

Diamonds are a dictator's best friend: natural resources and the tradeoff between authoritarianism and development¹

Omar Al-Ubaydli²

June 2008

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. We test the model's predictions using fixed-effects regressions on an international panel from 1975-2000 and find some support.

Key words: development, natural resources, authoritarianism, democratisation

JEL codes: O1, Q1

¹ I wish to thank Ahmad Al-Ubaydli, Mohammad Al-Ubaydli, Gary Becker, Carles Boix, Gustaf Bruze, James Heckman, DeForest McDuff, Casey Mulligan, Roger Myerson, Gerard Padro, Rufus Pollock, Markus Reisinger, George Tolley and Gavin Wright for helpful comments, and I would also like to thank Alberto Alesina, Steve Levitt, Phil Reny and Balazs Szentes.

² Department of economics and Mercatus Center, George Mason University.

“Be gone Satan! Never tempt me with your vanities! What you offer me is evil. Drink the poison yourself!” – inscription on the back of a Saint Benedict medal.

I. Introduction

Why do natural resources seem to be a poisoned chalice to democracy and development in African and Middle Eastern countries but not for Australia, Norway and USA? A growing literature has argued that the benevolence or malignance of natural resources depends upon the quality of institutions. If institutions are weak, natural resources draw other production factors away from constructive uses toward destructive rent-seeking (Torvik (2002)) or towards bloated public sectors that act as vehicles of rent distribution (Robinson et al (2005)). They also strengthen the hand of authoritarians who favor distortionary taxation (Acemoglu et al (2004)).

This paper offers and empirically tests another complementary explanation. 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.

Consequently, 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.

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 as a function of natural resource income. The result is that natural resources damage development and democratization in authoritarian regimes, but not in democracies. We test these predictions using an international panel from 1975-2000 and find some support for the model.

This paper's innovations are as follows. Firstly, this paper proposes a new mechanism by which natural resources simultaneously impact democracy and development. Secondly, we are able to test our theory without only referring to case-study evidence. Finally, our empirical analysis uses fixed-effects panel regressions to partially mitigate the difficulty of finding genuine exogeneity in natural resource data.

This paper is organized as follows. Section II discusses associational freedom and democratization. Section III is a model of why diamonds are a dictator's best friend. Section IV is the empirical analysis. Section V concludes.

II. Associational freedom and democratization

A. Setup

Imagine an economy with output $Y(x, z)$, where x is a vector of endogenous policy instruments at the ruler's disposal and z is a vector of parameters. Under an authoritarian regime, the ruler is unrestricted in his choice of x . Given payoff $U(x; z)$, his problem is $\max_x U(x; z)$ with resulting indirect utility is $v(z)$ (we will specify the exact forms of these optimands later).

In a democracy, the ruler is held accountable by elections. We 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 x . Let $\tilde{x}(z)$ represent the 'people's choice'. Democratic elections are costless, instantaneous and perfectly frequent (Becker (1958)) so that any deviation from $\tilde{x}(z)$ is immediately punished by removal from office. Therefore as far as a democratic ruler is concerned, $\tilde{x}(z)$ represents the only choice.

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)).

B. 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 protecting natural resources all fall under the umbrella of CAPs. We can think of the economy's output $y(x, z)$ 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 below in figure 1:³

	C	D
C	1,1	-1,2
D	2,-1	0,0

	C	D
C	1,1	-1,-1
D	-1,-1	0,0

Figure 1: Prisoner's dilemma (left) and the coordination game (right)

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.⁴

In principle, operationalizing the solving of the CAP requires two steps. Firstly, in the case of the PD, transforming the game such that an efficient outcome actually becomes an equilibrium

³ See Olson (1965), Hardin (1995), Ostrom (1990, 2000), Weber (2005), Weingast (1997).

⁴ To our knowledge, there is no generally accepted model of the probability of reaching the efficient equilibrium in CGs (see, for example, Harsanyi and Selten (1988) and Medina (2007) for attempts). However the cited empirical evidence 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.

(e.g., repeating the game and applying the Folk theorem; see Dasgupta (2002)). Secondly, 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 we will not model explicitly). We 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.^{5,6} Moreover in the face of multiple equilibria, there is a large body of experimental evidence confirming that communication aids coordination.⁷ 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 (Ostrom (2000)). Therefore we can think of output $Y(x, z)$ being responsive to the prevalence of associations 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.⁸ 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

⁵ Ostrom (1990, 2000), Dasgupta (2002); also see Durlauf and Fafchamps' (2004) review of the social capital literature .

⁶ 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).

⁷ Cooper et al (1992), Burton and Sefton (2001), Duffy and Feltovich (2002), Charness and Grosskopf (2004), Brandts and Cooper (2005) and Blume and Ortmann (2007); these references apply to footnote 3

⁸ Weingast (1997), Tullock (1974), Lichbach (1995), Hardin (1995), Chong (1993), Goldstone (2001), Moore (1995), Ginkel and Smith (1999)

(Przeworski (1991)). This should cripple any attempts at successful transition – so why do we still see successful democratic transitions?

C. Democratization and economies of scope in associations

The answer is simple: because 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 cannot only act as substitutes for new organizations, but that 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: 151-3).

D. Controlling associational freedom and implications for democracy

Legal and coercive barriers to communication make association harder. Let r represent comprehensive repression of association-building – if it is not comprehensive, 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 virtually all association. In section III we 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

hamstrings the economy. In terms of the simple setup in section II.A, r is an element of the endogenous policy instrument vector x . Letting p denote the probability of transition to democracy, we have:

$$Y = Y(r, z), Y_r < 0; \quad p = p(r), p' < 0$$

In other words, there is a tradeoff between authoritarianism and development.⁹ The next section builds a model based on these relationships that explains why diamonds are a dictator's best friend and why consequently, natural resources can be a poisoned chalice for the economy.¹⁰

III. Diamonds are a dictator's best friend

A. Model

Divide the economy into two sectors: $Y = y_{NR} + y_R$. Let y_{NR} denote the natural resource sector and y_R denote the rest of the economy (henceforth regular income).¹¹ Imagine a dictator who, every period, receives a fixed income $\tau_{NR}y_{NR}$ from natural resources, where τ_{NR} is the exogenously given proportional tax-rate on natural resources. The dictator also receives an income $\tau_R y_R$ from the regular income. Both these incomes are dependent upon the dictator being

⁹ For a version of this model with more explicit microfoundations, see Al-Ubaydli (2007). Given how straightforward the logic of this paper's argument, we felt it unnecessary to burden the reader with such formality.

¹⁰ 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), Pzeworski et al (2000)).

¹¹ By natural resources, we refer to point resources (Bulte et al (2005)), which include fossil fuels and precious minerals. See the data section for more information.

in power. His probability of retaining power next period is $\pi = 1 - p$.¹² If overthrown, the dictator is forever replaced by a democracy.

Recall that r represent repression of associations. The dictator's survival probability is increasing in repression ($\pi' > 0$) and regular income is decreasing in repression ($y'_R < 0$). These two relationships reflect the economies of scope in associations that we discussed in section II.

Finally, assume that natural resource income y_{NR} is not affected by repression. We will expand upon this assumption below. For now, think of it as the only element of the policy parameter vector z .

We can state the dictator's problem as:

$$v(y_{NR}) = \max_r \{y_{NR} + y_R(r) + \pi(r)v(y_{NR})\}$$

Note that we have suppressed the tax terms as they are irrelevant to what follows.¹³ Letting r^* denote the unique solution to the problem, we have the following simple comparative statics:

$$\frac{\partial r^*}{\partial y_{NR}} > 0 \Rightarrow \frac{\partial \pi^*}{\partial y_{NR}} > 0, \frac{\partial y_R^*}{\partial y_{NR}} < 0$$

In words, in authoritarian regimes, increasing natural resources leads to a smaller likelihood of transiting to democracy and smaller regular income. We expand upon the intuition below.

In contrast, once an authoritarian regime has democratized, $\pi' < 0$. This is because a democratically-elected leader seen to be repressing the economy will be swiftly removed from

¹² For the paper, we abstract from the endogenous succession of dictators by other dictators.

¹³ We relegate to the appendix the simple assumptions required for existence and uniqueness of the solution, as well as its differentiability.

office by the democratic process. As such, in a democracy, $\tilde{x} = r^* = 0$ (the people's choice from section II.A) and so natural resources should have no impact on regular income.

How do we justify the assumption that natural resource income is unaffected by repression of associational freedom?¹⁴ 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)). The same point is made by Bueno de Mesquite et al (2003), who 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. 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 model's logic is very simple. Authoritarians face a tradeoff to repression: increasing repression leads to a higher probability of remaining in power at the cost of lower income while in power. This is the aforementioned tradeoff between authoritarianism and development. 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).

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

¹⁴ Actually, Al-Ubaydli (2007) shows how the weaker assumption that natural resource income is merely less responsive to repression of associations than regular income delivers the same predictions. We make the stronger assumption merely for ease of exposition.

has more guaranteed income, permitting him to rule over the parochial hermits without having to give up the good life. This is why diamonds are a dictator's best friend.

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 the Emir of Qatar 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, the Prime Minister of Norway 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. 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: 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)).

B. Comparison to existing literature

The resource curse has been studied extensively in the literature (see Ross (2001) for a review of the earlier work). The main drawback of the earlier literature is its failure to explain why natural resources may have a differential impact on the rest of the economy, e.g., why the UK and Norway seem to have suffered no ill-effects of the discovery of North-Sea oil.

More recent models addressed this by focusing on the role of institutions.¹⁵ In the case of Torvik (2002), Robinson et al (2005) and Acemoglu et al (2004), the predictions about the impact of natural resources on the economy are similar to those in our model, but the mechanisms and interpretations differ substantially.

Our 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 from land. The former involves 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. Secondly, 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.

¹⁵ Torvik (2002), Robinson et al (2005), Acemoglu et al (2004), Acemoglu and Robinson (2006), Boix (2003)

Finally, as we will discuss in the empirical section, most of the theoretical papers in the literature use case-study evidence where we use a much broader dataset. Moreover, we are able to find data on repression of associational freedom – a key difference between our model and those in the literature.

IV. Empirical analysis

A. Econometric approach

The model has the following predictions:

Prediction 1: the probability of democratization is decreasing in natural resources: $\frac{d\pi}{dy_{NR}} < 0$.

Prediction 2: regular income is decreasing in natural resources in authoritarian regimes $\left(\frac{dy_R}{dy_{NR}} < 0\right)$ but not in democracies $\left(\frac{dy_R}{dy_{NR}} = 0\right)$.

Prediction 3: associational repression is increasing in natural resources in authoritarian regimes $\left(\frac{\partial r}{\partial y_{NR}} > 0\right)$ but not in democracies $\left(\frac{\partial r}{\partial y_{NR}} = 0\right)$.

Prediction 4: conditional on associational repression, natural resources have no effect on the probability of democratization: $\frac{d\pi}{dy_{NR}}\Big|_{r=\bar{r}} = 0$.

Prediction 5: conditional on associational repression, natural resources have no effect on regular income: $\frac{dy_R}{dy_{NR}}\Big|_{r=\bar{r}} = 0$.

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, 4 and 5 depend upon explicitly specifying r . We therefore consider testing 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 . We refer to predictions 1 and 2 as the basic model and 3, 4 and 5 as the associational regression model.

To test these predictions using international data, we need exogenous variation in natural resource income. The reality is that this is extremely difficult to find (for an important exception, see Tsui (2006)). Moreover, given the complexity of modern economies, controlling for the endogeneity is also virtually impossible. We are forced to rely on naturally occurring variation in natural resource income. This means that at best, our empirical analysis will be suggestive of the impact of natural resource income. Yet we still believe that it is worth investigating this data as long as we exercise due caution in interpreting the results.

The empirical literature on the resource curse has typically relied on cross-country growth regressions (Sachs and Warner (1995), Mehlum et al (2005)) where all the identifying variation is between. Essentially, this involves checking if countries that have abundant natural resources tend to grow more slowly than ones that do not (conditional on bad institutions in the case of Mehlum et al (2005)).

We extend this by using a panel. Since lots of countries in our panel democratise, 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 seems plausible, though is impossible to confirm), it is preferable to rely on within variation for identification. To further shift the burden on within variation, we use fixed-effect regressions in the panel.

For most of the basic specifications of our econometric models, we undertake a three-pronged approach to robustness. To test for sensitivity to the countries included, we reestimate 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, Islamic countries). To test for sensitivity to the inclusion of k additional explanatory variables, we reestimate the basic 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.

B. Data

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

Natural resource data is value added from mining and quarrying activities per capita at 1995 US\$ PPP. The source is the UN statistical database.¹⁶ Using this data, as expected, the Gulf authoritarian states are among the best endowed. However in general, natural resources are not

¹⁶ We standardise 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. We are assuming that the absolute size of this group is linear in population.

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. While it is a substantial simplification to treat political system as a binary variable, we still think that we can gain insight. In our sample, there are 24 countries that are authoritarian throughout, 27 that are democratic throughout and 44 that democratise 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. We 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, (B) associational and organizational rights, (C) rule of law, and (D) personal autonomy and individual rights. It is (B) that we find 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?

Given the other components of this index, it is at best a partial measure. To attenuate its noisiness, we also have a series on law and order. In principle, it can allow us to isolate the variation in the Freedom House index that is from associational freedom.

C. Tests of the basic model

Let D_{it} be a dummy variable denoting democracy ($D_{it} = 1$) or authoritarianism ($D_{it} = 0$). To test prediction 1, we wish to estimate the following panel probit:

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

X_{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), we include the controls education, literacy, urbanization and radio ownership.

Democratization is a relatively rare event. Given our limited data and that fact that the authoritarian regimes democratise at most once for the duration of the sample, we have to rely on between variation to gain identification (so we 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.¹⁷ A one SD increase in y_{NR} leads to a 47% 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) and Jensen and Wantchekon (2004)). The results are robust to regional omission (including the Middle East

¹⁷ Though we omit the output, estimating a hazard model rather than a panel probit yields analogous results.

or Islam) and the inclusion of income per capita, trade and openness as additional explanatory variables.¹⁸

To test prediction 2, our basic specification is:

$$y_{R,it} = \beta_i + \beta_t + \beta_D D_{it} + \lambda y_{NR,it} + \mu D_{it} y_{NR,it} + \beta' X_{it} + e_{it}$$

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

The basic results are in table 4. Regression 4.1 is the basic model without fixed effects ($\beta_i = \beta \forall i$). A one SD increase in y_{NR} leads to a 14% of one SD decrease in y_R in authoritarian regimes, which is a small effect. Prediction 2 receives some support: the effect of natural resources is significantly negative, the interaction term with democracy is positive, but the sum is still negative.¹⁹

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%. Secondly, the sum is positive and significantly different from zero. The coefficients on y_{NR} 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.

¹⁸ In the basic specification, only the inclusion of education is required to ensure a significantly negative coefficient on natural resource income.

¹⁹ This may reflect the existence of resource-curse mechanisms that are common to democracies and authoritarian regimes, such as Dutch disease (see Ross (2001)).

Using 4.2 as our benchmark, we 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.

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, we 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:

$$y_{R,i} = \alpha + \beta'X_i + e_i$$

The vector X_i includes human and physical capital per capita. We obtain the fitted values $\hat{y}_{R,i}$ and define $\hat{e}_i = y_{R,i} - \hat{y}_{R,i}$. Figure 2 is a scatter plot of $y_{NR,i}$ vs. \hat{e}_i . It shows a weak negative relationship. Loosely speaking, if we 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. Figures 3 and 4 confirm this: the correlation for democracies is 0.05 (p-value = 71%) while for authoritarian regimes it is -0.54 (p-value < 1%). 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.

D. Tests of the associational repression model

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

$$r_{it} = \beta_i + \beta_t + \beta_D D_{it} + \lambda y_{NR,it} + \mu D_{it} y_{NR,it} + e_{it}$$

Prediction 3 corresponds to $\lambda < 0, \mu > 0, \lambda + \mu = 0$. The basic results are in table 5. Regression 5.1 is the basic model without fixed effects ($\beta_i = \beta \forall i$). A one SD increase in y_{NR} leads to a 7% 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 y_{NR} to 9% of one SD, the only notable difference is that the effect of y_{NR} 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, we 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 y_{NR} in democracies becomes significantly negative.

Using 5.2 as our benchmark, we 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.

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

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

$$y_{R,it} = \beta_i + \beta_t + \beta_D D_{it} + \lambda y_{NR,it} + \mu D_{it} y_{NR,it} + \beta' X_{it} + \lambda' r_{it} + e_{it}$$

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. However regression 4.5 (table 4) delivers results that contradict our 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.

E. Comparison to existing literature

As described previously, the early resource curse literature (including the more empirical work) did not address the possibility that resources can be benign under the right institutional or

political environment. More recent contributions have. Having related our model to the theoretical papers, we now relate our empirical results to the empirical papers.

Mehlum et al (2005) and Boschini et al (2003) estimate a resource-curse model where institutions rather than political system is the term that interacts with y_{NR} (though their econometric models have income growth rather than income per capita as the dependent variable). As a tentative comparison of our hypotheses, we include institutions and an interaction term between institutions and y_{NR} as additional regressors in regression 4.4. There are two notable changes to the basic specification in 4.2: firstly, the effect of natural resources in authoritarian regimes becomes positive and loses significance. Secondly, the interaction between institutions and natural resources is positive and insignificant, while the interaction with democracy remains positive and significant.

We can repeat comparison using income growth as the dependent variable and using only between variation for identification (Sachs and Warner (1995), Gylfason (2001), Mehlum et al (2005), Boschini et al (2003); we also use the usual controls described in Mehlum et al (2005)). Though we omit the results, the data fails to reject either our model or that of Mehlum et al (2005), 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.

V. Conclusion

Are natural resources a blessing or a poisoned chalice to an economy? We have argued that the political system has an important role to play. Economies of scope in associations across different collective action problems means that repressing them is a double-edge sword for authoritarians: it strengthens their hold on power at the expense of the economy's wealth.

Diamonds are a dictator's best friend because they permit the dictator 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 stunting 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.

We have presented mixed evidence in support of our theory. Under the assumption that there exists an unspecified factor that jointly causes development and democracy, the model is reasonably 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 and time periods, as well as the inclusion of additional regressors. However our 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).

Despite these empirical difficulties, we regard the paper's as providing several innovations.

Firstly, we propose a new resource curse mechanisms that makes sense theoretically and fits with important features of the descriptive literature on political transition. Secondly, we are 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 we can shift the emphasis even further towards within variation. Some of our results are even robust to including only countries that democratise during the sample period.

Our central and most robust result is that the effect of natural resources interacts with the political system in a way that our model predicts: positively when the dependent variable is economic performance, and negatively when it is associational repression. This is true even when we control for institutions or rule of law – the main ingredients of current refinements of the original resource curse literature.

Ultimately, the biggest difficulty that we face is finding genuinely exogenous variation in natural resource wealth. Despite this, we still regard the presented evidence as being suggestive of the factors that may drive the resource curse.

References

- Acemoglu, D. & J. Robinson. (2006). *Economic origins of dictatorship and democracy*. New York: Cambridge University Press.
- Acemoglu, D., T. Verdier & J. Robinson. (2004). "Kleptocracy and divide-and-rule: a model of personal rule". *Journal of the European Economic Association*. 2(2-3), p162-92.
- Alesina, A., A. Devleeschauer, W. Easterly, S. Kurlat and R. Wacziarg. (2003). "Fractionalization". *Journal of Economic Growth*. 8(2), p155-94.
- Al-Ubaydli, O. (2007). "Diamonds are a dictator's best friend: natural resources and the tradeoff between authoritarianism and development". *PhD dissertation*, University of Chicago.
- Barro, R. and J. Lee. (1999). "International data on educational attainment: updates and implications". *Oxford Economic Papers*. 53(3), p541-63.
- Becker, G. (1958). "Competition and Democracy". *Journal of Law and Economics*. 1, p105-9.
- Blume, A., and A. Ortmann. (2007). "The effects of costless pre-play communication: experimental evidence from games with Pareto-ranked equilibria". *Journal of Economic Theory*. 132, p274-90.
- Boschini, A. D., J. Pettersson and J. Roine. (2003). "Resource curse or not: a question of appropriability". Working paper, Department of economics, Stockholm University.
- Boix, C. (2003). *Democracy and redistribution*. Cambridge, UK: Cambridge University Press.
- Brandts, J., and D. Cooper. (2005). "It's what you say not what you play". Working paper, Case Western University.
- Bueno de Mesquita, B., A. Smith, R. Siverson and J. Morrow. (2003). *The logic of political survival*. Cambridge, MA: MIT Press.
- Bulte, E. R. Damania and R. Deacon. (2005). "Resource intensity, institutions, and development". *World Development*. 33(7), p1029-44.
- Burton, A., and M. Sefton. (2001). "Risk, pre-play communication and equilibrium". *Games and economic behaviour*. 46, p23-40.
- Charness, G. and B. Grosskopf. (2004). "What makes cheap talk effective? Experimental evidence". 83, p383-9.
- Chong, D. (1993). "Coordinating demands for social change". *Annals of the American Academy of Political and Social Science*. 528, p126-41.
- Cooper, R., D. DeJong, R. Forsythe and T. Ross. (1992). "Communication in coordination games". *Quarterly Journal of Economics*. 107(2), p. 739-71.
- Crystal, J. (1990). *Oil and politics in the gulf*. Cambridge, UK: Cambridge University Press.
- Crystal, J. (1995) in Norton, A. (1995). *Civil society in the Middle East*. New York: Brill.
- Dahl, R. (1989). *Democracy and its critics*. New Haven: Yale University Press.

- Dasgupta, P. (2002). "Social capital and economic performance: analytics". Working paper, University of Cambridge.
- Davis, D. and C. Holt. (1993). *Experimental economics*. New Jersey: Princeton University Press.
- Duffy, J. and N. Feltovich. (2002). "Do actions speak louder than words? An experimental comparison of observation and cheap talk". *Games and Economic Behavior*. 39, p1-27.
- Durlauf, S. and M. Fafchamps. (2004). "Social capital". *NBER Working paper 10485*.
- Ginkel, J. and A. Smith (1999). "So you say you want a revolution". *Journal of Conflict Resolution*. 43(3), p291-316.
- Goldstone, J. (2001). "Toward a fourth generation of revolutionary theory". *Annual Review of Political Science*. 4, 139-87.
- Gylfason, T. (2001). "Natural resources, education, and economic development". *European Economic Review*. 45, p847-59.
- Hall, R. and C. Jones. (1999). "Why do some countries produce so much more output per worker than others?". *Quarterly Journal of Economics*. 114(1), p83-116.
- Hardin, R. (1995). *One for all*. Princeton, NJ: Princeton University Press.
- Harsanyi, J. and R. Selten. (1988). *A general theory of equilibrium selection in games*. Massachusetts: MIT Press.
- Jensen, N. and L. Wantchekon. (2004). "Resource wealth and political regimes in Africa". *Comparative Political Studies*. 37(7), p816-41.
- Kagel, J. and A. Roth. (1995). *The handbook of experimental economics*. Princeton, NJ: Princeton University Press.
- Kraay, A. "Do high interest rates defend currencies during speculative attacks?". *Journal of International Economics*. 59(2), p297-321.
- Lichbach, M. (1995). *The rebel's dilemma*. Ann Arbor, MI: University of Michigan Press.
- Lipset, S. (1959). "Some Social Requisites of Democracy". *American Political Science Review*. 53(1), 69-105.
- McAdam, D. and R. Paulsen. (1993). "Specifying the relationship between social ties and activism". *American Journal of Sociology*. 99(3), p640-67.
- McGuire, M., and M. Olson. (1996). "The economics of autocracy and majority rule: the invisible hand and the use of force". *Journal of Economic Literature*. 34(1), p72-96.
- Medina, LF. (2007). *A unified theory of collective action and social change*. Ann Arbor: University of Michigan Press.
- Mehlum, H., K. Moene and R. Torvik. (2005). "Institutions and the resource curse". Forthcoming in *Economic Journal*.
- Moore, W. (1995). "Rational rebels: overcoming the free-rider problem". *Political Research Quarterly*. 48, p417-54.
- Olson, M. (1965). *The logic of collective action*. Cambridge: Harvard University Press.

- Opp, K-D. and C. Gern. (1993). "Dissident groups, personal networks, and spontaneous cooperation: the East German Revolution of 1989". *American Sociological Review*. 58(5), p659-80.
- Osborne, M. and A. Rubinstein. (1994). *A course in game theory*. Cambridge: MIT Press.
- Ostrom, E. (1990). *Governing the commons: the evolution of institutions for collective action*. Cambridge, UK: Cambridge University Press.
- Ostrom, E. (2000). "Collective action and the evolution of social norms". *Journal of Economic Perspectives*. 14(3), p137-58.
- Papaioannou, E. and G. Siourounis. (2005). "Economic and social factors driving the third wave of democratisation". Working paper, London Business School.
- Przeworski, A. (1991). *Democracy and the market*. New York: Cambridge University Press.
- Przeworski, A., M. Alvarez, J. Cheibub and F. Limongi (2000). *Democracy and development*. Cambridge, UK: Cambridge University Press.
- Robinson, J., R. Torvik & T. Verdier. (2005). "Political foundations of the resource curse". *Journal of Development Economics*. 79(2), p447-68.
- Ross, M. (2001). "Does oil hinder democracy?". *World Politics*. 53, p325-61.
- Sachs, J. and A. Warner. (1995). "Natural resource abundance and economic growth". *NBER Working Paper* 5398.
- Sandler, T. (1992). *Collective actions: theory and applications*. Ann Arbor: University of Michigan Press.
- Smith, S. (2002). *The Russian Revolution: A Very Short Introduction*. Oxford: Oxford University Press.
- Snow, D., L. Zurcher and S Eklund-Olson. (1980). "Social networks and social movements: a microstructural approach to differential recruitment". *American Sociological Review*. 45(5), p787-801.
- Torvik,R. (2002). "Natural resources, rent-seeking and welfare". *Journal of Development Economics*. 67, p455-70.
- Tsui, K. (2006). "More oil, less democracy? Theory and evidence from crude oil discoveries". Working paper, University of Chicago.
- Tullock, G. (1974). *The social dilemma: the economics of war and revolution*. Blacksburg, VA: University Publications.
- Wacziarg, R. and K. Welch (2003). "Trade liberalization and growth: new evidence". *NBER Working Paper* 10152.
- Weber, R. (2005). "Managing growth to achieve efficient coordination in large groups". *American Economic Review*. 96(1), p114-26.
- Weingast, B. (1997). "The Political Foundations of Democracy and the Rule of Law". *American Political Science Review*. 91, 245-63.

Appendix A: model

Let $Y: [0, \bar{r}] \times \mathbb{R}^+ \rightarrow [0, \bar{Y}]$ where $0 < \bar{Y} < \infty$ and $0 < \bar{r} < \infty$. Let Y be twice continuously differentiable in both arguments and let it be decreasing and strictly concave in r . Assume that it satisfies the Inada conditions: $\lim_{r \rightarrow 0} Y_r(r, z) = 0$ and $\lim_{r \rightarrow \bar{r}} Y_r(r, z) = -\infty$.

Let $\pi: [0, \bar{r}] \rightarrow [0, 1]$. Let π be twice continuously differentiable in r and let it be increasing and strictly concave in r . Assume that it satisfies the Inada conditions: $\lim_{r \rightarrow 0} \pi'(r) = \infty$ and $\lim_{r \rightarrow \bar{r}} \pi'(r) = 0$.

Letting r_t denote repression in period t , the dictator's problem is:

$$\max_{\{r_t \in [0, \bar{r}]\}_{t=1}^{\infty}} \left\{ U(r_1, r_2, \dots) = \sum_{t=1}^{\infty} \left(\prod_{s=1}^{t-1} \pi(r_s) Y(r_t, z) \right) \right\}$$

By the boundedness of Y and π , this problem can be re-expressed in value function form:

$$v(z) = \max_r \{Y(r, z) + \pi(r)v(z)\}$$

By the strict concavity of Y and π , the first-order condition will be sufficient. By the Inada conditions, there exists exactly one solution to the first-order conditions. By the smoothness of Y and π , the solution will be a differentiable function of z .

Appendix B: data descriptions

Political system: a binary variable taking the value '1' for a democracy and '0' for an authoritarian regime. Source: Papaioannou and Siourounis (2005), which is based on Polity and Freedom House indices.

Natural resources: value added from mining and quarrying activities per capita at 1995 US\$ PPP. Mining and quarrying is defined as: Extraction, dressing and beneficiating of minerals occurring naturally: Solids, such as coal and ores; liquids, such as crude petroleum; and gases, such as natural gas. Mining includes underground and surface mines, quarries and wells and all supplemental activities for dressing and beneficiating ores and other crude materials, such as crushing, screening, washing, cleaning, grading milling, flotation, melting, pelleting, topping and other preparations needed to render the material marketable. Source: UN statistical database.

Income: GDP per capita at 1995 US\$ PPP. Source: World Bank World Development Indicators.

Repression/Civil liberties: an index of civil liberties (or its inverse in the case of repression). Index is composed of four subindices. Freedom of expression and belief; associational and organisational rights; rule of law; and personal autonomy and individual rights. Source: Freedom House.

Political liberties: an index of political liberties. Index is composed of three subindices. Electoral process; political pluralism and participation; and functioning of government. Source: Freedom House.

Education: average years of schooling in total population. Source: Barro and Lee (2001).

Literacy: literacy rate for the population over 15 years. Source: World Bank World Development Indicators.

Capital stock: physical capital per capita. Source: investment data obtained from World Bank World Development and transformed into capital stock via method in Hall and Jones (1999).

Urbanization: share of total population living in areas defined as urban. Source: World Bank World Development Indicators.

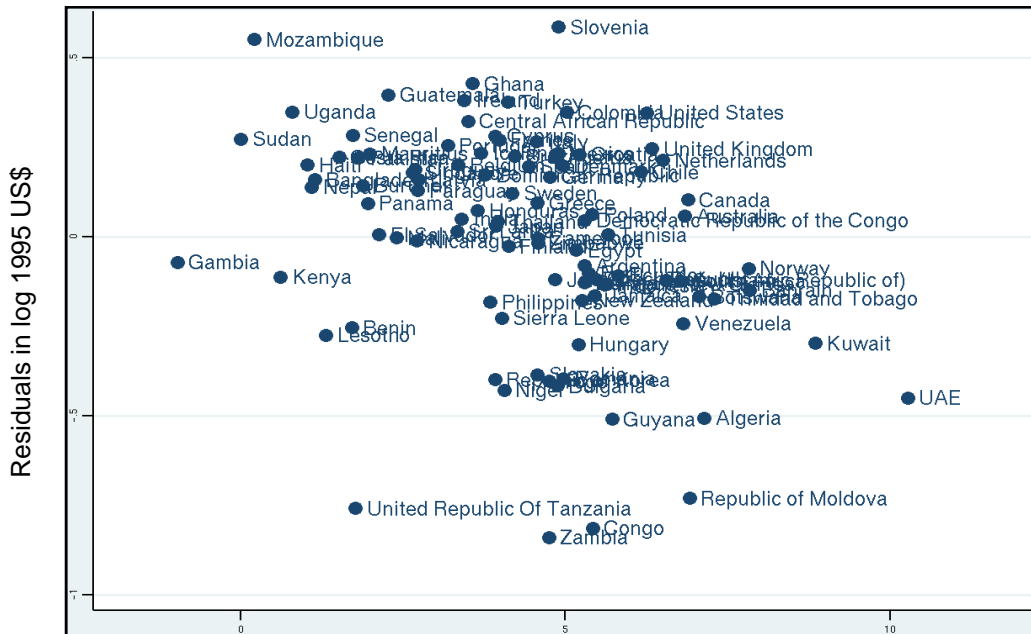
Radios: radios per 1000 people. Source: World Bank World Development Indicators.

Trade: imports plus exports as a share of GDP. Source: Penn World Table.

Region: the region to which the country belongs. Eight exhaustive geographical categories. Source: CIA world factbook.

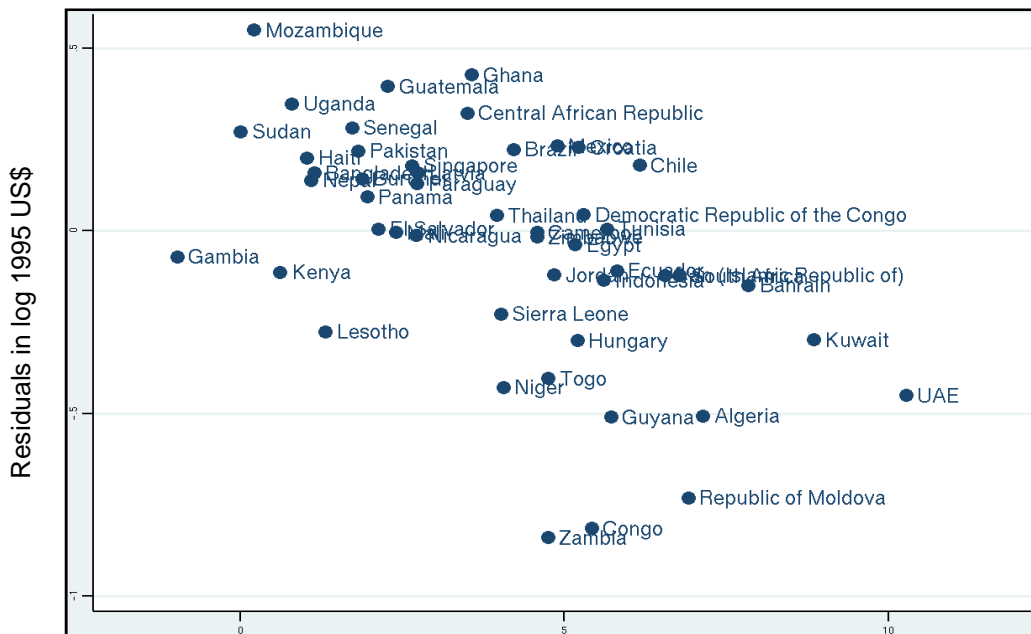
Islam: a dummy variable that takes the value '1' if over 50% of the population was Muslim in 1980. Used as a ninth region. Source: Alesina et al (2003).

Rule of law: a variable indicating the quality and effectiveness of law and order. Source: International Country Risk Guide (ICRG).



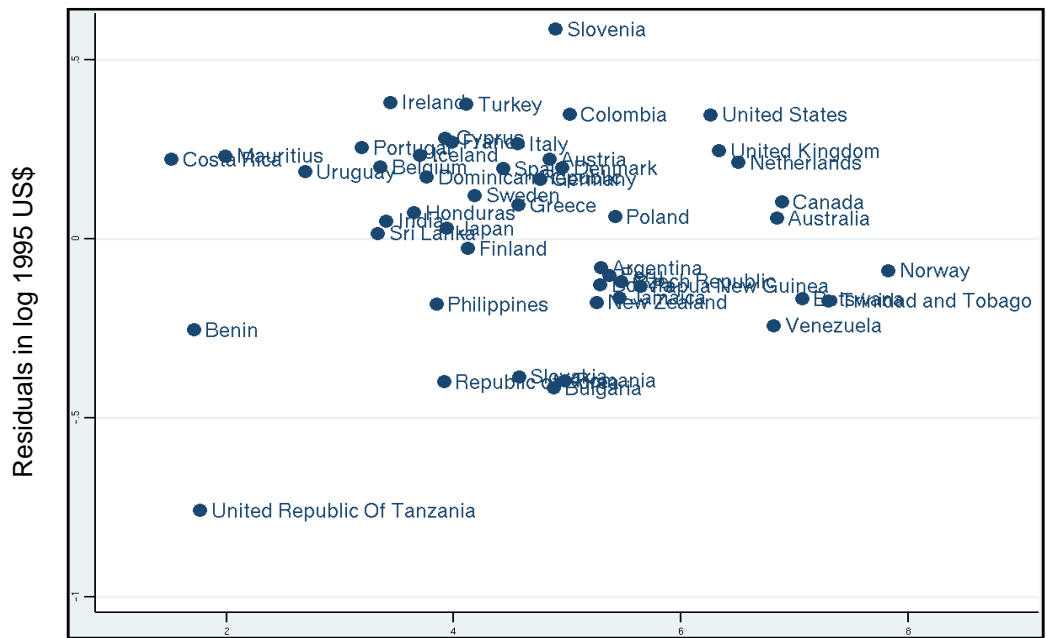
Average (1975-2000) log natural resource income per capita 1995 US\$

Figure 2: scatter plot of residuals on average log of natural resource income *per capita*. Residuals come from regression of average log regular income (1975-2000) on average log physical capital and log human capital



Average (1975-2000) log natural resource income per capita 1995 US\$

Figure 3: figure 2 for authoritarian regimes only, defined as countries that were authoritarian regimes for at least half the period 1975-2000



Average (1975-2000) log natural resource income per capita 1995 \$US

Figure 4: figure 2 for democracies only, defined as countries that were democracies for at least half the period 1975-2000

Range	Authoritarian	Democratic
1000 and above	Algeria Bahrain	Kuwait UAE Botswana Norway
500-1000	Iran Moldova	South Africa Australia Canada Netherlands
200-500	Chile Congo, Dem. Rep. Congo, Rep. Guyana	Indonesia Poland Tunisia Czech Rep. Ecuador Jamaica
150-200	Croatia Egypt	Hungary Argentina Bolivia
100-150	Jordan Mexico	Togo Zambia Colombia New Zealand
75-100	Cameroon Zimbabwe	Austria Bulgaria Denmark Greece Italy
50-75	Niger Sierra Leone	South Korea Thailand Brazil Cyprus Finland France
25-50	CAR Ghana Philippines	India Ireland Sri Lanka Belgium Dominican Rep. Honduras Iceland
25 or less	Bangladesh Benin Burundi El Salvador Gambia Guatemala Haiti Kenya Latvia Lesotho Mali	Mozambique Nepal Pakistan Panama Paraguay Senegal Singapore Sudan Tanzania Uganda Costa Rica Mauritius Nicaragua Portugal Uruguay

Table 1: Distribution of mean natural resource income per capita (US\$ 1995 PPP) by political system. NB: Countries that switch regime are classified by the regime in which they spend the majority of the time

Region	Always Authoritarian	Democratise	Always Democratic
Africa	Algeria Burundi Cameroon CAR Congo, Rep. Congo, DR. Egypt Gambia Kenya Niger Sierra Leone Sudan Togo Tunisia Uganda Zimbabwe	Benin Ghana Lesotho Mali Mozambique Senegal South Africa Tanzania Zambia	Botswana Mauritius
Asia	Pakistan Singapore	Nepal Philippines	South Korea Thailand Japan Sri Lanka
Caribbean		Dominican Rep. Haiti	Tri. & Tob. Jamaica
Central America		El Salvador Guatemala Honduras	Mexico Nicaragua Panama Costa Rica
Eastern Europe	Moldova	Bulgaria Croatia Czech Rep. Greece Hungary	Latvia Poland Romania Slovakia Slovenia
Middle East	Bahrain Iran Jordan Kuwait UAE	Turkey	Cyprus
N. Amer.			Canada USA
Oceania			Australia New Zealand Pap. N. Guinea
South America		Argentina Bolivia Brazil Chile Ecuador	Guyana Paraguay Peru Uruguay Colombia Venezuela
Western Europe		Portugal Spain	Austria Belgium Denmark Finland France Germany Iceland Ireland Italy Netherlands Norway Sweden UK

Table 2: Political system by region

Dependent variable	Democratisation dummy			
	3.1		3.2	
Log natural resource income per capita (US\$ 1995 PPP)	-0.118	{-0.018}	-0.101	{-0.007}
	[0.051]**		[0.062]	
Literacy (% of population over 15) [log(L/(100-L))]	0.233	{0.021}	0.217	{0.009}
	[0.159]		[0.173]	
Education (average schooling years)	0.008	{0.001}	-0.044	{-0.003}
	[0.110]		[0.115]	
Urbanisations [log(U/(100-U))]	0.092	{0.006}	0.004	{0.0001}
	[0.145]		[0.166]	
Radios per capita	0.031	{0.0003}	0.285	{0.001}
	[0.866]		[1.059]	
Associational repression			-0.59	{-0.020}
			[0.079]***	
Constant	-1.587		-3.746	
	[0.431]***		[0.607]***	
Observations	814		814	
Pseudo R-squared	7%		26%	

Standard errors in brackets; significance: *=10%, **=5%, ***=1%

Change in probability of democratisation from a one-SD shift in explanatory variable in braces (evaluated at mean of all explanatory variables)

Table 3: Basic results from a pooled probit

Dependent variable	Log income per capita not from natural resources (US\$ 1995 PPP)									
	4.1		4.2		4.3		4.4		4.5	
Regression number										
Log physical capital per capita (US\$ 1995 PPP)	0.750	{0.890}	0.532	{0.631}	0.498	{0.636}	0.539	{0.613}	0.532	{0.632}
	[0.008]***		[0.011]***		[0.016]***		[0.018]***		[0.012]***	
Education (average schooling years)	0.053	{0.134}	0.063	{0.160}	0.104	{0.258}	0.060	{0.147}	0.063	{0.161}
	[0.004]***		[0.006]***		[0.013]***		[0.010]***		[0.007]***	
Democracy (dummy)	-0.098	{-0.045}	-0.157	{-0.072}	-0.106	{-0.061}	-0.195	{-0.086}	-0.156	{-0.072}
	[0.030]***		[0.018]***		[0.023]***		[0.028]***		[0.019]***	
Log of natural resource income per capita (US\$ 1995 PPP) = [A]	-0.076	{-0.141}	-0.011	{-0.022}	-0.011	{-0.022}	0.002	{0.004}	-0.013	{-0.024}
	[0.004]***		[0.004]***		[0.006]*		[0.006]		[0.004]***	
Democracy X log natural resouces = [B]	0.043	{0.103}	0.027	{0.065}	0.024	{0.060}	0.025	{0.058}	0.028	{0.067}
	[0.006]***		[0.004]***		[0.005]***		[0.006]***		[0.004]***	
Institutions							0.005	{0.025}		
							[0.001]***			
Institutions X log natural resouces = [B']							0.003	{0.025}		
							[0.002]			
Associational repression									0.002	{0.003}
									[0.003]	
Constant	1.406		2.850		3.258		2.783		3.216	
	[0.068]***		[0.133]***		[0.209]***		[0.214]***		[0.172]***	
[A] + [B] = [C]	-0.033		0.015		0.014		0.028		0.015	
P-value of [C]	<1%		<1%		6%		<1%		<1%	
[A] + 20*[B'] = [C']							0.085			
P-value of [C']							14%			
Sample	All		All		Democratisors only		All		All	
Country controls	No		Yes		Yes		Yes		Yes	
Observations	2189		2189		951		1397		2167	
R-squared	0.94		0.99		0.99		0.99		0.99	

Standard errors in [brackets], standardised coefficients in {braces}; significance: *=10%, **=5%, ***=1%

Table 4: Basic specification pooled OLS income regressions

Dependent variable	Associational repression			
	5.1	5.2	5.3	5.4
Regression number				
Democracy (dummy)	-1.978 {-0.544} [0.103]***	-1.312 {-0.361} [0.109]***	-1.118 {-0.392} [0.163]***	-0.735 {-0.202} [0.152]***
Log of natural resource income per capita (US\$ 1995 PPP) = [A]	0.056 {0.066} [0.011]***	0.074 {0.088} [0.024]***	0.067 {0.087} [0.040]*	0.087 {0.098} [0.039]**
Democracy X log natural resouces = [B]	-0.218 {-0.302} [0.021]***	-0.048 {-0.067} [0.026]*	-0.074 {-0.105} [0.036]**	-0.176 {-0.250} [0.036]***
Rule of law				-0.020 {0.018} [0.026]
Constant	-3.440 [0.123]***	-5.844 [0.214]***	-5.215 [0.198]***	-5.510 [0.325]***
[A] + [B] = [C]	-0.162	0.026	-0.007	-0.089
P-value of [C]	6%	37%	90%	8%
Sample	All	All	Democratisors only	All
Country controls	No	Yes	Yes	Yes
Observations	2840	2840	1142	1680
R-squared	0.64	0.85	0.67	0.87

Standard errors in [brackets], standardised coefficients in {braces}; significance: *=10%, **=5%, ***=1%

Table 5: Basic specification pooled OLS regressions of associational repression