economic Review* 99 (1):528.
- Spilimbergo, Mr Antonio, Mr Alessandro Prati, and Mr Jonathan David Ostry. 2009. *Structural reforms and economic performance in advanced and developing countries*. 268. International Monetary Fund.
- Stokes, Susan. 1996. "Public Opinion and Market Reforms: The Limits of Economic Voting." *Comparative Political Studies* 29:499–519.
- Trefler, Daniel. 1993. "Trade liberalization and the theory of endogenous protection: an econometric study of US import policy." *Journal of political Economy* :138–160.
- Xi, Tianyang and Yang Yao. 2015. "National Leaders and the Political Selection, 1950-2010: a Data Set." .

Table A1: Unit root tests for key variables

	Δ (financial)	Δ (capital account)	Δ (product markets)	Δ (agriculture)	Δ (trade)	Δ (current account)	education_year	education
$\chi^2(256)$	579.12	1378.93	2420.75	1023.77	1193.88	887.21	371.47	326.56
prob > χ^2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002
# country	99	123	134	89	68	89	134	134
# years	44	46	46	33	46	33	46	46

Table A2: Benchmark results: AR(1) standard error

dependent variable: Δy_{ijt}					
	(1)	(2)	(3)	(4)	(5)
education_year	0.102*** (0.024)	0.109*** (0.029)			
education			0.209*** (0.073)		
≥college				0.496** (0.211)	-0.060 (0.465)
(≥college)×economics					1.051** (0.488)
(≥college)×law					[137, 2508] 0.591 (0.466)
(≥college)×social science					[221,4652] 0.991** (0.476)
(≥college)×engineer					[80,2405] -0.25 (0.563)
(≥college)×humanity					[64,1514] 0.036 (0.512)
(≥college)×military					[73,291] 0.514 (0.917)
(≥college)×science					[15,503] 2.273*** (0.639)
lag liberalization	-0.129*** (0.004)	-0.127*** (0.004)	-0.127*** (0.004)	-0.127*** (0.004)	-0.127*** (0.004)
# country	139	108	108	108	107
observations	18079	14993	14997	14997	14839
country-sector fixed effects	✓	✓	✓	✓	✓
year fixed effects	✓	✓	✓	✓	✓

Standard errors of AR1 are reported in the parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The two numbers in the brackets report the number of leaders and leader-years with corresponding majors.

Table A3: Random transitions in leadership

country	year	Leader	cause of death
Algeria	1978	Houari Boumedienne	Waldenstrom's disease
Australia	1967	Harold E. Holt	drowned
Bhutan	1972	Jigme Dorji Wangchuck	heart disease
Bolivia	1969	Rene Barrientos Ortuna	killed in an accident
Botswana	1980	Sir Seretse Khama	cancer
China	1976	Mao Tse-Tung	Parkinson's disease
China	1997	Deng Xiaoping	Parkinson's disease
Cyprus	1977	Makarios III	heart disease
Denmark	1960	Hans Christian Hansen	cancer
Ecuador	1981	Jaime Roldos Aguilera	killed in an accident
Egypt	1970	Gamal Abdel Nasser	heart disease
France	1974	George Pompidou	cancer
Gabon	1967	Leon Mba	cancer
Hungary	1993	Jozsef Antall	cancer
Iceland	1970	Bjarni Benediktsson	killed in an accident
India	1964	Jawaharlal Nehru	stroke
Iran	1989	Ayatollah Ruhollah Khomeini	complications during surgery
Israel	1969	Levi Eshkol	heart disease
Japan	1980	Masayoshi Ohira	heart disease
Jordan	1999	Hussein Ibn Talal El-Hashim	cancer
Kenya	1978	Jomo Kenyatta	natural causes
Laos	1992	Kaysone Phomvihhan	not known
Lesotho	1998	Ntsu Mokhehle	not known
Malaysia	1976	Tun Abdul Razak	cancer
Morocco	1961	Mohammed V	complications during surgery
Morocco	1999	Hassan II	heart disease
Mozambique	1986	Samora Machel	killed in an accident
Nepal	1972	Mahendra	heart disease
New Zealand	1974	Norman E. Kirk	heart disease
Nicaragua	1966	Rene Shick Gutierrez	heart disease
Niger	1987	Seyni Kountche	cancer
Nigeria	1998	Sani Abacha	heart disease
Pakistan	1988	Mohammed Zia Ul-Haq	killed in an accident
Panama	1981	Omar Torrijos Herrera	killed in an accident
Portugal	1968	Antonio de Oliveira Salazar	not known
Romania	1965	Gheorghe Gheorghiu-Dej	pneumonia
Russia	1982	Leonid I. Brezhnev	heart disease
Saudi Arabia	1982	Khalid	heart disease
Sierra Leone	1964	Sir Milton Margai	not known
Spain	1975	Francisco Franco Bahamonde	heart disease
Syria	2000	Hafez Al-Assad	heart disease
Taiwan	1975	Chiang Kai-Shek	heart disease
Taiwan	1988	Chiang Ching-Kuo	heart disease
Thailand	1963	Sarit thanarat	heart disease
Trinidad and Tobago	1981	Eric E. Williams	not known
Uruguay	1965	Luis Giannattasio	heart disease
Vietnam	1969	Ho Chi Minh	heart disease
Vietnam	1986	Le Duan	lung failure

Table A4: Public opinion with regard to the state and market: WVS

Variable	Range	Options	wave 1 1981-1984	wave 2 1990-1994	Wave 3 1995-1998	wave 4 1999-2004	wave 5 2005-2008	wave 6 2010-2012
Self positioning in political scale	[1-10]	1:Left 10:Right	✓	✓	✓	✓	✓	✓
Income equality	[1-10]	1:Incomes should be made more equal 10:We need larger income differences		✓	✓	✓	✓	✓
Government responsibility	[1-10]	1:The government should take more responsibility 10: People should take more responsibility		✓	✓	✓	✓	✓
Competition good or harmful	[1-10]	1:Competition is harmful 10:Competition is good		✓	✓	✓	✓	✓
Confidence: The Government	[1-4]	1:A great deal 2:Quite a lot 3:Not very much 4:None at all		✓	✓	✓	✓	✓
Confidence: Major Companies	[1-4]	1: None at all 2:Not very much 3: Quite a lot 4:A great deal	✓	✓	✓	✓	✓	✓