Coup Risk and Designated Successors in Autocracies

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Abstract

Why do some autocracies formalize designated successors in the constitution? According to a recent wave of research, autocrats have succession rules when coups are likely. Successors increase certainty over the regime's future and protect the autocrat from coups. In contrast, I argue that secure autocrats are more likely to have succession rules when they can prevent coups from successors and ambitious elites. I directly test whether coup risk influences having vice presidents and create a novel measurement of coup risk using Random Forests. I find support for my argument: Higher coup risk decreases the probability of an autocracy having a vice president. My results suggest that the relationship between successors and survival needs to be revisited. They also demonstrate the importance of testing institutions' causes for studying autocratic institutions. To understand the effects of institutions, we need to understand their causes.

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Introduction

Organizing succession is a core task of political systems. Succession rules determine how and when political power is transferred, both in normal times and in emergencies like the leader's death or incapacitation. Democracies have built-in mechanisms for succession: elections. Autocracies vary in how they organize succession through formal rules, such as constitutional provisions, and informal rules, such as norms in the ruling parties. Some autocracies simply fail to prepare for succession altogether.

A recent wave of research has examined the role of a particular succession rule, designated successors, in autocracies. The designated successor is an individual or office specified in the constitution to take power if the leader suddenly leaves office. Having a designated successor presents a simple puzzle. Designated successors can threaten the autocrat. The successor has the motivation to overthrow the autocrat, maximizing the successor's time in power and preventing an early removal from their role as successor. Through their status, the successor gains resources and allies who can facilitate a coup against the autocrat. A designated successor has both the means and motive to overthrow the autocrat (Herz, 1952).

Despite the successor's threat, the current consensus is that autocrats who expect to lose power have designated successors to secure their rule and extend their reign. Rather than threatening autocrats, successors protect autocrats (Frantz & Stein, 2017; Kokkonen, Møller, & Sundell, 2022; Kokkonen & Sundell, 2014; Konrad & Mui, 2017; Meng, 2020, 2021b; Zhou, 2023). In contrast, I argue that autocrats have designated successors when the threat of a coup is low. Autocrats can use succession rules to reward key allies but need enough security that the successor cannot credibly stage a preemptive coup. Designated successors are tools for survival only after the threat of coups is low.

I conduct the first direct test of whether coup risk affects having designated successors. I use Random Forests, a machine learning model, to calculate probabilities that a coup occurs in a given country-year observation for 2,400 country-year observations across 103 countries. Then, I use the predicted coup risk to model the probability that an autocracy has a vice president, the strongest form of designated successor in modern autocracies (Meng, 2021b). I find—contradicting existing theories—that autocracies are *less* likely to have vice presidents when

the risk of a coup is high.

The immediate implications of my argument and results impact studies of autocratic succession. If autocrats are more likely to have successors when coup risk is low, the result that succession rules lower coup risk is potentially spurious. The relationship needs retesting while accounting for selection effects. Even if the relationship still exists, the logic for why autocrats have succession rules needs to change. I argue that secure autocrats use designated to further solidify their rule, but designated successors could serve additional goals. Ultimately, successors are tools of the stable and secure, not the threatened.

I also contribute to the increasing use of machine learning in political science. Previous uses of machine learning in political science focus mainly on predictions (e.g., Beck et al., 2000; Muchlinski et al., 2016). Increasingly, political scientists use machine learning for theory testing. For example, Arel-Bundock (2017) uses Random Forests to assess how well political variables can explain foreign direct investment inflows. Flaherty (2023) uses a strategy similar to mine for measuring how geographic mobility affects voting behavior after exposure to NAFTA. Flaherty estimates the probability of moving with a Random Forests model and then includes the estimated probabilities in regression models.

My Random Forests model for coup risk is especially useful for studying autocratic institutions. While I focus on succession rules, the argument that autocrats have nominally democratic institutions to increase survival and dissuade coups applies more broadly to institutions like legislatures and parties (Boix & Svolik, 2013; Bove & Rivera, 2015; Gandhi, 2008; Gandhi & Przeworski, 2007; Geddes et al., 2018; Svolik, 2012). There is strong evidence that autocratic institutions increase survival.

Evidence on the origins of institutions is rarer. Generally, there is mixed support that autocrats more vulnerable to coups or in weaker positions have institutions more, but the evidence's strength depends on the proxy used (Boix & Svolik, 2013; Gandhi & Przeworski, 2006). The proxies make it difficult to disentangle whether the relevant variable—coup risk and security—drives the result or whether a separate feature of the proxy does. My Random Forests model provides a direct measure of coup risk that researchers can easily apply with minor modifications.[1]

In the next section, I discuss the literature on coup risk and succession rules in more depth. Then, I argue that autocrats should be more likely to have successors when the risk of a coup is low. I use the case of Robert Mugabe in Zimbabwe to illustrate how Mugabe used the vice presidency to co-opt the opposition and reward key allies. The remainder of the paper is dedicated to testing whether coup risk affects having a designated successor. I start by using a Random Forests model to predict the probability of a coup. I briefly describe how Random Forests models work and show that the model produces accurate predictions. Next, I describe the empirical model and discuss the results, finding a negative relationship between coup risk and having a vice president. The final section concludes.

Coup Risk & Succession

Current research on autocratic succession stems from Herz (1952). Herz introduces the crown-prince problem that subsequent scholars have sought to resolve. Designating a successor has a natural danger. An autocrat may wish, or find it advantageous, to designate and prepare a successor. But the successor gains power through their position. The sooner that the autocrat leaves power, the less risk that the successor loses their position and the longer that they rule as the autocrat themselves. The designated successor—the crown prince in Herz's terms—has both the means and motive to overthrow the autocrat. A designated successor may placate elites but introduces a new rival to the incumbent.

Subsequent scholars, however, argue that designated successors protect autocrats more than they threaten them. Scholars have studied succession rules most extensively through the use of primogeniture among medieval and early modern European monarchies. Primogeniture is a succession rule in monarchies where the monarch's oldest child, traditionally the oldest son, inherits the Crown when the monarch dies. Tullock (1987) proposes that primogeniture resolves the crown-prince problem. Primogeniture provides the regime with an immediate heir to organize around who is also young enough to wait for the monarch's natural death (see also Kurrild-Klitgaard, 2000). Consistent with Tullock's predictions, monarchs who implemented primogeniture were less likely to be violently overthrown (Kokkonen, Krishnarajan,

et al., 2021; Kokkonen, Møller, & Sundell, 2022; Kokkonen & Sundell, 2014). Primogeniture also reduced the probability of succession wars after a monarch's death (Kokkonen & Sundell, 2020).

Increasingly, scholars are studying succession rules in modern autocracies. Succession rules, either formal or informal, reduce political instability after assassinations (Iqbal & Zorn, 2008) and reduce the probability of attempted coups (Frantz & Stein, 2017). Succession rules, particularly in the form of designated successors, have two primary benefits for increasing survival and preventing coups. First, succession rules reduce uncertainty over the regime's future. Elites, the most important and privileged members of the regime, want to ensure that the regime survives. Elites receive rewards for supporting the autocrat, but losing power risks exile, imprisonment, torture, and death. Elites are especially vulnerable after an autocrat dies. The regime could fall, or the next autocrat could reshuffle their core supporters. Elites may preemptively remove an autocrat from power to avoid the autocrat dying in office and ensure that the regime survives (Bueno de Mesquita & Smith, 2017, 2018, 2023). Having a designated successor can assure elites that the regime will survive the incumbent, dissuading a preemptive coup.

The second mechanism—and the more recent theoretical innovation—is the barrier effect. According to the barrier effect, successors commit to the regime, rather than pose a threat to the incumbent. The designated successor protects the autocrat because the designated successor is most likely to take power if they wait for the autocrat's death. Because overthrowing the incumbent also requires overthrowing the committed-to-the-regime designated successor, coups are costly and less likely to succeed. The increased cost from the designated successor's "barrier" lowers the utility of committing coups (Konrad & Mui, 2017; Meng, 2020, 2021b). Designated successors, rather than threatening autocrats, reduce uncertainty over the regime's future and form protective barriers.

That designated successors reduce coup risks suggests why autocrats introduce designated successors. An autocrat should introduce designated successors when the autocrat fears a coup. The autocrat, otherwise, lacks the incentive to have a designated successor (Meng, 2020, 2021b). As a result,

> a leader who is *already* secure and anticipates a smooth succession has no reason to create succession policies since a peaceful leadership transition is possible *without* institutions... We should therefore expect incumbents who are *most likely* to experience *violent* leadership transitions to create succession policies. (Meng, 2021b, p. 957, italics in original)

Existing work on autocratic succession and coup risk, then, suggests two core hypotheses. Autocrats at risk of coups should introduce designated successors. Autocracies with designated successors should face fewer coups.

Existing work, however, focuses almost entirely on testing the effects of designated successors, not why they are introduced. Studying the effects of institutions like succession rules faces a fundamental problem. Institutions are themselves political outcomes. If institutions shape outcomes, actors have induced preferences over institutions. Institutions, certainly, can affect outcomes, but the forces that shape outcomes likely influence institutions too (Riker, 1980). The institutional turn in comparative autocracy has struggled to address the endogeneity of institutions (Pepinsky, 2014). Succession rules confront the same problem. If secure autocrats are already likely to have successors, existing findings are potentially spurious.

Only Meng (2020) uses succession rules as a dependent variable. Meng includes succession rules in a measurement for institutionalization and uses founding presidents, strong nationalist leaders, and coup leaders to proxy for leader strength. While there is a general tendency for Meng's proxies to be less likely to have successors, the exact results depend on the proxy and the version of the successor variable. In contrast, I provide a direct measurement of coup risk. I also have a global sample whereas Meng's analysis is limited to Sub-Saharan Africa. My results show support for the *opposite* conclusion from existing work: When coup risk is higher, vice presidents are less likely.

Choosing to Have a Successor

I argue that secure autocrats are more likely to have designated successors. Successors provide leaders with a powerful mechanism for distributing patronage, but the successor comes

with costs. The successor can evolve into a dangerous rival who may stage a preemptive coup. Ambitious elites not chosen for succession may also see a coup as a means of taking power. Although a marginal increase in survival is more valuable to endangered leaders, designated successors are narrow, targeted institutions. An endangered autocrat needs more comprehensive institutions to stabilize their rule. The costs, meanwhile, are much lower for a secure leader who can better protect themselves from coup attempts. When weighing the benefits and costs of appointing a successor, the benefits are more likely to outweigh the costs when coups are already unlikely.

Why Designate a Successor?

Designated successors offer the autocrat a vehicle for distributing patronage. Executive cabinets help autocrats distribute patronage to key allies. Autocrats appoint key allies to the cabinet, and appointees receive rents in return for their loyalty. The appointees can use their positions to distribute rewards to their own supporters, securing loyalty from larger groups (Arriola, 2009; Francois et al., 2015; Jackson & Rosberg, 1982; van de Walle, 2007).

The designated successor provides a particularly valuable office for distributing patronage. The designated successor comes with resources and importance. The designated successor also has a unique source of utility. If the autocrat dies, the designated successor becomes the autocrat. A weaker designated successor may still need to compete against other members of the regime to take power permanently, but they have a structural advantage. From being the designated successor, they gain more power than others in the regime. The successor serves as a focal point for the military and elites to organize around during a potentially chaotic fight over succession. Few in the regime have the designated successor's advantages in the succession process.[2]

Creating a designated successor provides the autocrat with a powerful tool for distributing patronage. Designated successors can secure essential alliances and supporters. Designated successors have been held by leaders of another major ethnic group, political faction, or even other political parties. Military regimes have occasionally used successors to shore up support with the civilian sector. If a secure autocrat wants to further strengthen their position, a

designated successor is among the autocrat's most valuable strategies.

Why *Not* Designate a Successor?

Designating a successor creates two potential sources of rivals. The first, as identified in the crown-prince problem, is the successor themselves. The successor gains power and resources from their position and has incentives to take power as soon as possible. The second source, which has not been considered in previous arguments,[3] is elites not designated the successor. Naming a successor names who is *not* the successor. An ambitious elite not named the successor may attempt a coup as their only path to power.

The designated successor has obvious motivations to remove the incumbent autocrat. Most successors will want to maximize their utility by maximizing the time that they rule as the autocrat. Designated successors can stage a coup to remove the autocrat early and hold power longer. Not all designated successors will have the ability to stage a successful coup when appointed. Over time, the designated successor builds their power and increases the probability that a coup succeeds.

Further, the designated successor is more likely to lose their position the longer that they wait for the incumbent to leave. The laws of politics do not supersede the laws of biology. A designated successor becomes more likely to die as they wait. The designated successor's growing power also suggests a strategic response from the incumbent. The incumbent can remove the designated successor before they grow too powerful. Regularly rotating designated successors minimizes the risk of a coup because the successor will not amass sufficient power. Elites will be less likely to develop relationships with the designated successor because they do not expect the current designated successor to remain in office for an extended time. Committing a coup can prevent the designated successor from losing power.

The successor is not the only potential challenger. Several elites in the regime may aspire to take power. Appointing a successor cuts off other elites from taking power peacefully. Once the succession is established, a coup may provide the only method through which a non-successor can gain power. Certainty can provide utility for elites looking to the regime's future, but too much certainty can trigger a backlash. For example, Robert Mugabe firmly establishing the

first lady as his successor triggered his downfall. The choice of a successor made a coup the only strategy available to the opposing candidate.

Strategic ambiguity was also a key feature of the success of the *dedazo* system in Mexico. The *dedazo* facilitated 11 peaceful transitions of power every six years from 1934 to 2000 when Mexico democratized. Under the *dedazo* system, the outgoing president would select his successor from the cabinet near the end of the president's term.[4] Regardless of the candidates being considered, the president always maintained the appearance that three or four secretaries were under consideration. The president waited as long as possible until relaying the decision to the party, who would organize around the successor before the losers could take any action (Castañeda, 2000; Langston, 2006). Maintaining partial uncertainty helped prevent coups by reducing the ability of those not chosen to act.

The focus on European primogeniture has overlooked the role that uncertainty also plays in monarchies. The Middle Eastern monarchies, which compromise most of the remaining ruling monarchies, do not practice primogeniture. The choice of successor requires consensus from the ruling family, and the designated successor position, usually titled the crown prince, can remain vacant for extended periods (Herb, 1999). Historic monarchies practiced rules that created even further uncertainty. For two centuries, the Ottoman Empire practiced no formal succession rule at all. The sultan distributed his sons across provincial governorships. When the sultan died, the princes raced to the capital. Whoever convinced the court and military to support them became sultan. The rest were murdered (Quataert, 2005). Creating certainty over succession can introduce threats from both the successor and ambitious elites.

Who Appoints a Successor?

Appointing a successor has countervailing effects. If the successor is dissuaded from staging a coup, the autocrat can gain a powerful ally and increase their hold on power. The successor, if they gain sufficient power, can also evolve into a rival for power. Even if the successor is placated, elites excluded from succession may stage coups as their only path to power. The decision to introduce a successor, then, follows a basic cost-benefit analysis. An autocrat introduces a successor when they believe that having a successor is more likely to create a supportive

successor than spur coups. A successor is most likely to have a net positive effect on the autocrat's security when they are already secure enough to prevent coups.

Several factors contribute to an autocrat's security. Secure autocrats typically have more control over the regime, which involves control over appointments to important offices and a lack of constraints from institutions (Gandhi & Sumner, 2020). While many autocracies have institutions like elections, legislatures, and parties, not all effectively constrain the autocrat's control over the regime (Meng, 2021a). The most important element of an autocrat's power is their control over the military and security services. Violence and the threat of violence are key to autocratic regimes (Svolik, 2012). In many regimes, violence directly determines who holds political power; in others, the threat of violence keeps elites together. They threaten the autocrat and other elites with rebellion if they violate agreements. An autocrat who controls the military and security services can better withstand challenges to their rule and control other elites. A designated successor must use violence to preemptively overthrow the leader. Coups require cooperation with the military and security services. An autocrat with more control over the military and security services can ward off threats from the designated successor.

A potential counterargument is that designated successors provide greater marginal benefits to insecure autocrats, so the benefits could outweigh the costs. An insecure autocrat needs tools to keep power. Adding a designated successor could dramatically change their fortunes while granting a secure autocrat only marginally more security. Designated successors, however, do not provide the resources to stabilize an insecure leader. Autocrats frequently need to "co-opt" the opposition, bringing them into the regime or at least earning their support (Gandhi & Przeworski, 2006). Autocrats can pursue two types of strategies to co-opt the opposition. They can cooperate with the opposition. Cooperation involves giving policy concessions and expanding access to political office. Elections, legislatures, and parties can facilitate cooperation and make agreements between the autocrat and new supporters more credible.

Autocrats can also distribute rents to co-opt new supporters. Distributing rents buys support for the autocrat by directly giving them resources and power. Designated successors facilitate distributing rents. Whereas elections, legislatures, and parties give benefits to large groups, designated successors have an extremely narrow target. Only the designated successor directly

benefits from their position although they can redistribute some of their rents to supporters. The autocrat would need a powerful person to appoint as the successor to secure their position, reintroducing the crown-prince problem. Designated successors do not create bargains between autocrats and supporters where the autocrat sacrifices some power. Instead, the autocrat buys support.

Designated successors are also poor tools to enforce commitments between autocrats and elites. Institutions can crystallize power-sharing agreements. If the autocrat reneges, the elites remove the autocrat (Boix & Svolik, 2013). Enforcing institutions require the autocrat to distribute rents and sufficiently reallocate power (Meng et al., 2023). The designated successor, as discussed, is the most dangerous office in which to place a powerful individual. The designated successor is a focal point for dissatisfied elites to organize around, presaging a coup. An insecure autocrat would further threaten their position by using a designated successor to enforce agreements.

The costs of having a successor are more likely to outweigh the benefits for threatened autocrats. Having a successor can increase an autocrat's security, but because it is a targeted strategy, the potential benefits are similar between weak and strong autocrats. The autocrat needs to believe that the successor is unlikely to stage a coup and that other elites will not commit coups to take power. Coups are more likely to succeed against weaker autocrats, so successors and elites are more likely to favor coups against them. In contrast, stronger autocrats can dissuade coups and keep successors placated. They can expect that the successor will strengthen their position and not plan coups against them. Weaker autocrats—because the costs of potential coups outweigh the benefits of a potential ally—should favor alternative strategies that satisfy elites and provide fewer motivations for preemptive coups.

The Example of Zimbabwe

Robert Mugabe of Zimbabwe demonstrates how an already secure autocrat can use successors to further his survival and protection against coups. Zimbabwe, unusually, began without a vice president and introduced a succession system later. Zimbabwe and its predecessor states, Rhodesia and Zimbabwe Rhodesia, had parliamentary systems with ceremonial pres-

idents. In Rhodesia, the cabinet appointed the president, or the "Officer Administering the Government." The presidency was meant to be a temporary office until the United Kingdom recognized Rhodesia's independence and the queen appointed a prime minister. Parliament elected the ceremonial president in the short-lived Zimbabwe Rhodesia. Neither Rhodesia nor Zimbabwe Rhodesia required succession systems for the president as the selection process could simply be repeated if a vacancy occurred.

After Zimbabwe gained independence, the country remained parliamentary. Robert Mugabe ruled as prime minister, and the legislature elected a ceremonial president. As before, presidential vacancies were addressed by repeating the election president. The 1987 constitutional amendment restructured the government, centralizing power in the presidency and eliminating the prime minister. Mugabe, who drove the reforms, took control as president. Along with creating an executive presidency, the amendment introduced a vice president, appointed by the president, to serve as the designated successor. A 1990 constitutional amendment added a second vice president.

The constitutional reforms came at the height of Mugabe's power and safety. In 1987, Mugabe successfully ended a campaign to violently co-opt the opposition Zimbabwe African People's Union (ZAPU) and merge ZAPU into the new, ruling Zimbabwe African National Union-Patriotic Front (ZANU-PF). The reforms further empowered Mugabe, giving him nearly all formal executive power, including near complete control of the cabinet (Compagnon, 2011). Mugabe's creation of the vice presidency coincided with the peak of his power, not at a time of weakness. As one Mugabe biographer describes him after the 1987 amendment, Mugabe's "control of appointments to all senior posts in the civil service, the defence forces, the police, and parastatal organisations gave him a virtual stranglehold on government machinery and unlimited opportunities to exercise patronage" (Meredith, 2002, p. 79).

Mugabe, undoubtedly, used the dual vice presidency system to his advantage, but the system relied on Mugabe's existing strength. The second vice presidency assisted in co-opting the surviving leadership of ZAPU. Former ZAPU leaders held the second vice presidency from 1990 to 2013. Beginning with the appointment of Joice Mujuru in 2004, the first vice president took a more important role in succession. Mugabe pitted pairs of successors against each other.

Mugabe would appoint the candidate less close to himself as first vice president, beginning with Mujuru against Mugabe protégé Emmerson Mnangagwa from 2004 to 2014. Then, Mugabe replaced Mujuru with Mnangagwa as the first vice president and positioned First Lady Grace Mugabe as the second candidate (Chan, 2019).

Crucially, Mugabe did *not* use the vice presidents as barriers to protect himself. Mugabe, instead, tried to split power between potential successors, preventing one from gaining enough strength to challenge Mugabe. Mugabe kept the candidate most likely to protect him, first Mnangagwa and then Grace Mugabe, outside the vice presidency. Instead, Mugabe placed the most likely barrier in the legislature. The system only functioned because Mugabe started with sufficient power. Mugabe needed enough security to prevent coups from powerful actors like Mujuru and bolster his wife to suddenly become a candidate for succession. Mugabe's inability to maintain the balance of power ultimately caused his downfall. In 2017, Mugabe fired Mnangagwa as vice president to firmly establish Grace Mugabe as the successor. The military sided with Mnangagwa, and Mnangagwa overthrew Mugabe shortly after his firing (Chan, 2019; Nyarota, 2018).

Measuring Coup Risk

The primary empirical challenge is measuring the probability that a successful coup occurs in a given country-year observation. I estimate the probability of a successful coup occurring—as coded by Powell and Thyne (2011)[5] —using Random Forests for classification, a machine learning model. The Random Forests model provides accurate predictions of coup onset while avoiding overfitting. I use the Random Forests predictions as the basis for testing the causes of autocratic succession rules.

The Random Forests model combines predictions from 1,000 decision trees (for additional descriptions of Random Forests models, see Breiman, 2001; Muchlinski et al., 2016; Siroky, 2009). I use 1,000 decision trees, a relatively large number, to minimize the variance in predictions across observations. Each decision tree takes a bootstrapped sample and generates predictions by splitting the data across dozens of nodes. The remaining, non-bootstrapped

Table 1. Variables in the Coup Random Forest Model

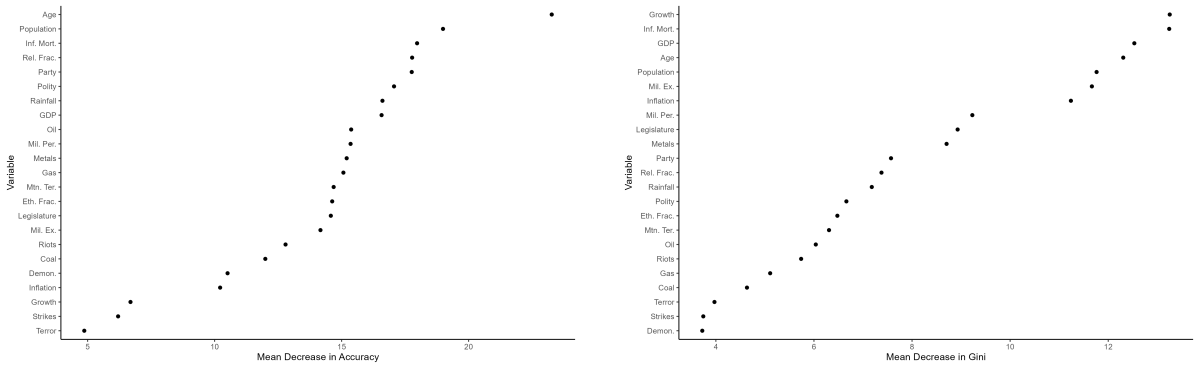
Variable	Source	Description/Notes
Age	Archigos[a]	Age in years of the oldest autocrat in a spell year.
Coal	Haber and Menaldo (2011)	Per capita income from coal.
Demon.	Banks and Wilson (2021)	Number of peaceful demonstrations with at least 100 people displaying opposition to government policies.
Eth. Frac.	Fearon and Laitin (2003)	Ethnic fractionalization. Treated as time invariant.
Gas	Haber and Menaldo (2011)	Per capita income from natural gas.
GDP	WDI[c]	Gross domestic product in constant 2015 dollars.
Growth	WDI[c]	Annual percentage change in GDP.
Inf. Mort.	WDI[c]	Infant mortality rate per 1,000 live births.
Inflation	WDI[c]	GDP deflator, or nominal GDP divided by real GDP.
Legislature	Cheibub et al. (2010)	Whether the regime has a legislature, either elected or unelected.
Metals	Haber and Menaldo (2011)	Per capita income from precious and industrial metals.
Mil. Exp.	NMC[b]	Military expenditure as state's total military budget.
Mil. Per.	NMC[b]	Number of military personnel.
Mtn. Ter.	Fearon and Laitin (2003)	Percentage of terrain that is mountainous. Treated as time invariant.
Oil	Haber and Menaldo (2011)	Per capita income from oil.
Party	Miller (2020)	Whether the regime has a ruling party.
Polity	Marshall et al. (2014)	Polity 2 score for level of democracy.
Population	WDI[c]	Total population.
Rainfall	WDI[c]	Average precipitation in depth in millimeters per year.
Rel. Frac.	Fearon and Laitin (2003)	Religious fractionalization. Treated as time invariant.
Riots	Banks and Wilson (2021)	Number of riots, or violent demonstrations of more than 100 citizens.
Strikes	Banks and Wilson (2021)	Number of strikes with 1,000 or more workers aimed at national government policies.
Terror	Banks and Wilson (2021)	Number of acts of terrorism or guerrilla warfare.

[a] Archigos version 4.1 (Goemans et al., 2009).
[b] National Material Capabilities version 6 (Singer, 1988; Singer et al., 1972).
[c] World Bank's World Development Indicators, accessed June 2023.

observations for that particular tree are held out-of-bag (OOB). At each node, two variables are randomly drawn.[6] The classification tree identifies the dichotomous split among the two variables that best reduces the error rate. The classification tree grows through the nodes until it reaches terminal nodes that end each path in the tree. OOB cases can then run through the decision tree to generate predictions. The Random Forests model repeats this process of decision trees with bootstrapped samples 1,000 times and aggregates the results. This processing of bootstrapping and aggregating, known as "bagging," has several desirable properties for the predictions. Bagging increases the accuracy of predictions while reducing the variance of predictions and the risk of overfitting.

My Random Forests approach is related to two other strategies. First, previous work has used generated regressors where predictions from a regression model are used as covariates. Wright (2008), for example, uses a logit model to estimate the probability that an autocratic regime ends. Then, Wright uses the estimated failure probabilities as a covariate in a model for having a legislature. Second, political scientists have increasingly used item response theory (IRT) to produce latent variables for concepts in autocracies like personalism (Frantz, Kendall-Taylor, et al., 2020; Geddes et al., 2018; Wright, 2021) and power consolidation (Gandhi & Sumner, 2020). IRT models use the presence of a set of indicators to measure the strength of

Figure 1. Importance of Variables in the Random Forests Model



Notes: The left panel shows the mean decrease The right panel shows the average marginal effects (AMEs) for coup risk on maintaining vice presidents.

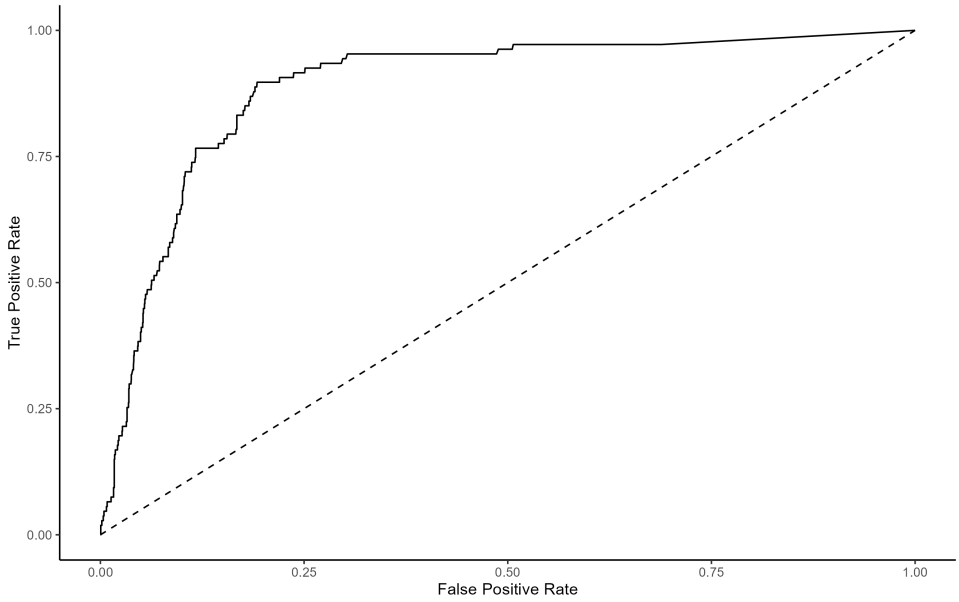
an unobservable, underlying trait.

Compared to both strategies, Random Forests are more predictive and more flexible. Random Forests do not impose function forms on the predictors, allowing for much larger and more complex sets of patterns than a researcher could identify. Random Forests models, unlike IRT variables, are not restricted to categorical variables. The Random Forests model dichotomizes variables at each decision, but the cutoff is chosen by model criteria rather than *a prior* by the researcher. While the inferential value of machine learning models like Random Forests is a developing topic, machine learning models dominate regression models for pure prediction (Athey & Imbens, 2019; Beck et al., 2000; Grimmer et al., 2021).

I include 23 variables in the Random Forests model, summarized in table 1. I base the choice of variables on existing forecasting models for coups and related forms of political instability like irregular leadership turnover (e.g., Belkin & Schofer, 2003; Bowlsby et al., 2020; Goldstone et al., 2010; Ward & Beger, 2017). The variables primarily focus on economic conditions, development, civil conflict, and resource wealth. I also include political institutions. Institutions, like a moderate Polity score, significantly predict instability (Gates et al., 2006; Goldstone et al., 2010). More specifically, autocratic institutions like legislatures and ruling parties reduce coup risk and increase autocratic survival (Boix & Svolik, 2013; Gandhi & Przeworski, 2007; Magaloni, 2008).

To provide further context for the model, figure 1 graphs the importance of each variable. In the left panel, the x-axis plots every variable's mean decrease in accuracy. When the mean de-

Figure 2. ROC Curve of the Random Forests Model



crease in accuracy is higher, removing the variable from the model would cause the predictions to become more inaccurate, so the variable is more important in making predictions. Leader age, GDP, the presence of a ruling party, and population have the greatest effect on producing accurate predictions. The only class of predictors that has a consistently weak effect is observed political instability. Demonstrations, riots, strikes, and acts of terrorism all rank among the least important variables in the model. Surprisingly, growth and inflation rank low on mean decrease in accuracy. Growth and inflation, however, rank highly for mean decrease in Gini coefficient, which is shown in the right panel. Variables with a higher mean decrease in Gini coefficient appear more often in node splits (Hastie et al., 2009). While growth and inflation do not have strong effects on the model's accuracy, they do affect the model's structure. The political instability variables, conversely, score lowly on both measures.

Finally, I assess the performance of the Random Forests model's predictions with a receiver operating characteristic (ROC) curve. The ROC curve, shown in figure 2, graphs the trade-off between true positives—cases that the model accurately predicts to experience successful coups—and false positives—cases that the model incorrectly predicts to experience successful coups (Fawcett, 2006). The dotted, diagonal line represents a random, purely guessing model. A line above the diagonal performs better than random. A line below is worse than random.

The Random Forests model performs better than random, but how much better? A useful

summary measure is the area under the curve (AUC), which ranges between 0 and 1. A higher AUC indicates better performance, and random guessing has an AUC of 0.5. The Random Forests model has an AUC of 0.89. The Random Forests model's AUC exceeds most forecasting models for uncommon political events like coups where the AUC tends to range between 0.8 and 0.85 (Ulfelder, 2012). The Random Forests model produces accurate predictions of coup risk and forms the basis of the empirical analysis.

Empirical Model

With the Random Forests predictions, I assess whether coup risk affects the probability of having designated successors. I use the OOB predictions to generate the coup risk variable. In other words, each case is only run through decision trees where the case is *not* included in that decision tree's bootstrapped sample. Otherwise, the predictions would have a near-perfect correlation with observed coups and risk overfitting.

I identify the sample of autocracies using the Democracy-Dictatorship dataset (Cheibub et al., 2010). A country is autocratic if it violates at least one of the following criteria: One, the chief executive is chosen by popular election or by a body chosen by popular election; two, the legislature is popularly elected; three, multiple parties compete in elections; and four, an alternation in power has occurred under the same electoral rules that brought the incumbent party into power. Based on data availability, the sample includes 103 countries from 1961 to 2006.

For the dependent variable, I identify designated successors using vice presidents. Vice presidents are expressly designed to serve as designated successors and replace the chief executive in an emergency. Constitutions use several different offices as designated successors, including prime ministers, members of the cabinet, legislative officers, and chief justices. But vice presidents are the most powerful form of designated successor for preventing coups and facilitating peaceful transfers of power (Meng, 2021b).

I code the presence of vice presidents based on the WhoGov dataset (Nryup & Bramwell, 2020). WhoGov covers national cabinets starting in 1966. I code a country as having a vice

president if WhoGov codes the chief executive as being a president and codes another individual as being a vice president. I always code the other two main classifications that chief executives have, prime ministers and chiefs of state, as not having vice presidents. Prime ministers do not have lines of succession and are replaced through the standard selection process. Chiefs of state hold offices outside the constitutional order, such as the general secretary of a ruling party. Because chiefs of state derive their power outside the constitution, the constitution does not determine how power is transferred.

The expectation is that changes in coup risk within a country affect the probability of having a vice president. Since the focus is on within-country variation, I use fixed effects to remove between-country variation and account for unobserved time-invariant variables. There is a considerable debate over the best modeling strategy for fixed effects with binary outcomes (see, e.g., Beck, 2020; Cook et al., 2020; Crisman-Cox, 2021). In the main results, I use linear probability models (LPMs). The LPM is the simplest modeling strategy. Because vice presidents are uncommon, occurring in 20% of country years, the LPM performs as well as maximum likelihood models with fixed effects (Timoneda, 2021). The LPM takes the form

$$\Pr(y_{it} = 1) = \beta r_{it} + \tau \mathbf{x}_{it} + \alpha_i + \varepsilon_{it}, \tag{1}$$

where i indexes countries and t indexes years, $y_{it} = 1$ indicates the presence of a vice president in country i at year t, r_{it} is coup risk, $\mathbf{x}_{it}$ is the vector of controls, α_i is the fixed effect for country i, and ε_{it} is the error term. My hypothesis is that $\beta < 0$, meaning that higher coup risk is associated with lower probabilities of having a vice president.

Throughout the models, I control for the predictors in the Random Forests model. If any of the predictors for coup risk also affect having a successor, the coup risk variable could have a spurious correlation in either direction. Many are already common controls for models of autocratic survival. Since the Random Forests model has 23 predictors, I organize the predictors into groups of two to four related variables, producing seven specifications.

The model specifications take the following forms. Model (1) is the most parsimonious model that only includes the coup risk variable. Model (2) controls for institutions: the presence of a legislature, ruling party, and Polity score. Model (3) controls for leader age, popula-

tion, infant mortality, and rainfall. Model (4) controls for economic conditions: GDP, growth, and inflation. Model (5) controls for military expenditure and military personnel. Model (6) controls for the natural resource wealth variables: metals, oil, coal, and gas. Model (7) controls for the political instability variables: riots, demonstrations, strikes, and terrorism. I exclude ethnic fractionalization, mountainous terrain, and religious fractionalization from the models because they are time-invariant. All of their information is included in the fixed effects.

Table A1 provides summary statistics for all the regression variables after appropriate transformations.[7] The country fixed effects change the information in the variables by removing between-country variation and only leaving within-country variation. To isolate the within-country variation, I regress each predictor on the country fixed effects. The resulting residuals are the remaining within-country variation (Mummolo & Peterson, 2018). Table A2 provides summary statistics for the within-country variation.

Results

Table 2 shows the results for the LPMs. All seven models show the expected effect of coup risk. The coup risk coefficient is negative, and all are statistically significant at a 95% confidence level. When the risk of a coup is higher, the probability of having a vice president is significantly lower. The predictors in the Random Forests model for coup risk are largely insignificant. Only the Polity score, population, rainfall, inflation, and oil wealth have significant associations with having a vice president controlling for coup risk.

The effect of coup risk is also substantively meaningful. The effect ranges from lowering the probability of having a vice president by 3.8 percentage points to 5.5 percentage points for a 10 percentage point increase in coup risk. The standard deviation for within-country variation is 0.054. The point estimates for increasing coup risk by a standard deviation range from 2.1 percentage points to three percentage points. Only 20% of observations have a vice president, so a standard deviation change in within-country coup risk changes the probability by over 10%.

Coup risk variability differs substantially within countries. At the lower end, Tanzania has

Table 2. Linear Probability Models for the Effect of Coup Risk on Vice Presidents

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Coup Risk	-0.43^{**}	-0.55^{**}	-0.38^{**}	-0.44^{**}	-0.41^{**}	-0.43^{**}	-0.43^{**}
	(0.18)	(0.25)	(0.17)	(0.17)	(0.18)	(0.18)	(0.20)
Legislature		0.02					
		(0.04)					
Party		-0.08					
		(0.08)					
Polity		0.01^{*}					
		(0.01)					
Age			-0.001				
			(0.002)				
Log. Pop.			0.11^{*}				
			(0.07)				
Log. Rainfall			-6.29^{*}				
			(3.27)				
Growth				-0.0004			
				(0.001)			
Log. Inflation				0.02^{**}			
				(0.01)			
Log. Mil. Ex.					-0.01		
					(0.01)		
Log. Mil. Per.					0.05		
					(0.05)		
Log. Coal						-0.09	
						(0.10)	
Log. Gas						0.02	
						(0.03)	
Log. Metals						0.002	
						(0.02)	
Log. Oil						-0.03^{*}	
						(0.02)	
Log. Demon.							-0.02
							(0.02)
Log. Riots							0.04
							(0.02)
Log. Strikes							-0.04
							(0.04)
Log. Terror							-0.004
							(0.04)
N	2283	2283	2283	2283	2283	2283	2283
Countries	102	102	102	102	102	102	102
R^2	0.59	0.60	0.59	0.59	0.59	0.59	0.59
Within R^2	0.01	0.03	0.02	0.02	0.01	0.02	0.01
Adj. R^2	0.57	0.58	0.57	0.57	0.57	0.57	0.57
Within Adj. R^2	0.01	0.03	0.02	0.02	0.01	0.02	0.01

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$. Robust standard errors clustered by country in parentheses. All models include country fixed effects.

a standard deviation of 0.002. Guatemala has the highest at 0.21. El Salvador provides a useful example where within-country coup risk undergoes large, short-term shifts. In 1975, El Salvador had a negligible coup risk that started to increase following domestic unrest and worsening economic conditions. Coup risk jumped to 19.77% in 1979 when a successful coup occurred. In 1980 after the coup occurred, coup risk more than doubled to 44.79%. Coup risk dropsed to 11.11% in 1981.

Changes in coup risk produce large changes in the predicted probability that El Salvador has a vice president. Based on model (1), the probability of El Salvador having a vice president is 10.7 percentage points lower in 1980 than in 1979 and 19.2 percentage points lower than in 1975. In 1981, the probability is 14.5 percentage points higher than in 1980, mostly undoing the changes from 1975. El Salvador's institutions followed the changes in coup risk. El Salvador had a vice president in 1975. After the October 15, 1979, coup, the Revolutionary Government Junta (JRG) suspended the vice presidency. The vice presidency remained vacant throughout nearly all of 1980 when coup risk peaked. The JRG named Jaime Abdul Gutiérrez the vice president under President José Napoleón Duarte on December 13 when the probability of a coup had sharply declined. The vice presidency remained filled through the final years of El Salvador's autocratic period.

The appendices contain alternative estimators to account for the binary dependent variable.[8] In appendix B, I use logit models with fixed effects. Table B1 uses simple logit models with country dummies. The main disadvantage is that any country that either always or never had a vice president is dropped from the sample, losing a majority of observations. In table B2, I use Firth (1993)'s penalized logit model. Penalized logit solves the separation issue, allowing for retaining all observations with country fixed effects (Cook et al., 2020; Zorn, 2005).

Appendix C replaces the country fixed effects with country random effects. Table C1 shows the results from baseline random effects models. Random effects models assume that the covariates are independent of the error term, which is rarely realistic. To address this problem, I use a correlated random effects model in table C2. The correlated random effects models include the country means of every covariate in the specification (Crisman-Cox, 2021; Mundlak, 1978).

All four additional estimator shows the same result as the LPMs. The coefficient on coup risk is negative and statistically significant. When coup risk increases, the probability of having a vice president decreases. The hypothesis is supported across the linear probability, logit, penalized logit, random effects, and correlated random effects models.

Conclusion

Autocracies vary in their willingness and ability to regulate political succession. A recent wave of research asks why some autocracies designate successors in the constitution. The general argument is that autocrats designate successors when they risk being overthrown by coups. Previous work, however, has only tested the effects of successors, not their causes. In contrast, I argue that autocrats designate successors when coups are less likely. Secure autocrats can overcome the core cost of successors: the threat of a coup. The benefits of appointing a successor, on the other hand, are insufficient to stabilize an endangered ruler.

I directly test whether coup risk affects having a vice president in autocracies. I introduce a new measurement of coup risk using Random Forests, a machine learning model. The results support my argument and contradict existing theories. When the probability of a coup is high, autocracies are *less* likely to have vice presidents. Designated successors are tools for autocrats who have secured their rule, not ones in danger of coups.

Because my results are the opposite of what the existing literature expects, the effects of succession rules on autocratic survival needs revisiting. Existing findings identify a positive relationship between designated successors and survival, but these findings may be spurious if autocrats have successors when they are already likely to survive. Regardless of whether the relationship persists, future research should consider additional motivations for having successors. The variation in how autocracies handle succession is vast. New theories and new data are needed to better explain variation in autocratic succession.

Further, this paper speaks to the broader challenges of studying institutions, especially in autocracies. Researchers primarily try to identify the effects that institutions have on outcomes. But if institutions affect outcomes, actors' preferences over outcomes make institutions them-

selves endogenous to the outcomes that they are meant to explain. This endogeneity is frequently neglected or treated as a nuisance. That institutions are political outcomes, however, makes them important and interesting dependent variables to study in and of themselves.

Future research should directly study and test why autocrats adopt nominally democratic, not only institutions' effects. Machine learning models like Random Forests provide powerful new resources to treat institutions as dependent variables. Theories of autocratic institutions often rely on concepts like the risk of coups or a regime transition. Machine learning models can produce accurate predictions for the probability of such rare events. Methods like Random Forests are particularly useful when the researcher lacks enough data to separate training and prediction data sets.

At present, the comparative literature on autocracy and institutions rarely studies institutions as outcomes. Scholars who account for potential endogeneity typically treat the reasons for institutions as a statistical nuisance or a design problem. Neither method is likely to address endogeneity sufficiently. Institutions have complex causes that are difficult to address as objects of secondary interest, especially in a cross-national context. Rather than treat endogeneity as a mere problem, scholars should study institutions as outcomes themselves and then evaluate their effects. To understand the effects of institutions, we need to understand their causes.

Notes

1. Namely, researchers should remove the relevant institutions, either parties or legislatures, from the model. Of course, researchers can easily add or remove other variables that best fit their research designs.

2. The other advantaged position appears to be close family members of the ruling autocrat. Family members have taken over after autocrat's death in the absence of succession rules or even preempting succession rules. For example, both Mahamat Déby of Chad and Faure Gnassingbé of Tonga succeeded their deceased fathers as president even though each country's constitutions specified a different successor.

3. Konrad and Mui (2017) are a partial exception. Their formal model has three players: the ruling autocrat, or the king; the designated successor, or the prince; and a member of the elite, or the duke. They focus on how the prince prevents the duke from committing a coup through the prince forming an additional obstacle to an additional coup. In my argument, the appointment of the prince itself could spur the duke to coup.

4. The term *dedazo*, typically translated to "tap of the finger" or "finger strike," referred to the president single-handedly choosing his successor.

5. I accessed Powell and Thyne's (2011) data from http://www.uky.edu/~clthyn2/coup_data/home.htm on July 21, 2021.

6. I chose two variables as the number that minimizes the OOB error rate in the data.

7. For any logged variables, the variables are initially transformed to make the minimum value equal to 1 before taking the log. The variables are only transformed for the regression models. Transforming them is unnecessary

in the Random Forests model. The Random Forests model itself identifies any non-linear relationships.

8. For the maximum likelihood models in the appendices, I normalize all continuous variables except coup risk to facilitate the estimation.

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A Summary Statistics

Table A1. Summary Statistics

Variable	N	Mean	SD	Min	Q1	Median	Q3	Max
Coup Risk	2400	0.04	0.07	0.00	0.00	0.01	0.04	0.69
Vice President	2283	0.20	0.40	0.00	0.00	0.00	0.00	1.00
Successful Coup	2400	0.04	0.21	0.00	0.00	0.00	0.00	1.00
Age	2400	56.96	12.35	19.00	49.00	56.00	65.00	93.00
Log. Coal	2400	0.52	1.18	0.00	0.00	0.00	0.19	5.89
Log. Demon.	2400	0.22	0.51	0.00	0.00	0.00	0.00	3.30
Eth. Frac.	2400	0.48	0.29	0.00	0.22	0.53	0.72	0.93
Log. Gas	2400	1.23	1.99	0.00	0.00	0.00	1.91	8.31
Log. GDP	2400	23.45	1.71	19.35	22.14	23.22	24.61	29.24
Growth	2400	4.20	6.90	-64.05	1.25	4.51	7.46	57.82
Inf. Mort.	2400	78.86	43.09	2.30	44.90	76.15	109.82	215.20
Log. Inflation	2400	2.67	1.20	0.00	2.04	2.67	3.30	10.20
Legislature	2400	0.77	0.42	0.00	1.00	1.00	1.00	1.00
Log. Metals	2400	1.88	2.01	0.00	0.00	1.20	3.33	7.27
Log. Mil. Ex.	2400	11.91	2.44	0.00	10.36	11.80	13.62	18.25
Log. Mil. Per.	2400	3.56	1.61	0.00	2.30	3.40	4.68	8.47
Log. Mtn. Ter.	2400	2.06	1.43	0.00	0.69	2.28	3.31	4.56
Log. Oil	2400	2.32	2.96	0.00	0.00	0.00	4.96	11.09
Party	2400	0.70	0.46	0.00	0.00	1.00	1.00	1.00
Polity	2400	-5.07	4.26	-10.00	-8.00	-7.00	-3.00	10.00
Log. Pop.	2400	15.99	1.42	12.84	15.05	15.92	16.89	20.99
Log. Rainfall	2400	6.55	1.13	2.90	5.77	6.98	7.38	7.98
Rel. Frac.	2400	0.37	0.21	0.00	0.19	0.38	0.55	0.78
Log. Riots	2400	0.18	0.45	0.00	0.00	0.00	0.00	3.18
Log. Strikes	2400	0.05	0.21	0.00	0.00	0.00	0.00	2.64
Log. Terror	2400	0.12	0.30	0.00	0.00	0.00	0.00	2.71

Table A2. Summary Statistics for Within-Country Variation

	N	Mean	SD	Min	P25	Median	P75	Max
Coup Risk	2283	0.00	0.05	-0.25	-0.02	-0.01	0.00	0.49
Age	2283	0.00	0.05	-0.25	-0.02	-0.01	0.00	0.49
Log. Coal	2283	0.00	0.24	-1.38	0.00	0.00	0.00	1.88
Log. Demon.	2283	0.00	0.43	-1.44	-0.20	-0.06	0.00	2.68
Log. Gas	2283	0.00	0.66	-4.49	-0.06	0.00	0.00	4.04
Log. GDP	2283	0.00	0.40	-1.66	-0.20	0.01	0.21	1.80
Growth	2283	0.00	6.59	-73.08	-2.79	0.25	3.01	48.78
Inf. Mort.	2283	0.00	20.21	-86.17	-11.92	-0.83	10.30	86.40
Log. Inflation	2283	0.00	0.98	-4.65	-0.38	0.06	0.42	5.88
Legislature	2283	0.00	0.31	-0.98	0.00	0.00	0.15	0.94
Log. Metals	2283	0.00	0.77	-4.67	-0.22	0.00	0.22	3.86
Log. Mil. Ex.	2283	0.00	1.14	-8.22	-0.49	0.10	0.58	4.25
Log. Mil. Per.	2283	0.00	0.42	-1.87	-0.18	0.02	0.23	1.72
Log. Oil	2283	0.00	0.76	-5.32	-0.14	0.00	0.08	5.37
Party	2283	0.00	0.26	-0.98	0.00	0.00	0.06	0.97
Polity	2283	0.00	2.91	-8.08	-1.36	-0.29	0.51	14.10
Log. Pop.	2283	0.00	0.25	-1.14	-0.16	0.00	0.17	0.94
Log. Rainfall	2283	0.00	0.00	-0.08	0.00	0.00	0.00	0.05
Log. Riots	2283	0.00	0.38	-1.63	-0.16	-0.05	0.00	2.47
Log. Strikes	2283	0.00	0.19	-0.82	-0.04	0.00	0.00	1.82
Log. Terror	2283	0.00	0.25	-0.72	-0.09	-0.02	0.00	2.34

B Logit Fixed Effects Models

Table B1. Logit Models for the Effect of Coup Risk on Vice Presidents

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Coup Risk	-7.11^{***}	-7.85^{**}	-6.07^{**}	-7.15^{***}	-6.66^{**}	-8.32^{***}	-7.56^{***}
	(2.74)	(3.55)	(2.80)	(2.60)	(2.69)	(2.97)	(2.77)
Legislature		0.43					
		(0.72)					
Party		-0.86					
		(0.88)					
Polity		0.59^{*}					
		(0.32)					
Age			-0.45				
			(0.43)				
Log. Pop.			2.94^{*}				
			(1.67)				
Log. Rainfall			-27.95				
			(26.13)				
Log. GDP				0.17			
				(1.35)			
Growth				-0.06			
				(0.09)			
Log. Inflation				0.40^{**}			
				(0.17)			
Log. Mil. Ex.					-0.39		
					(0.55)		
Log. Mil. Per.					0.99		
					(0.98)		
Log. Coal						-1.01	
						(0.89)	
Log. Gas						0.63	
						(0.94)	
Log. Metals						0.02	
						(0.44)	
Log. Oil						-1.38^{**}	
						(0.60)	
Log. Demon.							-0.10
							(0.18)
Log. Riots							0.23
							(0.15)
Log. Strikes							-0.19
							(0.12)
Log. Terror							-0.001
							(0.20)
N	1025	1025	1025	1025	1025	1025	1025
Countries	39	39	39	39	39	39	39
Log Likelihood	-461.73	-443.36	-446.18	-452.62	-457.64	-445.76	-458.51

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$. Robust standard errors clustered by country in parentheses. All models include country fixed effects. All continuous variables except coup risk are normalized.

Table B2. Penalized Logit Models for the Effect of Coup Risk on Vice Presidents

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Coup Risk	-6.51^{***}	-7.20^{***}	-5.45^{***}	-6.54^{***}	-6.07^{***}	-7.57^{***}	-6.87^{***}
	(1.56)	(1.87)	(1.57)	(1.62)	(1.57)	(1.68)	(1.66)
Legislature		0.40					
		(0.30)					
Party		-0.81^{***}					
		(0.88)					
Polity		0.55^{***}					
		(0.10)					
Age			-0.42^{***}				
			(0.13)				
Log. Pop.			2.77^{***}				
			(0.51)				
Log. Rainfall			-19.43				
			(22.36)				
Log. GDP				0.18			
				(0.36)			
Growth				-0.05			
				(0.07)			
Log. Inflation				0.37^{***}			
				(0.09)			
Log. Mil. Ex.					-0.36^{*}		
					(0.20)		
Log. Mil. Per.					0.93^{***}		
					(0.31)		
Log. Coal						-0.96^{***}	
						(0.31)	
Log. Gas						0.60^{**}	
						(0.24)	
Log. Metals						0.02	
						(0.19)	
Log. Oil						-1.29^{***}	
						(0.29)	
Log. Demon.							-0.09
							(0.11)
Log. Riots							0.21^{**}
							(0.10)
Log. Strikes							-0.17^{*}
							(0.09)
Log. Terror							0.001
							(0.09)
N	2283	2283	2283	2283	2283	2283	2283
Countries	102	102	102	102	102	102	102
Log Likelihood	-494.69	-472.70	-480.33	-480.17	-487.93	-474.05	-482.36

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$. Standard errors in parentheses. All models include country fixed effects. All continuous variables except coup risk are normalized.

C Logit Random Effects Models

Table C1. Random Effects Models for the Effect of Coup Risk on Vice Presidents

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Coup Risk	-6.73^{***}	-7.24^{***}	-6.36^{***}	-6.98^{***}	-6.43^{***}	-7.80^{***}	-7.10^{***}
	(1.73)	(2.10)	(1.77)	(1.80)	(1.75)	(1.86)	(1.85)
Legislature		0.47					
		(0.35)					
Party		-0.76^{**}					
		(0.34)					
Polity		0.56^{***}					
		(0.11)					
Age			-0.32^{**}				
			(0.13)				
Log. Pop.			1.83^{***}				
			(0.47)				
Log. Rainfall			0.59				
			(0.69)				
Growth				-0.05			
				(0.08)			
Log. Inflation				0.41^{***}			
				(0.10)			
Log. Mil. Ex.					-0.49^{**}		
					(0.23)		
Log. Mil. Per.					0.95^{***}		
					(0.33)		
Log. Coal						-0.97^{***}	
						(0.28)	
Log. Gas						0.53^{**}	
						(0.25)	
Log. Metals						0.07	
						(0.20)	
Log. Oil						-1.22^{***}	
						(0.30)	
Log. Demon.							-0.12
							(0.13)
Log. Riots							0.23^{**}
							(0.12)
Log. Strikes							-0.18^{*}
							(0.11)
Log. Terror							-0.004
							(0.10)
N	2283	2283	2283	2283	2283	2283	2283
Countries	102	102	102	102	102	102	102
Log Likelihood	-604.88	-587.47	-594.66	-595.08	-600.33	-589.30	-601.56
Country Intercept Variance	27.70	33.84	37.94	27.35	25.71	29.44	27.67

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$. Standard errors in parentheses. All models include country random effects. All continuous variables except coup risk are normalized.

Table C2. Correlated Random Effects Models for the Effect of Coup Risk on Vice Presidents

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Coup Risk	-7.01^{***}	-7.68^{***}	-6.02^{***}	-7.10^{***}	-6.57^{***}	-8.09^{***}	-7.45^{***}
	(1.75)	(2.11)	(1.80)	(1.84)	(1.77)	(1.89)	(1.88)
Legislature		0.44					
		(0.35)					
Party		-0.85^{**}					
		(0.35)					
Polity		0.58^{***}					
		(0.11)					
Age			-0.43^{***}				
			(0.14)				
Log. Pop.			2.85^{***}				
			(0.57)				
Log. Rainfall			-29.85				
			(25.99)				
Growth				-0.06			
				(0.08)			
Log. Inflation				0.39^{***}			
				(0.10)			
Log. Mil. Ex.					-0.37		
					(0.23)		
Log. Mil. Per.					0.98^{***}		
					(0.35)		
Log. Coal						-1.01^{***}	
						(0.33)	
Log. Gas						0.63^{**}	
						(0.26)	
Log. Metals						0.03	
						(0.20)	
Log. Oil						-1.38^{***}	
						(0.32)	
Log. Demon.							-0.10
							(0.13)
Log. Riots							0.22^{*}
							(0.12)
Log. Strikes							-0.18^{*}
							(0.11)
Log. Terror							0.0003
							(0.10)
N	2283	2283	2283	2283	2283	2283	2283
Countries	102	102	102	102	102	102	102
Log Likelihood	-604.30	-582.70	-588.63	-592.71	-596.57	-585.01	-598.63
Country Intercept Variance	28.42	21.41	29.64	26.44	23.09	24.09	23.50

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$. Standard errors in parentheses. All models include country random effects and country-level means. All continuous variables except coup risk are normalized.