

# POLITICAL DUTCH DISEASE.

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## Abstract

We consider a political environment with an elite and a populace operating in an economic environment with a productive sector and a rentier sector (e.g. a natural resource sector which produces a constant flow of rents per period). The claim to resource rents of every generation of the elite is a function of the wealth it has inherited from the previous generation. We show that resource booms lead to the consolidation of the power of the elite. In addition, in contrast to the standard Dutch disease result, resource boom results in slower growth rate only if the elite's bequest motive is weak. The theoretical analysis is preceded by an empirical investigation which establishes a positive correlation between natural resource abundance and dictatorship.

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## I. INTRODUCTION

This paper investigates how political regimes are affected by sectoral shifts in the economy, in particular by an increase in the size of the natural resource sector. There is much evidence that, somewhat counter-intuitively, the discovery of a natural resource can lead to a decrease in the rate of economic growth. This phenomenon has been termed the *Dutch disease*. Less studied has been the empirical evidence that most long standing authoritarian governments such as Libya and Iraq are sustained by natural resources rents. This phenomenon that we term *political Dutch disease* has first been noticed by political scientists in the context of the Middle-East.

We first build on previous empirical results by Wantchekon (1999) and Ross (2000) to establish a positive correlation between resource dependence and authoritarian governments: controlling for GDP, human capital, income inequality and other possible determinants, we find a robust and statistically significant association between resource dependence measured by the ratio of fuel and mineral exports as a percentage of total exports and authoritarianism.

We then present a dynamic model which provides a framework for investigating how economic growth, the distribution of income, and the allocation of political power simultaneously evolve when resources are discovered. We find that resource abundance exacerbates income inequality between the populace and the political elite (a political oligarchy or a dictator). Part of the elite's political power derive from their greater share of national income. In the model, resource abundance increases income inequality due to a direct and an indirect effect. The direct impact is due to the elite's control over the government which allows it to obtain a larger share of the resource rent. The indirect impact is due to the economic decline associated with the Dutch disease, which increases income inequality because the benefits from growth are more evenly distributed than resource rents.

The elite gains power from their control over the process of rent distribution. That is, the elite has the right to decide which proportion of the rents goes to which segment within the populace. Elites inherit this right by virtue of being in control of the government at the time of the resource windfalls. We argue that resource abundance generates the consolidation of elites' allocative power (distributive influence). This power manifests itself in the form of lobbying by members of the populace. This

expenditure on lobbying or rent-seeking feeds back into the economic side of the model and reduces the rate at which human capital accumulates: political considerations exacerbate the Dutch disease.<sup>1</sup>

The failure of resource-led growth has been extensively investigated in the literature. Case studies presented in Auty (1990) and Gelb (1988) show the adverse effects of resource abundance on growth. The most comprehensive and worldwide study is provided by Sachs and Warner (1997). They show that those countries with exports concentrated in the natural resource sector in 1970, tended to grow relatively slowly during the subsequent 20 years. The results hold even after controlling for initial income levels and trade policies, among other variables.<sup>2</sup>

Sachs and Warner [1997] provide a theoretical explanation of the Dutch disease by extending the endogenous growth model developed in Matsuyama [1992]. There are three sectors in the model: a traded manufacturing sector, a non-traded service sector, and a traded resource sector. Endogenous growth arises because employment in the manufacturing sector generates improvements in human capital as a by-product. When resources are discovered, it raises the *level* of income for a number of periods. Part of this income is spent on the non-traded service sector, drawing resources away from manufacturing; increased demand for manufactures is satisfied through imports. The reduction in manufacturing employment reduces the *rate* of growth, due to the attendant decrease in the accumulation of human capital. While Sachs and Warner's model explains the sectoral shifts in the economy that could result from a natural resource boom, it neglects the importance of political regimes in this process.

Our paper is related to the literature on rent-seeking in the context of resource booms (Lane and Tornell [1996, 1999], Baland and Francois [2000]) which attributes the Dutch disease to an increased rent-seeking and a pernicious distributive struggle for resource rents by numerous and equally powerful groups, which results in a

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<sup>1</sup>This assumption is consistent with the following observation made by Murphy, Shleifer and Vishny [1991]: "In most countries, rent seeking rewards talent more than entrepreneurship does." More specifically, we assume that rent seeking could, for example, cause talented people to invest less in education and to join the military or become political activist.

<sup>2</sup>For example, resource-rich countries such as Nigeria, Argentina and Venezuela have been outperformed by resource-poor countries such as Korea and Taiwan. In particular, despite huge oil windfalls, Venezuela has suffered a decline in per capita output of 28% from 1970 to 1990 and Nigeria experienced an output contraction of 4.4% from 1980 to 1990.

decline of the level of investment and in a lower growth rate.<sup>3</sup> In contrast with the literature, we consider rent-seeking not only as an occupational choice that affects income distribution and growth rate, but also a political choice that affects the nature of political regimes. Political elite in our model controls the government and faces no opposition. In addition, we assume that the claim to the resource rents of any generation of the elite is a function of the wealth it inherited from the previous generation. Thus, intergenerational income transfers are also transfers of power.

The paper also relates to the literature on inequality and democratization (Collier [1998], Acemoglu and Robinson [2001] and others) which suggests that high inequality induces popular pressure for democratic regime. Our results suggest that this conclusion might not hold when income inequality is generated through natural resource wealth. For example, an abundance of natural resource revenues allows the elite to considerably increase spending on patronage. As result, the populace is likely to find rent-seeking more efficient than political unrest as a way to induce redistribution.

The paper contributes the political science literature on “rentier” states which investigates the political implications of resource dependence (Mahdavy, 1970 and Beblawi and Luciani, 1987). A rentier state is characterized by a high dependence on external rents produced by a few economic actors. Rents are typically generated from the exploitation of natural resources, not from production (labor), investment (interest) or management of risk (profit). It is generally accepted that rentier states are prone to authoritarianism. Yates [1996], for example, observes that where “few control the inflow of economic rent,” the inevitable result is “personal aggrandizement as the prerogative of political power” [231]. With specific reference to Venezuela, Karl [1997] associates the influx of petrodollars with consolidation of power by an increasingly centralized state. Indeed, in most resource-dependent nations, centralized governments maintain monopolistic ownership of the extractive sector.

A common conclusion of the rentier state literature is that rentier states tend to be autonomous in the sense that natural resource rents allow them to be more detached and less accountable since they do not need to levy taxes. Mahdavy (1970), Yates (1996) and Karl (1996) use this argument to explain the lack of pressure (from below)

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<sup>3</sup>Murphy et al (1993), Robinson (1994) and Acemoglu (1995) explain the rationale for extreme difference in levels of rent-seeking activities across countries.

for democratic change in the Middle East. As Wantchekon [1999] explains, the “state autonomy” argument lacks empirical support and predictive power. First, the lack of pressure from below for democratic change is common to most developing countries (Diamond and Linz [1989]). Thus petrostates are no exception. Second, as Gwenn Okruhlik (1999) suggests, throughout the Middle-East and North Africa, in both oil and non oil states there are demands for social justice and political reforms (p. 296). In Saudi Arabia for example, political opposition to the ruling family is fueled by the fact that “prosperity of private citizens is dependent upon the acquisition of government wealth, with access to contracts, information, jobs in the public sector or infrastructure governed by family relations, friendship, religious branch and regional affiliation (p. 297).<sup>4</sup>

Since the state autonomy paradigm has limited empirical support, we adopt the “patron-client” paradigm, which focuses on the way in which resource abundance affects the ability of the elite to generate political support through spending on patronage networks. For instance, in Nigeria, more than half (55 percent) of oil rents accrue directly to the federal government, which is responsible for distributing an additional 35 percent of these profits to states (Khan [1994]) and in regional and ethnic competitions for oil revenues, which contributed to Nigeria’s political system of institutionalized patronage (Bienen [1995]). In the Middle-East, Entelis [1976] and Anderson [1995]), find that oil wealth allows the government to buy off political opposition.

The paper is organized as follows: Section II presents an econometric support for the correlation between resource dependence and dictatorships. Section III presents the basic model, and the equilibrium outcomes are discussed in Section IV . Section V concludes.

## II. RESOURCE DEPENDENCE AND AUTHORITARIANISM

In this section we establish the existence of a positive association between resource dependence and authoritarianism in a cross-section as well as in a panel setting.

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<sup>4</sup>Waterbury went even further, claiming that “neither historically not in the twentieth century is there much evidence that taxation has evoked demands that governments account for their use of tax monies. Predatory taxation has produced revolts, especially in the countryside, but there has been no translation of tax burden into pressure for democratization, (p.29)”.

## Dependent Variables

The dependent variables of the empirical analysis are levels of democracy in 1998, 1990, and 1970-1998. Measures of democracy are taken from Polity 98 data sets which provide regime data for 232 countries starting as early as 1800 and ending in 1998. The data measure countries on a democratic scale from 0 to 10 and an authoritarian scale from 0 to 10. Following the standard procedure in the international relations literature, we generate a unique political regime measure in the year 1998, i.e. Reg98 by adding 10 to the difference between the level of authoritarianism in 1998 from the level of democracy in 1998. In other words, “regime 98” is defined as level of democracy in 1998 minus the level of authoritarianism in 1998 plus 10. As a result, the regime scores range from 0 to 20.

For Regime 1990, we use both Polity 1998 and a data set provided by Alvarez, Cheibub, Limongi and Przeworski (ACLP 1997). Their data set covers 141 countries from 1950, or the year of independence to 1990. Democracy is coded as a 0 and a dictatorship as a 1. According to ACLP (1997) three conditions must be fulfilled for a regime to be classified as a democracy: the chief executive must be elected, the legislature must be elected, and there must be more than one ruling party. It follows that dictatorship is a political regime under which at least one of the those three conditions is not met.

## Independent Variables.

The key independent variable is resource dependence for which we use the World Bank (1999) data on the sum of oil and mineral exports as a percentage on the total merchandise exports. This measure of resource dependence seems more appropriate than the ratio of primary exports to GDP used in Sachs and Warner (1995), since it excludes agricultural products. In addition, as in all studies of the economic determinants of political regimes (Alvarez et al. 1997; Barro 1999), we use as control variables the log of GDP per economically active individual to control for wealth (originally taken from Summers and Heston version 5.6) and growth per economically active individual to isolate the effects of economic growth on my dependent variables (taken from Penn World Tables, version 5.6). Economically active individuals are defined as all individuals between the ages of 15 and 64. The inclusion of these standard

measures of economic development are particularly important to highlight the contribution of my results to the political economy literature on the relationship between development and democracy. Because the literature is ambiguous about the possibility of democracy in poor countries, a negative and significant correlation between resource dependence and democracy would suggest that sectoral characteristics of an economy could be at least as important as the GDP, or the growth rate of the GDP, as explanatory variables for political regimes.

Additional controls include the level of income inequality and the level of education, because they are both considered as possible determinants of democracy. According to Dahl (1971), an allocation of income, wealth, and status in a society is also an allocation of political resources that an actor can use to influence the behavior of other actors. As result,

extreme inequalities in the distribution of such key values as income, *wealth*, status, *knowledge*, and military prowess are equivalent to extreme inequalities in political resources,...A country with extreme inequalities stands a very high chance of having extreme inequality in the exercise of power, and hence to a hegemonic regime” (p. 82).

Deininger and Squire (1996) provide measures of income inequality for 65 countries from four different sources. My income inequality variable was constructed by taking an average of the Deininger and Squire’s measures for a specific country over 10 years. For example, the income inequality measure for Nigeria for 1975 to 1985 is an average of all surveys on income inequality in Nigeria between 1975 and 1985. As for measures of the level of human capital, we use the average education data from Barro and Lee (1993).

Finally, to show that the positive association between resource dependence and authoritarianism is not a purely African and petro-states phenomenon, we include regional as well as petro-states dummies provided by Easterly (1999). we include these dummies because the empirical regularity discussed in this article seems particularly valid in Africa. For instance, all African petro-states or resource dependent countries have authoritarian governments or have experienced a very slow process of political reforms. These include Algeria, Nigeria, Libya, Gabon, Cameroon, and

the former Zaire. On the other hand, besides South Africa, transition to democracy has been successful *only* in resource-poor countries such as Benin, Mali, Senegal, and Madagascar. My goal is to show that Africa is not an exception.

### Cross-Section Results

We now present the cross-section results of my two political regime variables regressed on resource dependence and various control variables and discuss some robustness or sensitivity checks. Table 2 presents the result for the regime 1998 variable and Table 3 the results for regime 1990.

Insert Tables 1 and 2

For the democracy in 1998 (reg 98) regression, we ran both OLS (not reported) and ordered probit (see Table 2) and the results are very similar. This is not surprising because the dependent variable has 20 categories. The coefficients are significant with at 1% level which shows that there is a negative correlation between the ratio of natural resource exports to total exports and likelihood of democracy in 1998. As for the level of Democracy in 1990 (Probit) regression, the coefficients have the right sign but are slightly less significant (see Table 3). Interestingly, the coefficient for oil exporter dummy is negative and significant, which means that rentier authoritarianism was also a petro-state phenomenon in the 1970s and the 1980s.

That resource dependence is negatively correlated with change in level of democracy corroborate a finding by Bratton (1998), of a decline in the levels of democracy in several African countries in the post third wave period (1995-1997). According to Bratton (1998), from the founding elections that took place in the period from 1989 to 1994 to the second elections that took place in period from 1995 to 1997, there has been a decline in the rate of leadership alternation (37% to 6.6%), an increase in the rate of opposition boycott (11% to 73%), and an increase in the mean of winner's vote share (61.4% to 69.1% for presidential elections and 62.7% to 72.0% in parliamentary elections). Our results suggest that such a decline could be partly attributed to natural resource dependence. For instance, an examination of Bratton's data set reveals that opposition boycott and election riggings took place mostly in petro-states or resource dependent countries such as Gabon, Cameroon, Togo, and

Zambia. In other resource dependent countries such as Algeria, Congo, the former Zaire, and Sierra Leone, democratization simply sank into civil wars.

For a check of robustness, we include traditional economic determinants of political regimes such as “log of GDP per capita”, GDP growth, Gini coefficient, and education. As expected, the level of GDP enters positively, which confirms the standard result that more affluent countries are more likely to be democratic.<sup>5</sup> Interestingly, GDP growth is negatively correlated with democracy. This could be attributed to the fact that many fast growing economies such as China, Thailand and other Eastern Asian countries are not democratic.<sup>6</sup> Indeed, that the GDP growth coefficients (Column III and IV) become insignificant when we introduce regional dummies might be used to support this explanation. Finally, neither education nor the Gini coefficient are significant. This means that cross-country differences in human capital and income inequality do not account for differences in levels of democracy in 1998.<sup>7</sup>

We also ran a set of regressions using a measure of authoritarianism called “incumbency” constructed by ACLP (1997). The authors created a regime dummy variable in which authoritarian regimes were coded as 0 and democracies as 1. We used the individual country scores for 1970 and 1990, in which countries were classified as democratic or nondemocratic according to the three above mentioned rules. Incumbency is represented by a dummy variable coded 1 if sometime during its current tenure in office the incumbents (person, party, or military hierarchy) unconstitutionally closed the lower house of the national legislature and rewrote the rules in their favor. It is coded 0 otherwise. As in the regime 1990 regression, the key independent variables are resource dependence, income inequality, log(GDP), and GDP growth. We find that the positive correlation between resource dependence and authoritarianism remains positive and significant with the *t*-statistics ranging from 2.498 to 3.182.<sup>8</sup> In other words, incumbents in resource dependent countries are more likely

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<sup>5</sup>See Barro (1999) and Alvarez et al. (1997).

<sup>6</sup>For example, China’s average growth rate from 1965 to 1997 is 8.5% as opposed to 2.5% for the United States.

<sup>7</sup>I also treated the dependent variable reg98 as a continuous variable (because it is a 20-category dependent variable) and ran an OLS instead of ordered probit. As expected, the the results remained essentially the same.

<sup>8</sup>The results are available upon request.

to close down parliaments and alter the constitutional rule in their favor.

## Panel Results

We now verify that the correlation between authoritarianism and resource dependence holds in a panel setting, that is within countries or regions and over time. For this purpose, we use pooled time series and cross-section data covering the period from 1970 to 1998. The sample is 1468 for yearly observations and 515 for five-year averages of the data. We show the results of the Ordinary Least Squares (OLS), Generalized Least Square (GLS), the Panel Corrected Standard Errors (PCSE) with random effects, regional and period dummies, which could be seen as “quasi-fixed effects”.

Insert Table 3 here

The resource dependence estimates are remarkably significant in all regressions except one. The heteroskedasticity corrected  $t$ -statistics ranges from  $-2.816$  to  $-22.130$ . The marginal effects of resource dependence in a panel setting are similar to those for the cross-section setting. A 1 percentage point increase in resource dependence leads to a decrease in democracy ranging from 2.350% to 7.969%.

In addition, the coefficients for the log GDP and education are all significant. In particular, as various modernization theories would predict,<sup>9</sup> both GDP and education levels are positively correlated with democracy. Also, as one should expect, whereas the coefficients for the Africa, Middle-East/North Africa dummies are negative and significant, the coefficients for Western Europe and North Africa are positive and significant. Finally, the oil exporter dummy is not significant.

In summary, the negative association between resource dependence and level of democracy is not only valid in a cross-section setting, it is also valid in a panel setting. The estimates are significant even after one adds regional and petro-state dummies. We consider this result to be the main empirical finding of the study.<sup>10</sup>

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<sup>9</sup>See Pzeworski and Limongi (1997) for a survey of the literature.

<sup>10</sup>Besides the empirical investigation of the effect of resource dependence on democracy, I also regress resource dependence on the rule of law using a set of economic controls as independent variables (results are available upon request). The rule of law data are taken from Sachs and Warner (1995) and Knack and Keefer (1995). This measure is based on 1982 survey data in which countries were ranked from 0 to 6, where lower values are defined as “a tradition of depending on physical

We now present a simple model to explain the political economy channel of the positive correlation between resource dependence and authoritarian governments as well as the traditional dutch disease effect.

## II. A SIMPLE MODEL

### The Economic Environment: The Supply Side

The structure of the supply side of the economy follows closely Matsuyama (1992) and Sachs and Warner (1997). There are three sectors in the economy: a traded manufacturing sector, a non-traded service sector, and a traded resource sector. There is only one factor of production in the economy, and its endowment is normalized to one. We denote by  $\lambda_t$  the proportion of the factor employed in the manufacturing sector at time  $t$ , and by  $h_t$  the stock of human capital at time  $t$ . Production in the manufacturing and service sectors ( $m_t$  and  $s_t$ ) have the following simple, linear technologies:

$$m_t = h_t \lambda_t \tag{1}$$

$$s_t = h_t(1 - \lambda_t) \tag{2}$$

To simplify matters, the resource sector requires no inputs and produces a constant flow of  $R$  units of the natural resource per period. Manufacturing and resource goods sell in competitive world markets at exogenously given prices. We normalize both of these prices to unity. Because services cannot be purchased in world markets, its price,  $p_t$ , is determined by equating supply and demand.

Since we assume that the technology of production in both the manufacturing and service sectors are constant returns to scale, prices are completely determined by the force or illegal means to settle claims. For the rule of law regression I include “centralization” as an independent variable to control for the federalist or unitary nature of the government. (Ideally, one should use an index of budgetary procedures around the world. But such data are not available.) Measures for the level of centralization are obtained from the Polity 98 data set. The centralization variable is coded as follows: a 1 represents a unitary state, a 2 an intermediate state, and a 3 a federal state. I find that both resource dependence and incumbency advantage have a negative and significant impact on the rule of law with  $t$ -statistics ranging from  $-2.328$  to  $-2.610$ , which means that natural resource abundance contributes to a rise in the “use of violence to settle disputes.” We also find robust and significant positive correlation between authoritarianism and rule of law.

supply side. The first order conditions for profit maximization in the manufacturing and service sectors imply:

$$w_t = h_t \tag{3}$$

$$p_t = 1 \tag{4}$$

where  $w_t$  is the price of the factor of production.

### The Political Environment

There are three dynasties in the model: an *elite*  $E$  (which can represent a political oligarchy or a dictator) and two identical groups (p1 and p2), which together make up the *populace* ( $P$ ). We think of the elite as a small ruling class. The populace is meant to represent a large population. We separate the populace into two groups in order to allow issues of distribution to be modeled; these groups compete for the elite's favor in allocating the resource rent. Each dynasty consists of a sequence of agents who live for one period. Successive members of the elite inherit wealth from the former generation and endow the next. This motive for bequest arises because the level of endowment left to the next generation enters the elite's utility function.

#### The Elite's Claim to Resources and the Elite's Power.

The political environment of the model is a dictatorship. The elite  $E$  is assumed to control the government and to face no opposition.<sup>11</sup> We assume that the elite's claim to resources depends on the size of its endowment. This can be justified by noting that wealthier segments of the society either control the natural resource sector or are better placed in the state apparatus and have more direct access to the resource rents.<sup>12</sup> As a result, they are more likely to reap a larger part of the benefits from the resources, which may contribute to an increase in income inequality. More precisely, the elite at time  $t$  inherits an amount  $e_t$  from generation  $t - 1$ . This wealth allows the elite to make a claim of a fraction  $\phi_t$  of that period's resource rent.

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<sup>11</sup>Alvarez, Cheibub, Limongi and Przeworski [1997] defines a dictatorship as a political system in which either the chief executive or the legislature is not elected, or there only party.

<sup>12</sup>In all petrostates, the government or monarchy maintains explicit legal ownership of below-ground reserves irrespective of surface property rights. According to Kuwari (1970) the ruling shares of the total government expenditure is 25.7% in Abu Dhabi, 29% in Bahrain, 32.8% in Qatar and 12.0% in Saudi Arabia.

$$\phi_t = \phi(e_t) \tag{5}$$

$$\phi \in [0, 1], \quad \phi(0) = 0 \quad \text{and} \quad \phi(\infty) = 1 \tag{6}$$

$$\phi' > 0 \quad \text{and} \quad \phi'' < 0 \tag{7}$$

Since  $e_t$  directly determines the elite's access to resources rents, it is assumed to represent a measure of the elite's (political) power as defined by Dahl (1971). Indeed, according to Dahl, an allocation of income, wealth, status in a society is also an allocation political resources which an actor can use to influence the behavior of other actors.

### Distributive Influence

Together, the two members of the populace receive a fraction  $1 - \phi_t$  of the resource rent. The distribution between them is determined by the levels of lobbying or rent-seeking they undertake. The elite and the populace are thus involved in a "patron-client" relationship.<sup>13</sup> Let the levels of lobbying for the two groups which make up the populace be  $l_t^1$  and  $l_t^2$ , respectively. Each unit of lobbying costs  $\kappa$ . A proportion  $\sigma_t$  is allocated to the first group in the populace, p1; the other member, p2, receives  $1 - \sigma_t$ . For concreteness, we assume that the elite chooses  $\sigma_t$  according to the following simple rule:

$$\begin{aligned} \sigma_t &= \arg \max_{\sigma} \sigma^{l_t^1} (1 - \sigma)^{l_t^2} \\ &= \frac{l_t^1}{l_t^1 + l_t^2} \end{aligned} \tag{8}$$

Thus the elite favors the group with the higher expenditure on lobbying. Given this rule, the first member of the populace solves the following maximization problem to obtain its optimal level of expenditure on lobbying:

$$\max_{l_t^1} \left( \frac{l_t^1}{l_t^1 + l_t^2} \right) (1 - \phi_t) R - \kappa l_t^1 \tag{9}$$

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<sup>13</sup> "Patron-client" relationship is understood as a personalized relationship between actors, or sets of actors commanding unequal wealth, status or influence, based on conditional loyalties and involving mutually beneficial transactions. The reciprocity is assured by the offer of material rewards and opportunities for social mobility in return for political support at the polls and elsewhere.

The symmetric solution is:

$$l_t^1 = \frac{(1 - \phi_t) R}{4\kappa} \quad (10)$$

### Human Capital Accumulation, Consumption and Endowment decisions

In the process of making manufactures, the stock of knowledge accumulates, causing production in both sectors to be more effective. Specifically, we assume that human capital grows according to the following equation:

$$h_{t+1} = h_t f(\lambda_t) \quad (11)$$

$$f > 0, \quad f_\lambda > 0 \quad (12)$$

At time  $t$ , the current generation of the elite has preferences over consumption of manufactures  $m_t$ , consumption of services  $s_t$ , the endowment it leaves to the next generation  $e_{t+1}$  and a measure of political power which depends on lobbying. We assume that the utility function of the elite is Cobb-Douglas in  $m_t$ ,  $s_t$  and  $e_{t+1}$  with  $\alpha$  as the exponent on  $e$ . The elite solves the following problem:

$$\max_{m_t, s_t, e_{t+1}} u(m_t, s_t, e_{t+1}) = m_t s_t e_{t+1}^\alpha \quad (13)$$

$$\text{subject to } m_t + s_t + e_{t+1} = \phi(e_t) R + e_t \quad (14)$$

the only sources of income for the elite are resource rents and the endowment.

We now turn to the populace. Both segments of the populace solve the same problem.

$$\max_{m_t, s_t} v(m_t, s_t) \quad (15)$$

$$\text{subject to } m_t + s_t + \kappa l_t = \frac{1}{2} h_t + \frac{1}{2} (1 - \phi_t) R \quad (16)$$

Note that, in the political equilibrium, the agent receives half of the populace's share of rents,  $\frac{1}{2} (1 - \phi_t) R$ , as well as a fraction  $\frac{1}{2}$  from returns to the domestic input.

For the elite:

$$m_t^E = s_t^E = \frac{1}{2+\alpha} [\phi(e_t) R + e_t] \quad (17)$$

$$e_{t+1} = \frac{\alpha}{2+\alpha} [\phi(e_t) R + e_t] \quad (18)$$

Under the assumption that we have a Cobb-Douglas functional form in  $m$ ,  $s$ , for the first member of the populace, we have:

$$\begin{aligned} m_t^1 = s_t^1 &= \frac{1}{2} \left[ \frac{1}{2} h_t + \frac{1}{2} [1 - \phi(e_t)] R - \kappa l_t^1 \right] \\ &= \frac{1}{4} h_t + \frac{1}{8} [1 - \phi(e_t)] R \end{aligned} \quad (19)$$

where  $l_t^1$  is given by the equation (10) above. The solution for the other group in the populace is of course identical.

The accumulation equation for human capital and the market clearing condition for the services sector complete this model:

$$h_{t+1} = h_t f(\lambda_t) \quad (20)$$

$$s_t^E + s_t^1 + s_t^2 = h_t(1 - \lambda_t) \quad (21)$$

Rearranging the market clearing condition, we have the solution for  $\lambda_t$ , the proportion of the input employed in the manufacturing sector:

$$\lambda_t = 1 - \frac{1}{h_t} (s_t^E + s_t^1 + s_t^2) \quad (22)$$

Assume the following functional form for  $f$  :

$$h_{t+1} = h_t (1 + \lambda_t) \quad (23)$$

The system of equations which describe the dynamics of the two state variables,  $h_t$  and  $e_t$  are:

$$e_{t+1} = \frac{\alpha}{2 + \alpha} [\phi(e_t) R + e_t] \quad (24)$$

$$h_{t+1} = 2h_t - (s_t^E + s_t^1 + s_t^2) \quad (25)$$

The first equation describes the dynamics of the power accumulation by the elite and the second equation the dynamics of human capital accumulation.

**Proposition 1** (*Effect of Change in  $R$  on Time Path of  $e_t$ : political dutch disease*)

*When the resource rent per period ( $R$ ) increases, the level of endowment/power for the elite increases at all points in time ( $\frac{de_t}{dR} > 0$  for all  $t$ ).*

*Thus, the elite's claim to resources and the elite's consumption increases at all points in time ( $\frac{d\phi_t}{dR} > 0$ ,  $\frac{dm_t^E}{dR} > 0$ ,  $\frac{ds_t^E}{dR} > 0$  for all  $t$ ).*

**Proof.** From equation (24):

$$\frac{de_{t+1}}{dR} = \frac{\alpha}{2 + \alpha} \left( [\phi'(e_t) R + 1] \frac{de_t}{dR} + \phi(e_t) \right) \quad (26)$$

where:

$$\frac{de_1}{dR} = \frac{\alpha \phi(e_0)}{2 + \alpha} > 0 \quad (27)$$

$$\frac{\alpha [\phi'(e_t) R + 1]}{2 + \alpha} > 0 \text{ for all } t \quad (28)$$

$$\frac{\alpha \phi(e_t)}{2 + \alpha} > 0 \text{ for all } t \quad (29)$$

From (5) and (17), we know that  $\phi_t$ ,  $m_t^E$ , and  $s_t^E$  all increase in  $e_t$ . ■

The result shows that resource booms lead to a higher level of income inequality at all point in time, than would be the case in the absence of the resource rent. In addition, resource boom also leads to an increase in the power of the elite at all point in time. Note that in the model, because of the benefits from growth in  $h_t$  go to the populace, the populace actually gets more and more of the economy's income, whatever the level of resource.

**Proposition 2** (*Effect of Change in R on Time Path of  $h_t$* ) *When the resource rent per period (R) increases, the level of human capital decreases at all points in time ( $\frac{dh_t}{dR} < 0$  for all t) if the elite's endowment motive ( $\alpha$ ) is sufficiently weak.*

**Proof.** Substituting equations (19) and (17) into (25), and then differentiating:

$$\begin{aligned} \frac{dh_{t+1}}{dR} &= \frac{3}{2} \frac{dh_t}{dR} \\ &+ \left[ \frac{R\phi'(e_t)}{4} - \frac{R\phi'(e_t) + 1}{2 + \alpha} \right] \frac{de_t}{dR} \\ &- \frac{\phi(e_t)}{2 + \alpha} - \frac{1 - \phi(e_t)}{4} \end{aligned} \quad (30)$$

Notice that:

$$\frac{dh_1}{dR} = -\frac{\phi(e_0)}{2 + \alpha} - \frac{1 - \phi(e_0)}{4} < 0 \quad (31)$$

$$-\frac{\phi(e_t)}{2 + \alpha} - \frac{1 - \phi(e_t)}{4} < 0 \quad (32)$$

$$\frac{R\phi'(e_t)}{4} - \frac{R\phi'(e_t) + 1}{2 + \alpha} < 0 \quad (33)$$

This last inequality holds for  $\alpha < 2$ . Together with the previous proposition, these inequalities imply the result. ■

If the elite's endowment motive is weak that is, —if it derives low utility from endowing its descendent—then an increase in the resource rent per period will lower the level of human capital at all points in time. One channel through which an increase in the resource rent  $R$  affects the level of human capital  $h_t$  is via the level of endowment  $e_t$ . The level of  $e_t$  affects both the elite and the populace's demand for domestically produced services,  $s_t^1$ ,  $s_t^2$  and  $s_t^E$ . When  $e_t$  is high, it tends to increase the elite's consumption of services  $s_t^E$ . It also increases the endowment left by the elite at period  $t$  to the elite at period  $t+1$ ,  $e_{t+1}$ . A smaller  $\alpha$  implies a smaller effect on services consumption. In contrast to the effect on the elite's choices, an increase in  $e_t$  decreases the populace's consumption of services,  $s_t^1$  and  $s_t^2$ . For  $\alpha$  which is sufficiently small, the overall consumption of services is increased thus moving resources away from manufacturing, in turn lowering the accumulation of human capital. In other words, the result indicates that the negative impact of the resource booms on the level of human capital could be mitigated by the strength of the elite bequest motive.

**Proposition 3** (*Effect of Change in  $R$  on Time Path of  $s_t^1$ ,  $m_t^1$ : dutch disease*)  
When the resource rent per period ( $R$ ) increases, the populace's consumption initially increases ( $\frac{ds_0^1}{dR} > 0$ ,  $\frac{dm_0^1}{dR} > 0$ ). If the elite's endowment motive is sufficiently weak, then this change in the level of consumption decreases over time; at some point the change may be negative ( $\frac{ds_t^1}{dR}$ ,  $\frac{dm_t^1}{dR}$  may be negative for some  $t > 1$ ).

**Proof.**

$$\frac{dm_t^1}{dR} = \frac{1}{4} \frac{dh_t}{dR} + \frac{1}{8} \left[ 1 - \phi(e_t) - \phi'(e_t) \frac{de_t}{dR} R \right] \quad (34)$$

where:

$$\frac{dm_0^1}{dR} = \frac{1}{8} [1 - \phi(e_0)] > 0 \quad (35)$$

The result holds because  $\frac{dh_t}{dR} < 0$  and  $1 - \phi(e_t)$  is decreasing in  $t$  given the result of the previous proposition. ■

The populace's consumption of manufacturing and services depend in large part on the its wages which is determined by the level of human capital. If  $\alpha$  is sufficiently small, then the previous proposition implies that the level of human capital will decrease at all points in time (relative to what it would otherwise have been) as a

result of the increase in resource rent. This may imply that consumption for the populace become lower than it would otherwise have been. The resource rent also tend to decrease consumption via its effect through  $e_t$ .

**Proposition 4** (*Effect of Change in  $R$  on Time Path of  $l_t^1$* ) *When the resource rent per period ( $R$ ) increases, the level of lobbying initially increases ( $\frac{dl_0^1}{dR} > 0$ ). If  $\phi'$  is small, then this change in the level of lobbying decreases over time; eventually the change may be negative ( $\frac{dl_t^1}{dR}$  is decreasing in  $t$  and may be negative for sufficiently large  $t$ ).*

**Proof.**

$$\frac{dl_t^1}{dR} = \frac{1}{4\kappa} \left[ 1 - \phi(e_t) - \phi'(e_t) \frac{de_t}{dR} R \right] \quad (36)$$

where:

$$\frac{dl_0^1}{dR} = \frac{1}{4\kappa} [1 - \phi(e_0)] > 0 \quad (37)$$

For sufficiently small  $\phi''$ ,  $\frac{dl_t^1}{dR} \approx \frac{1}{4\kappa} [1 - \phi(e_t)]$  is decreasing over time. ■

An increase in the level of the resource rent has two effects on the level of lobbying. One the one hand, the prize to be shared among the two members of the populace and the elite is larger. On the other hand, the elite's share of resources is increased at all times  $t \geq 1$ . If  $\phi'$  is small, then the second effect is negligible. The assumption the elite's claim function,  $\phi$ , is concave then yields the required result.

### III. CONCLUSION

In this paper, we investigate empirically the correlation between resource dependence and authoritarianism and then present a model that helps explain conditions under which resource booms not only lead to slower growth rate but also to the consolidation of a dictatorial regime. Our results contribute to a better understanding of the interaction between income inequality, democracy and growth in resource-rich countries. These results imply that the prevalence of non-democratic regimes in the Middle East as well as Northern and Sub-Saharan Africa may have as much to do with the structure of their economies than with religious, ethnic or cultural factors. As a result, economic reforms, especially properly designed ownership structure of the resource sector, could be the most effective way to promote democracy and economic development in resource-rich countries.

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TABLE I. Ordered Probit Polity 98 Regressions

Dependent Variable: Democracy 1998				
Log of GDP per capita	0.695*** (2.752)	1.033*** (3.271)	0.682*** (2.693)	0.466** (2.047)
GDP Growth	-0.123*** (-2.830)	-0.195*** (-2.778)	-0.100** (-1.969)	-0.107 (-1.538)
Resource Dependence	-2.860*** (-4.851)	-2.324*** (-3.100)	-3.126*** (-3.009)	-2.256*** (-2.427)
Education	0.010 (1.177)	0.005 (0.479)	0.017 (1.630)	0.015* (1.727)
Gini Coefficient		0.003 (0.167)		
Sub-Sahara Africa Dummy			0.549 (1.134)	0.719 (1.217)
Latin America/Caribbean Dummy			0.799** (2.530)	0.492 (1.418)
Transition Economy Dummy			-0.046 (-0.082)	-0.167 (-0.348)
Oil Exporter Dummy			0.038 (0.044)	0.095 (0.140)
Democracy 1992				0.254*** (3.389)
Number of Observations	74	60	74	72
Wald Chi-sq	70.97	52.44	109.79	70.11
Prob>Chi-sq	0.000	0.000	0.000	0.000
Pseudo R-sq	0.22	0.24	0.24	0.42

TABLE II. Probit Democracy Regression

Dependent Variable Democracy 1990				
Democracy 1970	1.547*** (3.364)	1.746*** (4.014)	1.726*** (3.021)	1.666*** (2.796)
Log GDP 1970	0.414 (0.945)	1.037*** (3.271)	0.679* (1.914)	0.542 (0.869)
Growth 1970-90	0.042 (0.323)	0.077 (0.651)	0.112 (0.738)	0.046 (0.287)
Resource Dependence	-6.106** (-2.427)	-5.072** (-2.103)	-3.515 (-1.254)	-3.392 (-1.269)
Gini 1970-90	0.023 (0.803)	0.025 (0.897)	0.010 (0.258)	0.004 (0.094)
Average Education	0.217 (1.380)			0.042 (0.214)
Oil Dummy		-1.291** (-2.284)		-1.042 (-1.342)
Sub-Saharan Africa Dummy			-1.343 (-1.635)	-1.364 (-1.574)
Middle East/North Africa Dummy			-0.667 (-1.158)	-0.267 (-0.367)
Latin America/Carib Dummy			0.478 (0.596)	0.403 (0.516)
Constant	-4.789 (-1.229)	-9.382*** (-2.957)	-5.946* (-1.760)	-4.546 (-0.927)
Number of Observations	66	74	74	66
LR Chi-sq	28.87	41.17	65.90	51.65
Prob>Chi-sq	0.000	0.000	0.000	0.00
Pseudo R-sq	0.48	0.53	0.58	0.54

Table III. Panel Regressions

Dependent Variable: Democracy						
	OLS	OLS	GLS	GLS	PCSE	PCSE
Log GDP per capita	0.943*** (3.856)	0.453* (1.864)	0.417*** (13.091)	0.321*** (5.981)	0.580*** (6.576)	0.320*** (3.949)
GDP Growth	-0.002 (0.917)	0.006 (0.298)	-0.120*** (-10.582)	-0.022 (-1.511)	-0.088** (-2.352)	-0.037 (-1.209)
Resource Dependence	-2.350*** (-2.816)	-0.999 (-1.143)	-7.969*** (-22.130)	-2.746*** (-6.690)	-7.435*** (-14.755)	-4.055*** (-6.147)
Education	0.033*** (3.199)	0.007 (0.678)	0.137*** (46.444)	0.056*** (11.514)	0.118*** (21.540)	0.070*** (15.076)
East Asia/Pacific		-0.929 (-0.579)		-1.028** (-2.282)		-1.855*** (-2.823)
E. Europe and Central Asia		0.413 (0.256)		-1.029** (-2.470)		-2.606*** (-3.066)
Middle East/North Africa		-9.449*** (-5.617)		-9.512*** (-26.647)		-8.865*** (-17.515)
South Asia		-2.043 (0.346)		0.421 (0.707)		-0.290 (0.421)
Western Europe		5.043*** (3.244)		2.258*** (5.461)		1.989** (2.183)
North America		4.423 (1.359)		1.903*** (3.707)		1.719* (1.816)
Sub Sahara Africa		-6.491*** (-4.906)		-7.630*** (-19.978)		-5.403*** (-14.092)
Transition Economy		1.944 (1.441)		0.756*** (3.609)		1.103*** (4.987)
Oil Exporter		-0.614 (-0.374)		-0.251 (-0.738)		0.976** (2.126)
Number of Observations	1468	1468	1468	1468	1468	1468
Number of Countries	109	109	109	109	109	109
Prob>Chi-sq	0.000	0.000	0.000	0.000	0.000	0.000