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Abstract

This paper proposes and tests a mechanism through which the natural resource curse can operate. I posit that, in the presence of high natural resource rents, leaders lower the burden of taxation on citizens in order to reduce the demand for democratic accountability. The theory is tested using micro-level data from public opinion surveys across 15 sub-Saharan countries, in addition to country-level data on natural resource rents, taxation and election proximity. It is found that an increase in natural resource rents decreases perceived tax enforcement, which in turn reduces the demand for regular, open and honest elections. Results are robust to alternative specifications. A supplementary analysis reveals that, consistent with the two-period model proposed, the effects are more acute closer to national elections. The findings support political-economy explanations of how natural resources affect economies, in which resource rents are purported to influence the decisions of the political elite through increased returns to staying in power.

Keywords: Democracy; Political Economy; Natural Resources; Curses; Africa

JEL Classification: D73, O13, O55

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1 Introduction

From 1965 to 2000, cumulative oil revenues in Nigeria amounted to $350 billion at 1995 prices. In 1970, per capita GDP was $245, and the poverty rate, measured as the share of the population subsisting on less than $1 a day, was around 40 percent. Oil revenues per capita were $33. In 2000, per capita GDP was the same; the poverty rate was just under 70 percent. Oil revenues per capita were $325.[1]

Sachs and Warner (1995) show that resource-rich countries grow more slowly than others; the importance of understanding why, how and when this occurs is clear. In this paper, I propose and test a mechanism linking increasing rents from natural resource exploitation with a decrease in the demand for political accountability through a reduced burden of taxation on citizens.

The finding contributes to a growing body of literature on the natural resource curse. Early explanations presented largely economic channels, most notably the Dutch Disease, whereby natural resource booms lead to an appreciation of the real exchange rate, reducing competitiveness in more productive export sectors and, as a result, TFP growth (Corden and Neary, 1982; Krugman, 1987). Models of rent-seeking are also used to explain the phenomenon: Torvik (2002) shows how allocative distortion can reduce growth when entrepreneurs depart from productive activities to engage in rent-seeking, and Tornell and Lane (1999) show how, in economies containing a concentration of powerful groups and a lack of institutional strength, revenue shocks reduce growth.

More recent cross-country observations from Mehlum et al (2006) suggest that a more political mechanism is at play: the deleterious impact of natural resources on growth is stronger in countries with weak institutions. The finding supports political-economy explanations of the resource curse posited by, for example, Robinson et al (2006), who show how resource booms create dysfunctional state behaviour in the presence of bad institutions.

Empirical evidence of the specific mechanisms through which resource booms can lead to a curse is relatively sparse. Macro-level studies show that resources have a detrimental impact on institutions through waste and corruption (Sala-i-Martin and Subramanian, 2003); they increase the likelihood of civil war (Collier and Hoeffler, 2002); and they reduce measures of democracy

[1] Sala-i-Martin and Subramanian (2003)

(Barro, 1999). Research using micro-level data finds evidence of more specific mechanisms: using an oil discovery announcement in São Tomé and Príncipe, Vicente (2010) shows that resources increase corruption through vote buying, customs, and the allocation of scholarships; Caselli and Michaels (2009) analyse a Brazilian oil discovery, finding that oil money has little, if any, impact on households – it largely 'goes missing' as it passes through administrators.

This paper specifically contributes to the literature on micro-level empirical mechanisms. I propose that, in the presence of high natural resource rents, the political elite lowers the burden of taxation on citizens in order to reduce accountability. This reduction in accountability leads to the resource curse in democracies (Collier and Hoeffler, 2009). The mechanism is consistent with theories presented by Robinson et al (2006) and Caselli and Cunningham (2009), who explain that natural resource rents alter the behaviour of the political elite through increasing the value of being in power, leading to an increase in resources spent on power-preserving activities and a misallocation of resources in the rest of the economy.

To test this, I use a cross-country representative household survey sample of over 50,000 observations taken in 33 survey rounds across 15 nascent democracies in sub-Saharan Africa from 2001-2006. I use data on the demand for democratic accountability – which I interpret as the strength of respondents' preferences for regular, open and honest elections – and on perceived tax enforcement, which is used to measure the tax burden on citizens in the absence of data on tax payments at the individual level and of aggregate data on tax revenues for the sample country-years. Data on annual natural resource rents are at the country level. I hypothesise that resource rents decrease perceptions of tax enforcement, which in turn reduces the demand for accountability. As the latter relationship is likely to exhibit endogeneity, the identification strategy lends itself to an Instrumental Variable (IV) two-stage least squares approach, where the demand for accountability is the dependant variable, tax enforcement is the endogenous regressor, and a measure of resource rents is used as the exogenous instrument. I include country fixed effects to control for time-invariant country-level correlates. That the data is at the individual level facilitates the estimation of the second, inherently micro-level, relationship, as well as the inclusion of numerous demographic and economic variables to control for otherwise unexplained variation in the model.

I find clear and significant evidence in support of the hypothesis. Increases in resource

rents lower perceived tax enforcement, which itself is a significant predictor of the demand for accountability (a one point increase in tax enforcement raises the demand for accountability by just under a third of a point. Both are measured on four-point scales). Moreover, suggestive evidence is given in support of a negative relationship between a variety of aggregate tax measures and resource rents, providing external corroboration. Results are robust to alternative measures of the demand for democratic accountability, the exclusion of outliers and various alternative specifications. The use of resource rents as an instrument is justified by tests for overidentifying restrictions, where measures of aid are used as additional instruments.

Further to the primary estimation strategy, I explore a testable implication of the theory: that the effect of rents on tax enforcement is more acute closer to an election, or, phrased alternatively, that the effect of election proximity on tax enforcement is significant in the presence of high resource rents. This is supported by the data – the manipulation of tax enforcement in order to preserve power is a phenomenon that expressly concerns resource-rich countries. Taken together, the results are consistent with political-economy explanations of the natural resource curse, in which resource rents are purported to affect the decisions of the political elite through increased returns to staying in power.

The paper is organised as follows. First I contextualise the proposed relationships and present a simple model of leader behaviour. I then discuss the estimation strategy and the data used for the analysis, before examining the results and finally offering some concluding remarks.

2 On The Political Economy of the Natural Resource Curse

In this paper I propose that dysfunctional leader behaviour in the presence of resource rents can be observed through an attenuation of the tax burden on citizens, effected with a view to decreasing the demand for accountability in order to stay in power.

2.1 The Political Resource Curse

The idea that resources affect leader behaviour is central to Robinson et al (2006). Resource booms increase the value of being in power and also provide politicians with the means to influence elections. Where checks and balances are weak, the political incentives generated by

the boom will result in a misallocation of resources in the economy. The nature of these incentives is the key to determining whether or not the boom will result in a curse.

Collier and Hoeffler (2004) provide empirical evidence that resource booms increase the value of being in power. Increases in resource rents significantly raise the likelihood of coups and civil wars as the returns to being in power augment. That democracy suffers in the presence of high resource rents is also a well supported proposition; Barro (1999) and Tsui (2005) each make the observation using cross-country data. The empirical literature also supports the suggestion that perverse political incentives are fostered by resource booms. Vicente (2010), Sala-i-Martin and Subramanian (2003) and, to a lesser extent, Caselli and Michaels (2009) show that natural resources increase corruption. The proposition that the nature of political incentives created by resource booms determines whether or not a curse will prevail is strongly reinforced by the relationships identified in Mehlum et al (2006) – that curses occur where institutions are weak (i.e. where low checks and balances produce rapacious political incentives) and not where they are strong.

2.2 Natural Resources, Taxation and Accountability

While several remarks on the relationship between resource rents, taxation and the demand for accountability are present in the literature, an empirical analysis of the entire mechanism appears to be absent. As such, it is useful to look at each link separately before formalising the relationship in full.

Bornhorst et al (2009) offer the most recent and detailed cross-country evidence of an offset between natural resource revenues and revenues from other domestic sources. They find that a 1% increase in the former lowers non-resource revenues by about 0.2%. Although a reduction in public scrutiny of government is mentioned as a possible consequence, the authors refrain from identifying a specific explanation for the offset. Collier (2006, pp. 1484) also discusses the relationship, referring to IMF data that, on average, shows no discernible difference in government expenditure as a percentage of GDP between resource-rich and resource-poor African countries.[2] His explanation is that "the governments of oil economies do not spend more, they tax less."

The political science literature is replete with allusions to the concept of taxation as a tool

[2] See IMF (2009; Table SA11) for an up-to-date version of this table.

for engaging citizens; for increasing scrutiny and the demand for accountability. A recent book by Brautigam et al (2008) discusses at length the role of taxation in the formation of democratic states. It is argued that taxation is an integral part of the social contract that increases representation in and scrutiny of government. Indeed much of the literature on the relationship is framed in the context of the mechanism analysed in this paper. In proposing a theory to explain that *rentier* states[3] do not foster democracy, Ross (2001, pp. 332) argues that:

> "[...] governments use their oil revenues to relieve social pressures that might otherwise lead to demands for greater accountability [...] when governments derive sufficient revenues from the sale of oil, they are likely to tax their populations less heavily or not at all, and the public in turn will be less likely to demand accountability from – and representation in – their government."

Two case studies are used to support this. Crystal (1990) observes that the governments of Kuwait and Qatar were made less accountable to the traditional merchant class by oil discoveries, and Brand (1992) argues that decreases in foreign aid and remittances in 1980s Jordan led to greater demand for political representation.[4]

The study closest in spirit to this one is perhaps Collier and Hoeffler (2009), who offer a theoretical explanation of the mechanism as part of a wider analysis of the effect of resource rents on growth across different polities. They argue that the lower tax rate imposed as a result of higher rents facilitates the embezzlement of rents as well as the provision of resources for patronage due to its ruinous effects on scrutiny from citizens. This is used to explain their cross-country empirical finding: natural resource rents reduce growth in democracies with weak accountability. Indeed Collier also writes in an earlier paper (2006, pp. 1484):

> "Scrutiny of government is a public good, the supply of which is commonly provoked by the tax burden. The lack of scrutiny in countries with large resource rents makes it easier for public revenues to be diverted into patronage [...] *resource rents subvert democracy by making patronage politics financially feasible.*"

[3] Rentier states are defined by Mehdavy (1970, pp. 428) as those "that receive on a regular basis substantial amounts of external rent."

[4] The link between rents, taxes and accountability is also discussed at length by, inter alia, Herb (2003) and Moore (2004). However, the state of the literature on rentier behaviour is perhaps best captured by Chaudhry (1997; pp. 187), who notes that "theories of the rentier state far outstrip detailed empirical analysis of actual cases."

It is also worth noting that this effect has recently received attention from policy-makers (Devarajan et al, 2010). Thus, the idea that resource rents mollify citizens' scrutiny through a decreased burden of taxation is not a new one. Below, I formalise the theory before offering an empirical test of its implications.

2.3 Theory

In the spirit of Vicente (2010), I propose to explain a specific channel through which the natural resource curse can operate. I build on a very simple two-period framework developed by Caselli and Cunningham (2009), where leader utility is partially determined by a standard survival function, i.e. the reduced-form probability of retaining power.[5] The increased returns to power-preserving activities caused by high resource rents will alter the behaviour of leaders in accordance with the incentives produced by the survival function. The authors therefore explore the effects of resource rents on leader behaviour under various assumptions of survival determination. For example, the 'repressive leader' emerges where survival is determined by repressive spending; the 'fatalistic leader' emerges where it is negatively determined by resource rents, and so on.

Here, I suggest that citizens are provoked into demanding accountability by the taxation of non-resource GDP (as discussed above). This increased demand for accountability diminishes the prospects of re-election for a leader engaged in resource embezzlement or patronage. It follows that the reduced-form probability of survival π is a function of taxation τ, where $\pi'(\tau) < 0$ and $\tau \in [0, 1]$. First period leader consumption is comprised of exogenous rents α. Second period consumption is comprised again of α along with revenue collected from non-resource GDP $\tau\nu$, subject to survival of probability $\pi(\tau)$. The objective function is thus:

$$u = \alpha + \pi(\tau)[\alpha + \tau\nu], \tag{1}$$

with first-order condition:

$$\frac{du}{d\tau} = \pi'(\tau)[\alpha + \tau\nu] + \pi(\tau)\nu, \tag{2}$$

[5] As in Caselli and Cunningham (2009), the term 'leader' is broadly construed as the political elite.

total differential:

$$d\alpha[\pi'(\tau)] + d\tau[\pi''(\tau)(\alpha + \tau\nu) + 2\pi'(\tau)\nu] = 0, \tag{3}$$

and comparative statics:

$$\frac{d\tau}{d\alpha} = -\frac{\pi'(\tau)}{\pi''(\tau)(\alpha + \tau\nu) + 2\pi'(\tau)\nu}. \tag{4}$$

By the second order condition, the second term in brackets in (3) must be non-positive. It follows that the denominator in (4) is non-positive. As the numerator is negative by definition, I can thus conclude that $\frac{d\tau}{d\alpha} < 0$; in other words, where survival is determined by taxation, leaders will decrease the tax burden on citizens as resource rents increase.[6]

3 Estimation

I test the theory by analysing two specific propositions: that resource rents decrease the extent to which citizens are taxed ($\frac{d\tau}{d\alpha} < 0$), and that the extent to which citizens are taxed affects their demand for democratic accountability (i.e. a test of the reduced form $\pi'(\tau) < 0$, as discussed above).

3.1 Identification

To investigate the nature of these relationships, I use data collected in rounds 1.5, 2, 2.5 and 3 of the Afrobarometer, a series of standardised, nationally representative public opinion surveys conducted in nascent sub-Saharan democracies.[7] The sample of 50,755 is drawn from 33 surveys conducted between 2001 and 2006 in 15 countries: Botswana, Cape Verde, Ghana, Kenya, Lesotho, Malawi, Mali, Mozambique, Namibia, Nigeria, Senegal, South Africa, Tanzania, Uganda and Zambia. As I include country fixed effects in the analysis, the sample is restricted to countries in which the questions of interest were asked in more than one round. As in Eifert et al (2010),

[6] Whereas this model shows how rational leader behaviour can lead to lower taxes where resource rents are higher, it does not in and of itself prove that this behaviour leads to the natural resource curse (i.e. reduced growth). Recall that Collier and Hoeffler (2009) show that weakened accountability (argued to be caused by a lower tax burden) has a detrimental effect on the economic performance of resource-rich democracies. A key point here is that, should any positive effect of lower taxes on non-resource GDP v exist, it will be more than offset by the deleterious effects of weak accountability in the presence of natural resources.

[7] Samples are drawn through a multi-stage stratified, clustered sampling procedure; sample sizes are sufficient to yield a margin of error of percentage points at the 95% confidence level. Further information on Afrobarometer methodology is provided by Bratton, Mattes and Gymah-Boadi (2004).

the loss of data (in this case two countries) is more than compensated by the methodological benefits of including country fixed effects. Additional constraints are imposed by the absence of the relevant questions in the 12 first-round surveys.

The two questions of interest involve respondents attributing a subjective score to a statement or question. The dependent variable comes from a standard question designed to gauge respondents' preferences for democratic, accountable governance:

> *I would like to hear your views about how this country is governed. Which of the following statements is closest to your view? Choose Statement A or Statement B.*
>
> *A: We should choose our leaders in this country through regular, open and honest elections.*
>
> *B: Since elections sometimes produce bad results, we should adopt other methods for choosing this country's leaders.*

The respondents are probed for the strength of their opinion, which are subsequently coded on a four-point scale ranging from *agree very strongly with A* to *agree very strongly with B*.[8] The significant advantage of this question is that the variation in respondents' subjective concept of elections is minimised by the inclusion of the "regular, open and honest" qualifier and, most importantly, by the country fixed effects framework, which controls for time-invariant country-specific characteristics such as colonial history, ethnic heterogeneity and level of economic and institutional development. In addition, one can safely assume that the alternative choice – the "other methods" – is highly unlikely to capture any preference for democratic accountability, especially given that colonial and/or autocratic rule constitute the most salient alternative methods of governance to most Africans.

The taxation variable is based on individuals' subjective measurement of income tax enforcement:

> *How likely do you think it would be that the authorities could enforce the law if a person like yourself did not pay a tax on some of the income they earned?*

[8] I recode responses so that the variable *increases* with the demand for accountability.

Values are labelled on a four point scale, ranging from *not at all likely* to *very likely*. The variable is used to measure the extent to which leaders are directly taxing the citizenry. Alternative methods of capturing the tax burden are limited: measures of individual tax payments are not included in the survey; the availability of data on tax revenues for the sample country-years is severely limited (I use an extended dataset in Figure 1, discussed below), as are data on tax rates, though I would argue that the latter two are less appropriate measures than the one used, given that they are aggregated to the country level. Moreover, the enforcement of taxation can be reasonably assumed to be administratively more malleable than tax rates, making it more consistent with the theory. Again, concerns that initial country-level institutional variation influence results are mitigated by the inclusion of country fixed effects in the econometric model.

Nevertheless, and as with many survey-based studies, significant methodological issues remain. As answers to the above questions are given in a specific context, it is necessary to control for potentially confounding factors that could influence responses. With this in mind, I include controls for characteristics of the interview (whether other people were present during questioning) and the interviewer (age, education, gender, rural-urban background). As mentioned, contextual factors that are correlated with the country in which the interview takes place are controlled for, as are survey round-specific features. I also include a control for the proximity of the survey to a national election, together with a linear time trend control.

In addition to context-specific variation, subjective survey responses are also prone to bias. It is plausible that one's inclination to *express* their preferences for democratically accountable governance – or indeed to convey the impression that income tax is weakly enforced – varies somewhat according to both the social norms of their country and to their suspicions of the enumerator's affiliation. For example, a downward bias in the responses could be expected where such opinions are frowned upon. The possibility of this is assuaged by both the confidential and private manner in which the Afrobarometer is conducted and by the independence of the enumerators, who were not affiliated with the government or any political party. That the presence of other people during interviews is controlled for will also reduce the possibility of bias. Where the bias is symptomatic of a nation's social norms, the country fixed effects framework will control for these differences. As is standard in studies of this nature, respondents' demographic and socioeconomic characteristics (including age, economic status – measured using an index

comprised of respondents' access to food, water, fuel for cooking and healthcare during the preceding year – education, gender and rural-urban background) are also controlled for.

As these data stem from repeated cross-sections rather than from a panel, it is possible that sampling variation accounts for some of the observed changes between rounds. However, the combination of large nationally representative surveys (mean survey size is 1538.03 respondents) and the consistency of the sampling methodology used by Afrobarometer across rounds indicate that this may not be a significant problem. Nevertheless, I include controls for survey rounds (1.5, 2, 2.5 and 3) in the estimations.

Endogeneity is another concern in a survey-based analysis such as this. It is possible that either one's demand for accountability may have a causal influence on their perception of tax enforcement, or that other factors simultaneously affect both responses. In such a case, the reported relationship would be spurious. To overcome this, I instrument the potentially endogenous tax variable with the exogenous resource rents variable. This approach is in line with the theory, and allows a clear test of the proposed links. Of course, the validity of the approach is dependent on the satisfaction of the usual restrictions: that the instrument is directly related to the endogenous variable and is independent of the error term. I show that this is the case in Section 4.

The resource rents measurement is taken from the World Bank's World Development Indicators (WDI). It was initially developed by Collier and Hoeffler (2009), who define rents as the difference between the resource price and the extraction costs.[9] They then multiply the unit rent by the total volume extracted. Rents are added for a variety of resources and are then divided by GDP. The resources used in this paper are crude oil, natural gas, coal, bauxite, copper, iron, lead, nickel, phosphate, tin, zinc, gold, silver and wood.[10] The measure is particularly accurate as, although commodity prices vary over time but are constant across countries, extraction costs vary over time *and* across countries. It thus precisely captures the value for which cruder resource-revenue measurements were hitherto used as proxies.

[9] The measurements are based on sources and methods from Kunte et al (1998).

[10] Wood rents, coded as net forest depletion in the WDI, are calculated as the product of unit resource rents and the excess of roundwood harvest over natural growth. It has been pointed out that as forests have an open access problem, one could argue that poor property rights and bad management could lead to overharvesting, which would decrease unit rents. To assauge the potential resultant endogeneity of the variable, I check that results are robust to the exclusion of the wood component in the rents variable (unreported).

The main specification is as follows: I use an IV (two-stage least squares) method to estimate the causal links between resources rents, perceived tax enforcement, and the demand for democratic accountability of individual respondent i living in country c taking part in survey round s during period t. I express the two-stage relationship as:

$$T_{icst} = a_T + \beta R_{ct} + X'_{icst}\gamma_T + C'_{ct}\lambda_T + S'_{st}\psi_T + u_{icst} \tag{5}$$

and

$$D_{icst} = a_D + \varphi T_{icst} + X'_{icst}\gamma_D + C'_{ct}\lambda_D + S'_{st}\psi_D + e_{icst} \tag{6}$$

where T is the measure of tax enforcement; R is resource rents; X is a vector of individual covariates including age, economic status, education, gender, rural-urban background and interview controls; C is a vector of country-related controls, namely country dummies and an election proximity variable; S is a vector of temporal controls, comprised of a linear time trend and survey round dummies; D is the demand for democratic accountability; and φ explains the relationship between T and the dependent variable D. Throughout the analysis, β and φ are the coefficients of interest, where β is predicted to be negative and φ positive.

3.1.1 Rents, Taxes and Survival

In addition to the main analysis, I explore another testable implication of the theory using data on the proximity of electoral competition. As outlined above, the role of the 'survival function' – the reduced-form probability of retaining power – is a key concept in the political explanations of resource curse mechanisms. As elections are likely to determine the survival or otherwise of leaders, I propose that dysfunctional leader behaviour in the presence of high resource rents is likely to intensify as elections draw nearer.

I test this proposition by introducing an election proximity model to the analysis. I hypothesise that the effects of an approaching election on tax enforcement will be negative as resource rents increase. This is tested by including a simple interaction variable between rents and election proximity in the following:

$$T_{icst} = \alpha_T + \beta R_{ct} + \theta E_{ct} + \zeta(R_{ct} * E_{ct}) + \lambda_T C_c + X'_{icst}\gamma_T + S'_{st}\psi_T + v_{icst} \tag{7}$$

where E is election proximity, defined as the absolute value in months between a survey round and the most proximate national elections – parliamentary or presidential. I follow Eifert et al (2010) by multiplying the values by -1 for ease of interpretation: elections are closer as the variable *increases*. As such, I expect ζ to have a negative sign, signifying that, in resource rich countries (i.e. as rents increase), leaders reduce tax enforcement as an election approaches.

3.2 Data

Table 1 gives a summary of the main dependant variable used in the analysis, showing the percentage of responses attributed to each of the four points on the Likert scale for all 33 survey rounds, together with means and standard deviations. In Table 2 I present more sample statistics, including mean tax enforcement scores and resource rent data used in the IV estimations. Two potentially problematic issues are evident here: first, some countries (Namibia, Nigeria and South Africa) are represented by three survey rounds in the sample, whereas all other countries feature twice; and, second, Nigeria has particularly high resource rent levels that could bias overall results.[11] To mitigate the first problem, I use population weights (defined as $\frac{1}{n_c}$, where $n_c$is the total number of observations from that country) that control for over-representation. For the second, I exclude Nigerian data from the analysis as a robustness check.

4 Results

4.1 External Corroboration

Before turning to more formal analysis, I begin in Figure 1 by supplementing the findings of Bornhorst et al (2009) with external corroboration of the hypothesised link between natural resource rents and taxation using cross-country data. Taking data from the WDI across sub-Saharan African countries from 1960 to date, I present the linear fit (with 95% confidence interval) of natural resource rents and six measurements of aggregate taxation: tax revenue as a percentage of GDP; net taxes on products; the average number of meetings between firms and tax officials per year; taxes on goods and services as a percentage of government revenue; taxes on international

[11] Mean for 2001, 2003 and 2005 is 26.9 (σ = 3.51); the sample mean is 4.58 (σ = 4.45).

trade as a percentage of government revenue; and the total tax paid by businesses expressed as a percentage of profits.[12] With varying levels of statistical significance, each plot is suggestive of a negative relationship. In Figure 2, I restrict the sample to include the 15 countries used in the main analysis of this paper only, again from 1960 onwards. Again with varying levels of confidence, the expected relationship holds in all but two cases: net taxes on products and taxes on goods and services. In the first case, the apparent anomaly can be explained by the fact that the tax measure is on indirect taxes, which can be reasonably assumed to be less salient than direct taxes. This would not be expected to affect the demand for democratic accountability. As a result, the negative relationship with resource rents is not necessarily required to corroborate the theory. Regarding the second case, the glossary of tax variable definitions in Appendix A shows that this measure includes taxes on the production and extraction of minerals, as well as taxes on the profits of fiscal monopolies. The positive relationship between this variable and resource rents is thus hardly a confounding observation.

4.2 Instrumental Variable Estimates: Rents, Taxation and Accountability

Table 3 shows the main results of the paper. In Column (1) we see the positive and significant relationship between tax enforcement and the demand for democratic accountability. Column (2) shows that the relationship is robust to the inclusion of individual, interview, time and country-related controls. However, as discussed, this relationship is likely to be endogenous.

Columns (3) and (4) show the first stage results. Consistent with the theory, increases in resource rents are found to reduce the level of tax enforcement. Again, the results are stable when controls are added. The IV results presented in Columns (5) and (6) suggest that the relationship between tax enforcement and the demand for democratic accountability is causal; a one-point increase on the four-point tax enforcement scale raises the demand for accountability by just under a third of a point on an equivalent scale when controls are included, and by around an eighth of a point in their absence.[13] In the both cases, the hypothesis that the instrument is

[12] These are defined in Appendix A.

[13] That the instrument is measured at the country level necessitates special treatment of the standard error. The relatively small number of clusters implies that a bootstrap of standard errors re-sampling at the country level is theoretically more appropriate than clustering (Cameron et al, 2008). Results are robust to this.

weak can be rejected (F = 95.02; 82.67).

The results in Columns (5) and (6) are subject to the suitability of the rents variable as a valid instrument. Although the premise that it is weak can be rejected, the validity of the other implicit assumption – that the instrument is independent of the error term – has to be investigated. In order to do so, a second instrument is required. Once identified, it is then possible to test whether the instruments are jointly valid; that is, that they are uncorrelated with the error term, and that they are correctly excluded from the main equation.

I test this by using measures of aid as an accompanying instrument. Aid represents a non-salient, external flow of resources to leaders, and is thus likely to elicit behaviour analogous to that predicted by increasing resource rents,[14] albeit tempered by the role of NGOs and other outsiders in the distribution process. Here, the data on aid is taken from the same WDI database as the main instrument. I use aid per capita, where aid refers to both official development assistance (ODA) and official aid, as well as aid as a percentage of government revenue.

Column (1) in Table 4 shows the effects of including aid as a percentage of government expenditure as an instrument. The results are robust to the addition. Most importantly, however, I find that the instruments are valid. The null hypothesis that the instruments are uncorrelated with the error term and that the excluded instruments are correctly excluded from the estimated equation cannot be rejected (overidentification test p-value = 0.17). However, the sample size is significantly reduced due to a lack of available data. In Column (2) we see that the instrument - this time aid per capita - is again uncorrelated with the error term. A note must go, however, to the weak first stage effect of the second instrument (P = 0.21).

Another potential concern is that the variation of the resource-rent measure is merely capturing a trend effect within each country. To check this, I include a country-specific linear time trend in Column (2) of Table 4. The results are not weakened. However, the inclusion of a country-level trend variable presents collinearity issues in a model that already includes country fixed effects, survey round fixed effects, two variables that vary at the country level (election proximity and resource rents) and a linear time trend. I thus follow Eifert et al (2010) by favouring a linear time trend to control for these effects.

[14] Gupta (2004) and Morrison (2009) both show empirical evidence of the negative relationship between foreign aid flows and domestic tax revenue.

A number of other robustness checks were carried out. I allude above to the potential problems that may arise due to the inclusion of Nigeria in the analysis, namely that high resource rents may bias overall results. In Column (3) we see that results are robust to the exclusion of Nigerian data. An added concern is that the linear specifications used thus far may not suit the nature of the data, and that, given the ordinal nature of the dependent variable, an alternative estimator should be tried. I thus dichotomise the dependent variable by grouping each half of the four-point scale into a single point in order to facilitate the estimation of the relationship using IV Probit and Linear Probability Models (LPM). The resultant marginal effects shown in Table 5 continue to corroborate the theory.[15]

Furthermore, results may be conditional on the operation of the specific dependent variable used to proxy the demand for accountability in this analysis. To check this, I replicate the estimation using an alternative Afrobarometer question that could reasonably be expected to capture the demand for democratic accountability:

> *There are many ways to govern a country. Would you disapprove or approve of the following alternatives?*
>
> *Elections and Parliament are abolished so that the president can decide everything.*

As with the original measurement, I recode the variable so that the strongest level of demand for accountability (i.e., disapproval of one-man rule) is at the higher end of the four-point scale used to measure attitudes towards the statement. The variable is particularly appropriate as a substitute for the original measurement given that it also provides respondents with the option to eschew democratic elections, albeit in favour of a defined alternative. Results in Table 6 reinforce the original findings.

Two issues remain on the interpretation of these results. Firstly, Bueno de Mesquita and Smith (2009) propose what could be construed as a competing hypothesis, whereby the response of leaders to revolutionary threats vary with the source of central revenues. Governments with access to external revenues such as resource rents or foreign aid reduce the provision of public goods and increase repressive activities, while those who rely on revenues that derive from

[15] Multiplying linear probability estimates by 2.5 allows for a rough comparison with probit estimates (Cameron and Trivedi, 2009). In this context, multiplying the linear estimate gives $2.5(0.145) = 0.3625$. The probit estimate is 0.376.

citizens' labour inputs are more likely to assuage the threats by providing public services and democratising. It could thus be argued that the returns to tax collecting activities in resource-rich countries would diminish due to the negative impact of repression on productivity. However, a reduction in tax enforcement that is caused by an increase in repressive activities is highly unlikely to erode citizens' demand for accountability - if anything, it would be expected to increase the desire for clean elections. This hypothesis is thus inconsistent with the empirical results. Secondly, it could be reasonably claimed that the effects of perceived tax enforcement on the demand for democratic accountability are not homogeneous – some people may be affected differently than others. In this context, it is perhaps most likely that individuals with higher educational attainment are more sensitive to the effect. I thus test for heterogeneity across the ten levels of education in the survey, ranging from no formal education (0) to post-graduate level (9). Although I find significant differences for some categories, the effects are not concentrated at either end of the distribution: the effects for people with primary education (3), some high school education (4), post-secondary education excluding university (6), and university education (8) are significantly higher than the effects for those with no formal education.[16] Homogeneous effects across economic status could not be rejected ($p = 0.27$), nor could those for the rural-urban background of respondents ($p = 0.65$). I conclude that the effects of tax enforcement on the demand for accountability are largely homogeneous.

4.3 Rents, Taxes and Survival

Table 7 reports the findings of equation (7). The interaction term, although small in magnitude, is significant and negative: tax enforcement is reduced in resource-rich countries as elections become more proximate. The rents variable maintains its negative coefficient and, as expected, the effects of election proximity on tax enforcement (controlling for those that are associated with increases in resource rents) are also negative. As rents increase, the illusory leader disengages his citizenry by lowering tax enforcement.

[16] Coefficients are 0.22***, 0.12*, 0.18* and 0.36*** respectively, where *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

5 Conclusion

In this paper I identify a mechanism that supports a political-economy explanation of the natural resource curse in developing countries. Where resource rents increase, leaders soften the burden of taxation on the citizenry as a means to render them more acquiescent. The findings are corroborated by supplementary analyses of testable theoretical implications.

In the main analysis I use household survey data from 15 sub-Saharan countries. The IV micro-level approach facilitates the identification of a specific channel through which the curse can operate. However, this approach also imposes a considerable constraint on the data, as country-level temporal variation is required when controlling for country fixed effects. The opportunity to exploit variation in natural resource data from more than 33 survey rounds would therefore be one way to reinforce the results. Another valuable addition to the area would be made possible by the availability of data on tax payments at the individual level as an alternative to perceptions of tax enforcement.

Furthermore, it is important to note that this mechanism plays a part of a bigger story, namely that it facilitates political malfeasance in the form of patronage politics and resource embezzlement. This is key to understanding whether or not this behaviour leads to the natural resource curse. As I mention in the main analysis, Collier and Hoeffler (2009) show that weak accountability in resource-rich democracies leads to a reduction in growth, suggesting that this is indeed the case. Nevertheless, analysing the channel in this context would constitute a valuable extension.

Turning to policy implications, a recent World Bank proposal (Devarajan et al, 2010) outlines a way in which the cycle identified in this paper can be mitigated, namely by directly transferring resource revenues to citizens before taxing a proportion of it back. Though an assessment of this specific proposal is beyond the remit of this study, the findings I report in this paper reinforce the movement to strengthen accountability in resource-rich countries, as reflected by the emergence of international protocols such as the Extractive Industries Transparency Initiative and the Natural Resource Charter. Although the vital import of democratic accountability as an accompaniment to electoral competition cannot be understated for any sub-Saharan African country, it should be noted that resource-rich countries are particularly prone to institutional deterioration as a

result of citizen acquiescence through a decrease in the tax burden – where checks and balances are most needed, they are perhaps at their most delicate.

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Table 1: Demand for Democratic Accountability (Likert Scale)

Country	Year	Agree Very Strongly with A	Agree with A	Agree with B	Agree Very Strongly with B	Mean Score (1-4)
Botswana	2003	0.13	0.08	0.28	0.51	3.14
Botswana	2005	0.05	0.09	0.3	0.56	3.1
Cape Verde	2002	0.06	0.17	0.33	0.44	3.22
Cape Verde	2005	0.08	0.1	0.25	0.57	3.41
Ghana	2002	0.04	0.05	0.27	0.64	3.31
Ghana	2005	0.04	0.04	0.34	0.58	3.28
Kenya	2003	0.05	0.05	0.21	0.69	3.16
Kenya	2005	0.03	0.07	0.26	0.64	3.16
Lesotho	2003	0.17	0.14	0.34	0.35	3.52
Lesotho	2005	0.12	0.11	0.2	0.57	3.2
Malawi	2003	0.14	0.06	013	0.67	3.46
Malawi	2005	0.34	0.03	0.03	0.6	3.35
Mali	2003	0.09	0.07	0.33	0.51	3.54
Mali	2005	0.06	0.08	0.45	0.41	3.28
Mozambique	2002	0.08	0.1	0.41	0.41	3.31
Mozambique	2005	0.07	0.08	0.31	0.54	3.3
Namibia	2001	0.05	0.08	0.24	0.63	3.16
Namibia	2003	0.04	0.13	0.31	0.52	3.51
Namibia	2006	0.07	0.21	0.26	0.46	3.31
Nigeria	2001	0.05	0.08	0.27	0.6	3.37
Nigeria	2003	0.07	0.1	0.3	0.53	2.87
Nigeria	2005	0.1	0.14	0.26	0.5	3.16
Senegal	2003	0.11	0.09	0.3	0.5	3.46
Senegal	2005	0.02	0.06	0.46	0.46	3.54
South Africa	2002	0.07	0.09	0.32	0.52	3.22
South Africa	2004	0.08	0.09	0.29	0.54	3.31
South Africa	2006	0.06	0.08	0.36	0.5	3.38
Tanzania	2003	0.12	0.09	0.28	0.51	3.33
Tanzania	2005	0.06	0.03	0.22	0.69	3.51
Uganda	2002	0.11	0.06	0.18	0.65	2.89
Uganda	2005	0.05	0.06	0.22	0.67	3.21
Zambia	2003	0.15	0.08	0.19	0.58	3.27
Zambia	2005	0.05	0.07	0.32	0.56	3.39
Mean		*0.09*	*0.09*	*0.28*	*0.55*	*3.29*
Standard Deviation		*0.04*	*0.03*	*0.06*	*0.07*	*0.12*

Notes: A = We should choose our leaders in this country through regular, open and honest elections; B = Since elections sometimes produce bad results, we should adopt other methods for choosing this country's leaders. "Agree with Neither," "Don't Know" and refusals all treated as missing values. These values collectively account for 1407 observations in the total sample of 50755.

Table 2: Sample Country Statistics

Country	Year	GDP pc	Tax Enforcement	Tax Revenue	Rents	Electoral Proximity
Botswana	2003	3976	3.36	.	2	16
Botswana	2005	4336	3.52	.	3	-7
Cape Verde	2002	1269	3.13	.	0	-16
Cape Verde	2005	1357	3.42	20.4	0	10
Ghana	2002	264	3.42	17.5	6	-21
Ghana	2005	290	3.49	21.3	5	-3.5
Kenya	2003	404	3.19	15.8	1	-8
Kenya	2005	426	3.58	18.6	1	27.5
Lesotho	2003	437	2.93	37.3	2	-9
Lesotho	2005	453	3.67	44.3	1	18.5
Malawi	2003	134	3.2	.	1	12.5
Malawi	2005	138	3.51	.	1	-13.5
Mali	2003	278	2.94	13.8	0	-6.5
Mali	2005	284	3.34	15.7	0	22
Mozambique	2002	270	3.31	.	1	27.5
Mozambique	2005	312	3.17	.	5	-6.5
Namibia	2001	2067	2.82	29.5	0	-28
Namibia	2003	2194	2.97	25.9	0	14.5
Namibia	2006	2603	3.19	.	4	-15
Nigeria	2001	370	3.11	.	26	19.5
Nigeria	2003	394	3.04	.	23	-6
Nigeria	2005	438	3.08	.	30	19.5
Senegal	2003	492	3.21	.	0	-19
Senegal	2005	522	3.43	.	0	17
South Africa	2002	3128	3.09	24.2	4	18.5
South Africa	2004	3302	2.71	25.7	4	-6
South Africa	2006	3570	3.11	28.8	4	-22.5
Tanzania	2003	296	3.17	.	2	29
Tanzania	2005	321	3.62	.	3	4.5
Uganda	2002	266	3.28	11.1	5	-18.5
Uganda	2005	291	3.46	11.8	4	10
Zambia	2003	329	3.3	16.7	3	-16.5
Zambia	2005	348	3.48	17.8	10	14
Mean		*1078*	*3.25*	*22.01*	*4.58*	15.24
Standard Deviation		*1031.91*	*0.19*	*6.85*	*4.45*	7.24

Notes: GDP pc is measured in 2000 US$. Tax Enforcement is the mean score on a four point scale (1-4) given by respondents in each survey round to the question shown in Section 3.1. Tax Revenue is expressed as a percentage of GDP. Rents are natural resource rents expressed as a percentage of GNI. Data on GDP pc, tax revenue and resource rents are taken from the World Development Indicators. Electoral Proximity is number of months between the survey and the most proximate national elections.

Table 3: Rents, Taxes and the Demand for Democratic Accountability

	Least Squares (1)	Least Squares (2)	1st Stage (3)	1st Stage (4)	2SLS (5)	2SLS (6)
Dependent Variable:	Dem a/c	Dem a/c	Tax	Tax	Dem a/c	Dem a/c
Instrument:					Rents	Rents
Tax	0.0655***	0.0649***			0.1274*	0.3191***
	(0.006)	(0.0061)			(0.0717)	(0.0908)
Rents			-0.0363***	-0.0305***		
			(0.0031)	(0.0032)		
Controls						
Individual	No	Yes	No	Yes	No	Yes
Interview	No	Yes	No	Yes	No	Yes
Election Proximity	No	Yes	No	Yes	No	Yes
Survey Round	Yes	Yes	Yes	Yes	Yes	Yes
Linear Time Trend	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	46832	45270	47957	46276	46832	45270
R-Squared	0.023	0.033	0.061	0.067		
1st Stage F-stat.			95.02	82.67		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Notes: All models include population weights (defined as $\frac{1}{n_c}$, where $n_c$is the total number of observations from that country).

Table 4: Robustness Checks

	Over ID Test		Country Time Trend	Excl. Nigeria
	2SLS	2SLS	2SLS	2SLS
	(1)	(2)	(3)	(4)
Dependent Variable:	Dem a/c	Dem a/c	Dem a/c	Dem a/c
Instruments:	Rents; Aid/GE	Rents; Aid PC	Rents	Rents
Tax	0.160*	0.331***	0.568***	0.3***
	(0.094)	(0.111)	(0.062)	(0.091)
Controls				
Individual	Yes	Yes	Yes	Yes
Interview	Yes	Yes	Yes	Yes
Election Proximity	Yes	Yes	Yes	Yes
Survey Round	Yes	Yes	Yes	Yes
Linear Time Trend	Yes	Yes	Dropped	Yes
Country FE	Yes	Yes	Yes	Yes
Country Time Trend	No	No	Yes	No
Observations	24998	45270	45270	45270
Test for Overidentification				
Chi-sq P-value	0.17	0.31		
First Stage				
Rents	-0.039***	-0.032***		
	(0.006)	(0.003)		
Aid PC		-0.0003		
		(0.0002)		
Aid / GE	-0.003***			
	(0.001)			
F-stat.	20.05	51.57	.	33.38

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Notes: All models include population weights (defined as $\frac{1}{n_c}$, where $n_c$is the total number of observations from that country) with the exception of (1). Test of overidentifying restrictions interpreted as follows: The joint null hypothesis is that the instruments are valid, i.e. uncorrelated with the error term, and that the excluded instruments are correctly excluded from the estimated equation. Under the null, the test statistic is distributed as chi-squared in the number of overidentifying restrictions. A rejection casts doubt on the validity of the instruments. Here, the null hypothesis cannot be rejected.

Table 5: Binary Dependent Variable Models

	IV Probit	LPM
	(1)	(2)
Dependent Variable:	Dem a/c (1/0)	Dem a/c (1/0)
Instrument:	Rents	Rents
Tax	0.376**	0.145***
	(0.177)	(0.037)
Controls		
Individual	Yes	Yes
Interview	Yes	Yes
Election Proximity	Yes	Yes
Survey Round	Yes	Yes
Linear Time Trend	Yes	Yes
Country FE	Yes	Yes
Observations	45720	45720

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: All models include population weights (defined as $\frac{1}{n_c}$, where $n_c$is the total number of observations from that country). Dependent variable is a dichotomous variation of the main measurement for the demand for democratic accountability, where the higher and lower two points on the Likert scale are bundled into single points (0/1) to create a binary variable. Coefficients reported represent marginal effects (dy/dx)

Table 6: Models with an Alternative Dependent Variable

	2SLS	IV Probit	IV LPM
	(1)	(2)	(3)
Dependent Variable:	Reject One-Man Rule (1-4)	Reject One-Man Rule (1/0)	Reject One-Man Rule (1/0)
Instrument:	Rents	Rents	Rents
Tax	0.619***	0.443**	0.246***
	(0.111)	(0.209)	(0.039)
Controls			
Individual	Yes	Yes	Yes
Interview	Yes	Yes	Yes
Election Proximity	Yes	Yes	Yes
Survey Round	Yes	Yes	Yes
Linear Time Trend	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Observations	44490	40746	40746
Robust standard errors in parentheses			
*** p<0.01, ** p<0.05, *p<0.1			

Notes: All models include population weights (defined as $\frac{1}{n_c}$, where $n_c$is the total number of observations from that country). First-stage results as in Table 3. Coefficients reported in (2) and (3) represent marginal effects (dy/dx).

Table 7: Rents, Taxes and Elections

	OLS
Dependent Variable:	Tax
Rents	-0.03883***
	(0.0054)
Election Proximity	-0.00203**
	(0.0009)
Rents*Election Proximity	-(0.00022)*
	(0.0001)
Controls	
Individual	Yes
Interview	Yes
Survey Round	Yes
Linear Time Trend	Yes
Country FE	Yes
Observations	46968
R-squared	0.065

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Notes: Model includes population weights (defined as $\frac{1}{n_c}$, where $n_c$is the total number of observations from that country).

Figure 1: Taxes and Natural Resources in sub-Saharan Africa, 1960 - 2009

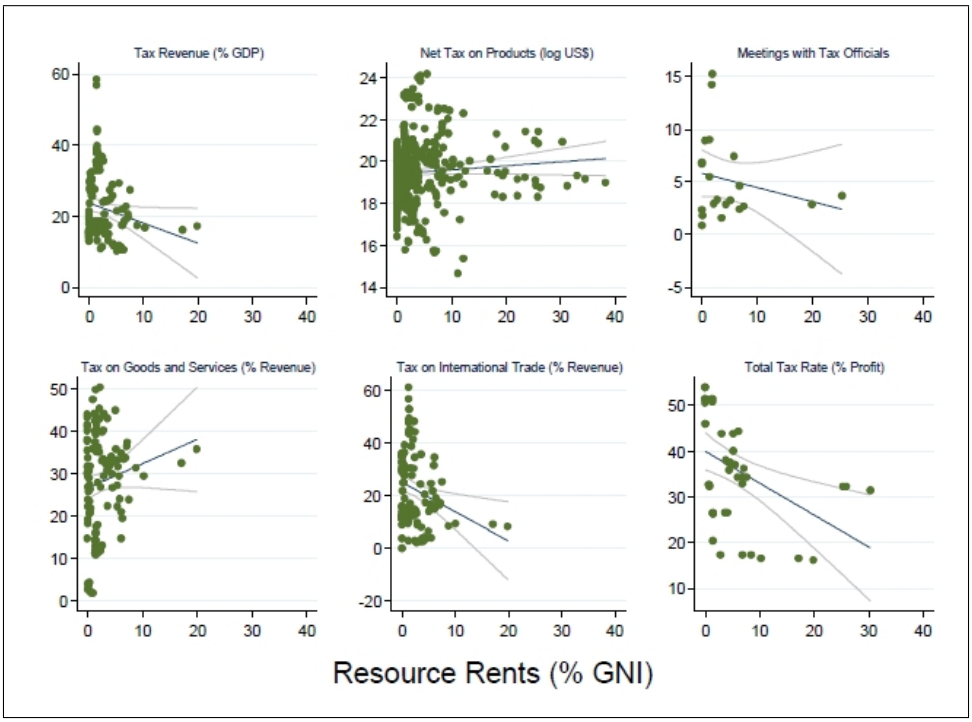

Figure 2: Taxes and Natural Resources in Sample Countries, 1960 - 2009.

Appendix A: Macro Tax Variable Definitions (Source: World Bank)

Tax Revenue Tax revenue refers to compulsory transfers to the central government for public purposes. Certain compulsory transfers such as fines, penalties, and most social security contributions are excluded. Refunds and corrections of erroneously collected tax revenue are treated as negative revenue.

Net Tax on Products Net taxes on products (net indirect taxes) are the sum of product taxes less subsidies. Product taxes are those taxes payable by producers that relate to the production, sale, purchase or use of the goods and services. Subsidies are grants on the current account made by general government to private enterprises and unincorporated public enterprises. The grants may take the form of payments to ensure a guaranteed price or to enable maintenance of prices of goods and services below costs of production, and other forms of assistance to producers. Data are in current U.S. dollars.

Meetings with Tax Officials These figures show the average number of days firms spent in inspections and mandatory meetings with tax officials in the last two years.

Tax on Goods and Services Taxes on goods and services include general sales and turnover or value added taxes, selective excises on goods, selective taxes on services, taxes on the use of goods or property, taxes on extraction and production of minerals, and profits of fiscal monopolies.

Taxes on International Trade Taxes on international trade include import duties, export duties, profits of export or import monopolies, exchange profits, and exchange taxes.

Total Tax Rate Total tax rate is the total amount of taxes payable by businesses (except for labour taxes) after accounting for deductions and exemptions as a percentage of profit.

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