Democracy and Resource Rents

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1. Introduction

The phenomenon of the resource-rich developing country is once again of global importance. Reversing a trend, the number of such countries has sharply increased due to a wave of resource discoveries, the break-up of the USSR, and the rise in commodity prices. It is now conventional that resource rents have usually reduced growth. The explanation has shifted from the purely economic – Dutch disease – to political economy: rents both undermine governance, and are dysfunctional in the context of poor governance. This shift in explanation is important because the new resource boom is occurring against a backdrop of democratization. During the resource boom of the 1970s, the average resource-rich country scored only 0.96 on the Polity IV scale of political rights (the scale ranges 0-10). By the mid-1990s the score had risen to 3.47.[1] American policy following the intervention in Iraq is explicitly to democratize the Middle East, the world's most important resource-rich region. The purpose of this paper is to investigate, theoretically and empirically, how democracy and natural resource rents are likely to interact.

Our analysis contributes to the active literature on the relationship between geography, institutions, and growth. However, to date that literature has disputed causal structure only in its broadest terms. One thesis is that geography causes institutions which are highly persistent and in turn cause growth (Acemoglu *et al*. 2000). Another is that geography directly causes growth (Sachs and Warner, 2000) or does so by affecting the distribution of income (Easterly, 2004). A third is that institutions are fluid consequences of political choices that determine growth (Glaeser *et al*. 2004). Our thesis is that geography and institutions must be analyzed together because their effects on growth depend upon their interaction: conditional upon geography, some institutions matter a lot for growth in the early stages of development. The specific aspect of geography that matters is not disease vectors but resource rents: in the context of resource rents democracy reduces growth unless electoral competition is bolstered by atypically strong checks and balances such as press freedom. Resource rents not only interact with democratic institutions to determine growth, they also adversely influence those institutions. However, this influence is gradual: democratic institutions are fairly fluid and so can be changed by political choices: for example, press freedom fluctuates. Further, since income also influences these institutions, a phase of good institutional choices can induce a virtuous circle. Geography is not destiny, but it determines which institutional choices matter when.

The interaction of resource wealth and institutions has begun to attract rigorous analysis. Robinson *et al*. (2002) develop a theory of patronage politics in the context of resource wealth and suggest that this dysfunctional behavior may be restrained by good institutions. Mehlum *et al*. (2005) find some empirical support for the idea that institutions are particularly important in the context of natural resources, but do not

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[1] The scale ranges from 0-10. Details of these figures are given in Section 2.

investigate what institutions are important. Finally, Smith (2004) makes the point that because institutions usually pre-exist oil discoveries, the effects of oil rents are likely to be dependent upon this institutional variation. The present paper extends this literature both through a simple model of how resource rents undermine democracy and through econometrics.

In Section 2 we develop a model of democracy in which resource rents undermine its normally beneficial effects on the utilization of public resources. Citizens can potentially discipline governments through either voice or exit. Since democracy enhances the option of voice, our model focuses on how resource rents might weaken its effects. We distinguish between two mechanisms by which voice normally disciplines governments into providing public goods: electoral competition and checks and balances such as press freedom. A key result of the model is that natural resource rents undermine both of these mechanisms and thereby facilitate patronage politics, reducing public goods provision in the process. Our approach can be contrasted with that of Tornell and Lane (1999) who also model a political process in which resource rents can be adverse – the 'voracity effect'. Tornell and Lane rely upon exit rather than voice: taxation is constrained by a participation constraint which a resource discovery relaxes.

We then turn to empirical analysis. In Section 3 we develop a general-purpose empirical measure of natural resource rents, country-by-country. In Section 4 we use this measure to investigate whether the effect of democracy upon growth is altered by the presence of natural resource rents. We find a large adverse interaction of natural resource rents and electoral competition and a large positive interaction of natural resource rents and checks and balances. We then investigate the routes by which electoral competition and checks and balances might have these effects. Controlling for a range of intermediating variables, we come down to a few channels by which electoral competition in the context of natural resource rents is damaging, and by which checks and balances offset these effects. In Section 5 we investigate whether over time resource rents erode democracy. We find that both electoral competition and checks and balances tend to be eroded. Section 6 concludes.

2. Public Goods Provision in the Presence of Resource Rents

The Set Up

Public officials control public resources. Potentially, these resources can be used either for the provision of public goods or for private patronage. Governments in democracies normally face two institutions of restraint: the ballot box and the courts. Public officials who choose private patronage over public goods are potentially punished both by losing elections and by scrutiny and prosecution. We model these two processes of restraint, showing their limitations in societies with the characteristics common in developing countries.

Our model has three steps. In the first we focus on the restraint imposed by elections. We show how in certain conditions political parties in a competitive democracy will rationally prefer to compete through private patronage rather than by the provision of public goods. In the second step we introduce the restraint imposed by scrutiny. We

show that as a result of this restraint some public goods have to be provided even though political parties would prefer patronage. In the final step we introduce natural resource rents into the model and show how in patronage politics these resources are used to subvert the restraint of scrutiny.

The Electoral Restraint on Patronage Politics

Voters

We imagine that voters face the choice between two candidates for the presidency. Once elected, one, the *altruist*, will in fact try to use public revenues for the supply of national public goods whereas the other, the *patron*, will embezzle for private gain. The problem is that voters do not have full information about candidates. In many low-income democracies public information through the media is extremely limited. Additionally, people have strong ethnic or religious identities. In conjunction, these features may affect the voter decision problem. Lacking objective information about candidates, voters rely upon the advice of 'opinion leaders' from their own ethnic or religious community.

Such circumstances readily give rise to an information cascade (Bikhchandani, Hirshleifer and Welch, 1998) in which observable signals - objective indicators that enter the pool of publicly observable information - are discounted in decisions relative to the observable actions of other voters. It is well understood that non-continuous actions, such as voting or public demonstrations of support, are most susceptible to such a cascade. Knowing that he is badly informed, the voter chooses to rely either directly upon opinion leaders, or upon the public manifestations of support which they organize. In turn, because all voters act this way, the signals observed by individual voters do not influence their actions and so fail to build into a pool of collective information.

An effect of this information cascade is that communities tend to vote in blocks, according to the advice of their opinion leaders. This has consequences for political parties. We return to the conditions under which reliance on community leaders will continue to be consistent with bounded rationality. For the present we consider its implications.

Political Parties

Political parties compete for votes for the presidency. To the extent that they gain power, or have prospects of power, they control some financial resources. In spending these resources to attract votes they have a choice of instruments: the altruist party supports the provision of public goods, and the patronage party supports the provision of private patronage. Which party wins depends upon the relative efficacy of public goods and patronage in attracting votes. The superior technological properties of public goods imply that where voters have full information, it is cheaper for parties to attract votes by offering public goods than by offering private patronage. A supply of public goods of $1 produces benefits of $$x$ for each individual voter ($1>x>0$), and with a sufficiently large number of voters, n, public goods provision dominates patronage because $n \cdot x > 1$. However, because of the limited sources of information available to voters, votes must be attracted 'wholesale' through community leaders in blocks of

size *c*, rather than individually through direct appeal to each voter. The block vote introduces the possibility that the option of bribing community leaders with private goods may be cost-effective.

First, consider the extreme case in which community leaders maximize only their own wellbeing and are ethically indifferent between benefits from private goods financed through the receipt of bribes and their own consumption of public goods. Now, the only beneficiaries of public goods that matter for the political party are the community leaders, and so the critical calculation becomes whether public goods or private transfers are the most cost-effective way of giving them benefits. To win the election we will assume that the political party needs to attract the support of half the community leaders, so that only half the community leaders need to be given patronage. The condition under which patronage is the cheaper means of attracting votes is then simply that *x<2c/n*.

Were community leaders to act in this way it would not be rational for community members to follow their advice. However, more sophisticated behavior by community leaders may reconcile bribe taking with the retention of community support.

Community Leaders

The community leader is faced with a choice between accepting patronage and providing the public good of free accurate information on the presidential candidates to his community. If the community leader has some genuine concern for the wellbeing of his community, this creates an honesty premium, *h*, for public goods over private goods. That is, the community leader values a dollar of public goods not at *x*, his individual gain, but at *h·x*. Where *h = c*, the community leader has fully internalized the benefits to his community. We will assume that *c>h>1*. The honesty premium raises the efficiency of public goods and hence the critical size of community at which it becomes more cost-effective to transfer a dollar of benefits to each community leader through patronage rather than through public goods to:

$$x·h<2c/n. \tag{1}$$

However, if community leaders are bribed into bad advice, why would voters continue to follow the advice? They know that their leader has access to better information, but they also know that he can be bribed. What they do not directly observe is the honesty premium, *h*, that signifies the leader's concern for the community. They can, however, observe a signal which is correlated with *h*, namely gifts provided by the leader to members of the community. In order to retain allegiance, the leader must engage in ostentatious giving. Note that such gifts are neither bribery, nor public goods. They are not bribery, because the community leader is not in a position to enforce a contract. They do not provide public goods because the leader lacks the technology to spend money to this effect. The gift is a merely a signal of concern. This signal will need to compete with other information: the failure of the president to supply public goods, and evidence that the community leader has accepted bribes. There may be some threshold level of gift giving, $\hat{g}$, below which community members come to rely on this other information. Should the political party choose to win the support of the community leader through patronage, it will also need to meet these costs of gifting. The community leader must be compensated both

for his intrinsic aversion to mislead, and for the costs incurred by misleading. Whether patronage is an efficient strategy for a political party now depends upon the size of the bribe net of covering the costs of gifting. Denote the size of the net bribe as B. Even if condition (1) is satisfied, the efficiency gain from patronage must be sufficient to offset the fixed costs of gifting that are incurred. The critical condition under which patronage becomes the cost-effective political strategy becomes:

$$B(2c/n - x \cdot h) > \hat{g} \, n/2c. \qquad (2)$$

The left hand term is the gross efficiency gain from patronage and the right hand term is the additional cost incurred through covering the costs of gifting by community leaders.

The Competitive Equilibrium

To be viable, patronage politics requires a threshold level of resources available for patronage. The party must provide for half of the community leaders the net bribe plus the costs of gifting:

$$(B + \hat{g}) \, n/2c. \qquad (3)$$

However, (2) implies a critical minimum scale of bribe, $\hat{B}$, below which patronage is not cost effective:

$$\hat{B} = (\hat{g} \cdot n/2c)/\{(2c/n) - x \cdot h\}. \qquad (4)$$

Hence, we arrive at a threshold level of public resources available for patronage, $\hat{P}$, below which patronage is not the chosen strategy:

$$\hat{P} = [(\hat{g} \cdot n/2c)/\{(2c/n) - x \cdot h\} + \hat{g}] \, n/2c. \qquad (5)$$

The likelihood that electoral competition will take the form of patronage is thus decreasing in the amount of gifting needed to overcome other channels of information, and the community-spiritedness of communal leaders, and increasing in the size of communities and in the resources available for patronage. We derive the actual resources available in the next sub-section.

Competition occurs both between parties for the presidency and between individuals wishing to become community leaders. Where bribery is viable and cost-effective, competition drives parties to use it: the patron will defeat the altruist. Evidently, in a fully competitive party system without incumbent advantage the successful patronage party must devote all available resources to bribery.

For their position to be sustainable, corrupt community leaders must spend a certain threshold of resources on ostentatious gifts. This is incorporated into the minimum acceptable bribe. However, competition between individuals wishing to become community leaders may drive up ostentatious giving beyond this threshold. Again, only incumbent advantage limits the extent to which bribes are fully dissipated in gifts.

The key outcome is that the political process, though democratic, does not choose to supply the public goods that people want. Along the way, if the system has substantial incumbent advantage, party leaders and community leaders will become rich. However, even a fully competitive political system will merely reduce the scope for riches, it will not supply public goods.

Public Resources and the Scrutiny Restraint

In the above model voters elect predatory presidents. However, presidents may nevertheless be restrained by the other democratic checks and balances implied by the rule of law. Virtually all societies have laws which in principle curtail presidential embezzlement. The issue is the extent to which public officials are subject to practical scrutiny. Such scrutiny is itself a public good.

Scrutiny forces patronage presidents to use 'inefficient' means of embezzlement. That is, some resources must be diverted from patronage into public goods provision. For example, if direct looting of public money from the Central Bank is too difficult, politicians may resort to the provision of public infrastructure, since the resulting construction contracts enable a high rate of embezzlement. For example, in Nigeria electoral competition has produced intense pressure to spend on infrastructure. A new transparency initiative which put approved contracts out to competitive tender reduced their cost by an average of forty percent (Collier and Hoeffler, 2005, p 14). Politicians may be motivated by the high share of such expenditures that they can appropriate, but in the process some public goods are unavoidably supplied. More generally, within this model public goods are provided not because politicians need to do so in order to win votes, but because the checks and balances present in the system prevent them from diverting all revenues to patronage.

To endogenize scrutiny, we now introduce a standard political science relationship in which citizens are provoked into scrutiny by taxation. Politicians would like to tax heavily in order to generate revenue for patronage, but they are constrained from doing so because heavy taxation provokes heavy scrutiny. Patronage expenditures, P, are determined by the product of the tax rate, t, taxable income, Y, and the proportion of revenue which can be embezzled for patronage, e. In turn, the rate of embezzlement, is constrained by the degree of scrutiny, which is determined by the rate of taxation.

This implies a maximum revenue available for patronage, somewhat analogous to a Laffer curve. The maximum is determined by:

$$P^{max} = \underset{\text{wrt } t}{\text{Max }} e \cdot t \cdot Y. \tag{6}$$

subject to $e = e(t)$, $e'<0$.

To see the implication at their simplest, we linearize the inverse relationship between the embezzlement rate and the tax rate:

$$e = \alpha(1\text{-}t). \tag{7}$$

The society has an underlying rate of embezzlement, α, which is curtailed by taxation.

The decision problem is thus:

$$\max_t \ \alpha(1-t)\cdot t \cdot Y. \tag{8}$$

At the patronage-maximizing tax rate, $t^* = 0.5$, the resources available for patronage are:

$$P = Y\alpha/4, \tag{9}$$

and the provision of public goods, G, is:

$$G = (2 - \alpha)Y/4. \tag{10}$$

The maximum resources available for patronage (9) may be above or below the threshold (5) required for sustainable patronage politics. If they are below the threshold electoral competition will take the conventional form of undertakings to supply public goods. If they are above the threshold, electoral competition between parties, and between individuals wishing to become community leaders, will tend to push the system towards the patronage-maximizing outcome.

Patronage Restraints in the Presence of Resource Rents

We now introduce resource rents as a proportion, r, of income. The rents accrue directly to the government, augmenting its revenue from the taxation of citizens. We assume that the government is not able to ring-fence the revenue from resource rents from the prevailing public scrutiny of its tax revenue. It is thus not free simply to spend all the resource rents on patronage. However, unlike taxation, the resource rents do not themselves provoke citizen scrutiny. Government revenue thus becomes:

$$[t(1-r) + r]\cdot Y, \tag{11}$$

and the maximum patronage resources available to the government become:

$$\max_t \ \alpha (1-t)\cdot[t(1-r) + r]\cdot Y \tag{12}$$

The patronage-maximizing tax rate is now:

$$t^{**} = (1-2r)/(2-2r). \tag{13}$$

A corollary of (13) is that the tax rate is lower the higher is revenue from resource rents. In turn, this implies that the level of scrutiny is lower and so the rate of embezzlement is higher. More surprisingly, total chosen revenue as a share of income, v, is constant:

$$v^{**} = t^{**}(1-r) + r = [(1-2r)/(2-2r)]\cdot[(1-r) + r] = 0.5 \tag{14}$$

For a given total income, revenue for patronage rises as a result of resource rents not because the government commands more money, but because it is able to raise the same money while arousing less public scrutiny. As a result, less needs to be diverted to the provision of public goods. A corollary of this is that comparing two societies with the same level of income but with different shares of natural resource rents, the one with the higher share will have the worse provision of public goods.

Whether a resource discovery which augments income will nevertheless worsen the provision of public goods depends upon the scale of the resource discovery, r, and the value of α. To see this it is useful to consider a resource discovery which precisely doubles national income, so that $r = 0.5$. From (13) at this point the tax rate on the non-rent economy has been driven down to zero. Total government revenue has thus doubled: the state previously received half of national income and now it receives all the rents but nothing else. The demise of taxation increases the rate of embezzlement from $\alpha/2$ to α. Hence, public goods provision in the presence of the rents, G^r is:

$$G^r = (1 - \alpha)Y. \tag{15}$$

Comparing this with (10), the provision of public goods deteriorates if $\alpha > 2/3$. For resource discoveries beyond $r = 0.5$ there is no further scope for the reduction in taxation (unless, for example, sinecures in public employment are introduced), and so public goods provision unambiguously begins to improve. Norway is an example of a relatively small resource discovery in a society with a strong prior tradition of scrutiny, so that α was very small, and Saudi Arabia is probably an example of a society were the resource discovery is so large that even though α is high, the provision of public goods has improved. Nigeria is an example of a society with a moderate-size discovery and a high initial value of α, where the discovery has indeed probably worsened public goods provision: across a range of social indicators Nigeria is ranked below other African economies with fewer resources.

Natural resource rents thus subvert democracy through two routes. Resource rent democracies are more likely to suffer from patronage politics because the maximum patronage resources available to the government increase. Secondly, even where societies without natural resources do have patronage politics, the consequences are less dire. Because they have to rely more heavily upon taxation, patronage governments can get away with less, and so have to spend more on public goods provision. Through both these routes, natural resource societies are liable to have inferior public goods.

Feedback effects

Patronage politics is socially inefficient: the system diverts resources from public goods to less valuable private goods. Hopefully, this eventually generates an observable signal that alters behavior: things get sufficiently bad that voters override the advice of community leaders, or community leaders switch to advising support for candidates who will supply public goods. However, there are also liable to be feedback effects that reinforce the patronage system.

Once a political party has gained power through patronage it has the means and incentive to censor the flow of public information. The biased content of public information may be effective in aligning the apparently advantageous voting strategy suggested by public information with the recommendation of community leaders. It may also lead voters to further discount public information, and so increase the weight attached to the advice from community leaders. Second, as the benefits of being a leader shift from the satisfaction of delivering the public good of welfare for the community to the enjoyment of private patronage, the returns to becoming a community leader rise for those with an intrinsic motivation for private gain, and fall for those with an intrinsic motivation for community welfare. Third, once a patronage system has electoral creditability, voters may aspire to no more than that their community should benefit from a share of the patronage. A 'good' community leader becomes one who is able to attract and pass on bribes, rather than one who correctly advises on the national public good.

Autocracy

So far our implicit benchmark has been a well-functioning democracy. However, for many developing societies the more pertinent benchmark against which to compare patronage politics is autocracy. In the limit, the autocrat is subject to neither election nor scrutiny and is free to spend public resources as he chooses. This is liable to produce an idiosyncratic pattern in which some autocrats choose public goods, whether in order to promote general wellbeing or because such goods confer prestige on the ruler, while others simply amass private wealth. More generally, the need to purchase support through patronage is diminished, and the need to restrain taxation in order to diminish scrutiny is diminished. Public goods are more likely to behave like normal goods, with the autocrat choosing to use some of the natural resource rents to increase provision.

A Comparison with the 'voracity effect'

Tornell and Lane (1999) assume a situation of patronage politics. They focus on the uncoordinated 'gauging' of multiple powerful groups, restrained only by concern for a participation constraint. Resource rents ease the participation constraint and induce an increase in gauging greater than the value of the rents, this being the voracity effect. The process of gauging is inexplicit but is most reasonably interpreted as taxation. This provides a clear contrast: whereas Tornell and Lane predict that resource rents would increase gauging, our model predicts that they will reduce other taxation which is clearly a more accurate description of actual behavior. A further testable difference is that the voracity effect is at its peak when there are only *two* powerful groups in the society, each able to gauge. In this situation the cost of rent extraction is double the value of the rents themselves. There is no voracity effect either when the political system is competitive with multiple groups each holding some power. In contrast, our model predicts that as electoral competition increases the costs of resource rents continue to mount.

3. Natural Resource Rents and Political Rights: Descriptive Statistics

In this Section we first build and present a new measure of natural resource rents, country-by-country, for the period 1970-2001. We then match this data against a quantitative measure of political rights for the same period to show how, on average, the level of political rights has changed in countries with large resource rents.

Using environmental economics data from the World Bank we calculated natural resource rents as a percentage of GDP. This calculation included several different steps. First, we defined rents as the difference between the natural resource price and the extraction costs. For example, for oil the World Bank data base provides the average of four spot crude oil prices. Prices are global, thus they vary over time but are the same across countries. Extraction costs on the other hand vary over time as well as across countries. In a second step, we multiplied the natural resource rents per unit of output by the total volume extracted. We then added these total rents for a variety of natural resources: oil, gas, coal, lignite, bauxite, copper, iron, lead, nickel, phosphate, tin, zinc, silver and gold. For each year we divided the sum of resource rents by GDP. Our regression analysis uses four year averages, so we averaged the data over 8 sub-periods: 1970-73, 1974-77, … , 1998-2001. We were able to construct this rent variable for 969 panel data observations. A histogram of the natural resource rents as a percentage of GDP shows a heavily skewed frequency. A number of countries did not extract any of these natural resources (158 observations) and a large number only had small rents of less than one percent (363 observations). For 180 observations the natural resource rents were between one and five percent and 79 observations had rents between five and ten percent. We define countries with a natural resource rent percentage of ten or higher as high rent countries. Only 187 observations were in this range.[2]

We proxy democracy by the Polity IV scoring of 'Democracy'. This is an 11 point scale, ranging from zero to ten. Higher values indicate a greater openness of the democratic process. Although the measure is termed 'democracy', its criteria are essentially focused on electoral processes rather than upon 'due process'. Data are available for 1,004 observations. We measure democracy at the beginning of each sub-period.

In Table 1 we show the means and standard deviations for the democracy scores. The first row provides these descriptive statistics for the entire sample period (1970-1998). The average democracy score for the entire sample is about 4, for countries with a high percentage of natural resources this average is less than half (about 1.5). Countries with high percentages of natural resource rents have much lower democracy scores. However, the standard deviation is relatively large compared with the entire sample, indicating that there is a large dispersion of democracy scores among these countries. On average democracy scores were low in the 1970s and improved over time globally. For the entire sample the biggest improvement

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[2] For two observations this average is larger than 100. This is possible because the numerator and denominator are based on different measurement concepts, rents and value added. In any case in our regression analysis we could not use these observations because other data were missing.

happened from 1986 to 1990 with the collapse of the Eastern Block. For the natural resource rich economies the improvements were less steady over time and contained no jump at the end of the 1980s. At the end of the period high natural resource rent countries still had a score of less than half the average country (1.9 compared with 5.3).

--- Table 1 about here ---

4. Empirical Analysis

We now use our measure of rents to investigate the interaction between democracy and natural resources. We proceed in three steps. First we discuss our proxy for public goods provision. We then set out and test the central hypotheses of Section 2 concerning electoral competition and scrutiny. Finally, we try to pin down more precisely the mechanisms by which electoral competition and scrutiny affect the capacity of a society to transform resource rents into growth.

Proxying three core concepts

Section 3 has set out our measure of natural resource rents. However, our model uses two further core concepts which must be proxied empirically: public goods and scrutiny.

The dependent variable in our analysis is the provision of public goods. This is not straightforward. A measure based on expenditure would miss one of the most prevalent features of patronage politics, the diversion of money classified as public goods expenditure into private gain. A measure based on some low-level public good outcome would be liable to reflect differences in prioritization among public goods rather than in the overall capacity to supply them. We adopt the medium-term growth rate of the economy as being the best encompassing indicator of public goods performance in the context of a resource-rich developing country, this is indeed the dependent variable postulated in the 'voracity effect'. Resource rents are very largely depletable, and so a core challenge for a resource-rich society is to transform them into more sustained forms of income. Since resource rents almost invariably accrue to the state, this is essentially a test of government behavior and so gets to the heart of patronage versus public interest. Adopting the growth rate as the dependent variable implies a wide definition of public goods, to include services such as economic policy as well as more obvious goods such as infrastructure. We follow a common practice in taking four-year periods as our units of observation to smooth out the noise of annual observations of growth rates. Evidently, in addition to any interaction effects with the political process, natural resource rents can be expected to have direct effects on growth and we will control for them.

We proxy scrutiny by a measure used by Keefer and Stasavage (2004) termed 'checks'. As implied, this focuses on the ability of other agents to restrain the government and so require it to comply with due process. The index ranges from one (few veto players) to 17 (high number of veto players). Although the democracy score and the checks variable are correlated, the correlation coefficient is only about 0.33 and so the two indices are usable in the same regression.

Testing hypotheses

The first hypothesis concerns the interaction of natural resource rents and democracy. If resource rents indeed subvert the normal tendency of democracy to promote the provision of public goods, two relationships should be found in the data. First, in democracies resource rents should significantly reduce growth. Second, resource rents should be significantly more damaging for growth in democracies than in autocracies, so that with sufficiently large resource rents autocracy should outperform democracy. An implicit third relationship is that in the absence of resource rents democracies should outperform autocracies.

We start from a simple specification which includes only the variables directly of interest, - the level of natural resource rents, and the level of democracy, - and a single conditioning variable, the level of per capita income (Table 2, column 1). Countries with an initially higher democracy score have on average higher growth rates. The coefficient on natural resource rents is insignificant. From this base we introduce the interaction term rents·democracy which is the focus of our analysis (column 2). The interaction term is negative and marginally significant. Thus, democracy enhances growth except in the presence of substantial natural resources where they retard it. Around this simple specification we investigate three variants. First, we investigate diminishing returns (column 3) but find no evidence of such non-linear effects. Second, the literature on natural resource rents stresses lagged effects: for example, public expenditure is increased to unsustainable levels. Although our dependent variable considers growth averaged over a four-year period, this is likely to be too short to capture all the lagged effects, and so we introduce lagged resource rents as a further explanatory variable (column 4). The lagged term is significant and substantial. Resource rents generate unsustainable increases in the level of output. Third, since contemporaneous natural resource rents have no significant direct effect in this regression we investigate dropping the term (column 5).

--- Table 2 about here ---

We next test the hypothesis that this deleterious effect of resource rents in democracies could potentially be inhibited by scrutiny. We therefore introduce an additional interaction term between resource rents and checks and balances. We also add the variable checks itself, to control for any direct effect that it might have other than through its effect on the utilization of resource rents, the results being shown in column 6. While the direct effect of checks is insignificant, the interaction of resource rents with checks and balances is positive and significant. The adverse interaction effect of democracy and natural resources now becomes larger and more significant. Thus, whereas democracy *per se* is distinctively detrimental for resource-rich countries, checks are distinctively beneficial. In column 7 we drop the insignificant direct effect of checks with no change in the overall results.

We take the regression of column 7 as an initial baseline. Both the direct and interaction effects of democracy are significant. This regression implies all three relationships. In democracies resource rents significantly reduce growth unless offset

by strong checks and balances: in a developing country at the 75th percentile of the democracy score (7) but with no checks and balances, each additional percentage point of GDP from natural resource rents reduces growth by 0.19 percentage points. For a given level of checks and balances, resource rents are more damaging if the country is democratic: taking a developing country with resource rents equal to 20% of GDP, if the country is switched from being at the 75th percentile of the democracy score (7) to the 25th percentile (0), its growth rate increases by 1.8 percentage points. By contrast, again for a given level of checks, in the absence of resource rents democracy is good for growth: taking a developing country without resource rents, if it is switched from the 25th percentile of the democracy score to the 75th percentile, its growth rate increases by 1.02 percentage points. The critical level of natural resource rents beyond which democracy becomes dysfunctional for growth, for given checks, is 7.25% of GDP.

Although democracy is correlated with checks the two are far from being synonymous. We have argued that democracy has a dual aspect: electoral competition and adherence to due process. Controlling for the level of checks, the democracy measure approximates to electoral competition, while our measure of checks approximates to due process. The results suggest that a society with substantial natural resource rents needs a distinctive type of democracy, with atypically strong checks and balances and perhaps less emphasis upon electoral competition. Interestingly, the only African natural resource success, Botswana, has precisely this type of democracy. Electoral competition is quite limited: the government has never been defeated at the polls. Yet, perhaps because the democracy has been continuous since independence, the legal and bureaucratic procedures that constitute due process have been maintained.

Evidently, an important limitation of the above results is that democracy is an endogenous variable. Since we are only concerned with the interaction effect of democracy, rather than its direct effect, this endogeneity is arguably less serious. The interaction effect is analogous to a difference-in-differences approach: does a difference in democracy have a different effect depending upon resource rents? However, to address the problem we instrument for democracy using the celebrated Acemoglu-Johnson-Robinson variable, the historical data on settler mortality. Because of data limitations this drastically reduces the size of our sample Table 3. Nevertheless, so instrumented, the interaction of democracy and natural resource rents remains negative and significant. There is thus some basis for thinking that there is a causal mechanism from this interaction onto growth as hypothesized in Section 2.

--- Table 3 about here ---

Within the basic structure of electoral competition being distinctively detrimental and checks and balances being distinctively beneficial, we now investigate the specific routes by which resource rents undermine the economy. Our approach is cumulatively to control for possible routes to see whether the interaction effects lose economic and statistical significance. To do this we need to introduce a range of new variables which are sample-constraining. We are able, however, to work with a virtually constant sample of 520 observations. We first re-run the regression of Table 2, column 7 on this restricted sample (Table 4, column 1). The interactions of resource rents with both democracy and checks and balances remain significant with opposite

signs. This becomes our baseline regression from which to investigate the routes through which these interactions come about.

--- Table 4 about here ---

We first introduce economic policy as measured by the Country Policy and Institutional Assessment of the World Bank (CPIA). When the CPIA is introduced (Table 4, column 2) it is significant, but the size and significance of the two interaction terms is unaffected. We pursue this further by introducing a double interaction term, adding the CPIA to the two existing interaction terms. The double interaction term of the CPIA·rents·democracy is positive. This coefficient becomes significant when we drop the CPIA·rents·checks term (column 4). Economic policy and institutions matter differentially in the resource-rent democracies..

We now pursue the question as to which policies and institutions matter most. Dropping the CPIA, but retaining the same sample, we control for the share of investment in GDP (Table 4, columns 5 and6). We allow for both a direct effect of investment on growth and for interactions between investment and the two core interaction effects. Unsurprisingly, investment is highly significant. Its inclusion has important consequences for the other terms. When we simply control for investment, (column 5) the coefficient on the democracy·rents interaction stays negative and significant but falls by a fifth relative to the baseline (column 1). This suggests that part of the problem is that the resource-rich democracies under-invest. This is consistent with the more general analysis of Tavares and Wacziarg (2001) that democracy tends to reduce investment. When we introduce the double-interaction terms, that of investment·rents·checks is also significant and positive. This term now destroys both the core interaction effects. Indeed, the interaction between checks and balances and resource rents now becomes negative. This result suggests that the key route by which democracy undermines the harnessing of resource rents is that it reduces the returns on investment: checks and balances powerfully accentuate the growth effects of a given level of investment.

We next replace investment with public expenditure (Table 4, columns 7 and 8). Government expenditure is directly significant and negative: as is commonly found in the growth literature, higher public spending reduces growth. However, this has no effect on either the significance of the core interaction terms, or the magnitude of their coefficients. Nor does government spending interact significantly with either of the core interaction terms. This suggests that the route by which democracy undermines the growth effects of resource rents is not that public spending becomes inflated in aggregate, but that its composition is shifted away from investment. Note that this is consistent with (14) above: resource rents induce a shift in the composition of public spending away from public goods towards patronage goods, rather than an increase in overall spending.

We next introduce a measure of press freedom (Table 4, columns 9 and 10). We derive this measure from a scoring system of Freedom House. In order to get a long time series we have to aggregate scores into just three levels: free, partially free, and not free. When introduced on its own, press freedom directly increases growth. When, however, we allow for interactions between press freedom and our two core interactions we get an interesting pattern. The direct effect of press freedom remains

significant, and the interaction with democracy·resource rents is significant and positive at 8%. Correspondingly, the coefficient on democracy·resource rents stays negative significant, but more than doubles. A free press thus makes a considerable difference to whether a democracy turns the opportunity of resource rents into a problem. With a fully free press the net effect of resource rents on growth is around zero, whereas without any press freedom it is highly adverse. The interaction between checks and resource rents·press freedom is negative but not significant at conventional levels. Thus it is significantly different from the interaction between press freedom·democracy, resource rents. Given the meaning of 'checks' this result is unsurprising, but again reassuring. One of the checks and balances is, of course, press freedom. Thus, controlling for the overall level of checks and balances, an increase in press freedom must be balanced by a reduction in some other part of checks and balances.

We next control for ethnic diversity. Previous studies have found that ethnic diversity is detrimental to growth (Easterly and Levine, 1997), but that this effect is *reduced* by democracy (Collier, 2000; Alesina and La Ferrera, 2004). A probable explanation for this benign effect is that autocracy is liable to be particularly damaging in the context of ethnic diversity: the dictatorship is based on a narrow ethnic support group so that redistribution is preferred to the public good of growth. This benign effect of democracy is thus the opposite of the malign effect we have so far found. We now bring the two effects together (Table 4, columns 11-14). We use the new measures of diversity proposed by Alesina et al (2003), one is a broader measure which classifies ethnic groups according to their racial and linguistic characteristics and the other one concentrates on linguistic diversity only. Both measures yield similar results, although the broader ethnicity measure generates higher levels of statistical significance. Consistent with previous research, the direct effect of ethnic diversity is adverse, and its interaction with democracy is positive. However, controlling for these effects has no effect on either the significance or the coefficients of the two core interaction terms. Further, controlling for checks and balances, ethnic diversity does not effect either of the core interaction terms.

Recall that in Section 2 we have appealed to ethnicity as an important dimension by which voters may be grouped into blocks, thereby facilitating patronage politics. We therefore investigate whether ethnic diversity assists the process by which resource rents subvert democracy. For this we drop the control for checks. Now, when ethnic diversity is included both directly and as the double interaction ethnic diversity·democracy·rents the significance of the democracy·resource rents term collapses, leaving the new double interaction term close to significance (Table 4, column 13). When democracy·resource rents is dropped due to its insignificance (column 14), the new double interaction term becomes highly significant. Hence, there is some suggestion that resource rents indeed subvert democracy more easily in conditions in which politics is likely to be dominated by ethnic identity.

Finally, we test for the 'voracity effect' by investigating whether the effect of democracy on the use of resource rents is non-linear as postulated by Tornell and Lane (1999). For this we introduce a quadratic term: democracy squared·resource rents: for the Tornell-Lane hypothesis to hold this term should be significantly positive. The term is insignificant: there is no sign that as political competition intensifies the problem of public goods provision is diminished, rather it continues to

get worse. The results are consistent with the analysis of section 2: as political competition intensifies, parties are compelled to substitute patronage goods for public goods.

To summarize, the results suggest that resource rents undermine and indeed reverse the normally beneficial effects of democracy for the growth process. They do this by adopting policies that both reduce investment and reduce the returns on a given level of investment. In the context of natural resource rents, democracy needs strong checks and balances, one of which we have identified as press freedom.

5. Do Resource Rents Erode Democracy?

In Section 4 we investigated whether and how resource rents subverted democracy. Now we turn to a related question: whether resource rents actually erode democracy. The effect of oil revenue on democracy has already been investigated by Ross (2001). He finds statistical evidence for such an effect and considers three causal mechanisms: a *rentier* effect, through which governments use low tax rates and high spending to dampen pressures for democracy, a repression mechanism, by which governments build up their internal security forces to ward off democratic pressures and a modernization effect, in which the failure of the population to move into industrial and service sector jobs renders them less likely to push for democracy.

We have stressed that a proper democracy has two aspects: electoral competition and checks and balances that maintain adherence to due process. Resource rents may weaken both these properties. The model of Section 2 indeed implied that resource rents would erode checks and balances as low taxation weakened scrutiny. Potentially, resource rents might also erode electoral competition, whether along the routes proposed by Ross, or simply as the lure of control of unscrutinized revenues increases the incentive for autocracy.

We begin with a simple OLS specification in which the level of democracy and the level of checks and balances are each explained by the level of per capita GDP, and time dummy variables, and the lagged value of natural resource rents (Table 5). For both democracy and checks and balances the lagged value of resource rents is highly significant and negative. Further, as the lag is progressively lengthened from one period (four years) to two periods (eight years) to seven periods (28 years), the significance level and the size of the coefficient increase for the democracy score. The effects are large: after 28 years a country with mean income but with resource rents worth 30% of GDP would have a democracy score in the 25th percentile instead of in the 40th percentile, and a checks score in the 22th percentile instead of in the 34th percentile.

--- Table 5 about here ---

While the OLS results are suggestive, they are open to multiple interpretations. In Table 6 we check robustness by switching the dependent variable to the changes in democracy and in checks, respectively, over various periods, controlling for both their initial level and per capita GDP. Again, resource rents significantly erode both

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democracy and checks. These results are consistent both with Ross (2001) on the effect of oil, and with the model of Section 2.

---Table 6 about here ---

6. Conclusion

Resource-rich countries have tended to be autocratic and also have tended to use their resource wealth badly. The new democratization in resource-rich countries might appear to offer the hopeful prospect of a better use of their economic opportunities. Our analysis has questioned such hopes.

We first set out a simple model of democratic politics in which we distinguished between two dimensions of democracy, electoral competition and the checks and balances that enforce due process. Within the model, in certain conditions politicians find it more effective to compete by providing private patronage than by providing public goods. In the conditions typical of developing countries resource rents make such patronage politics more likely by reducing the intensity of public scrutiny, and thereby increasing the resources available for patronage. Further, once the political contest comes to be by means of patronage, resource rents are predicted to have perverse effects, actually reducing the provision of public goods.

Using new data on the value of resource rents, we then tested these propositions. We found that in developing countries the combination of resource rents and democracy has been significantly growth-reducing. In the absence of resource rents democracies outperform autocracies, in the presence of large resource rents autocracies outperform democracies. We found that this result was robust to controlling for the potential endogeneity of democracy by using settler mortality as an instrument. We were able to trace this adverse effect of democracy, first through a generalized measure of economic policy, and then to the more specific policy errors of insufficient investment and reduced returns on investment. We found that the antidote to these adverse effects of democracy was intensified checks and balances, including specifically, the freedom of the press. Thus, resource-rich democracies need a distinctive form of democracy, strong on checks and balances with perhaps less emphasis upon electoral competition. This is indeed the form of democracy in the most striking exception to generally adverse combination of democracy and resource rents, namely Botswana.

While countries with large resource rents need checks and balances, this is not what they tend to get. Resource rents tend gradually to undermine both checks and balances and indeed electoral competition itself. The disturbing implication is that in those developing societies where the state has most command over resources, the democratic process has been least effective at controlling them for the public good.

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Tables

Table 1: Change in Democracy Scores

Period	Sample	High Natural Rents Countries
1970-1998	4.03 (4.26)	1.46 (3.11)
1970	3.29 (4.16)	0.96 (2.56)
1974	3.08 (4.22)	0.89 (2.56)
1978	3.18 (4.28)	1.32 (3.09)
1982	3.43 (4.29)	1.76 (3.41)
1986	3.72 (4.35)	1.28 (3.08)
1990	4.52 (4.27)	1.89 (3.49)
1994	5.29 (3.96)	2.00 (3.48)
1998	5.26 (3.98)	1.92 (3.43)

Notes: Standard Deviation in parentheses.

Table 1a: Change in Checks Scores

Period	Sample	High Natural Rents Countries
1975-1998	2.34 (1.72)	1.54 (1.34)
1974	1.74 (1.41)	1.03 (0.16)
1978	1.89 (1.35)	1.26 (0.70)
1982	2.08 (1.51)	1.46 (1.10)
1986	2.17 (1.59)	1.48 (1.43)
1990	2.41 (1.89)	1.64 (1.89)
1994	2.97 (1.87)	2.40 (2.00)
1998	2.88 (1.87)	2.04 (1.59)

Notes: Standard Deviation in parentheses.

Table 2: Growth, Democracy and Natural Resource Rents

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*
Ln GDP	-0.045 (0.702)	-0.130 (0.284)	-0.118 (0.333)	-0.254 (0.041)**	-0.183 (0.146)	-0.216 (0.115)	-0.219 (0.104)
Nat. Resources	-0.027 (0.154)	-0.013 (0.572)	0.027 (0.538)	0.053 (0.140)			
Democracy	0.089 (0.036)**	0.131 (0.005)***	0.141 (0.003)***	0.162 (0.001)***	0.129 (0.005)***	0.151 (0.005)***	0.145 (0.002)***
NatRes*Dem		-0.007 (0.096)*	-0.010 (0.028)**	-0.009 (0.054)*	-0.005 (0.166)	-0.020 (0.003)***	-0.020 (0.002)***
NatRes^2			-0.001 (0.432)				
NatRes $_{t-1}$				-0.055 (0.016)**	-0.026 (0.067)*	-0.052 (0.044)**	-0.051 (0.042)**
Checks						-0.024 (0.805)	
NatRes*Checks						0.034 (0.043)**	0.033 (0.033)**
East Asia	3.080 (0.000)***	2.989 (0.000)***	2.943 (0.000)***	3.055 (0.000)***	3.113 (0.000)***	2.905 (0.000)***	2.901 (0.000)***
E&C Europe	0.688 (0.212)	0.545 (0.318)	0.541 (0.326)	0.649 (0.271)	0.719 (0.228)	0.645 (0.293)	0.648 (0.292)
MEast&NAfrica	0.708 (0.124)	0.476 (0.326)	0.462 (0.341)	0.226 (0.647)	0.577 (0.206)	0.144 (0.770)	0.155 (0.750)
South Asia	0.683 (0.169)	0.433 (0.382)	0.498 (0.317)	0.556 (0.240)	0.700 (0.142)	0.499 (0.329)	0.476 (0.333)
SSAfrica	-0.763 (0.063)*	-0.921 (0.024)**	-0.888 (0.031)**	-1.038 (0.015)**	-0.933 (0.030)**	-1.199 (0.006)***	-1.198 (0.006)***
Observations	858	858	858	760	760	720	720
R-squared	0.138	0.142	0.145	0.149	0.142	0.159	0.159

Notes: Dependent variable: average annual growth. Robust p values in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%, regressions include time dummies (not reported)

Table 3: Growth, Democracy and Natural Resource Rents – 2SLSQ

	1st stage	2nd stage
Dependent Variable	Democracy	Growth
Ln GDP	0.931	-0.322
	(0.000***	(0.564)
Nat. Res. t-1	0.005	0.011
	(0.766)	(0.461)
Democracy		0.441
		(0.276)
ln Settler Mortality	-0.540	
	(0.007)***	
NatRes*Dem		0.008
		(0.057)*
Residual		-0.331
		(0.421)
East Asia	-4.124	5.250
	(0.000)***	(0.002)***
MEast&NAfrica	-5.064	3.017
	(0.000)	(0.146)
South Asia	1.024	1.183
	(0.166)	(0.188)
SSAfrica	-2.174	0.078
	(0.000)	(0.946)
Observations	383	382
R-squared	0.51	0.19

Notes: 2SLQ regression. Robust p values in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%, regressions include time dummies (not reported)

Table 4: Growth, Democracy and Scrutiny

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Ln GDP	-0.138	-0.482	-0.522	-0.490	-0.478	-0.485	-0.041	-0.039
	(0.533)	(0.044)**	(0.030)**	(0.041)**	(0.037)**	(0.034)**	(0.857)	(0.861)
Nat. Res. $_{t-1}$	0.009	0.030	0.024	0.028	-0.012	-0.012	0.020	0.023
	(0.755)	(0.267)	(0.402)	(0.306)	(0.621)	(0.642)	(0.475)	(0.444)
Democracy	0.184	0.123	0.114	0.122	0.186	0.191	0.220	0.220
	(0.001)***	(0.029)**	(0.053)*	(0.031)**	(0.001)***	(0.001)***	(0.000)***	(0.000)***
NatRes*Dem	-0.026	-0.029	-0.075	-0.059	-0.020	0.027	-0.028	-0.035
	(0.001)***	(0.000)***	(0.025)**	(0.005)***	(0.007)***	(0.366)	(0.000)***	(0.076)*
NatRes*Checks	0.034	0.039	0.088	0.039	0.029	-0.088	0.035	0.043
	(0.062)*	(0.030)**	(0.164)	(0.032)**	(0.100)*	(0.182)	(0.057)*	(0.204)
CPIA		1.417	1.425	1.305				
		(0.000)***	(0.000)***	(0.000)***				
NatRes*Dem*CPIA			0.016	0.010				
			(0.115)	(0.082)*				
NatRes*Checks *CPIA			-0.017					
			(0.373)					
Ln Investment					1.696	1.528		
					(0.000)***	(0.000)***		
NatRes*Dem*lnInv						-0.020		
						(0.132)		
NatRes*Checks *lnInv						0.051		
						(0.080)*		
Government cons.							-0.093	-0.090
							(0.007)***	(0.012)**
NatRes*Dem*GovCons							0.000	
							(0.718)	
NatRes*Checks *Gov Cons							-0.001	
							(0.798)	
East Asia	3.432	2.067	2.073	2.068	2.625	2.498	3.370	3.348
	(0.000)***	(0.001)***	(0.001)***	(0.001)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
E&C Europe	1.078	0.904	0.960	1.001	0.893	0.857	1.484	1.464
	(0.147)	(0.195)	(0.166)	(0.152)	(0.223)	(0.248)	(0.050)**	(0.050)*
MEast&NAfrica	0.883	0.172	0.213	0.243	1.052	0.995	1.479	1.477
	(0.162)	(0.785)	(0.736)	(0.700)	(0.083)*	(0.107)	(0.024)**	(0.024)**
South Asia	1.080	0.551	0.506	0.549	0.640	0.634	0.956	0.967
	(0.045)**	(0.287)	(0.325)	(0.289)	(0.237)	(0.239)	(0.078)*	(0.073)*
SSAfrica	-0.679	-1.064	-1.111	-1.039	-0.111	-0.131	-0.233	-0.241
	(0.177)	(0.028)**	(0.024)**	(0.033)**	(0.822)	(0.790)	(0.650)	(0.637)
Observations	520	520	520	520	502	502	514	514
R-squared	0.179	0.234	0.239	0.238	0.221	0.226	0.199	0.199

Notes: Dependent variable: average annual growth. Robust p values in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%, regressions include time dummies (not reported)

Table 4 continued …

	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Ln GDP	-0.256 (0.266)	-0.296 (0.195)	-0.111 (0.610)	-0.070 (0.747)	-0.067 (0.755)	-0.075 (0.731)	-0.138 (0.532)
Nat. Res. $_{t-1}$	0.027 (0.329)	0.005 (0.852)	0.011 (0.685)	0.016 (0.551)	0.044 (0.067)*	0.045 (0.057)*	0.009 (0.753)
Democracy	0.112 (0.129)	0.114 (0.143)	-0.122 (0.271)	-0.110 (0.334)	-0.151 (0.183)	-0.139 (0.230)	0.184 (0.001)***
NatRes*Dem	-0.027 (0.001)***	-0.063 (0.002)***	-0.029 (0.000)***	-0.042 (0.133)	0.004 (0.822)		-0.026 (0.417)
NatRes*Checks	0.031 (0.091)*	0.090 (0.033)**	0.039 (0.032)**	0.062 (0.148)			0.034 (0.053)*
Press Freedom	0.638 (0.041)**	0.660 (0.049)**					
NatRes*Dem*PressF		0.019 (0.083)*					
NatRes*Checks* PressF		-0.029 (0.177)					
Ethnic Diversity			-3.917 (0.000)***	-3.628 (0.000)***	-3.931 (0.000)***	-3.925 (0.000)***	
Ethnic Div* Dem			0.618 (0.002)***	0.588 (0.006)***	0.628 (0.003)***	0.611 (0.004)***	
NatRes*Dem *Ethnic Div				0.025 (0.573)	-0.027 (0.251)	-0.022 (0.005)***	
NatRes*Checks* *Ethnic Div				-0.050 (0.491)			
NatRes*Dem^2							0.000 (0.996)
East Asia	3.834 (0.000)***	3.831 (0.000)***	3.415 (0.000)***	3.427 (0.000)***	3.544 (0.000)***	3.530 (0.000)***	3.432 (0.000)***
E&C Europe	1.278 (0.077)*	1.293 (0.070)*	1.137 (0.131)	1.099 (0.150)	1.198 (0.118)	1.178 (0.122)	1.079 (0.136)
MEast&NAfrica	0.613 (0.366)	0.472 (0.497)	0.439 (0.486)	0.312 (0.649)	0.610 (0.330)	0.596 (0.339)	0.883 (0.162)
South Asia	1.400 (0.011)**	1.334 (0.014)**	1.116 (0.047)**	1.202 (0.030)**	1.324 (0.016)**	1.301 (0.019)**	1.081 (0.044)**
SSAfrica	-0.589 (0.265)	-0.652 (0.216)	0.083 (0.876)	0.136 (0.798)	0.248 (0.635)	0.229 (0.659)	-0.679 (0.177)
Observations	460	460	519	519	519	519	520
R-squared	0.191	0.198	0.208	0.209	0.199	0.199	0.179

Notes: Dependent variable: average annual growth. Robust p values in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%, regressions include time dummies (not reported)

Table 5: Democracy and Natural Resource Rents

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Ln GDP	1.682 (0.000)***						
NatRes	-0.068 (0.000)***						
Ln GDP $_{t-1}$		1.701 (0.000)***					
NatRes $_{t-1}$		-0.065 (0.000)***					
Ln GDP $_{t-2}$			1.717 (0.000)***				
NatRes $_{t-2}$			-0.092 (0.000)***				
Ln GDP $_{t-3}$				1.688 (0.000)***			
NatRes $_{t-3}$				-0.098 (0.000)***			
Ln GDP $_{t-4}$					1.649 (0.000)***		
NatRes $_{t-4}$					-0.112 (0.000)***		
Ln GDP $_{t-5}$						1.528 (0.000)***	
NatRes $_{t-5}$						-0.124 (0.000)***	
Ln GDP $_{t-6}$							1.586 (0.000)***
NatRes $_{t-6}$							-0.144 (0.000)***
Observations	762	635	506	393	287	186	91
R-squared	0.487	0.493	0.518	0.528	0.524	0.488	0.515

Notes: Dependent variable: Democracy. Robust p values in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%, regressions include time dummies (not reported)

Table 5a: Checks and Natural Resource Rents

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Ln GDP	0.511						
	(0.000)***						
NatRes	-0.029						
	(0.000)***						
Ln GDP $_{t-1}$		0.495					
		(0.000)***					
NatRes $_{t-1}$		-0.023					
		(0.000)***					
Ln GDP $_{t-2}$			0.496				
			(0.000)***				
NatRes $_{t-2}$			-0.030				
			(0.000)***				
Ln GDP $_{t-3}$				0.466			
				(0.000)***			
NatRes $_{t-3}$				-0.031			
				(0.000)***			
Ln GDP $_{t-4}$					0.417		
					(0.000)***		
NatRes $_{t-4}$					-0.035		
					(0.000)***		
Ln GDP $_{t-5}$						0.322	
						(0.001)***	
NatRes $_{t-5}$						-0.036	
						(0.000)***	
Ln GDP $_{t-6}$							0.179
							(0.229)
NatRes $_{t-6}$							-0.037
							(0.000)***
Observations	758	645	518	402	294	191	96
R-squared	0.306	0.279	0.259	0.225	0.172	0.117	0.059

Notes: Dependent variable: Checks. Robust p values in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%, regressions include time dummies (not reported)

Table 6: Change in Democracy and Natural Resource Rents

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dem–Dem$_{t-1}$	Dem-Dem$_{t-2}$	Dem-Dem$_{t-3}$	Dem-Dem$_{t-4}$	Dem-Dem$_{t-5}$	Dem-Dem$_{t-6}$	Dem-Dem$_{t-7}$
Ln GDP$_{t-1}$	0.372 (0.000)***						
Democracy$_{t-1}$	-0.212 (0.000)***						
NatRes$_{t-1}$	-0.025 (0.000)***						
Ln GDP$_{t-2}$		0.636 (0.000)***					
Democracy$_{t-2}$		-0.390 (0.000)***					
NatRes$_{t-2}$		-0.045 (0.000)***					
Ln GDP$_{t-3}$			0.905 (0.000)***				
Democracy$_{t-3}$			-0.545 (0.000)***				
NatRes$_{t-3}$			-0.071 (0.000)***				
Ln GDP$_{t-4}$				1.083 (0.000)***			
Democracy$_{t-4}$				-0.642 (0.000)***			
NatRes$_{t-4}$				-0.084 (0.000)***			
Ln GDP$_{t-5}$					1.172 (0.000)***		
Democracy$_{t-5}$					-0.721 (0.000)***		
NatRes$_{t-5}$					-0.094 (0.000)***		
Ln GDP$_{t-6}$						1.161 (0.000)***	
Democracy$_{t-6}$						-0.752 (0.000)***	
NatRes$_{t-6}$						-0.106 (0.000)***	
Ln GDP$_{t-7}$							1.238 (0.000)***
Democracy$_{t-7}$							-0.745 (0.000)***
NatRes$_{t-7}$							-0.124 (0.000)***
Observations	710	579	472	368	268	176	86
R-squared	0.149	0.243	0.349	0.420	0.463	0.478	0.488

Notes: Dependent variable: Change in Democracy. Robust p values in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%, regressions include time dummies (not reported)

Table 6a: Change in Checks and Natural Resource Rents

	(1) Checks–Checks$_{t-1}$	(2) Checks-Checks$_{t-2}$	(3) Checks–Checks$_{t-3}$	(4) Checks-Checks$_{t-4}$	(5) Checks-Checks$_{t-5}$	(6) Checks-Checks$_{t-6}$
Ln GDP$_{t-1}$	0.157					
	(0.003)***					
Checks$_{t-1}$	-0.384					
	(0.000)***					
NatREs$_{t-1}$	-0.012					
	(0.000)***					
Ln GDP$_{t-2}$		0.214				
		(0.004)***				
Checks$_{t-2}$		-0.500				
		(0.000)***				
NatREs$_{t-2}$		-0.017				
		(0.000)***				
Ln GDP$_{t-3}$			0.234			
			(0.010)**			
Checks$_{t-3}$			-0.563			
			(0.000)***			
NatREs$_{t-3}$			-0.022			
			(0.000)***			
Ln GDP$_{t-4}$				0.222		
				(0.066)*		
Checks$_{t-4}$				-0.617		
				(0.000)***		
NatREs$_{t-4}$				-0.025		
				(0.000)***		
Ln GDP$_{t-5}$					0.120	
					(0.574)	
Checks$_{t-5}$					-0.608	
					(0.018)**	
NatREs$_{t-5}$					-0.022	
					(0.014)**	
Ln GDP$_{t-6}$						-0.112
						(0.766)
Checks$_{t-6}$						-0.415
						(0.292)
NatREs$_{t-6}$						-0.016
						(0.352)
Observations	626	497	381	272	168	77
R-squared	0.182	0.200	0.190	0.191	0.197	0.139

Notes: Dependent variable: Change in Checks. Robust p values in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%, regressions include time dummies (not reported)

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Appendix

Descriptive Statistics for the Core Model

Table A1: Means

Variable	Obs	Mean	Std. Dev.	Min	Max
Growth	520	1.23	3.82	-15.76	20.29
ln GDP	520	6.75	1.11	4.57	9.77
Nat. Resources	520	5.54	9.84	0	65.58
Nat. Res. $_{t-1}$	520	5.62	9.95	0	65.27
Democracy	520	3.29	3.76	0	10
Checks	520	2.20	1.65	1	17
CPIA	520	3.09	0.77	1	5.03
Ethnic	519	0.53	0.24	0.04	0.93
ln Investment	502	2.38	0.58	0.60	4.03
Gov. Cons.	514	14.35	6.22	4.23	49.86
Press Freedom	460	1.76	0.77	1	3

Table A2: Correlation Coefficients

	growth	ln GDP	Nat. Res.	Nat.Res. $_{t-1}$	Democracy	Checks	CPIA
Growth	0.10	1.00					
ln GDP	0.02	0.12	1.00				
Nat. Res.	-0.02	0.12	0.89	1.00			
Nat. Res. $_{t-1}$	0.17	0.48	-0.10	-0.10	1.00		
Democracy	0.17	0.33	-0.02	-0.03	0.67	1.00	
Checks	0.36	0.38	-0.20	-0.16	0.33	0.26	1.00
CPIA	-0.24	-0.34	0.09	0.08	-0.27	-0.17	-0.25
Ethnic	0.33	0.53	0.06	0.06	0.23	0.21	0.44
ln Investment	-0.15	0.08	0.13	0.15	-0.02	-0.05	0.01
Gov. Cons.	0.16	0.52	-0.08	-0.07	0.75	0.55	0.33
Press Freedom	0.12	0.48	-0.05	−0.04	0.74	0.63	0.30

	Ethnic	ln Investment	Gov. Cons
ln Investment	-0.37	1.00	
Gov. Cons.	0.05	0.07	1.00
Press Freedom	-0.25	0.28	-0.01

Sample: Albania, Algeria, Angola, Argentina, Armenia, Azerbaijan, Bangladesh, Belarus, Benin, Bolivia, Botswana, Brazil, Bulgaria, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Chile, China, Colombia, Dem. Rep. Congo, Rep. Congo, Costa Rica, Cote d'Ivoire, Croatia, Czech Republic, Dominican Republic, Ecuador, Egypt, El Salvador, Eritrea, Estonia, Ethiopia, Fiji, Gabon, The Gambia, Georgia, Ghana, Guatemala, Guinea, Guinea-Bissau, Haiti, Honduras, Hungary, India, Indonesia, Jamaica, Jordan, Kazakhstan, Kenya, Kyrgyz, Laos, Lesotho, Macedonia, Madagascar, Malawi, Malaysia, Mali, Mauritania, Mauritius, Mexico, Moldova, Mongolia, Morocco, Mozambique, Namibia, Nepal, Nicaragua, Niger, Nigeria, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Romania, Russian Federation, Rwanda, Senegal, Sierra Leone, Singapore, Slovak Republic, Slovenia, South Africa, Sri Lanka, Sudan, Syrian Arab Republic, Tanzania, Thailand, Togo, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Uganda, Ukraine, Uruguay, Uzbekistan, Venezuela, Vietnam, Yemen, Zambia, Zimbabwe.

Data Description and Sources:

Economic Growth

We used WDI 2003 data for GDP and population. GDP is measured in constant 1995 US dollars, we divided GDP by the population to calculate per capita GDP. We approximated the growth of per capita GDP by taking the log differences at the beginning and end of each sub period (1970-73, 1974-77, …, 1998-2001) and divided this difference by the number of years, four, and multiplied this by 100.

GDP per capita

We measure GDP per capita at the beginning of each sub-period (1970-73, 1974-77, …, 1998-2001). Data are measured in constant 1995 US dollars and the data source is WDI 2003.

Natural Resource Rents

Using data from the World Bank's adjusted savings project we calculated the rents for each commodity by subtracting the cost from the commodity price. We then multiplied the rents per unit by the amount extracted and summed across the different commodities. We then calculated the share of rents in GDP. Since the rents are provided in current US dollars we used the WDI 2003 GDP in current dollars to calculate this share. Natural resources for which rent data were available are: oil, gas, coal, lignite, bauxite, copper, iron, lead, nickel, phosphate, tin, zinc, silver and gold. The data are available from http://lnweb18.worldbank.org/ESSD/envext.nsf/44ByDocName/GreenAccountingAdjustedNetSavings and are described in Hamilton and Clemens (1998).

Democracy

The degree of openness of democratic institutions is measured on a scale of zero (low) to ten (high). We used the Polity IV score at the beginning of each sub-period (1970-73, 1974-77, …, 1998-2001). Source: http://www.cidcm.umd.edu/polity/index.html. The data are described in Jaggers and Gurr (1995).

Government Consumption

We used the general government final consumption expenditure as a percentage of GDP and averaged over each sub-period (1970-73, 1974-77, …, 1998-2001). Data source: WDI 2003.

Investment

We used total investment as a percentage of GDP and averaged and logged over each sub-period (1970-73, 1974-77, …, 1998-2001). Data source: PWT as described in Heston, Summers and Aten (2002).

Checks

This variable captures the number of veto players. This variable is built from several other variables, two of which are the legislative and the executive indices of electoral competitiveness. The checks and balances index ranges from 1 to 17 with higher numbers indicating a higher number of veto players. Data Source: DPI2000, data are described in Beck et al (2001) and Keefer and Stasavage (2003) and are available from http://econ.worldbank.org/view.php?type=18&id=25467

Freedom of the Press

Freedom of the Press is measured by Freedom House and countries are allocated into three categories, free (value of 3), partly free (value of 2) and not free (value of 1).

Ethnic Diversity
Diversity is a measure of ethnic fractionalization is measured as the probability of two randomly people not belonging to the same ethnic group. This measure of ethnic fragmentation is based on a broader classification of groups, taking into account not only language but also other cleavages such as racial characteristics. Data source: Alesina et al (2003).

Policy
We measure policy with the World Bank's Country Policy Institutional Assessment (CPIA) indicator. It ranges from 1 (poor) to 5 (good). It is the average of 20 equally weighted components which fall into four groups: Macroeconomic management and sustainability of reforms, structural policies for sustainable and equitable economic growth, policies for social inclusion and public sector management.

Governance
We measure governance with the International Country Risk Guide indicator, it ranges from 1 (poor) to 6 (good). Source: Collier and Dollar (2002).

Regional Dummies
The regional dummies were obtained from Collier and Dollar (2001).
Sub-Saharan Africa: Angola, Burundi, Benin, Burkina Faso Central African Republic Cote Congo, Rep Cape Verde Djibouti, Eritrea, Ethiopia, Gabon, Ghana, Guinea, The Gambia, Guinea-Bissau, Equatorial Guinea, Kenya, Liberia, Lesotho, Madagascar, Mali, Mozambique, Mauritania, Mauritius, Malawi, Namibia, Niger, Nigeria, Rwanda, Sudan, Senegal, Sierra Leone, Somalia, Sao Tome and Principe, Swaziland, Seychelles, Chad, Togo, Tanzania, Uganda, South Africa, Congo, Dem. Rep., Zambia and Zimbabwe.
South Asia: Afghanistan, Bangladesh, Bhutan, India, Sri Lanka, Maldives, Nepal and Pakistan.
East Asia: China, Indonesia, Japan, Korea, Rep., Malaysia, Philippines, Singapore and   Thailand.
Middle East and North Africa: United Arab Emirates, Bahrain, Algeria, Egypt, Arab Rep., Greece, Iran, Islamic Rep., Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Morocco, Malta, Oman, Portugal, Qatar, Saudi Arabia, Syrian Arab Republic, Tunisia and   Yemen, Rep.
Eastern and Central Europe: Albania, Armenia, Azerbaijan, Bulgaria, Bosnia and Herzegovina,   Belarus,   Czech   Republic,   Estonia,   Georgia,   Croatia, Hungary,Kazakhstan, Kyrgyz Republic, Lithuania, Latvia, Moldova, Macedonia, FYR, Poland,   Romania, Russian Federation, Slovak Republic, Slovenia, Tajikistan,   Turkmenistan, Turkey, Ukraine, Uzbekistan and Yugoslavia (Serbia/Montenegro).