The Transparency Curse: Private Information and Political Freedom.

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Abstract
I offer a model of the sustainability of authoritarian rule that is consistent with the apparent existence of a “resource curse”, in which, at a given level of income, primary resource exporting countries appear to be more prone to authoritarian rule. The key to the model is authoritarian governments’ inability to monitor anti-government conspiracy in the innovative sector of the economy.

Introduction

Authoritarian governments often display hostility to innovation, whether of the scientific sort, or of the entrepreneurial variety. During Summer, 1933 industrialist Carl Bosch complained to Hitler about the damaging effects on German competitiveness of widespread dismissals of Jewish professors in physics and chemistry. Hitler replied that “Germany could get on for another hundred years without any physics or chemistry at all” (Evans, 2003) p.426.

While authoritarian governments are all too effective at forcing people to carry out easily monitored tasks, they have more difficulty inducing individuals to take hidden actions. Yet hidden actions are often an intrinsic part of innovating and managing complicated and idiosyncratic enterprises. Indeed, even many mundane tasks, such as running a bodega, or share cropping,

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involved taking hidden actions. However, the autonomy necessary to do an effective job of extending the scientific frontier, or even running a solvent taxi company, may also be the autonomy one needs to mount an effective conspiracy. A government that allows it’s citizens the freedom to innovate and produce as they will may also find it has left them with the freedom to plot its own downfall.

Here I present a model that incorporates economic activity that leaves citizens with private information about their productivity in an autonomous economic activity. This private information makes it difficult for the government to distinguish a worker with low productivity in the private sector from a worker with high productivity who is plotting. This inability to discern whether workers are plotting may lead an authoritarian government to have to choose between liberalization or shutting down the productive sector of the economy. The less transparent the activity is, the greater the cost of maintaining an authoritarian government rather than liberalizing.

The model identifies conditions under which authoritarian governments will prefer to step down, as did Spain’s Juán Carlos, as well as military governments in Chile and Korea, and the one-party state in the Republic of China (Taiwan), preferring to accept a smaller share of the larger pie that results from political liberalization. This is most likely to occur when hidden actions and innovation are important, and least likely when economic activity uses known and easy to monitor technologies.

These findings are relevant for two strands of the political economy literature that coexist uneasily: the association between high income and democracy identified by Lipset (1959), and pursued by many others, and the so-called “resource curse”, see for example Gelb (1988). The first pole of the literature emphasizes that wealthy countries tend to be democratic, and scholars often assert a causal relationship, typically from wealth to democracy, see for example Londregan and Poole (1990), or Cheibub et al. (1996). The
second axis of investigation, focuses on the tendency for the governments of primary resource exporters to be authoritarian, an effect that is asserted to overwhelm any pro-democratic effects that may spring from the extra income the resources entail see Ross (2001), Humphrey’s, Sachs and Stiglitz (2007), and Dunning (2008). The model I develop here implies the costs of totalitarian rule are higher when the information asymmetry between the government and workers in the productive sector is greater. *ceteris paribus* information rents will be higher when the overall level of economic activity is greater (*e.g.* taxi drivers in London earn greater information rents than their counterparts in the even more labyrinthine Calcutta), making totalitarian rule more costly in wealthier countries. If we add the plausible ancillary hypothesis that resource extraction activities are relatively easy to monitor, and so involve relatively small information rents\(^1\), then the model is also consistent with the hypothesis that the economic costs of totalitarian rule are lower in extractive economies. Rather than a “resource curse” linking large endowments of extractable resources to authoritarian rule, there is a “transparency curse”, in which easy to monitor economic activities provide a stable base for authoritarian rule.

The next section of the paper sets forth a simple information theoretic model of the political economy of production and rent extraction by the government.

1 Information Theory and Rent Extraction

The model centers on the informational asymmetry between a citizen and her government. Because the government is sovereign it cannot bind itself to a contract. This is a key departure from principal-agent models in which

\(^1\)Resource exploration is another matter, and resource extractive countries often experience difficulties in exploring for new reserves.
the principal is able to bind herself to a contract, see for example Laffont and Martimort (2002). In this model a citizen’s productivity at innovative activity is drawn from a probability distribution—the realized value of her productivity is private information. In addition the citizen can devote a fraction of her time to plotting against the government. Whether a revolt against the government occurs depends on the citizen’s decision to go through with her plot, and on whether she has spent enough time “arming” or otherwise organizing her intrigue. If rebellion occurs some output is destroyed and the citizen disposes of what remains. The citizen is able to work at innovation, or in a traditional productive activity where her productivity level is known to be low. For its part, the government can reward high levels of output and punish low levels using a combination of punishment, think of this as capital punishment, and economic rewards, in the form of giving the citizen back some of the output she has produced. If the government suspects plotting on the part of the citizen, it can inflict punishment and or withhold rewards. The government can observe the citizen’s economic output but not her productivity, and it cannot observe the way she uses her time. At the initial stage the government can choose whether or not to allow the citizen to use a productive but hard to monitor technology where her productivity is private information for the citizen, or whether she is restricted to a traditional production technique where her productivity is known. The government also can choose whether to forgo the ability to punish the citizen. If it does so the citizen can dismiss the government with probability one, but at a cost that is proportional to output. The output lost from dismissing the government is lower than the output destroyed in a successful rebellion.

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2This paper takes a somewhat darker vision of government than that of Hobbes, Locke, and Rousseau. Instead of a social contract there is a predatory state.

3This feature of the model is shared with the framework set forth in chapters 4 and 5 of Acemoglu and Robinson (2005), though it differs in several other respects.
1.1 The Model

The preferences of the citizen are:

\[
U_C = t + \eta(\Phi q - t) \\
= t + \eta(\Phi q - t) + \alpha \left( \rho(\Lambda q - t) - \pi(t + \rho(\Lambda q - t) + B) - \eta(\Phi q - t) \right)
\] (1)

Here \( q \) is the output quantity produced by the citizen, all of which is under the control of the government, and \( t \) is the consumption allotted to citizens by the government, and \(-B\) is the subjective value of being punished by the government, think of this as the death penalty, so that \( B \) is very large compared with the available resources.

Equation (1) says that if the government remains in place and does not punish the citizen she receives the transfer \( t \) that the government chooses for her. If she overthrows or expels the government she gets what remains of output, and if she is punished her wellbeing corresponds to \(-B\).

Going through this a bit at a time, the variable \( \alpha \) is an indicator for whether government chooses repressive institutions, with \( \alpha = 1 \) indicating that the government selects a repressive system that gives it the option to punish the citizen, while \( \alpha = 0 \) means the government relinquishes this capability. In equation (1) we see that if the government chooses not to repress then either the citizen chooses to expel it, setting \( \eta = 1 \), in which case she receives a payoff of \( \Phi q \), where \( \Phi \) represents the costs of losing the expertise of the government\(^4\), or the citizen chooses to leave the government in place and accept the transfer the government offers her. If the government does choose to repress then the citizen is either punished, \( \pi = 1 \) with a payoff of \(-B\), or she is allowed to remain alive. If she lives she either overthrows the

\(^4\)This can be less benign, it may include the destruction of files and fixtures and other forms of sabotage committed by an outgoing government.
government, if she has made the relevant preparations and chooses to rebel, or she accepts the government’s transfer of \( t \). In the wake of a successful rebellion the citizen receives all of the surviving output: \( \Lambda q \), where \( \Lambda \) is the fraction that makes it through the rebellion.

The government’s preferences are:

\[
\begin{align*}
U_G &= (1 - \eta)(q - t) \\
&+ \alpha \left( \eta(q - t) + \pi(t + (\Psi - 1)q + \rho(B + q - t)) - \rho(B + q - t) \right) \quad (2)
\end{align*}
\]

Equation (2) says that if the government liberalizes and the citizen chooses to let it stay in power, or if the government represses, leaves the citizen alive, and it is not overthrown, then it receives what is left of output after the citizen has received a transfer of \( t \). If instead if the citizen chooses to expel the government in an unpressive environment it receives nothing, while in case of an overthrow it is the government that is punished. If a repressive government punishes the citizen the government receives a fraction \( \Psi \) of output, while the rest is deemed to be destroyed\(^5\).

Now let’s consider the sequence of events in more detail.

(1) Nature chooses \( \theta \in \{\underline{\theta}, \bar{\theta}\} \). The probability of \( \theta = \underline{\theta} \) is \( \epsilon \), while the probability that \( \theta = \bar{\theta} \) is \( 1 - \epsilon \).

(2) Government selects the institutional structure, by choosing either \( \alpha = 1 \) and retaining the ability to punish the citizen and imposing its choice of productive technology \( \tau \), or \( \alpha = 0 \) and subjecting itself to removal by the citizen, while the citizen is left free to choose \( \tau \). As the government chooses the political and productive regime it does so under uncertainty about the citizen’s productivity parameter. The government does know the \textit{ex ante} probabilities for \( \bar{\theta} \) and \( \underline{\theta} \).

\(^5\)This can also be thought of as encompassing the costs to the government of inflicting punishment.
There are two technologies, an innovative technology, indicated by \( \iota = 1 \) that depends on the citizen’s productive type \( \theta \) in which the quantity produced is \( q = \theta s \), where \( s \in [0, 1] \) is the fraction of her time the citizen devotes to production. The second technology, denoted \( \iota = 0 \), delivers a quantity of \( q = \theta_0 s \), regardless of the citizen’s productivity parameter. The parameter \( \theta_0 \) satisfies:

\[
\underline{\theta} < \theta_0 < \bar{\theta} + \epsilon (\bar{\theta} - \underline{\theta}) \tag{3}
\]

This says that the \( \iota = 0 \) technology is more productive than a citizen in the \( \iota = 1 \) activity if her productivity is low, but it falls short of the expected productivity of a citizen in the innovative industry. Expression (3) also tells us that the \( \iota = 0 \) technology is less productive than the high productivity realization of the \( \iota = 1 \) process.

(3) After the political regime \( \alpha \) and the production technology \( \iota \) are chosen by the government, the citizen allocates her time between production and preparing a rebellion. Only if she spends more than a fraction \( 1 - \xi \) of her time getting the rebellion ready will she be able to choose \( \rho \) at the rebellion stage. If the political regime is \( \alpha = 0 \) then rebellion is dominated by excercising the right to expel the government, as \( \Phi > \Psi \).

(4) Once the citizen has made her time allocation decision, the government observes \( q \). At this stage the government updates its beliefs about the citizen’s productivity parameter \( \theta \) on the basis of having observed \( q \).

(4a) If the regime is repressive the government now decides whether to punish the citizen, setting \( \pi = 1 \) and receive a terminal payoff of \( \Psi q \). If the government chooses \( \pi = 1 \) the citizen’s payoff is \(-B\) and the decision making comes to an end.

(5) If the government chooses not to punish, or if the regime is not a repressive one, the government next chooses a transfer \( t \) to profer to the citizen.
At this stage the citizen either accepts the transfer of $t$, or does away with the government. She can only avail herself of the option of ejecting the government if she spent at least a fraction $1 - \xi$ of her time preparing for rebellion during the production stage, or if the regime is not repressive. Remember that if the citizen is punished at stage (4a) then stages (5) and (6) do not occur.

If at stage (6) the citizen accepts $t$ then her payoff is $t$ while the government receives a payoff of $q - t$. If in contrast the citizen tosses the government out then the government’s payoff is 0, if it is expelled in an open regime, or $-B$ if the citizen rebels against a repressive regime. If the citizen expels a non-repressive government her payoff is $\Phi q$, while if she rebels against a repressive regime her payoff is $\Lambda q$. It seems reasonable that even the most chad infested, litigation ridden election will still result in less destruction than an armed rebellion, so I impose the condition:

$$\Lambda < \Phi$$  \hspace{1cm} (4)

The following tables summarize the symbols used in the model. Firstly there are the strategic variables chosen by the government:

| $\alpha$ | G’s binary choice of regime type. |
| $t_G$ | G’s binary choice of production technology (when $\alpha = 1$) |
| $\pi$ | G’s binary decision whether to liberalize |
| $t$ | G’s non-negative transfer to C |

The citizen can choose the following variables:

| $t_C$ | C’s binary choice of production technology (when $\alpha = 0$) |
| $\rho$ | C’s binary choice whether to rebel. |
| $\eta$ | C’s binary choice whether to expel the leader. |
| $q$ | C’s production decision. |
In the $\alpha = 1$ regime, the time $C$ does not spend on production is spent preparing to rebel.

The following variables are parameters of the model:

- $\epsilon$: The probability nature chooses $\theta = \tilde{\theta}$.
- $\theta_0$: The productivity parameter for the $t = 0$ technology.
- $\bar{\theta}$: The high value for the $t = 1$ productivity parameter.
- $\underline{\theta}$: The low value for the $t = 1$ productivity parameter.
- $-B$: The punishment payoff.
- $\Phi$: the fraction of output not lost when the government is expelled.
- $\Lambda$: the fraction of output not lost when the government is overthrown.
- $\Psi$: the fraction of output not lost when the citizen is punished.

I impose the following condition on the punishment payoff:

$$-B < -\frac{2\bar{\theta}}{\epsilon}$$

being punished is “a very bad thing”.

Finally we denote the information set for the government at stage 2 of the game by $\mathcal{F}_2$, while it’s information set at stages (4A) and (5) is $\mathcal{F}_4$. Likewise, let $\mathcal{F}_3$ denote the citizen’s information set at stage 3, while $\mathcal{F}_6$ is her information at stage 6 if it is reached. In contrast with the government the citizen observes $\theta$, so her only source of uncertainty at stage 3 arises from not knowing what policies, $t$ and $\pi$, the government will select. At stage 6 she knows the entire state of the system.

A strategy for the government is a set of contingent plans setting forth how the government will choose $\alpha$, and $\lambda$, and if it selects $\lambda = 1$, how it will choose $t$ at at stage 2 given $\mathcal{F}_2$, and how it will choose $\pi$ at stage (4a) (when $\alpha = 1$), and how it will select $t$ at stage (5) (provided $\alpha\pi \neq 1$) contingent on $\mathcal{F}_4$.

I will denote this as:
A strategy for the citizen is a similar set of plans that depend on her information at stage 3, for the choice of \( q \), (and of \( t \) if \( \lambda = 0 \)) and at stage 6, for the selection of \( \eta \) and \( \rho \):

\[
\sigma_G \equiv \begin{pmatrix} \alpha^* \\ \tau_G^* \\ \pi^* \\ t^* \end{pmatrix}
\]  

\[ (6) \]

**Definition:** A *sequentially rational equilibrium* (Kreps and Wilson, 1982) to this game consists of a pair of strategies \( \sigma_G \) and \( \sigma_C \), and a set of beliefs at each decision node, such that:

(a) \( \alpha^* \), and \( \tau_G^* \) solve (8):

\[
\begin{align*}
\max_{\alpha, \tau_G} & \quad E((1 - \alpha)(1 - \eta)(q - t) \\
& + \alpha(\pi \Psi q + (1 - \pi)(1 - \rho)(q - t) - (1 - \pi)\rho B) | \mathcal{G}_2) \quad (8)
\end{align*}
\]

(b) \( q^* \) and \( \tau_C^* \) solve (9):

\[
\begin{align*}
\max_{\mathbf{q}, \mathbf{t}_C} & \quad E\{(1 - \alpha)(t + \eta(\Phi q - t)) + \alpha \left[(1 - \pi)(t + \rho(A q - t) - \pi B)| \mathcal{G}_3\right] \\
\text{subject to} & \quad q \leq \theta_0 + \tau_C (\theta - \theta_0) \quad (9)
\end{align*}
\]

(c) \( \pi^* \) solves (10):
\[
\max_{\alpha} \mathbb{E}\left( \pi \left( \Psi (q - (1 - \rho)(q - t) + \rho B) + (1 - \rho)(q - t) - \rho B \right) \right) \tag{10}
\]

(d) \(t^*\) solves (11):

\[
\max_{t} \mathbb{E}\left( (1 - \alpha)(1 - \eta)(q - t) + \alpha(1 - \pi)\left((1 - \rho)(q - t) - \rho B\right) \right) \tag{11}
\]

(e) \(\eta^*\) and \(\rho^*\) solve (12):

\[
\max_{\eta, \rho} (1 - \alpha)\left((1 - \eta)t + \eta \Phi q\right) + \alpha(1 - \pi)\left((1 - \rho)t + \rho \lambda q\right) \tag{12}
\]

Beliefs, expressed as a probability distribution over decision nodes in the same information set, reflect the strategies used by the other player and satisfy Bayes’ rule when this is decisive.

1.2 Equilibrium

A central feature of the game set forth in the previous section is the government’s fear that under the repressive regime, with \(\alpha = 1\), the citizen is dividing her time between production and preparing a rebellion. If the government is sufficiently ruthless it can punish low output as if it was conspiracy, terrorizing citizens into using most or all of their time to meet production quotas, and preventing them from preparing a rebellion. However, if the technology is sufficiently heterogeneous any production quota high enough to prevent the high productivity types from preparing a rebellion is too high for the low productivity types to meet, even if they dedicate their entire time to doing so\(^6\). A sufficiently ruthless government either keeps the quotas in place any-

\(^6\)This raises an interesting question: how should the desperate low productivity types respond to the certainty that the government will punish them. While in this model production is costless to the citizen, it seems implausible that the citizen would continue to produce her full quota. Here she selects \(q = 0\), but one could argue that a selection of \(q = \frac{\xi}{\Phi}\) would be even more appropriate, as it would leave the citizen in a position to rebel and still consume afterward if the government “trembled”. Under this alternative conjecture expected output for a government with \(\Psi + \lambda < 1\) facing a technology for which \(\xi < \frac{\Phi}{\lambda}\) would still be lower than for a government facing the easy to monitor technology, leaving such a government with a lower threshold for liberalizing, just as in the equilibrium analyzed here.
way, and winds up punishing all the low productivity types in order to keep
the high productivity types busy not plotting, or it forces everyone to switch
to the transparent technology, setting $i = 0$, with a lower expected produc-
tivity. Either option reduces the expected rents for the repressive regime,
and both make liberalization a relatively more attractive option.

These considerations lead to the following result:

**Corollary to Proposition 1:** The government’s choice of $\alpha^*$ is consistent
with a sequential equilibrium to the game set forth in the preceding discus-

$$
\alpha^* = \begin{cases} 
1 & \Lambda + \Psi < 1 \text{ and } 1 - \Phi < \tau' \\
1 & 1 \leq \Lambda + \Psi \text{ and } \xi \leq \frac{\bar{\theta}}{\bar{\theta}} \text{ and } 1 - \Phi < \tau_H \\
1 & 1 \leq \Lambda + \Psi \text{ and } \frac{\bar{\theta}}{\bar{\theta}} < \xi \text{ and } 1 - \Phi < \tau_L \\
0 & \text{otherwise}
\end{cases}
$$

where

$$
t_H = \frac{\bar{\theta} + \epsilon(\bar{\theta} - \theta)}{\theta_0 + \epsilon(\bar{\theta} - \theta_0)} > \frac{\epsilon \bar{\theta}}{\theta_0 + \epsilon(\bar{\theta} - \theta_0)} = t_L
$$

while:

$$
t' = \frac{(1 - \Lambda)(\bar{\theta} + \epsilon(\bar{\theta} - \theta))}{\theta_0 + \epsilon(\bar{\theta} - \theta_0)}
$$

**Proof:** This is a corollary to Proposition 1, which is stated and proved in
the Appendix.

There are two dividing lines in this result. Firstly there is the division
between governments that prefer to appease rather than punish when they
detect the possibility of a rebellion, corresponding to the parameter config-
uration $\Psi + \Lambda < 1$ and governments that would rather punish than appease
in the face of insurrection, with $1 \leq \Psi + \Lambda$. In the former case the decision
about whether to liberalize, setting $\alpha = 0$, or to impose a repressive regime,
with $\alpha = 1$ amounts to a comparison of what they can expect to keep once they have appeased their citizens with what they can hold back if the citizen is able to dismiss them. If such a government does decide to repress it’s choice of technology is suboptimal in the sense that it cannot observe whether $\theta = \bar{\theta}$ or $\underline{\theta}$, but it selects the technology with the highest \textit{ex ante} expected return, which in this model is the $i = 1$ technology.

The second group of governments, those with $1 \leq \Psi + \Lambda$ are divided by their ability to exploit the maxim “the devil makes work for idle hands”. In this case of course, we might think of the devil as the regime, and it makes sure the citizens work at producing as a way to vouchsafe that they are not using their time to prepare a rebellion. When the ratio of low productivity to high productivity $\frac{\bar{\theta}}{\underline{\theta}}$ is high then by setting production quotas high enough the government is able to ensure that neither type of citizen is preparing an overthrow, and the government’s rents from having a repressive regime are high. Although there is some loss in expected output from the government not directly observing the value of $\theta$ before it selects which technology to use, once it has chosen a technology that production technique is used efficiently, and the repressive government captures all of the surplus.

In contrast, a “tough” government with $1 \leq \Psi + \Lambda$ facing a harder to monitor technology, with a low $\frac{\bar{\theta}}{\underline{\theta}}$ ratio, is less efficient. It must choose between a Stalinist scheme in which it punishes low productivity citizens in order to prevent their high productivity counterparts from pooling and plotting, or it must select the less productive but easy to monitor “backstop” technology $i = 0$. Both of these options are less lucrative than those facing a “tough” government type with an easy to monitor technology, and so both result in a lower threshold for liberalizing, that is, for setting $\alpha = 0$. 

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2 Discussion

A central feature of the model analyzed in the preceding section is the substitutability of effort between rebellion and production. The essential idea is that the freedom to engage in hard to monitor economic activities also confers the freedom to work against the government. An economy in which hundreds of thousands of high school students are schooled in chemistry every year, and in which chemical fertilizer can be bought in large quantities is an environment in which the Oklahoma City bombers of 1995 can blow up the largest government office building in that state. When box cutters are for sale, and when people are free to contract for flying lessons the September 11, 2001 murders can take place. The simple economic freedoms that one readily takes for granted can be readily converted to sinister purpose by those with the time and determination to do so. Consider the measures needed to suppress such activities would severely impede the workings of the economy—a license to haul fertilizer? A background check to buy box-cutters? An environment in which Steve Jobs and Steve Wozniak can found Apple Computer in Jobs’s parents’ garage is an environment in which anti-government plotters can conspire and prepare bombs, recruit followers, and launch a rebellion. In a free society there are thankfully few people willing to take up such a cause—a group large enough to prepare a secret rebellion would do better to organize a 527 committee and start a viral marketing campaign for their pet idea. But a repressive government that does not exercise careful vigilance may find itself faced not with a few disgruntled sociopaths the likes of the Oklahoma City conspirators but with an insurrection of tens of thousands of individuals.

The seemingly pathological suspicion with which most authoritarian regimes view activities that permit access to weapons, to contact with foreigners, or

\footnote{In the future students may need to at least feign interest in the procedures for landing.}
the ability to travel within a country may be perfectly well founded on the possibility that these activities are a mask for anti-regime activities. While shepherds in the Pyrenees and fisherman along the English Channel have for centuries exploited synergies between their official occupation and smuggling, a repressive regime (consider Vichy France) will tend to heavily restrict or completely outlaw such activities for fear that they are being used to assist in the overthrow of the government.

Of course, some activities are easier to monitor than others, and this is what the ratio $\frac{\theta}{\Omega}$ is meant to capture. In particular, many of the activities associated with technical innovation and commerce, especially international commerce, will be very hard for an authoritarian government to effectively keep tabs on, and these correspond to a technology with a low $\frac{\theta}{\Omega}$ ratio. On the other hand, we might expect that extractive activities, such as pumping oil from known reserves, or mining known deposits or harvesting old growth timber in the rain-forests of Indonesia\textsuperscript{8} will be relatively easy for the authorities to track, so that the ratio $\frac{\theta}{\Omega}$ will rise closer to 1. However, other easy to monitor activities, such as certain occupations in traditional agriculture will also be easy to monitor, while some extractive activities, such as oil exploration, will be hard to track.

The tendency for oil exporting countries to exhibit “Dutch disease”, in which export oriented manufactures suffer, is widely noted, as is a tendency for resource exporters to give short shrift to education Humphrey’s, Sachs and Stiglitz (2007). While in the case of it’s eponymous country Dutch disease is likely the result of exchange rate appreciation, one notes that authoritarian regimes looking to stay in control would likely resist the emergence of new industries, and the expansion of education, given the difficulty of monitoring them. Likewise, cultivation on large estates that makes inefficient use of

\textsuperscript{8}This last is the focus of Ross (2001).
landless laborers is likely easier to monitor than small individual land holdings, offering a new perspective on Robinson’s argument that small coffee growers in Costa Rica have been a mainstay of that country’s democracy. More generally, we might expect authoritarian regimes to have been more resistant to the expansion of agriculture to remote venues that are harder to monitor and control. Indeed, Britain’s North American colonies of a quarter millennium ago were given considerable economic autonomy, and used the opportunity to prepare a rebellion.

Likewise, the model set forth here is consistent with regimes that remain authoritarian despite asymmetric information will impose intrusive controls on innovative economic activity. The extreme form of this is illustrated in Slozhenitzyn’s novel *First Circle* in which research scientists work inside a prison, so that Stalin’s henchmen can keep them under constant surveillance. However, the tendency for authoritarian regimes to place nearly crippling controls on any sort of innovative or independent economic activity is widespread. This corresponds to the cases in the model in which \( \frac{\theta}{\vartheta} \) is small, but not so small that the regime actually liberalizes.

**The “Transparency Curse” and Innovation.**

While there is no presumption that information issues have become more intensive over time—hunting and gathering activities are notoriously complex, while assembly line work is infamous for its repetitive drudgery, it is likely that innovative activities are harder to monitor, if only because they are intrinsically novel. Moreover, the entrepreneurial process of translating new inventions into marketable results may be particularly hard to distinguish from an aggressive anti-government conspiracy.

One might thus expect that the pressures to liberalize will be particularly keenly felt at moments of economic transformation—especially when that transformation involves the creation of new technology. Greenwood and
Yorukoglu (1997) note that the adoption of new technology is often accompanied by an increase in the skill premium (in the model here this would correspond with a lower $\frac{\theta}{\bar{\theta}}$ and a more severe monitoring problem). Of course, buying that technology “off the rack” is one thing, integrating it into the economy is another. Repressive governments have been heavy consumers of the latest military technology as far back as history recounts, and during the notoriously repressive Czarist regime in Russia the aristocracy in that country were nevertheless avid consumers of the latest luxuries. However, integrating a new technology into the economic fabric of a society is another matter. Across Europe repressive regimes were replaced by more liberal ones as the industrial revolution progressed, and today repressive states such as China and Iran struggle with the trade-off between repressing cyber technology, notably the internet, in order to maintain repressive control, and liberalizing in order to capture the economic benefits of the new technology.

While an elevated skill premium during times of innovation is not identical with the “inverted U-shaped” relationship between inequality and growth predicted by Kuznets (1955) and often referred to as the “Kuznets curve” it bears some similarities. If one was to measure uncertainty about output in the model using the inequality coefficient of Gini (1921) for the set of cases in which $1 \leq \Lambda + \Psi$ the highest value emerges in the case of “Stalinist” repression in which the low productivity types are punished even if they produce at full capacity: $G_{\text{Stalin}} = \epsilon$, while it is somewhat lower when $\frac{\theta}{\bar{\theta}}$ is high enough to permit the government to distinguish between low productivity citizens producing at full force and high productivity citizens who have devoted sufficient time to plotting that they are dangerous. We might think of this as “efficient” or “bureaucratic authoritarian” repression, and it leads to a somewhat lower Gini coefficient for the distribution of output given by:

$$G_{\text{BA}} = \frac{\epsilon(1-\epsilon)(\bar{\theta} - \theta)}{\theta + \epsilon(\bar{\theta} - \theta)}$$
Finally, the Gini parameter for production in a non-repressive government is even lower:

\[ G_{\text{Free}} = \frac{\epsilon(1 - \epsilon)(\bar{\theta} - \bar{\theta}_0)}{\bar{\theta}_0 + \epsilon(\bar{\theta} - \bar{\theta}_0)} \]

Of course the fate the despot can anticipate if he relents and sets \( \alpha = 0 \) is also relevant, even the inefficiency and high variability of the Stalinist regime may be preferable from the standpoint of the despot to liberalizing if the despot in the liberal regime cannot lay claim to enough surplus, that is, if \( 1 - \Phi \) is too low (or in other words, if \( \Phi \) is too high). However, the range of \( 1 - \Phi \) consistent with choosing \( \alpha = 0 \) is wider for the Stalinist regime facing a hard to monitor technology than for a bureaucratic authoritarian regime with an easier to monitor production technology. Perhaps ironically the polities with the best prospects for freedom, \textit{ceteris paribus} are very similar, in terms of \( \frac{\bar{\theta}}{\bar{\theta}} \) and \( 1 \leq \Psi + \Lambda \) to those that have the most destructive form of authoritarian rule. Perhaps it is less of an accidental fluke than it appears that some of the worst repressive regimes have occurred in some of the most modernized countries.

Because this model addresses informational issues it is not directly comparable with the discussion by Acemoglu and Robinson (2002) of the political genesis of the “Kuznets curve”. However, those authors observe heterogeneous responses to economic growth, and the model here does so as well, albeit in a somewhat different way. From the perspective of this paper it is lack of transparency in the means of production that best fosters the emergence of democracy. Curiously the most innovative sectors of the world’s economy may often be expected to be the least transparent, and so we might anticipate an association between the emergence of democracy and innovation. Notice that polities that produce using more transparent technologies may still participate in waves of growth in the world economy with less pressure for liberalization. It is not economic growth \textit{per se} that creates the
most favorable environment for the emergence of democracy (as Acemoglu and Robinson (2002) argue it can by exacerbating inequality and so spurring rebellion). Instead it is the lack of transparency in the productive technology that best fosters the emergence of political freedom.

**Comparison with the “Resource Curse”**

The income and democracy hypothesis put forward by Lipset (1959) asserted that wealthier countries are more likely to be democratic. While it lacked a theoretical foundation, it had the advantage of verisimilitude—even a cursory cross-national analysis reveals that wealth and democracy tend to appear together, although there are some glaring exceptions—including the resource rich monarchies of the Persian Gulf and the impoverished but democratic nation of India. Inspired in part by the example of the oil exporting kingdoms of the Middle East, and in part by close study of the internal politics of primary resource exporting countries Ross (2001) and others have argued that it is something about primary resource exploitation that allows authoritarians to cling to power.

However, just as there are nagging counterexamples to the income and democracy association, so too the “resource curse” has its detractors Haber and Menaldo (2007). Consider the example of pharaonic Egypt. For thousands of years farm workers in Egypt used essentially the same technology to irrigate and till the Nile flood planes, and for thousands of years oppressive rulers have extracted most of the surplus from their toils. This pattern comports closely with the portrayal in the literature of an extractive economy, except that every year brings a new crop. In contrast, consider the flurry of gold prospecting in California in 1849: while the gold rush was all a matter of extracting resources, the miners were highly autonomous, while the state cast a very faint shadow over Sutter’s Mill—an example that is hardly consistent with the stereotype of an extractive authoritarian state.
Of course, individual counter-examples are not definitive evidence, and nature is a notoriously poor research assistant when it comes to designing experiments. Nevertheless, between the apparent counter examples and one’s desire for a compact explanation one would like to look for an explanation based on something closer to the nature of freedom and authoritarian rule to explain the association between economic activity and government type.

The model set forth here shares with the literature on the resource curse that there are some economic environments in which authoritarian rule is more likely to emerge. It is even the case that the informational explanation posited here makes predictions that are correlated with the “resource curse” hypothesis. But they are not identical. The model analyzed here bases its predictions on the level of transparency that a particular productive activity entails, and not on whether it makes use of an exhaustible input.

**Weak States**

While the discussion in this section has focused on the case of $1 \leq \Lambda + \Psi$, the analysis of the model also encompassed the possibility that $\Lambda + \Psi < 1$. In that case the government prefers to appease rather than punish if it believes the citizen has prepared for rebellion. In that case the government’s security activities did not interact with transparency. The threshold for democratization in this case is lower, and so easier to meet, than it would be for an easy to monitor technology and an aggressive government, for which $1 \leq \Lambda + \Psi$. In the model the disposition to appease is an amalgam of two factors—relatively harsh side effects of rebellion, as measured by a low value for $\Lambda$, and relatively harsh side effects of punishing the citizen, corresponding to a low $\Psi$.

This corresponds to societies in which the state is weak and individuals are well armed and hard to punish. Perhaps the epitome of such a situation would be the conditions that prevailed in northern California during the gold
rush of 1849 and analyzed by Umbeck (1981). The state was weak—Mexican
law had ceased to hold sway and US Law was still a very distant echo of the
government’s will, while the prospectors and miners were armed to the teeth.
What prevailed was characterized by one miner as “Clear Creek district law,
backed up by shotgun amendments” Umbeck (1981) p.v. Other examples
of predatory state tyranny heavily ameliorated by a general disrespect for
the law abound, consider early twentieth century small coffee growers in the
mountains of Colombia, or the mid twentieth century Ma’dan people living
in the marshlands of the lower Euphrates and Tigris river flood lands.

In these conditions a repressive government will not be particularly averse
to the use of hard to monitor technology because it stands ready to appease
rather than to repress.

3 Conclusion

The hypothesis set forth here, that it is asymmetric information that max-
imizes the pressure for political freedom, suggests that we will observe het-
erogeneity among countries that is related to the difficulty of monitoring
economic activity. While this difficulty is likely to be correlated with the
level of income, and with the nature of the activities that generate that in-
come it is not caused by them. Instead, it is the informational environment
itself that is key to the emergence of democracy. Looked at the other way, too
little information asymmetry creates what we might think of as a “curse of
information”: regimes that can easily monitor productive activity and so de-
tect plotting at an early stage will tend to remain autocratic. A transparent
productive technology may be the enemy of nascent democracy!
Appendix: The Equilibrium

Proposition 1: The following strategies and beliefs constitute a sequential equilibrium to the game set forth in section 1.1:

\[
\eta^* = \begin{cases} 
1 & t < \Phi q \\
0 & \Phi q \leq t 
\end{cases}
\quad \text{and} \quad
\rho^* = \begin{cases} 
1 & t < \Lambda q \text{ and } q < \xi(\theta_0 + \iota(\theta - \theta_0)) \\
0 & \Lambda q \leq t \text{ or } \xi(\theta_0 + \iota(\theta - \theta_0)) \leq q 
\end{cases}
\]

\[
t^* = \begin{cases} 
0 & \alpha = 1 \text{ and } (\theta_0 + \iota(\bar{\theta} - \theta_0)) \xi < q \\
0 & \alpha = 1 \text{ and } t = 1 \text{ and } \xi \bar{\theta} < q < \min(\overline{\theta}, \xi \bar{\theta}) \\
\Lambda q & \alpha = 1 \text{ and } t = 0 \text{ q } \leq \xi \theta_0 \\
\Lambda q & \alpha = 1 \text{ and } t = 1 \text{ q } \in (\min(\overline{\theta}, \xi \bar{\theta}), \xi \bar{\theta}] \\
\Lambda q & \alpha = 1 \text{ and } t = 1 \text{ q } \leq \xi \bar{\theta} \\
\Phi q & \alpha = 0 
\end{cases}
\]

\[
\pi^* = \begin{cases} 
1 & 1 < \Psi + \Lambda \text{ and } q \leq (\theta_0 + \iota(\bar{\theta} - \theta_0)) \xi, \\
0 & \text{otherwise} 
\end{cases}
\]

\[
q^* = \begin{cases} 
\theta_0 & \alpha = 0 \text{ and } \theta = \overline{\theta} \\
\bar{\theta} & \alpha = 0 \text{ and } \theta = \bar{\theta} \\
\theta_0 & t = 0 \text{ and } \alpha = 1 \text{ and } 1 \leq \Psi + \Lambda \\
\xi \theta_0 & t = 0 \text{ and } \alpha = 1 \text{ and } \Psi + \Lambda < 1 \\
\bar{\theta} & t = 1 \text{ and } \alpha = 1 \text{ and } \theta = \bar{\theta} \text{ and } 1 \leq \Psi + \Lambda \\
\xi \bar{\theta} & t = 1 \text{ and } \alpha = 1 \text{ and } \theta = \bar{\theta} \text{ and } \Psi + \Lambda < 1 \\
\theta & t = 1 \text{ and } \alpha = 1 \text{ and } \theta = \overline{\theta} \text{ and } \xi \leq \frac{\theta}{\overline{\theta}} \text{ and } 1 \leq \Psi + \Lambda \\
\xi \theta & t = 1 \text{ and } \alpha = 1 \text{ and } \theta = \overline{\theta} \text{ and } \frac{\theta}{\overline{\theta}} < \xi \text{ and } \Psi + \Lambda < 1 \\
\xi \bar{\theta} & t = 1 \text{ and } \alpha = 1 \text{ and } \theta = \bar{\theta} \text{ and } \xi \leq \frac{\theta}{\bar{\theta}} \text{ and } \Psi + \Lambda < 1 \\
0 & t = 1 \text{ and } \alpha = 1 \text{ and } \theta = \overline{\theta} \text{ and } \frac{\theta}{\overline{\theta}} < \xi \text{ and } 1 \leq \Psi + \Lambda 
\end{cases}
\]
\[ t^*_c = \begin{cases} 
1 & \theta = \bar{\theta} \\
0 & \theta = \underline{\theta} 
\end{cases} \]

\[ t^*_g = \begin{cases} 
0 & \epsilon < \frac{\theta_0}{\bar{\theta}} \text{ and } \frac{\theta}{\bar{\theta}} < \xi \text{ and } 1 \leq \Psi + \Lambda \\
1 & \text{otherwise} 
\end{cases} \]

\[ \alpha^* = \begin{cases} 
1 & \Lambda + \Psi < 1 \text{ and } 1 - \Phi < \tau' \\
1 & 1 \leq \Lambda + \Psi \text{ and } \xi \leq \frac{\theta}{\bar{\theta}} \text{ and } 1 - \Phi < \tau_H \\
1 & 1 \leq \Lambda + \Psi \text{ and } \frac{\theta}{\bar{\theta}} < \xi \text{ and } 1 - \Phi < \tau_L \\
0 & \text{otherwise} 
\end{cases} \]

where

\[ t_H = \frac{(\bar{\theta} + \epsilon(\bar{\theta} - \underline{\theta}))}{\theta_0 + \epsilon(\bar{\theta} - \theta_0)} \quad \text{and} \quad t_L = \frac{\epsilon \bar{\theta}}{\theta_0 + \epsilon(\bar{\theta} - \theta_0)} \]

while:

\[ t' = \frac{(1 - \Lambda)(\bar{\theta} + \epsilon(\bar{\theta} - \underline{\theta}))}{\theta_0 + \epsilon(\bar{\theta} - \theta_0)} \]

At \text{§3} and at stage 5 the citizen knows the value of \( \theta \) with certainty. Moreover, neither the citizen nor the government use mixed strategies, so that at each decision node the citizen is certain about the current and future states of the system. In contrast, at stage 2 the government’s beliefs about \( \theta \) are characterized by a Bernoulli distribution with \( \Pr(\theta = \bar{\theta}) = \epsilon \) and \( \Pr(\theta = \underline{\theta}) = 1 - \epsilon \). At stage 4 if \( \alpha = 0 \) the government’s beliefs about the level of \( \theta \) are irrelevant, as it simply offers transfer of \( \Phi q \) regardless of what it thinks of the citizen’s type\(^9\). If \( \alpha = 1 \) and \( \iota = 0 \) the government’s beliefs

\(^9\)Of course, if the citizen follows her equilibrium strategy then her type is revealed, however the government’s beliefs in the wake of an out of equilibrium move are irrelevant. No value for \( q \) above \( \theta \) is possible, any value of \( q \in (\bar{\theta}, \underline{\theta}) \) will lead the government to assign a posterior density of 1 to \( \theta = \bar{\theta} \), and any value for \( q < \bar{\theta} \) will lead to the government offering a transfer of \( \Phi q \), regardless of the relative weight the government assigns to the events \( \theta = \bar{\theta} \) and \( \theta = \underline{\theta} \).
are also Bernoulli with $\Pr(\theta = \bar{\theta}) = \epsilon$ and $\Pr(\theta = \theta) = 1 - \epsilon$, although these are irrelevant to the government’s decision making.

If $\alpha = 1$ and $t_G = 1$ and $1 \leq \Psi + \Lambda$ and $\xi \leq \frac{\bar{\theta}}{\bar{\theta}}$ then

$$p(\theta = \bar{\theta}|q) = \begin{cases} 
1 & q \in (\bar{\theta}, \bar{\theta}] \\
0 & q = \bar{\theta} \\
r_1 & q \in (\xi \bar{\theta}, \bar{\theta}] \\
\epsilon & \xi \bar{\theta} < q < \xi \bar{\theta} \\
r_2 & q < \xi \bar{\theta}
\end{cases}$$

where $r_1 = 0 = r_2$. However, notice that any values for $r_i \in [0, 1], i \in \{1, 2\}$ will support the rest of the equilibrium.

If $\alpha = 1$ and $t_G = 1$ and $1 \leq \Psi + \Lambda$ and $\frac{\theta}{\bar{\theta}} < \xi$, then

$$p(\theta = \theta|q) = \begin{cases} 
1 & q \in (\theta, \bar{\theta}] \\
\epsilon & q \in [\xi \theta, \theta] \\
r_3 & q \in [0, \xi \theta]
\end{cases}$$

where $r_3 = 0$, although any value for $r_3 \in [0, 1]$ will support the rest of the equilibrium.

If $\alpha = 1$ and $t_G = 1$ and $\Psi + \Lambda < 1$ and $\xi \leq \frac{\theta}{\bar{\theta}}$ then

$$p(\theta = \bar{\theta}|q) = \begin{cases} 
1 & q \in (\bar{\theta}, \bar{\theta}] \\
r_4 & q \in (\xi \bar{\theta}, \theta] \\
\epsilon & q = \xi \bar{\theta} \\
0 & q \in (\xi \bar{\theta}, \xi \bar{\theta}) \\
r_5 & q \leq \xi \bar{\theta}
\end{cases}$$

where $r_4 = 0 = r_5$. However, notice that any values for $r_i \in [0, 1], i \in \{4, 5\}$ will support the rest of the equilibrium.

If $\alpha = 1$ and $t_G = 1$ and $\Psi + \Lambda < 1$ and $\frac{\theta}{\bar{\theta}} < \xi$, then
\[ p(\theta = \bar{\theta}|q) = \begin{cases} 
1 & q \in (\bar{\theta}, \bar{\theta}) \\
0 & q \in (\xi \bar{\theta}, \bar{\theta}) \\
r_6 & q < \xi \bar{\theta} 
\end{cases} \]

where \( r_6 = 0 \), but any \( r_6 \in [0, 1] \) supports the rest of the equilibrium.

**Proof:** Working backwards through the time line, notice that if \( \pi = 1 \) then stage 6 does not arise, the choice of \( \rho \) is irrelevant if either \( \alpha = 0 \) (in which case the citizen can simply vote the government out of office, which by inequality (4) is easier than staging a revolt) or \( q \geq \xi (\theta_0 + \xi (\theta - \theta_0)) \) in which case the citizen has not dedicated enough time to preparing a rebellion to have the option of setting \( \rho = 1 \). However, if \( \alpha = 1, \pi = 0 \) and \( q < \xi (\theta_0 + \xi (\theta - \theta_0)) \) equation (12) becomes:

\[ \max_{\rho} U_C = t + \rho (\Lambda q - t) \]

Here \( U_C \) is increasing in \( \rho \) for \( t < \Lambda q \) and decreasing in \( \rho \) when \( \Lambda q < t \), so

\[ \rho^* = \begin{cases} 
1 & t < \Lambda q \\
0 & t \geq \Lambda q 
\end{cases} \]

is maximal.

If \( \alpha = 0 \) equation (12) becomes:

\[ \max_{\eta} U_C = t + \eta (\Phi q - t) \]

Again, recall from inequality (4) that even if it required no preparation at all the citizen would prefer ousting the government *via* legal means, setting \( \eta = 1 \) to rebellion, with \( \rho = 1 \).

Here \( U_C \) is increasing in \( \rho \) for \( t < \Lambda q \) and decreasing in \( \rho \) when \( \Lambda q < t \), so

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\[ \eta^* = \begin{cases} 
1 & t < \Phi q \text{ and } \alpha = 0 \\
0 & t \geq \Phi q 
\end{cases} \]
is maximal.

Stage 5 is irrelevant if both \( \alpha = 1 \) and \( \pi = 1 \). Suppose that \( \alpha = 1 \) and \( \iota = 0 \), while \( \pi = 0 \). In this case, if we have in addition \( \xi \theta_0 < q \) the citizen is not “armed” for rebellion, and the government sets a transfer of \( t = 0 \). If instead \( q \leq \xi \theta_0 \) when \( \alpha = 1 \) and \( \iota = 0 \), with \( \pi = 0 \) then the government faces certain rebellion if it does not offer a transfer of at least \( \Lambda q \), while it is loath to offer more—hence it’s best response is to set \( t = \Lambda q \).

Now consider the cases that arise when \( \alpha = 1 \) and \( \iota = 1 \), \( \pi = 0 \). If we add the condition that \( \xi \bar{\theta} < q \) then the citizen is not prepared to rebel, and the government sets a transfer of \( t = 0 \). If instead \( q \in (\min(\underline{q}, \xi \bar{\theta}), \xi \bar{\theta}] \) then the government believes the probability that the citizen’s type is \( \bar{\theta} \) reaches at least\(^{10}\) \( e \). The government’s expected utility from appeasing the citizen is \( (1 - \Lambda)\bar{\theta} \) whereas it’s utility from setting a transfer below \( \Lambda q \), at which point it may as well set \( t = 0 \), is at best:

\[
(1 - e)\bar{\theta} - eB < (1 - e)\bar{\theta} - e \frac{2 \bar{\theta}}{e} < \bar{\theta} < 0
\]

where the first inequality follows from condition (5).

Next consider what happens when \( \alpha = 1 \) and \( \iota = 1 \), \( \pi = 0 \), and \( \xi \underline{\theta} < q \leq \min(\underline{\theta}, \xi \bar{\theta}) \). Once again we know that \( \Psi + \Lambda < 1 \) else government would already have punished the citizen. On this interval the government places unit probability on \( \theta = \underline{\theta} \), and so it is certain that the citizen is not prepared to rebel, and so it sets a transfer of \( t = 0 \).

If \( \alpha = 1 \) and \( \iota = 1 \), \( \pi = 0 \), and \( q \leq \xi \underline{\theta} \) then the government is certain that the citizen is prepared to rebel, and it sets a transfer of \( t = \Lambda q \).

\(^{10}\)Recall that given the government’s equilibrium choice of \( \pi \) this will only occur if \( \Psi + \Lambda < 1 \)
Next, let’s consider the government’s stage 4a decision. If \( \alpha = 0 \) then the choice of \( \pi \) is irrelevant. If instead \( \alpha = 1 \) but \( \Psi + \Lambda < 1 \) then appeasement (setting \( \pi = 0 \) and offering \( \Lambda q \)) dominates punishment (\( \pi = 1 \) yielding a maximum payoff of \( \Psi q \)), and so \( \pi = 0 \).

However, if \( 1 \leq \Psi + \Lambda \) then if \( \xi \bar{\theta} < q \) the citizen cannot rebel and the government will still prefer to set \( \pi = 0 \) with a transfer of \( t = 0 \) rather than punish the citizen. When the citizen retains the option of rebellion matters change.

With \( 1 \leq \Psi + \Lambda \) and \( q \leq \xi \bar{\theta} \) the government is certain that the citizen is able to rebel, so that the government will either have to punish, in which case it’s payoff is \( \Psi q \), or appease, netting a payoff of \( 1 - \Lambda q \). Given that \( 1 \leq \Psi + \Lambda \) it prefers to punish, and so \( \pi = 1 \).

What if \( 1 \leq \Psi + \Lambda \) and \( \xi \bar{\theta} < q \leq \bar{\theta} \)? In this case we see that the government assigns a probability of at least \( \varepsilon \) to the event that \( \theta = \bar{\theta} \). The expected payoff of punishing the citizen is \( \Psi q \), whereas if it appeases it nets a lower payoff: \( 1 - \Lambda q \). But what if the government decides not to punish the citizen and to set \( t < \Lambda q \). If the government does this it will be overthrown if \( \theta = \bar{\theta} \) while it will net \( q - t \) otherwise (and so it will set \( t = 0 \)). The government’s expected payoff from this lottery is at best:

\[
(1 - \varepsilon)q - \varepsilon B < (1 - \varepsilon)\bar{\theta} - \varepsilon \frac{2\bar{\theta}}{\varepsilon} < \bar{\theta} < 0
\]

where the first inequality follows from condition (5). The least unattractive of these options from the government’s standpoint is \( \Psi q \), the punishment payoff, and so the government will set \( \pi = 1 \).

Now turning to stage 3, suppose \( t \) has already been selected. If \( \alpha = 0 \) then \( t^* = \Phi q \) and equation (9) simplifies to:

\[
\max_{q} E((\Phi q + \eta^*(\Phi q - \Phi q))|\xi_3) = \Phi q
\]
and so the citizen produces up to capacity, namely $q = \theta$.

By the same token, if $\alpha = 0$ it is up to the citizen to choose $t$. Substituting $q = \theta_0 + t^*_C(\bar{\theta} - \theta_0)$ into (13) we have:

$$\max_{t_C} \Phi(\theta_0 + t_C(\theta - \theta_0))$$

the solution to this problem will be $t_C = 1$ if $\theta = \bar{\theta} > \theta_0$ and $t_C = 0$ if $\theta = \underline{\theta} < \theta_0$. We can now give a more explicit statement about the value of $q$: $q = \theta_0 + t^*_C(\bar{\theta} - \theta_0)$, where we note that $t^*_C = 1$ if and only if $\theta = \bar{\theta}$.

If instead $\alpha = 1$ then the citizen’s stage 3 objective becomes:

$$\max_q E[(1 - \pi^*)(t^* + \rho^*(\Lambda q - t^*) - \pi^*B|\mathfrak{g}_3)]$$

Notice that given our assumptions about $B$, when $t = 0$ and $1 < \Psi + \Lambda$ the citizen’s utility function becomes:

$$U_C = \begin{cases} 0 & q \geq \xi \theta_0 \\ -B & q < \xi \theta_0 \end{cases}$$

The citizen seeks to maximize this subject to the constraint that $q < \theta_0$. The result $q = \theta_0$ is maximal.

If instead $t = 0$ and $\Psi + \Lambda < 1$ the citizen’s utility will be:

$$U_C = \begin{cases} 0 & q > \xi \theta_0 \\ \Lambda q & q \leq \xi \theta_0 \end{cases}$$

Maximizing subject to $q \leq \theta_0$ the citizen will choose $q = \xi \theta_0$.

When $\alpha = 1$, $t = 1$, and $\theta = \bar{\theta}$ and $1 \leq \Psi + \Lambda$ the citizen’s equilibrium utility simplifies to:

$$U_C = \begin{cases} 0 & q > \xi \bar{\theta} \\ -B & q \leq \xi \bar{\theta} \end{cases}$$
Maximizing $U_C$ subject to the constraint that $q \leq \bar{q}$ the quantity $q = \bar{q}$ is a solution.

When $\alpha = 1$, $\iota = 1$, and $\theta = \bar{q}$ and $1 \leq \Psi + \Lambda$ and $\xi < \frac{\theta}{\bar{q}}$ the citizen’s equilibrium utility simplifies to:

$$U_C = \begin{cases} 
0 & q > \xi \bar{q} \\
Lq & q \leq \xi \bar{q} 
\end{cases}$$

Maximizing $U_C$ subject to the constraint that $q \leq \bar{q}$ the quantity $q = \bar{q}$ is a solution.

If instead $\alpha = 1$, $\iota = 1$, and $\theta = \bar{q}$ and $\Psi + \Lambda < 1$ and $\xi \leq \frac{\theta}{\bar{q}}$ then:

$$U_C = \begin{cases} 
0 & q > \xi \bar{q} \\
\Lambda q & q \leq \xi \bar{q}
\end{cases}$$

Optimizing subject to $q \leq \bar{q}$ $q = \xi \bar{q}$ is maximal.

If instead $\alpha = 1$, $\iota = 1$ and $\Psi + \Lambda < 1$ and $\xi \leq \frac{\theta}{\bar{q}}$ and $\theta = \bar{q}$ then the citizen’s utility function becomes:

$$U_C = \begin{cases} 
0 & q > \xi \theta_0 \\
\Lambda q & q = \xi \bar{q} \\
0 & \xi \theta_0 q < \xi \bar{q} \\
\Lambda q & q \leq \xi \bar{q}
\end{cases}$$

Maximizing subject to $q \leq \bar{q}$ the citizen will choose $q = \xi \bar{q}$.

If $\alpha = 1$, $\iota = 1$ and $\Psi + \Lambda \leq 1$ and $\frac{\theta}{\bar{q}} < \xi$, and $\theta = \bar{q}$ then the citizen’s utility function becomes:

$$U_C = \begin{cases} 
0 & q > \xi \bar{q} \\
\Lambda q & \bar{q} < q \leq \xi \bar{q} \\
0 & \xi \theta_0 < q \leq \bar{q} \\
\Lambda q & q \leq \xi \bar{q}
\end{cases}$$
The citizen seeks to maximize this subject to the constraint that $q \leq \theta$. The result $q = \bar{\theta}$ is maximal.

If $\alpha = 1$, $\iota = 1$ and $1 \leq \Psi + \Lambda$ and $\frac{\theta}{\bar{\theta}} < \xi$ and $\theta = 0$ then the citizen’s utility function becomes:

$$U_C = \begin{cases} 
0 & q \geq \xi \bar{\theta} \\
-B & q < \xi \bar{\theta}
\end{cases}$$

The citizen seeks to maximize this subject to the constraint that $q \leq \theta$. However, her productive capacity is not sufficient to reach the threshold $\xi \bar{\theta}$, so she is doomed to be punished whatever action she takes. Thus $q = 0$ is maximal (but so is $q = \xi \theta$).

If the government has chosen $\alpha = 1$ then it is up to the government to select $\iota$. If $\Psi + \Lambda < 1$ then the government’s expected utility from selecting $\iota_G = 0$ is:

$$E\{U_G|\mathcal{F}_2\} = (1 - \Lambda)\xi \theta_0$$

whereas if instead $\Psi + \Lambda < 1$ but $\iota_G = 1$ and $\frac{\theta}{\bar{\theta}} < \xi$, then the government can expect a utility of:

$$E\{U_G'|\mathcal{F}_2\} = (1 - \Lambda)\xi(\bar{\theta} + \epsilon(\bar{\theta} - \bar{\theta}))$$

it follows from the inequality (3) that:

$$E\{U_G|\mathcal{F}_2\} < E\{U_G'|\mathcal{F}_2\}$$

and so the government will choose $\iota_G = 1$.

If $\Psi + \Lambda < 1$ and $\iota_G = 1$ while $\frac{\theta}{\bar{\theta}} < \xi$, then the expected utility of the government will be:

$$E\{U_G''|\mathcal{F}_2\} = (1 - \Lambda)\xi \bar{\theta} > (1 - \Lambda)\xi \theta_0 = E\{U_G|\mathcal{F}_2\}$$
Now consider what happens when $\alpha = 1$ but $1 \leq \Psi + \Lambda$ and the government opts for $t_G = 0$. The government’s expected utility becomes:

$$E[U^a_G | \mathcal{F}_2] = \theta_0$$

while if $\alpha = 1$ and $1 \leq \Psi + \Lambda$ with $\xi \leq \frac{\theta}{\bar{\theta}}$ a choice of $t_G = 1$ yields:

$$E[U^b_G | \mathcal{F}_2] = \left( \theta + \epsilon(\bar{\theta} - \theta) \right)$$

if follows from the inequality (3) that:

$$E[U^a_G | \mathcal{F}_2] \leq E[U^b_G | \mathcal{F}_2]$$

so the government will select $t_G = 1$.

Now let’s take up the case in which $\alpha = 1$ and $1 \leq \Psi + \Lambda$ while $\frac{\theta}{\bar{\theta}} < \xi$, a choice of $t_G = 1$ yields:

$$E[U^c_G | \mathcal{F}_2] = \epsilon \bar{\theta}$$

The government will select $t_G = 1$ if

$$E[U^a_G | \mathcal{F}_2] \leq E[U^c_G | \mathcal{F}_2]$$

while it will choose $t_G = 0$ otherwise.

The condition (15) simplifies to:

$$\theta_0 \leq \epsilon \bar{\theta}$$

Finally, we come to the government’s stage 2 decision whether to liberalize or to repress. A choice of $\alpha = 0$ will net the government an expected payoff of:

$$U_G^{\alpha = 0} = (1 - \Phi)(\theta_0 + \epsilon(\bar{\theta} - \theta_0))$$
in contrast, if \( \xi \leq \frac{\theta}{\bar{\theta}} \) the government’s expected payoff from choosing \( \alpha = 1 \) is given by (14). The government will liberalize if and only if:

\[
E[U_G^L | \mathcal{F}_2] \leq U_G^{\alpha=0}
\]

If instead \( \frac{\theta}{\bar{\theta}} < \xi \) then the expected payoff to repression corresponds to

\[
E[U_G^R | \mathcal{F}_2] = \max\{\theta_0, \epsilon \bar{\theta}\}
\]

and the condition under which the government chooses to liberalize is:

\[
E[U_G^L | \mathcal{F}_2] \leq U_G^{\alpha=0}
\]

finally notice that:

\[
t_H - t_L = \frac{\theta + \epsilon(\bar{\theta} - \theta) - \max\{\theta_0, \epsilon \bar{\theta}\}}{(\theta_0 + \epsilon(\bar{\theta} - \theta_0))}
\]

where

\[
\theta + \epsilon(\bar{\theta} - \theta) > \theta_0
\]

follows from equation (3), while

\[
\theta + \epsilon(\bar{\theta} - \theta) > \epsilon \bar{\theta}
\]

because \( \theta > 0 \) and \( \epsilon < 1 \). This yields \( t_L < t_H \), and completes the proof. \( \Box \)

References


