On the Looting of Nations*

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Abstract

We develop a dynamic discrete choice model of a self-interested and unchecked ruler making decisions regarding the development of a resource rich country. Resource wealth serves as collateral and facilitates the acquisition of loans. The ruler makes the recursive choice of either staying in power to live off the productivity of the country while facing the risk of being ousted, or looting the country's riches by liquefying the natural assets through external lending. We show in a simple model of looting that 1) unstructured lending from international credit markets can enhance the autocrat's incentives to loot the country's resource wealth; and then demonstrate that 2) an enhanced likelihood of looting within an economy reduces tenures (greater political instability), increases indebtedness, reduces investment, and diminishes growth potential. We test these predictions with the data and find strong empirical evidence that instability caused by unsound lending to unchecked rulers of resource rich countries may result in a negative shock to economic growth.

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"Countries don't go out of business.... The infrastructure doesn't go away, the productivity of the people doesn't go away, the natural resources don't go away. And so their assets always exceed their liabilities, which is the technical reason for bankruptcy. And that's very different from a company." Walter Wriston (Citicorp Chairman, 1970-1984)

1 Introduction

An extensive literature documents that resource wealth can be a curse rather than a blessing for many countries (Sachs and Warner, 1995). There are at least three different explanations for this so-called resource curse. Reduced growth in resource-rich countries has been associated with (i) increased indebtedness (Manzano and Rigobon, 2001), (ii) domestic conflict and political instability (Collier and Hoeffler, 2004), and with (iii) autocratic regimes and poor institutions (Ross, 2001; Isham et al., 2004). Clearly there are political and institutional dimensions to resource-related development problems that need to be unraveled.

This paper contributes to that ambitious objective, by combining institutional and economic factors in modeling resource-rich economies. It commences from the observation that many resource-rich countries hold these resources as national assets (rather than under systems of private property rights) and thus present a situation where the ruling party or person finds itself immediately endowed with substantial rights in the state's resource wealth upon taking political control. Where such control is relatively unchecked, this presents the new rulers of such states with an immediate decision regarding the exploitation of its new political position. Should political control be converted into immediately available wealth, or should it be retained to generate some other positive payoffs for the leadership in the future? This is akin to the voluntary liquidation - or "looting" - option first modeled by Akerlof and Romer (1994) and discussed in the context of African economies by Bates (2008).

Autocratic leaders who stay and invest in the development of such countries must first make the decision not to engage in immediate looting. When the incentives to stay and invest are inadequate, centralised autocratic regimes translate control into little other than a series of looting incidents. Thus it is the incentives for looting (rather than investing) that turn resource-richness into economic disaster. States evidencing long-standing looting behaviour include countries such as Nigeria or the Democratic Republic of Congo (DRC), in which the disastrous economic and political performance can be easily traced to the ongoing predatory behavior of a series of autocratic regimes. Many economic and political studies list examples of such resource-inspired looting-type behaviour (e.g. Jayachandran and Kremer, 2006; Bates, 2008).

We are not the first to point to the importance of institutions in the explanation of the resource curse. There is plenty of evidence suggesting that institutional quality is one of the main drivers of economic development in general (Acemoglu et al. 2001; Rodrik et al., 2004), and it has been argued that the fates of resource-rich economies in particular are influenced by the quality of their institutions (Robinson et al., 2006; Mehlum et al., 2005). Our point is more specific. We argue that it can be a particular sort of interaction between domestic institutional weaknesses (centralised governance and unchecked autocratic decision making) and international institutional weaknesses (unstructured lending conditions) that might explain looting behaviour and provide a better understanding of the resource curse. Specifically we demonstrate here that there is one set of institutional failures that can combine to create irresistible incentives for the looting of nations. These are: a) the existence of relatively undeveloped domestic democratic institutions (an absence of checks on the current ruler); b) the presence of nationally held resource rights (centralised economies); and c) the availability of relatively unstructured international lending by banks to such rulers (unconditional conferment of liquidity).

As indicated above, the international capital market plays a crucial role in our story. We wish to examine in particular how excessive resource-based lending by external financial institutions can induce default, departure and debt in developing countries. This sort of moral hazard in the financial markets leading to excessive lending to sovereigns has been previously noted (Bulow, 2002).[1] A casual look at the data confirms some basic findings highlighted in the literature. Figure 1 shows the evolution of average lending and resource rents between 1970 and 2000. The lending curve mirrors the resource rents curve. This supports earlier claims that international financial markets lend money during commodity "booms" and restrict liquidity during "busts". The evolution of these two indicators is indicative of the "boom-based borrowing capacity" highlighted by Usui (1997), and Manzano and Rigobon (2001). We also are not the first to highlight the roles of international lending and indebtedness in reduced growth. Manzano and Rigobon (2001) find that the resource curse vanishes when controlling for indebtedness. Their argument is that large credit offered on resource-based collateral in periods of commodity boom resulted in substantial debt overhang when commodity prices fell in the 1980's.[2]

We agree with their analysis, and develop ours to elaborate and expound upon the mechanisms by which resource-based lending goes bad. The most fundamental cause of this problem is moral hazard: the international financial institutions perceive no downside risk to lending on the basis of resource-based collateral. This is because lenders see little reason to exercise restraint in lending to resource-rich states, since the resources (and liabilities) remain behind even when the regime changes (see introductory quote above) (Bulow, 2002). This means that lenders have little reason to be concerned about the incentives their loans generate. According to Raffer and Singer (2001 p. 161), the policy of "liberal lending by commercial banks opened a bonanza for corrupt regimes. After amassing huge debts and filling their pockets, military juntas (...) simply handed power and the debt problem over to civilians." We demonstrate in our model precisely how such unstructured lending generates the incentives for the combined events of debt and departure, instability and indebtedness.

[1] The existence of "excessive resource-based lending" is reinforced by the observation that 12 of the world's most mineral-dependent countries and six of the world most oil-dependent countries are currently classified as highly indebted poor countries (Weinthal and Luong, 2006).

[2] In the 1970s and early 1980s international banks (such as Citicorp and Chase Manhattan) lent vast amounts of money to developing nations based on their natural resources endowment, virtually irrespective of their long-run ability to repay such debts (Sampson, 1982). It is now seen that the boom in resource prices in the 1970s increased the value of *in situ* resources, aiding the ability of resource-rich economies to attract foreign loans and run up debts. The absence of productive investment by these resource-rich nations meant that there was significant indebtedness with little demonstratively positive impact upon growth.

In sum, we develop a model of a resource-rich economy governed by a self-interested ruler with unchecked property rights in national resources who cares only about his own consumption. The crucial and discrete choice made by the ruler is whether to stay and invest, or to exit and loot. In spirit, the model is close to Overland et al. (2005) who explore what determines a dictator to initiate growth or "plunder his country" when he faces a potentially insecure tenure. However, our model differs because our focus is on the role of financial markets in liquefying sunk capital, especially in regard to natural resources. To the extent that external finance facilitates the conversion of sunk capital into liquid capital—enabling the leader to make immediate access to wealth that usually requires time and investment—it affects the tradeoff between staying (re-investing in the economy and consuming by maintaining control) or looting (taking the extant liquidity and exiting). This combination of resource wealth and excessive external lending gives rise over time to endogenous political instability, lack of investment and indebtedness.

Our main results are as follows. We first demonstrate in a simple model how a dictator taking control of a nation's resources might decide between three distinctly different paths: (1) immediate looting of the country's resource wealth; (2) transitory investment in the country's capital base to build up additional liquidity for looting in the medium term; or (3) long term investment in the economy (and possibly in shared consumption or political repression) in an attempt to secure tenure and to consume from the economy. Second, we demonstrate the main factors affecting the dictator's choice between these various paths, being: a) the level of external finance available for liquefying resource wealth; b) the indebtedness of the economy; and finally c) the productivity of investments within the economy. After modelling the dictator's problem, we provide simulations of the path of such an economy over time which, under specific conditions (low productivity and high liquidity), is one of recurrent looting—resulting in political instability, low growth and substantial indebtedness. We demonstrate that the same autocrats (with lower liquidity or higher security) will pursue a path of optimal investment and high growth—acting more as an owner and less as a looter of the economy. Finally, we provide empirical evidence that corroborates the predictions from our theoretical framework. We find that greater lending to sufficiently resource-rich countries is associated with enhanced likelihood of looting, which in turn is negatively associated with economic growth. Indeed, the effect of one standard deviation increase in lending results in an expected decrease in economic growth ranging from 0.47 to 0.72 percentage points. This finding suggests that the model points to a channel through which the resource curse may arise.

The paper is organized as follows. In section 2, we present a stylized model of the looting of a resource-rich nation with an unchecked ruler who has access to foreign lending. In section 3, we simulate the choices of a series of such autocrats over time, and demonstrate the economic outcomes for the nation over a significant range of parameters. In section 4, we initiate our empirical analysis of resource-rich states, outlining our empirical strategy and introducing our data. In section 5, we present regression results—looking at the relationship in these states between: a) lending and looting; and b) political instability and economic growth. Section 6 concludes.

2 A model of looting

Here we develop a model based on Akerlof and Romer (1994) in which we investigate the effects of natural resource abundance, poor governance and unsound lending on political stability and ultimately on economic performance. Poor governance is present in the form of an unchecked ruler with implicit property rights in the resources of the state. We are interested in how such an autocrat will elect to achieve a payout on these property rights and, in particular, the impact of lending market imperfections upon the dictator's choice between staying and looting. Staying involves the dictator's commitment to acquiring a return through holding power and investing in the economy. Looting involves electing a short term "hit and run" strategy of maximum loan, minimal investment, and immediate departure. Before we examine the model, we will first define the primary actors existing within the framework.

Autocratic Resource-Rich States. The states concerned hold their fixed natural resource stocks directly as sovereign assets; there are no intermediate entities (corporations, individuals) holding rights in these resources. Once in power, the leader of the state has the unchecked authority to mine the resources or to enter into contracts on behalf of the state in regard to the natural resource assets. These natural resources are sunk assets, but are assumed to be capable of providing a constant stream of revenues into the indefinite future. Consider such an autocratic resource-rich state, a small open economy producing output y_t according to the function $y_t = f(k_t) + \varphi(Z)$, where f and φ are two increasing, concave, and continuously differentiable functions of capital k_t and Z. $\varphi(Z)$ is the flow of resource rents deriving from the state's sunk resource wealth Z. We will assume here that the flow of rents from resources remains constant throughout the program, while the productivity of the economy may be enhanced by means of investment in capital. The capital stock k_t evolves according to the transition equation $k_{t+1} = (1-\delta)k_t + i_t$, where i_t and δ represent the current gross investment and the depreciation rate. Because of the natural resource endowment, this country qualifies for loans l_t from international commercial banks at the beginning of each period so that it faces the following budget constraint: $c_t + i_t + rd_t = y_t + l_t$, where r is the interest rate paid on accumulated debt, d_t. The country's stock of debt evolves according to the following transition equation:

$$d_{t+1} = d_t + l_t$$

The interest on the debt must be paid each period for the banks to accept lending in the next period. So, the cost of servicing the debt rd_t is incurred each period that the state is not in default.

External financial institutions. Foreign financial institutions make liquidity available to the resource-rich states in recognition of the expected future flows of value from the resource base. These institutions (primarily the commercial banking sector) recognise the authority of rulers of autocratic resource-rich states to enter into contracts on behalf of the states in regard to these resources, and any contracts entered into by a ruler continue as obligations of that state beyond the individual tenure of that ruler. The commercial banking sector offers liquidity to the current leader contingent upon the state not currently being in default. The amount of liquidity is constrained by an aggregate debt ceiling proportionate to the total resources available.

We are assuming here that international lenders are relying primarily on the anticipated flows from natural resource stocks as implicit collateral for their loans. Natural resources (more specifically the so-called "point source" resources such as oil and minerals) differ from other forms of capital such as physical infrastructure, hospitals, schools or factories in that they can be more readily liquefied by means of bank lending. We capture this notion by assuming that the liquidity parameter θ_z for the natural resource is larger than for other forms of capital, θ_k, i.e. $\theta_z > \theta_k \geq 0$.

Banks recognise that adverse selection can result from price-based lending and so limit lending levels instead (Stiglitz and Weiss, 1981). Credit rationing here is limited by both the immediate and aggregate flows from the resource base available for repayment (Bulow and Rogoff, 1989). This means that, so long as the state is not in default (i.e. prior debt is serviced), the lenders are willing to provide a maximum loan amount in any given period in proportion to the total amount of longer term resources available. The first point indicates that there is a certain proportion of resource-based capital and physical capital that is liquefiable in any given period, i.e. $\theta_z Z + \theta_k k_t$ ($l_t \leq \theta_z Z + \theta_k k_t$). The second point captures the idea of a credit ceiling (Eaton and Gersovitz, 1981). We assume that the aggregate debt level is limited to the amount serviceable by the present value of the stream of liquidity derivable from all capital stocks.

$$d_{t+1} \leq \frac{(1+r)}{r} \left(\theta_z Z + \theta_k k_t\right) \tag{1}$$

The Dictator. The ruler of the state concerned is a dictator in that he has unchecked power over the resource wealth and other assets of the state for the duration of his tenure. His problem is to determine how best to appropriate maximum utility from his period of tenure over these resources. These resources are sunk, in that there is only a fixed proportion of the resources realisable in any given period of his tenure. These flows may then be consumed immediately or invested in the productive capacity of the economy which makes them available for future consumption. The ruler can affect the length of his tenure by means of investments in societal betterment (shared consumption) but there remains uncertainty in each period concerning whether the regime will end at that time. With international lending, the ruler has the option of liquefying some additional proportion of the state's resource wealth in any given period, at the cost of an increase in the state's debt at the beginning of the next period.

The Dictator's Problem. These three assumptions are sufficient for establishing the structure of our autocrat's choice problem, which is built upon the premise that the ruler is pursuing his own agenda after assuming control of the state (Acemoglu et al., 2004). We assume that the self-interested dictator is faced with the problem of maximising his own life-time utility largely by means of making the decision concerning his optimal length of tenure.

$$\begin{aligned} V(k_t, d_t, \varepsilon_t) \quad = \quad & \max_{\chi_t \in \{stay, loot\}} E_t \left[\sum_{j=0}^{\infty} \beta^j U(k_{t+j}, d_{t+j}, \varepsilon_{t+j}, \chi_{t+j}) \right] \\ & \text{s.t. } \chi_t \geq \chi_{t-1} \end{aligned} \tag{2}$$

where χ_t is the dictator's binary choice between staying ($\chi_t = 0$) and looting ($\chi_t = 1$); and ε_t is an unobservable state variable for the analyst.[3] Time is discrete and the dictator faces an infinite time horizon.

In each period, the incumbent dictator decides whether to stay in power or to loot the country and leave immediately. His choice resembles that of the manager of a firm who is strategically choosing the point in time of the liquidation of a limited liability corporation (Mason and Swanson, 1996). The basic decision comes down to whether to abscond with maximum liquidity today, or whether to stay and invest in tenure and productivity in order acquire a return from holding control over the productive capacities of the enterprise in the future.

Here we model the problem recursively. If the dictator decides to stay, he captures part of the benefits from production, and then faces the decision regarding looting again in the next period. By staying, the dictator faces the possibility that he will be ousted, and lose everything along with his loss of control. The decision whether to stay one more period or to loot is a recursive discrete choice problem described by the following equation:

$$V(k_t, d_t, \varepsilon_t) = \max_{\chi_t \in \{stay, loot\}} [v^{\chi}(k_t, d_t) + \varepsilon_t(\chi_t)] \tag{3}$$

This equation relies on the assumption of additive separability (AS) of the utility function between observed and unobserved state variables. We will also assume that 1) ε_t follows an extreme value distribution; and 2) ε_{t+1} and ε_t are independent conditional on the observed state variables k_t and d_t. These assumptions follow Rust (1987 and 1994) and greatly simplify this complex problem.

The Decision to Retain Control. Given a decision to stay and maintain control, the dictator will choose current period consumption c_t, capital level k_{t+1}, debt level d_{t+1} and repression level s_t to secure his rule. He enjoys an instantaneous utility $u(c_t)$ where $u > 0$, $u' > 0$ and $u'' < 0$, and expected stream of future utilities should he remain in power. He decides the investment level in productive capital each period by choosing k_{t+1} according to the following law of motion:

$$k_{t+1} = f(k_t) + \varphi(Z) + (1 - \delta)k_t - c_t - rd_t + l_t - cost(s_t) \tag{4}$$

where s_t measures the repression level chosen by the dictator (e.g. expenditures on secret services, police and army) and $cost(s_t)$ are the associated costs.

Within each period t, the dictator experiences the realisation of a discrete random variable $\xi_t = \{0, 1\}$, where $\xi_t = 1$ indicates that the dictator is toppled, and $\xi_t = 0$ indicates that the dictator remains in power. We assume that the realisation of the shock depends both on the choice of next period's capital stock and repression level. This specification captures the idea that both consumption-sharing and military-spending are strategies for maintaining control over the economy. Let $\rho(k_{t+1}, s_t) = \rho(\xi_t = 1 \mid k_{t+1}, s_t)$ denote the

[3] The state variables k_t and d_t are observable unlike ε_t.

probability of the dictator being deposed next period given he was in power this period; $\rho(k_{t+1}, s_t)$ is assumed to be strictly decreasing and strictly convex in both arguments—see Overland et al. (2005) for a similar idea. That is, increased k_{t+1} and s_t decrease the probability of being toppled at a decreasing rate. The idea here is that the dictator may invest in repression to secure his tenure and may also attempt to buy off peace by sharing some of the output with the population (k_{t+1}). This dilemma has also been analyzed by Azam (1995).

The recursive problem faced by the dictator does not depend on time *per se*, so that the programme is written as:

$$v^{stay}(k,d) = \max_{c,k',d',s \in \Gamma(k,d)} (1 - \rho(k', s)) \left[u(c) + \beta E_{\varepsilon'} V(k', d')\right] \tag{5}$$

$$\text{s.t. } \Gamma(k,d) = \begin{cases} k' = f(k) + \varphi(Z) + (1-\delta)k - c - (1+r)d + d' - cost(s) \\ d' = d + l \\ d' \leq \dfrac{(1+r)}{r} (\theta_z Z + \theta_k k) \\ l \leq \theta_z Z + \theta_k k \\ c \geq 0; \\ k \geq 0; \; d \geq 0 \\ k(0) = k_0; \; d(0) = d_0 \end{cases} \tag{6}$$

where β is the discount factor, and k', d' and ε' represent next period's state variables.

The Decision to Loot. The dictator also has the choice to loot the economy's riches and exit. Conditional on looting, the dictator leaves with the maximum loan amount he can contract and the share of non-sunk capital $w_0 = \theta_z Z + \theta_k k$ representing the current value of the liquefied natural and physical capital assets. It is assumed that the dictator absconds with this maximum amount of liquidity, without making any effort at retaining power, paying debts or investing in the economy. On departure, he invests the looted sum to live off a constant flow of consumption c^{loot}. The value of looting is then given by:

$$v^{loot}(k,d) = \frac{u(c^{loot})}{1-\beta} \quad \text{where } c^{loot} = \frac{r w_0}{1+r} = \frac{r}{1+r} (\theta_z Z + \theta_k k) \tag{7}$$

Figure 2 illustrates the dictator's decision tree.

Results. Obviously the dictator compares the payoffs from the two distinct options and chooses the strategy with the highest payoff. Hence, the optimal solution solves:

$$\chi^*(k,d,\varepsilon) = argmax \left[v^{stay}(k,d) + \varepsilon(0), \; v^{loot}(k,d) + \varepsilon(1)\right] \tag{8}$$

where the value of staying $v^{stay}(k,d)$ and the value of looting $v^{loot}(k,d)$ are defined above. This amounts to an optimal stopping problem, where the decision to loot is an absorbing state.

As mentioned, if the decision is to loot, the optimal choice for the dictator is to set the level of loan at its maximum, invest nothing in the retention of tenure, and to depart immediately in pursuit of a lifetime of consumption (from looted lending). Given the decision to stay, however, the dictator's optimal choice for the next period's capital k', consumption c^{stay} and next period's debt d' is given by the following first order conditions:

$$\begin{aligned}(1-\rho(k',s))\,u'(c^{stay}) &= \beta\,(1-\rho(k',s))\left[(1-\rho(k'',s'))\,(f'(k')+(1-\delta))\,u'(c'^{stay})Pr(\chi=0|k',d')\right.\\ &+ \left.\frac{r\theta_k}{1+r}\frac{u'(c'^{loot})}{1-\beta}Pr(\chi=1|k',d')\right] - \frac{\partial\rho}{\partial k'}\left(u(c^{stay})+\beta EV(k',d')\right) \qquad (9)\end{aligned}$$

$$u'(c^{stay}) = \beta\,(1-\rho(k'',s'))\,(1+r)\,u'(c'^{stay})Pr(\chi=0|k',d') \qquad (10)$$

$$(1-\rho(k',s))\,cost'(s)\,u'(c^{stay}) = -\frac{\partial\rho}{\partial s}\left(u(c^{stay})+\beta EV(k',d')\right) \qquad (11)$$

Equation (9) says that the dictator faces a trade-off when increasing capital stock: decreased consumption today versus an increased probability of remaining in power next period together with increased consumption tomorrow if power is retained or increased liquidity from capital in case of exit. The next condition (10) conveys the idea that the dictator chooses d' in order to balance increased consumption today against decreased consumption tomorrow due to debt servicing (if he stays the following period). Finally, equation (11) reflects the fact that by choosing s the dictator will trade-off the utility loss from expending resources on retaining power against the benefit from an enhanced security of tenure.

Proposition 1: *Define $\Delta V(k,d) \equiv v^{stay}(k,d) - v^{loot}(k,d)$ to be the net gain from staying relative to looting in any given period. For any given pair (k,d), the dictator's optimal choice is to stay if $\Delta V(k,d) > 0$ and to loot if $\Delta V(k,d) < 0$.*

1) The value function $V(k,d)$ is increasing in k, Z, θ_z and θ_k, and is decreasing in d.

2) The gain from staying ΔV is decreasing in d, θ_z and θ_k.

3) If $-\frac{f''(k)}{f'(k)+(1-\delta)} - (f'(k)+(1-\delta))\frac{u''(c^{stay})}{u'(c^{stay})} > -\frac{r\theta_k}{1+r}\frac{u''(c^{loot})}{u'(c^{loot})}$ then the gain from staying ΔV is non-monotonic with respect to k

4) If $-\frac{\varphi''(Z)}{\varphi'(Z)} - \varphi'(Z)\frac{u''(c^{stay})+\beta u''(c'^{stay})D}{u'(c^{stay})+\beta u'(c'^{stay})D} > -\frac{r\theta_z}{1+r}\frac{u''(c^{loot})}{u'(c^{loot})}$, then the gain from staying ΔV is non-monotonic with respect to Z

5) The negative effect of θ_z on the gain from staying ΔV increases with Z, i.e. $\frac{\partial^2\Delta V}{\partial\theta_z\partial Z} < 0$, if $-\frac{u''(c^{loot})}{u'(c^{loot})} < \frac{1+r}{r\theta_z Z}$.

These results are derived formally in Appendix A.1. The intuition for most of the findings is straightforward. Affording higher liquidity to the dictator (increasing parameters θ_z and θ_k) increases the opportunity cost of retaining power. The level of indebtedness reduces the relative returns to staying, since payment (by the dictator) is not required after looting. Increased security of tenure (reduced hazards) increases the relative returns to staying.

The non-monotonicity of ΔV with respect to k and Z results from the condition that v^{stay} is more concave than v^{loot} with respect to k and Z. Finally, we establish that the impact of liquidity supplied by the banks on the likelihood of looting increases with resource wealth when the dictator is not too risk-averse.

As indicated in Proposition 1, the sign of ΔV , that is whether v^{stay} is above or below v^{loot}, depends on many of the parameters in the model (debt, liquidity, security). We wish to focus here on how the level of resource-based liquidity afforded to the dictator (θ_z) affects the autocrat's incentives to loot or to stay and invest in the economy. We commence by defining the critical values of collateral-based liquidity (θ_z) in terms of their impacts upon the dictator's incentives.

Definition:

1) For a given θ_k*, define* $\overline{\theta}_z : v^{loot}(\overline{\theta}_z) = \dfrac{u\left(\frac{r(\overline{\theta}_z Z+\theta_k k)}{1+r}\right)}{1-\beta}$*, represented by the curve tangent to* v^{stay} *at* k^* *in Figure 3 such that* $(1-\rho(k',s))\left(f'(k^*)+(1-\delta)\right)u'(c^{stay}) = \dfrac{r\theta_k}{1+r}\dfrac{u'(c^{loot})}{1-\beta}$ *and* $v^{loot}(k^*,d) = v^{stay}(k^*,d)$*.*

2) For a given θ_k*, define* $\underline{\theta}_z : v^{loot}(\underline{\theta}_z) = \dfrac{u\left(\frac{r(\underline{\theta}_z Z+\theta_k k)}{1+r}\right)}{1-\beta}$*, represented by the curve parallel to* $v^{loot}(\overline{\theta}_z)$ *in Figure 3 such that* $v^{loot}(k=0,d;\underline{\theta}_z) = v^{stay}(k=0,d)$*, with* $\underline{\theta}_z < \overline{\theta}_z$*.*

Note that $v^{loot}(\overline{\theta}_z)$ is the curve passing the point at which the marginal product of capital and the marginal liquidity of capital are equal for a given θ_k. Also, $v^{loot}(\underline{\theta}_z)$ is parallel to $v^{loot}(\overline{\theta}_z)$ and passes through the minimum of v^{stay} at $k=0$. In effect, the v^{loot} iso-cline shifts upwards with increasing θ_z and the critical values define where it lies in relation to the v^{stay} curve. This definition allows us to state our main result.

Proposition 2: Value of looting as a function of liquidity

1) If $v^{loot}(\theta_z) > v^{loot}(\overline{\theta}_z)$ *for a given* d *and* θ_k*, then the dictator always loots irrespective of the level of* k*.*

2) If $v^{loot}(\underline{\theta}_z) < v^{loot}(\theta_z) < v^{loot}(\overline{\theta}_z)$ *for a given* d *and* θ_k*, there are two capital levels* $\tilde{k}_1$ *and* $\tilde{k}_2$ *(with* $\tilde{k}_1 < \tilde{k}_2$*) such that the dictator stays for any* $k \in (\tilde{k}_1, \tilde{k}_2)$ *and loots otherwise.*

3) If $v^{loot}(\theta_z) < v^{loot}(\underline{\theta}_z)$ *for a given* d *and* θ_k*, then there is a capital level* $\tilde{k}_3$ *such that* $v^{stay}(\tilde{k}_3,d) = v^{loot}(\tilde{k}_3,d)$*. The dictator loots for any capital level above* $\tilde{k}_3$ *and stays otherwise.*

Proof: see Appendix A.2.

In Figure 3 we illustrate the results stated in Proposition 2. For a given set of parameters (debt level, security of tenure), the level of resource-based liquidity will determine the incentives of the dictator to stay and invest, or to loot the economy.[4] Specifically, the level of resource-based liquidity afforded must be such that the dictator finds itself in the region where the v^{stay} curve lies above the v^{loot} curve in order to have any incentives to stay and invest in the economy; otherwise, the optimal choice is to take any proffered liquidity and "to loot" the economy. Our main result is that increased liquidity will unambiguously increase the prospects for political instability and looting in a given state. That is, increases in the value of the parameter for resource-based liquidity (θ_z) raises the value of looting (shifts the v^{loot} curve upwards).[5]

If the two curves potentially intersect, then the two values $\overline{\theta}_z$ and $\underline{\theta}_z$ separate the space into three regions: 1) Region I, for values of θ_z located above $\overline{\theta}_z$ where looting is always optimal; 2) Region II for values of θ_z between $\overline{\theta}_z$ and $\underline{\theta}_z$ where staying and investing is optimal within a specified (intermediate) range of capital levels; and 3) Region III for values of θ_z below $\underline{\theta}_z$ where looting is optimal only for the highest values of k. This interaction between liquidity, capital and the incentives for looting provides the structure of the dynamics of the incentive system, and is investigated in the simulation in section 3.

The fundamental trade-off from the perspective of the dictator concerns the amounts currently appropriable from the economy (via liquidity and looting) and the amounts potentially producible (via investment and security of tenure). Any new dictator must turn down proffered liquidity in order to decide to stay and invest in the economy. This points to the fact that almost any resource-rich country can be rendered politically unstable by affording sufficient levels of liquidity. This has been demonstrated by others, in their demonstration of the nature of self-enforcing sovereign debt contracts (Bulow and Rogoff, 1989; Kletzer and Wright, 2000). In all of these models of enforceable sovereign loan agreements, excess liquidity in any given period is sufficient to generate the choice of default. Our model is a counter-part to those, illustrating how an inefficient sovereign debt contract is capable of inducing political instability and default, and what is "excessive" liquidity in the context of a resource-rich but autocratic state.

3 Simulation of the model – Liquidity and the Looting Economy

The previous section demonstrated how the offer of resource-based liquidity provides an incentive system for the dictator, determining whether he will choose to loot, or invest in, the economy. The results of Proposition 2 indicate that the incentives are dependent upon the level of capital stock available within the economy (k), since this will determine both the expected productivity of additional increments to the capital stock as well as the capital for liquidation. For this reason, the system of incentives for looting may evolve along a particular development path, given a particular level of proffered liquidity. In particular, an economy commencing within Region II (in Figure 3) will initially commence with incentives for investment,

[4] Of course, the other parameters also play a role. Reductions in the values for the parameters for debt (d) and security of tenure (ρ) increases the value of staying (shifts the v^{stay} curve upwards). We investigate this further in the simulation in section 3.

[5] It is of course possible that, for particular parameter values, the two curves do not intersect anywhere in (v, k) space. This would be the case if either debt levels or security levels were so extreme as to render financial contracting unimportant. In this instance we term the issue of financial contracting non-critical, and we leave this case aside. Examples of such states might be the highly indebted states of sub-Saharan Africa or the extremely secure states of Arabia.

but may evolve into a situation where the incentives are for looting. In these circumstances the time of departure is endogenous, and a function of both liquidity and capital stock within the economy.

In this section we simulate the evolution of such an economy, given both low liquidity and high liquidity, to illustrate how a dictator will choose its date of departure by reference to the evolving system of incentives to loot. Initially the dictator will perceive high returns to initial investments in capital, and so stay and invest, but as successive increments to the capital stock reduce returns, the relative returns to looting may come to dominate.

Specification of the Model. To illustrate the dynamics of a resource-rich economy with optional liquidity-based looting, we simulate the model using the following functional forms: utility is specified as a CES function $u(c) = \dfrac{c^{1-\sigma}}{1-\sigma}$, and the probability of losing power is an exponential function of the form $\rho(k') = \exp(-\lambda k')$, where λ represents the dictator's effectiveness in preventing his demise. The production function takes the form $f(k) = Y_s - \dfrac{Y_s}{1+k}$, where $f' < 0$ and $f'' < 0$. In the limit, output will tend to Y_s. The value of staying and looting are then given by:[6]

$$v^{stay}(k,d) = \max_{c,k',d' \in \Gamma(k,d)} (1-\exp(-\lambda k')) \left[\frac{c^{1-\sigma}}{1-\sigma} + \beta E_{\varepsilon'} V(k',d') \right] \tag{12}$$

$$\text{s.t. } \Gamma(k,d) = \begin{cases} k' = f(k) + Z^{\varphi} + (1-\delta)k - c - (1+r)d + d' \\ d' = d + l \\ d' \leq \dfrac{(1+r)}{r} (\theta_z Z + \theta_k k) \\ l \leq \theta_z Z + \theta_k k \\ c \geq 0; \\ k \geq 0; \ d \geq 0 \\ k(0) = k_0; \ d(0) = d_0 \end{cases} \tag{13}$$

$$v^{loot}(k,d) = \frac{u(c^{loot})}{1-\beta} \quad \text{where } c^{loot} = \frac{r}{1+r} (\theta_z Z + \theta_k k) \tag{14}$$

Parametrisation of the Model. The following parameters are established as baselines, and will remain constant throughout all of the simulations: $\beta = 0.95$; $\sigma = 0.9$; $\delta = 0.1$; $r = 0.12$.

Simulation of Growth. In Figure 4 and Figure 5 we illustrate the impact of incentives for looting generated by first low liquidity and then high liquidity in resource-based lending. Figure 4 demonstrates how, for low enough values of θ_z, the incentives for investment inhere. Here the dictator views the productivity of the

[6] For the sake of simplicity, we omit the role of repression s in the simulation.

economy as his primary asset. Debt is exercised to its limit, but the dictator uses it for investment and in-place consumption. The regime does not change and capital levels reach the steady state optimum. In effect, the autocrat is acting as "owner" of the entire economy, and lending simply serves its purpose as a mechanism for shifting consumption across time. However, when θ_z is high enough (doubled to 0.6 Z as in Figure 5), the dictator uses debt to pursue a "hit and run" strategy with regard to the economy. He accumulates capital to a point, but then loots as much of the capital and liquidity as is possible. This decision to loot is based on the dictator's comparison of the relative returns to further capital investments versus liquidity-based looting, which flip the incentives for the autocrat in the third period. This change in incentives for the dictator makes a big difference for the economy concerned. A comparison of the two simulations reveals that capital in the looted economy moves to levels approximately 15% below that which occurs under the investment scenario (comparing Figure 4 and Figure 5 at period 3).

More importantly, the dynamics of the simulation reveal that the second economy never recovers from this initial looting. The fact that the new dictator (in period 4) takes over an economy with higher debt levels means that the value of staying commences at a much reduced level. Looting becomes the optimal choice for this economy from then on. A series of incoming autocrats immediately loot the country's riches until debt reaches the ceiling, at which point banks are no longer willing to provide further liquidity. (see Figure 5 in periods 4–13) This economy is now caught in a "debt trap" of political instability and low growth, with its origins in the level of resource-based liquidity proffered to the incoming autocrats.

These simulations demonstrate that an incoming autocrat may act as an "owner" or as a "thief" in regard to the economy, depending upon the level of liquidity on offer. Low levels of liquidity maintain the incentives to stay and to invest as the owner of the economy. The returns from control are secured by staying on the scene, maintaining control and securing the flow of returns from earlier investments. On the other hand, high levels of liquidity act as a prize to the winner of the contest for control, and create incentives for an ongoing system of hit and runs. The returns from control in this case are secured simply by winning the contest for control of the economy—then the banks pay the prize and the contest winner exits the stage. This may be illustrated by comparing the incentives of a relatively secure dictator (low hazard of displacement) in Figure 4 with those inhering under the conditions of an insecure ruler (high hazard rate) in Figure 6. What is the impact of "security of tenure" on the incentive system facing the dictator?[7] If the dictator is able to secure his tenure (relatively high λ in Figure 4) then he has incentives to stay and invest in productive capital as "owner". By contrast, if he is unable to secure his tenure (low λ in Figure 6), then the incentives are to loot. Since insecurity and lending have the same impact on incentives, it is apparent that both have the capacity to turn an owner-ruler into a thief.

These simulations translate our basic model of autocratic choice into empirically observable outcomes regarding lending, political instability, and economic growth. We have demonstrated that excessive resource-based lending may be seen to induce political instability and result in poorly performing economies. We turn

[7]Comparing Figures 4 and 6 demonstrates the point of McGuire & Olson (1996). Their argument is that when an autocrat is secure about his tenure, he will stop behaving as a bandit leader and instead act as a ruler whose interest is aligned with the people's. When the probability of survival is high and the autocrat values the future, an "invisible hand" makes his interest consistent with the interests of society at large.

now to an empirical examination of these claims.

4 Empirical Model and Data

The key prediction from our theoretical model is that unstructured lending into a country with resources heightens the incentive to loot and under-invest in the economy. This leads to low economic growth.[8]

Proposition 1 suggests these and several other hypotheses which we intend to explore below. We will test our theory against the Dutch Disease alternative. Claims to be investigated are as follows:

Claim 1) Greater lending at a fixed level of natural resource wealth makes the probability of looting more likely. The impact is magnified as resource wealth increases.

Claim 2) The political instability associated with looting will adversely affect economic growth in an autocratic resource-rich state.

Claim 3) The probability of looting may fall, then rise, with the physical capital or natural resource stock. Looting should be less profitable at low values of these variables.[9]

All of these claims follow from the logic of our dynamic model.[10] These claims are tested against a more conventional Dutch Disease hypothesis. This alternative implies increased resource reliance leads directly to slower growth by making industrial activity less lucrative.

In a related vein, another alternative hypothesis is that resource rents are grabbed when poor institutions reign (Mehlum, Moene and Torvik, 2006). Grabbing diverts resources from other more productive pursuits, but this alternative is implicit in our tests. We restrict attention to autocracies which, by and large, all have poor institutional quality. The financial channel that determines the level of looting is the focus of our paper. This complements previous research on grabbing.

It has also been argued that natural resource abundance creates civil conflict and costly battles over resource rents; we control for the level of civil unrest and disorder so as to compare countries with similar levels of

[8] The relevant baseline comparison is to a dictator who has sufficiently low levels of resource collateral so that unstructured lending is minimal. It could also be to an infinitely lived representative consumer/producer who does not face political uncertainty and who cannot borrow in the same unstructured fashion that the dictator can.

[9] Diminishing marginal utility implies large gains from staying one more period to consume in the future. Similarly, the present discounted value of departing from power/looting depends positively on both variables. This also incentivizes staying slightly longer particularly at low values. Beyond some threshold of income, which is a function of natural resources wealth and the capital stock, looting should become more likely.

[10] One subsidiary claim is that greater lending at fixed levels of the capital stock (higher θ_k) makes looting more likely. We do not have good measures of the capital stock and interacting a lending variable with GDP per capita is problematic given that GDP depends on resources etc. We assume therefore that this part of the lending and looting decision is orthogonal to the resource lending we see and only control for lending relative to the resource stock.

conflict. The question is whether the financial channel adds any explanatory power to regime turnover. Thus we look both at the empirical implications of our model versus others for political instability and also economic growth.[11]

To test our claims, we use a sample of 44 autocracies between 1972 and 1999. These are listed in Table 1. Data on lending, political and economic performance, natural resource wealth and other control variables are included from various sources described below.

We specify two estimating equations. One is for annual changes in economic growth following Londregan and Poole (1990) and Alesina et al. (1996) who studied political instability and growth. The other is a latent variable model of looting. Looting is inherently unobservable. Our model suggests that if enough looting occurs a regime could be toppled (e.g., due low investment and popular dissatisfaction with low growth) or, alternatively, a leader that loots would choose to depart in order to consume the fruits of his malfeasance. We proxy this looting with a binary variable that takes the value one if there is an irregular political change in regime.[12] The two equations of interest are:

$$\Delta log(GDPcap)_{it} = \alpha_0 + \alpha_1 Loot_{it} + \alpha_2 Rent_{it-1} + \alpha_3 \mathbf{X_1}_{it} + u_{it} \tag{15}$$

$$\begin{aligned} Loot_{it} &= \begin{cases} 1 & \text{if } Loot^*_{it} > 0 \\ 0 & \text{otherwise} \end{cases} \qquad (16) \\ Loot^*_{it} &= \mathbf{W}_{it}\beta = \beta_0 + \beta_1 NRStock_{it} + \beta_2 Lending_{it} + \beta_3 \left(NRStock_{it} \times Lending_{it}\right) + \beta_4 NRStock^2_{it} \\ &+ \beta_5 log(GDPcap)_{it-1} + \beta_6 log(GDPcap)^2_{it-1} + \beta_7 \frac{Debt_{it}}{GDP_{it}} + \mathbf{W_1}_{it}\beta_8 + \eta_{it}. \end{aligned}$$

where $NRStock$ and $Rent$ denote respectively the ratio of the resource stock and the resource rent over GDP.

We estimate equations (15) and (16) jointly by Full Information Maximum Likelihood (FIML) using a treatment regression approach. This allows for correlation between the two error terms u and η which are assumed to be joint normally distributed with correlation ω. The treatment (looting regression) and outcome (growth equation) are estimated jointly by maximizing the bivariate normal likelihood function. This is a fully efficient estimation method which takes account of the possibility that omitted and unobservable forces determine the realizations of both growth and looting. This is not a simultaneous equation procedure, so one key identifying assumption is that contemporaneous growth itself does not determine the $Loot$ variable.[13]

$Loot$ is a binary variable that takes on the value 0 or 1. It is equal to 1 when the latent variable $Loot^*$ is positive which proxies for a scenario when the net benefit of staying $\Delta V(k,d)$ is negative and departure is

[11] Sachs and Warner (1997) and Mehlum, Moene and Torvik (2006) look at average growth over a 25-year period. We look at the short-run since our model predicts more immediate impacts on investment and growth.

[12] Of course irregular departures of the incumbent regime could be due to other factors. We attempt to control for these other factors with indicators of civil unrest and assume that any other possible determinants are unrelated to included variables.

[13] We allow the lagged growth rate of income to enter into the looting equation. We also explore separately a simultaneous equation model and results are qualitatively similar but require purchase on further identifying assumptions.

optimal. We set *Loot* equal to 1 when there is an irregular regime change meaning a ruler or regime has been deposed or forced from power in a non-constitutional manner.[14]

Throughout we restrict attention to only those states classified as an autocracy by Cheibub and Gandhi (2004). The regime change data come from Bueno de Mesquita, et al. (2003). Complementary data is available from Archigos, a database of political leaders developed by Gleditsch and Chiozza (2006, version July 2006). Archigos is particularly comprehensive and detailed so that we relied on it whenever there was a discrepancy with Bueno de Mesquita et al.

The key determinants of *Loot* are resource stocks and foreign lending. The resource stock comes from K. Hamilton and G. Ruta (World Bank, Environment Department). Squared resource stocks are included to help test Claim 3. Lending (i.e., disbursements) by private creditors comes from the World Bank Global Development Finance (GDF, 2006).[15] The interaction between these two variables is particularly important. If a positive coefficient is found here, and the marginal impact of lending turns out to be positive at a given level of resource abundance, this would substantiate the looting hypothesis.

Claim 3 also predicts less looting for intermediate values of capital (Region II in Figure 3). We test this prediction by including lagged per capita GDP and its square.[16] We take PPP-adjusted real GDP (and real GDP per capita) from the Penn World Tables version 6.2 (2006).

We impose a number of other exclusion restrictions to improve identification. In particular we assume that the length of tenure in years of the current regime, fraction of people speaking a European language at birth introduced by Hall and Jones (1999), the number of violent demonstrations and clashes (Banks, 2001), the existence of an active guerrilla force (Banks, 2001), and the number of peaceful demonstrations of one hundred or more people in protest of the regime (Banks, 2001) all help determine whether looting is in fact present in the observed irregular regime change. We also assume that these variables only affect growth via the impact on political instability. The prior is that such variables are related to some measure of repression or the intensity of the battles for political power and hence change the time horizons of the government by raising the probability of being deposed in any period which is related to the variables $\rho(k', s)$ and $cost\,(s)$ from our theoretical model. Also in the vector $\mathbf{W_1}$, we include lagged economic growth and regional dummies for Sub-Saharan Africa, Middle East/North Africa and Latin America.

Following the empirical growth literature (Barro and Sala-ì-Martin, 1995) , the growth equation incorporates lagged growth of GDP per capita, a proxy for human capital accumulation (number of years of schooling), population growth, investment as a percentage of GDP, the inflation rate, and trade openness. In addition to these variables, vector $\mathbf{X_1}$ includes regional dummies (country dummies in a robustness check), and year indicators. To test for Dutch Disease, we include in the growth regression the level of resource rents relative

[14]We are assuming that the political instability induced through looting-type behavior is manifested in terms of enhanced levels of unscheduled departures. We control for other potential sources of such observed irregular regime change, see below. In our baseline sample (results are reported in Table 3) there are 44 country-year observations out of 752 when *Loot* equals 1.

[15]The main limitation of this dataset is that the major Gulf countries are not available because they do not report such borrowing.

[16]Capital stock data are scarce and unreliable. If the marginal product of capital in the non-resource sector is (inversely) related to the level of GDP per capita this is a good proxy.

to GDP provided by K. Hamilton and G. Ruta from the World Bank. This variable covers mineral, coal, oil and gas rents, and is measured as the product of the quantity of resources extracted and the difference between the resource price and the unit cost of extraction.[17]

To test Claim 2 the standard growth equation is augmented with our *Loot* indicator. We are interested in the indirect effect of lending and resources on growth due to political instability, that is:

$$\frac{\partial E(\Delta log(GDPcap)_{it}|Loot(Lending_{it}, NRStock_{it}) = 1)}{\partial Lending_{it}} = \alpha_1 \frac{\partial Pr(Loot = 1|Lending_{it}, NRStock_{it})}{\partial Lending_{it}} \quad (17)$$

5 Estimation Results

This section reports our estimation results. Our baseline specifications are reported in columns (1) and (2) of Table 3. Panel A represents the growth equation (15) and Panel B presents the results from our equation for looting (16). In column (2) of the growth equation, we control for country fixed effects.[18]

Claim 1 suggests that more foreign lending for a given level of resource wealth raises the likelihood of looting. The marginal impact of lending is also amplified at higher levels of resource wealth. The treatment equation shows that the marginal effect of lending for a given level of resource wealth is given by

$$\frac{\partial Pr(Loot = 1|Lending_{it}, NRStock_{it}, \mathbf{W}_{1it})}{\partial Lending_{it}} = (\beta_2 + \beta_3 NRStock_{it})\, \phi\left(\mathbf{W}_{it}\beta\right) \quad (18)$$

where ϕ is the standard normal density function.

If this effect is positive and statistically distinguishable from zero, then Claim 1 is substantiated. Indeed, we find that the marginal impact of lending is positive and hence associated with a higher likelihood of turnover at sufficiently high levels of resources. This effect is statistically significant at better than the 1 percent level for ratios of natural resource wealth to GDP of greater than 315 percent (just above the 88 percentile) in the sample.[19] The impact is given as

[17]The stock measure is used in the looting model to correspond with our theory. We can alternatively include stocks in the growth equation instead of the flow value of resources. The results are not changed. The reason we use the flow in this case is to correspond with the theoretical predictions that resource intensity in current production is what matters for Dutch Disease.

[18]The treatment equation (probit for *Loot*) controls only for regional dummies. Country fixed effects produce inconsistent estimates in a standard probit model due to the incidental parameters problem. Conditional logit is an alternative but comes at the cost of dropping all countries with no looting or 285 country-year observations in this case. We ran such a model, and the results on the marginal impact of lending were qualitatively similar to the probit results discussed below.

[19]The impact is significant at the 10 percent level at resource wealth above 260 percent (84 percentile).

$$\frac{\partial Pr(Loot=1|Lending_{it}, NRStock_{it})}{\partial Lending_{it}} = (-0.121 + 0.0006 \times NRStock_{it})\, \phi\left(\mathbf{W}_{it}\beta\right) \quad (19)$$

This result indicates that greater lending to sufficiently resource-rich countries is associated with enhanced likelihood of looting (see Figure 7). Table 4 also shows a rise in the predicted probability of looting from 0.07 to 0.15 when lending rises by one standard deviation from the mean and other control variables are as in Nigeria in 1998.[20] In many of our sample countries just prior to looting events we see equivalent rises in foreign lending. Both of these results indicate that greater lending in resource-rich countries is associated with higher political instability. Twelve of the forty-four countries in our sample had resource wealth large enough to make the overall marginal effect above positive and statistically significant.

Claim 2 is that looting is detrimental to growth. The outcome (growth) model supports this claim as well—see columns (1) and (2) in Panel A. The effect of our looting indicator on growth is negative and it is statistically significant. The point estimate suggests that output per capita drops by nearly nine percent in the event of an irregular political turnover.[21]

In investigating the effect of looting on growth, we are largely interested in the indirect effect of foreign lending on growth which fuels looting in resource rich countries. This indirect effect is the product of the coefficient of instability in the growth equation (α_1) with the marginal effect of lending on the probability of looting. For expositional purposes, we choose to vary lending (L) relative to GDP by one standard deviation from its mean (respectively $\overline{L} = 2.78$ and $\overline{L} + StdDev = 6.1$). The value of the resource ratios, past growth, per capita GDP and the number of riots and anti-government demonstrations are those of Nigeria in the year 1998—at the end of Sani Abacha's dictatorship.[22] All the other variables in the treatment equations were set at their mean level. Equation (17) is then re-written as:

$$\begin{aligned} &E(\Delta log(GDPcap)_{it}|\overline{L} + StdDev) - E(\Delta log(GDPcap)_{it}|\overline{L}) \\ &\qquad = \alpha_1 \left\{ Pr(Loot=1|\overline{L} + StdDev) - Pr(Loot=1|\overline{L}) \right\} \end{aligned}$$

We find in Table 4 that the effect of one standard deviation increase in lending results in an expected decrease in economic growth of 0.72 and 0.47 percentage points for specifications (1) and (2). Together these findings provide strong evidence to support our Claims 1 and 2 and our theoretical model. Lending to resource-rich dictators raises the chance of political instability, leading to low growth.

[20] To determine the partial effect of lending, the variables included in vector $\mathbf{W}_{it}$ are calculated at their sample mean as a baseline (see Figure 7). We also ascertain how the effect changes when key variables such as past growth, per capita GDP and the number of riots and anti-government demonstrations are similar to Nigeria's (see Table 4).

[21] Adding five further lags of the looting indicator to the growth equation suggests another loss of four percent of output after two years. There is also no sign of significantly faster growth even up to five years after the irregular political change. This is suggestive of our model's prediction that once looting has occurred little further investment in the economy is worthwhile.

[22] Nigeria is not actually in our sample due to missing data on schooling rates. The resource stock to GDP ratio averaged 645 (in percentage terms) between 1970 and 1999.

The data also are consistent with the two other subsidiary claims made above. First, **Claim 3** suggests that at sufficiently high levels of per capita GDP, or resource wealth, looting becomes more attractive, but middle range levels of per capita income tend to reduce the likelihood of looting. In such a range it is worthwhile for a dictator to build up future capacity and to consume out of current income rather than loot the net present value of the economy's wealth.

The coefficient on the logarithm of per capita GDP has a negative and statistically significant coefficient both in columns (1) and (2). Its square has a positive, statistically significant coefficient. Beyond a certain level of per capita GDP equal to roughly $3,400 (real 2000 US dollars) instability becomes more likely. **Claim 3** also extends to resource wealth, and we find a coefficient on the squared value of the resource wealth ratio that is positive but very small and not statistically significant. Still the total marginal effect, which depends on the level of lending and resources suggests that at sufficiently high resources and lending looting is more likely.[23]

We also include debt in the looting equation. Our modeling of the dictator would indicate that in general debt would be positively related to looting. Our empirical results are not so clear-cut. The coefficient in the probit equation is positive, but it is not statistically significant. The lack of a clear finding here could be because the debt to GDP ratio is a noisy measure of the debt burden. Alternatively, this weak finding could be the result of the fact that our model looks at a single dictator's choices across time, while the dataset encompasses a heterogeneous group of states. The relationship between debt and looting becomes more complicated as any given state approaches its aggregate debt constraint. When the debt constraint is slack banks are willing to provide loans, making looting more likely. However, when the constraint becomes tighter, increased indebtedness impacts upon the availability of lending as the supply of credit is rationed. This reduces the scope for obtaining new loans and therefore may render looting less attractive.

The ratio of resource rents to GDP is included in the growth regression as a test of the Dutch disease hypothesis. We find that the impact on annual growth is negative but it is significant only at the 80 percent level of confidence. This suggests that the claims generated by our model of looting may provide an alternative, or at least complementary channel to the Dutch Disease channel. It also expands on Mehlum, Moene and Torvik (2006) who found evidence consistent with Dutch Disease when institutional quality was low.[24] We find that even in weak institutional environments foreign lending may be necessary to lead to

[23] Combinations of high resource stocks and low lending or high lending and low resources lead to an overall positive marginal effect of resources on looting. Some examples: The marginal effect of resources on looting is positive at any positive resource stock as long as lending is greater than 8.2 percent of GDP. Alternatively, a lending ratio of 7.4 percent and a resource stock to GDP of 385 percent makes the marginal impact of resources become positive (0.000048). These are numbers consistent with Algeria's average data. The marginal effect has three parts which are given by the coefficients on resources, the interaction of resources and lending and the square term. This is given as $\beta_1 + \beta_3 Lending_{it} + 2\beta_4 NRStock_{it} = -0.005 + 0.0006(Lending_{it}) + 2(.0000007) NRStock_{it}$.

[24] Both Mehlum, Moene and Torvik (2006), and Corden and Neary (1982) used the value of resource exports relative to GDP as a proxy for resource dependence. They also study average growth over longer horizons than our paper which focuses on short-run output losses. In the original theories of resource dependence (e.g., Corden and Neary), economic dependence on resources is measured as the share of total production accounted for by resource-based activity. Using the export ratio in our growth regression instead, reduces the point estimate on the looting variable to -3.2, and it is no longer significant. Still, in the treatment regression, lending is positively and significantly associated with the probability of looting as before. Finding out

slow growth.

Regarding the effects of the other control variables on growth we find mixed results. Inflation is negatively associated with growth (p-value = 0.001). The lagged growth rate is positively associated with this year's growth rate (p-value = 0.042). Investment is positively associated with annual growth rates (p-value = 0.558). Schooling is negatively associated with growth (again, not statistically significant). Trade openness is positively associated with growth (p-value = 0.672).[25] Overall, our model uses relatively high frequency (annual) data. Using lower frequency data puts our growth regression results more in line with standard empirical growth regressions, but we lose the ability to gauge the immediate impact of looting on the economy.

Further results from the probit equation suggest that riots, guerrilla activity and anti-government demonstrations are positively associated with turnover. These variables are outcomes determining the probability of losing power via repression and consumption sharing. In the theory we model this outcome as a function of the capital stock (or incomes) and the investment in security services. Further work could be done to parameterize this auxiliary equation but it is only of indirect interest to us.

Also, other theories suggest that resources generate civil conflict as interest groups compete to secure rents (Collier and Hoeffler, 2004 and Caselli, 2006). Despite controlling for these conflicts, we find that foreign lending, on the back of resource collateral, still has an impact of our measure of looting. That is to say, these controls still leave room for the looting hypothesis. The length of tenure is statistically insignificant, while the fraction of population speaking a European language is negatively associated with looting.

Finally, a Wald test rejects the null hypothesis that the error term of the looting equation is uncorrelated with the error term of the growth equation. For example, in our baseline specifications, we obtain a test statistic for the null hypothesis that the correlation is zero of $\chi^2(1) = 8.34$ (p-value = 0.0039) without fixed effects in column (1) and $\chi^2(1) = 4.04$ (p-value = 0.045) with fixed effects in column (2). This implies that the joint estimation of the treatment and outcome equations is required to generate unbiased estimates of the other parameters. We also note that the correlation between the errors is estimated to be positive. Unobserved factors positively affecting turnover are also associated with periods of higher growth. This could be the case if the unobservables driving turnover clear the way for better growth.

Robustness

We now discuss the robustness of our findings to possible endogeneity. It could be argued that our main explanatory variables—lending and resource wealth—may be endogenous and associated with omitted factors that determine looting.

why resource exports relative to GDP, but not the ratio of total resource rents to GDP, eliminates the statistical significance of looting on growth is an avenue for further exploration.

[25]Evidence on the relationship between trade and growth is generally mixed (cf. Yanikaya, 2003; and Edwards, 1998). According to Rodrik and Rodriguez (2000), the only systematic relationship is "that countries reduce their trade barriers as they get richer".

Development and exploitation of natural resources might be pursued where industrial potential (and hence growth potential) is limited for institutional or other social and political reasons. This could also lead to short-time horizons for leaders leading to malfeasance, popular discontent and a higher chance of political turnover. If true, this would tend to overstate the impact of resources in our probit model since countries already at risk for looting and slow growth for other reasons simply become reliant on resources by default.

The impact of loans might also be biased, but in this case the bias is likely to be downwards. If banks and companies that invest in countries do so only in the least risky environments, where political turnover is most unlikely, then the marginal impact of capital inflows on looting and growth could be biased downward.[26]

Since both international lending and commodity prices are often determined by forces *external* to developing economies, a set of instrumental variables based on these forces is available. Demand conditions in the principal industrialised countries strongly drive commodity prices (Pindyck and Rotemberg, 1990). These prices are key components of measured resource rents and stocks. Similarly, international capital flows to the developing world tend to surge when G-7 interest rates are low (see Calvo, Leiderman and Reinhart, 1993 and 1994). On the other hand, it would be hard to argue that industrial country policies and macroeconomic conditions are related to country-level unobservables that drive variance in our looting variable. These are mainly determined by forces unrelated to the foreign business cycle given the relative magnitudes of economic output and the structure of aggregate global supply and demand.[27]

The fact that external forces drive resource wealth and lending make commodity prices and interest rates plausible instruments since they seem to be highly correlated with our potentially endogenous variables and there is little reason to expect that they would affect political instability except via their impact on resource dependence and lending as per the model presented above. Our excluded instruments include global price indexes for 12 key commodities, the yield on three year US Treasury bonds and the interaction between each price index and the bond yield.[28]

To use these instruments, we report estimation results from a control function approach for our looting equation. This also enables us to test directly the exogeneity of these variables in the political instability equation. The method is a two-step procedure. In the first step, we estimate the residuals of the reduced-form equations for the ratio of resource stocks to GDP, lending and the interaction of the two on the excluded instruments and the other included covariates. The second step is the estimation of the looting probit equation with the addition of the reduced-form residuals as additional explanatory variables. The joint significance of the coefficients of the residuals in the second stage probit equation will be indicative of endogeneity (Smith and Blundell, 1986).

For the first stage, we find that the instruments are highly correlated with the (potentially) endogenous

[26]Despite this we still find a positive impact of lending which qualitatively supports our main prediction from our model. If this bias dominated, the impact could in fact be larger than we have found.

[27]If these external forces affect countries in different ways, or if lending rises more quickly in particular types of countries that are systematically less likely to experience looting there may still be some remaining endogeneity bias. However, much of the variance is inter-temporal rather than in cross-sectional. This raises the plausibility of the identification strategy since it compares the impact of these forces for the same set of countries over time.

[28]The commodities include petroleum, natural gas, bauxite, copper, lead, nickel, phosphate, tin, gold, zinc, silver and iron.

variables (full results available upon request). The set of instruments used for lending, resources and their interaction is jointly significant in each of the three reduced form equations.[29] Second stage results are reported in Table 5. The residuals are jointly statistically insignificant ($\chi^2(3) = 2.32$, p-value=0.5083). This finding shows that we cannot reject the null hypothesis that our key explanatory variables are exogenous.[30]

We also undertook several other robustness checks in addition to those mentioned above. Our results are not being driven solely by African experience. We removed all Sub-Saharan African countries from our sample. This drops the sample size to just 394 country-year observations. Still our results are qualitatively exactly the same as when these countries are included.

We explored a simultaneous system for these our two estimating equations. We found that our results regarding the determinants of looting are again qualitatively the same as those found using the treatment regression specification.

Another robustness check uses an alternative measure of political instability. We use an indicator of turnover of all the veto players introduced by Beck et al. (*Database of Political Institutions*, 2004 update—DPI).[31] The results are presented in Table 6. Our findings for the treatment regression are consistent with our earlier findings using *Loot*. The marginal effect of lending at sufficiently high levels of resources is positive. The point estimates on the turnover of veto players variable is also negative and statistically significant in the growth equation. This suggests that subsequent economic outcomes might be similar after coalition implosion as in the cases examine above.

6 Conclusion

This paper attempts to unravel a mechanism through which the much-discussed resource curse operates. Our main contribution is to show how credit market imperfections impact upon the choices of dictators in resource-rich countries, which in turn leads to instability and slow growth. In our model, a dictator makes a choice between staying and looting. Looting involves the immediate translation of political control into

[29] F-tests for the excluded instruments are as follows: in the resource stock equation $F(25, 43) = 1.99$, p-value = 0.0232; the lending equation $F(25, 43) = 18.49$, p-value = 0.0; the interaction between resources and lending $F(25, 43) = 2.22$, p-value = 0.01.

[30] We also replaced lending, resources and their interaction with the price index for petroleum, the US 3-year interest rate, and their interaction in the looting probit model. Our results from Claim 1 are once again confirmed. Interest rates enter with a negative sign, and the interaction term is positive. This implies a marginal decline in US interest rates has a direct positive impact. At the average value of the oil price index, the impact remains positive. Also an instrumental variables linear probability model with fixed effects was run. A Hausman test cannot reject that OLS is consistent.

[31] Instead of the turnover of the leader only, this database records the percentage turnover of veto players. In presidential systems, veto players are defined as the president and the largest party in the legislature, and in parliamentary systems, the veto players are defined as the PM and the three largest government parties. There are 35 instances out of 676 country-year observations when such a turnover occurs.

Note that in the DPI, the turnover of all the veto players is almost systematically reported a year after the actual turnover of leadership—checked with both Bueno de Mesquita, et al. (2003) and the detailed documentation from Archigos. We have corrected this discrepancy accordingly.

maximum appropriable gain. Such looting is facilitated when international banks are willing to turn natural capital into loans. The incentives for staying, on the other hand, result from the opportunity for taking advantage of the country's potential productivity while remaining in power.

Our model suggests that the dictator will be fundamentally influenced in this choice by the level of lending afforded by external banking institutions. The opportunity cost to staying and investing in the economy increases directly with any increase in the liquidity being afforded.

Our story is closely related to the literature on "odious debt" (Jayachandran and Kremer, 2006). Odious debt may result when lending to autocrats results in little for the country concerned other than debt. Our story is also related to the literature on efficient contracts for sovereign lending (Bulow, 2002; Kletzer and Wright, 2000). We have demonstrated here that unstructured resource-based lending is the antithesis of efficient sovereign loan contracting, and odious debts are the result. Our point here is that the indebtedness and poor performance of these resource-rich economies is as much a result of the poor contracting by the financial sector as it is the unchecked power and poor institutions within the debtor regimes. It takes negligence or malfeasance by both the parties to make a bad contract. These bad contracts, together with the weak institutions in the resource-rich nations, create the environment within which non-investment, instability, and debt are generated—hence the resource curse.

The importance of restricting short term liquidity to aid the enforceability of loan agreements has been long-noted (Bulow and Rogoff, 1989) as has been the tendency of banks to ignore such advice (Bulow, 2002). The problem is argued to be one of moral hazard in the financial markets, where banks fail to internalise the risks of default because of the belief that sovereign debts will ultimately be "worked out" and particularly those with large amounts of natural resources underlying them. The failure of the financial sector to internalise these risks places these costs upon the peoples of the countries concerned.

We find strong evidence to support our main prediction that unsound lending to dictators in resources rich countries results in instability, and ultimately in slower economic growth. Here, resources become a curse when imperfect domestic and international institutions (political and financial markets) interact to produce political instability, which in turn impedes economic growth. Poor lending practices is one channel to the resource curse.

There are many approaches advocated to deal with this sort of moral hazard Bulow (2002). believes that the problem is sourced fundamentally in the intervention of external institutions in rescuing commercial banks from defaults. Banks engage in moral hazard in these lending practices on account of a fundamental failure of belief in the possibility of default. He recommends that banks should be made to execute loan agreements under domestic laws, enforceable only in domestic courts, in order to ensure that the debtor state's interests are taken into consideration. It is argued by some that advance due diligence in lending should be a requirement for the enforceability of the resulting debt (Jayachandran, Kremer and Schafter, 2006). One possibility is to require that any loans be more structured obligations, relying on specified investments rather than general assets. This would ensure that banks required investments as a result of loans, and that these investments were of a sort that could generate returns to the bank. Finally, it may be more appropriate to encourage FDI rather than sovereign debt, again rendering recourse to domestic institutions necessary. All of these approaches may reduce the availability of debt in general, but our analysis indicates that this may be a good thing.

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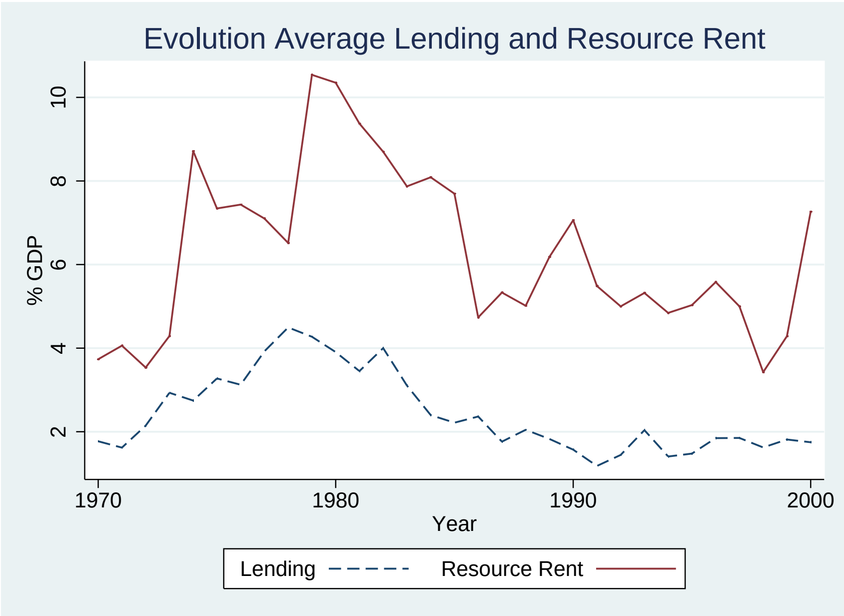


Figure 1: Evolution of Average Lending and Resource Rent (% GDP)

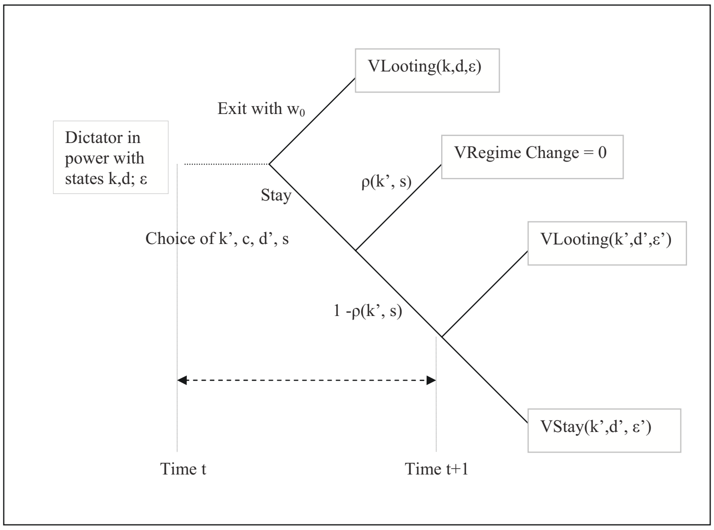


Figure 2: Dictator's Decision Tree

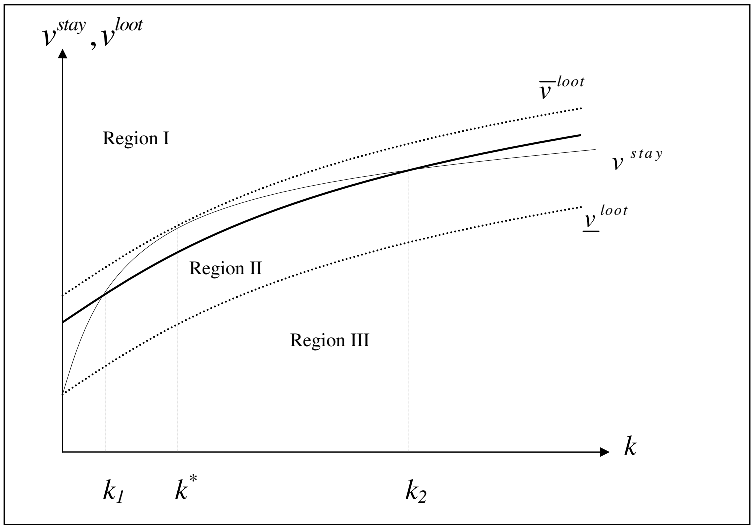
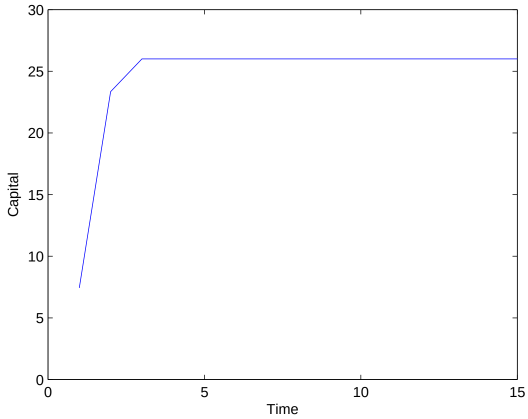


Figure 3: Looting and Staying Regions as function of θ_z

Simulation of the Model

Case of low liquidity

$\beta = 0.95$; $\sigma = 0.9$; $r = 0.12$; $\delta = 0.1$; $\theta_z = 0.3$; $\theta_k = 0.1$; $\lambda = 0.15$; $\varphi = 0.5$; $NR = 5$; $Y_s = 13$; $d_{max} = 37$

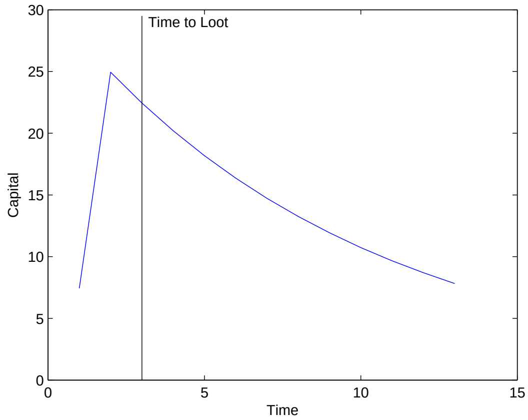


Period	Capital	Output	Debt	Consumption	Number Regimes
1	7.4	11.5	1.5	0.9	1
2	23.3	12.5	6.0	13.0	1
3	26.0	12.5	10.6	14.9	1
4	26.0	12.5	15.1	14.3	1
5	26.0	12.5	19.6	13.8	1
6	26.0	12.5	24.2	13.3	1
7	26.0	12.5	28.7	12.7	1
8	26.0	12.5	33.2	11.9	1
9	26.0	12.5	37.0	7.7	1
10	26.0	12.5	37.0	7.7	1
11	26.0	12.5	37.0	7.7	1
12	26.0	12.5	37.0	7.7	1
13	26.0	12.5	37.0	7.7	1
14	26.0	12.5	37.0	7.7	1
15	26.0	12.5	37.0	7.7	1

Figure 4: Optimal capital over time with low θ_z

Case of high liquidity

$\beta = 0.95$; $\sigma = 0.9$; $r = 0.12$; $\delta = 0.1$; $\theta_z = 0.6$; $\theta_k = 0.1$; $\lambda = 0.15$; $\varphi = 0.5$; $NR = 5$; $Y_s = 13$; $d_{max} = 56$

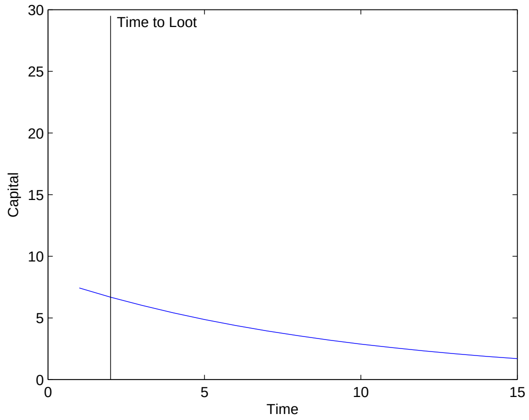


Period	Capital	Output	Debt	Consumption	VLoot	Number Regimes
1	7.4	11.5	2.3	1.2		1
2	24.9	12.5	9.1	16.1		1
3	22.4	12.4	14.1		184.8	1
4	20.2	12.4	19.1		183.8	2
5	18.2	12.3	24.1		182.9	3
6	16.4	12.3	29.1		182.0	4
7	14.7	12.2	34.1		181.2	5
8	13.3	12.1	38.1		180.4	6
9	11.9	12.0	42.1		179.7	7
10	10.7	11.9	46.1		179.0	8
11	9.7	11.8	50.1		178.3	9
12	8.7	11.7	54.1		177.7	10
13	7.8	11.5	56.0		177.2	11

Figure 5: Optimal capital over time with high θ_z

Case of high hazard

$\beta = 0.95$; $\sigma = 0.9$; $r = 0.12$; $\delta = 0.1$; $\theta_z = 0.3$; $\theta_k = 0.1$; $\lambda = 0.13$; $\varphi = 0.5$; $NR = 5$; $Y_s = 13$; $d_{max} = 37$



Period	Capital	Output	Debt	Consumption	ConsoLoot	VLoot	Number Regimes
1	7.4	11.5	1.5	0.85			1
2	6.7	11.3	3.5		0.18	168.37	1
3	6.0	11.1	5.5		0.17	167.68	2
4	5.4	11.0	7.5		0.17	167.04	3
5	4.9	10.8	9.5		0.16	166.44	4
6	4.4	10.6	11.5		0.15	165.89	5
7	3.9	10.4	13.5		0.15	165.38	6
8	3.6	10.1	15.5		0.15	164.90	7
9	3.2	9.9	17.5		0.14	164.47	8
10	2.9	9.6	19.5		0.14	164.06	9
11	2.6	9.4	21.5		0.13	163.69	10
12	2.3	9.1	23.5		0.13	163.35	11
13	2.1	8.8	25.5		0.13	163.04	12
14	1.9	8.5	27.5		0.13	162.76	13
15	1.7	8.2	29.5		0.13	162.50	14

Figure 6: Optimal Capital over time with High Hazard (low λ)

Table 1: List of Countries

Countries	Occurrence of Looting in the sample		
Algeria			1992
Argentina			1976
Bangladesh			1990
Bolivia	1978	1980	1981
Botswana			
Burundi			1987
Cameroon			1982
Central African Republic			1981
Chile			1973
China			
Congo Brazzaville			
Ecuador		1972	1976
Egypt			1981
El Salvador		1979	1980
Ghana	1972	1978	1981
Guatemala		1982	1983
Honduras	1972	1975	1978
Indonesia			1998
Iran			1979
Jordan			
Kenya			
Malaysia			
Mauritania			
Mexico			1994
Mozambique			
Nicaragua			1979
Niger	1974	1996	1999
Pakistan		1977	1999
Peru			1975
Philippines			
Rwanda			1973
Senegal			
Sierra Leone			1992
Sri Lanka			
Sudan		1985	1989
Syria			
Thailand		1973	1991
Togo			
Tunisia			1987
Turkey			1980
Uganda			
Zaire			1997
Zambia			
Zimbabwe			

We proxy looting with a binary variable that takes the value one if there is an irregular political change in regime.

Table 2: Definitions of Variables and Source

Variables	Definition	Data Source
Resource Rent (% GDP)	Quantity $*$ (Commodity price $-$ Unit extraction cost)$/GDP$	World Bank, Environment Dept
Resource Stock (% GDP)	Ratio of the stock of resource over GDP	World Bank, Environment Dept
Private Lending (% GDP)	Ratio of lending from private creditors over GDP	Global Development Finance 2006
Private Debt (% GNI)	Ratio of the debt from private creditors over GNI	Global Development Finance 2006
Real per capita GDP (log)	Real per capita GDP (PPP-adjusted)	Penn World Tables 6.2
Real per capita GDP Growth (%)	Real per capita GDP Growth (PPP-adjusted)	Penn World Tables 6.2
Inflation (%)	Annual consumer price index	World Development Indicator 2006
Population Growth (%)	Population Growth	Calculation from WDI 2006
Average Years of Schooling	Years of Schooling	Barro-Lee 2000
Investment (% GDP)	Investment share of real GDP	Penn World Tables 6.2
Trade (% GDP)	Export+Import over real GDP	Penn World Tables 6.2
Tenure	Leaders' length of tenure in years	Bueno de Mesquita, et al. 2003
Native European Language (%)	Share of the population speaking a European language at birth	Hall and Jones 1999
Riots	Violent demo./clash of 100+ citizens involving physical force	Banks 2001
Guerrilla Warfare	Guerrilla warfare– aimed at overthrow of regime	Banks 2001
Anti-government demonstrations	Peaceful public gathering 100+ people to express discontent	Banks 2001

Years of schooling has a 5-year frequency. Each data point is applied on a yearly basis in the 4 preceding years.

Table 3: Growth and Political Instability Regressions—Looting

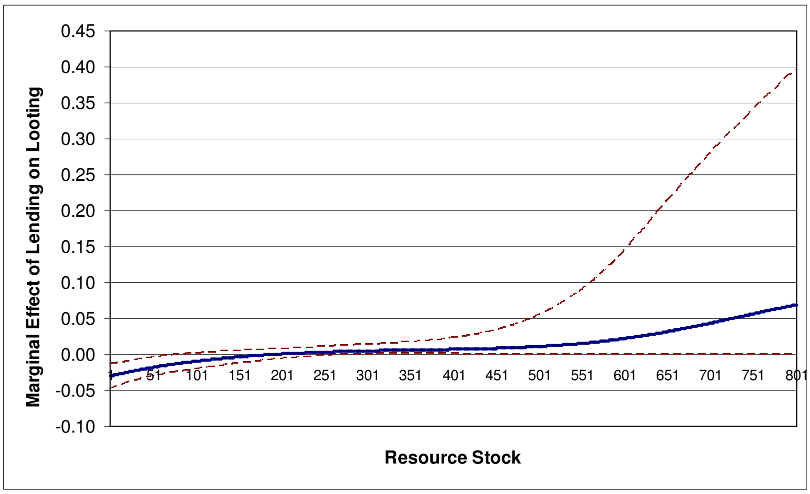
	Without country fixed effects		With country fixed effects	
	(1)		(2)	
Panel A: Growth Equation				
Dependent Variable: Real per capita GDP growth				
Loot	-8.790***	(2.602)	-7.899**	(3.466)
Lag Resource Rent (% GDP)	-0.0629	(0.0483)	-0.0328	(0.0410)
Lag per capita GDP Growth	0.0940**	(0.0463)	0.00908	(0.0438)
Population Growth	0.0459	(0.203)	0.113	(0.179)
Average Years of Schooling	-0.0977	(0.230)	0.0486	(0.496)
Inflation	-0.000297***	(0.0000924)	-0.000229**	(0.000111)
Investment (% GDP)	0.0352	(0.0602)	0.126	(0.125)
Trade (% GDP)	0.00452	(0.0107)	-0.0373	(0.0251)
Sub-Saharan Africa	-4.032***	(1.146)		
Middle East and North Africa	-2.213**	(0.859)		
Latin America	-2.029*	(1.062)		
Constant	6.740***	(2.274)	3.634	(3.696)
Panel B: Instability Equation				
Dependent Variable: Leaders' Looting				
Resource Stock (% GDP)	-0.00521**	(0.00211)	-0.00294	(0.00208)
Private Lending (% GDP)	-0.121***	(0.0469)	-0.125**	(0.0505)
Resource Stock×Lending	0.000639***	(0.000176)	0.000626***	(0.000177)
Resource Stock^2	0.000000687	(0.00000603)	-0.00000347	(0.00000652)
Private Debt (% GNI)	0.00174	(0.00713)	-0.00122	(0.00796)
Lag per capita GDP Growth	-0.00859	(0.0105)	-0.0136	(0.00954)
Lag Real per capita GDP	-6.395***	(1.756)	-4.322**	(1.878)
Lag Real per capita GDP^2	0.392***	(0.114)	0.257**	(0.121)
Tenure	0.00180	(0.00904)	-0.00690	(0.00899)
Native European Language (%)	-1.604***	(0.574)	-1.654**	(0.725)
Riots	0.119**	(0.0595)	0.119**	(0.0602)
Guerrilla Warfare	0.186*	(0.107)	0.108	(0.126)
Anti-government demonstrations	0.0464	(0.0404)	0.0503	(0.0450)
Sub-Saharan Africa	-0.866**	(0.342)	-0.732**	(0.346)
Middle East and North Africa	0.172	(0.420)	0.217	(0.393)
Latin America	2.032***	(0.500)	2.108***	(0.594)
Constant	24.65***	(6.811)	16.75**	(7.371)
Correlation ω	0.741***	(0.149)	0.675**	(0.222)
Variance σ	6.353***	(0.397)	5.966***	(0.363)
Observations	752		752	
Number of Countries	44		44	
Log Pseudo-Likelihood	-2544.0		-2505.9	
Wald Test of Indep. Eq Chi2(1)	8.342		4.038	

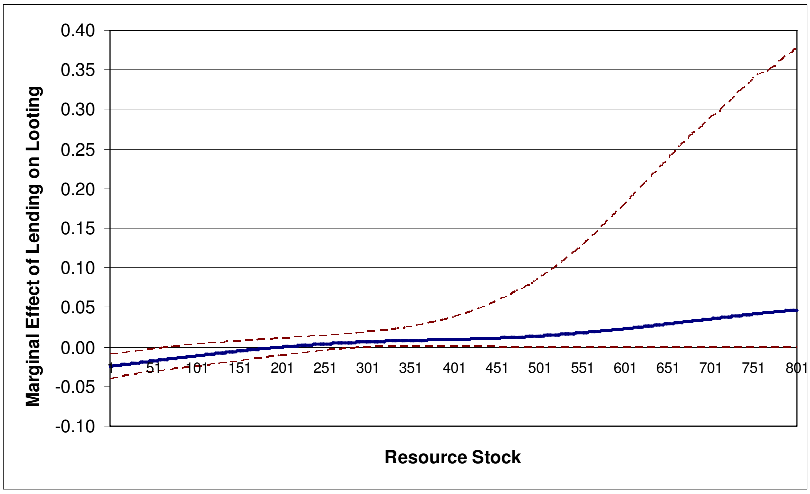
Standard errors clustered at the country level in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Dependent variables: GDP growth in Panel A (Outcome Equation) and Looting in Panel B (Treatment Equation).

Control for time dummies.

Figure 7: Marginal Effect of Lending on Looting





The full line represents the marginal effect of lending on the probability of looting as the resource stock increases from 0 to 800 percent of GDP. The dotted lines represent the confidence interval at 5% level. These graphs relate to the baseline regressions performed in Table 3. The first one depicts the marginal effect of lending on looting in the absence of country fixed effects, while the second one depicts the marginal effect in the presence of country fixed effects.

Table 4: Effect of Lending on Growth

Effect of Lending on Growth	Growth (1)	Growth (2)
Coefficient Loot	-8.790***	-7.899**
Pr(Loot=1|Mean Lending, Other Controls)	0.069	0.068
Pr(Loot=1|Mean Lending+Std Dev, Other Controls)	0.151	0.128
Increase in Probability of Loot	0.082***	0.06***
Total	-0.72	-0.47

Column (1) shows the effect without country fixed effects; column (2) with country fixed effects. The variables are set at their mean level (average country) except for resource levels, growth, log GDP per capita, and the number of riots and demonstrations which are set as in Nigeria in the year 1998 (at the end of Abacha's dictatorship). We test whether the partial effect of lending on the probability of looting is different from 0. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Second Stage Instrumental Variables—Probit for Loot Equation

	Loot with residuals		Loot without residuals	
	(1)		(2)	
Resource Stock (% GDP)	0.00182	(0.00659)	-0.00225	(0.00223)
Private Lending (% GDP)	0.127	(0.199)	-0.101**	(0.0482)
Resource Stock×Lending	-0.000592	(0.00136)	0.000589***	(0.000147)
Resource Stock^2	-0.00000398	(0.00000710)	-0.00000324	(0.00000573)
Private Debt (% GNI)	-0.00408	(0.0120)	-0.00709	(0.00671)
Lag per capita GDP Growth	-0.0137	(0.00995)	-0.0152	(0.00938)
Lag Real per capita GDP	-6.865	(4.525)	-4.333	(2.678)
Lag Real per capita GDP^2	0.408	(0.291)	0.248	(0.171)
Tenure	-0.0188	(0.0176)	-0.0111	(0.0125)
Native European Language (%)	-1.940*	(1.177)	-1.473*	(0.815)
Riots	0.155*	(0.0852)	0.110*	(0.0639)
Guerrilla Warfare	0.155	(0.176)	0.124	(0.145)
Anti-government demonstrations	0.0246	(0.0694)	0.0470	(0.0558)
Sub-Saharan Africa	-0.323	(0.457)	-0.495	(0.387)
Middle East and North Africa	0.156	(0.802)	0.432	(0.396)
Latin America	2.212***	(0.700)	2.087***	(0.627)
Residuals Resource Stock	-0.00398	(0.00621)		
Residuals Lending	-0.256	(0.206)		
Residuals Resource Stock	0.00126	(0.00143)		
Constant	26.55	(17.02)	17.20	(10.67)
Observations	752		752	
Number of Countries	44		44	
Log Pseudo-Likelihood	-132.0		-133.1	
Pseudo R-square	0.185		0.178	
F-test First Stage—Resource $F(25, 43)$	1.99			
F-test First Stage—Lending $F(25, 43)$	18.49			
F-test First Stage—Interaction $F(25, 43)$	2.22			
Test all residuals = 0—Chi2(3)	2.32			
P-value	0.5083			

Standard errors clustered at the country level in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

The three F-tests test the joint significance of the instrumental variables in each of the first-stage regressions.

The Chi2-test is an endogeneity test of the joint significance of the three residuals.

Table 6: Growth and Political Instability Regressions—Turnover of All Veto Players

	Without country fixed effects		With country fixed effects	
	(1)		(2)	
Panel A: Growth Equation				
Dependent Variable: Real per capita GDP growth				
Turnover All Veto Players	-9.343***	(2.024)	-8.104***	(2.505)
Lag Resource Rent (% GDP)	-0.0458	(0.0490)	0.00590	(0.0442)
Lag per capita GDP Growth	0.121**	(0.0486)	0.0277	(0.0473)
Population Growth	0.0133	(0.206)	0.0942	(0.179)
Average Years of Schooling	-0.00660	(0.214)	0.685	(0.737)
Inflation	-0.000335***	(0.000115)	-0.000229*	(0.000122)
Investment (% GDP)	0.0272	(0.0611)	0.187	(0.145)
Trade (% GDP)	0.00679	(0.0115)	-0.0456	(0.0295)
Sub-Saharan Africa	-3.671***	(1.151)		
Middle East and North Africa	-2.205**	(0.941)		
Latin America	-2.063*	(1.115)		
Constant	5.592**	(2.177)	4.997	(3.972)
Panel B: Instability Equation				
Dependent Variable: Turnover of 100% Veto Players				
Resource Stock (% GDP)	-0.00801***	(0.00209)	-0.00580***	(0.00219)
Private Lending (% GDP)	0.00404	(0.0337)	0.0192	(0.0355)
Resource Stock×Lending	0.000372***	(0.000116)	0.000280*	(0.000147)
Resource Stock^2	0.0000117***	(0.00000326)	0.00000739**	(0.00000327)
Private Debt (% GNI)	-0.00214	(0.00440)	-0.00261	(0.00546)
Lag per capita GDP Growth	0.0154	(0.0102)	0.00844	(0.00918)
Lag Real per capita GDP	-3.314	(2.042)	-1.816	(2.220)
Lag Real per capita GDP^2	0.206	(0.130)	0.104	(0.142)
Tenure	0.0210*	(0.0127)	0.00729	(0.0118)
Native European Language (%)	-1.095	(0.709)	-0.988	(1.065)
Riots	0.0250	(0.0483)	0.0368	(0.0576)
Guerrilla Warfare	0.198*	(0.112)	0.117	(0.135)
Anti-government demonstrations	0.0913***	(0.0295)	0.0866**	(0.0360)
Sub-Saharan Africa	-0.588	(0.382)	-0.553	(0.447)
Middle East and North Africa	-0.275	(0.493)	-0.00268	(0.436)
Latin America	1.576***	(0.580)	1.517*	(0.810)
Constant	11.60	(8.142)	6.228	(8.854)
Correlation ω	0.826***	(0.106)	0.772***	(0.158)
Variance σ	6.354***	(0.417)	5.949***	(0.388)
Observations	676		676	
Number of Countries	44		44	
Log Pseudo-Likelihood	-2272.4		-2237.2	
Wald Test of Indep. Eq Chi2(1)	12.47		6.906	

Standard errors clustered at the country level in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Dependent variables: GDP growth in Panel A (Outcome Equation) and Turnover of All Veto Players in Panel B (Treatment Equation). Control for time dummies.

7 Appendix A.1: Proof of Proposition 1 - Comparative Statics

Comparative Statics $V(k,d)$

From the Envelope Theorem we can derive the marginal changes of v^{stay} and v^{loot} with respect to k and d:

$V(k,d)$ is strictly increasing in k as:

$$\frac{\partial v^{stay}(k,d)}{\partial k} = (1-\rho(k',s))\left(f'(k)+(1-\delta)\right)u'(c^{stay}) > 0; \text{ and } \frac{\partial v^{loot}(k,d)}{\partial k} = \frac{r\theta_k}{1+r}\frac{u'(c^{loot})}{1-\beta} > 0$$

$V(k,d)$ is decreasing in d as:

$$\frac{\partial v^{stay}(k,d)}{\partial d} = -(1+r)(1-\rho(k',s))\,u'(c^{stay}) < 0; \text{ and } \frac{\partial v^{loot}(k,d)}{\partial d} = 0$$

Monotonicity of $V(k,d)$ with respect to θ_z, θ_k and Z

$$\frac{\partial v^{loot}(k,d)}{\partial \theta_z} = \frac{rZ}{1+r}\frac{u'(c^{loot})}{1-\beta} > 0; \text{ and } \frac{\partial v^{stay}(k,d)}{\partial \theta_z} = \beta(1-\rho(k',s))\frac{\partial EV}{\partial \theta_z}(k',d')$$

$$\frac{\partial v^{loot}(k,d)}{\partial \theta_k} = \frac{rk}{1+r}\frac{u'(c^{loot})}{1-\beta} > 0; \text{ and } \frac{\partial v^{stay}(k,d)}{\partial \theta_k} = \beta(1-\rho(k',s))\frac{\partial EV}{\partial \theta_k}(k',d')$$

$$\frac{\partial v^{loot}(k,d)}{\partial Z} = \frac{r\theta_z}{1+r}\frac{u'\left(c^{loot}\right)}{1-\beta} > 0; \text{ and } \frac{\partial v^{stay}(k,d)}{\partial Z} = (1-\rho(k',s))\left[\varphi'(Z)u'\left(c^{stay}\right)+\beta\frac{\partial EV(k',d')}{\partial Z}\right]$$

We now need to determine the sign of $\frac{\partial EV}{\partial \theta_z}$, $\frac{\partial EV}{\partial \theta_k}$ and $\frac{\partial EV}{\partial Z}$. We know that $EV(k',d')$ is the unique fixed point of a contraction mapping Λ (see Rust 1988 and 1994) such that when ε has an extreme value distribution, we have:

$EV = \Lambda(EV) = \log\left[\exp\left(v^{stay}(k',d')\right)+\exp\left(v^{loot}(k',d')\right)\right]$

So we have $H(EV;\theta_z,Z) \equiv EV - \Lambda(EV) = (I-\Lambda)(EV) = 0$. By the implicit function theorem:

$$\frac{\partial EV}{\partial \theta_z} = \left(I-\Lambda'(EV)\right)^{-1}\frac{\partial \Lambda(EV)}{\partial \theta_z}$$

Now by differentiating Λ with respect to EV, we obtain $\Lambda'(EV) = \beta(1-\rho(k'',s'))\,Pr(\chi=0|k',d')$ so that:

$$(I-\Lambda)'(EV) = 1-\beta(1-\rho(k'',s'))\,Pr(\chi=0|k',d')$$

In addition we can show that:

$$\frac{\partial \Lambda(EV)}{\partial \theta_z} = \frac{rZ}{1+r}\frac{u'\left(c'^{loot}\right)}{1-\beta}Pr\left(\chi=1|k',d'\right)$$

Hence we obtain:

$$\frac{\partial EV}{\partial \theta_z} = \frac{Pr\left(\chi=1|k',d'\right)}{1-\beta\left(1-\rho(k'',s')\right)Pr\left(\chi=0|k',d'\right)}\frac{rZ}{1+r}\frac{u'\left(c'^{loot}\right)}{1-\beta} > 0$$

Similarly we determine:

$$\frac{\partial EV}{\partial \theta_k} = \frac{Pr\left(\chi=1|k',d'\right)}{1-\beta\left(1-\rho(k'',s')\right)Pr\left(\chi=0|k',d'\right)}\frac{rk}{1+r}\frac{u'\left(c'^{loot}\right)}{1-\beta} > 0$$

$$\frac{\partial EV}{\partial Z}(k',d') = \frac{\varphi'(Z)u'(c'^{stay})Pr\left(\chi=0|k',d'\right) + \frac{r\theta_z}{1+r}\frac{u'\left(c'^{loot}\right)}{1-\beta}Pr\left(\chi=1|k',d'\right)}{1-\beta\left(1-\rho(k'',s')\right)Pr\left(\chi=0|k',d'\right)} > 0$$

Given that $\frac{\partial EV}{\partial \theta_z}$, $\frac{\partial EV}{\partial \theta_k}$ and $\frac{\partial EV}{\partial Z}$ are all strictly positive, it follows that V is strictly increasing in θ_z, θ_k and Z.■

Comparative statics: Monotonicity of $\Delta V(k,d)$

Comparative statics of $\Delta V(k,d)$ with respect to d, θ_z and θ_k

First let us analyse the partial effect of d on $\Delta V(k,d)$.

$\frac{\partial \Delta V(k,d)}{\partial d} = -\left(1+r\right)\left(1-\rho(k',s)\right)u'(c^{stay})$

It follows that ΔV is decreasing with respect to d.

We are now interested in the effect of θ_z on $\Delta V(k,d)$.

$\frac{\partial \Delta V(k,d)}{\partial \theta_z} = \beta\left(1-\rho(k',s)\right)\frac{\partial EV}{\partial \theta_z}(k',d') - \frac{rZ}{1+r}\frac{u'(c^{loot})}{1-\beta}$

Replacing $\frac{\partial EV}{\partial \theta_z}$ by its expression and given c^{loot} is constant by assumption, $u'\left(c^{loot}\right) = u'\left(c'^{loot}\right)$, we obtain:

$$\frac{\partial \Delta V(k,d)}{\partial \theta_z} = \frac{rZ}{1+r}\frac{u'\left(c^{loot}\right)}{1-\beta}Q \tag{20}$$

where $Q \equiv \dfrac{\beta\left(1-\rho(k',s)\right) Pr\left(\chi=1|k',d'\right)+\beta\left(1-\rho(k'',s')\right) Pr\left(\chi=0|k',d'\right)-1}{1-\beta\left(1-\rho(k'',s')\right) Pr\left(\chi=0|k',d'\right)}$.

Now, it is clear that the numerator $\beta\left(1-\rho(k',s)\right) Pr\left(\chi=1|k',d'\right)+\beta\left(1-\rho(k'',s')\right) Pr\left(\chi=0|k',d'\right)<1$. It follows that the $\dfrac{\partial\Delta V(k,d)}{\partial\theta_z}<0$. That is the return to staying decreases as θ_z increases.

Similarly, we determine the monotonicity with respect to θ_k:

$$\frac{\partial\Delta V(k,d)}{\partial\theta_k}=\frac{rk}{1+r}\frac{u'\left(c^{loot}\right)}{1-\beta}Q<0 \tag{21}$$

That is the return to staying decreases as θ_k increases.

Non-monotonicity of $\Delta V(k,d)$ with respect to k and Z

Let us first consider the case of k:

$$\frac{\partial\Delta V(k,d)}{\partial k}=\left(1-\rho(k',s)\right)\left(f'(k)+(1-\delta)\right)u'(c^{stay})-\frac{r\theta_k}{1+r}\frac{u'(c^{loot})}{1-\beta} \tag{22}$$

To determine the non-monotonicity of ΔV with respect to k, we will apply the idea of relative concavity[32] to $v^{stay}(k,d)$ and $v^{loot}(k,d)$. As $u(c^{stay})$ is a composite of two increasing and concave functions, there is a presumption that it is more concave in k than $u(c^{loot})$, which implies that $v^{stay}(k,d)$ would be more concave than $v^{loot}(k,d)$. We want to determine the condition under which this is true, i.e. $-\dfrac{\partial^2 v^{stay}/\partial k^2}{\partial v^{stay}/\partial k}>-\dfrac{\partial^2 v^{loot}/\partial k^2}{\partial v^{loot}/\partial k}$.

We can show that $v^{stay}(k,d)$ is more concave than $v^{loot}(k,d)$ with respect to k if the following condition is satisfied:

$$-\frac{f''(k)}{f'(k)+(1-\delta)}-\left(f'(k)+(1-\delta)\right)\frac{u''(c^{stay})}{u'(c^{stay})} \quad > \quad -\frac{r\theta_k}{1+r}\frac{u''(c^{loot})}{u'(c^{loot})} \tag{23}$$

Under this condition, v^{stay} exhibits faster diminishing returns to capital than v^{loot}. This implies that the gains from staying will increase for sufficiently low capital levels, for which the first term in equation (22) is larger that the second term. For large enough capital levels, the second becomes greater than the first term. This results in the non-monotonicity of ΔV with respect to k.

Let us now look at the non-monotonicity with respect to Z.

[32] Assume h and g are twice differentiable on (a,b), h is concave with respect to g (or h is more concave than g) if for h and g increasing we have: $-\dfrac{h''(x)}{h'(x)}>-\dfrac{g''(x)}{g'(x)}$ for any $x\in(a,b)$

$$\frac{\partial \Delta V(k,d)}{\partial Z} = \left(1-\rho(k',s)\right)\left[\varphi'(Z)u'\left(c^{stay}\right)+\beta\frac{\partial EV(k',d')}{\partial Z}\right] - \frac{r\theta_z}{1+r}\frac{u'(c^{loot})}{1-\beta}$$

$$\frac{\partial \Delta V(k,d)}{\partial Z} = (1-\rho(k',s))\,\varphi'(Z)\left[u'(c^{stay})+\beta u'(c'^{stay})D\right]+\frac{r\theta_z}{1+r}\frac{u'\left(c^{loot}\right)}{1-\beta}Q \tag{24}$$

where $D \equiv \dfrac{Pr\left(\chi=0|k',d'\right)}{1-\beta\left(1-\rho(k'',s')\right)Pr\left(\chi=0|k',d'\right)}$, and $Q<0$ was defined above.

Applying the same method, we show that $v^{stay}(k,d)$ is more concave than $v^{loot}(k,d)$ with respect to Z if:

$$-\frac{\varphi''(Z)}{\varphi'(Z)}-\varphi'(Z)\frac{u''(c^{stay})+\beta u''(c'^{stay})D}{u'(c^{stay})+\beta u'(c'^{stay})D} > -\frac{r\theta_z}{1+r}\frac{u''\left(c^{loot}\right)}{u'\left(c^{loot}\right)} \tag{25}$$

Then under condition (25), ΔV is non-monotonic with respect to Z. v^{stay} exhibits faster diminishing returns to resources than v^{loot}. This implies that the gains from staying will increase for sufficiently low resource levels, for which the first term in equation (24) is larger that the second term. For large enough resource levels, the second becomes greater than the first term.

Effect of Z on $\dfrac{\partial \Delta V(k,d)}{\partial \theta_z}$

The cross-partial derivative of ΔV with respect to θ_z and Z is given by:

$$\frac{\partial^2 \Delta V(k,d)}{\partial Z \partial \theta_z} = \left(u'\left(c^{loot}\right)+\frac{r\theta_z Z}{1+r}u''\left(c^{loot}\right)\right)\frac{rQ}{(1+r)(1-\beta)} \tag{26}$$

We know that the Q is negative so that $\dfrac{\partial^2 \Delta V(k,d)}{\partial \theta_z \partial Z}<0$ if and only if $u'\left(c^{loot}\right)+\dfrac{r\theta_z Z}{1+r}u''\left(c^{loot}\right)>0$. That is:

$$-\frac{u''\left(c^{loot}\right)}{u'\left(c^{loot}\right)} < \frac{1+r}{r\theta_z Z} \tag{27}$$

The LHS of the inequality is the Arrow-Pratt measure of risk aversion. If the dictator is not too risk averse then the negative effect of liquidity supplied by banks on the likelihood of looting increases with resource wealth Z. ■

8 Appendix A.2: Proof of Proposition 2

Case 1: $v^{loot}(k,d) > v^{loot}(\overline{\theta}_z)$ ***for a given*** d ***and*** θ_k

By definition of $v^{loot}(\overline{\theta}_z)$, $v^{loot}(k,d) > v^{loot}(\overline{\theta}_z)$ implies that for any value of capital k, $v^{stay}(k,d) < v^{loot}(k,d)$. Looting is always optimal independently of k.

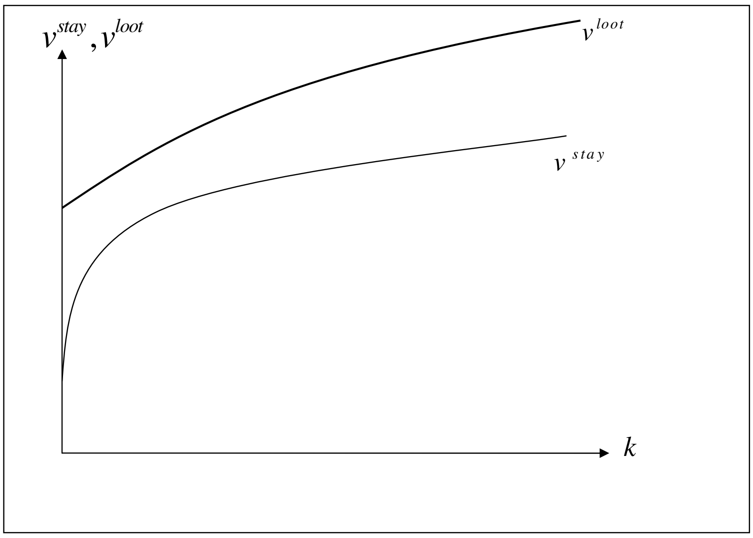


Figure 8: Case 1: Dictator Always Loots

Case 2: $v^{loot}(\underline{\theta}_z) < v^{loot}(k,d) < v^{loot}(\overline{\theta}_z)$ ***for a given*** d ***and*** θ_k

Given that 1) $v^{loot}(\underline{\theta}_z) < v^{loot}(k,d) < v^{loot}(\overline{\theta}_z)$ for some d and θ_k; 2) both v^{loot} and v^{stay} are continuous in k and strictly increasing; and 3) the value of staying is more concave than the value of looting under condition (23), there exist two points of intersection between v^{stay} and v^{loot}. The value v^{stay} increases fast enough (for low k, v^{stay} increases faster than v^{loot}) to intersect v^{loot} from below at $\tilde{k}_1$. As k increases the combination of point 2 and 3 results in v^{stay} intersecting v^{loot} from above at $\tilde{k}_2$. Formally, there exist two capital levels $\tilde{k}_1$ and $\tilde{k}_2$ such that for $\tilde{k}_1 < \tilde{k}_2$:

1. $v^{stay}(\tilde{k}_1,d) = v^{loot}(\tilde{k}_1,d)$ and $\dfrac{\partial v^{stay}}{\partial k}(\tilde{k}_1,d) > \dfrac{\partial v^{loot}}{\partial k}(\tilde{k}_1,d)$
2. $v^{stay}(\tilde{k}_2,d) = v^{loot}(\tilde{k}_2,d)$ and $\dfrac{\partial v^{stay}}{\partial k}(\tilde{k}_2,d) < \dfrac{\partial v^{loot}}{\partial k}(\tilde{k}_2,d)$
3. $v^{stay}(k,d) < v^{loot}(k,d)$ for $k < \tilde{k}_1$ and $k > \tilde{k}_2$; and $v^{stay}(k,d) > v^{loot}(k,d)$ for $\tilde{k}_1 < k < \tilde{k}_2$

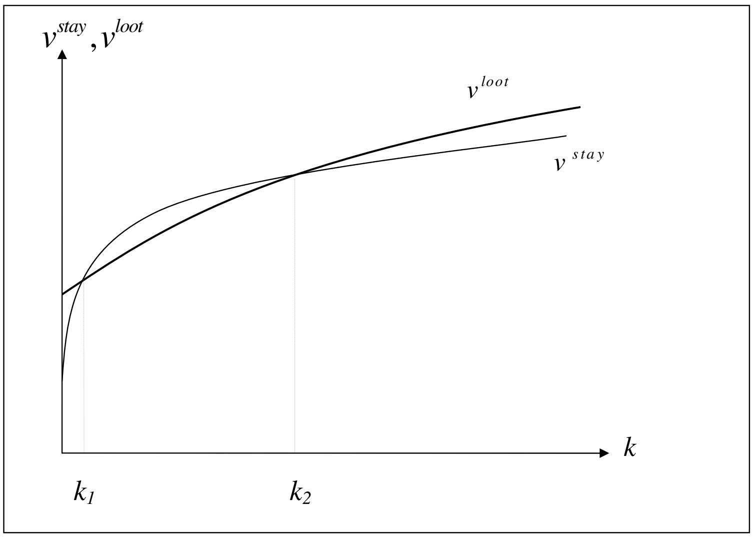


Figure 9: Case 2: Dictator Loots for Low and High k

Case 3: $v^{loot}(k,d) < v^{loot}(\underline{\theta}_z)$ ***for a given*** d ***and*** θ_k

Given that 1) $v^{loot}(k,d) < v^{loot}(\underline{\theta}_z)$ for some debt level d; 2) both v^{loot} and v^{stay} are continuous in k and strictly increasing; and 3) the value of staying is more concave than the value of looting under condition (23), it follows that there exists a capital level $\tilde{k}_3$ such that

$$v^{stay}(\tilde{k}_3, d) = v^{loot}(\tilde{k}_3, d) \text{ and } \frac{\partial v^{stay}}{\partial k}(\tilde{k}_3, d) < \frac{\partial v^{loot}}{\partial k}(\tilde{k}_3, d) \text{ for some } d$$

The inequality is necessary because as v^{loot} is initially below v^{stay}, it has to grow faster than v^{stay} to catch up. For any $k < \tilde{k}_3$, $v^{stay}(k,d) > v^{loot}(k,d)$. For any $k > \tilde{k}_3$, $v^{stay}(k,d) < v^{loot}(k,d)$.

To summarise, if $v^{loot}(k,d) < v^{loot}(\underline{\theta}_z)$ for some debt level d, then there exists a capital level $\tilde{k}_3$ such that $v^{stay}(\tilde{k}_3, d) = v^{loot}(\tilde{k}_3, d)$ and $(1-\rho(k',s))\left(f'(\tilde{k}_3) + (1-\delta)\right) u'(c^{stay}) < \frac{r\theta_k}{1+r}\frac{u'(c^{loot})}{1-\beta}$. The dictator loots for any capital level above $\tilde{k}_3$ and stays otherwise.

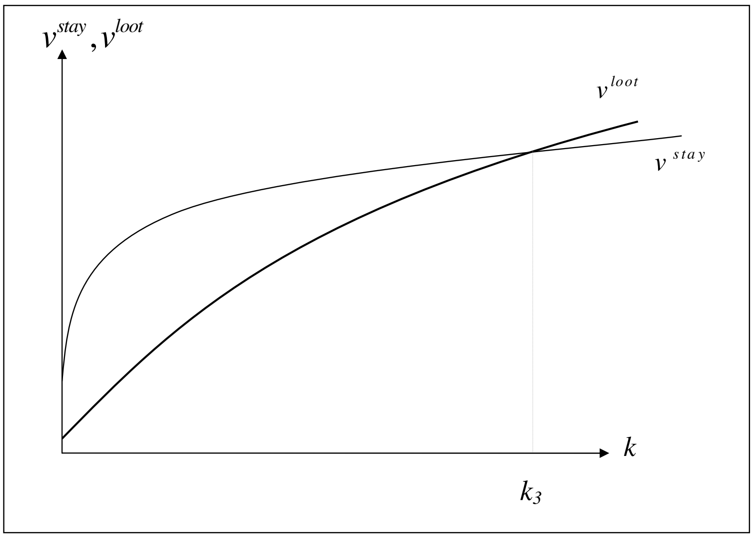


Figure 10: Case 3: Dictator Loots only for High k

Comparative static of $\tilde{k}_i$ $(i = 1, 2, 3)$ with respect to θ_z and θ_k

Using $\dfrac{\partial EV}{\partial \theta_k}$ and $\dfrac{\partial EV}{\partial \theta_z}$ determined in Appendix A.1 and the implicit function theorem, we obtain:

$$\frac{\partial \tilde{k}_i}{\partial \theta_k} = \frac{\dfrac{rk}{1+r}\dfrac{u'(c^{loot})}{1-\beta}Q}{(1-\rho(k',s))\,(f'(k)+(1-\delta))\,u'(c^{stay}) - \dfrac{r\theta_k}{1+r}\dfrac{u'(c^{loot})}{1-\beta}}$$

$$\frac{\partial \tilde{k}_i}{\partial \theta_z} = \frac{\dfrac{rZ}{1+r}\dfrac{u'(c^{loot})}{1-\beta}Q}{(1-\rho(k',s))\,(f'(k)+(1-\delta))\,u'(c^{stay}) - \dfrac{r\theta_k}{1+r}\dfrac{u'(c^{loot})}{1-\beta}}$$

We established in Appendix A.1 that Q is negative so that the signs of these ratios depend on the sign of the denominator. When the marginal liquidity of capital is larger than the marginal product of capital, then the denominator is negative and $\tilde{k}_i$ increases with both θ_k and θ_z. In particular, we infer that the denominator is negative at $\tilde{k}_2$ and $\tilde{k}_3$ (see Case 2 and Case 3) and positive at $\tilde{k}_1$ (see Case 2). Therefore, it follows that $\tilde{k}_1$ is decreasing in θ_k and θ_z while $\tilde{k}_2$ and $\tilde{k}_3$ are increasing with these parameters.■