Oil and political survival

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Oil and Political Survival*

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Abstract

Political economy theories on the "natural resource curse" predict that natural resource wealth is a determining factor for the length of time political leaderships remain in office. Whether resource wealth leads to longer or shorter durations in political office depends on the political incentives created by the natural resources, which in turn depend on the types of institutions and natural resource. Exploiting a sample of more than 600 political leadership durations in up to 152 countries, we find that both institutions and resource types matter for the effect that natural resource wealth has on political survival: (i) wealth derived from natural resources affects political survival in intermediate and autocratic, but not in democratic, polities; and (ii) while oil and non-lootable diamonds are associated with positive effects on the duration in political office, minerals are associated with negative duration effects.

Keywords: Political survival, oil, natural resources, institutions.

JEL: D72, H11, Q38

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1 Introduction

Over the last couple of decades, researchers have gathered mounting evidence that wealth derived from natural resources contributes to numerous dysfunctional economic and political outcomes—from poor and uneven economic development, to authoritarianism, corruption, and violent conflict. These findings are commonly referred to as "the resource curse".[1] Lately, increasing attention has been drawn to the political incentives triggered by resource booms. In a paper in this journal, Robinson et al. (2006, p.447) argue that: "... the political incentives that resource endowments generate are the key to understanding whether or not they are a curse."

In most political economy models on the resource curse, a key incentive of political leaders is to stay in power to harvest not only the current, but also the future rents from natural resource extraction. Moreover, resource rents equip political leaders with funds that can be used to increase their chances of surviving in political office, via different forms of patronage or strategic spending, tax cuts, or political oppression.[2] For these reasons we would expect abundance in natural resources to be associated with longer durations in political office.

However, there may also be counteracting forces at work. For example, resource wealth may motivate oppositional groups to seize power, and certain types of natural resources may provide financing for the activities of rebel factions.[3] Alternatively, the political leadership may consist of different political elites competing over the rents from holding office.[4] If these two latter mechanisms are relevant, natural resources may be expected to destabilize the political leaderships and lead to shorter durations in office. Finally, the political leaderships may be effectively constrained by different types of institutional arrangements. Whether the relationship between natural resource wealth and political survival is positive, neutral, or negative may, thus, generally depend on the value of the resource rents, the type of resources, and the political and institutional environment.

The relationship between resource wealth and the duration of a political leadership remains mainly theoretical.[5] We aim to fill this gap in the literature by employing the broadest possible sample, given the available data, to investigate this relationship. This leaves us with a sample

[1] See, e.g., Sachs and Warner (1995) on economic development, Ross (2001) on authoritarianism, Bhattacharyya and Hodler (2010) on corruption, and Collier and Hoeffler (2004) on civil war. Van der Ploeg (2011) and Frankel (2010) offer two recent overviews of the empirical and theoretical research on the resource curse.

[2] See Caselli and Cunningham (2009) for a systematic review over how political leadership incentives may be influenced by natural resources, Robinson *et al.* (2006) and Robinson and Torvik (2005) for different forms of strategic spending, and Ross (2001, 2008) for an overview of the so-called rentier state theory.

[3] See, e.g., Collier and Hoeffler (2004), or Lujala (2010).

[4] As in, e.g., Acemoglu et al. (2004; 2010), and Caselli (2006).

[5] Some empirical studies on resource wealth and political survival do exist, but these have typically focused on either particular subgroups of countries, or on specific polity and regime types. Cuaresma *et al.* (2011) analyze the relationship between oil and the duration of dictatorships, and Omgba (2009) analyzes the duration in office of chief executives of 26 African countries. Ross (2008) employs a broader sample of 170 countries from 1960 to 2002, but his main focus is on regime survival (e.g. the survival of "authoritarianism" and "democracy") and not on political survival, as in the present study. In a new and complementary study to ours, Wright et al. (2012) document a positive effect of oil wealth on autocratic regime survival using a different methodology (ordinary and conditional logit) and regime duration variable (from Geddes et al. 2012) than we do.

of up to 152 countries and 617 leadership durations (henceforth LDs).[6] The natural resource variables that we include in our analysis are various measures of oil income and wealth, mineral rents, and indicators for different types of diamond extraction.

Our empirical results are strongly suggestive that resource endowments matter for political survival. Oil wealth is a particularly important determinant, and its association with political survival can even be seen in the raw data. Figure 1 plots the Kaplan-Meier survival function for oil poor (solid line) and oil rich (dashed line) political leaderships, respectively, and the graph indicates that the average survival rate in political office is higher for the oil rich than for the oil poor political leaderships.[7]

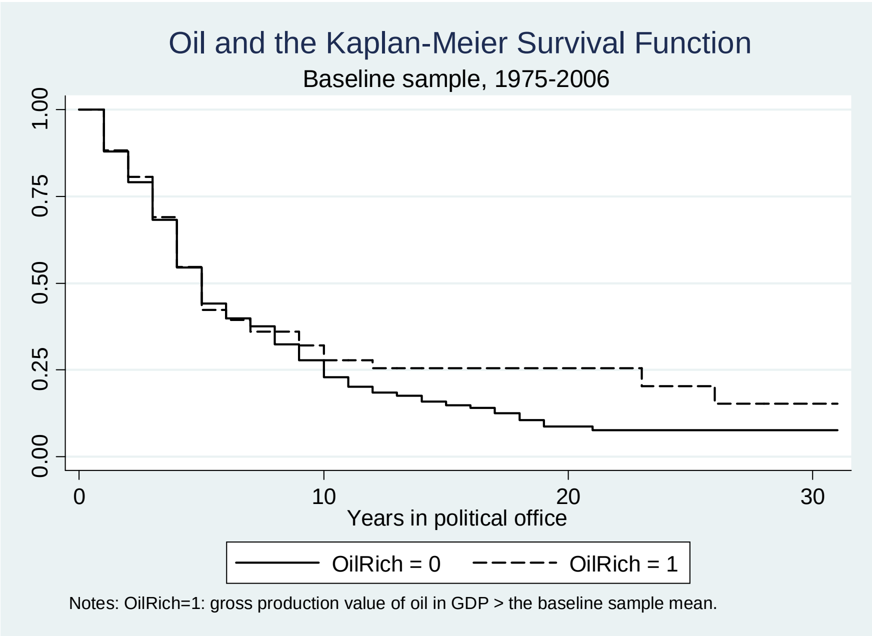

Figure 1: Oil and political survival in the baseline sample of 138 countries and 500 leadership durations.

When we investigate this relationship more rigorously, using survival analysis, our baseline estimates suggest that an increase in the value of oil production in a country's GDP by one standard deviation increases the expected duration in political office by approximately 10 months on average. The positive and statistically significant association between oil and political survival is robust to using a range of parametric and non-parametric survival models, and to the inclusion of potentially confounding economic, political, demographic and geopolitical factors.

[6] We define a leadership duration as the duration in office of the party which has the chief executive, or, in the case where chief executive is not associated with a particular party, the duration in office of the chief executive. The precise definition is provided in Section 3.1.

[7] The Kaplan-Meier suvival estimate is the conditional probability of survival beyond time t, given survival up until t: $\hat{S}(t) = \prod_{j|t_j \leq t} \left(\frac{n_j - d_j}{n_j} \right)$, where n_j is the number of political leaderships at risk at time t_j and d_j is the number of political failures at time t_j.

The graph in Figure 1 is uninformative about confounding factors, and the baseline estimates may also conceal important nonlinearities in the data. In particular, the theoretical predictions on the political incentives of natural resources are often conditioned on institutional parameters. The political effects of natural resources are expected to be stronger the lower the level of democracy, or, alternatively, the weaker are the constraints on the executive.[8] Additionally, resource type may matter. Because natural resource wealth might facilitate the financing of war, it may make armed conflicts more likely.[9] Moreover, easily accessible and extractable resources, such as minerals and certain types of diamonds, may provide financing for competing elites or rebel groups and thus increase the odds that the incumbent is ousted from political office. Lujala (2010) provides empirical evidence that both the onset and the duration of conflict are positively associated with the accessibility of the resources. The hypothesis that different types of resources may affect social tension and conflict differently is further supported by the finding in Smith (2004) that oil wealth is associated with a lower, not higher, likelihood of civil war and anti-state protests.

Investigating the effects of political institutions and resource types on political survival, both separately and in interaction, we find that both dimensions matter. First, while most of the resource variables are significant determinants of political survival in non-democratic polities, we find no systematic effects within the sample of democratic polities.[10] The pattern in Figure 1 suggesting a positive relationship between oil and political survival is hence exclusively driven by non-democracies. Second, we find that the type of resource matters. Those resource types that are the least technically appropriable, oil and non-lootable diamonds, are positively related to political survival. On the other hand, those resources that are the most technically appropriable, minerals and lootable diamonds, are found to be negatively associated with survival in office.[11] In the light of the insights from the conflict literature, one might thus hypothesize that conflict should be a main mechanisms by which different resource types affect political survival differently. We therefore run a set of regressions where we include conflict variables among the regressors. As expected, the results from these regressions suggest that conflict is negatively related to political survival. However, the resource effects remain significant and, if anything, stronger. Thus, our main results on the effects of resource type do not appear to be exclusively driven by violent conflict.

Our data do not allow us to investigate all the different mechanisms by which different resource types may have different effects for political survival. However, one straightforward interpretation is that different types of resources may be exploited by different groups in the

[8] As in, e.g., Robinson *et al.* (2006) and further surveyed in van der Ploeg (2011).

[9] See, e.g., Collier and Hoeffler (2004).

[10] With respect to institutions, we follow the standard approach to institutional categorization and account for both polity types (democracy, intermediate, autocracy), autocratic regime types (military, single party, personalistic regimes, and monarchies), and, in the sample of democratic polities, constitutional features (e.g., the form of government and the electoral rules).

[11] The term "technical appropriability" refers to the physical and economical characteristics of the natural resource. In particular, resources which are easy to extract, very valuable, can be stored, are easily transported, and are easily sold, are characterized as technically appropriable (Boschini *et al.* 2007).

population. In particular, resources that are less technically appropriable, such offshore oil and most forms of subsoil oil reservoirs, require a high level of technology and large investments which can only be financed by large companies or governments. These types of resources are also examples of "point source" resources that are typically easier for the government to tax than "diffuse" resources.[12] Other examples of point source resources include natural gas and non-lootable diamonds. On the other hand, the appropriation of more diffuse resources, such as several forms of minerals and lootable diamonds, requires less technology and investments and can more easily be exploited by non-elites. These types of resources can also be more difficult for the government to tax. This is consistent with insights from the conflict literature, where only the technically appropriable resources are associated with violent conflict, arguably via the financing of the activities of rebel groups. However, the funds from the appropriation of diffuse resources may not only finance violent conflict, but could also help sustain other types of political activities by oppositional groups. So, while oil and non-lootable diamonds to a larger extent may be exploited by the political leaderships in power, minerals and lootable diamonds may provide financing for the political activities of the opposition. If this mechanism is relevant, oil and minerals may be expected to exert different effects on the survival in office of the political leaderships, which may explain our findings on the role of resource type.

Measuring political survival is not always straightforward. Past contributions tend to focus on the duration in office of the chief executive or head of state (in authoritarian regimes usually the dictator, in democracies commonly the prime minister or the president).[13] The chief executive's duration in office is, however, in many situations an imperfect measure of the continuity of a faction's political power.[14] We therefore argue that a political leadership duration is better measured by the continuity in power of the *party* of the chief executive. Hence, we consider a transition of political power to take place when in the following year the chief executive is from a different party. Because this definition is independent of the specific status of the chief executive, it facilitates comparison across different polities and regime types. Importantly, using this measure of a LD, we reduce the likelihood of estimation bias due to specific institutional arrangements, such as the term limit imposed upon the chief executive. We do, however, also investigate the duration in office of the chief executive, and find that our results are not exclusively driven by our specific choice of LD operationalization.

A general concern in empirical comparative politics is endogeneity bias. We take several steps to address this concern. First, the duration in office of a political leadership may reflect endogenous political responses to changes in the resource environment, which in turn might imply endogeneity in the categorization of the LDs into polity types (democratic, intermediate,

[12] On the distinction between "point source" resources and "diffuse" resources, see, e.g. Auty (1997) or Boschini et al. (2007). Notice that this distinction is not precise with respect to exactly which types of natural resources belong in which category, and while some types of minerals may be categorized as diffuse resources, others are better defined as point source resources.

[13] See, e.g., Cuaresma *et al.* (2011), Ross (2008), and Omgba (2009).

[14] Cheibub and Przeworski (1999) include a discussion of the different sources of bias which may arise from focussing on the transition of chief executive in the study of political survival in democracy.

or autocratic). We address this concern by basing our categorization of a LD on the institutional performance *prior* to when the chief executive's party assumes office. Hence, the regressions are preconditioned on the inherited institutional environment that a political leadership faces when it enters into political office. Still, one may be concerned that even the inherited set of institutions may be endogenous to the resource environment, since the resource environment is often quite stable over time. We therefore control for institutional characteristics that are known to be associated with the duration in office of political leaderships and at the same time may correlate with the resource environment, such as autocratic regime types, or specific constitutional features. In some regressions we also control for the average duration in office of the political leaderships in the country, as a proxy for potentially omitted factors that correlate with both the resource endowment and political survival. In the sample of autocracies it appears that some regime types, in particular monarchy and personal rule, correlate with the resource environment to such a degree that the effects of the two in some specifications cannot safely be separated. An available interpretation is that the effect of oil on political survival is partly working via the survival of specific types of autocratic institutions. However, in the samples of intermediates and democracies, the main results remain robust to all of these exercises: in intermediate polities, the effect of oil survives even when controlling for the average leadership duration in the country, and in the sample of democratic polities there are no robust resource effects no matter which set of institutional controls we include, or exclude, in the regressions.

Second, the natural resource variables might also be endogenous in our regressions, as office-seeking political leaders—democratic or non-democratic—may be tempted to increase the intensity of exploration and extraction to influence their own probability of staying in office. We address this concern by employing, as a robustness check on our most preferred specification, several alternative measures of oil income and oil wealth. While our baseline variable—the production value of oil in GDP—is the most relevant with respect to theory, it may be more susceptible to endogeneity than other, alternative measures which are less closely aligned with the theoretical models. The results from these robustness exercises suggest that the effect of oil remains qualitatively similar for all of our alternative oil measures.[15] Interestingly, when employing the size of the proven oil reserves per capita (instead of the value of oil production in GDP)—which perhaps may be argued to be the least susceptible to endogeneity concerns—the oil effects are even more precisely estimated in both the intermediate and the autocratic subsamples.

Finally, we investigate the robustness of our main results to the inclusion of regional indicators and to a host of alternative model specifications and survival models. The results from these exercises demonstrate that our main results are not driven by any specific region, including the oil rich middle east. Moreover, our main results go through for a large variety of empirical specifications and survival models.

[15] The alternative oil measures we employ in our robustness specifications are the value of oil per capita, several predetermined oil measures (dated back to either the entry of the current LD, or to 1970), and the size of the proven oil reserves per capita.

The paper proceeds as follows. In the next section, we present a literature review on the arguments that could explain a relationship between political survival and natural resources. In Section 3, we present our empirical design and our data. Section 4 presents and discusses the main results, and Section 5 offers a broad selection of robustness checks. Section 6 concludes.

2 Literature review

As discussed in the introduction, there is a large and growing body of theoretical literature that explicitly or implicitly analyze the association between natural resource wealth and political survival. Additionally, some empirical studies do exist, and there is also a well of case studies suggesting that natural resources affect the duration in office of political leaderships. A full-fledged literature review is outside the scope of this paper, so we restrict ourselves to reviewing a representative set of contributions that illustrate the different mechanisms that may be driving our results.

2.1 Theoretical mechanisms

A natural point of departure is the so-called "oil hinders democracy" literature, which dates back to the contribution on rentier states and oil in Iran by Mahdavy (1970).[16] One explanation for the "rentier effect" of oil is that governments endowed with an abundance of oil use low tax rates and high public spending to dampen the pressure for democratic reforms. The rentier effect can be decomposed into three related pieces (Ross 2001; 2008): (*i*) a taxation effect; (*ii*) a spending effect; and (*iii*) a group formation effect.[17] Hence, the rentier effect implies that the government takes a strategic action in order to increase its probability of remaining in power.

A different strand of the literature is more concerned with different types of non-democratic regimes. Acemoglu *et al.* (2004) develop a model where kleptocratic rulers that expropriate the wealth and incomes of their citizens can remain in power without maintaining a significant base of support in society. The success of kleptocrats rests on their ability to use a particular political strategy termed "divide-and-rule" since members of a society need to cooperate in order to depose a kleptocrat. The kleptocrat may undermine such cooperation by using the rents from natural resources to bribe other groups in order to maintain his position.

[16] See also Ross (2001); Jensen and Wantechekon (2004); Epstein *et al.* (2006); Ulfelder (2007); Tsui (2010); Gassebner *et al.* (2008); Dunning (2008); Goldberg *et al.* (2009); Aslaksen (2010).

[17] The taxation effect suggests that when governments derive sufficient revenues from oil, they are likely to tax their populations less heavily. In turn, the population will be less likely to demand accountability from, and representation in, the government. Ross (2008) finds a strong correlation between a country's oil rents per capita, and the size of government consumption.

The intuition for the spending effect is that oil wealth may lead to greater spending on patronage, which dampens latent pressures for democratization. Ross (2008) finds a strong negative correlation between oil rents and taxes on goods, even with country fixed effects.

According to the group formation effect, the government will use its largesse to prevent the formation of social groups which are independent from the state and hence which may be inclined to demand political rights from its government.

Cuaresma *et al.* (2011) analyze a setting similar to that used in Acemoglu *et al.* (2004), but propose an alternative mechanism. In their model, which is an extension of Gallego and Pitchik (2004), the autocratic leadership (or dictator) uses the rents from oil extraction for both personal gain and to pay off potential opposition, and chooses the optimal level of oil exploitation accordingly. A group of kingmakers decides whether to stage a coup and establish a new leadership. The model finds that a higher endowment of natural resources leads to a lower probability of the oppositional group staging a coup d'état.

Military regimes might be characterized by different mechanisms than those used to categorize other types of non-democratic regimes. For example, the military can act as an agent of the elite, but may turn against this group in order to create a regime more in line with the military leaders' objectives. Analyzing the effects of the natural resource endowments in this setting, Acemoglu *et al.* (2010) show that two opposing effects for non-democratic regimes emerge. On the one hand, more natural resources allow the regime to finance military repression and thus increase the regime's likelihood to persist. On the other hand, the military is more tempted to undertake coups against the oligarchic regime, which decreases the survival likelihood of the existing regime.

A common strand uniting the theories surveyed above is that these caveats mainly apply in a non-democratic political environment. However, natural resource wealth may also be relevant for political survival in democratic polities. Robinson and Torvik (2005) propose a theory on so-called white elephants, which refers to economically inefficient public investments. They demonstrate that the very inefficiency of such projects is what makes them politically appealing. This is particularly so when the ability to commit to inefficient projects critically depends on partisanship. The fact that in the future not all politicians can credibly undertake economically inefficient projects, gives those who can do so a strategic advantage in the present. Natural resource revenues increase the value of being in power, thereby making it more attractive to implement inefficient projects that can give incumbents a strategic advantage in elections.

Employing a similar partisan framework as Robinson and Torvik (2005), Robinson *et al.* (2006) develop a model in which the incumbent can either consume the resource income or can distribute it as patronage to bias the election outcome in his own favor. In this model, institutions play a central role in the relationship between resource income and political survival. If the economy is characterized by institutions that limit the ability of politicians to engage in clientelism, resource booms should not affect the incumbent's re-election probability.

The theories reviewed above provide several reasons why natural resources might increase the chance of political survival. However, as discussed above, some of these mechanisms could have the reverse effect, particularly when considering the military's incentive to stage a coup (Acemoglu *et al.* 2010), but also when the resource boom is temporary (Robinson *et al.* 2006). Additionally, Caselli (2006) develops a model of the natural resource curse which predicts a negative relationship between resource income and political survival. The model's essential idea is that natural resource wealth is more easily appropriated by the governing elites than are other sources of wealth. As a result, countries with large natural resource endowments experience frequent power struggles—in the sense that potential challengers have a stronger incentive to replace the existing government by staging a coup or engaging in other forms of forced leadership changes. Hence, in countries with large amounts of natural resources, there will be a greater probability that the government will lose power to challengers.

2.2 Case studies and empirical evidence

In addition to the more formal theoretical and empirical contributions, there is a considerable amount of case study evidence on how natural resource income has been used to maintain power.

Several studies document a pattern of natural resource windfalls leading to an overexpansion of the public sector, and relate these observation to patronage and clientelism. In a study of oil boom's effects in Nigeria, Gavin (1993) found that between 1973 and 1987, employment contracted in all sectors except for the service sector which includes government employment. Importantly, this hiring effort was seen as a deliberate policy by the government to stay in power despite an earlier promise to withdraw in 1975. Similarly, in copper-dependent Zambia: "To secure power and access to copper income United National Independence Party (UNIP) and the president Kenneth Kaunda in 1972 banned other political parties and put in place a system that favored UNIP members offering employment and power" (Robinson *et al.*, 2006, p. 464). In Trinidad and Tobago, Auty (1999) blames an overexpanded public sector in response to windfall income for the weak economic performance, and notes that the government share of formal employment reached 50 percent during the period of the resource boom. Ecuador and Venezuela are two additional examples of countries where the public sector has expanded as a result of booms in the price of oil. In Ecuador, numerous governments have made attempts towards fiscal restraint and structural reform, but none has withstood social pressure long enough to significantly alter the country's political economy. According to Eifert *et al.* (2002, p. 13): "14.5 percent of all oil revenues [in Ecuador] were earmarked directly to the military in 1989; and 67.6 percent were allocated to finance the public wage bill and other programs, notably the rural roads program, a politically important source of patronage". With regard to Venezuela, Eifert *et al.* (2002, p. 14) argue that: "[o]il revenues have shaped Venezuelan politics for decades, creating a rentier state legitimized by patronage and entrenched constituencies whose continued loyalty are attached directly to state expenditures funded by oil rents".

In addition to political equilibrium effects, natural resource endowments may also cause changes in the rules of the political game. Guliyev (2009) discusses several examples of constitutions being manipulated in favor of the survival in office of the political leadership. In particular, there are several examples of strong presidents who eliminated term limits to prolong their hold on power. The 2004 referendum in Belarus (whose state elites depend heavily on Russian oil and gas transit) lifted the two-term limit on President Lukashenko who was in power since 1994. Uzbekistan held two referendums in 1995 and 2002 that extended President Islam Karimov's term. In 2007, Kazakhstan's parliament amended the constitution to lift the term limit on the tenure of President Nazarbayev, who has been in power since the country's independence in

1991. In natural gas rich Turkmenistan, the People's Council abolished term limits in 1999 and announced that the now-defunct ruler, Saparmurat Niyazov, would be "president for life" (p.3). In Venezuela, Hugo Chavez won approval in the February 2009 referendum for a constitutional amendment that enables him to run for the presidency when his term ends in 2012. In April 2008, President Paul Biya of Cameroon, a commodity-based African economy, had parliament pass a constitutional bill abolishing a two-term limit restriction. The updated legislation made it possible for Mr. Biya to extend his 25-year rule. In November 2008, President Abdelaziz Bouteflika of Algeria also had his two-term restriction abolished. Mr. Bouteflika became president of the country in 1999 and was re-elected in a landslide victory in 2004. After the change, he was able to run for a third time in the presidential race which he won in April 2009 (Guliyev, 2009).

The analysis presented in this paper also relates to an interesting study by Goldberg *et al.* (2009), which shows, using data from U.S. gubernatorial elections, that the competitiveness of the electoral environment is influenced by resource dependence. Their empirical investigation indicates that the margin of victory in gubernatorial elections and the incumbent governor's share of votes increases the more the state depends on natural resources (measured by oil and coal production as a share of state income).

Finally, a considerable empirical literature links natural resources to the onset of civil conflict (e.g. Fearon and Laitin, 2003; Smith, 2004; Humphreys, 2005; de Soysa and Neumayer, 2007; Lujala, 2010). Particularly interesting given the aim of our study is the work by Lujala (2010), who concentrates on the issue of how rebel access to natural resources affects conflict. Her finding strongly supports the idea that access to natural resources is essential for the funding of violent conflict by rebel groups. According to her study, both onshore (as opposed to offshore) oil production and lootable (as opposed to non-lootable) diamonds increase the risk of conflict onset.

2.3 How the present study relates to the existing literature

Although there are several theories, case studies, and some within-country empirical analyses that discuss how resource income can be linked to political duration, there are few systematic empirical studies of this subject across countries. One exception is Cuaresma *et al.* (2011) who analyze the relationship between oil endowments and the duration of dictatorships. They use the Archigos database developed by Goemans *et al.* (2009) to calculate how long dictators remain in power. Their main result is that a high oil endowment significantly increases the duration of a dictatorship for both a relatively large subsample as well as a sample of the most terrifying dictators.

In a more restricted sample, Omgba (2009) analyzes the duration in office of the heads of state of 26 African countries. The study is suggestive of a positive link between oil rents and the duration in office of African leaders, but other mineral rents are not found to exhibit the same stabilizing effects.

Ross (2008) analyzes the relationship between oil and leadership durations in a broader group of countries. To identify the transition from one leader to the next, he also relies on the Archigos database, which identifies the term in office of a country's effective leader. He finds that across different income and regional categories, leaders in oil-producing countries last longer. Ross further separates the effects of oil rents on duration between authoritarian states and democratic states, and his results indicate that while oil revenues reduces the likelihood that an autocratic leader will depart office, oil wealth has no effect on the longevity of democratic leaders.

Smith (2004) and Ulfelder (2007) both analyze the association between natural resource wealth and political survival. However, their focus is on the duration of autocracy as such, and not on the duration in office of political leaderships. Both studies rely on the Polity dataset (Marshall and Jaggers, 2009) to measure regime type, and both studies find that resource wealth, and in particular oil and energy measures, impede transitions to democracy.[18] Our study complements these studies and suggests a mechanism by which oil may impede democratic transitions—namely by allowing non-democratic leaderships to stay longer in political office. The relevance of this mechanism is supported by recent evidence in Wright et al. (2012) who, using different variants of the logit model and a different definition of leadership survival than we do, document that oil wealth positively affects the likelihood that autocratic leaderships remain in power.

Our approach differs from the papers reviewed above along several dimensions. First, we interpret leadership duration differently. While Cuaresma *et al.* (2011), Ross (2008), and Omgba (2009) all analyze the duration of individual leaders, our focus is on the duration of the political party in power. Our duration variable is thus how many years the chief executive's party has been in office.[19] Second, we include different types of natural resources to allow for the possibility that technically appropriable (or lootable) and non-technically appropriable (or non-lootable) resources affect duration differently. We also address potential endogeneity problems in the regression analysis by employing predetermined oil production volumes and proven oil reserves rather than contemporaneous oil rents. Third, we incorporate a larger number of countries and split the data into subgroups according to institutional, constitutional and/or regime differences. Since countries differ so dramatically along these dimensions, we consider it naïve to assume that the natural resource variables will have the same effect on duration across different group of countries. Therefore we control for institutional, constitutional, and/or regime characteristics in some specifications and analyze each subgroup separately in others.

3 Data and empirical model

3.1 Leadership duration

To construct entry and exit of political parties in power, we use the Database on Political Institutions, henceforth DPI (Beck *et al.*, 2001; Keefer, 2007).[20] The dependent variable in our

[18] Both Smith (2004) and Ulfelder (2007) rely on a binary dependent variable to identify democratic transitions.

[19] See Section 3 for details.

[20] The version of the DPI that we rely on here goes from 1975 to 2006, and covers all independent countries with populations above 100.000.

analysis is a binary one indicating whether the chief executive's party is removed from power in a given year.[21] We consider a political change to have occurred when in the following year the chief executive belongs to a different party.

There are several reasons why we prefer this definition of a LD. First, prime ministers in a parliamentary systems have less power relative to the members of their respective parties and coalitions. Moreover, in presidential systems there are usually rules regarding the number of terms a president can serve. Hence, in many cases observing a change in a country's chief executive does not reflect the incumbent party's loss in electoral support, but is more the result of constitutional rules or party preferences.[22] Therefore we believe that in democratic polities it is more appropriate to look at the dominant political party's duration in office, rather than relying on the duration in office of their individual leaders.

Second, political parties are often regionally or ethnically oriented. This might cause groups within a population to benefit at the expense of others if the party that represents their region or their ethnic group is in office.[23]

Finally, in non-democratic contexts, looking at individual leaders' term in office might be problematic if we want to determine the effect of natural resource income on LD. For instance, when Raúl Castro assumed the duties of President of the Council of State in Cuba due to his brother Fidel Castro's illness, we believe that this did not represent a transition that can be explained by economic factors. According to the definitions in previous studies (e.g., in Cuaresma *et al.* 2011, Ross 2008, and Omgba 2009) this transition would be considered the end of a LD in Cuba, while according to our definition the end of a LD in Cuba would take place when the chief executive no longer belongs to the communist party (i.e., the Partido Comunista de Cuba, PCC).[24]

There are changes in chief executive within the same party that perhaps represent a change in leadership that is due to an individual's leadership style or particular economic conditions.[25] So we are aware that our classification of leadership change is not perfect in all cases, but we believe that it is superior to ignoring the political parties of the leaders holding office and instead

[21] For the complete list of variable definitions and sources, see the online Data appendix at: http://www.bi.edu/research/academic-homepage/?ansattid=a0810301.

[22] See Cheibub and Przeworski (1999) for a discussion along these lines.

[23] Consider for example the case of Sierra Leone, where the Sierra Leone People's Party gets its support from the south and east and the Mende ethnic group. Its main opponents, the All People's Congress Party, gets its support from the north and west and the Temne ethnic group (Robinson and Torvik, 2008). According to our definition it would not have been a leadership change in Sierra Leone in 2007 if Sierra Leone People's Party candidate Solomon Berewa had defeated the All People's Congress Party candidate Ernest Bai Koroma although it would have been a change of president (from Ahmad Tejan Kabbah to Solomon Berewa).

[24] Other example of a non-democratic change in chief executive that according to our definition do not represent a leadership change includes when Ismail Omar Guelleh succeeded his uncle Hassan Gouled Aptidon on May 8, 1999 in Djibouti when his uncle retired and when Daniel arap Moi succeeded Jomo Kenyatta after his death on August 22, 1978 in Kenya. According to our definition, a leadership change did not occur in Kenya until Kenya African National Unions (KANU) candidate Uhuru Kenyatta was defeated by Mwai Kibaki and thus ending nearly 40 years of post-independence KANU rule.

[25] For example, in Paraguay in 1989, February 2, to the surprise of many, and with the backing of the United States, Rodríguez launched a coup against Stroessner. The coup quickly succeeded, with Stroessner fleeing the country within days (Mora, 1998). Both Stroessner and Rodríguez belonged to the Colorado Party, and hence this episode does not qualify as a leadership change according to our definition.

regarding only individual leaders. There are also cases where the chief executive is not associated with a specific party, but is an independent candidate, a military leader, or a hereditary king. In these cases we have no choice but to use their individual term in office as our duration variable.

In our data, the observed period referring to a LD is the date that the chief executive's party rose to power, for which the duration in office is indexed in the DPI. In duration (or survival) models, the process observed may have begun at different dates for various parties present in the sample. By construction, the observations are brought back to January 1 of each year. We restrict our attention to regimes that started in 1975 or later. The year 2006 marks the end of all observation periods. To construct a LD, we primarily use the variable PRTYIN from DPI. The variable PRTYIN is how long the chief executive's party has been in office. Years are counted when the party of the chief executive was in power as of January 1 or was elected but had not yet taken office as of January 1. If a country made a transition from being colony to being an independent nation, the leadership tenure is dated to start at independence. The variable PRTYIN is missing if there are no political parties, if the chief executive is independent of party affiliation, or if the "party" is the army in the case of a military regime. In these cases we use the variable YRSOFFC to construct the LDs. YRSOFFC refers to how many years the chief executive (not party of chief executive) has been in office.

3.2 Natural resources variables

The natural resource measures that we employ correspond to oil, diamonds, and minerals. Information on oil production and prices are from the World Bank's Adjusted Net Savings (ANS) dataset. Our main oil variable, *Oil*, is oil income as percentage of GDP (GDP data is from World Development Indicators, henceforth WDI).[26]

In some specifications oil income is measured per capita instead of as percentage of GDP (*Oil per capita*). We also use alternative variables for oil revenues in order to minimize the potential endogeneity of oil extraction. There is always a concern that some political leaders extract more oil for political reasons, and that any relationship between oil income and duration might partly capture this endogenous effect. Therefore in some specifications we use production volume from the year prior to the start of a new leadership tenure instead of current oil production. The variable *Oil last failure* is equal to oil production the year prior to the start of the current leadership, times the current oil price, and measured as percentage of current GDP. We also use oil production in 1970 (the WB's Adjusted net savings dataset starts in 1970) instead of current oil production, and *Oil 1970* is equal to oil production in 1970 times the current oil price, also measured as percentage of current GDP. Finally we employ proven oil reserves per capita (*Oil reserves*) as robustness check on the other oil variables (data on proven oil reserves are from EIA).

[26]Oil income equals oil production multiplied by oil price. Oil production is oil production volume in tons. Missing values are replaced by zero if the country does not produce oil domestically. We have consulted Petrodata (Lulia et al., 2007), Energy Information Administration (EIA), and BP Statistical Review of World Energy June 2008.

The *Minerals* variable is from the WDI and equals the product of unit resource rents and the physical quantities of minerals extracted as a percentage in GNI. The minerals included are bauxite, copper, iron, lead, nickel, phosphate, tin, zinc, gold, and silver.

The information on diamonds and classification into lootable diamonds and non-lootable diamonds are from the Gilmore *et al.* (2005) dataset which offers a comprehensive list of all known diamond deposits throughout the world. In our analysis, the variable *Lootable Diamonds* is a dummy variable for the existence of lootable diamond deposits with known production, and the variable *Non-lootable Diamonds* is a dummy variable for the existence of non-lootable diamond deposits with known production.

3.3 Institutions

We use several different institutional variables to classify the LDs into different polity types and institutional subcategories. Our baseline polity type split is based on the POLITY score the year before the leadership tenure started (Marshall and Jaggers, 2009). We categorize as "Democratic" those LDs with a POLITY score greater than 5 when last leadership ended. The LDs are categorized as "Intermediate" if they have a POLITY score between -5 and 5 when last leadership ended. Finally, LDs with a POLITY score lower than -5 when last leadership ended are categorized as "Autocratic".

The POLITY score is compounded of five subindices, of which two have been argued to reflect the level of violent conflict in society (Vreeland 2008). Hence, the use of this index to categorize the LDs could potentially reflect one of the proposed mechanisms relating the natural resource variables to political survival. In order to check whether our results are driven by endogenous LD categorization, we employ two alternative institutional variables that are robust to this critique. First, we employ the combined index proposed by Vreeland (2008) called the X-POLITY index, which is compounded by three of the subindices in the POLITY index: XCONST, XRCOMP, and XROPEN (see the Web appendix in Vreeland, 2008, for details). Second, we employ the XCONST index, since this is the most used institutional subindex of the POLITY IV indices and has the straightforward interpretation of decision rules that constrain the political actions of the chief executive (Marshall and Jaggers, 2009). With respect to the X-POLITY index, which has the range [-6,7], we employ the wide threshold prescribed by Vreeland (2008) in order to categorize the LDs, which correspond to -3 and 4 on the X-POLITY index.[27] With respect to the XCONST index, which has the range [-3,4], we use the thresholds -1 and 2, as proposed by Vreeland (2008).

In addition to dividing the LDs into polity types based on the institutional indices described above, we also use the three institutional indices as separate controls in the respective regressions, and in some regressions also in interaction with the resource variables. We continue using the polity scores prior to the entry of the LDs in order to reduce problems with endogeneity. To

[27] We have also experimented with the range [-2,3], however, this implied too few observations in the intermediate category to make meaningful inference.

facilitate interpretation of the estimates, we normalize all the indices to the range [0,1] and rename these normalized indices to *Polity[0,1]*, *Xpolity[0,1]*, and *Xconst[0,1]*, respectively.[28]

We further classify the democratic LDs according to their constitutions, as either presidential form of government (*Presidential*) or parliamentary form of government (*Parliamentary*), and as majoritarian (*Majoritarian*) or proportional electoral systems (*Proportional*). Finally, the autocratic regimes are classified into *Single party regimes, Personal rule*, *Military regimes* and *Monarchies*. Notice that all LDs are classified according to the regime type they were characterized by at entry (i.e., upon taking power). This is done to avoid endogeneity in the classification due to potential effects the resource variables might have on the institutional variables. So if, for instance, the political leadership changed character from being a parliamentary to being a presidential system, or from being a military regime to being a single-party regime within one LD, the whole leadership tenure is classified as a parliamentary or a military regime.

3.4 Control variables

It has been argued that political stability, and therefore the duration of political leadership, depends on the economic environment in which the leader acts (Lipset 1960). In our baseline specifications we always include (log of) GDP per capita (*GDP per capita*), the growth rate of GDP (*Economic growth*), and the age-dependency ratio (*Dependency ratio*) as variables to capture the country's economic and demographic environment.

The development of sound economic conditions is often associated with the size of a country. The literature on the viability of countries tends to find that large countries are sustainable in economic terms (Robinson 1960). On the other hand, governability of countries seems to become more difficult in large countries (Cuaresma *et al.* 2011). We include (log of) population (*Population*) as a proxy for country size.

In some specifications, we also include a set of economic policy variables (depending on data availability): *Gov't exp.*, *Education exp.*, *Inflation*, and *Trade* (from WDI). For democratic regimes, we include several controls for the political environment in which the leadership operates, including a dummy variable indicating if the political leadership controls all legislative houses when it assumes power (*Exec′s party all houses*); party fractionalization in the legislature when it enters power (*Party fract. in legislature*); the number of years left in the chief executive's current term before a new election must be called (*Years left in current term*) (all based on WDI). Additionally, we include a variable for the age of democracy (*Democratic age*), which is the fraction of years between 1800 and 2006 the country has been an uninterrupted democracy, given that the country was also an independent nation (uninterrupted democracy means an uninterrupted string of positive yearly values of the variable polity IV until the end of the sample). Hence if a country has had an uninterrupted string of positive yearly values of the

[28] We have also experimented with the Polcon index (Henisz, 2002) as an alternative measure of institutional constraints on the executive. The results were very similar as with the other three indices and are not reported in the text. The results from using the Polcon index can be made available upon request.

Polity score from 1800 to 2006 they get a rating of one, and if a country does not have a positive value of the POLITY in 2006 it gets a rating of zero.

3.5 Nelson-Aalen hazard estimates

There is a wide variety of survival models to choose from, and the choice of empirical model generally depends on the properties of the data. In order to assess the properties of our data, we first estimate the (Nelson-Aalen) hazard function for the full sample and examine its properties graphically.[29] Figure 1 in the Introduction graphs the Kaplan-Meier survival estimate for the whole sample of LDs, and distinguishes between those where oil production as a percent of GDP is 1 percent or more at the onset of the LD ("OilRich=1"), and those less dependent on oil ("OilRich=0"). In order to assess the monotonicity of the underlying hazard function, we graph in Figure 2 the corresponding Nelson-Aalen (smoothed) hazard function.

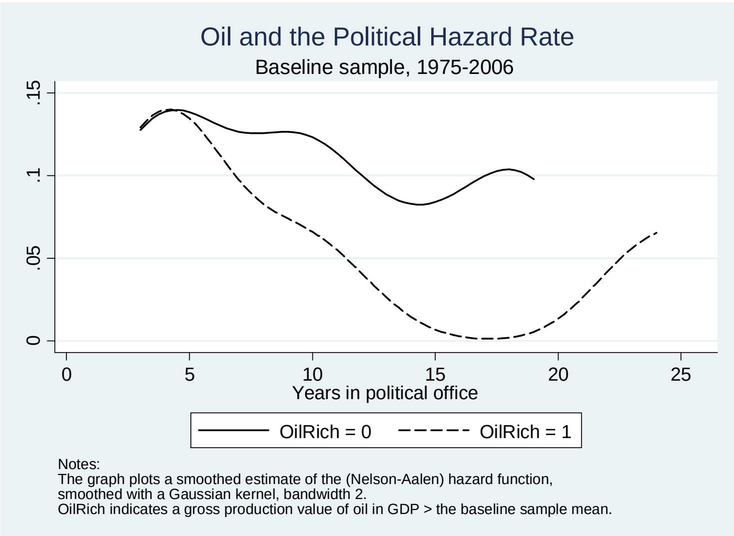

Figure 2: Oil and the political hazard rate in the baseline sample.

The graph indicates a non-monotonic baseline hazard function, where the hazard rate is first increasing and then decreasing, both for the oil intensive and non-oil intensive LDs.

As reviewed in Section 2, the political economy of oil is likely to depend on the level of democracy. In figures 3 and 4, we break the sample into democratic and non-democratic polity types (based on the POLITY index, as discussed in Section 3.3).

[29]The Nelson-Aalen hazard function is estimated using the following estimator, $\widehat{h}(t) = b^{-1} \sum_{j=1}^{D} K_t \Delta \widehat{H}(t_j)$, where $\Delta \widehat{H}(t_j) = \widehat{H}(t_j) - \widehat{H}(t_{j-1})$, $\widehat{H}(t_j) = \sum_{j|t_j \leq t} \frac{d_j}{n_j}$, and n_j is the number at risk at time t_j, d_j is the number of failures at t_j, and the sum is over all distinct failure times less than or equal to t. The variable K_t refers to the kernel function and b is the bandwidth of the kernel smoother. The specific choice of kernel smoother is not essential for the general empirical pattern; in the figures, we employ the Gaussian kernel smoother but we have also experimented with the Epanechnikov kernel smoother, and with a bandwidth that minimizes the mean integrated square error of a Gaussian distribution.

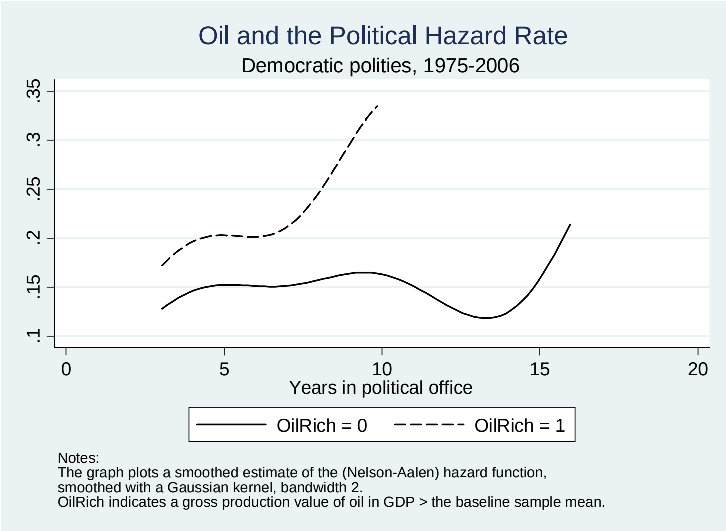

Figure 3: Oil and the political hazard rate in democratic polities.

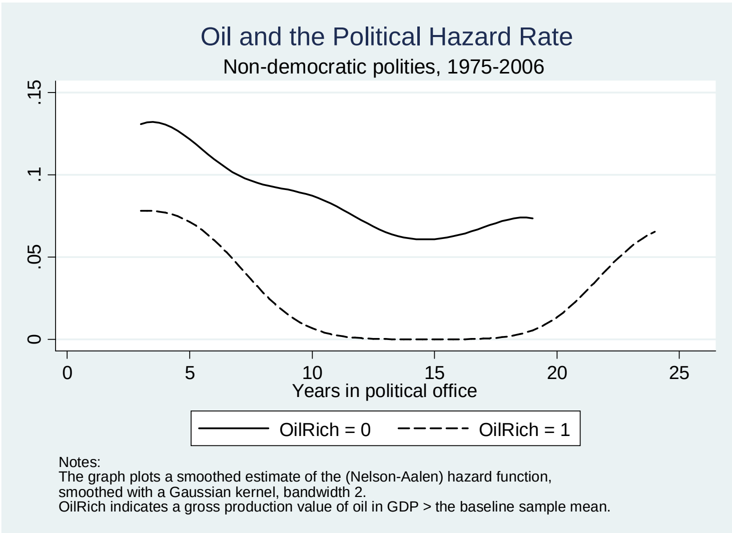

Figure 4: Oil and the political hazard rate in non-democratic polities.

The graphs in figures 3 and 4 are suggestive that the effect of oil may depend on level of democracy, and we investigate this institutional dependency in much more detail below. Here, our primary interest is in the properties of the hazard function, and the figures are indicative of a hazard rate that first increases and then decreases, independent of institutional categorization.[30] Thus, the probability of the current government or the chief executive being ousted appears to be relatively low immediately after an election (or after a non-democratic transition of executive power), then it increases, and finally it decreases for governments and executives that succeed in staying in power for a sufficiently long period of time.

[30] Section 3.6 investigates the properties of the survival function more rigorously.

3.6 Model selection and the log-normal survival model

Several classes of survival models are consistent with the hazard functions graphed out in Figures 2–4, such as the semi-parametric Cox model and a variety of parametric survival models. Given that the proper distributional assumptions are made, parametric analysis is more efficient than non-parametric- or semi-parametric models because prospective periods without leadership failures are also informative (Cleves *et al.*, 2002). Hence, if a parametric survival model can be robustly fitted to the data, such a model is preferred over semi-parametric and nonparametric models.

We base our choice of parametric survival model on the Akaike (AIC) and the Bayesian Information Criteria (BIC), where lower test values indicate a better fit to the data.[31] The test results are consistent with our interpretation of the graphed hazard functions in Figures 1–3, and indicate that the non-monotonic survival models (i.e. the log-logistic, the log-normal, and the gamma models) are associated with lower values of the AIC and the BIC statistics than the monotonic models.[32] Additionally, the log-normal model performs better than the log-logistic model, and weakly better than the gamma model. Employing the law of parsimony, the log-normal model is preferred over the gamma model since it relies on fewer parameters. In the continuation, we thus base our main inference on the log-normal survival model, and employ the other models as robustness checks on the main specification.

To facilitate interpretation of the parameter estimates displayed in the ensuing tables, consider the following, simple representation of the log-normal survival model,

$$\tau_j = e^{-\mathbf{x}_j \boldsymbol{\beta}} t_j, \tag{1}$$

where $\tau_j \tilde{\ } Lognormal\left(\beta_0, \sigma\right)$, and where t_j is time at risk for the j'th LD. The associated cumulative distribution function is given by $F\left(t_j|\mathbf{x}_j\right) = \Phi\left(\frac{\ln t_j - (\beta_0 + \mathbf{x}_j \boldsymbol{\beta})}{\sigma}\right)$. We can thus express the survival function as

$$S\left(t_j|\mathbf{x}_j\right) = 1 - \Phi\left(\frac{\ln t_j - \left(\beta_0 + \mathbf{x}_j \boldsymbol{\beta}\right)}{\sigma}\right). \tag{2}$$

The parameter vector $\boldsymbol{\beta}$ can be interpreted by rearranging equation (1) such that

$$\ln\left(t_j\right) = \beta_0 + \mathbf{x}_j \boldsymbol{\beta} + u_j, \tag{3}$$

where $u_j \tilde{\ } N\left(0, \sigma\right)$. Using equation (3), we can express the expected time to failure as

$$E\left(t_j|\mathbf{x}_j\right) = e^{\boldsymbol{\beta}_0} e^{\mathbf{x}_j \boldsymbol{\beta}}. \tag{4}$$

In equation (4), the time to failure at the onset of a LD is equal to the product of the baseline

[31] The AIC is defined as $AIC = -2ln(L) + 2k$, while the BIC is $BIC = -2ln(L) + ln(N)k$. In both formulas, L is the likelihood estimate, k is the model's degrees of freedom, and N is the number of observations.

[32] The test results can be found in Table OA1 in the Online Appendix to "Oil and Political Survival" at: http://www.bi.edu/research/academic-homepage/?ansattid=a0810301

failure time, $e^{\boldsymbol{\beta}_0}$, and the natural base e raised to the power of a linear combination of the vector of regressors, $\mathbf{x}_j\boldsymbol{\beta}$. The term e^{β_k} then has the simple interpretation of the *time ratio* of variable x_{jk}, and expresses the factor by which the time to failure shifts if there is a one unit change in x_{jk}, conditional on the characteristics $\mathbf{x}_{jk}$, and on the remaining parameters β_{-k}.

Some covariates may be time-varying within the LDs, while others may be constant. The value of oil production, for example, vary both across and within LDs, while features of the political institutions may be constant throughout. Whenever a time-varying covariate changes within a LD, the change induces an acceleration (or deceleration) of the predicted *remaining* time to failure, as indicated by the β-estimate of that covariate. Notice that this feature has consequences for the interpretation of the estimates of time-varying covariates. In particular, if a covariate has an autoregressive lag-structure, the interpretation of its respective β-coefficient is not straightforward, because one would need to take into account the endogenous adjustment of that variable. In the case of our main oil variables this should, however, not constitute a major concern. It is generally found in the literature that annual oil prices, and in particular within the time window of the present analysis, approximate the properties of a random walk.[33] Hence, changes in the value of oil production which are induced by changes in the international price of oil, should not be subject to autocorrelation, and hence should be interpreted as permanent, rather than transitory, shocks.[34]

4 Results

4.1 Baseline regressions

Table 1 reports the results from employing the log-normal model on our preferred baseline sample of up to 138 countries and 500 LDs that start in 1975 or later. Additionally, the table also reports estimates based on the full sample with all available countries and LDs (152 countries, 617 LDs), and on the sample of LDs that are excluded from the baseline sample due to data availability (117 LDs from equally many countries).[35]

As discussed in Section 3.1, the baseline vector of explanatory variables contains four classes of variables: natural resource variables, an index of institutional performance, economic variables, and demographics. We introduce the explanatory variables successively, beginning with our

[33] See, e.g., Kline (2008), Hamilton (2008) and Acemoglu *et.al.* (2008).

[34] Our baseline specification employs current value of oil production as percentage in GDP as the main oil variable. Hence, some of the variation in this variable will be attributed to variation in the levels of oil production and GDP. Although oil prices, due to their volatile nature, constitute the main source of variation in our baseline oil variable, the variable may be autocorrelated due to the influence of the other components, which could affect the interpretation of the associated time ratio estimates. To address this issue, as well as other potential sources of biases, we experiment with alternative operationalizations of the oil intensity variable in which the within LD variation in the oil measure is exclusively derived from fluctuations in the oil price. The results from these robustness exercises are presented and discussed in Section 5.

[35] As discussed in Section 3.1, our preferred empirical identification strategy implies conditioning on initial conditions, which constrains the baseline sample to include LDs starting no earlier than 1975 and onwards. We discuss the robustness of our main results with regard to model choice in Section 5.

primary variable of interest, the value of oil production in GDP.

[Table 1 about here]

Column 1 in Table 1 reports the time ratio estimate of the value of oil production in GDP, *Oil*, when all other covariates are excluded. The time ratio estimate of *Oil* of 1.011 is significant at the 10 percent level, implying that a 1-percentage point increase in the value of oil production in GDP is associated with an average increase in the duration of the current political leadership of 1.1 percent. Notice that the magnitude of this estimate is substantial: the estimate suggests that a random LD increasing its value of oil production in GDP by one standard deviation (13.95 percent in GDP) is expected to increase its time to failure by 16.5 percent, which amounts to roughly 10 months at the onset of the LD (from 4.95 to 5.77 years).[36]

We introduce the battery of baseline controls successively in columns (2)–(5) of Table 1. Notably, the estimate of *Oil* remains stable in the range 1.011–1.012 throughout. If anything, adding more controls makes the effect of oil in GDP stronger, both in terms of its time ratio estimate and in terms of statistical significance (in column (5), the p-value of the *Oil* variable is .007; not reported in the table). We interpret this as an indication that the effect of *Oil* does not appear to be significantly confounded with any of the included covariates.

In column (2), additional natural resource measures are added to the specification to investigate whether there is a distinction between resource *value* and resource *type*. The variable *Minerals* measures the net value of mineral production (net of production costs), as a percentage in GDP. As minerals commonly are classified as "technically appropriable" as opposed to, for example, oil and non-lootable diamonds, we might expect this variable and the dummy variable *Lootable Diamonds*, to be associated with shorter LDs. The estimates in tables (2)–(5) provide some support for the hypothesis that technically appropriable natural resources are associated with shorter durations than the mean, and vice versa: *Minerals* are associated with time ratio estimates that are smaller than one throughout, while the time ratio estimates of *Non-lootable Diamonds* are in all regressions larger than one. Both *Minerals* and *Non-lootable Diamonds* are significant at the 10 percent level in Column (5), which is the most demanding regression in the baseline sample in Table 1. The variable *Lootable Diamonds*, however, is never significant, and its effect can hence not be separated from the excluded category of LDs without any diamonds.

The regressions in Columns (3)–(5) employ the baseline set of control variables. The only two variables which are statistically significant in the regressions are per capita growth, *Economic growth*, and the log of the population size, *Population*. When the chief executive's party experiences a higher rate of economic growth, the expected time to failure increases. Additionally, LDs in a country with a larger population size are more frequently replaced. However, neither the polity score (*Polity[0,1]*), the level of GDP per capita (*GDP per capita*), or the demographic composition (*Dependency ratio*) are associated with statistically significant effects. The regressions in columns (3)–(5) thus suggest that several of the control variables, and perhaps

[36] The time ratio is calculated as $(1.011)^{13.95} \approx 1.165$, which further translates into time (months) as follows: $4.95 * 0.165 * 12 \approx 9.80$.

most notably the level of income and the democratic performance, appear inessential for political leadership survival. As will be shown below, however, these aggregated patterns hide heterogenous, nonlinear effects across the different polity types, suggesting that the baseline controls are still relevant. Moreover, the inclusion of the baseline set of controls in the regressions in Table 1 do indeed increase the overall explanatory power of the model, by increasing the log-likelihood by some 6–7 percent (from $\sim$ -580 to $\sim$ -545, comparing Column (2) and (5)).

4.2 Sampling and censoring

The oil variables from the ANS dataset dates back to 1970, while the DPI, from which we construct the LDs and most of our political and institutional covariates, dates back to 1975. This effectively constrains our preferred baseline sample to the 1975–2006 period. This, however, also introduces a potential selection problem. In particular, one might worry that our selected baseline sample introduces a systematic bias due to a systematic correlation between the survival times in political office and the oil intensity of the excluded LDs. Indeed, from the summary statistic in Table A1, it is clear that the excluded LDs are associated with both a higher value of oil in GDP, as well as a longer survival time, than the corresponding mean values. Thus, based on the summary statistic in Table A1, one might expect the baseline time ratio estimates of *Oil* to be downward biased (towards a time ratio estimate of one).

The regressions reported in columns (6)–(11) in Table 1 assess the severity of this potential selection problem. Columns (6)–(8) report regression results on the full sample, which also includes the LDs which began prior to 1975. Additionally, columns (9)–(11) report the results from exclusively employing the sample of LDs that are excluded from our baseline sample. The number of LDs excluded is between 106–117 (one LD per country), depending on the number of controls included in the regression model. The regression results indicate that, if anything, and as expected, the baseline regressions are likely to underestimate the true time ratio parameter associated with the *Oil* variable: In all but one regression (Column (11)), the time ratio estimates in the full and excluded samples are higher than in the baseline sample. In the continuation, when we base our inference exclusively on the baseline sample, the time ratio estimates should thus be interpreted with this potential downward selection bias in mind.

Restricting the sample to LDs which begin in 1975 or later implies that we avoid problems of left-censoring, since our dataset is complete with regard to the onset of all LDs included. For the same reason of completeness, interval censoring is also not a concern. For the observations that are right-censored, meaning all LDs which end after 2006, the censored failure times are mechanically replaced by the estimated survival function, which should not constitute a source of bias as long as the censoring is not correlated with our covariates of interest.[37]

[37] The statistical software package (Stata/SE version 12.0) performs this substitution by default. Although censoring might not be a concern, truncation could potentially be, due to the relatively few 14-15 countries in which we never observe a political failure. In particular, this would be a concern if the properties of the underlying survival function are different for these countries/LDs, and if these properties are correlated with *Oil*. In this specific case, the correlation would necessarily be positive, implying that the time ratio estimates of *Oil* in columns

4.3 Institutional nonlinearities

Our findings so far indicate that oil in particular, but also diamonds and mineral production, are systematically associated with political parties' duration in office. As discussed in the Introduction and in the Literature review, however, the resource effects are likely to depend on the overall quality of the democratic institutions. In this section, we investigate this possibility by interacting the resource variables with the different indices of the level of democracy and the constraints on the executive. As discussed in Section 3.1, we use the polity scores *prior* to the onset of a LD rather than current polity scores. This is to avoid that the institutional variables we condition the resource effects on are influenced by endogenous responses by the current political regime to the resource environment, which would systematically bias our estimates of the resource effects.

In Table 2 we report the results from employing the three normalized institutional variables *Polity[0,1]*, *Xpolity[0,1]*, and *Xconst[0,1]* in separate regressions. First, we employ the three indices in interaction with the resource variables (indicated by "Scale" in the table), and, second, we use the three indices to construct an indicator for LDs that were non-democratic at the onset (*Nondem*=1 if non-democratic, *Nondem*=0 if democratic) which we, in turn, interact with the resource measures (indicated by "Nondem" in the table).

The results in Table 2 are strongly suggestive that the resource effects are contingent on the inherited level of democracy and constraints on the executive. The value of oil production in GDP is a statistically significant determinant of political survival whenever the level of democracy and the constraints on the executive were low at the onset of the LD, i.e., when the values of *Polity[0,1]*, *Xpolity[0,1]*, and *Xconst[0,1]* are close to zero, or when *Nondem*=1. Since the estimated interaction effects are negative (with regression estimates lower than one), the resource effects are smaller the more democratic are the institutions, or, for the *Xconst[0,1]* index, the more institutionally constrained is the executive. The estimates are indicative that the effect of *Oil* completely disappears if the institutional performance is at the maximum, that is, when any of *Polity[0,1]*, *Xpolity[0,1]*, and *Xconst[0,1]* are equal to one. Similarly, the effect is close to zero when the *Nondem* indicator is turned off (i.e. when *Nondem*=0).

The results appear robust to the set of included controls. Considering the full specifications in Columns (2), (3), (5), (6), (8) and (9), the time ratio estimates on *Oil* range from 1.015 to 1.026. This implies that for the LDs with the lowest scores on any of the three indices (= 0), a one standard deviation increase in *Oil* gives an increase in the expected duration of the political leadership of between 13.7 and 25.6 months. Hence, according to these estimates, *Oil* exerts a positive and significant effect on the survival in political office if the LD is sufficiently non-democratic at the onset.

With regard to the three additional resource measures, we find significant effects only for

(6)–(11) are downward biased. Again, this would, if anything, imply a downward bias in our baseline estimates. Since the sample of truncated LDs constitutes at most 2-3% (14–15 out of 571–617 LDs) of the full sample, the extent of downward bias, if any, is likely inessential.

minerals. As with oil, the effects of minerals seem to depend on institutional performance; the estimates suggest that only those LDs with the worst set of democratic institutions are affected. However, the results in Table 2 suggest that the effect of minerals is opposite to the effect of oil in the sense that mineral incomes tend to shorten, rather than lengthen, the expected duration in political office. The time ratio estimates on *Minerals* for the least democratic LDs are in the range 0.862 to 0.915, which implies that a one standard deviation increase in *Minerals* gives a reduction in the expected time to failure of between 17.3 and 11.1 months, respectively. The negative effect of mineral rents is thus also substantial.

The results in Table 2 are in line with existing evidence (Omgba 2008) showing that it is only oil, and not other minerals, that prolongs the duration of state leaders in Africa. One possible explanation for this result, according to Omgba (2008), is that oil requires massive financial investment and considerable production technology. To ensure the profitability of these investments, investors are tempted to give their support to political leaders with whom the contracts were initially negotiated, thereby reducing the risk of losing the property rights that may accompany a change in leadership. Omgba (2008) also highlights that the tensions on the international oil market have global repercussions, adding a strategic aspect that other mining products do not have. Of course these mechanisms might also be driving some of the results in our sample, and might explain why *Oil* always is associated with a statistically and economically significant effect on the duration in political office among the non-democratic polities.

Taken together, the evidence in Table 2 strongly suggests that the political economy of natural resources is dependent on the polity type as identified by the level of the democratic institutions and the constraints on the executive. There is evidence that oil exerts a positive effect and minerals a negative effect on political survival if the LDs are non-democratic at the onset. Moreover, the effects are weaker the more democratic is the institutions, and even completely vanishes for the most democratic polities.

A potential weakness with the way we explore institutional nonlinearities in the regressions in Table 2, is that we do not allow also other economic, political, and demographic variables to have different effects depending on the overall performance of the (inherited) set of democratic institutions. In the next sections we therefore investigate institutional nonlinearities by allowing the parameters of all of the included set of resource variables and controls to vary by polity type. In particular, we divide the LDs into three categories based on the democratic institutions and the constraints on the executive prior to the onset of the LDs.[38]

4.4 Democratic polities

The above results indicate that the levels of oil and mineral income do not matter for political survival in the sample of democratic LDs. In the regressions reported in Table 3, we investigate these effects in more detail on different samples of democratic LDs, as categorized by the three institutional indices *Polity[0,1]*, *Xpolity[0,1]*, and *Xconst[0,1]*. In addition, we control for a

[38] The institutional categorization is detailed out in Section 3.3.

number of political, institutional and economic variables that are either specific to democratic polities, or that are only available for this category of LDs.

[Table 3 about here]

The main message to take away from Table 3 is that adding more controls does not materially affect the estimate of the *Oil* variable. With the exception of Column (3), *Oil* remains not statistically significant throughout—if anything, *Oil* is associated with a negative effect. Hence, oil income appears unrelated to political survival in the democratic polities. Turning to the other resource variables, the positive effect of *Lootable Diamonds* that appeared in Table 2 is not robust to the inclusion of additional economic and policy variables in Columns (4)–(6). *Minerals*, on the other hand, is only significant when the additional economic and policy variables are included. The few statistically significant effects of *Lootable Diamonds* and *Minerals* that we occasionally observe in Table 3 are thus not empirically robust and most likely reflect the influence of outlying observations in single regressions in specific subsamples.

The non-effect of the natural resource variables could in principle be a result of the model specification—however this is not likely to be the case. First, the model is indeed capable of capturing the effects of other covariates, which affect the duration in political office in the expected ways. For example, institutional quality exerts a negative effect on duration throughout the regressions; in better democracies the duration in office is on average shorter. Moreover, the more years a leader has left of his current term in office, the longer is the expected survival in office of his/her political party. Also, not surprisingly, the expected duration in political office is higher in presidential forms of governments.[39] Finally, if the executive's party controls all houses the expected duration in political office is longer, while party fractionalization in the legislative bodies is negative for political survival. The age of a democracy and the electoral system are never significant. The remaining economic and political variables (estimates not reported in the table) are, for the most part, not significant.

In columns (6) through (8), we employ a specification where we control for the average duration (*Average Duration*) of the LDs in a country. Including a measure of the average leadership duration in the country will proxy for the effects of all variables—observables and unobservables—that might be omitted from the regression specifications and that correlate with the duration in office of political leaderships. If the natural resource endowments affect political survival via predetermined (to the current political leadership) institutions and regime types, the effect of the resource variables should, if anything, be downward biased when controlling for observed and predetermined institutional characteristics/regime types and/or the average duration measure. As expected, the *Average duration* variable is highly significant and positively correlated with the survival in political office, indicating that there are country specific effects (variables), not captured by our included resource variables and the set of baseline controls, that are positively associated with the expected duration in office of the political leaderships. With the exception

[39] The finding that presidential regimes have a stronger tendency to political deadlock and longer durations is consistent with key insights in the literature, as argued by, e.g., Cheibub *et al.* (2002), and, in a more recent theory contribution, Robinson and Torvik (2008).

of *Lootable diamonds* that occasionally have a positive and statistically significant time ratio estimate, the resource variables remain statistically insignificant throughout.

In conclusion, the regressions reported in Table 3 confirm that most of the constitutional- and contextual variables that are being added successively into the specifications are robust determinants of political survival in democratic polities, with the expected effects. However, the introduction of these variables have virtually no effect on the estimate of our main variable of interest: the time ratio estimate *Oil* is relatively stable and statistically insignificant throughout.

4.5 Intermediate polities

The nonlinear effects of oil and minerals documented in Table 2 suggest that the resource variables may affect political survival not only in the least democratic LDs, but also among the polities with intermediate scores on the polity and constraints on the executive indices. In this section we investigate in more detail the effect of the resource variables on the subsample of intermediate LDs, which amounts to 98 LDs, 72 failures and 56 countries when employing the POLITY categorization, and 112 LDs, 80 failures and 59 countries when employing the X-POLITY categorization.[40] By our categorizations, compared to democratic polities the intermediate polities suffer from worse overall democratic performance at the onset of the LDs. Democratic performance also correlates with economic performance, as indicated in Table A1, and the intermediate LDs are the poorest performing economies in our sample. In the sample of intermediate LDs the level of real GDP per capita is about one-eighth of the level in the democratic LDs, and one-fourth the level found in the autocratic LDs. As the availability and quality of macro data often is associated with economic performance, the potential vector of controls that can be applied in the intermediate regressions is strongly limited. However, some additional controls are available, and in Table 4 we add these successively to the baseline specification.

In Table 4, first notice that the baseline specification in column (1) suggests strong and statistically significant effects of all resource variables. Moreover, the effects on political survival are in accordance with our priors: the least technically appropriable resources (*Oil* and *Non-lootable Diamonds*) are associated with positive effects; the more technically appropriable resources (*Lootable Diamonds* and *Minerals*) are associated with negative effects. Adding additional controls for openness to trade, the size of government adds little to the explanatory power of the model (the Log pseudolikelihood increases by some 3–4 percent) and the resource effects remain relatively stable throughout.

Because the available set of controls is quite limited for the intermediate category of LDs, one may worry that the resource effects reflect omitted country specific variables. Moreover, the omitted variables may even be influenced by the resource measures. For example, oil may affect the political regime type, which in turn affects the expected duration in office of the parties of the chief executives. In order to address this concern, we control for the average duration in office of

[40] Notice that the regressions when employing the XCONST categorization and the baseline specification did not converge in the intermediate sample.

a political leadership in the countries. Since the average duration in office of a political leadership may correlate with oil, we might expect the time ratio estimates on the resource variables to be downward biased when including the *Average Duration* variable in the regression. However, considering the time ratio estimates on the resource variables in columns (4) and (5) there is little, if any, indication that this type of endogeneity is driving our results. That is, even when controlling for *Average Duration*, the time ratio estimates on the resource variables remain quite stable throughout; the only exception is *Lootable Diamonds*, suggesting that the effect of this variable may be confounded with omitted, country specific variables. We thus conclude that with the possible exception of *Lootable Diamonds* the time ratio estimates of the resource variables in Table 4 not likely reflect unobserved country specific factors excluded from the empirical model.

To sum up our findings for the intermediate polities, we find that natural resource wealth appears to exert a strong effect on political survival. Moreover, the resource type also appears to matter. Oil is the most robust determinant and is associated with longer durations in political office, while lootable diamonds and minerals are associated with shorter durations.

4.6 Autocratic polities

Among the three polity categories, the subsample of autocratic polities is the smallest and consists of up to 77 LDs with the POLITY categorization, only 21 LDs with the X-POLITY categorizations, and 72 LDs with the XCONST categorization. As with the two other categories of LDs, we investigate the robustness of the Table 2 regressions by running separate regressions for the autocratic LDs, and by adding more controls. In particular, we account for regime heterogeneity by including indicators for different types of autocratic regimes: *Personal rule*, *Military regime*, *Single party regime*, and *Monarchy*.

As in the previous two tables, the first column in Table 5, column (1), constitutes the baseline specification. Only *Oil* and *Minerals* are statistically significant with the expected effects in the baseline regression, however, also the diamonds variables have the expected signs. In Column (2) of Table 5 we add two additional economic controls (trade and inflation) and two policy controls (the size of government, and expenditures spent on education, both measured relative to GDP). Neither of these variables are statistically significant, but their inclusion increases the log pseudolikelihood statistics from -103.2 to -72.3. However, little happens to the natural resource estimates of interest; the time ratio estimate of *Minerals* drops just short of statistical significance (with a p-value of 0.13; not reported in the table), and the significance, both economically and statistically, of *Oil* is higher when the additional controls are included. The time ratio estimate for *Oil* increases from 1.029 to 1.047 (with an associated p-value of 0.025; not reported in the table).

We further proceed by investigating the effect of regime type as classified by Geddes (1999).[41] In columns (3) - (6), we include the different regime indicators separately and find that all

[41] See Online Appendix: http://www.bi.edu/research/academic-homepage/?ansattid=a0810301 for details about regime classifications.

except *Personal rule* have strong explanatory power. We find that *Single party regime* and *Monarchy* is associated with longer political durations, and *Military regime* is associated with shorter durations. A similar pattern emerges when including any combination of three of the four regime types in the regressions (with the fourth regime type being the default category); we hence do not report these results. Importantly, regime type appear to be strongly associated with political survival. Moreover, including indicators for regime type in the regressions reduces the effects of the resource measures, both with respect to the time ratio estimates and with respect to statistical significance.

The results when controlling for autocratic regime types suggest that the effect of the resource variables cannot be statistically separated from the effect of the regime indicators. Notice, however, that since the autocratic regime types themselves may be endogenous in the regressions, these regressions should not be given a causal interpretation. For example, if one mechanism by which oil, or other natural resources, affect political survival in autocracies is by facilitating the survival of monarchies or single party regimes, or if oil destabilizes the political leadership by facilitating military dictatorship—both of which would be consistent with our findings—then the estimated effect of *Oil* in these regressions would potentially be strongly biased towards zero. In this case, the estimates in columns (1) and (2), which exlude the potentially endogenous regime indicators, would be closer to the true effect of the resource variables.

As in the intermediate sample, we introduce, in Column (7), the variable *Average Duration* to account for potential omitted, country-specific factors. The time ratio estimate of *Average Duration* is positive and highly significant (with p-values in some of the regressions below .001; not shown in table), indicating that, in the autocratic sample, variation in political survival among the LDs is strongly correlated with unobserved heterogeneity at the country level. When including the *Average Duration* variable together with any combination of three of the four regime indicators, the *Average Duration* variable looses its statistical significance and explanatory power in the regressions (results not shown in the table). Moreover, the *Average Duration* variable is strongly and positively correlated with *Single party regime* and *Monarchy*, and strongly negatively correlated with *Military regime*, suggesting that *Average Duration* is indeed a good proxy for these underlying institutional characteristics.[42] Thus, the inclusion of the *Average Duration* variable in columns (7)-(9) appears to effectively control for regime heterogeneity. It is thus likely that the *Average Duration* variable also captures any *unobserved* cross-country heterogeneity.

Interestingly, the time ratio estimate of *Oil* is still always positive, and even statistically significant in one out of the three regressions (Column (9)) which include *Average Duration*, while the effect of *Minerals* is negative and statistically significant in two out of the three regressions (columns (7) and (8)). Thus, even when including our proxy for unobserved country specific heterogeneity, *Average Duration*, the results indicate that *Oil* and *Minerals* are associated with the expected effects. Notice that for similar reasons as with the regime indicators, also the *Average Duration* variable is likely endogenous. However, even when controlling for *Average Duration*,

[42] The correlation coefficients between *Average Duration* and *Single party regime*, *Monarchy*, and *Military regime* in the autocratic subsample are 0.20, 0.45, and -0.30, respectively.

the resource effects have the expected signs, albeit weaker than in the baseline regressions.

In conclusion, the value of oil in GDP is strongly correlated with political survival in autocratic polities, and the other resource variables also appear to have similar effects (albeit not statistically significant) as in the intermediate sample. However, the effects are strongly correlated with the different autocratic regime types, and in particular with monarchies and single party regimes. Hence, we cannot safely conclude whether it is the natural resource wealth, directly or indirectly via the autocratic regime types, that have causal effects for political survival, or whether it is the regime types *per se* that causes the observed effects. Given that the observed natural resource effects in the autocratic regimes are qualitatively similar to the effects in the intermediate polities, and that the resource effects are strongest in the regressions that exlude the potentially endogenous regime indicators and the *Average Duration* variable, the first explanation seems more plausible than the latter, but, again, the data alone do not allow us to draw this conclusion.

5 Robustness and extensions

5.1 Party versus chief executive

In Section 3.1 we argued that the duration in office of the *party* of the chief executive's is a better measure of the continuation of political power than the duration in office of the chief executive. However, as we also discuss in Section 3.1, making this distinction is not always straightforward, and in some situations following the chief executive's duration may be the preferred choice.

To investigate the robustness of our results with regard to the choice of duration variable, we reran our main regressions from Table 1, Column (5), and the first columns in tables 3–5, but now employing the duration in office of the chief executive as the regressand. The results are reported in Table 6, showing that the main results concerning the strong effect of *Oil* and the institutional nonlinearities remain. In columns (2), (4), (6) and (8) we also control for *Average Duration*, as a proxy for country specific institutions and regime types. One difference when using the chief executive variable as regressand, however, is that *Minerals* and *Non-lootable Diamonds* appear to be of less importance than when considering the party of the chief executive.[43]

5.2 Endogeneity in the *Oil* variable

The regressions reported in Tables 1–5 might not establish causality. First, any variable whether political, policy, or economic is potentially endogenous as these are, at least to some extent, determined in the same political equilibrium as our regressand. This empirical challenge is difficult to solve, and is inherent to most, if not all, empirical cross-country analyses in political

[43] One available intuition for this result, which is in line with our argument in Section 3.1, is that the chief executive's party better captures the duration of political power than the chief executive's term in office. Looking at the intermediate LDs, the amount of durations is about 40 percent larger when employing chief executive's duration than when employing duration of the chief executive's party, indicating a higher intraparty turnover of chief executives within this category of LDs relative to the other categories.

economy and political science. In the above regressions, we have employed predetermined, rather than contemporaneous, measures of the political and institutional variables to reduce the severity of this problem.

Second, the natural resource variables, and in particular the value of oil and minerals in GDP, are potentially endogenous to political leaderships: a political leader with the ambition to remain long in office has a strong incentive to intensify the pace of resource exploration; a farsighted leader also has an incentive to optimize the extraction path; a myopic leader has a strong incentive to overextract resources in the short run. Additionally, the resource variables may be subject to measurement errors. In this section we address this objection by replacing the variable *Oil* with alternative and potentially more exogenous variables in the baseline regressions.

Table 7 shows the results from running the baseline regressions in the first columns of tables 3–5, but with the alternative oil measures. First, we employ the variable *Oil last failure*, which is similar to our main oil variable except that it is calculated using oil production volumes at the time of the last leadership failure, rather than the contemporaneous production volumes. Since a current leader cannot exert any influence upon past production volumes, this variable is arguable less likely to be subject to the type of endogeneity discussed above. The second alternative oil variable in Table 7, *Oil reserves*, is a measure of the size of the proven oil reserves per capita, which, we would argue, is the least endogenous of our oil variables; current leaders can only with great difficulty, and a good deal of luck, have an impact on the amount of oil reserves available under their leadership—at best they may influence upon the level of future reserves by investing heavily in resource exploration. Finally, we employ a variable that is similar to our baseline oil variable, *Oil per capita*, except that it measures the value of oil production per capita rather than in GDP. The reason is that GDP in itself is potentially endogenous to the LDs; for example, a political leader who illegitimately clings to power might be associated with both long durations and bad economic outcomes, generating a positive correlation between our baseline oil variable (which is denominated in GDP) and duration. Denominating the oil variable in the size of the population, rather than GDP, eliminates this potential source of estimation bias.

The time ratio estimates in Table 7 are strongly supportive that our main results with respect to the effect of oil are robust. First, the oil variables have only very weak, and if anything negative, effects on political survival in the sample of democratic polities. Second, the strongest effects are found in the intermediate subsample, for which all alternative oil measures are highly statistically significant. Interestingly, the specifications employing, arguably, the least endogenous oil measure, oil reserves per capita, has the highest overall explanatory power (as indicated by the highest log pseudolikelihood statistic). This is an additional indication that *Oil*'s baseline estimates might be biased downward. Assigning a meaningful economic interpretation to the time ratio estimate of the reserves per capita variable is, however, less straightforward.

5.3 Conflict

As discussed in the literature review, a host of competing or complementary mechanisms may potentially explain why there is a relationship between natural resources and political survival, why this relationship may depend on the type of resource, and why institutions may matter. Several of these mechanisms involve violent conflict, such as oppression by the government, rebel activity, or violent attempts of political takeover by oppositional groups or competing elites.

It is outside the scope of the current paper to investigate all of the different potential and relevant mechanisms. As a simple test on the empirical relevance of conflict, and its association with the resource effects, we have investigated whether the resource effects remain when controlling for different types of conflict variables. This exercise may inform us whether conflict is a key—or even *the* key—mediating variable, or if there may be other, alternative mechanisms at play.

There exist a variety of conflict variables in the literature. Using data from the UCDP/PRIO dataset and from the World Bank, we have run the baseline and the split sample regressions, with and without the *Average Duration* variable, when also controlling for various conflict measures. Importantly, the different conflict measures—which captures internal, interstate, or internationalized conflicts, as well as an index for whether the country is a location of different types of conflicts, and the number of battle-related deaths—are strongly and positively correlated. Hence, the regression results were very similar independent of which conflict measure we use.

In Table 8, we report the results when employing the index for whether the country-year is listed as a location of a different types of conflict.[44] Not surprisingly, whenever statistically significant in the regressions, conflict is negatively related to the survival in office of the political leadership. However, more interestingly, the resource effects remain, and are, if anything, stronger than when not including conflict among the regressors. It is important to note that this exercise is not informative about causality; for a recent line of research focussing on the causal relationship between oil and conflict, conditional on institutional and other contextual variables, see, e.g., Cotet and Tsui (2010) and Lei and Michaels (2012). Nevertheless, our results are suggestive that conflict—whether caused by natural resource wealth or not—is not the only driver, and may even not be a significant driver, of the resource effects that we document.[45]

5.4 Further robustness checks

In addition to the robustness exercises discussed above, we have investigated whether the main results remain robust to: the inclusion of a large battery of regional effects; additional tests for institutional nonlinearities (using interaction terms between *Oil* and the institutional variables

[44] In this index, 0 indicates that the country-year is not listed as location of a conflict, 1 indicates that the country-year is listed as a location of a minor armed conflict, 2 indicates that the country-year is listed as location of an intermediate armed conflict, and 3 indicates that the country-year is listed as location of war.

[45] Notice that there is a moderate drop in the sample size of some 15-20% in these regressions compared with the regressions in tables 1 and 3-5, which may account for the minor deviations in the values and precisions of the point estimates.

in the split sample regressions); alternative survival functions. The results from these exercises strongly indicate that our main results are not driven by the specific political contexts in any of the economic and/or political regions of the world, and that they are robust to a host of different survival models and model specifications.[46]

Considering the autocratic leadership durations, a main concern was whether the time ratio estimate of *Oil* should be assigned to this variable, or whether it could reflect the effects of the different autocratic regime types *per se*. We have investigated this concern by running separate regressions for each of the autocratic regime types, and the main results indicate that *Oil*, whenever statistically significant, is positively related to political survival even in these small subsamples of leadership durations.

6 Conclusion

Motivated by the literature on the political and economic effects of natural resource wealth, we investigate empirically whether natural resource abundance, and in particular the importance of oil in the economy, affect the political leadership's survival in office across countries and over time. In addition to the question of whether natural resources affect political survival, we also investigate whether the type of natural resource matters. Our findings are strongly suggestive that: (1) natural resources affect political survival; but (2) primarily in non-democratic polities; and (3) resource type appears key to whether the resources have positive or negative effects for political survival. Oil is robustly associated with longer political durations in non-democratic polity types, but not in democracies. Minerals, on the other hand, is associated with shorter durations in non-democratic polities.

Theory suggests a large variety of potential mechanisms that relate natural resource income and wealth to the survival in office of political leaderships. The proposed mechanisms include populist and patronage spending, less taxation, group-formation effects, strategic spending, power struggles (within the elites, or between the elites and the opposition), political or violent oppression, international relations and geopolitics, and violent conflict or civil war initiated by rebel groups. It is outside the scope of our analysis to investigate the exact mechanisms behind the resource effects that we document. Analyzing the path from resource type, different dimensions of conflict and elite dynamics, and the duration in office of political leaderships appear to be a natural next step. As a first, exploratory test, we added various conflict measures to our baseline regressions and found that the resource effects remain basically unaltered. This may indicate that also mechanisms that are unrelated to conflict and political violence may be at work. We intend to investigate the role of conflict, as well as other potential mediating mechanisms suggested by theory, in future research.

[46] See the Online Appendix at: http://www.bi.edu/research/academic-homepage/?ansattid=a0810301 for an extensive overview of the additional robustness exercises.

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Table 1
Baseline survival model

	Baseline sample (>1974)					Full sample			Excluded (<1975)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Oil	1.011[a]	1.012[a]	1.012[a]	1.011[a]	1.012[a]	1.016[a]	1.017[a]	1.011[a]	1.013[a]	1.020[a]	1.006
-percent of GDP	(2.29)	(2.36)	(2.41)	(2.33)	(2.69)	(3.32)	(3.40)	(2.51)	(2.42)	(3.09)	(0.61)
Minerals		0.973	0.973	0.969	0.960[a]		1.017	1.001		1.076[a]	1.047
-percent of GDP		(-1.43)	(-1.39)	(-1.60)	(-2.12)		(0.50)	(0.02)		(1.99)	(1.63)
Lootable Diamonds		1.042	1.049	1.043	1.036		1.306[a]	1.338[a]		1.879[a]	1.939[a]
-indicator var.		(0.36)	(0.40)	(0.34)	(0.30)		(2.07)	(2.26)		(2.44)	(2.44)
Non-loot. Diamonds		1.368	1.364	1.371	1.642[a]		1.429	1.796[a]		1.371	1.781[a]
-indicator var.		(1.34)	(1.31)	(1.31)	(2.28)		(1.59)	(3.21)		(0.98)	(1.78)
Polity [0,1]			1.034	1.025	1.032			0.671[a]			0.452[a]
-last failure			(0.17)	(0.11)	(0.14)			(-1.81)			(-2.27)
GDP per capita				0.993	0.963			1.075			1.104
-in logs				(-0.19)	(-0.78)			(1.39)			(0.83)
Economic growth				1.017[a]	1.017[a]			1.032[a]			1.049[a]
-perc., GDP/cap				(1.84)	(1.71)			(3.09)			(2.18)
Population					0.900[a]			0.895[a]			0.901
-in logs					(-2.83)			(-3.11)			(-1.37)
Dependency ratio					0.729			1.680			3.188
					(-0.72)			(1.08)			(1.14)
Sigma	0.98	0.97	0.97	0.93	0.93	1.10	1.07	1.02	1.03	0.96	0.95
Log pseudolikel.	-604.6	-580.6	-579.2	-552.1	-545.6	-806.1	-751.4	-707.2	-158.1	-131.0	-118.7
# Countries	138	137	137	135	135	152	151	148	117	110	106
# Lead. Durations	500	488	486	465	465	617	598	571	117	110	106
# Failures	363	351	351	349	343	466	446	440	103	95	91
Time at risk	2918	2818	2808	2630	2629	5366	4934	4670	2448	2116	2040

Notes: The table displays time ratio estimates using the Log-normal survival model. Z-statistics in parentheses. [a] indicates a level of significance of <10 percent of the two-sided test of the hypothesis that the time ratio is different from 1. Standard errors are robust, clustered at the country-level. *Polity[0,1]* is a normalized measure of the Polity variable and ranges from 0 to 1.

Table 2

Institution and resource interactions

Institutional variable	*Polity[0,1]*			*Xpolity[0,1]*			*Xconst[0,1]*		
Scale/Nondem	Scale	Scale	Nondem	Scale	Scale	Nondem	Scale	Scale	Nondem
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Oil	1.023[a]	1.026[a]	0.997	1.022[a]	1.024[a]	0.998	1.015[a]	1.020[a]	0.998
-percent of GDP	(2.37)	(2.60)	(-0.35)	(2.22)	(2.63)	(-0.35)	(1.87)	(2.27)	(-0.28)
Oil × Inst.var.	0.974[a]	0.972[a]	1.022[a]	0.974[a]	0.971[a]	1.019[a]	0.982	0.977	1.021[a]
-Inst.var. last failure	(-1.77)	(-1.77)	(2.10)	(-1.92)	(-1.97)	(1.87)	(-1.38)	(-1.50)	(1.68)
Minerals		0.862[a]	0.982		0.873[a]	0.989		0.888[a]	0.982
-share of GDP		(-2.68)	(-0.80)		(-2.56)	(-0.51)		(-1.88)	(-0.80)
Minerals × Inst.var.		1.203[a]	0.912[a]		1.131[a]	0.904[a]		1.104	0.915[a]
-Inst.var. last failure		(2.27)	(-1.86)		(2.05)	(-2.29)		(1.40)	(-1.87)
Lootable Diamonds		0.792	1.322		1.086	1.328		1.209	1.277
-indicator var.		(-0.62)	(1.52)		(0.16)	(1.55)		(-0.50)	(1.35)
LD × Inst.var.		1.577	0.612		1.233	0.877		1.056	0.955
-Inst.var. last failure		(0.81)	(-1.62)		(0.32)	(-0.33)		(0.10)	(-0.10)
Non-loot. Diamonds		2.384	1.470		4.026	1.343		3.058	1.667[a]
-indicator var.		(0.89)	(1.38)		(1.10)	(1.06)		(0.98)	(1.81)
ND × Inst.var.		0.609	1.460		0.367	2.798		0.502	1.419
-Inst.var. last failure		(-0.44)	(0.76)		(-0.74)	(1.17)		(-0.55)	(0.30)
Institutional variable	1.216	1.042	0.920	1.077	1.041	1.046	1.108	1.146	0.902
-last failure	(0.99)	(0.16)	(-0.58)	(0.32)	(0.15)	(0.27)	(0.52)	(0.58)	(-0.57)
Baseline controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Sigma	0.94	0.91	0.91	0.92	0.87	0.87	0.93	0.88	0.88
Log pseudolikel.	-555.0	-541.5	-541.5	-489.3	-469.2	-468.3	-490.5	-471.4	-470.7
# Countries	135	135	135	129	129	129	129	129	129
# Lead. Durations	465	465	465	419	419	419	419	419	419
# Failures	349	349	349	309	309	309	309	309	309
Time at risk	2630	2630	2630	2362	2362	2362	2362	2362	2362

Notes: The table displays time ratio estimates using the Log-normal survival model. Z-statistics in parentheses. [a] indicates a level of significance of <10 percent of the two-sided test of the hypothesis that the time ratio is different from 1. Standard errors are robust, clustered at the country-level. *Polity[0,1], Xpolity[0,1]* and *Xconst[0,1]* are normalized measures of the Polity, Xpolity and Xconst variables, respectivley, and range from 0 to 1. Nondem indicates the use of dummy variable which is equal to one if the LD is categorized as either intermediate (anocracy) or autocratic and otherwise (i.e., if democratic) equal to zero. The thresholds used in the categorization differ depending on which polity variable is used; see the main text for definitions.

Table 3
Democratic polities

Institutional variable	*Polity[0,1]*	*Polity[0,1]*	*Polity[0,1]*	*Polity[0,1]*	*Polity[0,1]*	*Polity[0,1]*	*Xpolity[0,1]*	*Xconst[0,1]*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Oil	0.997	0.986[a]	1.000	0.991	0.996	0.998	0.999	1.004
-percent of GDP	(-0.45)	(-1.75)	(0.00)	(-1.10)	(-0.45)	(-0.23)	(-0.12)	(0.51)
Minerals	0.974	0.992	1.006	1.137[a]	1.137[a]	0.969	1.006	1.005
-share of GDP	(-1.04)	(-0.33)	(0.20)	(3.32)	(2.63)	(-1.40)	(0.34)	(0.26)
Lootable Diamonds	1.362[a]	1.499[a]	1.363[a]	1.241	1.394	1.256	1.181	1.185
-indicator variable	(1.82)	(1.83)	(1.87)	(1.17)	(1.35)	(1.32)	(0.96)	(0.88)
Non-loot. Diamonds	1.409	1.227	1.332	1.275	0.890	1.522[a]	1.450[a]	1.382
-indicator variable	(1.49)	(0.67)	(1.29)	(1.09)	(-0.36)	(1.87)	(1.66)	(1.35)
Institutional variable	0.218	0.507	0.193	0.153[a]	0.240	0.140[a]	0.109[a]	0.500
-last failure	(-1.38)	(-0.56)	(-1.31)	(-1.93)	(-0.98)	(-1.94)	(-2.63)	(-0.78)
Democratic age		1.219			1.304			
		(0.53)			(0.70)			
Years left in current term		1.300[a]			1.270[a]			
		(4.66)			(3.67)			
Presidential		1.603[a]			1.287[a]			
-indicator variable		(3.64)			(1.72)			
Majoritarian		0.782[a]			0.879			
-indicator variable		(-1.82)			(-0.93)			
Exec.'s party all houses			1.350[a]		1.343[a]			
-at entry, indicator variable			(2.10)		(1.83)			
Party fract. in legislature			0.775		0.641[a]			
-at entry			(1.33)		(1.85)			
Average duration						1.028[a]	1.021[a]	1.023[a]
						(2.49)	(2.07)	(2.23)
Baseline controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Trade, Inflation	No	No	No	Yes	Yes	No	No	No
Gov't exp., Education exp.	No	No	No	Yes	Yes	No	No	No
Sigma	0.72	0.77	0.69	0.72	0.76	0.72	0.72	0.73
Log pseudolikelihood	-283.7	-236.5	-202.1	-251.4	-163.0	-279.3	-275.7	-251.6
# Countries	87	85	79	85	76	87	87	87
# LD	290	280	218	270	204	290	290	290
# Failures	219	209	158	199	144	219	219	219
Time at risk	1468	1418	1111	1356	1037	1468	1468	1468

Notes: The table displays time ratio estimates using the Log-normal survival model. Z-statistics in parentheses. [a] indicates a level of significance of <10 percent of the two-sided test of the hypothesis that the time ratio is different from 1. Standard errors are robust, clustered at the country-level. *Polity[0,1], Xpolity[0,1]* and *Xconst[0,1]* are normalized measures of the Polity, Xpolity and Xconst variables, respectivley, and range from 0 to 1.

Table 4
Intermediate polities

Institutional variable	*Polity[0,1]*	*Polity[0,1]*	*Polity[0,1]*	*Polity[0,1]*	*Xpolity[0,1]*	*Xconst[0,1]*
	(1)	(2)	(3)	(4)	(5)	(6)
Oil	1.025[a]	1.017[a]	1.017[a]	1.024[a]	1.014[a]	-
-percent of GDP	(2.45)	(1.67)	(1.67)	(2.45)	(1.73)	
Minerals	0.789[a]	0.809[a]	0.819[a]	0.793[a]	0.911[a]	-
-share of GDP	(-2.28)	(-2.06)	(-1.92)	(-2.22)	(-2.03)	
Lootable Diamonds	0.551[a]	0.566[a]	0.541[a]	0.553[a]	0.966	-
-indicator variable	(-2.00)	(-1.66)	(-1.70)	(-1.97)	(-0.11)	
Non-loot. Diamonds	2.491[a]	2.257[a]	2.052[a]	2.369[a]	2.572	-
-indicator variable	(2.53)	(2.13)	(1.66)	(2.17)	(1.01)	
Institutional variable	1.001	1.001	1.000	1.001	1.931	-
-last failure	(0.02)	(0.03)	(0.01)	(0.02)	(1.13)	
Trade		1.004	1.004			
-percent of GDP		(0.64)	(0.66)			
Gov't exp.		1.004	1.002			
-percent of GDP		(0.15)	(0.08)			
Average duration			1.013	1.007	1.077[a]	-
-in years			(0.63)	(0.38)	(2.71)	
Baseline controls	Yes	Yes	Yes	Yes	Yes	-
Sigma	1.02	1.01	1.02	1.02	1.01	-
Log pseudolikelihood	-125.9	-121.3	-121.1	-125.8	-136.5	-
# Countries	56	54	54	56	59	-
# LD	98	95	95	98	112	-
# Failures	74	72	72	74	80	-
Time at risk	585	557	557	585	757	-

Notes: The table displays time ratio estimates using the Log-normal survival model. Z-statistics in parentheses. [a] indicates a level of significance of <10 percent of the two-sided test of the hypothesis that the time ratio is different from 1. Standard errors are robust, clustered at the country-level. *Polity[0,1]* and *XPolity[0,1]* are normalized measures of the Polity and the XPolity variables and range from 0 to 1. The *Xconst[0,1]* regression did not converge.

Table 5
Autocratic polities

Instititional var.	*Polity[0,1]*	*Polity[0,1]*	*Polity[0,1]*	*Polity[0,1]*	*Polity[0,1]*	*Polity[0,1]*	*Polity[0,1]*	*Xpolity[0,1]*	*Xconst[0,1]*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Oil	1.029[a]	1.047[a]	1.030[a]	1.019[a]	1.021	1.015	1.009	1.003	1.016[a]
-percent of GDP	(2.11)	(2.25)	(2.33)	(1.97)	(1.63)	(1.31)	(0.95)	(0.14)	(1.79)
Minerals	0.884[a]	0.798	0.898	0.957	0.922	0.904	0.863[a]	0.194[a]	0.959
-share of GDP	(-1.81)	(-1.52)	(-1.46)	(-0.66)	(-1.17)	(-1.34)	(-2.38)	(-2.96)	(-0.39)
Lootable Diamonds	0.706	0.578	0.644	0.875	0.952	0.747	0.708	NA	0.841
-indicator var.	(-0.63)	(-0.88)	(-0.84)	(-0.29)	(-0.09)	(-0.54)	(-0.77)	-	(-0.33)
Non-loot. Diamonds	1.542	1.027	1.686	1.839	1.257	0.957	0.877	1.674	1.161
-indicator var.	(0.28)	(0.03)	(0.35)	(0.53)	(0.17)	(-0.03)	(-0.12)	(0.28)	(0.13)
Instititional var.	0.011	0.079	0.002[a]	0.041	0.0003[a]	0.117	0.040	1.6E-6	7.929
-last failure	(-1.10)	(-0.58)	(-1.66)	(-0.98)	(-2.13)	(-0.47)	(-0.91)	(-1.49)	(0.69)
Trade		1.000							
-percent of GDP		(0.04)							
Inflation		1.004							
-annual rates		(0.65)							
Gov't exp.		0.948							
-percent of GDP		(-1.04)							
Education exp.		1.379							
-percent of GDP		(1.45)							
Average duration							1.238[a]	1.187[a]	1.158[a]
-in years							(3.06)	(4.15)	(2.84)
Personal rule			1.586						
			(1.03)						
Military regime				0.282[a]					
				(-3.60)					
Single party reg.					4.033[a]				
					(2.07)				
Monarchy						11.18[a]			
						(3.16)			
Baseline controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sigma	1.21	1.13	1.20	1.07	1.13	1.15	1.02	0.66	1.06
Log pseudolikel.	-104.0	-72.8	-99.7	-93.4	-97.0	-97.3	-91.7	-10.7	-91.4
# Countries	45	37	44	44	44	44	45	15	42
# LD	77	60	74	74	74	74	77	21	72
# Failures	56	43	54	54	54	54	56	11	53
Time at risk	577	412	566	566	566	566	577	176	464

Notes: The table displays time ratio estimates using the Log-normal survival model. Z-statistics in parentheses. [a] indicates a level of significance of <10 percent of the two-sided test of the hypothesis that the time ratio is different from 1. Standard errors are robust, clustered at the country-level. *Polity[0,1], Xpolity[0,1]* and *Xconst[0,1]* are normalized measures of the Polity, Xpolity and Xconst variables, respectivley, and range from 0 to 1.

Table 6

Regressions on chief executive using the POLITY categorization

	Baseline		Democratic		Intermediate		Autocratic	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Oil	1.015[a]	1.013[a]	1.006	1.009	1.020[a]	1.016[a]	1.021[a]	1.018[a]
-percent of GDP	(3.63)	(3.96)	(1.03)	(1.49)	(2.40)	(2.28)	(2.48)	(2.16)
Minerals	0.973	0.979	0.979	0.986	1.013	1.036	0.917[a]	0.901[a]
-share of GDP	(-1.47)	(-1.06)	(-1.19)	(-1.01)	(0.14)	(0.40)	(-1.76)	(-2.09)
Lootable Diamonds	1.041	0.969	1.151	1.001	0.839	0.775	1.144	1.171
-indicator var.	(0.34)	(-0.25)	(0.99)	(0.01)	(-0.60)	(-0.90)	(0.34)	(0.43)
Non-loot. Diamonds	1.500[a]	1.365[a]	1.490[a]	1.492[a]	1.331	1.004	1.251	1.045
-indicator var.	(2.22)	(1.72)	(2.01)	(2.19)	(0.96)	(0.01)	(0.38)	(0.08)
Polity [0,1]	0.826	1.046	0.368	0.361	0.645	0.860	0.004[a]	0.065
-last failure	(-1.14)	(0.27)	(-1.18)	(-1.33)	(-0.64)	(-0.22)	(-2.17)	(-0.91)
Baseline controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Average Duration	No	Yes	No	Yes	No	Yes	No	Yes
Sigma	0.85	0.81	0.67	0.64	1.01	0.98	1.03	0.98
Log pseudolikel.	-703.8	-683.7	-351.0	-338.1	-176.3	-171.1	-140.4	-134.2
# Countries	143	143	88	88	66	66	59	59
# Lead. Durations	629	629	382	382	138	138	117	117
# Failures	508	508	312	312	110	110	86	86
Time at risk	3064	3064	1561	1561	741	741	762	762

Notes: The table displays time ratio estimates using the Log-normal survival model. Z-statistics in parentheses. [a] indicates a level of significance of <10 percent of the two-sided test of the hypothesis that the time ratio is different from 1. Standard errors are robust, clustered at the country-level. *Polity[0,1]* is a normalized measure of the Polity variable and ranges from 0 to 1.

Table 7
Alternative oil measures in the Table 2-regressions, colummns (3), (6), and (9)

	Democratic			Intermediate			Autocratic		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Oil last failure	0.996			1.024[a]			1.031[a]		
(using production vol. in last year of failure)	(-0.53)			(2.07)			(2.28)		
Oil reserves		0.899			4.073[a]			1.275[a]	
(proven, per capita)		(-0.80)			(3.67)			(3.14)	
Oil per capita			0.928[a]			3.579[a]			1.149[a]
			(-2.64)			(2.21)			(1.67)
Sigma	0.71	0.73	0.72	1.04	1.01	1.03	1.22	1.22	1.23
Log pseudolikel.	-261.3	-270.3	-282.5	-126.7	-102.2	-126.5	-103.9	-78.6	-104.9
# Countries	78	87	87	56	48	56	45	38	45
# Lead. Durations	268	283	290	98	82	98	77	63	77
# Failures	206	212	219	74	61	74	56	45	56
Time at risk	1360	1401	1468	585	475	585	577	441	577

Notes: All regressions include the baseline set of control variables. The table displays time ratio estimates using the Log-normal survival model. Z-statistics in parentheses. [a] indicates a level of significance of <10 percent of the two-sided test of the hypothesis that the time ratio is different from 1. Standard errors are robust, clustered at the country-level.

Table 8

Conflict

	Baseline sample		Democratic		Intermediate		Autocratic	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Oil	1.012[a]	1.011[a]	0.992	0.993	1.033[a]	1.033[a]	1.029[a]	1.016[a]
-percent of GDP	(2.18)	(2.31)	(-0.79)	(-0.72)	(3.33)	(3.34)	(2.27)	(1.65)
Minerals	0.945[a]	0.948[a]	0.969	0.962	0.700[a]	0.700[a]	0.883[a]	0.872[a]
-share of GDP	(-3.37)	(-2.90)	(-1.28)	(-1.77)	(-5.21)	(-5.12)	(-2.62)	(-2.78)
Lootable Diamonds	0.863	0.792	1.075	0.974	0.382[a]	0.382[a]	0.540	0.682
-indicator variable	(-1.13)	(-1.56)	(0.47)	(0.17)	(-2.86)	(-2.69)	(-1.33)	(-0.87)
Non-loot. Diamonds	1.709[a]	1.702[a]	1.459[a]	1.591[a]	2.523[a]	2.522[a]	1337.6[a]	3012.1[a]
-indicator variable	(2.10)	(2.10)	(1.70)	(2.12)	(1.93)	(1.84)	(10.49)	(7.80)
Polity[0.1]	1.168	1.229	0.391	0.211	1.095	1.095	0.023	0.069
-last failure	(0.72)	(1.00)	(-0.82)	(-1.45)	(0.13)	(0.13)	(-0.94)	(-0.68)
Conflict	0.906[a]	0.896[a]	0.900[a]	0.890[a]	0.705[a]	0.705[a]	1.221	1.143
-Index [0,3]	(-2.11)	(-2.11)	(-2.30)	(-2.48)	(-3.14)	(-3.15)	(1.51)	(0.82)
Average duration		1.032[a]		1.032[a]		1.000		1.135[a]
-in years		(2.21)		(2.21)		(0.00)		(1.73)
Baseline controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sigma	0.87	0.86	0.69	0.69	0.90	0.90	0.94	0.89
Log pseudolikel.	-437.5	-432.9	-232.2	-228.7	-90.6	-90.6	-74.5	-70.4
# Countries	120	120	78	78	51	51	37	37
# Lead.Durations	397	397	248	248	83	83	66	66
# Failures	291	291	188	188	56	56	47	47
Time at risk	2107	2107	1234	1234	463	463	410	410

Notes: The table displays time ratio estimates using the Log-normal survival model. Z-statistics in parentheses. [a] indicates a level of significance of <10 percent of the two-sided test of the hypothesis that the time ratio is different from 1. Standard errors are robust, clustered at the country-level. *Polity[0,1]* is a normalized measure of the Polity variable and ranges from 0 to 1. The *Conflict* index is equivalent to the Conflict Location variable in the UCDP/PRIO dataset (Gleditsch et al. 2002), where: 0 indicates that the country-year is not listed as location of a conflict; 1 indicates that the country-year is listed as a location of a minor armed conflict; 2 indicates that the country-year is listed as location of an intermediate armed conflict; 3 indicates that the country-year is listed as location of war. Notice that there are only two countries (Tanzania and Swaziland) in the Autocratic sample with non lootable diamonds - both of which have no recorded political leadership changes within the sample - which may explain the implausibly high coefficient on this variable.

Table A1
Summary statistics, selected variables

Sample:	Baseline (>1974)	Full	Excluded (<1975)	Democratic	Intermediate	Autocratic
	Mean (St.d/N)	Mean (St.d/N)	Mean (St.d/N)	Mean (St.d/N)	Mean (St.d/N)	Mean (St.d/N)
Duration, party of chief exec.	4.95	8.40	20.45	4.90	4.49	5.57
	(4.00/366)	(11.11/471)	(17.70/105)	(3.20/220)	(4.09/82)	(5.85/63)
Natural resource variables:						
Oil	5.37	6.69	9.63	2.98	7.00	10.11
- Percent of GDP	(13.95/3141)	(15.49/4553)	(18.11/1412)	(7.62/1550)	(16.24/6.49)	(20.77/728)
Minerals	0.63	0.77	1.10	0.71	0.32	0.53
- Percent of GDP	(2.32)	(2.46/4227)	(2.75/1267)	(2.38/1554)	(0.94/621)	(1.86/674)
Lootable diamonds	0.15	0.18	0.25	0.14	0.17	0.20
- Indicator variable						
Non-lootable diamonds	0.10	0.11	0.12	0.10	0.13	0.11
- Indicator variable						
Selected control variables:						
GDP per capita	5356	5075	4425	8798	996	2008
- In constant 2000 USD	(8139/2986)	(7883/4274)	(7218/1288)	(9687/1556)	(1249/623)	(4199/647)
Population	29	34	43	45	17	18
- In millions	(89/3409)	(119/4913)	(167/1504)	(127/1556)	(22/656)	(26/746)
Dependency ratio	0.71	0.72	0.76	0.61	0.81	0.84
	(0.19/3409)	(0.20/4913)	(0.19/1504)	(0.15/1556)	(0.18/656)	(0.16/746)
Institutional variables:						
Institutional quality						
Polity score	2.9	0.8	-3.4	8.3	0.0	-5.7
	(6.9/3021)	(7.5/4553)	(6.8/1532)	(2.7/1562)	(4.5/650)	(3.8/747)
Polity types:						
Democracy (percent of sample)	0.53	0.40	0.16			
Autocracy (percent of sample)	0.25	0.38	0.61			
Intermediate (percent of sample)	0.22	0.22	0.23			
Constitutional rules:						
Presidential (percent of sample)				0.48		
Majoritarian (percent of sample)				0.71		
Regime type:						
Military regime (percent of sample)						0.33
Personal rule (percent of sample)						0.21
Single party (percent of sample)						0.31
Monarchy (percent of sample)						0.15
No. of countries in sample	138	152	117	87	56	45

Notes: In the second row, under the heading 'Institutional measures', 'N' of the 'Duration time' refers to the number of failures in the respective samples.