Political foundations of the resource curse: an alternative formulation[*]

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Abstract

In this note we show how a considerably simpler model than the one in our original JDE 2006 paper generates all the same results. We also discuss the utility function in our previous paper. We show that a more reasonable formulation of the utility function in that paper will result in a violation of the second order conditions for the maximization problem.

1 Introduction

In the present paper we allow all real wages to be exogenous, which gives us a much simpler model than in our original paper at the same time that all results and main intuitions remians valid. Also towards the end we show that with an alternative and more consistent utility function than the one we applied in the original paper, the second order conditions for a maximum in that paper are violated.

Section 2 presents the formal model and derives its main implications, before Section 3 discuss the utility function of the politician in the original 2006 contribution. Some of the calculations are delegated to the Appendix.

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2   The Formal Model - A Simpler Version

Our model features an incumbent politician wishing to be re-elected, an alternative politician and a unit mass of voters. There are two periods with an election occurring at the end of the first period where the incumbent is challenged by the alternative politician. We assume that all agents have linear utility, are purely self-interested, and hence maximize their expected consumption. There is a stock of a non-renewable natural resource and all income from natural resources accrues directly to the government. Though this is not always the case, most of the literature on the resource curse emphasizes that a major issue is that it is the government that owns the resource. For instance, Australian development in the 19th century was not adversely influenced by the dominance of gold because gold mines were privately owned. However, we show that even in the case where all resource rents accrue to the government, resources may or may not be a curse, allowing us to capture Botswana and Venezuela within the same framework.

The incumbent must decide how much of the resources to extract in the first period and consequently how much will be left for the future. The more he extracts today, the less there is for the future. Nevertheless, realistically, the sum of resources depends on the extraction path. If the resource is extracted too fast today, this reduces the total stock that can be extracted. Resource income can be used in either of two ways; the incumbent can 'consume' the income or he can distribute it as patronage to influence the outcome of the election. After the election whichever politician wins takes power and consumes the remaining resource rents. For simplicity we assume that the government has no other sources of income apart from resource rents (i.e. to taxes).

We model patronage as the offer of employment in the public sector and we assume that the probability that the incumbent wins the election is an increasing function of the amount of public sector employment. Thus to increase the chance of remaining in power, the incumbent can hire more employees - more clients - though this is costly since it requires resources that otherwise the incumbent could have used for himself. Essentially we assume that when an individual works for the government, this increases the probability that they will vote for the incumbent. This probability may not be one

because clients may be able to cheat - take employment and vote for some other politician. An individual who receives a job offer from the incumbent will accept it because public sector jobs pay more than private sector jobs. In our 2006 paper we showed one possible microfoundation for such a relationship between public empolyment and voting, and in Appendix 1 we provide a possible microfoundation for such a relationship under autocratic regimes.

The prices of the natural resource in the two periods are p_1 in period 1 and p_2 in period 2 which we assume is determined on world markets and taken as given by the country under consideration. The resource curse is normally understood as the effect of resource abundance rather than the result of short time price fluctuations. Thus our main interest is to study permanent resource booms, which we define as increased prices in both periods (this can also be interpreted as a resource discovery). But for completeness we shall also vary the price path to investigate the implications of temporary and future anticipated resource booms. The physical quantity of the resource extracted in the first period is denoted e. In the period after the election there is $R(e)$ left of the resource. We assume that R is a strictly decreasing and strictly concave function with $R' < 0$ and $R'' < 0$, where the primes denote first and second derivatives, respectively. These assumptions mean that the more resources are extracted in the first period, the less is left for the second period. Moreover, the assumption about the second derivative captures the idea that the total amount of resources that can be extracted depends on the time path of extraction. If too much is taken out today, the total stock over the two periods falls.

To influence the outcome of the election, the incumbent politician engages in clientelism and offers to employ voters in the public sector. We assume that voters that get such deals stay employed in the public sector for both periods. The re-election probability, denoted Π, is thus higher the more of the voters the incumbent employs in the public sector. Formally, we assume that Π is a strictly increasing function of G, $\Pi = \Pi(G)$ where $\Pi' > 0$, and where G is the number of voters employed in the public sector.[1] Hence $1 - G$ voters

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[1]In the main text we interpret the probability of the incumbent being in power next period as the probability of reelection. However, as we show in Appendix 1, a similar function is also likely to hold for other regimes than those with free elections. Dictatorships also need support and to gain it they use the same types of clientelistic policies that

remain in the private sector. Private sector individuals have productivity H, while public sector workers have a lower productivity which we normalize to zero. Clearly, employing people in the public sector to influence their voting behavior will be socially inefficient because their productivity is lower than it would be in the private sector. Public sector workers receive a wage W. We assume here that $W > H$, so that a worker is better off if offered a job in the public sector. The incumbent decides policy before the election; resource extraction e and public sector employment G.

Policy (e, G) is chosen by the incumbent so as to maximize his own (expected) consumption over the two periods:

$$\max_{e,G} \ p_1 e - WG + \Pi(G)[p_2 R(e) - WG] \tag{1}$$

The first term in (1), $p_1 e - WG$ is the consumption of the incumbent politician before the election which consists of income from resources minus the wage bill of public sector workers. The second term, $\Pi(G)[p_2 R(e) - WG]$ is the expected future utility. With probability $\Pi(G)$ the incumbent wins the election and this is larger the greater is G. If re-elected the incumbent has resource income $p_2 R(e)$ and consumes this minus wage payments to public sector workers. With probability $1 - \Pi(G)$ the incumbent loses power and in this case his payoff is zero.

Differentiating with respect to e and G, respectively, the two first order conditions for this problem are

$$p_1 + \Pi(G) \ p_2 R'(e) = 0 \tag{2}$$

$$-[1 + \Pi(G)]W + \Pi'[p_2 R(e) - WG] = 0 \tag{3}$$

The first condition, (2), says that the marginal benefit of extracting the resource today, which is simply the amount of consumption that a unit of the resource would generate - i.e. p_1, should be equated to the expected marginal cost of extracting today. The cost of extracting today is that there is less left for tomorrow. The marginal benefit of having more tomorrow is $p_2 R'(e)$, but in (2) this is multiplied by the re-election probability $\Pi(G)$ because the incumbent only gets the benefit tomorrow with this probability. Equation (3) relates the marginal cost of public sector employment, $-[1 + \Pi(G)]W$, which

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democrats do. Indeed, most neo-patrimonial regimes in Africa have not been democratic.

is simply the increase in the wage bill, to the expected marginal benefit. The benefit is that higher public sector employment increases the re-election probability, $\Pi' > 0$ and re-election brings the benefit $p_2 R(e) - WG$, i.e. future resource rents minus the public sector wage bill.

These two-first order-conditions generate an straightforward but important result. Denote the socially optimal extraction of resources in the first period e^e. We then have our first proposition.

Proposition 1 *Resources are inefficiently over-extracted so that $e > e^e$.*

To see this, first note that the socially optimal extraction of resources in the first period solves

$$e^e = \arg \max_e \ \{p_1 e + p_2 R(e)\}.$$

and thus is the solution to the first-order condition,

$$p_1 + p_2 R'(e^e) = 0 \tag{4}$$

e^e is simply the value of first-period extraction which maximizes the total value of the resources extracted over the two periods.

Comparing (2) with (4), since $\Pi < 1$ it is immediate that $e > e^e$. Inefficiency here arises from the fact that the incumbent politician discounts the future stock of resources by the probability he wins power. Compared to the socially efficient extraction path a politician when in power over-extracts resources.

To find how extraction and public sector employment depend one the price path (p_1, p_2) of the resource, we write the two first order conditions in differential form:

$$\Pi \ p_2 R'' de + \Pi' \ p_2 R' dG = -dp_1 - \Pi(G) R' \ dp_2 \tag{5}$$

$$p_2 \Pi' R' de - 2W \Pi' dG = -\Pi' R \ dp_2 \tag{6}$$

where we have for simplicity assumed that the effect of public employment on the re-election probability is linear so that $\Pi'' = 0$. The second order conditions for the maximization problem are fulfilled provided the determinant is positive, i.e. $D_1 \equiv -2W \Pi \Pi' R'' - p_2 (\Pi')^2 (R')^2 > 0$, which we assume is the case.

Proposition 2 (the proof of which and all remaining propositions is in Appendix 2) shows that the political incentives of changes in resource prices are absolutely key to understanding their implications for the extraction path and social efficiency and they depend on whether the resource boom is permanent, transitory, or anticipated.

Proposition 2 *i) A permanent resource boom (ie. such that $dp_1/p_1 = dp_2/p_2 = dp/p$) reduces resource extraction and increases the efficiency of the extraction path.*

ii) A temporary resource boom (ie. $dp_1 > 0$ and $dp_2 = 0$) increases resource extraction and decreases the efficiency of the extraction path when $R'''(e) \geq 0$.

iii) A anticipated future resource boom (ie. $dp_1 = 0$ and $dp_2 > 0$) reduces resource extraction and increases the efficiency of the extraction path when $R'''(e) \geq 0$.

With a permanent resource boom the efficient extraction path is unaltered, at least in the reasonable case where the ratio of p_1 to p_2 is unchanged. This is evident from (4). Yet as the resource price increases, the benefit of being in power to the incumbent increases and thus the incentive to extract resources efficiently. The reason that a permanent resource boom increases the efficiency of the extraction path is that it makes it more valuable to be in power in the future. This induces the incumbent to expand the public sector and this increases $\Pi(G)$. When $\Pi(G)$ increases, the incumbent discounts the future less and moves the extraction path closer to that which would be socially optimal.

A similar result emerges with an anticipated future resource boom (when we for simplicity assume that $R'''(e) \geq 0$). In this case the efficient response is to reduce the extraction rate. The reduction in the extraction rate by the politician exceeds that of the optimal response. Thus, as the extraction rate is too high in the first place, also in this case the extraction path moves closer to that which is socially optimal.

In the case of a temporary resource boom the socially optimal response is to increase the extraction rate. Resources have become more valuable in the present than in the future, thus more should be extracted in the present and

less in the future. If the resource boom is only temporary, the efficiency of the extraction path does in fact decrease. The reason is that the equilibrium extraction rises more than the efficient change in the extraction rate.

Resource booms, if not viewed as being only temporary, thus may not represent a problem for the efficiency in the resource sector itself. The problem is the effect on the rest of the economy: our next result demonstrates this point.

Proposition 3 *i) A permanent resource boom (ie. such that $dp_1/p_1 = dp_2/p_2 = dp/p$) increases public sector employment and decreases private sector employment.*

ii) A temporary resource boom (ie. $dp_1 > 0$ and $dp_2 = 0$) decreases public sector employment and increases private sector employment.

iii) A anticipated future resource boom (ie. $dp_1 = 0$ and $dp_2 > 0$) increases public sector employment and decreases private sector employment.

Since a long lasting or an anticipated resource boom increases the rents from being in power, the incumbent politician has an incentive to influence the votes of more people by employing them in the public sector. Although this is good for the clients that receive jobs and the incumbent who is more likely to be re-elected, these deals decrease the efficiency of the economy by transferring labor from the relatively high productivity private sector to the low productivity public sector. A positive side effect, however, is that, as we noted in Proposition 2, the increased probability of re-election induces the incumbent to value the future stock of resources higher, which increases the efficiency of resource extraction.

When we consider a temporary resource boom more resources are extracted in the period when the price is high. Since less resources are left for the second period, the value of remaining in power decreases, and the incumbent politician has less incentive to influence the votes of people by employing them in the public sector. In turn this decreases the probability of re-election, and the incumbent values the future stock of resources even less than in the first place. As the valuation of future resources has decreased, the efficiency of the extraction path has become worse. Thus, for the efficiency in the economy as a whole, the extraction path effect and the labor

allocation effect pull in opposite directions. With more misallocation of labor the efficiency of the extraction path increases, while with less misallocation of labor the efficiency of the extraction path decreases. This leads to our final proposition.

Proposition 4 *A resource boom increases total income if institutions are strong but decreases it if institutions are weak.*

As the proof of the proposition in the appendix shows (see equation (17)) income is more likely to go down with a resource boom the more the incumbent can affect the reelection probability by hiring public sector workers. In regimes where it is not possible to affect the reelection probability by hiring clients of the incumbent in the public sector, $\Pi' = 0$, and the last two terms disappear. In regimes of this type, therefore, resource booms have a positive effect on income. In other types of regimes, with rich opportunities to bribe people into voting for the incumbent through public employment, a resource boom is more likely to lower total income. Thus, the effect on income from a resource boom may be of opposite sign in regimes with high and low institutional quality, or what we have called weak or strong institutions.

It is useful here to discuss what sort of microfoundations would be consistent with our model of clientelism. Why does an offer of employment influence an individual's voting behavior? The traditional political science literature is somewhat vague on this. If voting behavior is observable, as for example Sartori (1994, p. 18) claims it was in Italy under the pre-1992 electoral rules, then public sector employment may be attractive because it is a form of benefit that can be targeted to a specific individual. Moreover, it can be taken away if the voter/client does not fulfill his part of the bargain. With observable voting politicians know if the client fulfilled his part of the bargain. On the other hand, for this mechanism to work, it must also be the case that other politicians (who compete with incumbents) do not want, or are not able, to offset these incentives by offering such a person continued employment if they fail to support their incumbent patron. Intrinsic then to clientelism appears to be that a patron is able to offer to his client something that no other political agent can offer. There is an essential asymmetry about the situation. Once this is true the question of whether or not voting

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behavior is observable becomes irrelevant because clients will sincerely prefer that their patron succeed in an election - since only one patron can offer them employment or favors - and will consequently be willing to vote for him.

Where does this asymmetry come from? The most plausible idea is that individuals are already matched into groups or selected into social networks and patrons tend to make offers to individuals from their own group or network. In this context Turner and Young (1985, p. 158) note

> "Formation of a patron-client relationship is based not only on reciprocal advantage, but on some principle of affinity which supplies a social logic to the network. Kinship and ethnic affinity are the most frequent bases for network formation."

A natural idea is that this allows patrons to credibly offer to clients from within their group things that people from outside the group could not offer. This might be because individuals within a group partially internalize the welfare of other members of the group (a sort of altruism), or because group members interact with each other more frequently than they do with individual outside the group and this allows them to cooperate better and use intertemporal sanctions to solve problems of commitment.

For our purposes the key point is that politicians are able to gain the support of voter/clients by exchanging favors for support. This is valuable because it increases the probability of re-election, but it also costs money because government employees have to be paid and it has further 'opportunity costs' since if an individual works for the government they do not work for the private sector and we assume that private sector employment is more productive.

Why does clientelistic exchange between members of a group would take the form of employment in the public sector? For example, why would a patron not simply give money to a client? Although belonging to the same group aids problems of commitment, some things are more credible than others. For example, Robinson and Verdier (2002) show that while promises to give income in exchange for votes to members of ones own group may not be credible, offers of employment may be. Politicians may be able to transfer rents by employing individuals when there is moral hazard in the

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employment relationship since then it is optimal ex post for politicians to concede rents to public sector workers. Alternatively it could be the case that employment can be decided in advance of an election and is costly to reverse. The fact that only an incumbent can determine employment in advance induces a type of incumbency bias which also seems to be recognized as a key part of clientelism. Alternative approaches are due to Coate and Morris (1995) whose theory implies that patronage takes the form of public sector employment because this is less obviously redistribution than transfers of money (see Alesina, Baqir and Easterly, 2000, for evidence). Finally, it could also be, as argued by Acemoglu and Robinson (2001), that inefficient redistribution, here public sector employment, is a way of maintaining the coherence of a group and thus their future political power.

3 An alternative utility function in the 2006 version

In the 2006 paper equation (9) giving the utility function of the incumbent contains a last term showing the utility of the incumbent in case he should fail to win the next election. Rather than the term $(1 - \Pi(G_1))\alpha\frac{1}{2}(-F + H)$ it is more reasonable to let this term be $(1 - \Pi(G_1))\alpha(-G_1 F + \frac{1}{2}H)$ since the cost of firing F only applies to those that are employed in the public sector in the first period. However then Ψ_2 in the 2006 version becomes $2\Pi_G(F - H) > 0$, which violates the second order conditions.

4 Conclusion

A considerably simpler model is prefereable to our 2006 paper as all the same conclusions hold and the utility function in the 2006 version is unreasonable.

5 Appendix 1

Many resource abundant countries are not democracies with elections as modelled in the main text. In this appendix we provide microfoundations for the model under autocracies and dictatorships where political leaders are not cho-

sen in democratic ways. According to Bueno de Mesquita, Smith, Siverson and Morrow (2003, p. 19) autocrats "are not likely to survive the elimination of patronage or the corrupt benefits of cronyism. For autocrats what appears to be bad policy often is good politics". And (p. 28) "Make no mistake about it, no leader rules alone. Even the most oppressive dictators cannot survive the loss of support among their core constituents". Furthermore (p. 59): "To depose an incumbent, a challenger needs to convince a sufficient number of members of the winning coalition to defect him. On the surface this appears to be a relatively easy task. All the challenger has to do is to promise these members of the existing coalition more rewards than they currently receive. Unfortunately for the challenger, such a promise lacks long-term credibility". We show that taking these insights into account in a straighforward way produces a survival probability for a dictator which has the same properties as the relection function $\Pi(G)$ in the model under democracy.

As in Bueno de Mesquita, Smith, Siverson and Morrow (2003) we assume that for a dictator to survive politically he must capture the support of what they term the winning coalition - a critical mass of people smaller than under democratic elections. We denote this winning coalition C, and thus in our setting $C < \frac{1}{2}$. The dictator now has to choose public employment taking into account that he survives politically with a probability that we term Q.

Each citizen i has an ideological bias σ^i toward the dictator. We assume that σ^i is uniformly distributed at the interval $[-\frac{1}{2s}, \frac{1}{2s}]$ with density $s > 0$. Thus some citizens (those with $\sigma^i > 0$) are ideological supporters of the dictator while others are ideological supporters of the opposition. The overall popularity of the dictator may also be affected by other events than his economic policy and citizens ideology. To capture this we use a random popularity shock θ in favor of the dictator, which is uniformly distributed at the interval $[-\frac{1}{2h}, \frac{1}{2h}]$ with density $h > 0$.

For those hired in the public sector by the dictator in the first period there is an economic net gain of $W - H$ if the dictator survives. Therefore a citizen i that is employed in the public sector supports the dictator if

$$W - H + \sigma^i + \theta > 0 \tag{7}$$

Likewise, a citizen employed in the public sector supports the dictator if $\sigma^i + \theta > 0$. Thus among the public employees those with $\sigma^i > -W + H - \theta$

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support the dictator, while among private sector employees those with $\sigma^i > -\theta$ support the dictator. Denote by N_G the former and by N_P the latter. Then

$$N_G = G \int_{-W+H-\theta}^{\frac{1}{2s}} sdi = G \left(\frac{1}{2} + s(\theta + W - H) \right) \qquad (8)$$

$$N_P = (1-G) \int_{-\theta}^{\frac{1}{2s}} sdi = (1-G) \left(\frac{1}{2} + s\theta \right) \qquad (9)$$

The survival probability Q of the dictator is then the probability that he captures the winning coalition C:

$$Q = \Pr \{ N_G + N_P \geq C \}$$

It is equivalent to

$$Q = \Pr \left\{ \theta \geq - \left(\frac{1}{2} - C \right) \frac{1}{s} - (W-H)G \right\} \qquad (10)$$

which can be simplified to

$$Q = \int_{-\left(\frac{1}{2}-C\right)\frac{1}{s}-(W-H)G}^{\frac{1}{2h}} sdi = \frac{1}{2} + \left(\frac{1}{2} - C \right) \frac{h}{s} + h(W-H)G \equiv Q(G) \quad (11)$$

The more heterogeneous a population is ideologically, that is the lower is s, the more likely that a dictator survives. An ideologically heterogenous population increases the number of 'core supporters' for both the dictator and the challenger. However, as long as the winning coalition under dictatorship is less than under democracy (where it is $\frac{1}{2}$), this is an advantage for the incumbent dictator.

Most important for our purpose, however, note that $\Pi' = h(W-H) > 0$; i.e. the dictators' survival probability is increasing in public employment. Furthermore note that $Q'' = 0$.

6 Appendix 2

We now provide complete proofs of the results in the text. In the proofs we use symbols for the model version in the main text where the reelection probability of the incumbent is given by $\Pi(G)$, and where $\Pi' > 0$ while

$\Pi'' = 0$. Note, however, that all the propositions we derive is also valid under dictatorship, as the survival probability of a dictator calculated in Appendix 1 $Q(G)$ also has $Q' > 0$ and $Q'' = 0$.

Proof of Proposition 2:

i) For a permanent resource boom (ie. such that $dp_1/p_1 = dp_2/p_2 = dp/p$) it follows from (5) and (6) that

$$\frac{de}{dp/p} = \frac{R(\Pi')^2 R'}{D_1} p_2 < 0 \tag{12}$$

As well it is easy to see from (4) that

$$\frac{de^e}{dp/p} = 0$$

Since $e > e^e$, a permanent resource boom increases the efficiency of the extraction path.

ii) From (5) and (6) we find

$$\frac{de}{dp_1} = \frac{2W\Pi'}{D_1 p_2} > 0$$

Now differentiation of (4) provides

$$\frac{de^e}{dp_1} = -\frac{1}{R''(e^e)p_2}$$

Substitution of the expression for D_1 gives also:

$$\frac{de}{dp_1} = \frac{1}{-R''\Pi p_2 - \frac{(p_2\Pi' R')^2}{2W\Pi'}} > -\frac{1}{R''(e)p_2}$$

hence

$$\frac{de}{dp_1} - \frac{de^e}{dp_1} > \frac{1}{R''(e^e)p_2} - \frac{1}{R''(e)p_2} = \frac{R''(e) - R''(e^e)}{p_2 R''(e)R''(e^e)}$$

Since $e > e^e$, it follows that that a sufficient (but not necessary) condition for overextraction $e - e^e$ to increase with p_1 is that $R'''(e) \geq 0$.

iii) From (5) and (6) we find

$$\frac{de}{dp_2} = \frac{2W\Pi\Pi' R' + (\Pi')^2 RR' p_2}{D_1 p_2} < 0$$

Now differentiation of (4) provides

$$\frac{de^e}{dp_2} = -\frac{R'(e^e)}{R''(e^e)p_2} < 0$$

Again after substitution of D_1, and rearrangement of terms, we get :

$$\frac{de}{dp_2} = \frac{R'}{-R''p_2} \frac{2W\Pi\Pi' + (\Pi')^2 R p_2}{2W\Pi\Pi' + \frac{(\Pi' R')^2 p_2}{R''}} < -\frac{R'(e)}{R''(e)p_2}$$

Use of (4), (5) and (6) also demonstrates that:

$$\frac{de^e}{dp_2} = \frac{p_1}{R''(e^e)p_2^2} \text{ and } \frac{de}{dp_2} < \frac{p_1}{R''(e)p_2^2}$$

hence

$$\frac{de}{dp_2} - \frac{de^e}{dp_2} < \frac{p_1}{p_2^2} \frac{R''(e^e) - R''(e)}{p_2 R''(e) R''(e^e)}$$

Since $e > e^e$, it follows that a sufficient (but not necessary) condition for overextraction $e - e^e$ to decrease with p_2 is that $R'''(e) \geq 0$.

Proof of Proposition 3:

From (5) and (6) we find easily that for the three cases i) , ii) and iii) that

$$\frac{dG}{dp/p} = -\frac{\Pi\Pi' R R''}{D_1} p_2 > 0 \tag{13}$$

$$\frac{dG}{dp_1} = \frac{\Pi' R'}{D_1} < 0 \tag{14}$$

$$\frac{dG}{dp_2} = \frac{\Pi\Pi' [(R')^2 - R R'']}{D_1} > 0 \tag{15}$$

Since private sector employment equals $1 - G$ the proposition follows.

Proof of Proposition 4:

Consider for simplicity the case of a permanent resource boom (ie. $dp_1/p_1 = dp_2/p_2 = dp/p$) (it is easily to check that the same type of ambiguity persists for a temporary present or future boom). The total (net present value of) income Y in the economy if the incumbent remains in power equals production plus resource rents,

$$Y = 2(1 - G)H + p_1 e + p_2 R(e).$$

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By differentiating with respect to p the effect on total income from a resource boom is given by

$$\frac{dY}{dp/p} = p_1 e + p_2 R + (p_1 + p_2 R')\frac{de}{dp/p} - 2H\frac{dG}{dp/p} \qquad (16)$$

A resource boom has three effects on income. First, the increased proportional value of the resource has the direct effect of increasing income (the term $p_1 e + p_2 R$). Second, a resource boom increases income as the efficiency of the extraction path increases (the term $(p_1 + p_2 R')\frac{de}{dp/p}$ which is positive since $p_2 R' = -\frac{p_1}{\Pi} < -p_1$ and $\frac{de}{dp/p} < 0$). Third, as shown by the last term in (16), a resource boom transfers labor from the private to the less productive public sector, pulling in the direction of decreased income.

By inserting from (12) and (13) in (16) one finds after some calculation that

$$sign\frac{dY}{dp/p} = sign\left[2R''\left(-eW - \frac{p_2}{p_1}(W-H)R\right) - \frac{\Pi'}{\Pi}\left(ep_2(R')^2 - p_2 RR'\right)\right] \qquad (17)$$

Here the two first terms on the right hand side are positive while the two last terms are negative (recall that $R' < 0$). It is in general not possible to sign the expression. Note however that there exists a critical value of Π', denoted $\widetilde{\Pi}'$ such that when $\Pi' < \widetilde{\Pi}'$, $\frac{dY}{dp/p} > 0$ while when $\Pi' > \widetilde{\Pi}'$, $\frac{dY}{dp/p} < 0$. The magnitude of the derivative of Π captures in a nice way the impact of institutions on clientelism. When Π' is small it implies that electoral outcomes are not very responsive to public sector employment. This would happen when employment does not guarantee that citizens support the client. This might be because employment must be based on non-political criteria, or because politicians have become accountable to voters, and not the other way round. It could also be because of changes in electoral institutions which limit the ability of politicians to monitor employees voting behavior. We associate the case $\Pi' < \widetilde{\Pi}'$ with strong institutions and limit the effectiveness of clientelism, while $\Pi' > \widetilde{\Pi}'$ captures weak institutions that encourage clientelism since it is relatively effective. Hence the proposition follows.

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