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THE RENTIER PREDATORY STATE HYPOTHESIS: AN EMPIRICAL EXPLANATION OF THE RESOURCE CURSE

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This paper introduces an empirical growth model that explains the perplexing observed growth resource regime dubbed the resource curse. The main hypothesis advanced in this paper, the *rentier predatory state hypothesis*, holds that under autocracy, the interaction between political power and resource abundance is expected to lead to poor economic outcomes in the long run. In the empirical model, resource abundance is allowed to interact with political repression to generate a negative impact on economic growth. Depending on the extent of the repression, a state dependent on natural resources (a rentier state) can also become a predatory state, i.e., a *rentier predatory state*, or, in other words, a rentier state with a high rate of political repression. The resulting net effect of resource abundance on economic growth is contingent on the extent of the repression, and a resource-abundant state with a sufficiently high rate of political repression will have negative economic growth, while a state with a low to moderate rate of political repression will have positive economic growth.

Keywords: Rentier Predatory State, Political Repression, Economic Growth, Resource Curse, Developing Countries
JEL classification: O13, O40, P16, P26

1. INTRODUCTION

The slow and negative economic growth that has plagued most natural resource-abundant economies over the past few decades presents a conceptual dilemma to researchers and scholars alike. Indeed, researchers now consider resource wealth bestowed on many nations a *curse*, referring to the very slow or even negative economic

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growth experienced by most resource exporting countries over the past few decades. However, despite the documented evidence now that resource abundance appears to hinder economic growth, a puzzling question of why this should be the case remains largely unanswered. In a series of excellent empirical investigations, Sachs and Warner attempt to unravel the potential casual factors behind the poor performance of the resource-abundant economies by considering many possible channels of causation in estimating a standard cross-country growth regression model. In Sachs and Warner (1995a), they controlled for factors that do not appear to be directly related to the resource curse, like terms of trade volatility, trade policy, income inequality, bureaucratic efficiency, investment rates, and regions. Their later empirical study (Sachs and Warner, 1997a) emphasizes the efficiency of legal and governmental institutions, proxied by measures of the rule of law and institutional quality. Furthermore, Sachs and Warner control for possible omitted geography bias by including the growth rate over two previous decades (Sachs and Warner, 1997b) and by including direct measures of geography and climate in their regression equations (Sachs and Warner, 2001). However, none of Sachs and Warner's empirical investigations pins down the channel through which resource abundance adversely affects economic growth.

Prompted by Sachs and Warner's findings, the recent literature on the resource curse emphasizes the roles of (i) rent seeking, (ii) corruption, and (iii) poor institutional quality in attempting to explain the disappointing performance of the resource-abundant economies. Kronenberg (2004), for instance, attributes the curse in the former Eastern Bloc to corruption. However, this variable's influence on economic growth was found to be positive, though it was never a significant explanatory variable in his growth regression equations. More recently, Bhattacharyya and Holder (2008) find that natural resources foster corruption in less democratic states. Sala-i-Martin and Subramnian (2003), Murshed (2004), and Isham *et al.* (2005), associate point-source natural resources (those extracted from narrow geographic or economic base such as oil, minerals, and plantation crops) with higher rates of rent seeking, corruption, and weak public institutions, which are, in turn, associated with slower growth rates. However, neither Isham *et al.* nor Murshed identify the factor(s) that could eliminate or remedy the negative association between resource abundance and economic growth. Sala-i-Martin and Subramnian (2003), on the other hand, find a statistically insignificant negative effect from natural resources on growth. However, this result is possibly due to the inclusion of an interaction between resource abundance and a measure of the volatility of the terms of trade in their growth regression equation, which yields a statistically significant negative effect, rather than from the inclusion of institutional quality.[1] In the same vein, Mehlum *et al.* (2006) proxy rent seeking by institutional quality and claim positive effect on growth with sound institutions but a negative effect with poor

[1] With induced multi-colinearity and an increase in error variance, the coefficient on resource exports would be estimated less accurately.

institutional quality. Their empirical result, however, does not provide sufficient evidence in support of their claim (explained in detail in Section 3). Indeed, as argued by Arezki and Ploeg (2007), based on Melum *et al.* (2006), resource rent is 'unconditionally' a curse.

Another hypothesis advanced in recent literature (Stijns, 2005; and Brunnschweiler, 2008) suggests that the curse may be confined to Sachs and Warner's measure of natural resources (primary exports to GDP) and argue for broader measures of resource abundance.[2] Nonetheless, Arezki and Ploeg (2007) provide evidence of the curse in Sachs and Warner's data (see also Damania and Bulte, 2008) as well as in a broader measure (natural capital) of resource abundance.[3] Welsch (2008) also uses natural capital and finds empirical support for a negative correlation between this measure of natural resources; and knowledge formation, and the share of investment in output, which in turn, may depress economic growth.

In this paper, I present an empirical growth model that explains the resource curse identified earlier in the data of the seminal work of Sachs and Warner. The essential idea of the model is that under autocracy, resource abundance is likely to lead to poor economic outcomes. Analysis of the model reveals that the "curse" is the result of an *interactive* process between political power (repression) and resource abundance, and not a phenomenon arising simply from the abundance of resources alone. Once the effect of this interactive process is held constant in the growth regression equation, resource abundance no longer has a negative impact on economic growth. In fact, the negative effect of natural resources on economic growth becomes significantly positive and the only negative impact left is one that is solely generated from the interaction between resource abundance and political repression. The magnitude of this adverse effect is entirely dependent on the extent of the repression. That is, for degrees of political repression above a certain threshold, a greater endowment of resources leads to negative economic growth. By contrast, for lower to moderate (below the threshold) degrees of political repression, a higher level of resource endowment leads to positive economic growth. This result is also consistent with other cross-country evidence. For instance, Saudi Arabia, Nigeria, and Zambia vs. Norway, Botswana, and Mauritius, are all resource-rich countries. However, the former three economies have low measures of political rights and represented a growth failure, while the later three have high measures of political rights and represent a growth success.[4]

[2] Specifically, Stijns (2005) shows that primary exports (from Sachs and Warner) and land significantly impede growth, but instead he argues for the use of fuel and mineral reserves; however, these measures are not found to be a significant determinant of growth.

[3] In particular, the authors employ fuel and mineral assets as a broader measure of resource abundance, finding that the evidence of the curse is robust.

[4] Even when including observations from the recent oil-boom period, the real per capita GDP growth rate in Saudi Arabia, the largest oil exporter in the world, over the period 1980-2008 remains negative at - 0.01

In my analysis, I intentionally employ Sachs and Warner's data over the period 1970-1990 for a number of reasons: (a) First, it is this set of data where evidence of the curse prompted wide interest in the empirical work on the resource curse over the recent period. Hence, these data are heavily investigated and evidence of the curse is widely documented by numerous authors. Thus, to test Sachs and Warner's (as well as other authors') hypothesis, I use their data.[5] (b) Some authors suggest that the curse maybe confined to Sachs and Warner's measure of natural resources, suggesting possible different measures. Here, I show that the curse can be rectified in Sachs and Warner's data without having to change their measure. (c) Some authors suggest that the curse maybe confined to the period over which Sachs and Warner conducted their investigation (1970-1990) and that no curse after 1990 (Metcalfe, 2007). Here, I show that the curse can be reversed and could even be turned into a blessing prior to the 1990s.

In the remainder of this paper, I present my empirical growth model in two stages. In the next section, I develop the basic resource-based growth model, which includes determinants of growth as informed by the growth literature. I extend this literature to include a direct measure of physical capital stock for the first time. In this stage, I also control for potential channels of causation of the curse as suggested by the previous literature (specifically the effects of terms of trade volatility and domestic conflict), and I introduce and test the hypothesis of external war and invasion. This hypothesis holds that, more resource-rich lands are likely to be subject to external attacks and invasion, which, in turn, could hamper growth. The final stage of my model is developed in Section 3. Here, I introduce and test my main hypothesis by: (i) introducing a measure of political repression into the growth equation and allowing it to interact with resource abundance to generate negative economic growth, i.e., to produce a *rentier predatory state*; and (ii) testing for growth divergence across political regimes (democratic vs. non-democratic) with respect to initial level of resource endowments.

2. THE BASIC RESOURCE CURSE GROWTH MODEL

2.1. The General Model

In the general model below (Eq (1)), I follow the standard cross-country empirical growth model proposed by Barro (1991) and used by Sachs and Warner (1995a) and other numerous authors in the resource curse literature:[6]

percent per annum; World Bank (2009).

[5] These authors include Lederman and Maloney (2002), Sala-i-Martin and Subramnian (2003), Stijns (2005), Isham *et al*. (2005), Mehlum *et al.* (2006), Arezki and Ploeg (2007), and Damania and Bulte (2008).

[6] These authors include: Sachs and Warner (1997a; 1997b; 1999a; 1999b; 2001), Sala-i-Martin and

$$dy_{(t_0,T)j} = \alpha_0 + \alpha_1 X_{(t_0)j}(.) + \alpha_2 Z_{(t_0,T)j}(.) + \alpha_3 W_{(t_0,T)j}(.) + \varepsilon_j \ , \quad j = 1,...,N \ , \qquad (1)$$

where $dy_{(t_0,T)j}$ represents the growth rate of economy *j* over the period $t_0 - T$, t_0 is the initial period (year), *T* is the final period, and *N* is the sample size. Here, I follow Barro and Sala-i-Martin (2004), and consider two kinds of variables in (1): state variables (with initial values t_{0s}) represented by $X_{(t_0)j}(.)$ and control variables represented by $Z_{(t_0,T)j}(.)$, calculated as averages over the period $t_0 - T$. The variables included in $W_{(t_0,T)j}(.)$ represent all possible indirect influences of resource abundance on growth. Finally, ε_j is a random disturbance term.

2.2. The Basic Resource Based Growth Model

The model excluding the set of variables in *W* mainly serves as a preliminary check to confirm that the curse is not simply a matter of resource abundance crowding out human capital, adversely affecting physical capital stock accumulation, or depressing investment. Thus, in addition to the log of initial per capita income, and a measure of the initial value of the nation's natural resource endowment, I consider in my model the initial level of human capital stock. I extend this basic framework to include the initial value of physical capital stock, the other key component of the nation's capital stock in the neoclassical growth model.[7] To the best of my knowledge, no empirical growth study has included a direct measure of physical capital stock. Instead, this stock is often proxied by human capital (e.g., Barro and Sala-i-Martin, 2004, p. 516; Berthelemy and Varoudakis, 1996) or other alternative measures (such as that of Barro, 1996; who asserts that the GDP level reflects endowments of physical capital and natural resources).[8] The choice of control variables considered in my basic model includes the ratio of real investment.[9] The next step is to consider variables of possible indirect

Subramnian (2003), Murshed (2004), Stijns (2005), Isham *et al.* (2005), Mehlum *et al.* (2006), Arezki and Ploeg (2007), and Damania and Bulte (2008).

[7] Some researchers have broadened this concept of capital stock to include natural resources (e.g., Lucas, 1988; Rebelo, 1991; Caballe and Santos, 1993). Doppelhofer *et al*. (2000), indeed, classify them as one of the ten most robust variables in empirical growth studies. In my regression model, I directly control for all of these capital variables.

[8] Omission of physical capital stock in previous empirical studies is often justified by a lack of reliable international data. However, this variable is interesting in its own right, and it is of great importance to estimate its effect on growth in general, as well as to test if natural resources are sensitive to its inclusion. The data on physical capital stock, however, are available for only 52 of the 95 countries in the analysis.

[9] I also experimented with two other variables: governmental market distortion (as a general proxy of market distortion) and government consumption expenditure, since many resource-rich developing countries

channels of causation between natural resources and growth. Two of these factors-terms of trade volatility and domestic conflict-have already been considered in the previous literature, and I introduce and test the third one here, namely *the external war and invasion hypothesis*. I next turn into a brief discussion of these three factors.

2.2.1. Terms of Trade Volatility

It is often argued that specializing in primary exports exposes countries to secular decline (Prebisch, 1950; and Singer, 1950) and disruptive and unpredictable changes in world commodity prices. This added exposure is especially relevant for most resource-rich developing countries, which usually concentrate their exports in a few primary resources that are subject to fluctuations in commodity prices. Fluctuations in prices often precipitate boom-bust cycles, where the booms tend to be short and the busts tend to be longer in duration (Woolcock *et al.*, 2001) and larger in amplitude (Asfaha, 2007), with adverse consequences for long run growth. To account for this effect, I include the growth rate of export prices minus the growth rate of import prices in the growth regression equation.

2.2.2. Domestic Conflict over Contestable Resources

According to numerous authors, resource abundance increases the likelihood of civil conflict and war, leading to lower aggregate income and adverse consequences on long run growth (Collier and Hoeffler, 2002; 2004; Ross, 2004; Hodler, 2006; and Garfinkel and Skaperdas, 2007). I test this hypothesis by controlling for the period's average political instability as measured by Barro (1991), made up of a linear combination of the number of assassinations per million populations per year and the number of revolutions and coups per year in a given country.

2.2.3. External Conflict over Resources

There is historical and contemporary evidence that the more resource-rich (and less powerful) a nation is, the more likely it becomes the subject of external attacks and invasions in an attempt to capture the resources. This has been noticed since the time of Ibn Khaldun in the 14^{th} century up to recently by Greenspan (2007). Ibn Khaldun, for instance, notes in his explanation of *the rise and fall of the states* that there was constant renewal or replacement of ruling groups by nomads conquering the towns and rich fertile lands (Matthews, 1989). More recent observations come from the countless

are characterized by large size public sector and huge resource rents are wasted on consumption and inefficient investment (see for instance Eifert *et al.*, 2003; Robinson *et al.*, 2006; and the IMF, 2003, p. 75). However, estimates on these two variables tend to be statistically insignificant.

historical accounts on the riches of Spain in the 16th-17th centuries through the conquest and colonization of other territories by the Spanish Empire in quest for gold and other precious metals. Not long ago, in the past two centuries, Britain, France, and other European colonial powers almost colonized the rest of the world-from the resource-rich India (Britain), through the Middle East and to most of the primary commodity-rich African continent (France, Britain, Belgium, and others). A more vivid example, perhaps, is the recent US invasion of Iraq, the country with the second-largest oil reserves in the world (Greenspan, 2007). Hence, could external war be a causal factor behind the curse, for instance, by diverting attention from investing in productive activities into war effort, or is it the actual destruction war brings to the factors of production and economic prosperity? Or is the curse simply arising because of robbing nations of their resources by the invaders? Another argument that merits utmost consideration is that when the invaders withdraw, they usually leave behind autocratic puppet regimes that do not necessarily employ the resources in the best interests of their nations. Whatever might be the reason, the predicted sign on this variable is negative. To test this hypothesis, I include two measures of war from Barro and Lee (1994). The first one is a dummy for countries that participated in at least one external war over the period 1960-1985. The second measure of war estimates the fraction of a time a nation was involved in an external war over the period 1960-1985.

2.3. The Resource Curse-Growth Regression Model

The specifications of the resource curse-growth regression model are given in Eq (2):

$$dy_{(70,90)j} = \beta_0 + \beta_1 R_{(70)j} + \beta_2 \log y_{(70)j} + \beta_3 \log k_{(70)j} + \beta_4 h_{(70)j} + \beta_5 i_{(70,89)j} + \beta_6 \tau_{(70,84)j} + \beta_7 \;_{(70,84)j} + \beta_8 \omega_{(60,85)} + \varepsilon_j . \quad (2)$$

The initial year is 1970, while growth, $dy_{(70,90)j}$, is taken over the period 1970-1990 and the control variables are averaged over the period 1970-1989.[10] The specific time indexing, $t_0 - T$, however, may vary depending on data availability. Given below is a list of definitions of the variables in Eq (2):

$R_{(70)j}$: A measure of initial resource endowment, 1970.

$\log y_{(70)j}$: log of initial real per capita GDP, 1970.

$\log k_{(70)j}$: log of initial physical capital stock per worker, 1970.

[10] In particular, I use the data employed in Sachs and Warner (1995a; 1997a).

$h_{(70)j}$: Initial level of human capital stock, 1970.

$i_{(70,89)j}$: Real domestic (private plus public) investment to real GDP, 1970-89.

$\tau_{(70,84)j}$: A measure of the terms of trade volatility, 1970-84.

$\chi_{(70,84)j}$: A measure of political instability, 1970-84.

$\omega_{(60,85)}$: A dummy that equals 1 for countries that participated in external war over, 1960-85.

$\gamma_{(60,85)}$: The fraction of a time a nation was involved in an external war over, 1960-85.

The country index j will be dropped henceforth for simplicity.

2.4. The Data

The measures of resource endowment - primary product exports as a ratio to GDP - and GDP per person in the economically active population are those constructed by Sachs and Warner (1995a, b) over the period 1970-1990 and used in their later empirical studies (Sachs and Warner, 1997a; 1997b; 1999a; 1999b; and 2001) that show evidence of the resource curse.[11] Others have used these data as well, confirming the negative association found by Sachs and Warner between resource abundance and growth. Using this set of data allows me to test the robustness of previous empirical results and facilitates a comparison between their results and mine.[12] The data on the political variables, which include indices of political and civil freedoms, measures of political instability, and external war, are from Barro and Lee (1994). The rest of variables include non-residential per worker physical capital stock (from Summers and Heston, 1994), real investment, human capital stock, and terms of trade volatility (from Barro and Lee, 1994).[13]

2.5. Estimation of the Resource Curse Growth Regression Model

OLS estimation of the model in Eq (2), reported under regression (Reg) (1) in Table 1, reveals a number of results: First, the predicted sign on $\log y_{(70)}$ is consistent with the well-known conditional convergence hypothesis and its coefficient is close in magnitude to its counterparts in Sachs and Warner (1995a; 1997a), and Sala-i-Martin

[11] The economically active population is defined as the population between the ages of 15 and 64 years.

[12] These authors include Lederman and Maloney (2002), Sala-i-Martin and Subramnian (2003), Stijns (2005), Isham *et al.* (2005), Mehlum *et al.* (2006), Arezki and Ploeg (2007), and Damania and Bulte (2008).

[13] The Data Appendix provides further descriptions of the variables and their sources.

and Subramanian (2003): -2.07.[14] The estimated effect on the log of the initial per worker physical capital stock, $\log k_{(70)}$, is positive, as predicted, and statistically insignificant at the 5 percent level. The estimate on the initial level of human capital stock, $h_{(70)}$ (average years of schooling attainment in the total population) is positive but at borderline statistical significance level, while it is statistically insignificant in the case of contemporaneous investment (at this stage).[15] Reg 1 also shows weak positive effects from foreign trade and shows no direct effect from political instability on growth.[16] However, the fact that $\chi_{(70,84)}$ tends to be statistically insignificant when investment, terms of trade, and external war are added to the model, jointly or individually, suggests an indirect influence from political instability on growth, by depressing investment, by reducing trade, and through external war.[17] Estimations of these indirect effects, however, indicate that they are not sufficiently strong to account for the intensity of the adverse effect of a larger endowment of resources on economic growth. The estimated coefficient on $\omega_{(60,85)}$ is statistically significant (1%) and the acquired sign is intuitively appealing. It implies that countries involved in at least one external war over the period 1960-1985, grow by 1.39 percent less a year, on average, over the period 1970-1990, than those that never participated in any war. Employing the second measure of war in Reg (2), $\gamma_{(60,85)}$, i.e., the fraction of a time a nation was involved in an external war over the period 1960-1985, also shows a statistically significant negative effect on growth from involvement in external war. Specifically, the estimated coefficient implies, all other things being equal, that a unit standard deviation increase in the fraction of time over the sample spent in external war, is expected to

[14] The conditional convergence hypothesis predicts a negative sign on the estimate of the initial level of per capita income (i.e., higher growth rate in response to lower starting GDP per capita) after controlling for other growth determinants.

[15] In estimating investment, I use values from the previous five years instead of contemporaneous values to isolate possible reverse causation, but this measure tends to be insignificant. Barro (1994, 1996) and Barro and Sala-i-Martin (2004, p. 541) similarly find insignificance effect when using lagged investment as an instrumental variable. Indeed, Barro (1991, 1996), Sachs and Warner (1995a, 1997a), Barro and Sala-i-Martin (2004), Stijns (2005), and Arezki and Ploeg (2007) use contemporaneous investment. Moreover, investment is a major variable in growth and I want to follow Sachs and Warner as much as possible, and replicate their work to see if I can obtain the same results before I test my main hypothesis. At any rate, dropping investment altogether from the regression does not alter the final result for resource abundance.

[16] The result for terms of trade is consistent with previous empirical findings (e.g., Barro, 1996; and Sachs and Warner, 1995a; 1997a, who both employ the same measure).

[17] Feng's (2003) finding that with *policy certainty*, political instability need not have any influence on growth is particularly relevant in this respect. It is possible, therefore, that investment, trade, and the absence of war signify policy certainty in this case.

lower per capita real GDP growth by about 0.92 percentage points a year over the period 1970-1990. Both measures of external war tested here are robust determinant of growth.

Table 1. Resource-Based Growth Regression Equations
(Dependent Variable: Real Per Capita GDP Growth Rate, $dy_{(70,90)}$)

Regressions	1	2	3	4	5	6	7	8
Constant	12.72**	11.04**	14.86**	15.25**	15.19**	14.56**	16.49**	15.68**
	(3.85)	(3.95)	(4.45)	(4.56)	(3.48)	(3.78)	(3.01)	(3.19)
$R_{(70)}$	- 6.79*	-6.41*	-6.47*	-6.62*	11.34**	9.78*	-12.51**	-11.85**
	(2.95)	(3.04)	(2.86)	(2.86)	(4.28)	(4.56)	(2.46)	(2.63)
$\log y_{(70)}$	-2.07**	-1.80**	-2.27**	-2.29**	-2.86**	-2.67**	-2.94**	-2.66**
	(0.64)	(0.65)	(0.67)	(0.67)	(0.53)	(0.56)	(0.50)	(0.53)
$\log k_{(70)}$	0.70*	0.59	0.69*	0.68*	0.92**	0.83**	1.07**	0.87**
	(0.35)	(0.35)	(0.34)	(0.34)	(0.27)	(0.28)	(0.27)	(0.28)
$h_{(70)}$	0.26	0.30	0.24	0.22	0.27*	0.25	0.23*	0.27*
	(0.15)	(0.15)	(0.15)	(0.15)	(0.12)	(0.12)	(0.11)	(0.12)
$i_{(70,89)}$	3.41	3.52	4.33	4.41	10.72**	10.06**	10.08**	8.73**
	(3.39)	(3.54)	(3.25)	(3.25)	(2.86)	(3.01)	(2.70)	(2.84)
$\tau_{(70,84)}$	7.49	7.13	6.11	5.83	7.89*	7.47	8.79**	8.58*
	(4.37)	(4.59)	(4.52)	(4.57)	(3.56)	(3.80)	(3.33)	(3.73)
$\chi_{(70,84)}$	-0.80	-0.99	-	-	-	-	-	-
	(1.90)	(1.98)	-	-	-	-	-	-
$\omega_{(60,85)}$	-1.39**	-	-1.46**	-1.40**	-1.68**	-1.68**	-1.63**	-1.67**
	(0.52)	-	(0.50)	(0.50)	(0.39)	(0.41)	(0.38)	(0.41)
$\gamma_{(60,85)}$	-	-5.62*	-	-	-	-	-	-
	-	(2.68)	-	-	-	-	-	-
$\rho_{(72,89)}$	-	-	-1.11	-	2.41*	-	-	-
	-	-	(1.13)	-	(1.14)	-	-	-
$c_{(72,89)}$	-	-	-	-1.38	-	2.05	-	-
	-	-	-	(1.31)	-	(1.36)	-	-
$R_{(70)} * \rho_{(72,89)}$	-	-	-	-	-34.13**	-	-	-
	-	-	-	-	(6.99)	-	-	-
$R_{(70)} * c_{(72,89)}$	-	-	-	-	-	-31.29**	-	-
	-	-	-	-	-	(7.44)	-	-

Demo	-	-	-	-	-	-	-1.52*	-
	-	-	-	-	-	-	(0.63)	-
$Demo * R_{(70)}$	-	-	-	-	-	-	21.90**	-
	-	-	-	-	-	-	(4.19)	-
Lib	-	-	-	-	-	-	-	-1.10
	-	-	-	-	-	-	-	(0.66)
$Lib * R_{(70)}$	-	-	-	-	-	-	-	17.59**
	-	-	-	-	-	-	-	(4.21)
R-Squared	0.49	0.55	0.50	0.50	0.70	0.67	0.72	0.68
Sample Size	45	45	45	45	45	45	45	45

Notes: Standard errors are in parentheses below their respective coefficients. * and ** represent significance at the 5 and 1 percent levels, respectively.

Notations:

$dy_{(70,90)}$ = the growth rate of real per capita GDP taken over the period 1970-1990,

$R_{(70)}$ = natural resource-based exports to GDP in 1970,

$\log y_{(70)}$ = log of initial real per capita GDP, initial year is 1970,

$\log k_{(70)}$ = log of initial per worker physical capital stock, initial year is 1970,

$h_{(70)}$ = level of initial human capital stock; average years of schooling attainment in the total population in 1970,

$i_{(70,89)}$ = investment ratio to real GDP, averaged over the period 1970-1989,

$\tau_{(70,84)}$ = growth rate of export prices minus the growth rate of import prices averaged for the years 1970-1984,

$\chi_{(70,84)}$ = measure of political instability, a linear combination of number of assassinations per million population per year and number of revolutions per year in a given country over the period 1970-1984,

$\omega_{(60,85)}$ = 1 for countries that participated in at least one external war over 1960-1985, and zero otherwise,

$\gamma_{(60,85)}$ = the fraction of time a country was involved in an external war over the period 1960-1985,

$\rho_{(72,89)}$ (measure of political repression) = the Gastil's Index of Political Rights between the years 1972-1989 normalized to fall into the [0, 1] interval, with 1 representing the least freedom,

$c_{(72,89)}$ (measure of civil repression) = the Gastil's Index of Civil Rights between the years 1972-1989 normalized to fall into the [0, 1] interval, with 1 being most coercive,

Demo (dummy for democracy) = 1 for all states classified as democratic in Reg (7) and zero otherwise,

Lib (dummy for civil liberty) = 1 for all states classified as civil liberal in Reg (8) and zero otherwise.

The Data Appendix contains more descriptions of the variables and their sources.

However, reverse causation is possible here, since internal economic conditions (difficulties) may pressure countries to wage war against others.[18] Nonetheless, although the estimates on the measures of external war are consistent with the theoretical prediction, the result for resource abundance is not affected by their inclusion or omission from the growth equation. Analogously, the inclusion of terms of trade, domestic conflict, and physical and human capital stocks does not alter the result for resource abundance, i.e., the curse persists. This is indicated by the estimated negative sign on $R_{(70)}$, the share of primary exports in GDP in 1970, in Reg (1). The size of the estimated effect, -6.79, is consistent with its counterparts in Sachs and Warner (1995a; 1997a). This result adds support to earlier empirical findings and shows that resource abundant economies grow much more slowly than the resource-poor economies.

3. THE RENTIER PREDATORY STATE HYPOTHESIS

3.1. The Rentier Predatory State Growth Regression Model

It is well established in political science and economic theory that political power and wealth are inter-related, and they reinforce each other. Political power provides the ruler with the means to extract and expropriate resource rents, and to strip people of their economic and political freedoms. Natural resource wealth, by contrast, provides the ruler with the means to further strengthen his political power, independent of his subjects, and to maintain it indefinitely. Naturally, the objectives of such an autocrat are at variance with the wishes of his subjects. While promoting development would increase the wealth of the ruler and his subjects alike, it could subsequently jeopardize the incumbency of the ruler or the incumbency of his offspring or group members. Therefore, the self-interested ruler may benefit more from holding on to wealth and power than promoting development and redistributing resource wealth more equally or efficiently. Hence, the ruler is expected to use political power and, if necessary, terror to stay in power and enjoy the lavish resource abundance and power. Throughout this analysis, I assume that the political system is exogenously given at the initial period and that, most likely, it will determine the level of development over subsequent periods or substantially influence its path.[19] That is to say, assuming autocracy initially - a period of massive resource discovery or substantial improvement in terms of trade - the ruling autocrat is expected to exercise his political power to extract and expropriate resource rents to further strengthen his political power (over his subjects) and maintain it indefinitely (over time) by passing it to his offspring or group members.[20] Therefore,

[18] Unfortunately, an instrumental variable for war is not easily found.

[19] The analysis here draws upon the more complete analysis in Alkhater (2009).

[20] The discovery of oil in the 1930-1940s and the 1970s oil boom in the tribal monarchies of the Gulf States undoubtedly helped to reinforce the political status quo and consolidate the autonumous state systems

under autocracy, the interaction between political power and resource abundance is expected to lead to poor economic outcomes in the long run. This is *the rentier predatory state hypothesis* (*RPSH*). In a democracy, by contrast, the government is presumably held directly accountable for its actions by the electorates, which put some checks and balances on government actions, and restrains abusive resource exploitation and expropriation by the state. Therefore, in a democracy, one would expect more efficient utilization of a state's natural resources (for the benefit of the nation as a whole). Democracy might not only limit the power of the government so that it does not confiscate the capital accumulated by the private sector, as argued by Barro and Sala-i-Martin (2004, p. 520), but it might also provide more effective mechanisms whereby the private sector can keep a reasonable share of the resource wealth and hence accumulate capital in the first place. In this context, see Eifert *et al*. (2003) on the experiences of Norway, the State of Alaska, and the Province of Alberta.

To test the *RPSH*, I introduce a measure of political repression and let it interact with resource abundance in the regression equation. In a non-democratic environment or under autocracy, political repression can also reflect the amount of political power the ruling autocrat commands. Depending on the extent of the repression, the rentier state can also become a predatory state - that is, a rentier state and a predatory state at the same time. In other words, a *rentier predatory state* is a rentier state with a high rate of political repression and resource rent appropriation. Resource abundance is expected to generate two kinds of effects on economic growth here: (i) a direct effect, which is predicted to be positive; and (ii) an indirect effect through the degree of political repression which is endogenously chosen and exerted by the ruler depending on the amount of political power he has. This indirect effect is predicted to be negative. For political repression, I employ a subjective measure of non-democracy or lack of political rights from Gastil over the period 1972-1989 after normalizing it to fall in the [0,1] interval. Zero indicates full democratic representation and 1 indicates maximum coercion or, in other words, a complete totalitarian system (one party system, a military dictatorship, or the like). Let this variable be denoted by ρ. A parallel measure of civil repression is also obtained from Gastil's Index of Civil Rights. Applying the same transformation, let civil repression be denoted by $c_{(72,89)} \in [0,1]$, with 1 being the most coercive. These two variables, ρ and *c*, are then used to measure the extent of political and civil repression, henceforth, called *socio-political* repression.

in these countries. Auty and Gelb (2001) also argue that policy capture by a single tribe or tribal alliance since the removal of colonialism in Sub-Saharan Africa produced factional and predatory states, while a peasant society, with its potentially diffused socioeconomic linkages, is expected to generate developmental consensual democracy.

3.2. Model Specification

A full specification of the model is given by Eq (3):

$$dy_{(70,90)} = \beta_0 + \beta_1 R_{(70)} + \beta_2 \log y_{(70)} + \beta_3 \log k_{(70)} + \beta_4 h_{(70)} + \beta_5 i_{(70,89)} + \beta_6 \tau_{(70,84)} + \beta_7 \omega_{(60,85)} + \beta_8 v_{(72,89)} + \varphi R_{(70)} * v_{(72,89)} + \varepsilon_j , \quad (3)$$

where v is a measure of state repression. The specification in Eq (3) introduces (as an explanatory variable) an interaction between resource endowment and repression, $R_{(70)} * v_{(72,89)}$, to test the *RPSH.*[21] Under this specification, resource endowment affects growth via two different channels: directly through *R*, and indirectly through the interaction of resource abundance with repression, $R * v$. The interaction term implies that the effect of growth with respect to resource abundance depends on the extent of the repression, v. More formally, from Eq (3), we can obtain the expression in Eq (4), which reflects the (full) influence of resource endowment on growth:

$$\beta_1 R + \varphi R * v , \quad (4)$$

where β_1 and φ represent the estimated parameters of the regression. β_1 reflects the direct effect while φv reflects the indirect effect. Differentiating this expression with respect to *R* gives the full effect of a unit change in *R* on economic growth, *dy*:

$$\partial dy / \partial R \equiv \beta_1 + \varphi v , \quad v \in [0,1] . \quad (5)$$

The sign of this expression depends on the parameters β_1 and φ, and on the magnitude of v. Given that β_1 and φ are jointly statistically significant, there are four possible cases to consider.

Case 1. $\beta_1 < 0$ and $\varphi < 0 \Rightarrow \partial dy / \partial R < 0$.

The finding that the assumptions of this case hold would provide little if any evidence in support of the *RPSH*.

Case 2. $\beta_1 > 0$ and $\varphi > 0 \Rightarrow \partial dy / \partial R > 0$.

A finding that the assumptions of this case hold would represent evidence against the *RPSH*, since the interaction between repression and initial resource endowment generates positive economic growth for all possible degrees of repression.

Case 3. $\beta_1 < 0$ and $\varphi > 0 \Rightarrow$ the sign of $\partial dy / \partial R$ is ambiguous.

[21] Since political instability tends to be statistically insignificant when added to this and previous specifications, I drop it from the analysis.

A finding that the assumptions of this case hold would again represent evidence against the *RPSH*; since for all levels of repression, (i) the interaction between repression and initial resource endowment adds to economic growth, and (ii) a higher level of initial resource endowment detracts from economic growth.

Case 4. $\beta_1 > 0$ and $\varphi < 0 \Rightarrow$ the sign of $\partial dy / \partial R$ is ambiguous.

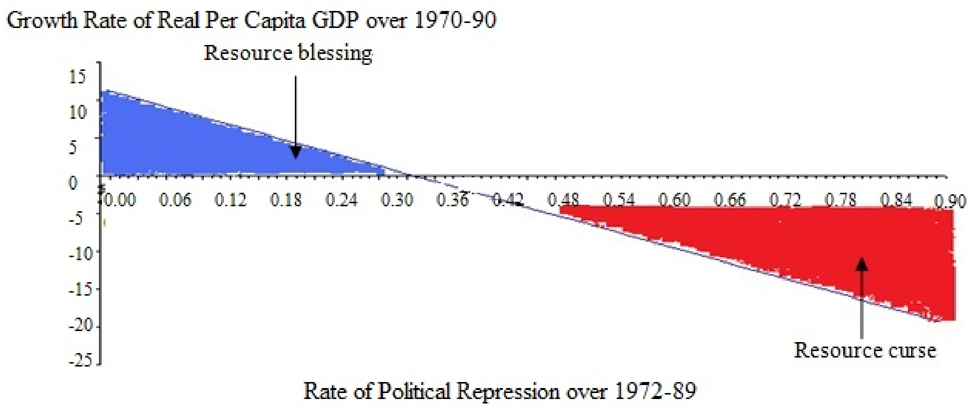
Under the assumptions of this case, the sign of $\partial dy / \partial R$ depends again on the relative magnitudes of β_1 and φ, and on the magnitude of v itself. A higher initial value of resource endowment leads to less economic growth for degrees of repression (through the indirect effect, φv), but a higher initial value of resource endowment leads to higher economic growth through the direct impact of *R* on growth, β_1. Thus, the interaction between repression and initial resource endowment can offset the (direct) positive impact on growth from resource abundance. A finding that the assumptions of this case hold would provide evidence in support of the *RPSH*.

3.3. Estimation of the Rentier Predatory State Growth Regression Model

To begin with, Regs (3) and (4) show $R_{(70)}$ to be negatively correlated with growth. In other words, the curse still persists even after controlling for the direct effect of the socio-political repression on growth, although these effects are statistically insignificant. The results from the OLS estimation of the model in Eq (3) are reported under Reg (5) in Table 1. This regression reveals results that are consistent with Case 4, i.e., a result in support of the theoretical prediction of the *RPSH*. In particular, Eq (6) below reports the estimated effect of a higher initial value of resource endowment on growth -calculated in Eq (5)- given the degree of political repression:

$$\partial dy / \partial R \equiv 11.33 - 34.13\rho \; . \qquad (6)$$

Notice the sign changes from negative to positive, on the estimate of the coefficient for *R* for the first time. That is, the direct effect of resource abundance on growth now becomes positive. This effect is large in magnitude and statistically significant, as measured by $\beta_1 = 11.33$ (*t*-ratio $= 2.65$). By contrast, the estimated effect on the interaction term $R * \rho$ is negative, high in magnitude, and statistically significant as well: $\varphi = -34.13$ (*t*-ratio $= -4.88$). Thus, the implied indirect effect, as measured by $\varphi\rho = -34.13\rho$, is negative. Moreover, a multiple hypotheses test for joint restrictions on the estimated parameters in Eq (6) indicates that they are jointly statistically significant at the 1 percent level. The estimated coefficients shown by Eq (6) imply that a higher value of *R*, leads to higher economic growth through the direct impact of *R* on growth, but a higher *R* ratio also leads to lower economic growth through the indirect effect of *R* on growth through its interaction with political repression. That is, a higher *R* ratio leads to lower economic growth for a higher rate of political repression. Specifically, the estimated effect of R on dy is strictly positive $\forall \rho \in [0,0.33)$. For $\rho \in (0.33,1]$, a higher ratio of R eventually lowers per capita economic growth. The partial effect is strictly decreasing in ρ, $\partial dy / \partial R(\partial dR / \partial \rho) < 0$. A graphical representation of this partial effect equation is depicted in Figure 1. In Table 2, observations are provided on each of the 45 countries in Reg (5), ranked in descending order according to ρ. There are 20 countries with $\rho > 0.33$, and these represent a *resource curse* - the red area in Figure 1.



Notes: Plot of the estimated partial effect equation of growth with respect to resource abundance, Reg (5): $\partial dy / \partial R \equiv \beta_1 + \varphi\rho = 11.33 - 34.13\rho$.

Figure 1. Resource Abundance and Political Repression

Conversely, there are 25 countries with $\rho < 0.33$, representing a *resource blessing* -the blue area in Figure 1.[22] In the group with $\rho > 0.33$, Malawi has the highest ρ value at 0.90, with a corresponding growth rate $dy_{(70,90)}$ of 0.87% and $R_{(70)} = 0.21$. Hong Kong has the lowest ρ at 0.44, with $dy_{(70,90)} = 5.12\%$ and $R_{(70)} = 0.03$. The average ρ for this group is 0.63, with an average $dy_{(70,90)}$ of 1.00% and an average $R_{(70)}$ of 0.13. This is compared with an average ρ of 0.08 for the group with

[22] The group of countries with $\rho > 0.33$ includes Malawi, Syria, Chile, Panama, Iran, Kenya, Sierra Leone, Taiwan, Zambia, Paraguay, Zimbabwe, the Republic of Korea, Bolivia, Honduras, Guatemala, Thailand, Argentina, Peru, Mexico, and Hong Kong. The group with $\rho < 0.33$ includes Spain, Portugal, Mauritius, the Dominican Republic, Colombia, Israel, India, Greece, Finland, Jamaica, Japan, Italy, Sweden, Iceland, New Zealand, Ireland, the Netherlands, Canada, Australia, Austria, France, the UK, West Germany, Switzerland, and the USA.

$\rho < 0.33$, with corresponding averages of $dy_{(70,90)} = 1.88\%$ and $R_{(70)} = 0.08$.

Table 2. Sample of 45 Countries in the Resource Exports and Political Repression Growth Equation

Country	$dy_{(70,90)}$	$R_{(70)}$	$\log y_{(70)}$	$\log k_{(70)}$	$h_{(70)}$
Malawi	0.87	0.21	6.76	5.46	1.95
Syria	2.4	0.08	8.50	9.18	1.67
Chile	0.26	0.15	8.77	8.75	5.38
Panama	-0.21	0.10	8.52	9.11	4.56
Iran	-1.91	0.12	9.16	8.42	1.22
Kenya	2.24	0.18	7.11	6.99	1.31
Sierra Leone	-2.09	0.09	7.87	4.78	0.93
Taiwan	5.77	0.02	8.25	8.51	4.38
Zambia	-2.18	0.54	7.68	7.77	2.12
Paraguay	1.58	0.10	7.93	5.83	3.74
Zimbabwe	0.02	0.17	7.72	8.62	1.86
Korea Rep.	5.71	0.02	8.03	8.27	5.58
Bolivia	-0.01	0.18	8.04	8.30	3.66
Honduras	0.36	0.23	7.81	8.31	1.95
Guatemala	0.23	0.11	8.28	7.85	1.71
Thailand	3.15	0.09	8.01	7.48	3.54
Argentina	-0.69	0.05	9.09	8.88	5.89
Peru	-1.63	0.15	8.56	9.00	3.75
Mexico	1.06	0.02	8.99	9.13	3.31
Hong Kong	5.12	0.03	8.94	9.06	5.17
Spain	2.12	0.03	9.15	9.21	4.78
Portugal	3.75	0.05	8.58	8.57	1.21
Mauritius	3.39	0.29	8.41	7.55	3.34
Dominican Rep.	0.85	0.13	8.04	7.62	2.87
Colombia	1.43	0.09	8.33	9.03	3.11
Israel	2.22	0.04	9.21	9.60	7.62
India	1.99	0.02	7.27	6.93	1.90
Greece	2.14	0.04	8.80	9.28	5.19
Finland	2.66	0.07	9.41	10.00	8.34
Jamaica	-1.35	0.14	8.63	8.52	3.20
Japan	3.31	0.01	9.27	9.15	6.80
Italy	2.19	0.02	9.37	9.70	5.22
Sweden	1.66	0.05	9.71	9.95	7.47
Iceland	2.96	0.28	9.35	9.17	6.37
New Zealand	0.51	0.18	9.66	9.99	9.69
Ireland	2.73	0.15	9.07	9.24	6.52

Netherlands	1.25	0.15	9.60	9.92	7.67
Canada	2.19	0.10	9.70	10.05	8.55
Australia	1.15	0.10	9.75	10.15	10.09
Austria	2.16	0.04	9.41	9.51	5.92
France	1.77	0.03	9.60	9.78	4.76
U.K.	1.99	0.03	9.52	9.37	7.32
West Germany	1.68	0.02	9.60	9.97	8.14
Switzerland	0.99	0.02	9.89	10.57	6.22
U.S.A.	1.34	0.01	9.95	10.05	10.14
Average for countries with $\rho > 0.33$	1.00	0.13	8.20	7.99	3.18
Average for countries with $\rho < 0.33$	1.88	0.08	9.17	9.32	6.10

Table 2. (Cont.)

Country	$i_{(70,89)}$	$\tau_{(70,84)}$	$\omega_{(60,85)}$	$\rho_{(72,89)}$
Malawi	0.15	-0.02	0.00	0.90
Syria	0.29	0.04	1.00	0.81
Chile	0.21	-0.04	1.00	0.80
Panama	0.13	-0.04	0.00	0.79
Iran	0.26	0.00	1.00	0.74
Kenya	0.12	-0.01	0.00	0.72
Sierra Leone	0.13	-0.03	0.00	0.70
Taiwan	0.29	-0.01	0.00	0.69
Zambia	0.12	-0.01	0.00	0.69
Paraguay	0.23	0.01	0.00	0.66
Zimbabwe	0.05	-0.01	1.00	0.64
Korea Rep.	0.11	-0.02	0.00	0.57
Bolivia	0.12	0.01	0.00	0.52
Honduras	0.12	0.00	1.00	0.51
Guatemala	0.09	-0.02	1.00	0.50
Thailand	0.25	0.10	1.00	0.49
Argentina	0.18	-0.03	1.00	0.49
Peru	0.03	0.00	1.00	0.46
Mexico	0.28	-0.04	0.00	0.44
Hong Kong	0.24	0.12	0.00	0.44
Spain	0.19	-0.01	0.00	0.23
Portugal	0.16	0.14	0.00	0.20
Mauritius	0.08	-0.02	0.00	0.19
Dominican Rep.	0.16	-0.04	1.00	0.19
Colombia	0.21	-0.03	1.00	0.19

Israel	0.29	-0.01	1.00	0.17
India	0.25	0.12	1.00	0.17
Greece	0.28	0.02	1.00	0.16
Finland	0.10	-0.04	0.00	0.14
Jamaica	0.06	-0.05	1.00	0.12
Japan	0.29	-0.01	0.00	0.07
Italy	0.29	-0.04	0.00	0.04
Sweden	0.26	-0.01	0.00	0.01
Iceland	0.06	-0.03	0.00	0.00
New Zealand	0.02	0.00	0.00	0.00
Ireland	0.16	-0.01	0.00	0.00
Netherlands	0.21	0.02	0.00	0.00
Canada	0.18	0.04	0.00	0.00
Australia	0.14	0.04	0.00	0.00
Austria	0.18	0.14	0.00	0.00
France	0.30	0.14	0.00	0.00
U.K.	0.16	0.10	0.00	0.00
West Germany	0.25	-0.01	0.00	0.00
Switzerland	0.27	-0.01	0.00	0.00
U.S.A.	0.37	0.00	1.00	0.00
Average for countries with $\rho > 0.33$	0.17	0.00	0.45	0.63
Average for countries with $\rho < 0.33$	0.20	0.02	0.28	0.08

Notations:

$dy_{(70,90)}$ = the growth rate of real per capita GDP taken over the period 1970-1990,

$R_{(70)}$ = natural resource-based exports to GDP in 1970,

$\log y_{(70)}$ = log of initial real per capita GDP, initial year is 1970,

$\log k_{(70)}$ = log of initial per worker physical capital stock, initial year is 1970,

$h_{(70)}$ = level of initial human capital stock; average years of schooling attainment in the total population in 1970,

$i_{(70,89)}$ = investment ratio to real GDP, averaged over the period 1970-1989,

$\tau_{(70,84)}$ = growth rate of export prices minus the growth rate of import prices averaged for the years 1970-1984,

$\chi_{(70,84)}$ = measure of political instability, a linear combination of number of assassinations per million population per year and number of revolutions per year in a given country over the period 1970-1984,

$\omega_{(60,85)}$ = 1 for countries that participated in at least one external war over 1960-1985, and zero otherwise,

$\rho_{(72,89)}$ (measure of political repression) = the Gastil's Index of Political Rights between the years 1972-1989 normalized to fall into the [0, 1] interval, with 1 being the most coercive.

The Data Appendix contains more descriptions of the variables and their sources.

The country with the highest ρ value in this group is Spain, with $\rho = 0.23$, and a growth rate of 2.12% and $R = 0.03$. New Zealand, Australia, Canada, the USA, and the 8 OECD countries shown at the bottom of Table 2, have the lowest rate of political repression at $\rho = 0$. In a sample of 112 countries (countries for which data on $\rho_{(72,89)}$ are available) there are 45 countries or 40% of the sample with $\rho < 0.33$. To get a sense of the size of the estimated partial effect equation in Eq (6), Table 3 reports the results for this effect evaluated at different values of ρ. For instance, at the mean of $\rho(= 0.50)$ for 112 countries in the sample, the implied net effect of *R* on growth is negative, being approximately $[11.33 - 34.13 * (0.50) =] - 5.74$. Therefore, other things being equal, at the sample mean of ρ, a unit standard deviation increase in $R_{(70)}$ (i.e., 0.16), reduces the per capita growth rate of real output by about $(5.74 * 0.16 =)0.92$ percentage points per annum over the subsequent two decades. Evaluated at the mean of the 20 leading resource exporters in a sample of 114 countries for which data on $R_{(70)}$ are available, the net negative impact from *R* on growth is the highest, −9.83%. By contrast, when evaluated at the mean of the lowest 20 countries on the *R* unit interval (the group with poorest resources in a sample of 114 countries), this effect turns to positive, 1.77%. The greatest positive effect from resource abundance on growth can be achieved only in a perfect world where there is no political repression at all. In such a world, $\rho = 0$ and the resulting partial effect of *R* on growth is simply its coefficient, 11.33. Here, a unit standard deviation increase in $R_{(70)}$ leads to about a $(11.33 * 0.16 =)1.81$ percentage point increase in $dy_{(70,90)}$, other variables held fixed. Therefore, it is evident that the intensity of the adverse effect on growth increases with resource exports. This finding is in contrast with that of Mehlum *et al.* (2006), who proxy rent seeking by institutional quality (*IQ*) and find positive effect on the interaction term $R_{(70)} * IQ$. However, the (direct) negative impact from $R_{(70)}$ on growth remains statistically significant. In their regression, growth is positive only for $IQ > 0.93$, on the unit interval, negative otherwise (16% of the sample or 14 out of 87 countries). $IQ > 0.93$ corresponds to advanced industrialized countries with not much primary exports and where the curse does not exist in the first place -Japan, Australia, Austria, (former) W. Germany, Norway, Sweden, New Zealand, Canada, Denmark, Finland, Belgium, the USA, Netherlands, and Switzerland.[23]

[23] From Mehlum *et al.*'s (2006) Table 4, note that the average $R_{(70)}$ for this group of countries is 0.076, with corresponding real per capita GDP growth rate average of 2.42% over the period 1965-1990. In this group, New Zealand has the highest $R_{(70)}$ value at 0.18 but it also has the lowest real per capita GDP growth rate, $dy_{(70,90)}$, of 0.51%. The USA and Japan, both have the lowest $R_{(70)}$ value at 0.01, with

Table 3. The Estimated Partial Effect of Resource Exports on Economic Growth

Evaluated at different values of ρ	Effect on Growth	
	1% ↑ R	Unit Sd ↑ R
Full sample mean of $\rho(=0.50)$	-5.74% (2.24)	0.92% ↓
Mean of the top 20 resource exporters in 114 countries in Sachs and Warner $(\rho = 0.62)$	-9.83% (2.34)	1.57% ↓
Mean of lowest 20 resource exporters in 114 countries in Sachs and Warner $(\rho = 0.28)$	1.77% (2.81)	0.28% ↑
Mean of the group with $\rho < 0.33$ in regression (5): $\rho = 0.28$	8.60% (3.81)	1.38% ↑
In a perfect world: no political repression, $\rho = 0$	11.33% (4.28)	1.81% ↑
At the critical value of $\rho(=0.33)$	0.00 (2.61)	0.00
1 standard deviation unit above the critical value of ρ	-10.16 (2.36)	1.63 ↓
1 standard deviation unit below the critical value of ρ	10.32 (4.10)	1.65 ↑

Notes: The estimated partial effect in Eq (6) is obtained from Reg (5) $(\beta_1 + \varphi\rho = 11.34 - 34.13\rho)$ and evaluated at different values of political repression (ρ) for 1 percentage point (↑R above) and 1 unit standard deviation (↑Sd = 0.16 above) increase, respectively, in the ratio of primary exports to GDP (R) at the initial period. The standard error of the estimated partial effect function is reported in parentheses below their respective values and is calculated in the following way:
$Se(\beta_1 + \varphi\rho) = [Var(\beta_1 + \varphi\rho)]^{1/2} = [Var(\beta_1) + 2\rho Cov(\beta_1, \varphi) + \rho^2 Var(\varphi)]^{1/2}$.

Therefore, this positive growth could be due to other characteristics associated with advanced economies rather than elimination of the curse (that never existed to begin with) by good enough institutions, as claimed by Mehlum *et al.* (2006). There is also a concern that $R_{(70)}$ is endogenous in Mehlum *et al.* since growth is calculated over the period 1965-1990, i.e., that growth prior to 1970 may influence their measure of initial

corresponding $dy_{(70,90)}$, of 1.34%, and 3.31% respectively. $R_{(70)}$ of 0.076 is also equivalent to the average $R_{(70)}$ for the lowest 20 countries on the R unit interval, i.e., the most resource scarcest group of countries in the entire sample of 114 countries in Sachs and Warner (1995a; b). This group of countries is evaluated as resource blessed group in Table 3.

resource endowment in 1970. Arezki and Ploeg (2007) also raise another serious issue and criticize Mehlum *et al.*'s (2006) *IQ* measure of being endogenous and that their results are not robust to using an instrumental variable for *IQ*. Finally, as argued by Arezki and Ploeg (2007), based on Mehlum *et al.*, most rents are likely to corrupt officials and induce rent seeking rather than being positively used to enhance productivity. Therefore, according to Mehlum *et al.*'s result, resource rents are 'unconditionally' a curse on economic growth.

More recently, Damania and Bulte (2008) also propose and test a rent seeking-lobbying model in which the interaction between bribing firms and corrupt governments (proxied by measures of autocracy and democracy) leads to a decline in aggregate income. The following results can be concluded from their regression estimations: (i) The full effect of R on growth (i.e., the effect of R alone plus the effect of its interaction with autocracy) is always negative even in the absence (at zero level) of autocracy.[24] (ii) The full effect of democracy on growth is always negative, i.e., the effect of democracy alone on growth is negative and the effect from its interaction with resource endowment is negative as well. (iii) Autocracy leads to positive growth in most countries, particularly in the less resource-endowed states - 75% out of 114 countries in Sachs and Warner's sample or for all countries with R < 19% of GDP. Therefore, the empirical results of Damania and Bulte (2008) are not in support of their theoretical model, as they claim. In fact, their empirical evidence is against the prediction of their theoretical model and it shows natural resources as a curse even in democratic states.

Estimation of the effect of political repression on growth, Reg (5), shows that a higher rate of repression leads to less economic growth for a higher R for all $R > 0.07$. Evaluating this effect at the mean of $R_{(70)}$ for 114 countries implies a net estimated effect of about $[2.41 - 34.13 * (0.16) =] - 3.05$ on economic growth from a higher rate of $\rho_{(72,89)}$. Reg (5) also shows a general improvement in the model. First, the overall goodness of fit increased by 21 percentage points over its counterpart in Reg (1), reaching 70%, and all the estimated coefficients became highly statistically significant. The estimate on $\log k_{(70)}$ is positive and implies that for every percentage point increase in k in the initial period, we have about 0.01 percentage point increase in annual growth in real per capita GDP over the subsequent two decades. This result is consistent with the theoretical prediction and shows physical capital stock as a positive factor in economic growth. The estimated effect on $h_{(70)}$ implies that an additional year of schooling attainment in the total population in 1970 increases the respective country's real per capita growth rate of output by an annual average of 0.27 percentage points over

[24] This is obviously the case because the estimated direct effect of R on growth is still negative; although the joint statistical significance for the full effect of R on growth is not reported, the estimate on R alone is marginally statistically significant, i.e., below the 10% level but above the 5% level.

the 1970-1990 period. Reg (5) also shows a positive effect on growth from improvements in terms of trade. Countries that participated in war grow by 1.68% less a year on average than those that never participated in any war. Finally, the estimate of the coefficient on ρ is statistically significant now. It tends to be statistically insignificant in the empirical literature (e.g., Kohli, 1986; Barro, 1994; Feng, 2003; among others) and in Regs (3) and (4), i.e., models that do not include the interactive term $R*\rho$. Hence, the analysis above suggests that relevant previous empirical growth studies and resource curse models were mis-specified (for not including the interactive term $R*\rho$) and suffer from omitted variable bias. Reg (6) introduces the second measure of repression from Gastil - civil repression, $c_{(72,89)} \in [0,1]$. An interaction between this measure of repression and resource abundance, $R_{(70)} * c_{(72,89)}$, is also introduced as a test of the *RPSH*. The estimated partial effect of $R_{(70)}$ on $dy_{(70,90)}$ from Reg (6) is given by:

$$\partial dy / \partial R \equiv 9.78 - 31.29 * c_{(72,89)} . \tag{7}$$

The effect is jointly statistically significant at the 1 percent level. Consistent with the result for the measure of political repression, Eq (7) shows that resource abundance is negatively related to growth through civil repression. More succinctly, the estimated effect of $R_{(70)}$ on $dy_{(70,90)}$ is positive for all $c_{(72,89)} \in [0,0.31)$ and negative for all $c_{(72,89)} \in (0.31,1]$.[25] Evaluating this effect at the mean of $c_{(72,89)}$, 0.50, for a sample of 112 countries implies an estimated net effect of $[9.78 - 31.29*(0.50) =] - 5.87$ on annual per capita growth rate.[26]

3.4. Can Democracy Lead to Growth in Resource-Abundant States?

In this subsection, I raise the following question: what if resource-abundant states were/or became democratic? Can economic growth materialize? In attempting to answer this question, I test for growth divergence across two groups of countries, democratic (civil liberal) vs. non-democratic (non-civil liberal) with respect to their initial level of resource endowments. First, we need to identify democratic states in the sample. To do so, I follow the methodology used by Durlauf and Johnson (1992) and Berthelemy and Varoudakis (1996), and allow for the possibility that the statistical data are generated by a local rather than a global convergence process. That is, different groups of countries

[25] In a sample of 112 countries, there are 33 countries with $c < 0.31$.

[26] The results in this subsection hold after testing for the effect of possible outliers in the limited samples analyzed in the regressions in Table 1.

form different long run growth regimes depending on their position with respect to political development or a freedom threshold, in this case. The global convergence hypothesis implies the structural stability of the estimated growth equation across the entire sample of countries. Therefore, following Berthelemy and Varoudakis (1996), I conduct a structural stability test on the growth equation with respect to a sorted sample (in decreasing order) of my measure of democracy, the Gastil Index of Political Rights (henceforth *PR*) for all countries. The structural break point serves as a threshold to separate the democratic group from the non-democratic group of countries. A similar technique is applied to identify the civil liberal group of countries. Now let *Demo* = 1 if a country is classified as democratic and zero otherwise, and let *Lib* = 1 if a country is classified as civil liberal and zero otherwise. Applying the basic Chow stability test on a sorted sample of 112 countries according to *PR* shows a statistically significant structural break in the data at the 3.94 level, which corresponds to Thailand. All countries with *PR* > 3.94 are classified as non-democratic, and all those with *PR* ≤ 3.94 as democratic. There are 49 democratic and 63 non-democratic states. The sample mean of *PR* is 3.98. For civil liberty, the structural break occurs at 3.89.[27] To test for divergence in growth trajectories with respect to $R_{(70)}$, I add the binary variable *Demo* (*Lib)* to the main growth regression framework and let it interact with the initial resource endowment as specified below:

$$dy_{(70,90)} = \beta_0 + \beta_1 R_{(70)} + \beta_2 \log y_{(70)} + \beta_3 \log k_{(70)} + \beta_4 h_{(70)} + \beta_5 i_{(70,89)} + \beta_6 \tau_{(70,84)} + \beta_7 \omega_{(60,85)} + \beta_8 Demo + \theta R_{(70)} * Demo + \varepsilon_j . \quad (8)$$

Analogous to Eq (3), we have two kinds of effects from *R* on growth: a direct effect through β_1 and an indirect effect through the interaction between *R* and *Demo*, estimated by θ. Under Eq (8), β_1 represents the effect of initial resource endowment on growth in the non-democratic group. The estimated effect on growth from $R_{(70)}$ in the democratic states can be calculated by the sum of $\beta_1 + \theta$. The null hypothesis is $H_0 : \theta = 0$.

OLS estimation of the full specification in Eq (8) is given in Reg (7), which shows $\theta = 21.90$ (*t*-ratio=5.22) -this is in contrast with negative estimate in Damania and Bulte (2008)- and $\beta_1 = -12.51$ (*t*-ratio=5.09). Thus, the implied growth rate for the democratic states is 9.39, with an intercept of about $(\beta_0 + \beta_8 =)14.97$, compared with a negative growth rate for the non-democratic states in the sample, -12.51.[28] This result

[27] Note that these indices are scaled from 1 to 7, with 1 indicating full political representation and 7 indicating complete totalitarian systems.

[28] Note that the general conditional convergence hypothesis still holds (across the entire sample) in Reg

confirms the findings of the previous subsection and hence provides further evidence in support of the *RPSH.* To get a sense of the extent of the growth divergence between the two groups with respect to $R_{(70)}$, Table 4 provides a comparison of the net estimated effects on growth in the two groups of countries in response to a percentage point increase and a unit standard deviation increase in $R_{(70)}$, i.e., 0.16. As shown in Table 4, a unit standard deviation increase in $R_{(70)}$, leads to about a $(9.39 * 0.16 =)1.50$ percentage point increase per annum in real per capita GDP growth rate in the democratic states vs. about a decrease of $(12.51 * 0.16 =)2$ percentage points per annum in real per capita GDP growth in the non-democratic states over subsequent two decades. The rest of the coefficients in this regression are self-explanatory with magnitudes that are statistically significant and close to their counterparts in Reg (5). Therefore, all other factors being equal, a higher share of primary exports in GDP in 1970 leads to *opposite* effects on growth in the two groups of countries in the sample. That is, a high growth rate in the democratic states vs. a negative growth rate in the non-democratic states over the period 1970-1990. This situation is depicted in Figure 2, which reproduces Reg (7), employing a different measure of external war, $\gamma_{(60,85)}$ - the fraction of time a given nation was involved in an external war over the period 1960-1985 - which, interestingly, produces the same result. Reg (8) reports a parallel result for growth from controlling for civil liberty (*Lib*) and its interaction with $R_{(70)}$ in the growth regression equation. The implied growth resource regression for the civil liberal nations is positive: 5.74. By contrast, for the non-civil liberal nations in the sample, resource endowment leads to negative impact on growth with an estimated coefficient of -11.85.[29]

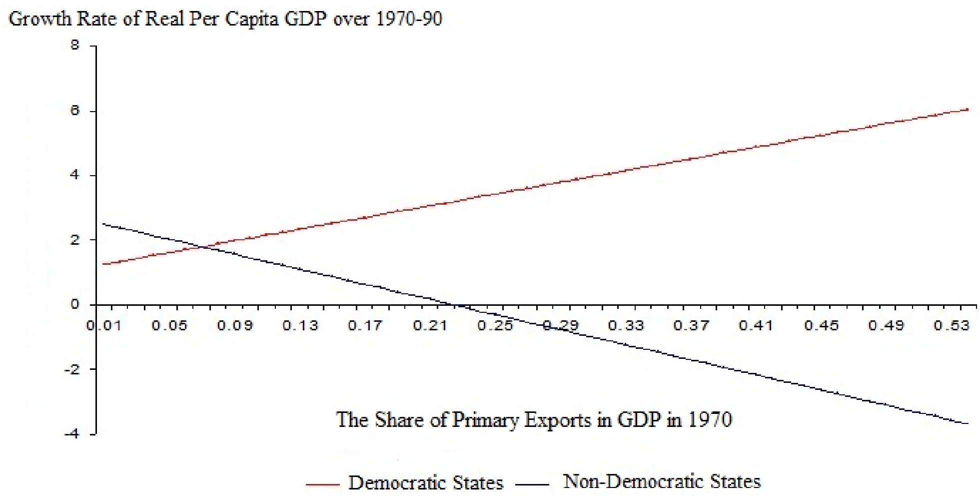
(7), as indicated by the negative sign on the estimate of initial per capita income, -2.97. The growth divergence between the democratic and the non-democratic groups of countries in the sample is with respect to the initial level of resource endowments, $R_{(70)}$.

[29] A point to emphasize here is that these results are also robust to using the sample means of political and civil rights to separate the democratic and the civil liberal states from the non-democratic and the non-civil liberal states, respectively.

Table 4. Net Estimated Effect of Growth Divergence between the Democratic and the Non-Democratic States

Regression 7	Democratic States	Non-Democratic States
1% ↑ *R*	↑ 9.39%	↓ 12.51%
Unit *Sd* ↑ *R*	↑ 1.50%	↓ 2.00%
Regression 8	Civil Liberal States	Non-Civil Liberal States
1% ↑ *R*	↑ 5.74%	↓ 11.85%
Unit *Sd* ↑ *R*	↑ 0.92%	↓ 1.90%

Notes: Net estimated effects on real per capita GDP growth rates per annum in the democratic (civil liberal) and non-democratic (non-civil liberal) states resulting from 1 percentage point and 1 unit standard deviation (*Sd* = 0.16 above) increase (respectively) in the ratio of primary exports to GDP (*R*) at the initial period.



Notes: The above growth trajectories are obtained from the following regression Equation:

$$dy_{(70,90)} = \underset{(3.32)}{14.25^{**}} - \underset{(2.69)}{11.64R^{**}_{(70)}} - \underset{(0.55)}{2.58\log y^{**}_{(70)}} + \underset{(0.29)}{0.90\log k^{**}_{(70)}} + \underset{(0.12)}{0.29h^{*}_{(70)}} + \underset{(2.99)}{9.87i^{**}_{(70,89)}} + \underset{(3.72)}{8.47\tau^{*}_{(70,84)}}$$

$$- \underset{(2.09)}{6.18\gamma^{**}_{(60,85)}} - \underset{(0.70)}{1.44Demo^{**}} + \underset{(4.61)}{20.68Demo * R^{**}_{(70)}}, \qquad R^2 = 0.66,\ N = 45.$$

The implied growth rate for the democratic states with respect to resource endowment is 9.04% per annum vs. –11.64% per annum for the non-democratic states. Standard errors are in parentheses. * and ** represent significance at the 5 and 1 percent levels, respectively.

Figure 2. Growth Divergence between the Democratic States and the Non-Democratic States with Respect to Resource Abundance

4. CONCLUDING REMARKS

The evidence presented in this paper (starting with 95 countries, limited thereafter by data availability) indicates the presence of non-linearity with respect to political systems in the observed "resource curse" motif. The pattern is evident in two ways: First, the interaction between initial resource abundance and political repression (measured in terms of the extent of non-democracy or a lack of political rights) in the growth regression equation is consistent with the observed negative correlation between resource abundance and economic growth that was revealed in Sachs and Warner's (1995a, b) data by numerous authors. This result is also robust to using different measures of repression. Furthermore, regression results from the model with an interaction between resource endowment and political repression underscore the lack of a statistically significant effect of democracy (and hence, non-democracy as an indicator of political repression) on growth, as has been noticed in numerous empirical studies. More importantly, this specification unravels the mysterious (direct) negative impact of natural resources on economic growth (in Sachs and Warner's data and elsewhere) and makes it solely dependent on the extent of the socio-political repression. In fact, once the effect of the interaction is held constant in the growth equation, the direct impact of natural resources on economic growth, which has widely been reported by numerous authors and deemed as a "curse", becomes significantly positive - a "blessing", as basic intuition would suggest. However, the total effect hinges on the extent of the repression and its interaction with resource abundance. An abundance of natural resources espoused with a higher rate of political repression leads to negative economic growth, a curse. By contrast, with a low to moderate rate of repression, resource abundance can generate a positive influence on growth. Second, this main finding is robust to using different measures and tests of political systems. Based on a formal classification of democracy, econometric analysis in a cross-section of nations shows different growth trajectories for the democratic nations vs. the non-democratic nations with respect to their initial level of resource endowment. That is, a higher level of initial resource endowment leads to a high per capita growth rate of real output in the democratic states as opposed to a negative growth rate in the non-democratic states over subsequent two decades.

The above findings are accomplished in Sachs and Warner's data and over the same period (1970-1990) where the curse is intensively investigated and confirmed by numerous authors, without having to alter the measure employed by Sachs and Warner (as was done, for instance, by Stijns, 2005; and Brunnschweiler, 2008). The evidence indicates that the tendency for the resource-abundant economies to have slow or negative growth rates is not a phenomenon intrinsic to these economies. Resource abundance can be a curse (if mismanaged or used for the wrong purpose) or a gift from heaven, but this largely depends on how it is used and for what purpose. However, in the data, the gimmick appears to separate out the effects of resource abundance on economic growth under two different fundamental structures, i.e., political structures. On the extreme side of the case, such as under a non-benevolent dictatorship, intense resource endowment could very well be used to hamper economic development when the interests of the dictator collide with the interests of the rest of the society. Under such conditions, resource abundance is closer to a curse than to a gift or manna from heaven.

APPENDIX

Data

$\log y_{(70)}$: log of real GDP in 1970 divided by the population between ages of 15 and 64. This variable is constructed by Sachs and Warner (1995) and was taken from the research datasets of the Center for International Development at Harvard University.
$dy_{(70,90)} = [\log y_{(90)} - \log y_{(70)}]/20$: per annum growth in real per capita GDP.
$R_{(70)}$: Share of primary exports in GNP in 1970, "primary products or natural resource exports of fuels and non-fuel primary products", constructed by Sachs and Warner (1995) and taken from the research datasets of the Center for International Development at Harvard University.
$\chi_{(70,84)}$: Measure of political instability (0.5∗ASSASSP+0.5∗REVOL) over the period 1972-1989. Source: Barro and Lee (1994), who, in turn used BANKS.
ASSASSP: Number of assassinations per million population per year. Source: (BANKS) BANKS, A.S., "Cross-National Time Series Data Archive," Center for Social Analysis, State University of New York at Binghamton, September 1979, updated.
REVOL: Number of revolutions per year, averaged over the period, 1960-1984. Source: BANKS.
$h_{(70)}$: Average schooling years in the total population over the age of 25 in 1970. Source: Barro and Lee (1994).
$k_{(70)}$: (KAPW=) Non-residential capital stock per worker in 1970 (1985 international prices). Source: PWT 5.6, November 20, 1994.
$\tau_{(70,84)}$: Terms of trade volatility. Growth rate of export prices minus growth rate of import prices averaged for the years 1970-1984. Source: United Nations Conference on Trade and Development, Handbook of International Trade and Development (UNTACD), World Bank, World Tables, various editions (WB). Taken from Barro and Lee (1994).
$i_{(70,89)}$: Ratio of real domestic investment (private plus public) to real GDP, averaged over the years 1970-1989. Source: Barro and Lee (1994).

$\omega_{(60,85)}$: War dummy for countries that participated in at least one external war over the period 1960-1985. Source: Barro and Lee (1994), who, in turn used BANKS.
$\gamma_{(60,85)}$: The fraction of time over 1960-1985 a country was involved in external war. Source: Barro and Lee (1994), who, in turn used BANKS.
Gastil's indices of political and civil rights. Source: Gastil, taken from Barro and Lee (1994).
$\rho_{(72,89)}$: (measure of political repression) = Gastil's index of political rights during the period 1972-1989 normalized to fall into the [0,1] interval, with 1 representing the least freedom or the most coercion.
$c_{(72,89)}$: (measure of civil repression) = Gastil's index of civil rights during the period 1972-1989 normalized to fall into the [0,1] interval, with 1 representing the least freedom or the most coercion.
Demo (dummy for democracy) = 1 for all states that are classified as democratic in subsection 3.4, Reg (7) and zero otherwise, using Gastil's index of political rights.
Lib (dummy for civil liberty) = 1 for all states that are classified as civil liberal in subsection 3.4, Reg (8) and zero otherwise, using gastil's index of civil rights.

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