The Choice of Electoral Systems in Electoral Autocracies

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Abstract

This paper develops a theory to account for the variation in electoral systems in electoral authoritarian regimes. We argue that resource-rich dictators are incentivized to employ proportional representation systems to alleviate the threat from the masses and preempt the emergence of new opposition, while resource-poor dictators tend to choose majoritarian systems to co-opt ruling elites in the legislature. Using newly collected cross-national data on electoral authoritarian regimes, we find strong empirical evidence supporting our theory. We also explicitly illustrate the causal links between natural resources and electoral systems with additional statistical analyses and comparative case studies on Kazakhstan and Kyrgyzstan, finding that majoritarian systems bias seat distributions in favor of ruling politicians, foster a unified opposition, and lower voter turnout more than PR systems in electoral autocracies.

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Majoritarian electoral systems are known to award large parties more seats than their vote shares (Taagepera and Shugart 1989). Much like in advanced democracies, single-member district (SMD) systems in electoral autocracies also provide large seat bonuses to governing parties.[1] Consequently, one would expect that self-serving dictators should choose SMD systems to maintain their electoral dominance in the legislature. Intriguingly, however, many electoral autocracies adopt proportional representation (PR) systems, a seemingly less-favorable and sub-optimal institutional choice. For instance, out of 90 electoral system reforms in electoral authoritarian regimes between 1949 and 2009, 52 reforms were shifts toward more proportional systems, including Mexico, Equatorial Guinea, Senegal, Gabon, Kazakhstan, Indonesia, to name a few. These anomalies beg the question: why do autocrats decide to adopt PR systems even though SMD systems are likely to generate a pro-regime seat bias? Put more generally, how can we explain dictators' choice of electoral systems?

This paper answers these questions and explores the origins of electoral systems in electoral autocracies. Over the last decade, a growing literature in authoritarian politics has shown how elections help autocrats hold onto power (Gandhi and Lust-Okar 2009). According to this scholarship, elections provide dictators with valuable information about their popularity (Malesky and Schuler 2011), and thus alleviate what Wintrobe refers to as the "Dictator's Dilemma." Elections also inform dictators about key bases of support and opposition strongholds (Blaydes 2011). With this information, elections enable dictators to co-opt ruling elites by distributing spoils and dividing the opposition more efficiently (Lust-Okar 2004; Gandhi and Przeworski 2007). By manufacturing an overwhelming victory, authoritarian leaders can also use elections to demonstrate their regime's invincibility and deter challengers (Magaloni 2006). Far less explored, however, is the variation of electoral systems in electoral authoritarian regimes. The literature on electoral systems has almost exclusively focused on democracies. Meanwhile, scholars have only begun to explore the conditions in which dictators favor one type of electoral system over another.

[1]This paper uses the terms SMD and majoritarian systems interchangeably.

A full understanding of the origins of electoral systems in electoral authoritarian regimes is thus necessary. Theoretically, recent scholarship has highlighted how dictators employ various techniques to manufacture a landslide victory. Electoral violence, ballot stuffing, media bias, voter intimidation, and vote-buying are all examples of blatant electoral manipulation (Simpser 2013). We contribute to this scholarship by investigating an under-explored yet fundamentally important aspect of electoral maneuvering in autocracies: electoral system manipulation.[2] Indeed, since electoral rules shape politicians' strategy and behavior during elections (Cox 1997), our knowledge of electoral politics in electoral autocracies remains incomplete without a deeper insight into the origins of electoral institutions. As Lust-Okar and Jamal (2002) argue, electoral systems in electoral authoritarian regimes can still influence electoral outcomes and change the distribution of power among pivotal actors. Empirically, as our analysis will reveal, there is wide variation in electoral systems among electoral autocracies. Unlike electoral systems in democracies that remain stable over time, autocratic electoral institutions also appear to be much more fluid and hence warrant further investigation. Finally, at a broader level, while political leaders in both democracies and autocracies often manipulate electoral systems for their political gains, the conditions under which political leaders change electoral systems can be quite different because electoral systems function differently between democracies and autocracies. Therefore, exploring such differences would be very important to understanding electoral reforms around the world.

Building upon the literature on electoral institutions, we first argue that different electoral systems are associated with different political and economic outcomes pertinent to the survival of electoral autocracies. For instance, by lowering the barrier for entry, PR systems encourage potential challengers to participate in politics through the existing institutional structure. Consequently, PR increases the effectiveness of dictators' institutional co-optation strategy toward the opposition. PR also helps dictators keep the opposition

[2]Essentially, we believe the choice of electoral systems is one of the most important items on dictators' "menu of manipulation" (Schedler 2002).

fragmented. Finally, by boosting turnout, PR helps dictators demonstrate their popularity and invincibility. In contrast, SMD offers a seat bonus that allows dictators to incorporate larger segments of ruling elites. Essentially, SMD generates extra institutional resources to help dictators entice the cooperation of potential opponents.

Given the diverse effects associated with different electoral systems, we suggest that different dictators strategically select different electoral systems to address their political needs and priorities. We build on Svolik's (2012) contributions and contend that dictators with insufficient capacity and resources will identify ruling elites as their primary threat and top political priority. These resource-poor dictators should be more likely to adopt SMD to boost their legislative seats and then use these additional seats to co-opt regime insiders. Alternatively, dictators with abundant resources have more rents to share with ruling elites and they can also reasonably expect to win elections with large margins. Therefore, resource-rich dictators are able to use materialistic and institutional capital to deal with ruling elites and can thus afford to use PR to alleviate the second threat: the opposition from the masses.

To test our theoretical expectations, we construct a dataset covering 90 electoral autocracies from 1949-2009. Using resource wealth to capture dictators' capacity to induce compliance, we find that dictators with abundant natural resources are more likely to adopt PR. Our results hold regardless of alternative variable operationalizations and estimation strategies. They are also robust to potential endogeneity and sample selection biases. We further supplement our analysis with additional statistical analyses and comparative case studies on Kazakhstan and Kyrgyzstan to illustrate the relationship and mechanisms between resource wealth and the choice of electoral systems in electoral autocracies.

Literature

Scholars have advanced three explanations for the selection of electoral systems, most of which come from democracies. These explanations include: (1) political (Rokkan 1970; Boix 1999) (2) economic (Rogowski 1987; Cusack et al. 2007), and (3) historical factors (Andrews

and Jackman 2005). However, we suggest that crucial differences between democracies and autocracies—for instance, that dictators rarely leave office through elections—make it difficult to directly apply the existing theories to the authoritarian context.

For example, the Rokkan-Boix hypothesis treats strong socialist threats as the driving force in choosing PR, yet most autocracies are not exposed to such imminent threats. Indeed, as Boix stated clearly, his theory is only applicable to democracies. Similarly, Cusack et al.'s economic coordination and Rogowski's international economy perspective argue strong political competition leads to distributional conflict between economic classes. However, opposition parties in authoritarian states are again too weak to be truly competitive. Finally, we suggest that electoral system changes in autocracies are largely driven by dictators' strategic considerations rather than historical legacies. In sum, much remains to be understood about the logic behind electoral system choices in electoral autocracies.

In light of limitations of the conventional wisdom, scholars have recently begun exploring the choice of electoral systems in electoral autocracies. In their pioneering research, Lust-Okar and Jamal (2002) argue that the type of authoritarian regime shapes dictators' preferences over electoral rules during political liberalization in the Middle East. Specifically, monarchs prefer electoral systems that allow them to remain key arbitrators, whereas party-based regimes desire electoral rules that favor their party while keeping the opposition fragmented. Gandhi and Heller (2018) offer useful information about elections and electoral rules in authoritarian regimes during the post-World War II period. They argue that the frequent use of electoral coercion and manipulation severely worsens the information problem, which in turn makes it difficult for dictators to find the optimal electoral rule. Finally, Negretto and Visconti (2018) argue that autocrats in Latin America use PR as a tool to either facilitate intra-party competition, increase regime support, or weaken the majority party during the course of political liberalization.

This paper extends these useful insights. Theoretically, we build on Lust-Okar and Jamal's contributions on the costs and benefits of different electoral systems. We also borrow

the insights from Gandhi and Heller's study and explicitly take into account the electoral constraints imposed by the ruling elites. We also concur with Negretto and Visconti that the adoption of PR is a well-calculated strategy by autocrats. Specifically, by highlighting dictators' differing abilities to induce compliance from ruling elites and society, we posit a novel theory for electoral autocrats' choice of electoral systems. Empirically, we expand the sample to include virtually all of the world's electoral autocracies. In doing so, we hope to add to our understanding of the origins of electoral institutions in electoral autocracies.

The Divergent Effects of SMD and PR

An extensive literature has documented various political and economic outcomes associated with different electoral systems (Cox 1997). Given the diverse effects by different electoral systems, we argue that dictators strategically choose electoral systems to meet their political needs and priorities. Parallel to what Franzese (2002) refers to as the "electioneering Ramsey Rule," this paper suggests that dictators will use all institutional tools available for political gains, provided the gains are inversely proportional to their marginal cost.

First, we argue that the greater vote-seat disproportionality in SMD gives dictators an extra boost of legislative seats. This is a direct extension of Duverger's (1954) well-known mechanical and psychological effects of majoritarian systems. SMD also allows authoritarian leaders to gerrymander electoral districts to induce an even larger seat bias. Taken together, SMD tilts election results toward the ruling party in electoral authoritarian regimes, an advantage we term "the SMD seat premium." Most importantly, the SMD seat premium gives dictators additional resources with which to co-opt ruling elites. As Gandhi and Przeworski (2007) argue, legislative seats are valuable cooptation tools for dictators seeking to make policy concessions to potential rivals. Lust-Okar (2008) also argues that dictators can use legislatures to guarantee long-lasting provisions of rents. Similarly, Reuter and Robertson (2015) suggest that legislative seats provide rent-seeking opportunities to opposition elites, which in turn reduce social protest. We add to this literature and suggest that the ex-

tra legislative seats from SMD allow dictators to incorporate more political forces into the legislature and thus give dictators more flexibility to deal with regime insiders.

Although PR systems do not generate extra seats for the incumbent, PR systems do possess several important characteristics imperative for the survival of dictators. First, by lowering the barrier for entry, PR encourages the opposition from the masses in electoral autocracies to participate in politics through existing institutions. Since it is still possible to win seats with smaller vote shares under PR, new challengers then become more willing to compete through the electoral process than they are to take an anti-system approach. Consequently, PR makes dictators' institutional co-optation strategies toward the opposition more effective. Also, due to the greater proportionality under PR, existing opposition forces are less likely to coordinate and build a unified electoral coalition against the incumbent. As Cox et al. (2020) show, PR not only increases numbers of effective parties but makes strategic coordination between political parties more difficult. Barbera (2013) also finds that PR increases the number of opposition parties in authoritarian countries. In short, PR allows dictators to effectively divide and rule. By contrast, SMD can promote opposition coordination, even in electoral autocracies. Consider the 2003 Georgian election held under SMD, where the two main opposition parties formed a coalition prior to the election, which later played a pivotal role in the success of the Rose Revolution.

Finally, PR systems help dictators demonstrate their strengths by scoring a higher level of voter turnout. Even voters in electoral autocracies have greater incentives to vote in PR elections because fewer votes are wasted. Meanwhile, as Cox et al.'s (2016) study on the contraction effect suggests, PR increases turnout when elections are less competitive since political elites have more incentives to mobilize voters. Importantly, high turnout is crucial for dictators, since winning an election with high turnout reinforces the regime's popularity and invincibility (Magaloni 2006). Illustratively, de Miguel et al. (2015: 1363) note that the recent Egyptian election had to be extended for an additional day to bolster turnout and legitimacy. According to news reports, many voters "stayed home due to political

apathy, opposition to another military man becoming president, discontent at suppression of freedoms among liberal youth, and calls for a boycott by Islamists."

Electoral System Choice in Electoral Autocracies

The discussion so far suggests that SMD systems help autocrats co-opt ruling elites with the extra seat bonus. PR systems, on the other hand, empower dictators to demonstrate regime strengths and weaken mass opposition. Precisely because different electoral systems provide dictators with different advantages, we argue that dictators' optimal choice of electoral systems crucially depends on their type. Specifically, we differentiate dictators based on their resources and capacity to induce compliance (voluntarily or involuntarily) from the ruling elites within the regime and from the citizens in the society.

Conceptually, we consider a dictator to be "resource-rich" ("resource-poor") if she has strong (weak) capacity and (in)sufficient resources to exercise her influence and control over ruling elites and citizens. Resource-rich dictators should be better positioned to secure submission to their authority from opponents. They can cultivate loyalty and deter defection from ruling elites by buying off political support and solidifying security forces. Simultaneously, they can entice active or passive support from the citizenry by distributing materialistic benefits and strengthening the coercive apparatus. Other scholars echo our proposition, arguing that dictators armed with resources are more likely to prevent coups, pacify the masses, and simply survive longer (Magaloni and Kricheli 2010).

Importantly, we suggest that different types of dictators tactically choose different electoral systems based on their political priorities. As Svolik's (2002) study shows, dictators constantly face two major challenges to their reigns. First, in what he refers to as the problem of power-sharing, Svolik identifies elites inside the power circle as the most imminent and immediate threat to dictators because more than two-thirds of dictators are forced out of power by regime insiders. We concur with this insight and suggest that the dominant mode of political conflict in dictatorships is the power struggle between dictators and ruling

elites. Importantly, we suggest that resource-poor dictators are more likely to be ousted by coups from ruling elites.[3] It follows that dictators who lack capacity and resources will identify the power-sharing problem as their top political priority. Given their lack of resources, resource-poor dictators have incentives to use SMD to boost their legislative seats. In so doing, they can use these additional seats to co-opt the ruling elites and secure their support. In this regard, SMD ensures that ruling elites, the primary threat to autocrats, remain loyal to the regime to the greatest extent possible.

Additionally, SMD systems allow resource-poor dictators to use their limited resources most effectively and efficiently. As Pearson and Tabellini (2003) show, SMD incentivizes political elites to concentrate their electoral endeavors in marginal districts with more swing voters, while PR encourages politicians to seek broad support from the whole population. SMD consequently becomes an ideal institutional choice for resource-poor dictators, as this system allows dictators to allocate their limited resources to key members of the winning coalition. Simply put, SMD provides a dictator with the "most bang for her buck."

Meanwhile, choosing PR systems can be politically risky for resource-poor dictators. When dictators lack the necessary resources and capacity to secure a landslide victory, PR systems may backfire and reveal a regime's weakness because PR does not yield an additional seat bonus. Consider, for example, Zafy's Madagascar, where losing a majority under a PR system in the 1993 legislative election encouraged the opposition to challenge the dictator again and defeat him in the 1996 presidential election. Indeed, Levitsky and Way (2010) argue that losing legislative control in authoritarian regimes can result in critical consequences for dictators.

On the other hand, PR is an ideal institutional investment for resource-rich dictators. We suggest that resource-rich dictators have plenty of materialistic and institutional capital

[3]To elaborate this point, we compare empirically the frequency of coup attempts between resource-poor and resource-rich authoritarian countries. Our results in Appendix A show that resource-poor autocracies are indeed much more likely to face coup attempts than resource-rich autocracies (p =0.05).

to co-opt both ruling elites and citizens.[4] Under such circumstances, resource-rich dictators are more capable of addressing the power-sharing problem and have less need for the seat-premium produced by SMD. Essentially, resource-rich dictators can "afford" to employ PR to further deal with the second threat, which Svolik calls the authoritarian control problem—the opposition from the masses. Specifically, PR's greater proportionality enables dictators to keep the existing opposition forces fragmented and uncoordinated in the society. In other words, PR helps dictators divide and weaken the existing opposition.

In addition to preventing societal groups from unifying together, PR also helps resource-rich dictators alleviate the authoritarian control problem by preempting the emergence of new opposition. As discussed earlier, PR allows autocrats to benefit from higher levels of turnout. Importantly, higher turnout allows dictators to credibly signal their popularity and invincibility and discourage new challengers. Even if new challengers do emerge from the society, they are more likely to participate in politics through elections, rather than using more violent means, because PR is associated with lower electoral thresholds. Finally, following Persson and Tabellini, PR also incentivizes dictators to use society-wide redistribution programs to win popular support. Taken together, PR effectively deters challengers and allows resource-rich dictators to preempt the threat from the masses.

Readers might reasonably wonder why resource-rich dictators, given their political strengths, do not simply choose an SMD system and then pocket the resources without sharing them with the masses. The key to understanding the logic of political economy in authoritarian regimes lies in dictators' expected time horizons. In his seminal contribution, Olson (1993) shows that a "roving bandit" who expects to lose office soon will grab everything while they can, whereas a "stationary bandit" who expects to stay in power for a while is more likely to engage in economic development with an eye for the future. Clague et al. (1996) echo this

[4]Notice that we do not intend to argue that resource-rich dictators have no need for cooptation. As discussed earlier, resource-rich dictators can use rents to buy support from ruling elites and then deter defection with strong security forces. Also, resource-rich dictators can reasonably expect to win the election with a large vote share and legislative seats.

insight, and they show that dictators' incentives for rent-seeking and predatory behaviors are negatively associated with their expected time horizons. Similarly, Wright (2008) uses the predicted probability of authoritarian regime collapse as a proxy for dictators' expected time horizons, and he shows that dictators with long time horizons are more likely to invest foreign aid in public goods whereas dictators with short time horizons are more likely to pocket foreign aid as personal wealth. Extending these insights, we suggest that resource-rich dictators are more likely to perceive longer time horizons since they can use their wealth to buy-off support and make credible threats to potential challengers.To reiterate, natural resource wealth empowers dictators to use public spending and patronage distribution to mitigates citizens' economic grievance and buttresses ruling elites' loyalty. At the same time, natural resource wealth helps autocrats strengthen their coercive capacities, which can further induce compliance from potential challengers. Our argument is parallel to previous studies showing that resource-rich dictatorships are less likely to break down (Jensen and Wantchekon 2004; Desai, Olofsgard, and Yousef, 2009; Morrison 2009; Wright, Geddes, and Frantz 2013). Consequently, they are less likely to kill the goose that lays the golden egg by stealing resources for their personal leisure and endanger their own regimes. Instead, they are more likely to choose PR and invest resources in the masses to further consolidate the regime.[5]

In sum, as Figure 1 reiterates, we suggest that resource-poor dictators prioritize on the authoritarian power-sharing problem and they are more likely to use SMD to co-opt ruling elites with extra seats. Meanwhile, resource-rich dictators are able to take a step further and address the power-control problem, and they are more likely to choose PR to alleviate the threat from the masses. Therefore, we hypothesize that *dictators with greater resources are more likely to choose PR over SMD systems.*

[Figure 1 about here]

[5]In so doing, they can extract from society for even longer.

Cross-National Evidence

We focus on electoral authoritarian regimes from 1949–2009. We first follow the minimalist approach and differentiate autocracies from democracies based on whether there exists free and fair elections, and we rely on Cheibub, Gandhi, and Vreeland (2009) data to identify autocracies. Then, following Schedler (2002), we consider electoral authoritarianism as those autocracies where multiple political parties exist and legally compete in elections, but the freedom and fairness of the elections is severely violated. We use two data sources to identify electoral autocracies. The first is the *National Elections in Democracy and Autocracy* (NELDA) dataset. NELDA treats elections as minimally competitive if there is *ex ante* uncertainty over election results. Specifically, elections are minimally competitive if (1) multiple parties are legal, (2) more than two candidates are allowed to stand in electoral districts, and (3) the opposition is allowed to participate in the election. We use these criteria to distinguish electoral autocracies from closed autocracies.

NELDA is useful because it covers a large number of countries over an extensive time period. It does not, however, include countries where political parties are *de jure* illegal but relevant groups function as *de facto* parties (e.g. Jordan, Kuwait, Swaziland, and Uganda). We therefore complement NELDA with Svolik's (2012) dataset on authoritarian systems. Following Svolik (2012), we count autocratic countries as electoral authoritarian regimes if multiple political actors, including both partisan and non-partisan opposition groups, compete in legislative elections. Taken together, if a country meets the criteria in either one of the two datasets, we treat that country as an electoral authoritarian regime. After compiling our dataset, we examined some of the borderline cases and we decided to remove Angola (1992–2008) from our sample.[6] Appendix B provides a list of the regimes in our sample.

Dependent Variable: Effective Electoral Threshold

The dependent variable, electoral system type, is measured by the Effective Electoral Thresh-

[6]Due to a resurgence of civil conflict in 1992, Angola did not hold elections until 2008.

old (EET) index. Since Boix's (1999) seminal study, scholars have increasingly adopted this measure for electoral systems. Conceptually, the EET measures "the proportion of votes that, for each electoral system, secures parliamentary representation to any party with a probability of at least 50 percent"(Boix 1999: 614). Operationally,

$$EET = \frac{75\%}{M+1}$$

where M represents the average district magnitude in a country-year. Note that algebraically, EET is a direct linear transformation of M, another common measurement of electoral systems in the literature. Empirically, EET is a more encompassing measure of electoral systems than the conventional binary SMD-PR variable.[7] In our sample, the EET ranges from 0.74 percent (Iraq in 2005) to 37.5 percent (Singapore from 1968-1991). When the EET is lower than the legal threshold that often exists in PR systems, we use the legal threshold in place of the EET for that country.[8]

Explanatory Variables

To reiterate, we argue that dictators' optimal choice of electoral systems depends on their resources and capacity to induce opposition compliance. Measuring dictators' resources and capacity is not an easy task, however. In an influential study, Boix and Svolik (2013) face a similar difficulty, and they propose measuring power distribution within the ruling coalition using natural resource wealth. As they explain, "dictators will need fewer allies in countries whose economy can be easily controlled and exploited by the government. At the extreme, a dictator in a country with a single natural resource that is easily extractable and uniquely located may use it to pay off subordinates who would substitute for allies"(Boix and Svolik 2013: 208). Following them, we also use measures of natural resource wealth to tap into the

[7] EET allows us to capture more nuance in electoral systems. The EET of a pure SMD system equals to 37.5 percent (M=1), and as the country's electoral system becomes more proportional, the value of EET becomes smaller.

[8] Our main results remain unchanged if we use the original EET variable.

dictator's capacity to induce compliance from ruling elites and the citizenry.

In effect, natural resource wealth fits our conceptualization of dictator type well, as it enables dictators to use the carrot-and-stick approach to cultivate support from ruling elites and citizens. First, by allocating natural resources to the military and police, authoritarian leaders can strengthen their coercive capabilities. As Levitsky and Way (2010: 60) put it, fiscal strength is key for effective coercion in authoritarian regimes, as "unpaid state officials are less likely to follow orders." Studies also find that high military spending discourages both coup and rebel attempts, and these effects are particularly strong in oil-rich countries (Bodea et al. 2016). Second, natural resources also improve a dictator's ability to distribute tangible benefits. In a useful review, Ross (2015) concludes that abundant natural resources provide ruling elites with rent opportunities. Additionally, resource wealth makes it easy for dictators to buy off their opponents and keep the opposition divided. As Arriola (2013) suggests, government control of resource wealth undermines the opposition's ability to unify. Finally, by placating citizens' grievances through social spending, autocrats can use natural resources to gain voluntary support from the citizenry. As several studies demonstrate, natural resource wealth strengthens dictators' distribution capability and thus makes autocratic regimes resilient to collapse (Wright et al. 2015).

To operationalize natural resource wealth, we use Ross's (2012) variable of oil-gas value per capita, calculated by taking the product of a country's total oil-gas production and the current oil-gas price, divided by total population. This variable has the most extensive data coverage among similar natural resources variables. Examining this variable, we find that 68 out of 90 electoral authoritarian countries experience temporal changes in natural resource wealth, indicating that this variable has substantial within-country variation.

To visualize the relationship between natural resource wealth and electoral systems, we follow Cleveland (1993) and combine jitter plots and violin plots in Figure 2.[9] As we can

[9]We first use countries that experienced periods of electoral autocracy as the unit of analysis. Then, for each observation, we calculate the mean of the oil-gas value per capita and we identify the type of electoral system used in the given country. We use the binary

see, while a good proportion of observations are clustered at zero (i.e., non-oil producing countries), there are also a lot of non-zero observations (oil producing countries) in our sample. More importantly, the plots show that the kernel density is concentrated in zero or little oil areas for SMD countries (i.e., the heavy tail of the distribution on the left panel), whereas it is far more dispersed from zero to oil abundant areas for PR countries. In other words, within the PR group, there are more oil-producing countries than non-oil producing ones, whereas the opposite is true within the SMD group. Second, if we examine the distribution of natural resources across electoral systems, we can see that SMD systems have a lot of electoral autocratic countries with no oil resources, whereas there are much fewer non-oil producing autocracies under PR. Together, these results corroborate our theoretical expectations and provide prima facie evidence for our theory.

[Figure 2 about here]

Finally, we control for several confounding factors that may impact electoral system selection. First, according to Boix (1999), strong opposition threats encourage ruling parties to adopt PR systems. Yet, using the seat or vote shares of opposition parties to measure opposition threats can be problematic because these indicators are directly affected by the dependent variable, the electoral system.[10] Instead, we use anti-regime collective action to measure the strength of opposition threats, as these actions can be highly threatening to authoritarian regimes if successfully mobilized. We first follow Aksoy et al. (2015) and use Banks' *Cross-National Time-Series Data Archive* (CNTS) to measure anti-government collective action events, including riots, demonstration, and strikes. Importantly, since the Banks data have been criticized for media reporting bias and varying societal norms, we follow Bueno de Mesquita and Smith (2010) and use the change rather than the level of anti-government events to ameliorate the potential problems.

SMD-PR variable instead of the EET variable to smooth and simplify the graph.

[10]For the same reason, we are unable to use the number of inherited opposition parties adopted by Gandhi and Przeworski (2007) to operationalize opposition threats.

Moreover, one may wonder whether countries engaging in civil war may be more likely to adopt PR to reflect diverse interests in society and reach a peace agreement (Bogaards 2013). Accordingly, we control for civil war (*Correlates of War*).[11] Additionally, several studies underscore the importance of uncertainty, showing that institutional crafters' strategic designs in transitioning countries do not necessarily allow them to reap the benefits they anticipated (Andrews and Jackman 2005). We include the number of years since a given country transitioned into an electoral authoritarian regime to control for the effect of uncertainty.

Finally, the literature of democratic diffusion suggests that the spread of democracy has a significant impact on the propensity to move to PR systems (Blais et al. 2005). We use the proportion of democratic countries in a given region to operationalize the spread of democracy. In addition, a country's electoral system may be mimicked by its neighboring countries (Bol et al. 2015). Regional trends of a particular electoral system may encourage a country to follow a similar system. In order to consider such diffusion effects, we control for neighboring countries' average of EET. Finally, following Boix (1999), we add standard time-varying controls such as logged total population and trade openness. The summary statistics for all variables are available in Appendix C.[12]

Estimation Results

Our unit of analysis is country-year in electoral authoritarian regimes. In all models,

[11]One can reasonably argue that the civil war variable only captures post-conflict PR, while PR systems might be introduced to mitigate the threat before the civil war actually takes place. We take into account this possibility by controlling for ethnic fractionalization as a robustness check, and adding this variable does not change our main substantive findings (See Model E5-1 in Table E-5, Appendix E). Meanwhile, one can also argue that the consequences of electoral system type can be different in countries with ethnic fractionalization (Zollinger and Bochsler 2012), and we also test this conjecture by adding an interaction term between the civil war and ethnic fractionalization variables as another robustness check. Again, our main findings remain unchanged (See Model E5-2 in Table E-5, Appendix E). We thank an anonymous reviewer for this suggestion.

[12]All of the independent variables are lagged by one year to address the potential simultaneity bias, and the results remain unchanged without lagging the variables.

we add a lagged dependent variable to control for time dependence or the path-dependent characteristics of electoral systems. We also include country fixed effects. This modeling strategy enables us to account for any unobserved country-level heterogeneity that potentially affects both resource wealth and electoral systems. To deal with time-specific effects, we include dummies for each year. Standard errors are clustered by country.[13]

As an obviously naive first test, we regress the variable of EET on just the variable of natural resource wealth in Table 1 (Model 1). The result confirms our theoretical hypothesis, suggesting resource-rich authoritarian regimes are associated with more PR systems.

[Table 1 about here]

One should naturally suspect this simple model must be under-specified and the result reflects an association between dictators' strength and other confounding factors. Accordingly, we next incorporate into our model specification the control variables we discussed earlier (Model 2). As we can see, the results in Model 2 corroborate our previous findings on the relationship between dictators' natural resource wealth and their optimal choice of electoral system.

One methodological concern regarding Model 2 is the Nickell bias, which suggests that, in panel data with T time units, adding a lagged dependent variable and fixed-effects will yield biased estimates of order $1/T$. The potential Nickell bias is particularly concerning since the number of countries (86) is larger than the time-series (60) in our paper. Therefore, we also estimate system GMM models to guard against this bias and better capture the dynamic relationship between dictators' resource wealth and electoral systems. The coefficient for the variable of natural resource wealth remains negative and significant in Model 3.

From Table 1, we can see that the natural resource wealth variables are negatively associated with the electoral system variable in all models. These results clearly suggest that dictators with abundant natural resources are more likely to adopt PR systems by lowering

[13]Using two-way clustered standard errors (by country and year) and the Driscol and Kraay standard errors, the results remain unchanged (Table E-6, Appendix E).

EET. For example, Model 2 indicates that a 1,000 USD increase in natural resource income per capita lowers EET by 0.253. Given that the average change in EET ranges from -0.46 to 0.24 and one standard deviation of natural resource wealth is 2,400 USD, the impact of natural resource wealth is substantial. Figure D1 in Appendix D further graphically presents the substantive effects of natural resource wealth on EET.

Robustness Check

To ensure the robustness of our previous results, we perform a series of robustness checks. Figure 3 summarizes the findings by presenting the estimated coefficient of our key independent variable of natural resource wealth. As we can see, our previous findings hold.[14] We first examine the issues on data and we use log transformation to reduce the skewness of our natural resource variable (Table E-1). We also employ alternative measurements of natural resource abundance (Table E-2). We further explore the heterogeneity of authoritarian regimes and examine different regime types, such as personalist and single-party regimes (Table E-3).[15] We also guard against the danger of selection bias in our empirical estimation with a Heckman selection model since our observations may be a self-selected sample from all potential authoritarian countries that have ever considered institutionalizing elections in the first place (Table E7-1, Table E7-2). We also deal with the potential threat of endogeneity between natural resource wealth and dictators' institutional choice with an instrumental variable model (Table E8).[16]

[14]See Appendix E for detailed discussions.

[15]As an additional confounder, we entertain the possibility that dictators can also directly appoint legislators into legislatures or even add an upper house for political appointments. Making use of the V-Dem dataset that contains information on the proportion of seats appointed by political leaders in both upper and lower houses, we find it is relatively uncommon for dictators in electoral autocracies to appoint more than 50 percent of legislators to the legislature. We further controlled for the proportion of appointed legislators in the lower house in our model. The results, shown in Table E-4, Appendix E, show that our key findings remain unchanged.

[16]We employ an IV-GMM estimator with three instrumental variables on proven oil reserves that satisfy the exclusion restriction: proven oil reserves in billions of dollars, proven oil reserves divided by country size, and proven oil reserves in each region. We also find

[Figure 3 about here]

Additional Implications and Comparative Case Studies

Our theory also implies several consequences of electoral systems in electoral autocracies, and this section offers empirical evidence for these implications.[17] First, we suggested that SMD leads to larger seat premiums favorable to ruling parties in electoral autocracies. Indeed, the case of Singapore nicely illustrates the SMD seat premium: between 1968-1991, the People's Action Party obtained 98 percent of the total seats with only 70 percent of the total votes. Our regression analysis in Appendix F further supports this implication, showing that more majoritarian systems are positively correlated with larger seat premiums for ruling parties. Second, we suggested that PR systems are more likely to deter pre-electoral opposition coalitions. Again, our cross-national analysis in Appendix G provides supporting evidence for this implication, finding that more PR systems are correlated with lower probability of pre-electoral coalitions by opposition parties. Third, we posited that PR systems are more likely to increase voter turnout. Our empirical investigation in Appendix H corroborates that it is indeed the case.

Additionally, our theory rests upon two important assumptions regarding resource wealth and electoral systems. First, we suggested that political leaders in autocracies have more leeway to change electoral systems than leaders in democracies. Figure I-1 in Appendix I examines inter-temporal variations in the EET variable for both electoral authoritarian and democratic regimes. We find that electoral systems in democracies are more permissive and less volatile than in electoral autocracies, and this empirical observation is consistent with

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that these instruments are good predictors of oil-gas value per capita (jointly statistically significant in the first stage). Also, Hansen's J-test of the over-identifying restrictions cannot reject the null hypothesis that instruments are not correlated with the error term in the second-stage estimation.

[17] See Appendices F-J for detailed discussions. We thank the anonymous reviewer for the construction of this section.

our argument. Second, we made another assumption that natural resources should increase political support for authoritarian regimes, and based on this assumption we use natural resources as a proxy for a dictator's ability to induce compliance. To provide direct evidence on this proposition, we empirically test whether natural resource wealth helps dictators mobilize regime supporters in legislative elections. As expected, in Appendix J we find that a larger amount of resource wealth increases both vote shares and margins of victory for ruling parties. We summarize all of these implications and findings in Table 2.

[Table 2 about here]

To further illustrate how natural resource wealth impacts dictators' choice of electoral systems, the next sections conduct comparative case studies of Nazarbaev's Kazakhstan (1991–2008) and Akaev's Kyrgyzstan (1991–2005). The structured comparison of both regimes is ideal for several reasons.[18] First, the two electoral authoritarian regimes shared similar historical, social, and institutional background conditions when they declared independence in 1991. Importantly, these similar background conditions allow us to control for numerous factors that might otherwise serve as alternative explanations for electoral system selection: ethnic diversity, which necessitates PR systems;[19] geographical locations, which decide the degree of foreign influence to adopt certain election rules; historical legacy, which encourages new regimes to retain previous electoral institutions;[20] and the practice of patronage politics, which breeds candidate-based electoral systems.

Despite their similarities, however, the two regimes experienced contrastingly different electoral systems after declaring independence. Therefore, these two countries provide us with a rare opportunity to conduct a systematic controlled comparison. More intriguingly,

[18]Several studies, such as Jones Luong (2002), have also used these two regimes as test cases.

[19]According to Alesina et al.'s (2003) ethnic fractionalization index, Kazakhstan scores 0.617 and Kyrgyzstan 0.67.

[20]Both regimes are geographically connected to each other in Central Asia, and they both initially inherited SMD systems from the Soviet Union.

both regimes also experienced inter-temporal changes in electoral systems in different manners, allowing us to make more rigorous controlled comparisons than we could with only cross-country case studies. As we can see from Figure 4.a and 4.b, both regimes used SMD after independence, similar to what they experienced under the Soviet Union. Then both regimes shifted to majoritarian-dominant mixed systems in the late 1990s. However, the Akaev regime later returned to a pure SMD system. In contrast, Kazakhstan's Nazarbaev made the country's electoral system highly proportional by adopting a pure PR system with a nationwide district in 2007. Our most similar systems design helps us better explain the between-country and inter-temporal variations in electoral systems in these two regimes.

[Figure 4 about here]

Specifically, our case studies illustrate several important aspects of the logic of electoral system choices. These causal links, consistent with the cross-national evidence presented above, are also summarized in Table 2. First, we trace how natural resources became useful in forcing compliance for both ruling elites and citizens in Kazakhstan. We also show that the decline of such resources gradually undermined the same groups' loyalty in Kyrgyzstan. Importantly, we show that Kazakhstan's adoption of the PR system was mainly driven by a rapid increase in their natural resource wealth, whereas Kyrgyzstan's switching back to the SMD system resulted from its autocrat's lack of such resources to maintain the support from ruling elites. Second, we demonstrate that SMD provides significant seat premiums to ruling parties in these two electoral authoritarian regimes. Third, our case studies suggest that majoritarian systems encouraged the opposition in both countries to form pre-electoral coalitions. Finally, we show how SMD also reduces voter turnout and unifies the opposition.

Rich Resource Wealth and Choosing PR in Kazakhstan

Since independence, the Kazakh government has reformed its electoral system three times, each time moving toward a more PR-based system. Inheriting the electoral system from the Soviet Union, Kazakhstan's first constitution, adopted in 1993, stipulated that all legislators, except those who were appointed by the president, would be elected through single-member districts.[21] In May 1999, Nazarbaev introduced a mixed-member majoritarian system in which 67 legislators would be elected via SMD while the remaining ten members would be determined via PR in a nationwide district. In June 2007, Nazarbaev initiated an even bigger change in Kazakhstan's electoral system: introducing a pure PR system.

Prior to 2007, ruling elites in Kazakhstan received more seats than their vote shares indicated due to the SMD seat premium. For instance, in the 1999 election, ruling elites obtained 80.6 percent of seat shares with just 61.7 percent of the vote. Conversely, the main opposition party, the Communist Party of Kazakhstan (CPK), obtained only 3.9 percent of seat shares even though the party scored 17.7 percent of total votes (Nohlen et al. 2001, 420-423). After the adoption of the PR system in 2007, however, the seat premium shrank to roughly half of the seat premium seen in past elections under SMD.

Meanwhile, under SMD, turnout in parliamentary elections continuously decreased from 73.5 percent in the first parliamentary election to 62.5 percent in the 1999 election and finally to 54.29 percent in the 2004 election (Nohlen et al. 2001: 420). Interestingly, once Kazakhstan switched to the PR system, the turnout bounced back dramatically, hitting 68.41 percent in the 2007 elections. Finally, the SMD encouraged the opposition to build a coalition to compete in elections. In the 2004 election, two outright opposition parties, CPK and the Democratic Choice of Kazakhstan, forged an opposition bloc to coordinate their election campaigns (Issacs 2011: 89-90). By the 2007 elections under the new PR system, however, the opposition failed to unite for elections after serious internal divisions emerged.

[21] In 1995, President Nazarbaev issued a presidential decree that reduced the number of seats in the lower house to 67, yet all legislators were still elected under SMD.

What explains the dramatic shift to PR in Kazakhstan, then? We suggest that a rapid increase in natural resource wealth enriched state coffers and enabled Nazarbaev to utilize the resources for his political advantage. Similar to other post-communist countries, Kazakhstan suffered serious economic decline during the first few years of independence. In response, the Kazakh government began to export natural resources such as oil, gas, and minerals (Pomfret 2006). Since 1999, when the international price of oil rapidly increased (see Figure 4.e), natural resource sectors substantively boosted Kazakhstan's economy and allowed the country to sustain almost 10 percent economic growth until 2007.[22]

Importantly, by establishing Kazakh Oil (the national oil and gas company) to centralize the management of natural resource sectors, Nazarbaev increasingly utilized natural resources to cultivate political support through his intensive patron-client networks. Total social spending, for instance, rose from 199.37 USD per capita in 2001 to 505.24 USD per capita in 2007. Public spending particularly spiked during election years when the government implemented new education and social policies, increased salaries and pensions, and reduced taxes (Kendall-Taylor 2012). The increased public spending was primarily directed toward state employees and pensioners, and embedded in strong patron-client relationships in which benefits trickled down to their followers in return for their votes. For example, just before the 2007 legislative elections, the government announced that they would increase the wages of public servants. As a result, real wages in fact increased by 30 percent that year (OECD 2011). One of our interviewees pointed out how effectively this vote-buying strategy worked for the government: "Public employees—teachers, professors in universities, and doctors in hospitals—were mobilized to vote for ruling parties. During election campaigns, these institutions not only asked their staff to vote for Nur Otan, but sometimes they threatened employees by saying, 'If you do not vote for Nur Otan, then there would be some

[22]As Figure 4.d shows, the oil-gas value per capita increased fourteenfold between 1998 (207 USD) and 2008 (2,975 USD).

measures, some implications for you, even being fired from your institution.'"[23] Additionally, the oil boom helped Nazarbaev strengthen the security apparatus, increasing spending on both the military and the internal security apparatus from 26.34 USD per capita in 1994 to 112.23 USD per capita in 2004 (*Correlates of War*).

Thanks to his effective carrot-and-stick approach, the electoral performance of Nazarbaev and his ruling coalition parties grew over time whereas that of opposition parties shrank. The vote share of Nazarbaev and his ruling parties in the PR segment steadily increased from 61 percent in 1999, to 79.06 percent in 2004, and then to 88.41 percent in 2007 (Figure 4.c), whereas the opposition camp decreased their vote shares from 17.7 percent, to 15.4 percent, and then to 4.54 percent. In fact, many political elites in Kazakhstan believe that rich natural resources would have helped Nazarbaev win elections with at least 60-70 percent of the vote, even if the elections were totally honest.[24] Most crucially, Nazarbaev's growing political dominance in the early 2000s made it possible for him to shift the electoral system to PR, which, he explained, "provided a real reflection of the distribution of political forces and the valid will of the population" (Issacs 2011: 90).

Poor Resource Endowment and Choosing SMD in Kyrgyzstan

Similar to Kazakhstan, Kyrgyzstan started legislative elections with the SMD system in 1995. Kyrgyzstan then shifted to a mixed system prior to the 2000 election. Interestingly, before the 2005 election, Akaev changed the country's electoral system back to the SMD system (see Figure 4.b).

Like Kazakhstan, Kyrgyzstan's SMD system also provided a seat premium and thus opportunities to co-opt ruling elites. For instance, in the 2000 legislative election, the opposition camp obtained 49.1 percent of votes nationwide, but they gained only 10.5 percent of

[23]The authors' interview with a scholar at a public university in Kazakhstan.

[24]Gathered from authors' interviews with government officials and opposition figures.

the seats. The ruling parties and pro-presidential independents, on the other hand, occupied more than 85 percent of total seats (Nohlen 2001: 447). Sjoberg (2011: 92) reports that candidates nominated by the biggest ruling party, Alga Kyrgyzstan, were 66 percent more likely to win seats than the opposition candidates in the 2005 election.

Akaev's heavy dependence on SMD is attributed to the fact that he lacked abundant and centralized natural resources to gather political support from citizens. Kyrgyzstan has almost no valuable natural resources such as oil and gas. A relevant source of natural resource wealth in the country is the Kumtor gold mine, which accounted for nearly 50 percent of industrial output in Kyrgyzstan between 1996-2000 (Pomfret 2006). This windfall income, however, was too small to be politically relevant. Gold income per capita was only 36.72 USD on average during the Akaev regime and accounted for only 1 percent of GDP per capita, which was far smaller than Kazakhstan's natural resource wealth (15 percent of GDP per capita on average between 1995-2005).

Due to his inability to gather political support through natural resources, Akaev increasingly faced strong opposition. Until the late 1990s, Akaev managed to sustain political support from regional elites with local patronage networks. The exhaustion of resources, however, increasingly forced the president to confront the emerging opposition. Luckily, the seat premium from the SMD segment allowed Akaev to buy off politicians in the legislature. Being a legislator provided ruling elites with various privileges, such as immunity from prosecution, access to illegal transactions through law-making influence, and protection of their property from special interests. From Akaev's perspective, employing SMD enabled him to co-opt regional elites, garner political support in their strongholds, and solidify his rule.

In the 2000 election, Akaev used various electoral malpractices to prevent the opposition from gaining political momentum. Additionally, Akaev also decided to return to the pure SMD system before the 2005 elections with an eye toward maintaining a majority in the parliament. The shift to the SMD system did boost the seat shares of ruling politicians. Despite declining financial resources, two ruling parties, Alga Kyrgyzstan and Adilet, occupied

53 percent of total seats after the second round. Further, SMD discouraged ruling politicians to defect from the regime after the electoral reform.

The switch to the pure SMD system in the 2005 election, however, suppressed voter turnout and undermined citizens' trust in democratic practices. The turnout in the second round of the 2005 election was only 51 percent, the lowest since the first elections in 1995. Moreover, after the election, only 22 percent of citizens believed the election was fair (Sjoberg 2011); most of the citizens considered the election biased in favor of the incumbent. Akaev's decision also encouraged the opposition to unite for electoral purposes. The most visible opposition coalition was the People's Movement of Kyrgyzstan (PMK), which was led by Kurmanbek Bakiev and represented nine opposition parties across the ideological spectrum (Kulov 2008: 342). The PMK then formed an alliance with three other opposition coalitions with "the potential to project significant strength (…) from the union of individual opposition figures from both the north and south of the country" (Radnitz 2010: 135).

In sum, the case of Nazarbaev's Kazakhstan suggests that growing natural resource wealth cemented political support from both ruling elites and citizens over time, which enabled Nazarbaev to switch from SMD-based mixed systems to a PR system. The adopted PR then helped the president improve voter turnout and keep the opposition divided. By contrast, the case of Akaev's Kyrgyzstan suggests that an essentially small and shrinking amount of natural resources made it difficult for Akaev to maintain popular support, which incentivized him to return to the pure SMD system prior to the 2005 election.

It is useful to note that these two case studies also show the limitation of the traditional view of historical legacy. Indeed, while both countries inherited SMD systems from the Soviet Union right after independence, both countries show divergent paths on their choices of electoral systems due to their different natural endowments and political strengths. Finally, while the switch to SMD helped Akaev enhance the cohesion of his ruling coalition with the seat premium, his regime eventually collapsed under the Tulip Revolution due to several factors. First, the oppositions mobilized large-scale popular protests (Radnitz 2010). Second,

even though Akaev announced that he would not run for the next election in mid-2004, his heavy-handed electoral malpractices significantly undermined the credibility of his statement, which in turn created a focal point of anti-government action (Hale 2015). Finally, and perhaps most importantly, previous protests in post-Soviet states, such as Serbia, Georgia, and Ukraine provided the opposition in Kyrgyzstan with models, skills, and training to organize popular protests (Bunce and Wolchik 2011).

Conclusions and Discussion

This paper argues that resource-poor dictators are incentivized to employ SMD systems to co-opt ruling elites in the legislature with the extra seats, while resource-rich dictators tend to choose PR systems to alleviate the threat from the masses. Using newly collected cross-national data on electoral authoritarian regimes, our empirical analyses lend strong empirical support to our theory. We also presented our comparative case studies of Kazakhstan and Kyrgyzstan, showing that majoritarian systems bias seat distributions in favor of ruling parties, foster a unified opposition, and lower voter turnout in electoral autocracies.

This paper makes several key contributions to the literature. First, it contributes to the electoral system choice literature. We highlight the limitations of conventional wisdom on the origins of electoral systems in democracies, and we posit a new theory of electoral autocracies' choice of electoral system. Our paper also connects to the emerging literature rethinking the oil curse (Ross 2012, 2015). Our empirical findings suggest that autocrats rich in natural resources may not necessarily alienate themselves from citizens. Rather, we show that dictators with natural resource endowment tend to adopt PR systems, thereby lowering the barrier of entry and encouraging citizens' political participation.[25] Our argument also

[25]One possible interpretation of the association between natural resources and PR might be that rich dictators become less interested in party dominance in the legislature. However, given the importance of legislative seats in autocracy, and our supplementary findings that resource abundance is positively associated with turnout and victory margins in elections, we believe dictators remain keen on dominating in the legislature.

intersects with Egorov et al.'s (2009) argument that resource-rich dictators can afford to suppress media freedom since they are less dependent on bureaucratic performance. Finally, our findings also supplement a study by Bueno de Mesquita and Smith (2009), which shows that as the level of free resources increases, dictators are more likely to strengthen their authoritarian rule with a smaller coalition system.

Second, by exploring the origins of electoral institutions in electoral autocracies, we add to the ongoing debate about the role of elections in authoritarian politics. As discussed, scholars have identified various beneficial functions of elections for authoritarian leaders. On the flip side, recent studies have begun to question the consolidating effects of elections, suggesting that elections in authoritarian regimes can lead to instability (Knutsen et al. 2017). By taking into account the origins of electoral systems, this paper argues that the effects of elections in electoral autocracies are likely to be endogenous to dictators' rationale for selecting electoral institutions in the first place. In this light, our paper engages in a direct dialogue with the endogenous nature of political institutions in authoritarian regimes. According to this perspective, political institutions in autocracies are the least likely to be randomly assigned and their designs are influenced by autocrats' rational calculations as well as various socio-economic factors. As Pepinsky (2014: 635) puts it, institutions in authoritarian regimes "reflect the distribution of power in authoritarian regimes rather than exogenously shape it." Pepinsky (2014: 633) further urges scholars to distinguish between "institutions as causes…and institutions as epiphenomena." Extending this insight, our theory illuminates the origins of electoral institutions in electoral autocracies.

Before concluding, it is important to highlight the limitations of this study and implications for future research.[26]‘ First, while this paper uses natural resources as a proxy to measure dictators' capacity to induce compliance, it is worth noting that dictators' strengths can stem from various other sources as well, including party strength (Meng 2019), expected time horizons (Wright 2008), and types of legitimacy (Negretto and Visconti 2018). To be

[26]We thank anonymous reviewers for these insightful suggestions.

sure, our analytical focus echoes the notion of incumbent capacity advanced by Levitsky and Way (2010).[27] At a broader level, our conceptualization of the resource-rich dictator also parallels what Svolik (2012) refers to as the "established autocrats" who "…have acquired so much power that they can no longer be credibly threatened by their allies." On the other hand, a resource-poor dictator is similar to what Svolik refers to as the "contested autocracy" where "…politics is one of balancing between the dictator and the allies"(Svolik 2012: 6). Therefore, it would be useful, both theoretically and empirically, to move beyond the parsimonious focus on natural resources and paint a fuller picture of different types of dictators.

Additionally, while this paper focuses on the choice of electoral systems in autocracies, there are likely to be multiple pathways through which dictators can manipulate the electoral outcomes.[28] Finally, our findings suggest that strong dictators would prefer PR, and PR in turn can help dictators preempt potential challengers and consolidate their rules. Therefore, one implication is that the mutually reinforcing dynamics between electoral systems and natural resource endowments can lead to authoritarian resilience over time. Meanwhile, if the oil price continues to stay low, the low oil-price equilibrium can force some dictators to shift back to majoritarian systems and even make their regimes more vulnerable. In this sense, the continuing low oil prices can have strong implications in both electoral system designs and regime durability for contemporary authoritarian regimes. Together, these implications represent interesting research opportunities in the future.

[27]Focusing primarily on the coercive capacity of the state and the organizational strengths of ruling parties, they argue that strong coercive apparatuses enable dictators to monitor and repress opponents. Meanwhile, strong party organizations help dictators manage elite conflict and elections, mobilize popular support, and most importantly, facilitate power succession.

[28]As previously discussed, it is possible that dictators can directly appoint legislators into the legislature.

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Tables and Figures

	Model 1 Country FE	Model 2 Country FE	Model 3 System GMM
Lagged EET	0.900***	0.880***	0.814***
	(0.0238)	(0.0262)	(0.0926)
Oil-gas value per capita (100 USD)	-0.0146***	-0.0253**	-0.0208**
	(0.00388)	(0.0118)	(0.00992)
Opposition threat		0.0617*	0.0286
		(0.0344)	(0.0204)
Trade openness		0.00114	0.00464
		(0.00537)	(0.00451)
Logged population		1.416	-0.0284
		(1.165)	(0.211)
Duration of EA regimes		-0.00622	-0.0102
		(0.0206)	(0.0193)
Regional democracy		0.0900	-0.0776
		(0.134)	(0.102)
Neighbors' electoral systems		0.0258	0.0863
		(0.0237)	(0.0537)
Civil war		0.347	0.101
		(0.595)	(0.555)
Constant	2.320***	-18.80	
	(0.719)	(17.40)	
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Number of observations	1,619	1,480	1,480
Number of countries	90	86	86
$Arellano-Bond\ Test\ for AR(2)$			0.543
Hansen Test			0.91

Robust standard errors clustered by country in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 1: Determinants of Electoral Systems in Electoral Authoritarianism

	Electoral Reforms	Resource	Seat Premiums	Coalitions	Turnout
Cross-national Evidence	Frequent in EA regimes	Help autocrats win big	Large in SMD	Less likely in PR	High in PR
Nazarbaev's Kazakhstan	First SMD; then MMD; lastly PR	Increasingly rich	Small in PR	Not existed in PR	High in PR
Akaev's Kyrgyzstan	First SMD; then MMD; lastly SMD	Increasingly poor	Large in SMD	Existed in SMD	Low in SMD

Table 2: Additional Cross-National Analyses and Comparative Case Studies

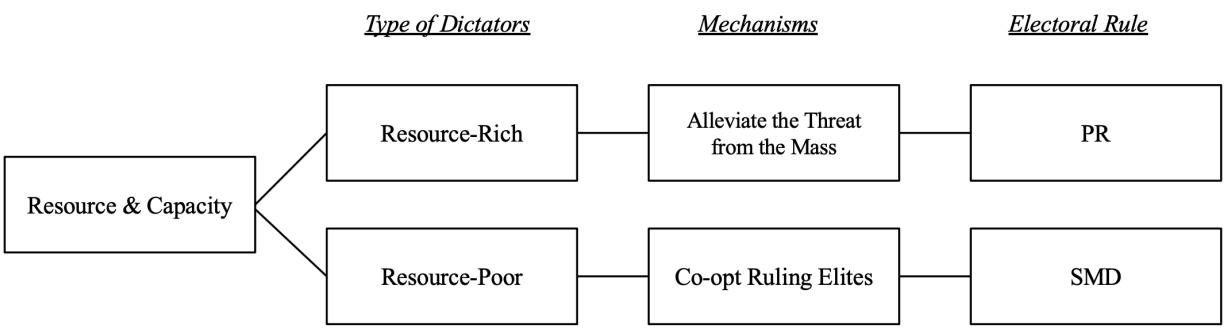


Figure 1: The Type of Dictators and the Choice of Electoral Systems

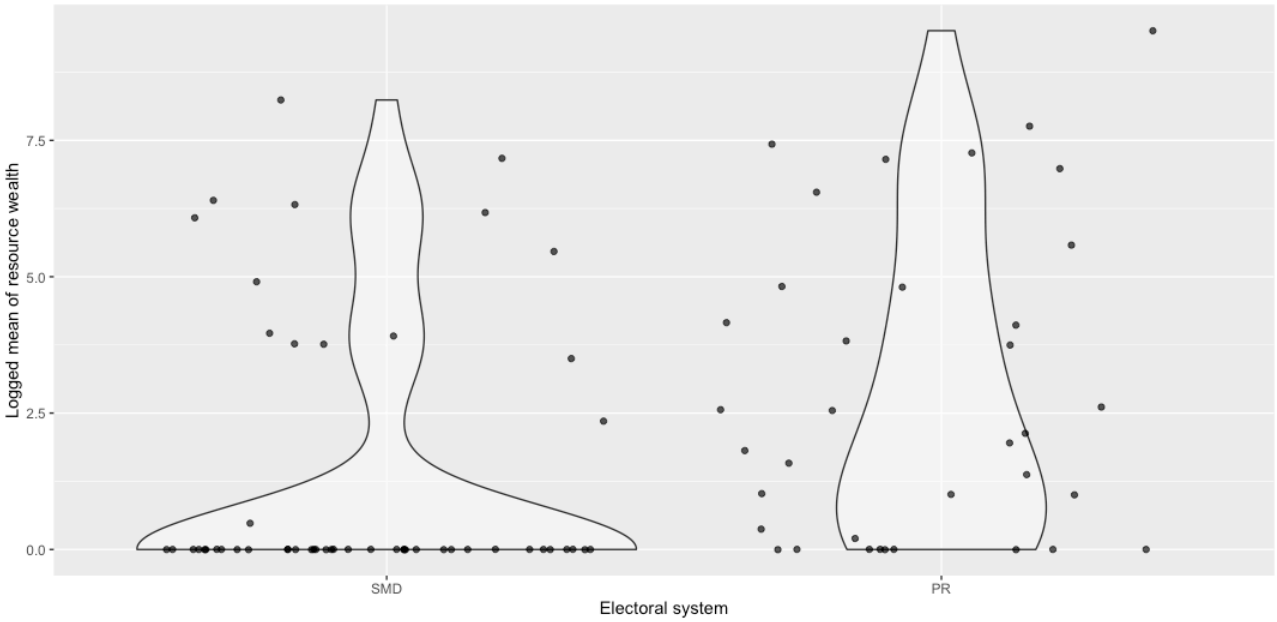


Figure 2: Bivariate Relationship between Resource Wealth and Electoral Systems

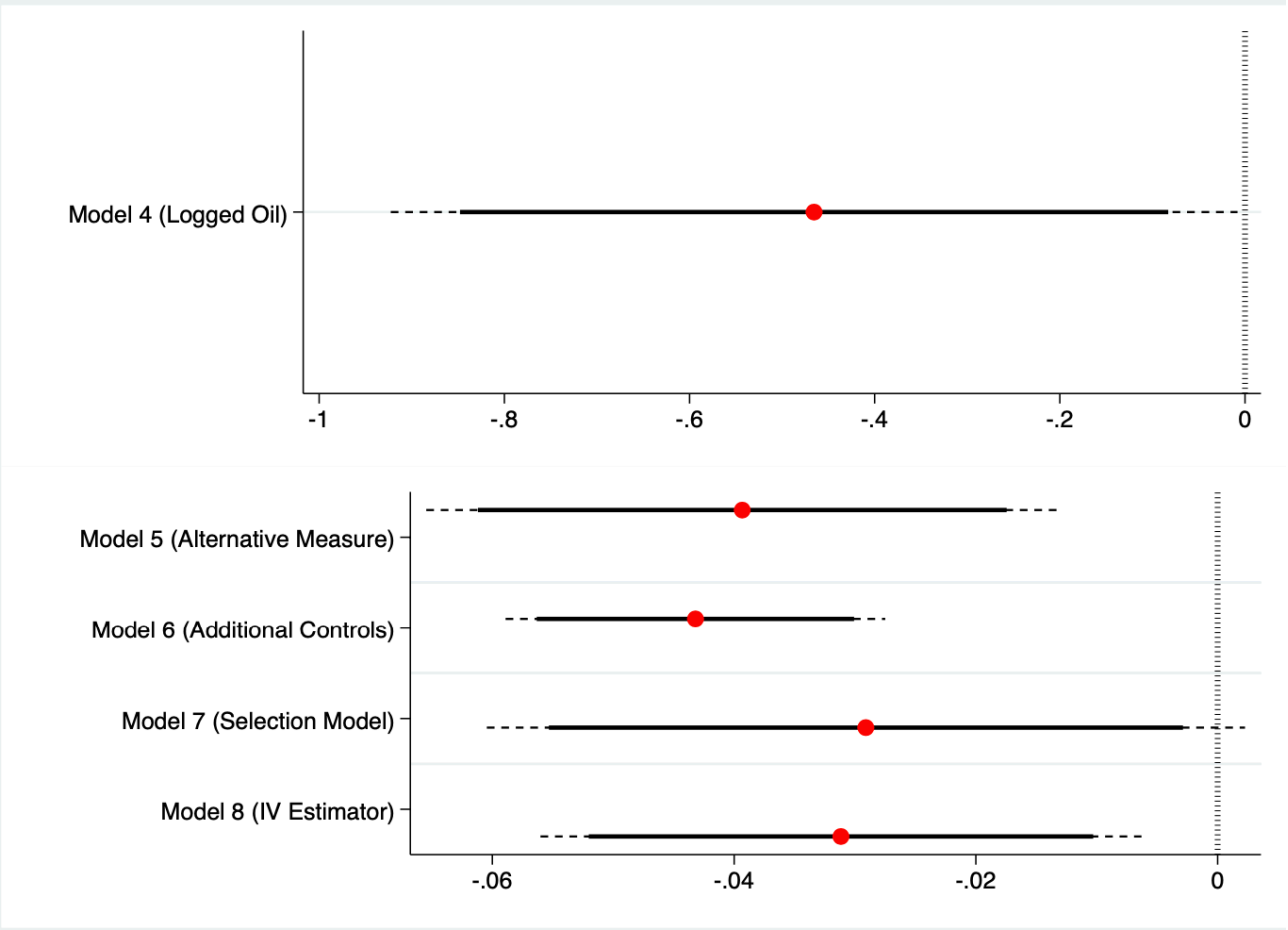


Figure 3: Plotting Robustness Checks

Note: The dashed lines are the 95 percent confidence intervals and the straight lines are the 90 percent confidence intervals.

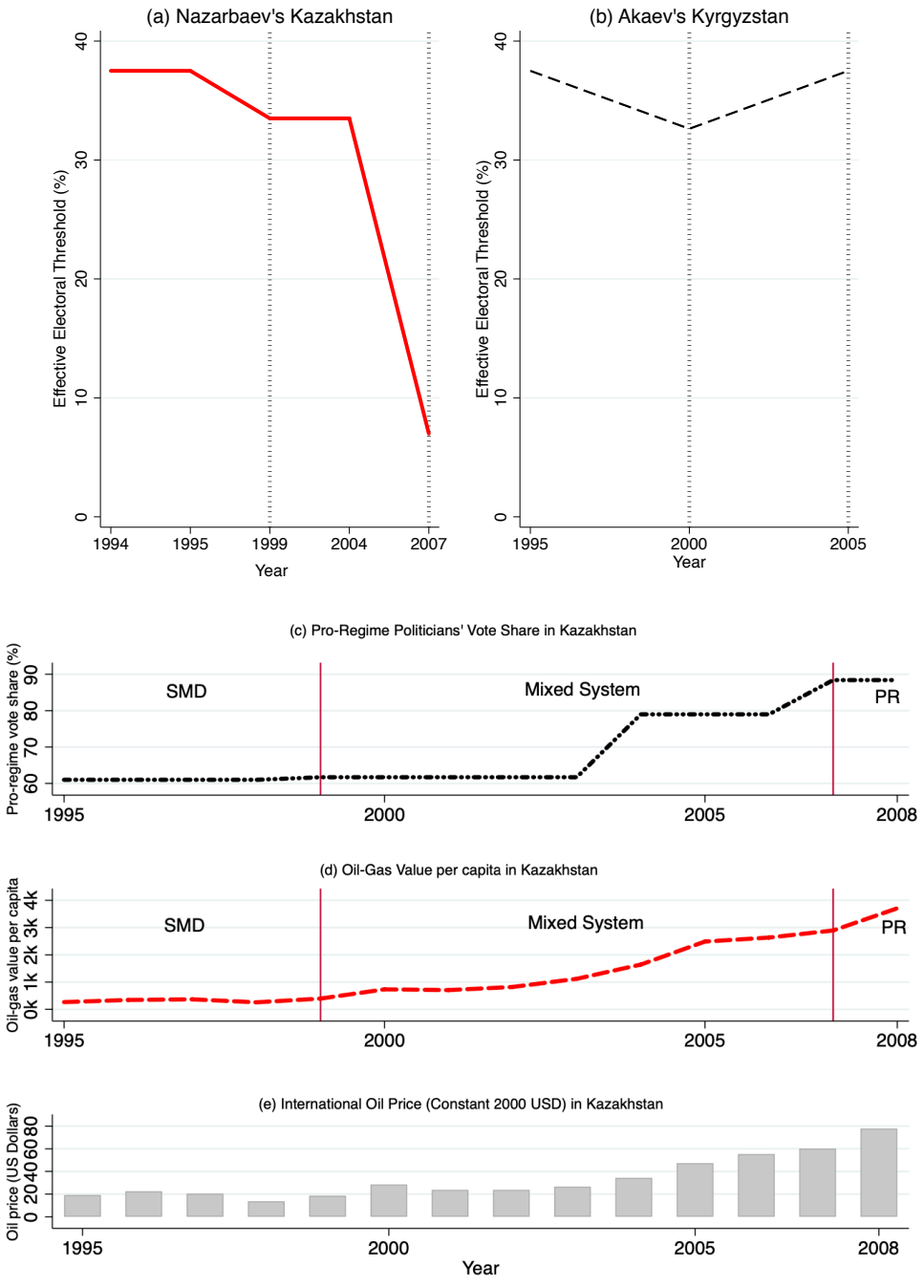


Figure 4: Natural Resources and Electoral System Changes in Kazakhstan and Kyrgyzstan

Appendix A: Coup Attempts in Oil-Rich and Oil-Poor Autocracies

	N	Mean of Coup Attempts	Standard Errors	95% Confidence Intervals
Oil-rich autocracies	1,005	0.003	0.00172	[-0.0003, 0.006]
Oil-poor autocracies	3,514	0.010	0.00167	[0.0066, 0.013]
Difference		-0.007	0.0032	[-0.013, -0.0005]

Note:

- Oil-rich (Oil-poor) countries are defined as countries whose oil-gas value per capita is above (below) the mean.
- The coup attempt data are drawn from Powell and Thyne (2011).

Appendix B: List of Countries

Electoral Authoritarianism	Time Period	Electoral Authoritarianism	Time Period
Afghanistan	2004-2009	Kyrgyzstan	1995-2005
Albania	1990-1992	Laos	1965-1974
Algeria	1997-2009	Lebanon	1993-2009
Azerbaijan	1993-2009	Lesotho	1967-1970, 1998-2009
Bahrain	1999-2008	Liberia	1985-2002
Bangladesh	1973-1974, 1978-1982, 1986-1990, 2007-2009	Madagascar	1960-1974
Belarus	1994-2009	Malaysia	1957-2009
Benin	1961-1962	Mauritania	1960-1963, 1992-2008
Botswana	1969-2009	Mexico	1967-2000
Burkina Faso	1970-1973, 1978-1979, 1992-2009	Moldova	1991-1997
Burundi	1996-2004	Morocco	1970-2009
Cambodia	1954-1970, 1972-1974, 1993-2009	Mozambique	1994-2009
Cameroon	1964-1969, 1992-2009	Namibia	1994-2009
Central African Requblic	1960-1961, 2005-2009	Nepal	2002-2005
Chad	1961-1962, 1996-2009	Nicaragua	1971-1978
Chile	1989	Niger	1996-1999
Comoros	1989-1994, 1996-1998	Pakistan	1985-1988, 2003-2009
Congo Brazzaville	2002-2009	Panama	1989-1990
Congo Kinshasa	1963-1964, 2006-2009	Paraguay	1968-2009
Cyprus	1961-1965, 1968-1977	Peru	1990-2000
Djibouti	1992-2004, 2008-2009	Philippines	1965-1971, 1978-1985
Ecuador	2000-2003	Russia	1994-2009
Egypt	1976-2009	Rwanda	2003-2009
El Salvador	1963-1979, 1982-1984	Senegal	1963-1967, 1982-2000
Equatorial Guinea	1969-1978, 1991-2009	Serbia	1993-2006
Ethiopia	1995-2010	Sierra Leone	1967-1981
Fiji	1972-1986, 1993-2005	Singapore	1968-2009
Gabon	1961-1966, 1990-2009	Somalia	1969-1975
Gambia	1969-2009	South Africa	1960-2009
Georgia	1995-2004	South Korea	1963-1988
Ghana	1961-1965	Sri Lanka	1977-1989
Guatemala	1955-1957, 1963-1966	Swaziland	1972-1977, 1993-2002
Guinea	1995-2008	Sudan	2000-2004, 2008-2009
Guinea-Bissau	1994-2000, 2004-2005	Syria	2007-2009
Guyana	1968-2009	Taiwan	1991-2002
Haiti	1987-2009	Tajikistan	1994-2009
Honduras	1964-1975	Tanzania	1961-1968, 1995-2009
Indonesia	1955-1965, 1971-1998	Thailand	1969-1970, 1980-1983, 2006-2007
Iran	1990-2009	Tunisia	1959-1963, 1979-1986, 1989-2009
Iraq	1953-1957, 2005-2009	Turkey	1949-1961, 1971-1973
Ivory Coast	1990-2007	Uganda	1966-1968, 1986-2009
Jordan	1962-1970, 1989-2009	Uzbekistan	1991-2002
Kazakhstan	1994-2009	Yemen	1993-2009
Kenya	1963-1972, 1992-2002	Zambia	1965-2009
Kuwait	1964-1975, 1982-1985, 1992-2008	Zimbabwe	1980-2009

Note:

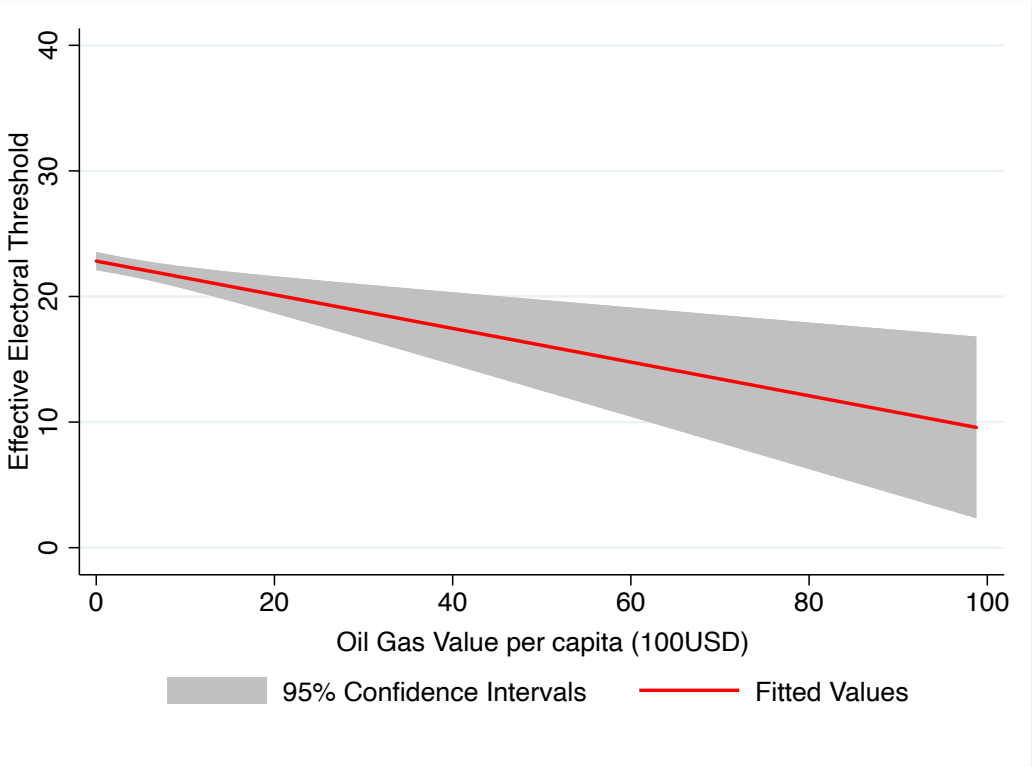
- Hyde and Marinov's (2012) NELDA and Svolik's (2012) dataset are used to define electoral authoritarian regimes.

Appendix C: Descriptive Statistics

Variables	Number of Observations	Mean	Standard Deviation	Maximum	Minimum
Effective Electoral Threshold (EET)	1,619	22.91	14.29	0.74	37.5
Oil-Gas Value per capita (100USD)	1,619	5.24	24.13	0	411.09
Collective Action (CNTS)	1,480	0.039	2.96	-28	30
Trade Openness	1,480	80.46	59.72	5.51	440.43
Logged Population Size	1,480	15.81	1.52	12.3	19.13
Duration of EA Regimes	1,480	16.52	15.4	1	85
Regional Democracy	1,480	-0.74	3.35	-6.09	7.304
Civil War	1,480	0.097	0.297	0	1

Appendix D: Estimated Results

Figure D1: Plot of Predicted Values (Based on Model 2 in Table 1)



Note:

- The straight line indicates fitted values of EET according to the values of the oil-gas value per capita. The shaded area represents the 95% confidence intervals.
- This figure shows that as natural resource wealth increases, electoral systems become more proportional.

Appendix E: Robustness Checks

To ensure the robustness of our previous results, we further perform a series of robustness checks. Robustness checks consist of two parts: (1) issues concerning data, measurements, and model specifications and (2) issues concerning selection bias and endogeneity.

I. Issues of Data, Measurement, and Model Specification

Because the distribution of the natural resource wealth variable is skewed, we take the natural logarithm transformation to reduce the skewness, and the transformation does not change our main results (Table E-1).

Additionally, we employ alternative measurements of natural resource abundance. A recent debate has emerged regarding how to best measure a country's natural resource profusion (Ross 2012: 15-17). In brief, Ross' measure focuses on oil and natural gas, but other natural resources may also be available to dictators (Ross 2012). To ensure that our previous findings are not sensitive to the measurement of natural resources, we re-estimate all models using Haber and Menaldo's (2011) measure of total fuel income per capita, which includes coal as well as oil and natural gas. Using their data, we also add minerals to our measurement of natural resources and find that our results are robust. It is worth noting, however, that some minerals, like gold and diamonds, are less capital intensive and are consequently also often available to rebel groups. Thus, their inclusion may not be appropriate in light of our theoretical focus. Nevertheless, we proceed with caution and our results remain unchanged (Table E-2).

We next consider the possibility that dictators' capacity and resources to induce compliance might be influenced by authoritarian regime type. For instance, some notable personalistic dictators, such as Mao of China and Stalin of the Soviet Union, were able to fully personalize their power and consolidate their regimes without the aid of natural resources. Essentially, personalistic regimes are important and distinctive from other types of autocracies because personalistic dictators can yield their power and dominance vis-à-vis ruling elites and citizens without being constrained by formal and informal rules. Therefore, we include a dummy variable for personalist regimes. Further, as we discussed earlier, Lust-Okar and Jamal (2002) argue that single-party regimes are more likely to choose electoral systems that favor the dominant party. Hence, we include a dummy variable of party-based regimes (Geddes et al. 2014).[1] Our results show that the inclusion of the personalist and party-based regimes dummies do not change our results (Table E-3).[2]

[1] We also added the dummy variable of monarchy regimes, but it is dropped from the analysis due to collinearity.

[2] It is important to note that while Lust-Okar and Jamal (2002) shed important light on various aspects of electoral rules, their study does not explicitly concern the (dis)proportionality of electoral systems. In fact, their net effect of regime types on the EET is theoretically ambiguous. For instance, while they argue that monarchs favor electoral rules that facilitate the representation of different forces, they also argue that monarchs do not necessary prefer PR since the proliferation of new political parties makes it difficult for the monarch to manage competition and remain chief arbitrator. Hence, they argue that monarchs also use small district magnitudes or even SMD

We also consider other potential confounding factors. First, we take into account the possibility that dictators can also directly appoint legislators into legislatures. Therefore, we control for the proportion of appointed legislators in the lower house in our model. The results, presented in Table E-4 show that our key findings remain unchanged. Second, in ethnically diverse societies, PR systems may be introduced to mitigate the threat of civil conflict between different ethnic groups. Also, in hybrid and authoritarian regimes, the political consequences of SMD can be different in countries with ethno-territorial splits (Zollinger and Bochsler 2012). To consider these possibilities, we introduce ethnic fractionalization index (Roeder 2001) and its interaction with civil conflict, and we find that our results remain unchanged (Table E-5).

Lastly, we employ alternative methods of computing standard errors. Errors may be correlated across countries as well as within them. To consider spatial and unit correlations, we use robust standard errors clustered by both country and year. In addition, we also compute the Driscoll and Kraay standard errors that simultaneously deal with both time and spatial dependence as well as heteroskedasticity. Again, our main results are insensitive to the choice of standard errors (Table E-6).

II. Selection Bias and Endogeneity

We also guard against the danger of selection bias in our empirical estimation. We analyze the set of electoral systems in autocratic regimes, but these observations may be a self-selected sample from all potential authoritarian countries that have ever considered institutionalizing elections in the first place. For instance, Gandhi (2008) argues that dictators have greater incentives to establish formal political institutions such as legislatures when they lack natural resources to buy off the opponent. Indeed, some oil-abundant countries in the Middle East, such as Saudi Arabia, do not even hold national elections. Likewise, some resource-abundant autocracies do not allow opposition parties to participate in elections (e.g., Turkmenistan).

To address this issue, we estimate a Heckman selection model. In the first-stage model, we build on Miller's (2017) baseline model (Table E7-1) while adding the natural resource variable to predict transitions from closed autocracies to electoral authoritarian regimes.[3] Then, introducing the inverse Mill's ratio calculated from the estimation of the first stage, we predict electoral system choice in electoral autocracies.[4] Our results show that the inverse Mill's ratio is not statistically

systems. Similarly, while they suggest that single-party regimes prefer electoral rules that concentrate power in the dominant party, they also need multimember districts to divide their opposition. Therefore, Lust-Okar and Jamal (2002: 361) conclude their analysis "extends beyond the simple choice between first-past-the-post electoral rules or proportional representation."

[3] Our reasoning is consistent with Gandhi and Przeworski (2007), who show that natural resource wealth is negatively correlated with the number of parties in a legislature.

[4] In addition to the predictors of electoral systems, we also added the variables included in the first stage model to the second stage to entertain the possibility that predictors for the emergence of electoral autocracy may also influence the choice of electoral systems.

significant, indicating that selection bias is not concerning. Most importantly, the selection model estimation does not alter our main findings (Table E7-2).

Finally, we are also cautious about the potential threat of endogeneity between natural resource wealth and dictators' institutional choice. A recent study points out that weak institutions may incentivize political leaders to increase non-tax revenues and buy off political support from elites (Menaldo 2016). Along this line of thinking, astute readers may wonder whether autocrats adopting PR systems may pump more oil prior to elections to maintain a supermajority. Consequently, we employ an instrumental variable (IV) estimation with country- and year-fixed effects and a GMM estimator (IV-GMM). Following Haber and Menaldo (2011), we use three time-varying variables on proven oil reserves–proven oil reserves in billions of dollars, proven oil reserves divided by country size, and proven oil reserves in each region–as instrumental variables. These instruments are ideal because oil reserves in a given country and region are highly correlated with oil-gas value per capita. Importantly, these variables satisfy the exclusion restriction because the amount of oil reserves cannot be artificially produced and be randomly distributed in nature and thus will not increase as a result of autocrats' policies. Further, it is highly reasonable to assume that oil reserves' effects on electoral systems should only run through the size of oil money, the instrumented variable. Additionally, these instrumental variables are jointly statistically significant at the 0.1 percent level in the first stage,[5] suggesting the instruments are good predictors of oil-gas value per capita. Also, Hansen's J-test of the over-identifying restrictions cannot reject the null hypothesis that instruments are not correlated with the error term in the second-stage estimation, suggesting the instruments are valid. Importantly, our IV estimation reaches the same conclusion that dictators' resource wealth is associated with the adoption of PR systems in electoral authoritarian regimes (Table E8).

[5] The first-stage model includes the three instruments, country dummies, year dummies, and the same set of variables introduced in the second-stage model.

Table E-1: Robustness Check – Logged Oil-Gas Value per capita

	Model E1-1 Country FE	Model E1-2 Country FE
Logged EET	0.901***	0.881***
	(0.0239)	(0.0263)
Logged oil-gas value per capita	-0.371*	-0.465**
	(0.208)	(0.230)
Collective action		0.0618*
		(0.0344)
Trade openness		0.00306
		(0.00541)
Logged population		1.319
		(1.109)
Duration of EA regimes		-0.00597
		(0.0209)
Regional democracy		0.0988
		(0.137)
Neighbors' electoral systems		0.0245
		(0.0235)
Civil war		0.327
		(0.591)
Constant	2.287***	-17.47
	(0.721)	(16.59)
Country FE	Yes	Yes
Year FE	Yes	Yes
Observations	1,619	1,480
Number of countries	90	86

Note:

- Cluster-robust standard errors in parentheses.
- * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

Table E-2: Robustness Check – Different Measurement of Natural Resource Endowments

	Model E2-1 Country FE	Model E2-2 Country FE
Lagged EET	0.901***	0.869***
	(0.0246)	(0.0305)
Fuel income per capita (100 USD)	-0.0126***	-0.0393***
	(0.00304)	(0.0132)
Collective action		0.0669*
		(0.0370)
Trade openness		0.00155
		(0.00600)
Logged population		1.829
		(1.312)
Duration of EA regimes		-0.00421
		(0.0223)
Regional democracy		0.119
		(0.138)
Neighbors' electoral systems		0.0311
		(0.0253)
Civil war		0.391
		(0.674)
Constant	5.172***	-24.87
	(1.266)	(19.64)
Country FE	Yes	Yes
Year FE	Yes	Yes
Observations	1,525	1,337
Number of countries	93	86

Note:

- We use Haber and Menaldo's (2011) fuel income per capita that includes oil, natural gas, and coal.
- Cluster-robust standard errors in parentheses.
- * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

Table E-3: Adding Personalist and Party-Based Regimes

	Model E3-1 Country FE
Lagged EET	0.841***
	(0.0451)
Oil-gas value per capita (100 USD)	-0.0432***
	(0.00788)
Collective action	0.0694*
	(0.0380)
Trade openness	0.00298
	(0.00622)
Logged population	2.323
	(1.866)
Duration of EA regimes	0.00219
	(0.0184)
Regional democracy	0.0596
	(0.162)
Neighbors' electoral systems	0.0124
	(0.0257)
Civil war	0.465
	(0.616)
Personalist regimes	0.822
	(0.813)
Party-based regimes	-0.210
	(0.928)
Constant	0.841***
	(0.0451)
Country FE	Yes
Year FE	Yes
Observations	1,186
Number of countries	73

Note:

- Country cluster-robust standard errors in parentheses.
- * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

Table E-4: Considering Proportions of Legislator Appointments in the Upper/Lower Houses

	Model E4-1 Country FE	Model E4-2 Country FE	Model E4-3 Country FE
Lagged EET	0.869***	0.880***	0.879***
	(0.0280)	(0.0263)	(0.0261)
Oil-gas value per capita (100 USD)	-0.0273**	-0.0252**	-0.0254**
	(0.0120)	(0.0117)	(0.0118)
Collective action	0.0660*	0.0614*	0.0617*
	(0.0366)	(0.0346)	(0.0344)
Trade openness	0.00102	0.00101	0.000956
	(0.00552)	(0.00531)	(0.00536)
Logged population	1.342	1.365	1.378
	(1.258)	(1.154)	(1.149)
Duration of EA regimes	-0.0156	-0.00600	-0.00589
	(0.0221)	(0.0203)	(0.0205)
Regional democracy	0.0535	0.0841	0.0836
	(0.114)	(0.128)	(0.129)
Neighbors' electoral systems	0.0276	0.0254	0.0257
	(0.0250)	(0.0234)	(0.0236)
Civil war	0.517	0.329	0.341
	(0.616)	(0.602)	(0.596)
Appointment in lower house	0.0803**		
	(0.0327)		
Bicameralism	0.0276	-0.175	
	(0.0250)	(0.611)	
Bicameralism with partially-appointed upper house	0.517		-0.214
	(0.616)		(0.657)
Constant	-17.78	-17.95	-11.12
	(18.80)	(17.25)	(17.18)
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	1,432	1,480	1,480
Number of countries	85	86	86

Note:

- Country cluster-robust standard errors in parentheses.
- * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

Table E-5: Considering Ethnic Diversity and Its Interaction with Civil War

	Model E5-1 Country FE	Model E5-2 Country FE
Lagged EET	0.880***	0.880***
	(0.0262)	(0.0255)
Oil-gas value per capita (100 USD)	-0.0253**	-0.0255**
	(0.0118)	(0.0118)
Collective action	0.0617*	0.0604*
	(0.0345)	(0.0351)
Trade openness	0.00114	0.000854
	(0.00537)	(0.00536)
Logged population	1.414	1.462
	(1.164)	(1.169)
Duration of EA regimes	-0.00626	-0.00700
	(0.0206)	(0.0208)
Regional democracy	0.0905	0.102
	(0.135)	(0.133)
Neighbors' electoral systems	0.0258	0.0274
	(0.0237)	(0.0246)
Civil war	0.347	-0.988
	(0.597)	(1.490)
Ethnic fractionalization (ELF)	-0.380	-1.116
	(3.804)	(4.117)
Civil war*ELF		2.025
		(2.165)
Constant	-18.57	-16.36
	(17.48)	(17.38)
Country FE	Yes	Yes
Year FE	Yes	Yes
Observations	1,480	1,480
Number of countries	86	86

Note:

- Country cluster-robust standard errors in parentheses.
- * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

Table E-6: Two-Way Clustering Standard Errors and the Driscol-Kraay Standard Errors

Standard Errors	Model E6-1 Country FE Two-Way Clustering	Model E6-2 Country FE Two-Way Clustering	Model E6-3 Country FE Driscol-Kraay	Model E6-4 Country FE Driscol-Kraay
Logged EET	0.900***	0.876***	0.900***	0.880***
	(0.0261)	(0.0310)	[0.0232]	[0.0281]
Logged oil-gas value per capita	-0.0146***	-0.0252**	-0.0146**	-0.0253***
	(0.00454)	(0.0119)	[0.00550]	[0.00857]
Collective action		0.0638		0.0617
		(0.0423)		[0.0387]
Trade openness		0.00176		0.00114
		(0.00572)		[0.00433]
Logged population		1.571		1.416*
		(1.312)		[0.714]
Duration of EA regimes		-0.00549		-0.00622
		(0.0218)		[0.0134]
Regional democracy		0.0927		0.0900
		(0.129)		[0.0847]
Neighbors' electoral systems		0.0263		0.0258
		(0.0284)		[0.0215]
Civil war		0.344		0.347
		(0.640)		[0.427]
Constant	2.321***	-21.09	2.305**	-18.60*
	(0.788)	(19.65)	[0.903]	[10.50]
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	1,616	1,433	1,619	1,480
Number of countries	87	83	90	86

Note:

- * $p<0.1$, ** $p<0.05$, *** $p<0.01$.
- Two-way clustered standard errors in parentheses and the Driscoll-Kraay standard errors in brackets.

E-7: Heckman's Selection Model

Table E7-1. First Stage

	Model E7-1 Logit
Oil-gas value per capita (100 USD)	-0.00695
	(0.00724)
Regional electoral autocracy (EA)	0.924
	(0.887)
Regional democracy	0.126**
	(0.0526)
Logged GDP per capita	-0.0433
	(0.228)
Economic growth	-0.00481
	(0.0167)
Recent coup	0.811*
	(0.481)
Recent irregular turnover from below	0.231
	(0.253)
Recent regular turnover	-0.183
	(0.392)
Urbanization	0.0135*
	(0.00766)
ELF	-0.0728
	(0.509)
Logged population	0.000821
	(0.0985)
Prior EA spells	0.755***
	(0.158)
Prior democratic spells	-0.0423
	(0.108)
Year	0.0280**
	(0.0137)
Constant	-59.46**
	(28.18)
Duration cubic splines	Yes
Observations	2,100
Number of countries	101
Pseudo R2	0.1466
Pseudo log likelihood	-317.06

Note:

- Model specification in the first stage is based on Miller (2017).
- Country cluster-robust standard errors in parentheses.
- * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

Table E7-2. Second Stage

	Model E7-2 Country FE
Lagged EET	0.868***
	(0.0270)
Oil gas value per capita (100 USD)	-0.0291*
	(0.0158)
Collective action	0.0657*
	(0.0374)
Trade openness	0.00179
	(0.00594)
Logged population	2.786
	(2.074)
Duration of EA regimes	-0.00952
	(0.0238)
Regional democracy	0.113
	(0.236)
Neighbors' electoral systems	0.0285
	(0.0290)
Civil war	0.266
	(0.628)
Inverse Mill's Ratio	0.345
	(1.859)
Regional electoral autocracy	0.509
	(2.073)
Logged GDP per capita	0.0431
	(0.638)
Economic growth	-0.0212
	(0.0195)
Recent coup	-0.392
	(1.595)
Recent irregular turnover from below	-0.263
	(0.560)
Recent regular turnover	-0.308
	(0.441)
Urbanization	0.0413
	(0.0454)
Constant	-42.13
	(31.93)
Country FE	Yes
Year FE	Yes
Observations	1,344
Number of countries	82

Note:

- Country cluster-robust standard errors in parentheses.
- * $p<0.1$, ** $p<0.05$, *** $p<0.01$.
- In addition to the predictors of electoral systems, we also control for the variables included in the first stage model because there is no guarantee of exclusive restriction, or that the explanatory factors possibly affecting the origins of electoral autocracies are orthogonal to electoral system choice (cf. Pepinsky 2014: 647-648). Two variables in the first-stage "Prior EA spells" and "Prior Democratic spells" are also added yet dropped due to collinearly.

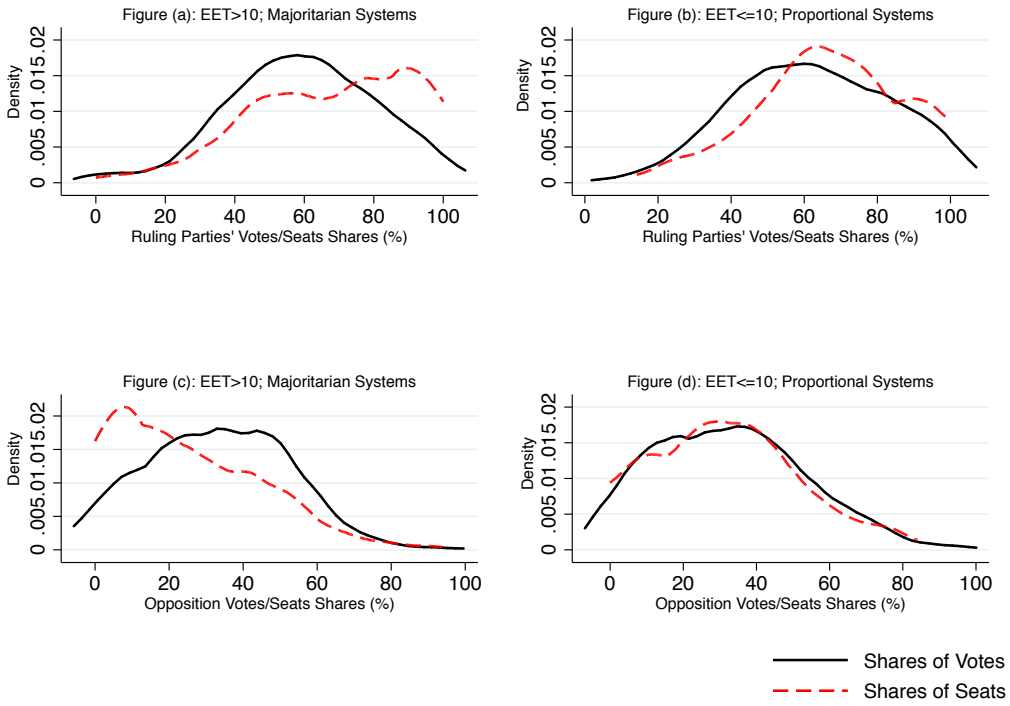
Table E8: Instrumental Variables Estimation (IV-GMM)

Dependent variable	Model E8-1 (Fist Model) Oil-Gas Value per capita	Model E8-2 EET
Oil-gas reserves (billion USD)	-0.135***	
	(0.03)	
Oil-gas reserves/country size	371032.7***	
	(17072.42)	
Oil-gas reserves in region	-0.0022	
	(0.0066)	
Oil-gas value per capita		-0.0312**
		(0.0127)
Lagged EET	-0.1097	0.861***
	(0.089)	(0.0341)
Collective action	-0.012	0.0712*
	(0.023)	(0.0431)
Trade openness	0.003	-0.00108
	(0.0207)	(0.00500)
Logged population	11.23**	1.087
	(4.87)	(0.967)
Duration of EA regimes	-0.022	-0.00201
	(0.028)	(0.0155)
Regional democracy	0.698*	0.157
	(0.394)	(0.102)
Neighbors' electoral systems	0.144*	0.0365
	(0.073)	(0.0252)
Civil war	0.198	0.264
	(0.42)	(0.447)
Year FE	Yes	Yes
Country FE	Yes	Yes
Observations	1,320	1,320
Number of countries	85	85
F-test on the instruments in first stage	242.45***	
Hansen J statistics of overidentifying restrictions	0.3933	

Note: The left-hand column shows the results of the first-stage estimation, where the dependent variable is oil-gas value per capita. Instrumental variables are (1) proven oil reserve in billion dollars, (2) proven oil reserve divided by country size, and (3) proven oil reserve in regions (Haber and Menaldo 2011). The right-hand side model is the second-stage estimation where instrumented oil-gas value per capita is used to predict EET. Cluster-robust standard errors in parentheses.
* $p<0.1$, ** $p<0.05$, *** $p<0.01$.

Appendix F: The SMD Seat Premium

Figure F1 - Kernel Density Plots



Note:

- The left figures show shares of votes and seats for ruling parties (Figure [a]) and those for opposition parties (Figure [c]) in majoritarian electoral systems (where the EET is more than 10).
- The graphs suggest that ruling parties tend to gain more seats relative to their votes, whereas opposition parties' seat shares in legislatures are underrepresented relative to their vote shares.
- Contrastingly, in proportional representation systems (where the EET is less than 10), shares of seats are more aligned with the vote shares for both ruling parties and opposition parties. The overall results suggest the SMD seat premium exists and favors ruling parties.

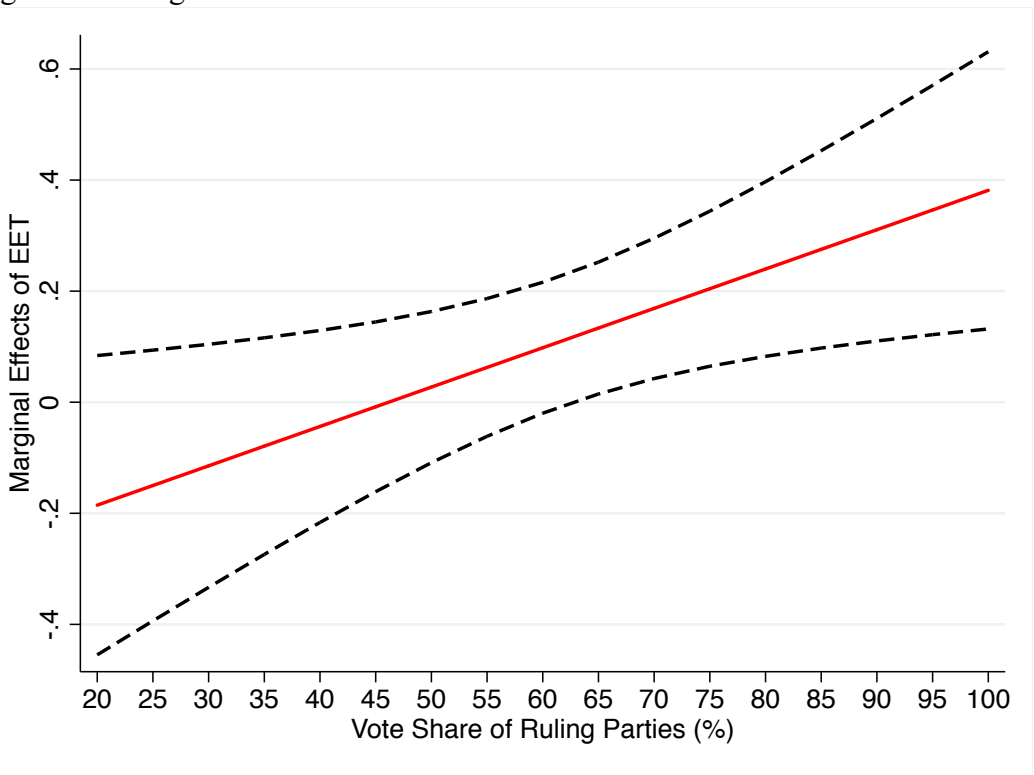
Table F1: Regression Results

	Model F1	Model F2
DV	Seats-Votes Gap of Ruling Parties (%)	Seats-Votes Gap of Ruling Parties (%)
Effective electoral threshold (EET)	0.120**	-0.327*
	(0.0579)	(0.192)
Vote share of ruling parties		-0.206***
		(0.07)
EET x ruling parties' vote share		0.00709**
		(0.003)
Vote share of independents (previous elections)	-0.0375	-0.03
	(0.04)	(0.04)
Logged assembly size	-0.00746	-0.53
	(1.35)	(1.37)
Parliamentarism	-0.0428	-0.701
	(1.38)	(1.36)
Constant	9.457	25.97**
	(7.64)	(10.41)
Regional dummies	Yes	Yes
Half-decade dummies	Yes	Yes
Number of countries	73	73
Observations	268	268
R-squared	0.144	0.183

Note:

- Panel-corrected standard errors in parentheses. AR (1) process is computed to deal with possible autocorrelation.
- * $p<0.1$, ** $p<0.05$, *** $p<0.01$.
- Model A1 shows that EET is positively correlated with discrepancies between seats and votes.
- Model F2 suggests that the SMD seat premiums tend to become larger as ruling parties obtain more vote shares. The interaction effect in Model F2 is graphically presented in Figure F2.

Figure F2: Marginal Effect of EET on Seat Premium Conditional on Vote Share



Note:

- This figure is based on Model F2. The dotted lines are the 95% confidence intervals.
- It shows that the SMD seat premium tends to magnify as ruling parties obtain more vote shares.

Appendix G: Pre-Electoral Opposition Coalition in Electoral Authoritarian Regime

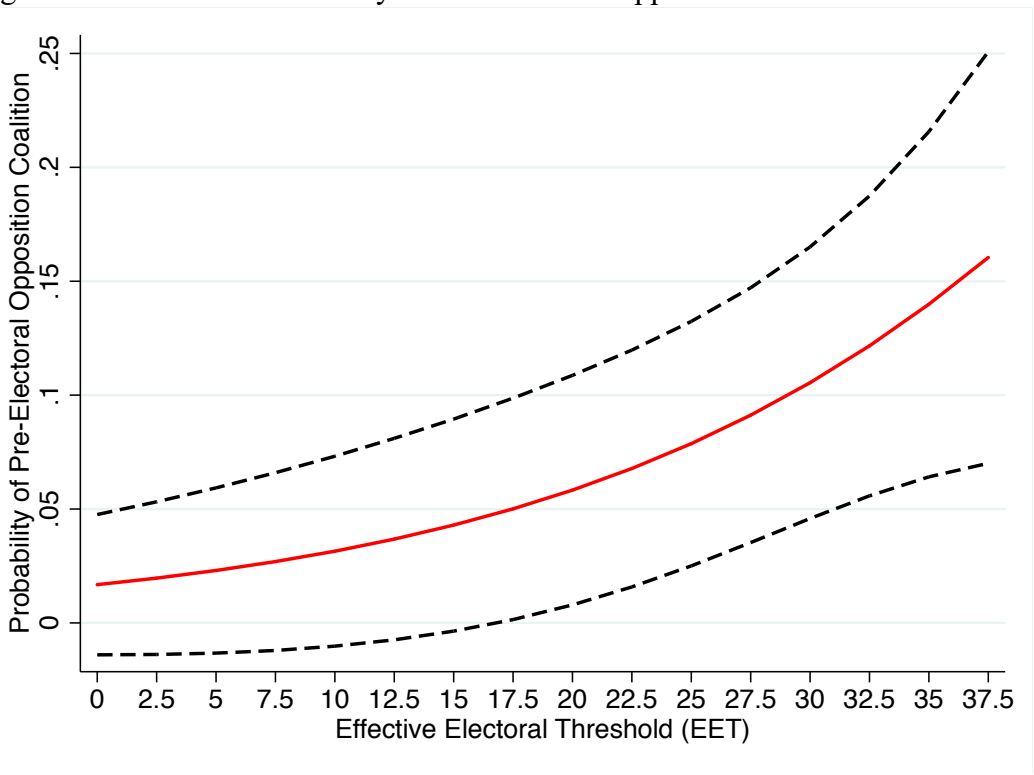
Table G1: Determinants of Pre-Electoral Opposition Coalition

	Model G-1	Model G-2
DV	Pre-Electoral Coalition	Pre-Electoral Coalition
Effective electoral threshold	0.0644**	0.0783***
	(0.028)	(0.025)
Natural resource wealth (100 dollars)	-0.00132	-0.00210*
	(0.001)	(0.001)
Age of largest opposition party	0.194**	0.325***
	(0.081)	(0.097)
Number of opposition parties	0.120*	0.0836
	(0.062)	(0.064)
Ruling party's seat share in the previous election	0.0166	0.0450**
	(0.013)	(0.020)
Parliamentarism	-0.42	-1.634*
	(0.655)	(0.887)
Ethno-linguistic fractionalization	2.856**	3.338*
	(1.236)	(1.744)
Economic growth (one year lagged)	0.024	0.0107
	(0.042)	(0.054)
Logged total population (one year lagged)	-0.0611	0.0401
	(0.192)	(0.237)
Electoral violence	-0.136	1.011
	(0.516)	(0.843)
Lagged dependent variable		2.862***
		(1.004)
Constant	-8.543**	-13.67**
	(4.2)	(5.405)
Regional dummies	Yes	Yes
Half-decade dummies	Yes	Yes
Number of countries	71	55
Observations	225	167
Pseudo log likelihood	-69.75	-42.03
Wald Chi Squared	104.64***	133.35***

Note:

- Cluster-robust standard errors in parentheses; * $p<0.1$, ** $p<0.05$, *** $p<0.01$.
- The dependent variable, pre-electoral opposition coalition, and model specifications are based on Gandhi and Reuter (2013).

Figure G1: Predicted Probability of Pre-Electoral Opposition Coalitions



Note:

- The figure is based on Model G-1.
- The straight line represents the predicted probabilities of pre-electoral opposition coalition making. The dotted lines stand for the 95 percent confidence intervals.
- It shows that a higher level of EET (i.e., more majoritarian electoral systems) increases the likelihood of pre-electoral opposition coalition making.

Appendix H: Determinants of Turnout in Electoral Authoritarianism

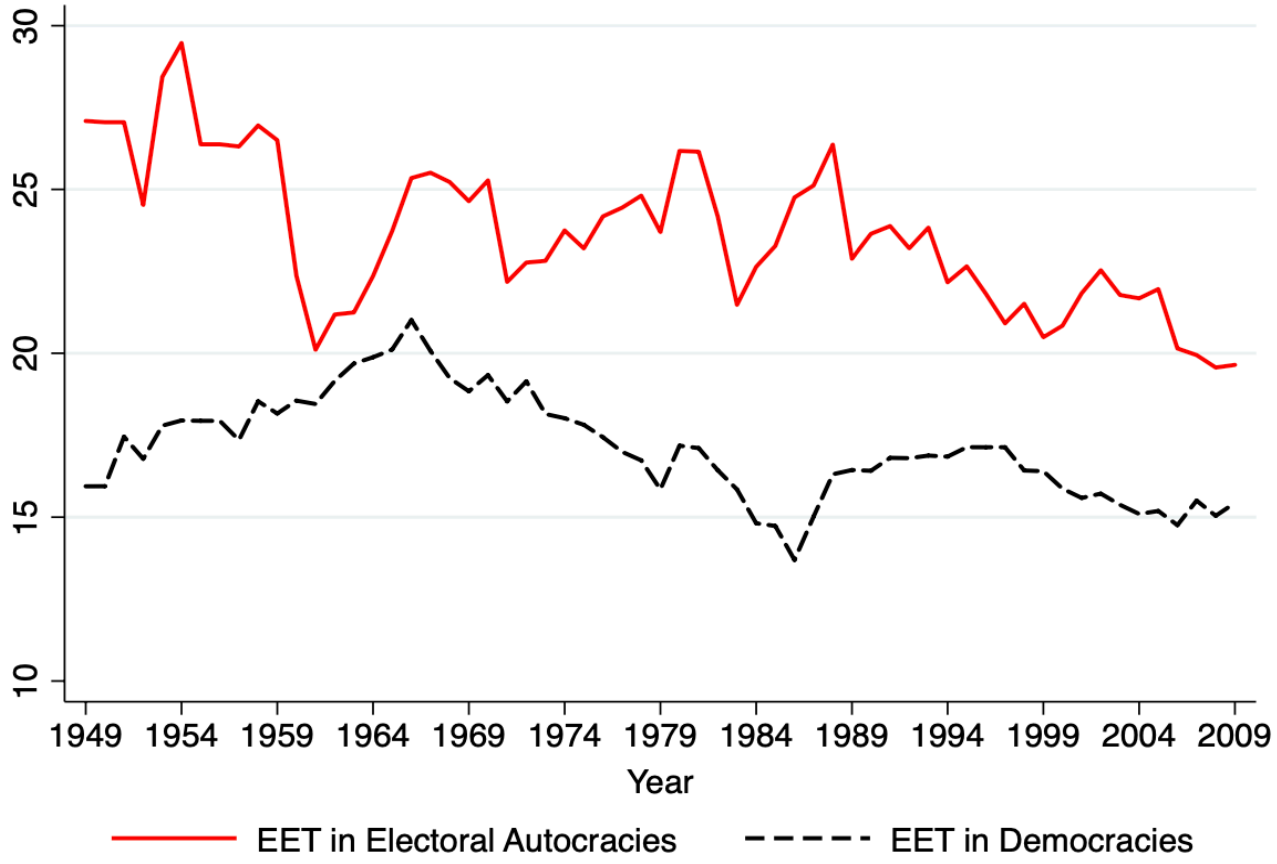
Table H1: Determinants of Turnout

	Model H1	Model H2
DV	Turnout	Turnout
Effective electoral threshold	-0.205***	-0.185***
	(0.056)	(0.061)
Parliamentarism	5.104***	5.880***
	(1.913)	(1.909)
Election violence	-2.545	-1.087
	(1.935)	(1.928)
Ethno-linguistic fractionalization	-3.1	-0.99
	(3.224)	(2.834)
Opposition boycott	-4.043*	-3.012
	(2.205)	(2.183)
Electoral fraud	-1.699	-1.449
	(1.605)	(1.886)
Logged GDP per capita	3.402***	4.365***
	(0.902)	(1.017)
Compulsory voting system		-0.622
		(4.074)
Constant	55.76***	34.44**
	(10.080)	(11.420)
Regional dummies	Yes	Yes
Half-decade dummies	Yes	Yes
Number of countries	82	76
Observations	314	271
R-Squared	0.420	0.493
Wald Chi Squared	318.80***	171.53***

Note:

- Panel corrected standard errors in parentheses.
- * $p<0.1$, ** $p<0.05$, *** $p<0.01$.
- AR (1) process is computed to deal with possible autocorrelation.
- Model H1 uses cross-national data of voter turnout that we originally collected by using several data sources.
- Model H2 introduces compulsory voting system as an additional independent variable, which comes from International IDEA (available at http://www.idea.int/vt/index.cfm).
- The results show that a higher level of the EET tends to suppress voter turnout.

Appendix I: Temporal Variations of Effective Electoral Threshold in Democracy and Autocracy



Note:

- The graph shows inter-temporal variations in the EET variable for both electoral authoritarian and democratic regimes. Electoral systems in democracies are more permissive and less volatile than in electoral autocracies.

Appendix J: Natural Resource Wealth and Dictators' Electoral Performance

Table J-1: Determinants of Dictator's Electoral Performance

	Model I-1	Model I-2
DV: Ruling Party's Electoral Performance	Share of Votes (%)	Margin of Victory (%)
Natural Resource Variable	Ross (2012)	Ross (2012)
Oil-gas value per capita	0.00408**	0.00730**
	(0.0019)	(0.0033)
Ethno-linguistic fractionalization	-1.799	-6.117
	(4.78)	(8.20)
Opposition boycott	5.942***	14.54***
	(2.02)	(4.01)
Electoral fraud	-1.508	-5.113**
	(1.18)	(2.45)
Election violence	-8.544***	-14.45***
	(1.91)	(3.61)
Lagged Polity IV	-0.40	-1.057***
	(0.25)	(0.39)
Parliamentarism	4.10	3.91
	(2.33)	(4.25)
Lagged GDP per capita (logged)	-1.185	-1.074
	(1.84)	(3.41)
Lagged GDP growth	0.514***	1.111***
	(0.130)	(0.277)
Constant	68.75***	69.61**
	(16.590)	(26.35)
Regional dummies	Yes	Yes
Half-decade dummies	Yes	Yes
Number of countries	73	73
Observations	285	282
R-squared	0.446	0.271
Wald Chi Squared	636.73***	135.44***

Note:

- Panel-corrected standard errors in parentheses; * $p<0.1$, ** $p<0.05$, *** $p<0.01$.
- AR (1) process is computed to deal with autocorrelation.
- The results show that natural resource wealth is positively correlated with both ruling parties' share of votes and margin of victory.

References (not cited in the main text)

Gandhi, Jennifer. 2008. *Political Institutions under Dictatorship*. New York: Cambridge University Press.

Menaldo, Victor. 2016. *The Institutions Curse*. New York: Cambridge University Press.

Miller, Michael. 2020. "The Strategic Origins of Electoral Authoritarianism." *British Journal of Political Science* 50-1: 17-44.