Natural resources and the tradeoff between authoritarianism and development

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ABSTRACT

Why do African and Middle Eastern countries seem cursed by an abundance of natural resources yet USA, Australia and Norway seem blessed? A growing literature has argued that the benevolence or malignance of natural resources depends upon the quality of institutions. This paper offers a new explanation based on associational freedom and its interaction with the political system. The model predicts that natural resources have an adverse impact on economic performance and transition to democracy in authoritarian regimes but not in democracies. It also predicts that repression of associational freedom will be increasing in natural resources in authoritarian regimes. I test the model’s predictions using fixed-effects regressions on an international panel from 1975 to 2000 and find support.

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1. Introduction

Why do natural resources seem to be a poisoned chalice in African and Middle Eastern countries but not in Australia, Norway and USA? A growing literature has argued that the benevolence or malignance of natural resources depends upon the quality of institutions.1 This paper offers and empirically tests another complementary explanation.

The paper’s first contribution is the provision of a new resource curse mechanism that makes sense theoretically and fits with important features of the descriptive literature on political transition. The freedom to associate is a double-edged sword from an authoritarian’s perspective. It promotes the development of economically productive, apolitical organizations such as firms, clubs and universities. However when people associate freely they may cooperate to overpower the authoritarian, and so it also facilitates transition to democracy. Even if authoritarians explicitly ban political organizations, history demonstrates that political movements can be organized over apolitical networks such as cultural societies, sports clubs and religious groups (Goldstone, 2001).

Consequently, in the case of many apolitical organizations that promote economic growth, rulers can effectively promote both political and apolitical organizations or repress both, but they cannot promote one and repress the other: there is a tradeoff between development and authoritarianism.

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The optimal solution to the tradeoff depends upon the abundance of natural resources. When natural resources are plentiful, dictators have a guaranteed income and can afford to hamstring the economy to maintain their grip on power. Conversely, when natural resources are limited, the cost of repressing associational freedom is high and so dictators have to balance their desire for longevity with their desire for wealth.

In democracies, on the other hand, the pressure of the electoral process does not give politicians an incentive to repress the economy. The result is that natural resources damage development and democratization in authoritarian regimes, but not in democracies. I test these predictions using an international panel from 1975 to 2000 and find support for the model.

Despite the similarity of my model’s predictions to those of the aforementioned papers, the mechanisms and interpretations differ substantially. For example, Torvik (2002) and Olsson (2006, 2007) argue that if institutions are weak, natural resources draw other production factors away from constructive uses towards destructive rent-seeking. In Robinson et al. (2005), weak institutions drive resources towards bloated public sectors that act as vehicles of rent distribution, while in Acemoglu et al. (2004), they also strengthen the hand of authoritarians who favor distortionary taxation. My model emphasizes the role of associational freedom and coordination.2

My model is in spirit closer to Acemoglu and Robinson (2006), who argue that the violence of repression and coups is much more disruptive to the income generated from physical and human capital than it is to the income generated from land. Human and physical capital involve sophisticated interactions and relationships that are sensitive to the upheaval of heavy-handed repression. Consequently, greater natural resource income renders this repression relatively attractive and so democracy and development suffer. Further, the authors argue that natural resource income is more easily taxable and so the costs of democracy to the incumbent autocrats is increasing in natural resources – they anticipate higher taxation of their income under democracy.

Needless to say, much repression of associational freedom requires conventional, heavy-handed violence, but it is not the violence per se in this paper that is stunting economic performance – rather it is the explicit activities being banned. This distinction is important since effective repression can be high without the presence of overt violence.

This paper’s second contribution is empirical. I am able to test my model using fixed-effects panel regressions. This helps mitigate the difficulty of finding genuine exogeneity in natural resource data. To the best of my knowledge, all other papers that investigate the impact of natural resources on economic performance (rather than, say, democracy or corruption) rely on purely cross-sectional variation for identification.3 I am able to exploit some within-country variation; I make this more pronounced by demonstrating robustness of results to using only countries which democratize during 1975–2000.

This paper is organized as follows. Section 2 discusses associational freedom and democratization. Section 3 is a model of the effect of natural resources. Section 4 is the empirical analysis. Section 5 concludes.

2. Background: associational freedom and democratization

2.1. Setup

Imagine an economy with output $Y(R, L)$, where $R$ is an endogenous policy instrument at the ruler’s disposal and $L$ is a parameter. Under an authoritarian regime, the ruler is unrestricted in his choice of $R$. Given payoff $U(R; L)$, his problem is $\max_{R} U(R; L)$ with resulting indirect utility $v(L)$ (I will specify the exact forms of these optimands later).

In a democracy, the ruler is held accountable by elections. I follow Becker (1958) and McGuire and Olson (1996) in abstracting from issues of redistribution within the electorate, assuming that there is unanimous agreement among the electorate in their preferences over $R$. This is admittedly a huge simplification of the intricacies of comparing authoritarian and democratic regimes. The goal is to capture in the simplest possible way a key difference between the two regime types: authoritarians are less bound to respond to the desires of the polity than are democratic leaders (Dahl, 1989). In Appendix, I relax this assumption and consider the possibility of a continuum of regimes between pure authoritarianism and pure democracy and demonstrate that the intuition of the model’s predictions is unaffected.

Under this simplified view of the political system, let $\hat{R}(L)$ represent the ‘people’s choice’. Democratic elections are costless, instantaneous and perfectly frequent (Becker, 1958) so that any deviation from $\hat{R}(L)$ is immediately punished by removal from office. Therefore as far as a democratic ruler is concerned, $\hat{R}(L)$ represents the only choice.

2.2. Associations and the collective action problem

Collective action problems (henceforth CAPs) arise when the efforts of two or more individuals are needed to accomplish an outcome (Sandler, 1992). Sandler (1992) makes the uncontroversial remark that “the need for collective action abounds in any advanced society.” Ostrom (2000) echoes this view by noting that activities as diverse as trade, insuring risk and

2 Other recent contributions to the literature on the resource curse include Bulte and Damania (2008), Bornhorst et al. (2009) and Tsui (2010).

protecting natural resources all fall under the umbrella of CAPs. One can think of the economy's output $Y(R,I)$ being the result of a multitude of CAPs.

Theoretical analysis of CAPs has focused on two games: the prisoner’s dilemma (henceforth PD) and the coordination game (henceforth CG), shown in Fig. 1\(^4\):

![Fig. 1. Prisoner’s dilemma (PD; left) and the coordination game (CG; right).](image)

In both games, $(C,C)$ is the ‘desirable’ efficient outcome, but only in the CG is it actually an equilibrium. The key characteristic of these two games is the existence of an inefficient equilibrium $(D,D)$. The collective action problem can be restated as maximizing the probability of $(C,C)$ emerging.

A sizeable experimental literature (see the reviews in Davis and Holt, 1993 or Kagel and Roth, 1995) demonstrates humanity’s failure to consistently solve the CAP, be it in PD or CG form. Moreover, there are no theoretical grounds for ruling out $(D,D)$ in a one-shot setting.\(^5\)

In principle, operationalizing the solving of the CAP requires two steps. First, in the case of the PD, transforming the game such that an efficient outcome actually becomes an equilibrium (e.g., repeating the game and applying the Folk theorem; see Ben-Porath and Kahneman, 1996; Dasgupta, 2002).\(^6\) Second, in both games, in the face of multiple equilibria, ensuring that the efficient one emerges.

In practice, arguably the most important tool for solving CAPs is the creation of associations (something that I will not model explicitly; see Appendix for a more formal treatment). I define associations simply as sustained, explicit communication channels between the participants. Thus they include everything from firms to neighborhood watch schemes. The communication allows for monitoring and, when combined with the horizon of interaction, permits mutual enforcement, i.e., the Folk theorem.\(^7\)\(^8\) Moreover in the face of multiple equilibria, there is a large body of experimental evidence confirming that communication aids coordination.\(^9\)

Extensive fieldwork has established that individuals in all walks of life and all parts of the world voluntarily form and participate in associations to solve CAPs. In the context of managing common property resources, Ostrom (2000) found the following factors to be the most important:

- Clear boundary rules
- Clear usage rules
- The individuals affected by the rules participate in rule-making
- The stakeholders select and hold accountable the monitors
- Graduated sanctions for rule-violation
- Access to conflict-resolution arenas

Associations are a critical way of providing these factors in a structured manner. In the case of firms, at first sight, it may seem odd to imagine associational freedom as being a substantive input to production. Yet many of the games in the aforementioned coordination literature are models of actual production processes (e.g., Weber, 2006). Moreover the literature on commodities with network externalities also identifies an important role for associations and communication in establishing efficient standards (Katz and Shapiro, 1994). Cutting-edge scientific advancement also depends critically upon flexibility in communication across organizational, geographical, and disciplinary lines (Price and Bass, 1969).

Politically motivated internet censorship is another example of how repressing associational freedom can hinder the private sector’s productivity. Rules and regulations in China (Abbott, 2001) and Singapore (Hogan, 1999) limit the availability of the internet, render it slower and more costly to use, and curtail competition among domestic internet service providers and from foreign technology companies. A particularly stark illustration is the recent threat of suspension of BlackBerry services in Dubai over political security concerns. Such a ban would, as one CEO described it, be “massively disruptive. . . to

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\(^5\) To my knowledge, there is no generally accepted model of the probability of reaching the efficient equilibrium in CGs (see, for example, Harsanyi and Selten, 1988; Medina, 2007 for attempts). However the experimental empirical evidence (see below) leaves one in little doubt that in reduced form it can be treated as a probability that is a function of certain exogenous factors such as communication channels, experience and so on. Assertions that the Pareto efficiency of $(C,C)$ rules out the inefficient equilibrium $(D,D)$ are not supported by the data.

\(^6\) Verbal sanctions can also promote cooperation in PDs despite technically having no bearing on material payoffs (Ostrom et al., 1992).

\(^7\) Ostrom (1990, 2000), Dasgupta (2002); also see Durlauf and Fafchamps (2004) review of the social capital literature and Ahlerup et al. (2009).

\(^8\) Note that exploiting the Folk theorem to attain efficiency in a PD involves transforming the PD into a coordination game (since repeated play of $(D,D)$ can never be ruled out as an equilibrium). See, for example, Osborne and Rubinstein (1994).

our own working practices.” Further the Arab Spring of 2011 has seen politically motivated disruption of internet services by governments lead to a stifling of commerce (Hoyle, 2011; Rhoads, 2011).

Several empirical studies have found a positive relationship between civil liberties and economic performance (e.g., see Scully, 1988; Alesina and Perotti, 1994). One of the mechanisms that underlies this relationship is the positive impact of civil liberties (and hence associational freedom) on foreign direct investment and education (FDI; see Harms and Ursprung, 2002; Jensen, 2003; Busse, 2004; Blanton and Blanton, 2007), a more subtle and indirect link between associational freedom and economic growth. (FDI in turn promotes growth primarily through the diffusion of superior technology and knowledge; see Barrell and Pain, 1997; Borenstein et al., 1996; De Mello, 1999.) Authoritarian regimes also favor controls on the opportunities to associate and trade with foreigners for fear that it might undermine their political power, despite the adverse economic consequences (Eichengreen and Leblang, 2008; Yu, 2010).

Therefore one can think of output $y(R_L)$ being responsive to the prevalence of associational freedom in the economy. Though not without controversy, democracy is generally considered to be a desirable collective goal (Becker, 1958; Dahl, 1989). Establishing a democratic government is a particularly complicated CAP. It is a process riddled with PD and CG aspects essentially because authoritarians oppose transition and punish insurgents accordingly.

In light of the massive complexity of democratization, associations should in principle play a hugely important role. Knowing this, authoritarians ban autonomous political organizations (Przeworski, 1991). This should cripple any attempts at successful transition – so why do we still see successful democratic transitions?

2.3. Democratization and economies of scope in associations

One facet of the answer is that associations have fundamental economies of scope. While specific associations may develop sophisticated rules and mechanisms for solving CAPs in a narrow context, the horizon and communication channels that define them can always aid, albeit imperfectly, the solution of other CAPs. Associations that are apolitical in conception can be mobilized for political goals.

This history of democratic transition – and political movements more generally – is littered with descriptions of how pre-existing apolitical organizations end up being vehicles of political change. According to Lichbach (1995) and also Moore (1995), dissidents rarely build organizations from scratch. Pre-existing associations help principally by reducing the transactions costs of social contracts: they allow communication, they permit the acquisition of information for monitoring, and they act as an environment for rewards and sanctions. From a more psycho-sociological perspective, they also help create shared goals, they provide a background of reciprocity and they increase the dissidents’ sense of personal efficacy. That is why historically, argues Lichbach, dissidents recruit heavily at meetings of both formal and informal community organizations.

These sentiments are echoed by McAdam and Paulsen (1993), who review an extensive literature confirming the importance of organizational ties and prior contact with movement participants to individual political activism. In fact in some contexts, it appears that pre-existing organizations not only act as substitutes for new organizations, but they can act as complements too. Their study of the 1964 Mississippi Freedom Summer Project exposes the importance of interpersonal ties in easing the uncertainty of mobilization and in helping develop a sense of efficacy in individuals, factors that are perhaps not best addressed using game theoretic models. Snow et al. (1980) find similar results using data from a variety of associations, as do Opp and Gern (1993) from data on the East German uprisings of 1989.

Goldstone’s (2001) review of the revolutions literature arrives at the same conclusion: “One key finding is that revolutionary actors do not act, or even think of themselves as acting, alone. They are recruited through pre-existing networks of residence, occupation, community, and friendship.” (2001: pp. 151–153).

It is worth noting that while associations that are apolitical in conception can be mobilized for political goals, they can also be mobilized to help strengthen an authoritarian’s grip on society. For example governments in the Persian Gulf often chose to infiltrate rather than eliminate certain types of apolitical organization (Crystal, 1995). However the inherent dynamism and unpredictability associated with the organizations that most drive growth means they cannot be infiltrated by government agents and still perform to their potential, nor can the government be confident that they will not transform into vehicles of insurgency.

2.4. Controlling associational freedom and implications for democracy

Legal and coercive barriers to communication make association harder. Let $R$ represent wide-ranging repression of association-building – if it is not wide-ranging, then economies of scope in the associations will circumvent and hence nullify the repression. In other words, it is not enough to repress individual associations as collective action will just piggy-back on other associations. An extreme example of combating this would be martial law where there is a lockdown on

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11 In principle, increasing associational freedom can damage social welfare as it permits rent-seeking groups to form. However empirically, we find that improving people’s capacity to associate improves economic performance and governance (see Evans, 1996; Boix and Posner, 1998; Bowles and Gintis, 2002; Rothstein, 2002; Ahlerup et al., 2009).

virtually all association. In Section 3, I will mention examples (post-revolutionary Russia, the Persian Gulf in the 1970s and 1980s) of relatively widespread associational repression in an attempt to combat economies of scope on association. The implication of the economies of scope is that successful repression of democratic transition requires repression of the rest of the economy. Attempts at solving other apolitical CAPs are inevitably tripped up as the authoritarian clamps down on all association. Repression of associations is a double-edged sword: it strengthens the authoritarian’s rule, but it also hampers the economy. Letting \( q \) denote the probability of transition to democracy, we have:

\[
Y = Y(R, L), \quad Y_R < 0; \quad q = q(R), \quad q' < 0
\]

In other words, there is a tradeoff between authoritarianism and development. The next section builds a model based on these relationships that explains why natural resources can be a poisoned chalice for the economy.

3. The effect of natural resources

Divide the economy into two sectors: \( Y = L + X \). Let \( L \) denote the natural resource sector and \( X \) denote the rest of the economy (henceforth regular income). Imagine a dictator who, every period, receives a fixed income \( rL \) from natural resources, where \( r \) is the exogenously given proportional tax-rate on natural resources. The dictator also receives an income \( rX \) from the regular income. Both these incomes are dependent upon the dictator being in power. His probability of retaining power next period is \( p = 1 - q \). If overthrown, the dictator is forever replaced by a democracy.

Recall that \( R \) represents repression of associations. The dictator’s survival probability is increasing in repression \( (p' > 0) \) and regular income is decreasing in repression \( (X' < 0) \). These two relationships reflect the economies of scope in associations discussed in Section 2.

Finally, I assume that natural resource income \( L \) is not affected by repression. Natural resource wealth is highly capital intensive with a majority of unskilled labor (Ross, 2001). The relatively low intensity of labor, unlike many agricultural products in developing economies, means that natural resources such as oil require little contact with the rest of the economy. They form revenue sources that are independent of the local economy (Crystal, 1990). Finally, Acemoglu and Robinson (2006) claim that natural resource income is less sensitive to the kind of heavy-handed repression that can be part of efforts to repress associational freedom.

The dictator’s problem is:

\[
\nu(L) = \max_{R} \left\{ L + X(R) + p(R)\nu(L) \right\}
\]

Note that I have suppressed the tax terms as they are irrelevant to what follows. Letting \( R^* \) denote the unique solution to the problem, we have the following simple comparative statics:

\[
\frac{\partial R^*}{\partial L} > 0 \quad \Rightarrow \quad \frac{\partial p^*}{\partial L} > 0, \quad \frac{\partial X^*}{\partial L} < 0
\]

In words, in authoritarian regimes, increasing natural resources leads to (1) a smaller likelihood of transiting to democracy and (2) smaller regular income. In contrast, once an authoritarian regime has democratized, \( p' < 0 \). This is because a democratically elected leader seen to be repressing the economy will be swiftly removed from office by the democratic process. As such, in a democracy, \( R = R^* = 0 \) (the people’s choice from Section 2.1) and no natural resources should have no impact on regular income.

The model’s logic is simple. Authoritarians face a tradeoff between authoritarianism and development when selecting repression: increasing repression leads to a higher probability of remaining in power at the cost of lower income while in power. In the absence of natural resource income, the ruler chooses between having an impoverished yet iron-like grip over a bunch of disassociated hermits (high \( R \)) and lucrative leadership over a wealthy civilization that is knocking on the door of democracy (low \( R \)).

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13 For a more formal treatment of this model, see Appendix. Given how straightforward the logic of this paper’s argument, I felt it unnecessary to burden the reader with such formality.

14 As an aside, this model is indirectly arguing that there is a structural relationship between democracy and development that is driven by associational freedom. This speaks to the extensive literature on the observed positive relationship between democracy and development (Lipset, 1959; Przeworski et al., 2000; Gundlach and Paldam, 2009).

15 By natural resources, I refer to point resources (Bulte et al., 2005), which include fossil fuels and precious minerals. See the data section for more information.

16 In Appendix, I show how the weaker assumption that natural resource income is merely less responsive to repression of associations than regular income delivers the same predictions. I make the stronger assumption merely for ease of exposition.

17 I relegate to Appendix the simple assumptions required for existence and uniqueness of the solution, as well as its differentiability.

18 See Wirl (2009) for a study of how international political considerations may affect OPEC’s behavior above and beyond the economic considerations studied in this paper.
If natural resource income is large, its insensitivity to repression shifts the balance of power in favor of the authoritarian. The relative cost of raising repression diminishes as the authoritarian has more guaranteed income, permitting him to rule over the parochial hermits without having to give up the good life.

In a democracy, the incentive structure is such that governments do not repress their subjects’ associational freedom in an attempt to stabilize their power. This is true regardless of the presence of natural resources, therefore eliminating the adverse effect of natural resources on regular income. While an autocratic king may be tempted to elevate his repression of his subjects’ associational freedom in response to a resource boom despite the adverse consequences on the rest of the economy, a democratically elected prime minister will not.

The logic of this model has been touched upon by several other studies. Crystal (1995) applies the same reasoning to explain why monarchs in the Persian Gulf over the last 30 years have been deeply suspicious of all organized groups. Even seemingly innocuous associations such as sports and student clubs have been either banned or infiltrated by the state with the explicit goal of retarding the polity’s ability to solve CAPs. Bueno de Mesquita et al. (2003) remark that the presence of natural resources means that authoritarian regimes do not need to rely on the economic activity of their citizens to acquire surplus. While not tying in the issue of natural resources, Przeworski (1991) acknowledges heterogeneity in how repressive of associational freedom authoritarians are: “Obviously, not all dictatorships are the same. Some tolerate no autonomous organizations of any kind... Others are more selective; they ban unions and parties but tolerate stamp collectors’ societies, churches or producers’ associations. But no dictatorship permits autonomous organization of political forces.” (1991: p. 54). The government of post-revolutionary Russia fell on the more austere end of the spectrum by choosing to ban any form of organization in the immediate aftermath of the revolution (Smith, 2002).

4. Empirical analysis

4.1. Econometric approach

The model has the following predictions.

Prediction 1. The probability of democratization is decreasing in natural resources; \( dp/dl < 0. \)

Prediction 2. Regular income is decreasing in natural resources in authoritarian regimes (\( dX/dl < 0 \)) but not in democracies (\( dX/dl = 0 \)).

Prediction 3. Associational repression is increasing in natural resources in authoritarian regimes (\( dR/dl > 0 \)) but not in democracies (\( dR/dl = 0 \)).

Prediction 4. Conditional on associational repression, natural resources have no effect on the probability of democratization: \( dp/dl|_{R=r} = 0. \)

Prediction 5. Conditional on associational repression, natural resources have no effect on regular income: \( dX/dl|_{R=r} = 0. \)

In fact, Predictions 1 and 2 hold if there is any controllable factor \( R \) that damages economic performance, sustains authoritarianism and has no effect on natural resource income. For example, the negative of education could arguably fulfill these criteria. Predictions 3–5 depend upon explicitly specifying \( R \). I therefore test these two sets of predictions separately in case the logic of the main model is correct but we have merely failed to correctly identify the variable \( R \). I refer to Predictions 1 and 2 as the basic model and Predictions 3–5 as the associational repression model.

To test these predictions using international data, I need exogenous variation in natural resource income. This is extremely difficult to find.\(^{20}\) The empirical literature on the resource curse has typically relied on cross-country growth regressions where all the endogenous variation is between.\(^{21}\) Essentially, this involves checking if countries that have abundant natural resources tend to grow more slowly than ones that do not (conditional on other observables, which includes institutions in the case of Mehlum et al., 2006).

I extend this by using a panel. Since many countries in the panel democratize, this means that some of the variation is within-country. For example, country X has a relatively high resource endowment and democratized, and the value of its resource endowment varied substantially. We can see if this seemed to have adverse effects prior to the democratization vis-à-vis afterwards. If unobserved heterogeneity is larger between countries than it is within countries (which is plausible, though is impossible to confirm), it is preferable to rely on within variation for identification. To further shift the burden on within variation, I use fixed-effect regressions in the panel.

For most of the basic specifications of our econometric models, I undertake a two-pronged approach to robustness. To test for sensitivity to the countries included, I re-estimate the basic model nine times, each time omitting countries from one of the following regions (Africa, Asia, Eastern Europe, Western Europe, Latin America, North America, Oceania, Middle East, and Islamic countries). To test for sensitivity to the inclusion of \( k \) additional explanatory variables, I reestimate the basic

\(^{20}\) For an important exception, see Tsui (2011).

model \( k \) times, each time including one of the \( k \) additional variables, as well as one time with all \( k \) included. These results are available upon request.

4.2. Data

Not all data are available for all countries, but all models are estimated for data between 1975 and 2000 for up to 95 countries. Let \( i \) subscripts denote country and \( t \) subscripts denote year. Precise descriptions of the data used and its sources can be found in Appendix. I here elaborate on some of the most important series.

Natural resource data is value added from mining and quarrying activities per capita at 1995 USS PPP. The source is the UN statistical database.\(^2\) Using this data, as expected, the Gulf authoritarian states are among the best endowed. However in general, natural resources are not significantly correlated with political system (in fact, democracies have slightly higher endowments). Table 1 gives a flavor of the data.

The data on political system comes from Papaioannou and Siourounis (2005), which is in turn based on Polity and Freedom House indices; it is a binary variable that takes the value ‘1’ for a democracy and the value ‘0’ for an authoritarian regime. In our sample, there are 24 countries that are authoritarian throughout, 27 that are democratic throughout and 44 that democratize at some point. Approximately half of the country-year observations are democratic vis-à-vis authoritarian. Table 2 gives a flavor of the data.

Associational repression is the most difficult variable on which to obtain data. I use the negative of the Freedom House series on civil liberties. Freedom House construct the index based on four checklists: (A) freedom of expression and belief,

\(^2\) I standardize natural resource income by population. To understand why, note that the dictator in the model is not literally a single person, but rather a representative of a minority group. I am assuming that the absolute size of this group is linear in population.
(B) associational and organizational rights, (C) rule of law, and (D) personal autonomy and individual rights. It is (B) that is the most relevant as a measure of associational freedom because it is based on the answer to the following questions:

1. Is there freedom of assembly, demonstration, and open public discussion?
2. Is there freedom of political or quasi-political organization? (NB: this includes political parties, civic organizations, ad hoc issue groups, etc.)
3. Are there free trade unions and peasant organizations or equivalents, and is there effective collective bargaining? Are there free professional and other private organizations?²³

Given the other components of this index, it is a partial measure. To attenuate its noisiness, I also have a series on law and order (see Appendix for a description). In principle, it can allow one to isolate the variation in the Freedom House index that is from associational freedom.

²³ Admittedly this series makes value judgments about what does and does not constitute repression of associations, e.g., in the US, one would face government obstacles in creating an organization that preaches hatred towards other races and only permits membership to people of certain races. The Freedom House definitions do not shed too much light on where such lines are drawn.
Table 3
Basic results from a pooled probit.

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Democratization dummy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Probit number</strong></td>
<td><strong>3.1</strong></td>
</tr>
<tr>
<td>Log natural resource income per capita (US$ 1995 PPP)</td>
<td>−0.118 [-0.051]</td>
</tr>
<tr>
<td></td>
<td>(−0.018)</td>
</tr>
<tr>
<td></td>
<td>−0.101 [-0.062]</td>
</tr>
<tr>
<td></td>
<td>(−0.007)</td>
</tr>
<tr>
<td>Literacy (% of population over 15) [log(L/(100 − L))]</td>
<td>0.233 [0.159]</td>
</tr>
<tr>
<td></td>
<td>(0.021)</td>
</tr>
<tr>
<td></td>
<td>0.217 [0.173]</td>
</tr>
<tr>
<td></td>
<td>(0.009)</td>
</tr>
<tr>
<td>Education (average schooling years)</td>
<td>0.008 [0.110]</td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
</tr>
<tr>
<td></td>
<td>−0.044 [0.115]</td>
</tr>
<tr>
<td></td>
<td>(−0.003)</td>
</tr>
<tr>
<td>Urbanizations [log(U/(100 − U))]</td>
<td>0.092 [0.145]</td>
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<tr>
<td></td>
<td>(0.006)</td>
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<tr>
<td></td>
<td>0.004 [0.166]</td>
</tr>
<tr>
<td></td>
<td>(0.0001)</td>
</tr>
<tr>
<td>Radios per capita</td>
<td>0.031 [0.866]</td>
</tr>
<tr>
<td></td>
<td>(0.0003)</td>
</tr>
<tr>
<td></td>
<td>0.285 [1.059]</td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
</tr>
<tr>
<td>Associational repression</td>
<td>−0.59 [0.079]</td>
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<tr>
<td></td>
<td>(−0.020)</td>
</tr>
<tr>
<td>Constant</td>
<td>−1.587 [-0.431]</td>
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<td></td>
<td>(−3.746)</td>
</tr>
<tr>
<td></td>
<td>(−0.067)</td>
</tr>
<tr>
<td>Observations</td>
<td>814</td>
</tr>
<tr>
<td>Pseudo R-squared</td>
<td>7%</td>
</tr>
<tr>
<td></td>
<td>26%</td>
</tr>
</tbody>
</table>

Standard errors in brackets.
Change in probability of democratization from a one-SD shift in explanatory variable in braces (evaluated at mean of all explanatory variables).

** 5% significance.
*** 1% significance.

4.3. Tests of the basic model

Let $D_t$ be a dummy variable denoting democracy ($D_t = 1$) or authoritarianism ($D_t = 0$). To test Prediction 1, I wish to estimate the following panel probit:

$$
\Pr (D_{it} = 1 | D_{i,t-1} = 0) = \Phi (\beta_0 + \lambda L_{it} + \beta' Z_{it} + e_{it})
$$

$Z_{it}$ is a vector of controls and $e_{it}$ is the error term. Following a recent econometric analysis of democratization by Papaioannou and Siourounis (2005), I include the controls education, literacy, urbanization and radio ownership.

Democratization is a relatively rare event. Given the limited data and that fact that the authoritarian regimes democratize at most once for the duration of the sample, I have to rely on between variation to gain identification (so I cannot estimate the model using fixed-effects).

The basic results can be seen in Table 3. Probit 3.1 shows that natural resources have a negative and significant effect on the probability of democratization.24 A one SD increase in $L$ leads to a 47 percent of one SD decrease in the probability of democratization. This is a substantial effect and is consistent with previous results (Papaioannou and Siourounis, 2005; Boix, 2003; Jensen and Wantchekon, 2004). The results are robust to regional omission (including the Middle East or Islam) and the inclusion of income per capita, trade and openness as additional explanatory variables.25

**Result 1.** The probability of democratization is decreasing in natural resources.

To test Prediction 2, the basic specification is:

$$X_{it} = \beta_1 + \beta_2 D_{it} + \lambda L_{it} + \mu D_{it} L_{it} + \beta' Z_{it} + e_{it}$$

The controls in $Z_{it}$ are the average education level and log physical capital per capita. Prediction 2 corresponds to $\lambda < 0$, $\mu > 0$, and $\lambda + \mu = 0$.

The basic results are in Table 4. Regression 4.1 is the basic model without fixed effects ($\beta_1 = \beta_2 Z_{it}$). A one SD increase in $L$ leads to a 14 percent of one SD decrease in $X$ in authoritarian regimes, which is a small effect. Prediction 2 receives support: the effect of natural resources is significantly negative, the interaction term with democracy is positive, but the sum (seen in the row below the constant term in Table 4) is still negative.26

To shift the emphasis away from between variation and towards within variation, regression 4.2 employs country fixed effects. The results differ in two notable ways: firstly, the negative effect of natural resources is much smaller, falling to 2.2

---

24 Though I omit the output, estimating a hazard model rather than a panel probit yields analogous results.

25 In the basic specification, only the inclusion of education is required to ensure a significantly negative coefficient on natural resource income.

26 This may reflect the existence of resource–curse mechanisms that are common to democracies and authoritarian regimes, such as Dutch disease (see Ross, 2001).
Table 4
Basic specification pooled OLS income regressions.

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Log income per capita not from natural resources (US$ 1995 PPP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression number</td>
<td>4.1</td>
</tr>
<tr>
<td>Log physical capital per capita (US$ 1995 PPP)</td>
<td>0.750</td>
</tr>
<tr>
<td>Education (average schooling years)</td>
<td>0.053</td>
</tr>
<tr>
<td>Democracy (dummy)</td>
<td>−0.098</td>
</tr>
<tr>
<td>Log NR income per capita (US$ 1995 PPP) [A]</td>
<td>−0.076</td>
</tr>
<tr>
<td>Democracy \times log natural resources [B]</td>
<td>0.043</td>
</tr>
<tr>
<td>Institutions</td>
<td>0.005</td>
</tr>
<tr>
<td>Institutions \times log natural resources [B'] &amp;</td>
<td></td>
</tr>
<tr>
<td>Associational repression</td>
<td>1.406</td>
</tr>
<tr>
<td>[A] + [B] + [C]</td>
<td>−0.033</td>
</tr>
<tr>
<td>p-Value of [C] &amp;</td>
<td></td>
</tr>
<tr>
<td>[A] + 20 \times [B] + [C] &amp;</td>
<td></td>
</tr>
<tr>
<td>p-Value of [C] &amp;</td>
<td></td>
</tr>
<tr>
<td>Sample</td>
<td>All</td>
</tr>
<tr>
<td>Country controls</td>
<td>No</td>
</tr>
<tr>
<td>Observations</td>
<td>2189</td>
</tr>
<tr>
<td>R-Squared</td>
<td>0.94</td>
</tr>
</tbody>
</table>

Standard errors in [brackets] and standardized coefficients in {braces}.
* 10% significance.
*** 1% significance.
percent. Secondly, the sum is positive and significantly different from zero. The coefficients on L and the interaction term retain the predicted sign and significance. To shift the emphasis even more towards within variation, regression 4.3 is the basic specification but includes only the countries that democratized, i.e., intransient democracies and authoritarian regimes are removed. The substantive results are unaffected.

Using 4.2 as our benchmark, I conduct the usual array of robustness checks. The results are robust to dropping regions (including the Middle East or Islam) and adding literacy, openness and trade as regressors. The bottom line from these results is that natural resources have a negative effect in authoritarian regimes but are benign in democracies.

**Result 2.** There is evidence, based substantially on within-country variation, that regular income is decreasing in natural resources in authoritarian regimes but not in democracies.

In a sample of many countries over many years, it is difficult to get an insight into what is driving these results. To get a flavor, I create a single cross-section by taking an average of each country’s values of explanatory variables in the period 1975–2000 and then estimate the model:

$$X_i = \alpha + \beta Z_i + e_i$$

The vector $Z_i$ includes human and physical capital per capita. We obtain the fitted values $\hat{X}_i$ and define $\hat{e}_i = X_i - \hat{X}_i$. Fig. 2 is a scatter plot of $L_i$ vs. $\hat{e}_i$.

It shows a weak negative relationship. Loosely speaking, if I separate democracies from authoritarian regimes in the above scatter, then the scatter for democracies should show no correlation while the scatter for authoritarian regimes should show a negative relationship. Figs. 3 and 4 confirm this: the correlation for democracies is 0.05 ($p$-value = 71 percent) while for authoritarian regimes it is −0.54 ($p$-value < 1 percent). This demonstrates the malignance of natural resources in authoritarian regimes vis-à-vis their benignness in democracies.

These results, however, are only for one cross-section which is based on averaging 25 year time series, and so they are suggestive. Moreover they focus exclusively on between variation rather than the arguably more convincing within variation.

### 4.4 Tests of the associational regression model

To test Prediction 3 (that natural resources increase associational repression in authoritarian regimes but not in democracies), the basic specification is:

$$R_{it} = \beta_i + \beta_i D_{it} + \lambda_i L_{it} + \mu_i D_{it} L_{it} + e_{it}$$

Prediction 3 corresponds to $\lambda < 0$, $\mu > 0$, and $\lambda + \mu = 0$. The basic results are in Table 5. Regression 5.1 is the basic model without fixed effects ($\beta_i = \beta$). A one SD increase in $L$ leads to a 7 percent of one SD increase in repression in authoritarian regimes, which is a small effect. Prediction 3 receives some support: the effect of natural resources is significantly positive, the interaction term with democracy is negative, but the sum is still significantly negative.

Again, to shift the emphasis away from between variation and towards within variation, regression 5.2 employs country fixed effects. Apart from a mild strengthening of the estimated effect of $L$ to 9 percent of one SD, the only notable difference is that the effect of $L$ in democracies becomes insignificantly different from zero. To shift the emphasis even more towards
within variation, regression 5.3 is the basic specification but includes only the countries that democratized, i.e., stable democracies and authoritarian regimes are removed. The substantive results are unaffected.

In regression 5.4, I attempt to refine our measure of repression by controlling for rule of law via the ICRG index. The only notable difference is that the effect of L in democracies becomes significantly negative.

Using 5.2 as our benchmark, I conduct the usual array of robustness checks. The results are robust to the exclusion of various regions though the results do seem to rest on the inclusion of Eastern European countries. The results are somewhat less robust to the inclusion of additional explanatory variables: adding the Freedom House political liberties index and per capita income apparently leads to no substantive changes, but adding literacy and/or education eliminates the statistical significance of the interaction between democracy and natural resources, as well as rendering the net effect in democracies significantly different from zero.

Result 3. There is evidence, based substantially on within-country variation, that associational repression is increasing in natural resources in authoritarian regimes but not in democracies.

Finally, I estimate two additional models to test Predictions 4 and 5, respectively. I am postulating that natural resources impact upon democratization and economic performance via their effect on associational repression. In the following models, I check if the terms involving natural resources are statistically insignificant \( (\lambda, \mu = 0) \) and if associational repression has the predicted significant effect \( (\lambda' \neq 0) \).

\[
\Pr(D_{it} = 1 | D_{i,t-1} = 0) = \Phi(\beta_0 + \lambda L_{it} + \beta' Z_{it} + \lambda' R_{it} + e_{it})
\]
Table 5
Basic specification pooled OLS regressions of associational repression.

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Associational repression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression number</td>
<td>5.1</td>
</tr>
<tr>
<td></td>
<td>5.2</td>
</tr>
<tr>
<td></td>
<td>5.3</td>
</tr>
<tr>
<td></td>
<td>5.4</td>
</tr>
<tr>
<td>Democracy (dummy)</td>
<td>(-1.978) ([0.103]^{***})</td>
</tr>
<tr>
<td>Log of natural resource income per capita (US$ 1995 PPP) × [A]</td>
<td>(0.056) ([0.011]^{***})</td>
</tr>
<tr>
<td>Democracy × log natural resources × [B]</td>
<td>(-0.218) ([0.021]^{***})</td>
</tr>
<tr>
<td>Rule of law</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>(-3.440) ([0.123]^{***})</td>
</tr>
<tr>
<td>(</td>
<td>[A] + [B] + [C] )</td>
</tr>
<tr>
<td>( p)-Value of ([C] )</td>
<td></td>
</tr>
<tr>
<td>Sample</td>
<td>All</td>
</tr>
<tr>
<td>Country controls</td>
<td>No</td>
</tr>
<tr>
<td>Observations</td>
<td>2840</td>
</tr>
<tr>
<td>R-Squared</td>
<td>0.64</td>
</tr>
</tbody>
</table>

Standard errors in [brackets] and standardized coefficients in {braces}.

- 10% significance.
- 5% significance.
- 1% significance.
\[ y_{\text{R},it} = \beta_0 + \beta_1 L_{it} + \beta_D D_{it} + \lambda I_{it} + \mu D_{it} L_{it} + \beta^* Z_{it} + \lambda^* R_{it} + \varepsilon_{it} \]

Probit 3.2 (Table 3) confirms this for the democratization model. This suggests that natural resources may indeed be driving associational repression as predicted by our model.

**Result 4.** Conditional on associational repression, natural resources have no effect on the probability of democratization.

However regression 4.5 (Table 4) delivers results that contradict my predictions: the absolute estimated effect and statistical significance of the terms including natural resources rises upon including associational repression, and repression has a positive (albeit insignificant) effect on economic performance.

**Result 5.** Conditioning on associational repression amplifies the effect of natural resources on regular income.

### 4.5. Comparison to existing literature

Mehlum et al. (2006) and Boschini et al. (2003) estimate a resource-curse model where institutions rather than political system is the term that interacts with \( L \) (though their econometric models have income growth rather than income per capita as the dependent variable). As a tentative comparison of our hypotheses, I include institutions and an interaction term between institutions and \( L \) as additional regressors in regression 4.4. There are two notable changes to the basic specification in 4.2: first, the effect of natural resources in authoritarian regimes becomes positive and loses significance. Second, the interaction between institutions and natural resources is positive and insignificant, while the interaction with democracy remains positive and significant.

I repeat the comparison using income growth as the dependent variable and using only between variation for identification (using the usual controls described in Mehlum et al., 2006). Though I omit the results, the data fails to reject either model or that of Mehlum et al. (2006), and nesting both in a larger model does not lead to the rejection of either. Neither modes of analysis provide any clear-cut conclusions about whether institutions or political system are an econometrically superior determinant of the malignance of natural resources.

Another related literature considers the possibility that factors such as per capita income, civil liberties and authoritarianism are jointly determined (Acemoglu and Robinson, 2006; Acemoglu et al., 2008, 2009; Greif, 2006; Kuran, 2010), and that different countries have embarked on separate paths for these variables. These theories are powerful ways of helping to organize our thinking concerning these complex phenomena. However the authors themselves would doubtless be the first to concede that, econometrically speaking, there is a lot of residual, idiosyncratic variation in these variables that needs to be explained by other factors. This is where my model contributes; there exists residual variation in associational freedom, democracy and per capita income that is partially explained by variation in natural resource income, and my theoretical model clarifies the potential mechanism, complementing the additional analyses in the literature.

### 5. Conclusion

Are natural resources a blessing or a poisoned chalice? I have argued that the political system has an important role to play. Economies of scope in associations across different collective action problems mean that, for authoritarians, repressing them is a double-edge sword: it strengthens their hold on power at the expense of the economy’s wealth. Natural resources aid dictators because they permit them to sidestep this quandary: by providing a source of income that is largely insensitive to such repression, natural resources accentuate the desirability of associational repression. The result is a stunning of economic performance and democratization. On the other hand, rulers operating in a democratic system do not have the incentive to hamstring the economy and so natural resources are benign.

I have presented evidence in support of the theory. Under the assumption that there exists an unspecified factor that jointly causes development and democracy, the model is supported empirically and is not dependent upon the inclusion of Middle Eastern or Islamic countries. The results are robust to the exclusion of various regions, as well as the inclusion of additional regressors. However the estimates suggest that the effect may be weak.

The econometric evidence that the factor jointly causing development and democracy is associational freedom is not as convincing. Though there is some evidence that associational repression in authoritarian regimes responds positively to natural resources, the main sticking point is that conditioning on associational repression fails to eliminate the effect of natural resources on economic performance (in fact it seems to strengthen in).

The paper provides several contributions. First, it proposes a new resource curse mechanism that makes sense theoretically and fits with important features of the descriptive literature on political transition. Second, I am able to test this theory using panel data rather than relying on the purely between variation inherent in cross-country growth regressions, and by using fixed-effects regressions I can shift the emphasis even further towards within variation. Some of the results are even robust to including only countries that democratize during the sample period.

The central and most robust result is that the effect of natural resources interacts with the political system in a way that the model predicts: positively when the dependent variable is economic performance, and negatively when it is associational repression. This is true even when one controls for institutions or rule of law – the main ingredients of current refinements of the original resource curse literature.
The presented evidence suggests a new factor that may drive the resource curse. A fruitful avenue for future research is finding genuinely exogenous variation in natural resource wealth as this will help parse the multiple prevailing theories.

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Appendix A. Supplementary data


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