

The Political Resource Curse: An Empirical Re-Evaluation

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Abstract

Extant theoretical work on the political resource curse implies that dependence on resource revenues should decrease autocracies' likelihood of democratizing but not necessarily affect democracies' chances of survival. Yet most previous empirical studies estimate models that are ill-suited to address this claim. We improve upon previous studies, estimating a dynamic logit model using data from 166 countries, covering the period from 1816-2006. We find that an increase in resource dependence decreases an autocracy's likelihood of being democratic over both the short-term and long-term, but has no appreciable effect on democracies' likelihood of persisting.

Keywords: resource curse, resource dependence, oil, authoritarianism, democratization

1. Introduction

Proponents of a “political resource curse” claim that revenues from natural resources such as oil and copper are positively associated with authoritarianism.¹ However, the claim that “resource wealth inhibits democratization” is ambiguous between at least two distinct claims: (1) that resource wealth decreases a country’s level of democracy; (2) that resource wealth decreases a country’s likelihood of being a democracy.² Most empirical studies — proponents and skeptics alike — use a measure of levels of democracy as the dependent variable, finding mixed results (Alexeev and Conrad 2009; Aslaksen 2010; Bueno de Mesquita and Smith 2010; Dunning 2008; Haber and Menaldo 2011; Herb 2005; Jensen and Wantchekon 2004; Ramsay 2011; Ross 2001; Tsui 2010).³ Hence, they only investigate the first claim, overlooking the second. In addition, very few studies consider the ways in which resource revenue’s effect on political institutions can be conditioned by the existing institutional context. Those that do (e.g., Ross 2012) are unable to indicate whether the effect of resource wealth in democracies differs, statistically speaking, from its effect in autocracies.⁴

These oversights mitigate the ability of existing studies to speak directly to key implications of the theoretical literature on the resource curse, implications that theorists have only recently begun to elucidate (Al-Ubaydli 2012; Bueno de Mesquita and Smith 2010). As we discuss below, extant theoretical work argues that resource wealth inhibits democratization by enabling political leaders to circumvent or resist pressures that might otherwise lead to democratic reforms (see also Beblawi 1987; Dunning 2008; Morrison 2007; Ross 2001; Wantchekon 2002). This implies, first, that a resource rich country will be less likely to become or remain a democracy, not necessarily that it will witness (fine-grained) changes in its level of democracy.⁵ Second, this implies that existing political institutions should condition the effect of

resource revenues. Where institutions afford incumbent leaders wide discretion over resource revenues, incumbents are free to neglect citizens' demands and use resource revenue in ways that preempt political opposition and consolidate authoritarian rule. But resource revenues need not subvert democracy once institutions are firmly entrenched to hold leaders accountable to their citizens and empower citizens to punish leaders for any mischief.

The foregoing discussion indicates a basic mismatch between previous empirical models and extant theory. We aim to narrow this gap. We start by clarifying the implications of extant theoretical work, showing that much of this work suggests that existing domestic institutions condition the effect of resource revenues on the likelihood of democracy. We then estimate a dynamic logit model that interacts a continuous measure of resource dependence with a measure of prior institutional constraints. Following the literature, we operationalize prior institutional constraints in terms of regime type; we assume democracies have more institutional constraints than dictatorships. Our estimation technique and model specification allow us to examine whether the impact of resource dependence on regime type varies across autocracies and democracies. We find that increasing an autocratic country's resource dependence increases the likelihood of autocratic persistence (decreases the probability of democratic emergence). However, contrary to other studies (Morrison 2009; Ross 2012; Smith 2004), we find that effect increasing a democratic country's resource dependence has no appreciable on the probability of democratic survival.⁶ Thus, in contrast with earlier empirical studies, our results indicate that a political resource curse exists for dictatorships but not for democracies. Finally, we go beyond existing empirical studies to show that increases in resource dependence have persistent and substantial cumulative effects on autocracies' likelihood of becoming democratic over the long-term, showing that the total effect of resource dependence on regime type is much larger than the

short-term (one period) effect indicates.

2. A Survey of Existing Theory

The resource curse literature has two main theoretical strands; following Ulfelder (2007), we will refer to these as “demand-side” and “supply-side” explanations respectively. To clarify the implications of the resource curse thesis, we begin by reviewing the key theoretical claims.

Demand-side explanations emphasize the ways in which resource revenues free governments from the need to raise revenue via domestic taxation (Beblawi 1987; Karl 1997; Mahdavy 1970; Ross 2001). Without the need to elicit citizens’ tax compliance, leaders need not accept institutional limits on their exercise of political power in exchange for revenue (cf. Bates and Lien 1985; Tilly 1992). Without the need to collect taxes from a broad swath of the populace, leaders need not develop an efficient and disciplined bureaucracy. As a consequence, fiscal oversight is weakened. Low tax rates and the increased social spending resource revenues permits further alleviate social pressures that might otherwise provoke demands for government accountability (Dunning 2008; Morrison 2007, 2009; Ross 2004). In sum, resource revenues preempt the emergence of demands for governments to democratize.

Supply-side explanations highlight the ways in which resource revenues empower authoritarian leaders to suppress opposition and consolidate their hold on political power (Al-Ubaydli 2012; Bueno de Mesquita and Smith 2010; Jensen and Wantchekon 2004; Smith 2006; Wantchekon 2002). When political leaders monopolize resource rents, they gain a sizeable “incumbent advantage” in securing political support. Leaders can use resource revenue to preempt opposition through patronage. Or, anticipating opponents’ need to resort to unconstitutional means to break this advantage, incumbents can use resource revenues to build

coercive power, which they can then use to repress political opposition. In either case, resource revenues help incumbent leaders sustain their rule by providing them with sufficient means to resist pressure to democratize and consolidate their hold on political power.

There are subtle differences between these two strands of literature. Demand-side explanations emphasize the ways in which resource revenues undermine a state-citizen bargaining dynamic that could otherwise culminate in democratic reforms; how the revenues are spent is of secondary importance. Supply-side explanations focus on the ways in which resource revenues provide resource-rich leaders with more means than their resource-poor counterparts for resisting or stifling political challenges; here spending is brought to the fore. We set these differences aside here. Our point of departure is a theme that underlies both — namely, that resource revenues diminish the prospects for democracy by forestalling or aborting causal processes that might otherwise culminate in democratic reforms. This general theme has two implications.

First, increased resource revenues need not undermine democracy where institutions to hold leaders accountable to citizens are firmly entrenched prior to the flow of resource rents. On the demand side, the rents will have come too late to hinder the emergence of institutions that subsequently check incumbents' attempts to centralize political power. On the supply side, revenue allocation will be subject to popular oversight, limiting incumbents' opportunities to spend the revenue on patronage or coercion. Hence, we should expect the presence of democratic institutions in the current period to condition the effect of resource revenues on political institutions in future periods.

Second, extant theory implies that increases in resource revenues to decrease a country's likelihood of being a democracy in future periods but not necessarily its level of democracy. If

democratizing pressures never have a chance to build in a country, this will reduce the likelihood of democratic institutions emerging in the future. But this need not be accompanied by a decrease in the level of democracy; a decreased likelihood of democratization is consistent with stagnation in the level of democracy. Or suppose a democratizing process is initiated in a country and the incumbent takes action to repress it. This must increase the likelihood of authoritarian persistence; but this is consistent with a temporary increase in the level of democracy (prior to the repression) or with stagnation. Hence, if resource revenues diminish the prospects for democracy by enabling incumbents to forestall or abort democratizing processes — as existing theoretical work argues — then increases in resource revenues should be accompanied by a reduced likelihood of democratization but not necessarily a decreased level of democracy. In short, the resource curse is a story about *autocratic persistence*, not about the origins of autocracy.

Before we formulate these implications precisely, we must discuss the measure of resource wealth that is supposed to explain autocratic persistence. Previous empirical studies differ on this point. Some studies favor a measure of resource *abundance*, which tracks the absolute size of resource rents entering the country (e.g., Al-Ubaydli 2012; Dunning 2008; Ramsay 2011; Ross 2012; Wright, Frantz, and Geddes forthcoming); others use a measure of resource *dependence*, which tracks the size of resource rents relative to other sources of government revenue (e.g., Haber and Menaldo 2011; Jensen and Wantchekon 2004; Ross 2001; Smith 2004; Ulfelder 2007). Extant theoretical work on the resource curse does not settle this issue one way or the other. However, we think there are more general theoretical reasons to focus on resource dependence rather than resource abundance. Here, we follow scholars such as Bates and Lien (1985), North and Weingast (1989), and Tilly (1992), among others, in thinking

that democratic institutions emerge as a means by which revenue-seeking political leaders can make credible fiscal policy commitments to citizens in exchange for tax and loan revenues. A key variable in determining the parties' relative bargaining strength is the extent to which the leader depends on mobile asset holders as a source of revenues. If a large proportion of the leader's total revenue derives from citizens who are able to withhold their cooperation (by, e.g., moving their enterprise overseas or underground or off-the-books), then the leader will need to credibly commit to fiscal policies that favor these citizens in exchange for tax and loan revenues. Institutions that enable citizens to hold the leader accountable — democratic institutions — provide a solution to this commitment problem. However, if a large percentage of the leader's total revenue derives from sources that circumvent the need to cooperate with mobile asset holders (e.g., natural resource extraction), then the leader's need to make credible commitments to citizens decreases and, along with it, the incentive to establish democratic institutions. Hence, there is a strong theoretical link between a leader's reliance on resource revenues and a country's propensity to democratize (cf. Smith 2008). This means that we should expect a country's *dependence* on resource revenues to affect its regime type, not necessarily mere resource abundance.

Summarizing the preceding discussion, existing theory implies that *an increase in resource dependence decreases the likelihood that a country is a democracy at time t if and only if that country is an autocracy at $t - 1$* . Alas, most existing empirical studies are ill-suited to address this claim directly. We aim to improve this situation.

We are, to some extent, catholic with respect to the effect of resource dependence under fully consolidated democratic institutions. However, we suspect that the institutionalized bargains embodied by democracy can mitigate any anti-democratic effects that resource

dependence might have in democracies. Democracies such as Canada, Norway, the United Kingdom, and the United States exemplify this point. Prior to the discovery of huge oil reserves, these countries had already implemented hard fought institutional agreements. With these institutional arrangements in place, citizens had both the means and the opportunities required to monitor government conduct and check any attempts to dismantle these arrangements, even once resource rents became a salient source of government revenue. Hence, we expect the effect of newly exploited resources to depend on the institutional endowment present when they are first exploited. If the only way in which resource dependence influences democracy is through its propensity to prevent the *emergence* of democracy – as implied by extant theory – then increased resource dependence in democracies should have no effect on the *survival* of democracy.

Of course, it is possible that increased resource dependence may actually inhibit democratic survival through causal paths we have not considered. Accordingly, we wish to directly investigate the effect of resource revenue in both autocracies *and* democracies. To do this, we specify below an empirical model where the effect of resource dependence is conditioned by regime type.

3. Research Design

Investigating our claim of interest requires operationalizing two key concepts: regime type and resource dependence. Additionally, to capture the conditionality implied by extant theory, we must model the interaction between resource dependence in period $t - 1$ and regime type in period $t - 1$. This section first describes our dichotomous measure of regime type and then describes our multiple measures of resource dependence.

3.1. Regime Type

For our dependent variable, we follow Al-Ubaydli (2012), Clark, Golder, and Golder (2009), and Ulfelder (2007) in using a binary indicator of regime type.⁷ Specifically, we use Przeworski et al's (2000) *Regime* variable (as updated by Cheibub, Gandhi, and Vreeland 2010), which has been extended back to 1800 by Haber and Menaldo (2011). This equals 1 if a country is autocratic in year t and 0 if it is democratic. Since we are particularly interested in whether resource wealth inhibits a country's likelihood of being a democracy at a particular time, we use the *Regime* variable to construct the variable *Democracy*, which equals 1 if a country is democratic in year t and 0 if it is autocratic.

Our use of a regime type indicator sets our analysis apart from most empirical studies of the resource curse. Analysts typically use a measure of level of democracy as the dependent variable, finding mixed results (Alexeev and Conrad 2009; Aslaksen 2010; Bueno de Mesquita and Smith 2010; Dunning 2008; Haber and Menaldo, 2011; Herb 2005; Jensen and Wantchekon 2004; Ramsay 2011; Ross 2001; Tsui, 2010). There are a handful of studies that, like us, use a binary dependent variable; but these studies do not directly investigate our claim of interest. For example, Morrison (2009) and Smith (2004) use a binary indicator of regime *transition* as their dependent variable, defining "regime change" as a three-point change in a country's *Polity* score over a period of three years or less. However, since *Polity* ranges from -10 to 10, Morrison's and Smith's dependent variable not only captures autocracy-to-democracy transitions (and vice versa), but also within-autocracy and within-democracy changes; that is, their variable lumps together changes in degree with changes in kind. For the sake of comparison, using our dependent variable, we observe 121 changes from autocracy to democracy and 72 changes from democracy to autocracy; using Morrison's and Smith's variable, we observe 3537 upward

transitions (i.e., toward higher levels of democracy) and 633 downward transitions (i.e., toward lower levels of democracy). Hence, their studies investigate the extent to which resource dependence inhibits fine-grained changes in political institutions, which is similar to those studies that use levels of democracy as the dependent variable.⁸ Thus, if we are interested in the effect of resource dependence on the likelihood of establishing a qualitatively distinct *kind* of regime, Morrison's and Smith's transition variable overestimates the number of transitions.

This transition variable poses an additional problem for addressing our question of interest: it combines transitions toward a higher level of democracy with transitions toward a lower level of democracy. Consequently, their studies only deliver estimates on the probability of regime transition away from the status quo in either direction. Their dependent variable is thus inappropriate if one wishes to estimate — as we do — the effect of resource dependence on the likelihood of regime change *in a particular direction*.

Wright, Frantz, and Geddes's (forthcoming) binary indicator of regime breakdown is similarly inappropriate given our aims. This distinctive variable identifies the start and end dates of particular autocratic regimes, defined as “set of basic formal and informal rules that identify the group from which leaders can come and the rules through which leaders and policies are chosen” (Wright, Frantz, and Geddes forthcoming, 6). Like Morrison's and Smith's variable, this variable groups together autocracy-to-autocracy transitions and autocracy-to-democracy transitions. Their results thus concern the effect of resource wealth on the persistence of particular autocratic regimes in the face of both democratic and autocratic challenges, not on the likelihood of regime change in a particular direction.

Andersen and Aslaksen (2013), Bueno de Mesquita and Smith (2010), and Cuaresma et al. (2011) use an indicator of leadership change to investigate the effect of resource income on

leader survival. Although related, our inquiry concerns the effect of resource income on the likelihood of a change in *regime type* rather than the likelihood of particular leaders' survival. Specifically, we investigate whether some form of autocracy would persist even if particular autocrats fall.

3.2. Resource Income

Haber and Menaldo's (2011) *Fiscal Reliance* measure best captures our theoretical quantity of interest: the percentage of the government's annual income that is derived from natural resources. Unfortunately, it is available for only nineteen countries. Therefore, we instead use Haber and Menaldo's original data on oil and resource income to construct two alternative measures of government reliance on resource income relative to other sources of revenue.⁹ *Oil Income as a Percentage of Gross Domestic Product* (Oil/GDP) captures, for each year of each country, the total oil income earned (barrels of oil produced multiplied by the real world price) divided by the country's GDP for that year, expressed in constant 2007 dollars. *Resource Income as a Percentage of Gross Domestic Product* (Resource/GDP) divides the income from oil, natural gas, coal, precious metal, and industrial metals and divides it by the country's GDP for that year (also expressed in thousands of 2007 dollars). This second variable is important if we are to generalize our results to dependence on all point-source extractive resources. We think both measures capture a government's *potential* fiscal reliance on resource income, as they capture the share of the national income — that is, the income that is potentially available to the government — derived from resource extraction.¹⁰

To demonstrate that our measures are a suitable second best measure of a government's reliance on oil/resource income, we compute the correlation between Haber and Menaldo's

Fiscal Reliance measure and our measures. *Fiscal Reliance* has a 0.72 correlation with *Oil/GDP* and a 0.65 correlation with *Resource/GDP*. Such high correlations, particularly for the *Oil/GDP* variable, give us added confidence in using these two variables. Nevertheless, we do conduct a robustness check using the more limited *Fiscal Reliance* data.

We wish to make clear that we are not interested in the effect of resource revenues per se, but in the effect of *government reliance on* resource revenues; that is, we want to estimate the extent to which a country's likelihood of being a democracy at a particular time is a function of the percentage of total revenue derived from resource extraction. Accordingly, it is appropriate that some countries with low resource income (in absolute terms) nonetheless qualify as resource dependent in virtue of their low GDP (in absolute terms).¹¹

4. Empirical Analysis

4.1. The Model

To investigate our claim of interest, we regress *Democracy* on *Resource Dependence* and a series of other covariates using a dynamic random effects logit model.¹² In this model, we lag *Resource Dependence* by one year, place it in the regression as a lower order constitutive term, and then interact it with the lagged value of *Democracy* (which is also included as a separate constitutive term). This technique treats the probability of country i being a democracy at time t as a function of whether i was democratic at $t - 1$ and the value of *Resource Dependence* and the other covariates at $t - 1$.

We include three control variables.¹³ First, since numerous previous studies have highlighted the relationship between economic growth and regime type (e.g., Acemoglu and Robinson 2006; Przeworski et al. 2000), we include the growth rate of $\log(\text{GDP Per Capita})$ at t

– 1, which captures the year-to-year change in Real GDP per capita. To account for the relationship between absolute poverty and regime type, we also control for the level of $\log(GDP \text{ Per Capita})$ at $t - 1$. Third, given the well established body of research exploring the relationship between regime type and civil wars and civil war and resource dependence (e.g., Collier and Hoeffler 1998; Fearon and Laitin 2003), we include *Civil War* at $t - 1$, which equals 1 if there was a civil war at $t - 1$ and 0 otherwise.¹⁴ As with *Resource Dependence*, we interact each of our control variables with the value of *Democracy* at $t - 1$ to control for potential endogeneity. Overall, this gives a model that can be depicted as follows:

$$\begin{aligned}
& \Pr(Democracy_{i,t}) \\
&= \Lambda \left[\beta_1 ResourceDependence_{i,t-1} + \beta_2 Democracy_{i,t-1} + \beta_3 ResourceDependence_{i,t-1} \right. \\
&\quad \left. \times Democracy_{i,t-1} + \sum_{k=4}^n (X_{i,t-1} \beta_k + Democracy_{i,t-1} \times X_{i,t-1} \beta_k) \right]
\end{aligned} \tag{1}$$

where X is a vector of control variables and $\Lambda(\cdot)$ is the logistic cumulative distribution function. Interacting each covariate (particularly our measure of resource dependence) with $Democracy_{t-1}$ allows us to model what we have identified as the core idea of existing theoretical work — that the effect of resource dependence at time $t - 1$ on regime type at time t is conditioned by regime type at $t - 1$.

Our empirical analysis is similar to several previous studies; Al-Ubaydli (2012), Clark, Golder, and Golder (2009, ch. 6), Ross (2012), and Ulfelder (2007) all use binary dependent models similar to our own, finding broadly similar results. We aim to improve upon these to more thoroughly investigate the claim that existing political institutions condition the effect of resource revenues on the likelihood of transitioning to democracy. For example, like us, Al-

Ubaydli and Ulfelder both find that resource wealth has anti-democratic effects in autocracies. However, by omitting democracies from their samples, these studies are unable to determine whether the effect of resource wealth differs between autocracies and democracies. Ross (2012) estimates two separate limited dependent variable models, one using an indicator of autocracy-to-democracy transition and another using an indicator of democracy-to-autocracy transition. Estimating these models separately mitigates our ability to determine whether the effect of resource dependence differs, statistically speaking, depending on prior institutional context. Clark, Golder, and Golder's (2009, ch. 6) model is most similar to our own. However, our use of a continuous rather than dichotomous explanatory variable better enables us to investigate how larger or smaller increases in resource dependence might affect regime type or how increases from different starting levels of dependence might matter. We also go beyond all of these studies by extensively analyzing the long-term effects of resource dependence on the likelihood of changing regime type.

4.2. Estimation Procedure

Our model specification has potentially unobserved country-specific factors and within-country variations over time. Therefore, we do not want to simply pool together all of the country-year observations without somehow accounting for this unobserved heterogeneity. One option is fixed effects (Aslaksen 2010; Haber and Menaldo 2011).¹⁵ However, the value of the dependent variable, *Democracy_{i,t}*, does not vary for many countries in our sample. Of the 166 countries in our sample, 58 are autocracies that are never coded as democracies, while 25 are democracies that are never coded as autocracies. Half (83) of the countries in our sample would be dropped from the analysis if we used fixed effects (Chamberlain 1982; King 2001). Hence,

including fixed effects will remove many autocracies, biasing our analysis in favor of finding a “resource blessing” (cf. Haber and Menaldo 2011). This is a severe form of selection bias, which means that the claim that resource dependence prevents transitions to democracy cannot be meaningfully assessed with a fixed effects logit.¹⁶

A random effects logit provides a straightforward alternative that still attempts to capture unobserved heterogeneity between groups, but does so without removing countries that lack variation in the dependent variable (King 2001, 501). A random effects model assumes exogeneity between the observed covariates and the country-specific intercept, as the intercept is not included as a dummy variable but is instead subsumed into the error term (Wooldridge 2009, 489). While there is no test for this assumption, we do conduct a Hausman test for systematic differences in the coefficients between the fixed effects and the random effects model (Wooldridge 2009, 493). If systematic differences are found, then it suggests that the random effects model is misspecified (Rabe-Hesketh and Skrondal 2008, 123). We fail to reject the null hypothesis of no systematic differences between the coefficients in the fixed effects and the random effects model (Chi-square statistic of 30.91, with a p-value of 0.85), thereby suggesting that the random effects model is not misspecified. We believe that this test, together with the aforementioned drawbacks associated with both pooled and fixed effects models, justifies use of a random effects model.

Finally, in addition to accounting for country-specific unobserved heterogeneity, we need to take account of temporal dependence. We do this in a number of ways. First, we include dummy variables for each year from 1970 to 2002.¹⁷ Second, while the lagged dependent variable in the logit model accounts for the effect of prior institutions on future institutions, it does not account for the actual transition to a new set of institutions. As Beck et al. (2001) make

clear, the lagged dependent variable (and associated interaction terms) models time dependencies associated with the persistence of institutions (a transition model), but not time dependencies associated with the event occurring (an event history model) (2001, 8). Carter and Signorino (2010) recommend accounting for such event history time dependency by including the variables $time$, $time^2$, and $time^3$, where $time$ is simply the time elapsed since the last regime change (either autocracy-to-democracy or democracy-to-autocracy).

4.3. Results

The results from estimating our random effect logit model are reported in Table 1. Model 1 uses Oil/GDP_{t-1} to measure $Resource\ Dependence_{t-1}$, while Model 2 uses $Resource/GDP_{t-1}$ to measure $Resource\ Dependence_{t-1}$. In both models, the coefficients on $Resource\ Dependence_{t-1}$ are large, negative, and statistically significant at the 0.99 level.¹⁸ Both indicate that, if a country is autocratic at $t - 1$, then resource dependence at $t - 1$ is negatively correlated with the likelihood of being a democracy at t . With respect to the effect of resource dependence when prior institutions are democratic, the coefficient on the interaction term in both models is large, positive, and significant at the 0.95 level. This indicates that having democratic institutions at $t - 1$ alters the relationship between resource dependence at $t - 1$ and the likelihood of being a democracy at t .¹⁹ However, given the non-linear nature of the logit model, properly identifying the marginal effect of resource dependence when countries have democratic institutions in period t requires evaluating the substantive effects via simulation.²⁰

[TABLE 1 ABOUT HERE]

We use model 2 in Table 1 to compute the short-term (one period) effect of a one-time increase in $Resource/GDP_{t-1}$ on the probability of being a democracy at t for two sets of

countries: those with fairly low resource dependence and those with high resource dependence. For purely illustrative purposes (nothing hangs on this classification), a country qualifies as having low resource dependence if its mean $Resource/GDP_{t-1}$ is between 0.03 and 0.08 starting with the first year of positive resource income (sample mean is 0.05). This group includes (among many others): China, Democratic Republic of Congo, Ecuador, Egypt, Indonesia, and Norway. A country is highly resource dependent if its mean $Resource/GDP_{t-1} \geq 0.25$. This group includes only autocracies like Equatorial Guinea, Kuwait, Liberia, Qatar, and Saudi Arabia (among others). When computing the effect for autocracies, we set $Democracy_{t-1} = 0$ (hence, all interactions involving $Democracy_{t-1}$ equal 0) and all other variables at their mean values, except $Civil\ War_{t-1}$ is set to 0 (its median value). For low resource dependence countries, we set $Resource/GDP_{t-1} = 0.05$, the sample mean; for highly resource dependent countries, we set $Resource/GDP_{t-1} = 0.25$.

Figure 1 presents estimates for the effect (with the 0.95 confidence bounds) associated with increasing an autocracy's level of $Resource/GDP_{t-1}$ on the probability that $Democracy_t = 1$ for 10 percent, 25 percent, 50 percent, and 100 percent increases in the level of $Resource/GDP_{t-1}$. All estimates are significant at the 0.05 level. To give a sense of the data supporting the estimated effect, we note the number of autocracies (and autocratic country-years) that witnessed an increase in the level of $Resource/GDP_{t-1}$ that is at least as large as the increase associated with each row.

To provide some intuition regarding the magnitude of these short term effects, let's consider two countries that represent differing levels of resource dependence: Egypt (low dependence, mean = 0.04) and Saudi Arabia (high resource dependence, mean = 0.35). The results show that a 10 percent increase in a country like Egypt's level of resource dependence at t

$t - 1$ leads to a roughly 3 percent decrease in its probability of being democratic at t ; for a country like Saudi Arabia, a 10 percent increase in resource dependence at $t - 1$ leads to a 12 percent decrease in the probability of being democratic at t . Thus, if Egypt's baseline probability of being a democracy at t is (e.g.) 0.05, a 10 percent increase in resource dependence at $t - 1$ reduces this probability to $0.05 \times (1 - 0.03) = 0.0485$; for Saudi Arabia, a 10 percent increase in resource dependence at $t - 1$ reduces a baseline probability of 0.05 to 0.044.²¹ 117 autocracies (1133 autocratic country-years) witnessed an increase in resource income that is at least as large as 10 percent.

Notably, 71 autocracies witnessed at least one increase in resource income dependence of at least 100 percent. This is important: for a country like Egypt, a 100 percent increase in resource dependence at $t - 1$ leads to a 24 percent decrease in the probability of being a democracy at t , from a baseline of 0.05 to 0.038. For a highly resource dependent country like Saudi Arabia, a one-time 100 percent increase in resource dependence at $t - 1$ leads to a 72 percent decrease in the probability of being a democracy at t , from a baseline of 0.05 to a posterior probability of 0.019.

In sum, these results suggest that a large number of autocracies experienced an increase in resource dependence that induced a fairly substantial decrease in the probability of establishing democratic institutions in the following period.

[FIGURE 1 ABOUT HERE]

Figure 2 presents estimates for the effect (with the 0.95 confidence bounds) of increasing a democracy's level of $Resource/GDP_{t-1}$ on the probability of being a democracy at t . To compute these, we now set $Democracy_{t-1} = 1$ and all other variables at their mean values, except $Civil War_{t-1}$ is set to 0 (its median value). As above, we calculate these effects for democracies

with relatively low resource dependence as well as those with high resource dependence.²² These estimates are uniformly small in magnitude and statistically insignificant, leading us to conclude that increases in resource dependence have no substantive effect on democracies' likelihood of remaining a democracy. This is consistent with a core implication of extant theory: namely, that the effect of resource dependence on future regime type is conditioned by current regime type.

[FIGURE 2 ABOUT HERE]

4.4. Long Term Effects

The short term effects reported in Figure 1 are notable, especially for large shocks in low resource dependence autocracies and *any* size shocks in highly resource dependent autocracies. But these short term effects underestimate the total effect of resource dependence on autocracies' probability of being democratic. There are two types of long term effect worth investigating: the persistent effect of a one-time increase in resource dependence several periods following the shock; and the cumulative effect of a upward structural shift in an autocracy's mean resource dependence. We investigate these in turn.

The strong persistence of governing institutions (Bates 1990; cf. Tsebelis 1990, 15) suggests that one-time increases in resource dependence can have substantial long-term consequences. Though a large increase in resource dependence may strike a country only once or twice, institutional persistence implies that this shock will continue to effect regime type for several years, decreasing an autocracy's likelihood of being a democracy beyond the next period. If this is correct, then ignoring the long term effect of resource dependence on the likelihood of institutional change amounts to a strong assumption that institutional investments depreciate fully over the course of one period.

We use the coefficients from model 2 in Table 1 to compute the long-term (multi-period) effect of a one-time increase in *Resource/GDP* at t on an autocracy's probability of being a democracy at $t + T$. If p_0 is the baseline probability of being a democracy and $p_0 + \delta$ is the probability of being a democracy one period after the increase in resource dependence, then T periods later, the estimated probability of being a democracy is given by

$$\Lambda\left(\Lambda^{-1}(p_0) + p^T(\Lambda^{-1}(p_0 + \delta) - \Lambda^{-1}(p_0))\right),$$

where Λ is the logistic cumulative distribution function, Λ^{-1} is the inverse logistic cumulative distribution function (which maps probabilities to values of the latent variable y^* ; see Jackman 2000). Intuitively, this equation yields an estimate of the geometric decay of the shock's effect.

[FIGURE 3 ABOUT HERE]

Figure 3 presents the results of this analysis for 25 and 100 percent shocks up to 10 years afterward, assuming a 0.05 baseline probability of being a democracy.²³ To provide some intuition, let's again consider the cases of Egypt (representing low resource dependent autocracies) and Saudi Arabia (representing highly resource dependent autocracies). Our results imply that a moderate (25 percent) one-time increase in Egypt's resource dependence has negligible long-term effects on its likelihood of being a democracy several years later. However, the persistent effects of larger shocks are relatively nontrivial. For example, if Egypt experiences a one-time 100 percent increase in resource dependence at t , then its probability of being a democracy at $t + 5$ decreases by more than 13 percent, to $0.05 \cdot (1 - 0.13) = 0.0435$, and its probability of being a democracy at $t + 10$ decreases by more than 7 percent. While the persistent effect of a one-time increase in resource dependence in low dependence autocracies is nontrivial under some conditions, they are quite large in highly resource dependent autocracies like Saudi Arabia. Consider just two examples. Given a baseline probability of 0.05 of being a democracy:

a modest 25 percent shock at t implies that, all else equal, Saudi Arabia's probability of being a democracy at $t + 10$ decreases by more than 8 percent, to $0.05 \cdot (1 - 0.08) = 0.046$; while a 100 percent shock at t implies that Saudi Arabia's probability of being a democracy at $t + 10$ decreases by more than a quarter, to $0.05 \cdot (1 - 0.295) = 0.035$. The “resource *curse*” seems an apt label in light of these persistent effects on regime type several years beyond an upward shock in resource dependence.

In addition to the effect of a one-time shock in resource dependence on regime type persisting several years into the future, institutional persistence also suggests that a structural increase in an autocracies' mean resource dependence can have potentially quite large cumulative effects over time. The type of scenario we have in mind is this. Suppose an autocracy's mean resource dependence has been 10 percent of GDP for many years but that, due to a long-term increase in resource prices or a new resource policy that calls for increased extraction over the long-term, its mean resource dependence increases to 12.5 percent of GDP for the foreseeable future. What effect will this structural increase in resource dependence have over the long term?

We can identify this cumulative effect by computing the quantity $\sum_{t=0}^T \beta \rho^t = \beta \frac{1 - \rho^{T+1}}{1 - \rho}$, where β is the coefficient of on lagged resource dependence and ρ is the coefficient on the lagged dependent variable (see De Boef and Keele 2008; Koyck 1954). Figure 4 presents the results of this analysis for 10 and 25 percent shifts up to 10 years afterward, assuming a 0.05 baseline probability of being a democracy.²⁴ We can see that even small structural increases in autocracies with fairly low resource dependence have substantial cumulative effects over the long run (all else equal, of course). For example, increasing (e.g.) Egypt's mean resource dependence from 0.05 to 0.055 results in a nearly 14 percent decrease in its probability of being

a democracy 10 years later; given a baseline of 0.05, this implies a decrease to $0.05 \cdot (1 - 0.139) = 0.043$. A structural increase in mean dependence from 0.05 to 0.0625 (a 25 percent increase) implies a nearly 32 percent reduction in the probability of being a democracy 10 years later, to $0.05 \cdot (1 - 0.317) = 0.034$. While these cumulative effects are noteworthy, the relative size of the effects in highly resource dependent countries like Saudi Arabia are truly staggering. One example should suffice to illustrate the point. Suppose Saudi Arabia's baseline probability of being a democracy is 0.05 and suppose at t it experiences a 10 percent structural increase in its mean resource dependence, from 0.35 (as of 2006) to 0.385. Our results imply that, all else equal, the effect of this structural increase decreases Saudi Arabia's probability of being a democracy at $t + 10$ by at least 55 percent, to $0.05 \cdot (1 - 0.552) = 0.023$. Things only get worse from there; a 25 percent structural increase in resource dependence decreases Saudi Arabia's probability of being a democracy at $t + 10$ by more than 85 percent, to 0.007! Clearly, structural increases in autocracies' mean resource dependence can have large cumulative effects on their probability of being a democracy.

[FIGURE 4 ABOUT HERE]

5. Conclusion

Based on existing theoretical work, we should expect resource revenues to decrease autocracies' likelihood of democratizing while leaving democracies' chances of survival untouched. A handful of previous empirical analyses have found that resource revenues decrease autocracies' likelihood of democratizing. We improve upon these previous studies by estimating a dynamic logit model that interacts a continuous measure of resource dependence with an indicator of regime type. This research design enables us to investigate, in a unified and nuanced

way, the effects of resource revenue on regime type in both autocracies and democracies. We also extend previous analyses by estimating not only the one-period effect of resource revenue, but the multi-period (long term) effect as well. We show that the persistent and cumulative effects of resource dependence are quite substantial over several periods. Thus, the short term effects typically reported by previous studies underestimate the total effect of resource dependence on regime type. Our results are consistent with the implications of much extant theory: resource dependence reduces autocracies' short term probability of transitioning to democracy and this translates into substantial long-term negative effects. In contrast, resource dependence has no effect on democracies' likelihood of remaining democratic. Put simply, the resource curse is a story about autocratic *persistence*, not the origins of autocracy.

Future work must seek out data that more directly capture our theoretical quantities of interests — namely, the extent of institutional constraints on leaders' fiscal discretion and leaders' fiscal reliance on income derived from resource extraction. Our findings leave us optimistic that studies using such data will cohere with our main conclusion: that the resource curse strikes countries that lack institutional mechanisms limiting political leaders' fiscal discretion prior to the onset of resource dependence, but passes over countries where such institutions are in place before the resource revenue begins to flow.

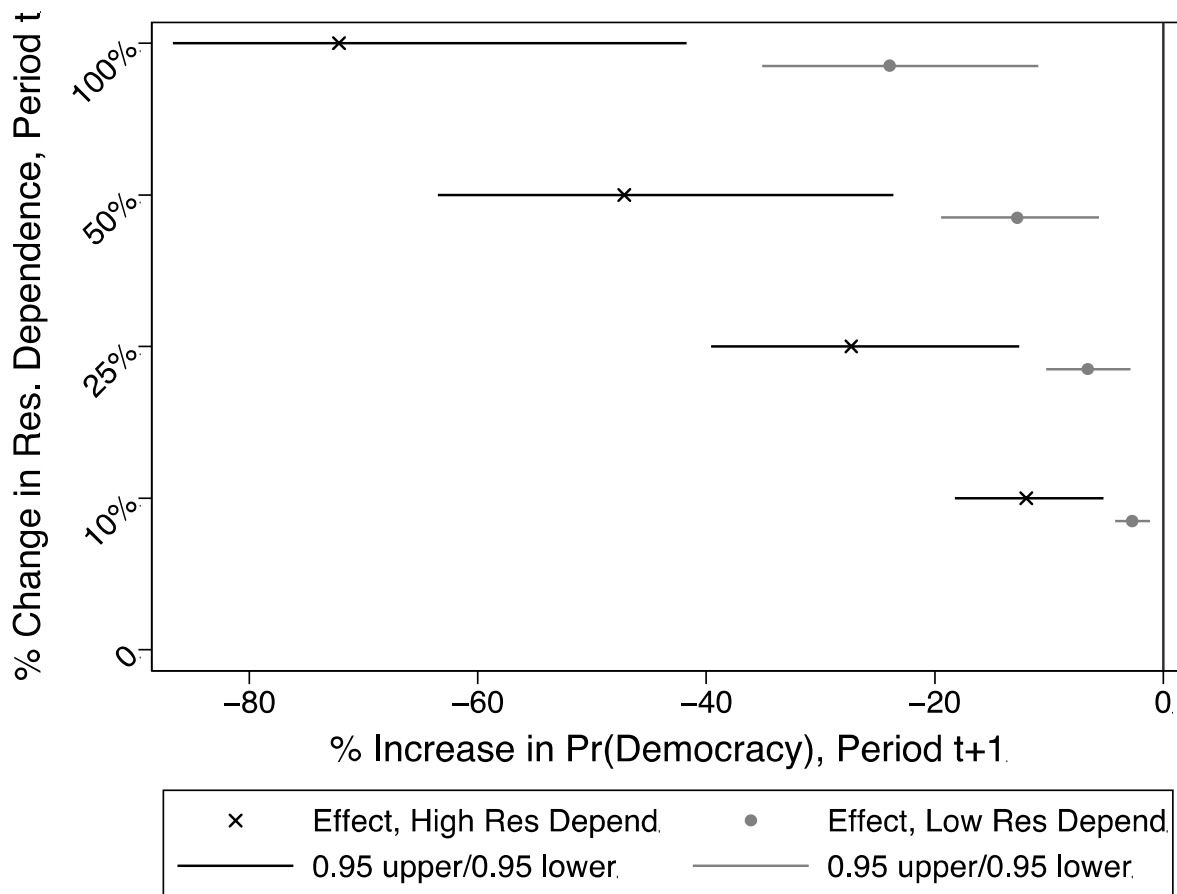
Table 1: Relationship of oil or resource dependence to probability of democracy

	Model 1 Oil Income	Model 2 Resource Income
Total Oil Income/GDP _{t-1}	-6.56*** (1.94)	
Total Oil Income/GDP _{t-1} ∧ Democracy _{t-1}	5.94** (2.42)	
Total Resource Income/GDP _{t-1}		-5.13*** (1.50)
Total Resource Income/GDP _{t-1} ∧ Democracy _{t-1}		4.88** (2.03)
Democracy _{t-1}	2.13 (1.60)	0.88 (1.44)
<i>Control Variables and Interactions</i>		
Growth Rate _{t-1}	-2.48** (1.15)	-2.42** (1.14)
Civil War _{t-1}	0.19 (0.33)	0.06 (0.33)
GDP per Capita _{t-1}	0.44*** (0.12)	0.37*** (0.12)
Growth Rate _{t-1} ∧ Democracy _{t-1}	5.82*** (2.02)	5.91*** (1.99)
Civil War _{t-1} ∧ Democracy _{t-1}	-0.90* (0.51)	-0.58 (0.51)
GDP per Capita _{t-1} ∧ Democracy _{t-1}	0.69*** (0.18)	0.80*** (0.18)
Constant	-7.52*** (0.93)	-6.73*** (0.92)
<i>Random Effects Model Descriptors</i>		
S_m	0.001	0.001
r	2.53e-07	2.53e-07
Number of observations	9452	8342
Year Coverage	1816-2006	1901-2006

Dependent variable: Democracy_{it}, which equals 1 when a country is a Democracy. Results from year dummy variables and time variables not reported.

** p<0.10; ** p<0.05; *** p< 0.01 (two-tailed).*

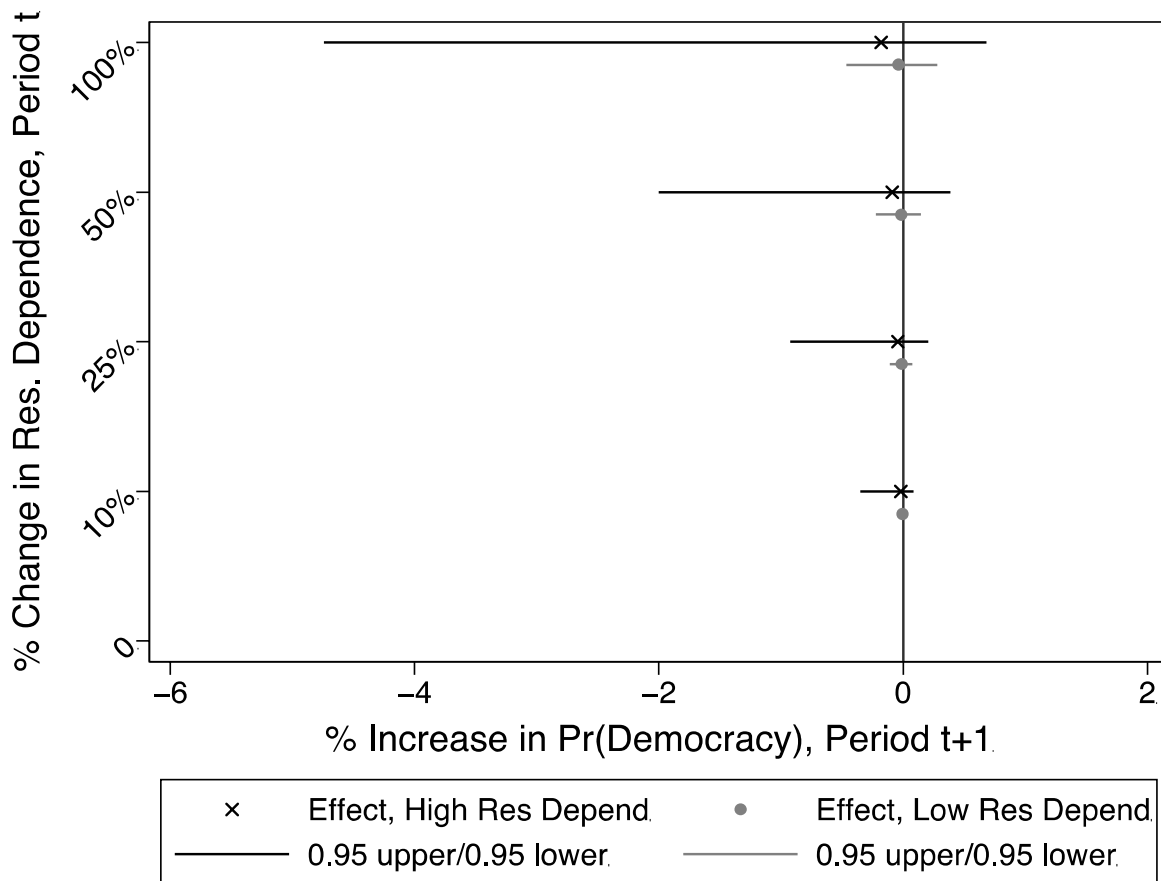
Figure 1: Effect of a one-time increase in resource dependence on probability of democratic transition one period after increase



Note: Figure depicts the percent change in the model's predicted probability of an autocracy being a democracy one period after the stipulated increase in resource dependence. Estimates calculated by setting Resource/GDP_{t-1} at 0.05 (low res depend) or 0.25 (high res depend); Democracy_{t-1} set to 1, and all other variables set to their means = 0.02 (2 percent), except Civil War_{t-1} is set to the median = 0.

Note: 166 total countries (10,640 total country-years) in the dataset. 10% or greater increase witnessed in 117 autocracies (1133 autocracy-years); 25% or greater increase witnessed in 111 autocracies (647 autocracy-years); 50% or greater increase witnessed in 88 autocracies (330 autocracy-years); 100% or greater increase witnessed in 71 autocracies (168 autocracy-years).

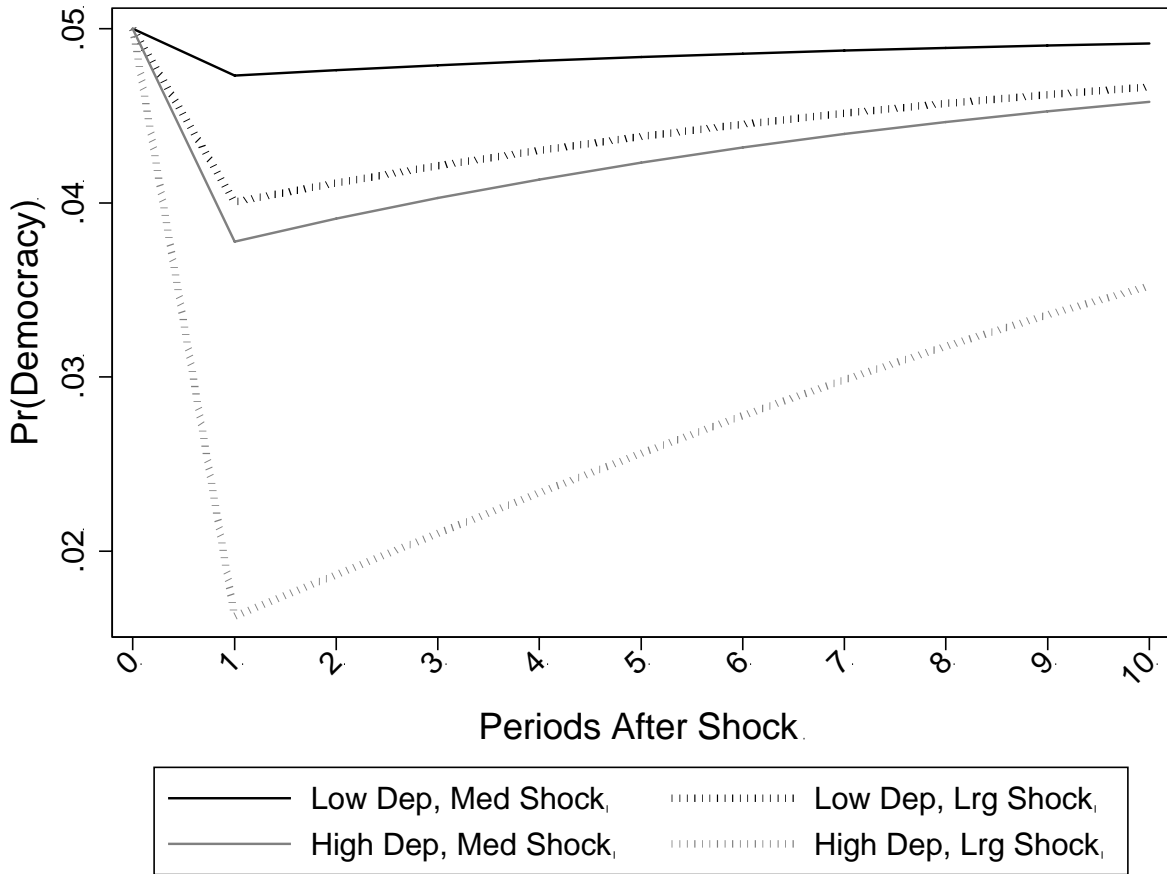
Figure 2: Effect of a one time increase in resource dependence on probability of remaining a democracy one period after increase



Note: Figure depicts the percent change in the model's predicted probability of a democracy being a democracy one period after the stipulated increase in resource dependence. Calculated by setting Resource/GDP_{t-1} at 0.05 (low res depend) or 0.25 (high res depend); Democracy_{t-1} set to 1, and all other variables set to their means = 0.99 (99 percent), except Civil War_{t-1} is set to the median = 0.

Note: 166 total countries (10,640 total country-years) in the dataset. 10% or greater increase witnessed in 142 democracies (953 democracy-years); 25% or greater increase witnessed in 118 democracies (519 democracy-years); 50% or greater increase witnessed in 83 democracies (246 democracy-years); 100% or greater increase witnessed in 51 democracies (107 democracy-years).

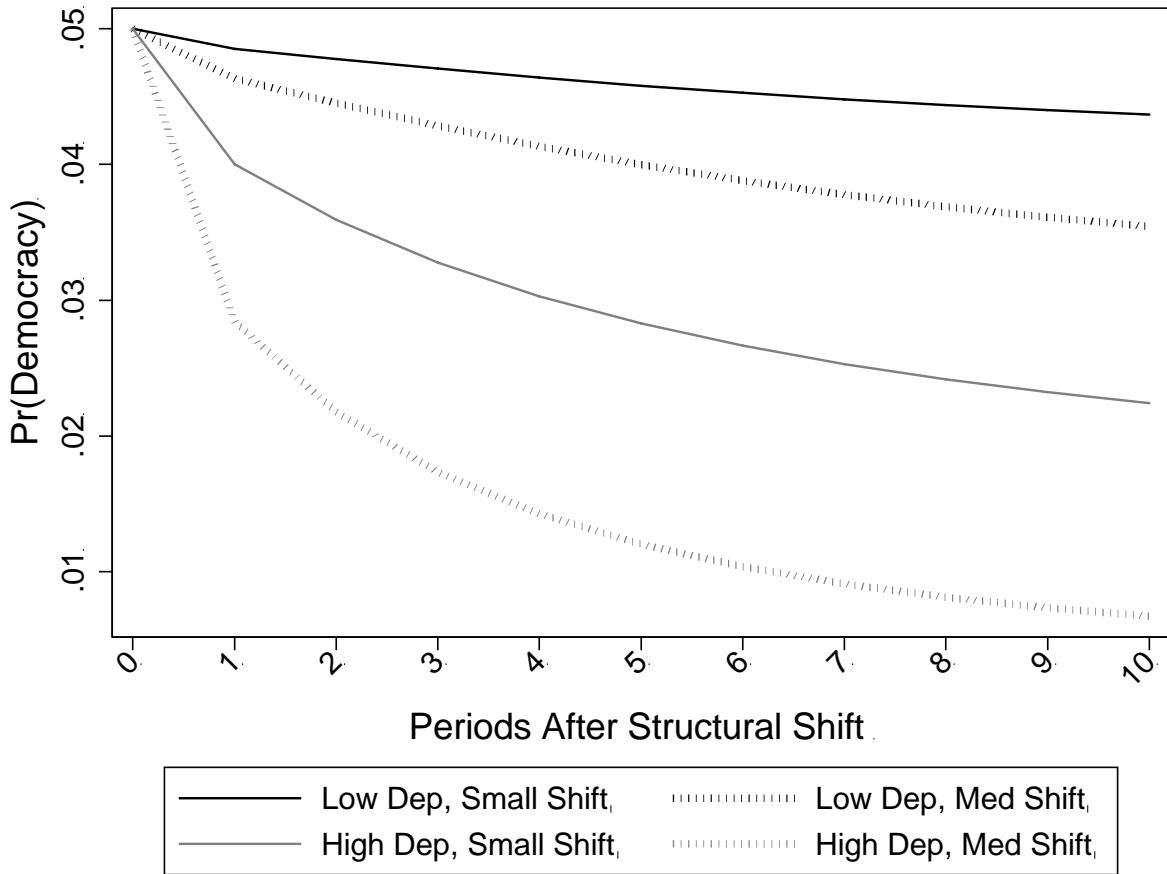
Figure 3: Effect of a one time increase in resource dependence on probability of democratic transition several periods after increase



Note: Figure depicts the percent change in the model's predicted probability of an autocracy being a democracy several periods after a one time 25% increase in resource dependence (med shock) and a one time 100% increase in resource dependence (lrg shock), assuming a baseline probability of 0.05. Calculated by setting Resource/GDP_t at 0.05 (low dep) or 0.25 (high dep); Democracy_t set to 0, and all other variables set to their means = 0.02 (2 percent), except Civil War_t is set to the median = 0. Estimates of relative decrease for t+3, t+5, and t+10, as well as estimates for 10 and 50 percent shocks, are reported in the Supplemental Analysis Packet.

Note: 25% or greater shock witnessed in 111 autocracies (647 autocracy-years); 100% or greater shock witnessed in 71 autocracies (168 autocracy-years).

Figure 4: Cumulative effect of a structural increase in mean resource dependence on probability of democratic transition several periods after increase



Note: Figure reports the percent change in the model's predicted probability of an autocracy being a democracy several periods after a 10% structural increase in mean resource dependence (small shift) and a 25% structural increase in mean resource dependence (med shift), assuming a baseline probability of 0.05. Calculated by setting Resource/GDP_t at 0.05 (low dependence) or 0.25 (moderate/high dependence); Democracy_t set to 0, and all other variables set to their means = 0.02 (2 percent), except Civil War_t is set to the median = 0. Estimates of relative decrease for $t+3$, $t+5$, and $t+10$, as well as estimates for 50 and 100 percent shifts, are reported in the Supplemental Analysis Packet.

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Notes

¹ The literature refers to both a “political” and an “economic” resource curse. Our focus is the former, which addresses the connection between natural resources and political institutions. The latter addresses the connection between natural resources and economic performance. With this distinction noted, we drop the “political” qualification hereafter.

² There is a second ambiguity, namely, that “resource wealth” can refer to *absolute* levels of resource income (“resource abundance”) or *relative* levels of resource income (“resource dependence”). We address this issue below.

³ We discuss several key exceptions at length in section 3.

⁴ Clark, Golder, and Golder (2009, ch. 6) are an exception. We discuss our differences below.

⁵ Morrison (2009) and Smith (2004) corroborate this somewhat, showing that resource revenues reduce the likelihood of somewhat fine-grained changes in the level of democracy, which are defined as three-point or greater change (in any direction) in a country's *Polity* score in a single year.

⁶ Morrison (2009) and Smith (2004) find that resource wealth stabilizes both autocracies and democracies. Ross (2012) finds that resource wealth undermines the prospects for democracy in both autocracies and democracies after 1980 (with two qualifications: resource-rich Latin American autocracies are not less likely to become democratic, while resource revenues precipitate democratic failure only in low income democracies). We note differences between these studies and our research design in section 3.

⁷ Unlike Al-Ubaydli and Ulfelder, we do not omit democracies from our sample. Unlike Clark, Golder, and Golder, we use a continuous rather than dichotomous measure of resource and oil dependence. We discuss these differences further below.

⁸ We also note that, in contrast with our study, neither Morrison nor Smith estimate the extent to which prior regime type conditions the effect of resource dependence on the probability of regime transition.

⁹ Haber and Menaldo offer a detailed discussion in their extensive online appendix of their various sources for compiling their unique data on Oil Income and Resource income.

¹⁰ Though future work should seek to expand the fiscal reliance dataset of Haber and Menaldo (2011).

¹¹ Some (e.g., Haber and Menaldo 2011; Wright, Frantz, and Geddes forthcoming) have argued that these measures of resource dependence are biased upward in poor (and, hence, perhaps autocratic) states. We address this concern by controlling for GDP per capita.

¹² For more on dynamic binary dependent variable models, see Przeworski et al. (2000).

¹³ We also estimate the models without these control variables. The results, reported in the Supplemental Analysis Packet, are consistent with those reported in Table 1.

¹⁴ Since civil wars have distinct dynamics with respect to regime survival, we run additional tests on just those observations without a civil war. These results of these tests are consistent with those reported in Table 1 and are reported in the Supplemental Analysis Packet.

¹⁵ Another approach, besides fixed and random effects, is to compute within-country and between-country effects using the procedure recommended by Chamberlain (1982) and Zorn (2001). This requires replacing the existing independent variables with two new sets of independent variables. The first set captures the country-specific mean value of each variable and the dependent variable. The second set captures the difference between each variable's value in year t (including the dependent variable) and its mean value. Because our empirical model conditions the effect of resources on previous institutions, applying this technique completely

alters the interpretation of our results (and does so in a way that no longer captures our quantity of interest). Specifically, we are no longer conditioning on previous institutions, but on the difference between the previous period's institutions and the average level of institutions for that country. We have no theoretical basis for understanding this quantity. Nevertheless, for the curious reader, we report results from this procedure in the Supplemental Analysis Packet.

¹⁶ Incidentally, this lack of variation in the dependent variable also challenges the fruitfulness of conducting the type of country-by-country analyses recommended by Haber and Menaldo (2011).

¹⁷ We also estimate our model using separate pre-1979 and post-1979 samples, since Andersen and Ross (2014) argue that oil wealth only has a strong anti-democratic effect after 1979. The results from these tests, which are reported in the Supplemental Analysis Packet, are consistent with those in Table 1.

¹⁸ We note, however, that the results for *Resource/GDP* are largely driven by oil income. If we subtract oil income from resource income, the coefficients on the independent variables of interest are the same sign as those reported in table 1; but the standard errors are large (due to the paucity of data) and so the coefficients are no longer statistically significant. We report the results without oil income in the Supplemental Analysis Packet.

¹⁹ In a limited dependent variable model, the coefficient on the interaction term does not quite capture the modifying effect — the modifying effect depends on the values of the other covariates (Berry et al. 2010, 2012; Norton et al. 2004). As a result, Norton et al. (2004) suggest looking at the interaction effect over the full range of possible values of the coefficients to verify that the marginal effect is statistically significant for some values. The plots used to conduct this evaluation are reported in the Supplemental Analysis Packet.

²⁰ We conduct several robustness analyses, including: use of a Middle East dummy; use of the *Polity* and *Executive Constraints* scores as alternate measures of regime type; and use of Haber and Menaldo's *Fiscal Reliance* variable as an alternate measure of resource dependence. The results of these analyses are consistent with those reported in table 1 and are, thus, relegated to the Supplemental Analysis Packet for space reasons.

²¹ Given the small magnitude of our chosen baseline probability (which seems most appropriate for discussing more or less stable autocracies), the absolute size of the effects reported here might appear small. Our point in this section is to highlight the relative size of the effects. In autocracies with a higher baseline probability of becoming a democracy, the absolute size of the effect becomes much more impressive.

²² We note, however, that the democracy with the highest mean resource dependence is Norway, at 0.073, which puts it squarely in our low resource dependence category. So the results for moderately to highly resource dependent democracies do not apply to any actual democracy.

²³ We report the results of this analysis in tabular form for $t + 3$, $t + 5$, and $t + 10$ in the Supplemental Analysis Packet. We also report the results of this analysis for 10 and 50 percent shocks there.

²⁴ We report the results of this analysis in tabular form for $t + 3$, $t + 5$, and $t + 10$ in the Supplemental Analysis Packet. We also report the results of this analysis for 50 and 100 percent shifts there.