CHAPTER 8

Persistence of Inefficient Institutions

1. General Issues

- Why do societies choose inefficient institutions and maintain these inefficient institutions for very long periods?
- This question is also related to the question of why societies cannot always switch to the best available technologies.
- Three different types of answers:
  (1) Those who can change institutions will lose economically from institutional reform.
  (2) Those who can change institutions are afraid of losing their political power.
  (3) Inefficient institutions persist because different social groups cannot agree on who should bear the costs of change (Alesina-Drazen).
- We have already seen a model along the lines of the third answer.
- The first type of answer presumes that there are serious constraints on how much of the gains from institutional change can be redistributed to those with political power. Yet, such constraints appear artificial, especially when we are trying to endogenize political economy decisions.
- Or, it might be those who will lose economically will also lose their political power. In that case, we are back to the second (political loser) explanation.
- Let us look in more detail to a political-loser type explanation now.

2. Persistence of Nondemocratic Institutions

- The models in the previous two chapters illustrated how democratic institutions may or may not emerge because of distributional conflicts.
- The emphasis was on the distributional effects of democracy, with little focus on its efficiency implications.
- Now I will briefly discuss how nondemocratic institutions may persist even when democratic institutions are more efficient.
- The basic idea is very similar to those discussed in the first part of these notes.

2.1. Blocking democratization.

- Imagine an economy dominated by the landed aristocracy and the monarchy. Let me think of these groups as one agent. For simplicity, assume that these groups do not engage in production.
- The economy also includes a group of merchants, with mass normalized to 1.
- Each merchant has access to a production technology

$$Ai$$

where i is investment.

- The cost of investment is incurred ex ante and is denoted by

$$c(i)$$

with $c'(\cdot) > 0$, $c''(\cdot) > 0$ and $c'(0) = 0$.

- When institutions are monarchic, the monarchy can expropriate a fraction $\tau \in (0,1)$ of these returns.
- Therefore, each merchant would choose an investment level equal to

$$(1-\tau) A = c'(i^*)$$

which is strictly positive by the assumption that $c'(0) = 0$.But, this investment level i^* less than the first-best investment level given by

$$A = c'\left(i^{fb}\right)$$

- Now imagine that democratic institutions (e.g., parliamentary control over the monarchy) can take away the power of the monarchy to expropriate returns from merchants' investment.
- Therefore, such institutional change would clearly improve efficiency and output.
- But as a result of institutional change the return to the monarchy and landed aristocracy would go down from $\tau A i^* > 0$ to 0.
- Therefore, the landed aristocracy and the monarchy will oppose institutional change that will introduce democracy, and to the extent that they have the power to do so, nondemocratic institutions will persist.

2.2. Reducing human capital investments to prevent democratization.

- A more extreme case of persistence of nondemocratic institutions is the model by Bourguignon and Verdier.
- In their model, the elite refrain from investing in the human capital of the poor because with greater human capital, the poor would take part in the political process, and demand transfers.
- Here is a simple version of their model:
- Suppose that political power is in the hands of a rich elite, and production is carried out by workers, whose measure is normalized 1.
- Total output is

$$A(1+h)$$

where h is the human capital of the workers.

- Workers do not participate in the political process unless their human capital is

$$h > \bar{h}$$

This could be because of regulations (e.g., franchise restrictions), or because low human capital individuals cannot organize.

- As long as they control political power, the rich elite obtain a fraction τ of output (either through taxation, or they own the land or the capital that are necessary for production).
- If the workers participate in the political process, they take over the control of political power, and now the rich elite obtains a smaller fraction of output, τ', which I will normalize to zero for simplicity.
- Workers start with human capital $h_0 = 0$, and the society can invest in the human capital of the workers at the cost $c(h)$.
- Moreover assume that the efficient level of human capital investment is h^* given by

$$c'(h^*) = A$$

such that

$$h^* > \bar{h}.$$

- The timing of events is as follows:
  (1) The rich elite decide the level of human capital investment h.
  (2) Production takes place.
  (3) Depending on the human capital of workers, who has control of political power is determined.
  (4) The distribution of output is determined as a function of who has political power.
- Now it is straightforward to solve this game backwards.

- When $h > \bar{h}$, workers control political power and they obtain the return of $A(1+h)$, and the rich obtain 0 ($\tau' A(1+h) = 0$ since $\tau' = 0$).
- When $h \leq \bar{h}$, the rich elite has control of political power, and they obtain the return of $\tau A(1+h) > 0$.
- Anticipating this outcome, at the first stage, the rich elite choose $h = \bar{h} < h^*$ in order to maintain political power.
- Therefore, this model illustrates how that could be under investment by the politically powerful groups in some assets in order to maintain their political power.
- The situation could of course be more extreme, for example, if workers themselves could invest in human capital, and their desired investment level of human capital h' were greater than $\bar{h}$. In this case, the rich would try to prevent the poor from investing in human capital in order to kling to political power.
- The difference of this scenario from the one discussed just before is that there the elite prevented institutional change because this would cause loss of political power. Here, the elite is preventing economic investments because this will cause institutional change.

3. Political Losers and Institutional Change

- Let me now discuss a more abstract model of resistance to beneficial institutional change.
- Consider an infinite horizon economy in discrete time consisting of a group of citizens, with mass normalized to 1, an incumbent ruler, and an infinite stream of potential new rulers. All agents are infinitely lived, maximize the net present discounted value of their income and discount the future with discount factor, β.

While citizens are infinitely lived, an incumbent ruler may be replaced by a new ruler, and from then on receives no utility.

- There is only one good in this economy, and each agent produces:

$$y_t = A_t,$$

where A_t is the state of "technology" or institutional structure that will enable citizens to produce output at time t.

- I will often refer to A_t as institutions, though it can also be thought of as technology broadly construed.
- For example, a change in the enforcement of property rights such as the creation of new legal institutions, or the removal of regulations that prevent productive activities, or any kind of political and economic *reform* that encourages investment would correspond to an increase in A_t.
- When there is beneficial institutional change, A increases to αA, where $\alpha > 1$. The cost of such change in is normalized to 0. In addition, if there is political change and the incumbent ruler is replaced, this also affects the output potential of the economy as captured by A. In particular, when the incumbent does not adopt a new technology, the "cost of political change"—that is, the cost of replacing the incumbent—is zA, while this cost is $z'A$ when there is institutional/technological innovation.
- Therefore, more formally

$$A_t = A_{t-1}\left(1 + x_t\left(\alpha - 1\right) - p_t\widehat{x}_t z' - p_t\left(1 - \widehat{x}_t\right)z\right), \tag{3.1}$$

where $x_t = 1$ or 0 denotes whether the new technology is introduced ($x_t = 1$) or not ($x_t = 0$) at time t by the incumbent ruler, while $\widehat{x}_t = 1$ or 0 refers to the innovation decision of a new ruler. Also, $p_t = 1$ denotes that the incumbent is replaced, while $p_t = 0$ applies when the incumbent is kept in place.

- The important assumption is that the extent of these costs of political change depend on whether there is institutional change. When there is institutional innovation, the position of the incumbent is relatively secure, and it will be more costly to replace him. With innovation, there is political uncertainty and *turbulence*, and part of the advantages of the incumbent are eroded. As a result, the cost of replacing the incumbent may be lower.
- More explicitly, assume that z and z' are random variables, enabling stochastic changes in rulers along the equilibrium path. z is drawn from the distribution F^N and z' is drawn from F^I, which is first-order stochastically dominated by F^N, capturing the notion that institutional change erodes part of the incumbency advantage of the initial ruler.
- To simplify the algebra, assume that F^I is uniform over $\left[\mu - \frac{1}{2}, \mu + \frac{1}{2}\right]$, while F^N is uniform over $\left[\gamma\mu - \frac{1}{2}, \gamma\mu + \frac{1}{2}\right]$, where $\gamma \geq 1$. In this formulation, μ is an inverse measure of the degree of political competition: when μ is low, incumbents have little advantage, and when μ is high, it is costly to replace the incumbent.
- Note that μ can be less than $\frac{1}{2}$, and in fact, we will focus much of the discussion on the case in which $\mu < \frac{1}{2}$. This implies that sometimes it may be less costly to replace the incumbent ruler than keeping him in place (i.e., the "cost" of replacing the incumbent may be negative). The case of $\mu = 0$ is of particular interest, since it implies that there is no incumbency advantage, and z is symmetric around zero.
- On the other hand, γ is a measure of how much the incumbency advantage is eroded by the introduction of a new technology: when $\gamma = 1$, the costs of replacing the ruler are identical irrespective of whether there is institutional change or not. A new entrant becomes the incumbent ruler in the following period after he takes control, and it will, in turn, be costly to replace him.
- Citizens replace the ruler if a new ruler provides them with higher utility.

- Finally, rulers levy a tax T on citizens. We assume that when the technology is A, citizens have access to a non-taxable informal technology that produces $(1-\tau)A$. This implies that it will never be optimal for rulers to impose a tax greater than τ.

The timing of events within the period is

(1) The period starts with A_t.
(2) The incumbent decides whether to undertake institutional change, $x_t = 0$ or 1.
(3) The stochastic costs of replacement, z_t or z_t', are revealed.
(4) Citizens decide whether to replace the ruler, p_t.
(5) If they replace the ruler, a new ruler comes the power and decides whether to initiate institutional change $\widehat{x}_t = 0$ or 1.
(6) The ruler in power decides the level of the tax rate, T_t.

- First consider the institutional innovation decisions that would be taken by an output-maximizing social planner.
- This can be done by writing the end-of-period Bellman equation for the social planner, $S(A)$. (evaluated in after step 6 in the timing of events above). By standard arguments, this value function can be written as:

(3.2)

$$S(A) = A +$$

$$\beta \left[x^S \int \left[\begin{array}{c} \left(1-p_I^S(z')\right) S(\alpha A) \\ +p_I^S(z') \left(\widehat{x}^S S((\alpha - z')A) + (1-\widehat{x}^S) S((1-z')A) \right) \end{array} \right] dF^I + \right.$$

$$\left. (1-x^S) \int \left[\begin{array}{c} \left(1-p_N^S(z)\right) S(A) \\ +p_N^S(z) \left(\widehat{x}^S S((\alpha - z)A) + (1-\widehat{x}^S) S((1-z)A) \right) \end{array} \right] dF^N \right]$$

where x^S denotes whether the social planner dictates that the incumbent innovates while $\widehat{x}^S$ denotes the social planner's decision of whether to undertake the institutional innovation with a new ruler (after replacing the incumbent). $p_I^S(z') \in \{0,1\}$ denotes whether the planner decides to replace an incumbent who has innovated when the realization of the cost of replacement is z', while $p_N^S(z) \in \{0,1\}$ is the decision to keep an incumbent who has not innovated as a function of the realization z.

- Intuitively, when technology is given by A, the total output of the economy is A, and the continuation value depends on the innovation and the replacement decisions. If $x^S = 1$, the social planner induces the incumbent to innovate, and the social value when he is not replaced is $S(\alpha A)$. When the planner decides to replace the incumbent, then there is a new ruler and the social planner decides if he will change institutions, $\widehat{x}^S$. In this case, conditional on the cost realization, z', the social value is $S((\alpha - z')\,A)$ or $S((1 - z')\,A)$ depending on whether the new technology is adopted. Notice that if $\widehat{x}^S = 1$ and the newcomer innovates, this affects the output potential of the economy immediately, hence the term $(\alpha - z')\,A$. The second line of (3.2) is explained similarly following a decision by the planner not to innovate. The important point in this case is that the cost of replacement is drawn from the distribution F^N not from F^I.
- By standard arguments, $S\,(A)$ is strictly increasing in A. This immediately implies that $S((\alpha - z')\,A) > S((1 - z')\,A)$ since $\alpha > 1$, so the planner will always choose $\widehat{x}^S = 1$.
- The same reasoning implies that the social planner would like to replace an incumbent who has innovated when $S((\alpha - z')\,A) > S(\alpha A)$, i.e., when $z' < 0$. Similarly, she would like to replace an incumbent who has not innovated when $S((\alpha - z)\,A) > S(A)$, i.e., when $z < \alpha - 1$. Substituting for these decision rules

in (3.2), the decision to innovate or not boils down to a comparison of

$$\text{Value from innovating} = \left(\int_0^{\mu+\frac{1}{2}} S(\alpha A)\, dz' \right) + \left(\int_{\mu-\frac{1}{2}}^{0} S((\alpha - z')\, A)\, dz' \right)$$

and

$$\text{Value from not innovating} = \left(\int_{\alpha-1}^{\gamma\mu+\frac{1}{2}} S(A)\, dz \right) + \left(\int_{\gamma\mu-\frac{1}{2}}^{\alpha-1} S((\alpha - z)\, A)\, dz \right)$$

Inspection shows that that the first expression is always greater. Therefore, the social planner will always adopt the new technology or initiate the necessary institutional change. Intuitively, the society receives two benefits from innovating: first, output is higher, and second the expected cost of replacing the incumbent, if necessary, is lower. Both of these benefits imply that the social planner always strictly prefers to undertake institutional change.

- Next considered the Markov Perfect Equilibria (MPE) of this repeated game.
- The strategy of the incumbent in each stage game is simply a technology adoption decision, $x \in [0, 1]$, and a tax rate $T \in [0, 1]$ when in power, the strategy of a new entrant is also similarly, an action, $\widehat{x} \in [0, 1]$ and a tax rate $\widehat{T}$.
- The strategy of the citizens consists of a replacement rule, $p(x, z, z') \in [0, 1]$, with $p = 1$ corresponding to replacing the incumbent. The action of citizens is conditioned on x, because they move following institutional change by the incumbent. At this point, they observe z, which is relevant to their payoff, if $x = 0$, and z', if $x = 1$.
- An MPE of this game consists of a strategy combination $\left\{x, T, \widehat{x}, \widehat{T}, p(x, z, z')\right\}$, such that all these actions are best responses to each other for all values of the state A.
- Denote the end-of-period value function of citizens by $V(A)$ (once again this is evaluated after the innovation decisions, i.e., after step 6 in the timing of events),

so A includes the improvement due to institutional change or the losses due to turbulence and political change during this period. With a similar reasoning to the social planner's problem:

(3.3)

$$V(A) = A(1-T) +$$

$$\beta \left[x \int \left[\begin{array}{c} (1-p_I(z'))\, V(\alpha A) \\ +p_I(z')\, (\widehat{x} V((\alpha - z')\, A) + (1-\widehat{x}) V((1-z')\, A)) \end{array} \right] dF^I + \right.$$

$$\left. (1-x) \int \left[\begin{array}{c} (1-p_N(z))\, V(A) \\ +p_N(z)\, (\widehat{x} V((\alpha - z)\, A) + (1-\widehat{x}) V((1-z)\, A)) \end{array} \right] dF^N \right]$$

where $p_I(z')$ and $p_N(z)$ denote the decisions of the citizens to replace the incumbent as a function of his innovation decision and the cost realization.

- Intuitively, the citizens produce A and pay a tax of TA. The next two lines of (3.3) give the continuation value of the citizens. This depends on whether the incumbent innovates or not, $x = 1$ or $x = 0$, and on the realization of the cost of replacing the incumbent. For example, following $x = 1$, citizens observe z', and decide whether to keep the incumbent. If they do not replace the incumbent, $p_I(z') = 0$, then there is no cost, and the value to the citizens is $V(\alpha A)$. In contrast, if they decide $p_I(z') = 1$, that is, they replace the incumbent, then the value is $V((\alpha - z')\, A)$ when the newcomer innovates, and $V((1 - z')\, A)$ when he doesn't. The third line is explained similarly as the expected continuation value following a decision not to innovate by the incumbent.
- The end-of-period value function for a ruler (again evaluated after step 6 in the timing of the game, so once he knows that he is in power) can be written as

(3.4)
$$W(A) = TA + \beta \left[\begin{array}{c} x \int (1-p_I(z'))\, W(\alpha A) dF^I \\ +(1-x) \int (1-p_N(z))\, W(A) dF^N \end{array} \right].$$

The ruler receives tax revenue of TA, and receives a continuation value which depends on his innovation decisions x. This continuation value also depends on the draw z' or z, indirectly through the replacement decisions of the citizens, $p_I(z')$ and $p_N(z)$.

- Standard arguments immediately imply that the value of the ruler is strictly increasing in T and A. Since, by construction, in an MPE the continuation value does not depend on T, the ruler will choose the maximum tax rate $T = \tau$.
- Next, consider the institutional innovation decision of a new ruler. Here, the decision boils down to the comparison of $W((1 - z)A)$ and $W((\alpha - z)A)$. Now the strict monotonicity of (3.4) in A and the fact that $\alpha > 1$ imply that $\widehat{x} = 1$ is a dominant strategy for the entrants.
- The citizens' decision of whether or not to replace the incumbent ruler is also simple. Again by standard arguments $V(A)$ is strictly increasing in A. Therefore, citizens will replace the incumbent ruler whenever $V(A) < V(A')$ where A is the output potential under the incumbent ruler and A' is the output potential under the newcomer.
- Now consider a ruler who has innovated and drawn a cost of replacement z'. If citizens keep him in power, they will receive $V(\alpha A)$. If they replace him, taking into account that the new ruler will innovate, they will receive $V((\alpha - z')A)$. Then, their best response is:

$$p_I(z') = 0 \text{ if } z' \geq 0 \text{ and } p_I(z') = 1 \text{ if } z' < 0. \tag{3.5}$$

Next, following a decision not to innovate by the incumbent, citizens compare the value $V(A)$ from keeping the incumbent to the value of replacing the incumbent and having the new technology, $V((\alpha - z)A)$. So

$$p_N(z) = 0 \text{ if } z \geq \alpha - 1 \text{ and } p_N(z) = 0 \text{ if } z < \alpha - 1. \tag{3.6}$$

- Finally, the incumbent will decide whether to innovate by comparing the continuation values. Using the decision rules of the citizens, the return to innovating is

$$\int_{\mu-\frac{1}{2}}^{\mu+\frac{1}{2}} (1 - p_I(z')) \cdot W(\alpha A) dF^I,$$

and the value to not innovating is given by the expression

$$\int_{\gamma\mu-\frac{1}{2}}^{\gamma\mu+\frac{1}{2}} (1 - p_N(z)) \cdot W(A) dF^N.$$

Now incorporating the decision rules (3.5) and (3.6), and exploiting the uniformity of the distribution function F^I gives the value of innovating as

(3.7) $$\text{Value from innovating} = \left[1 - F^I(0)\right] W(\alpha A) = P\left[\frac{1}{2} + \mu\right] W(\alpha A)$$

where the function P is defined as follows: $P[h] = 0$ if $h < 0$, $P[h] = h$ if $h \in [0, 1]$, and $P[h] = 1$ if $h > 1$, making sure that the first term is a cumulative probability (i.e., it does not become negative or greater than 1). Similarly, the value to the ruler of not innovating is

(3.8) $$\begin{aligned} \text{Value from not innovating} &= \left[1 - F^N(\alpha - 1)\right] W(A) \\ &= P\left[\frac{1}{2} + \gamma\mu - (\alpha - 1)\right] W(A), \end{aligned}$$

which differs from (3.7) for two reasons: the probability of replacement is different, and the value conditional on no-replacement is lower.

- It is straightforward to see that if $P\left[\frac{1}{2} + \gamma\mu - (\alpha - 1)\right] < P\left[\frac{1}{2} + \mu\right]$, so that the probability of replacement is higher after no-innovation than innovation, the ruler will always innovate—by innovating, he is increasing both his chances of staying in power and his returns conditional on staying in power. Therefore, there will only be blocking of institutional change when

(3.9) $$P\left[\frac{1}{2} + \gamma\mu - (\alpha - 1)\right] > P\left[\frac{1}{2} + \mu\right],$$

i.e., when by innovating, the ruler creates "turbulence," which increases his chances of being replaced.

- For future reference, define $\bar{\gamma}$ such that (3.9) holds only when $\gamma > \bar{\gamma}$. Therefore, as long as $\gamma \leq \bar{\gamma}$, there will be no blocking of institutional change.
- To fully characterize the equilibrium, conjecture that both value functions are linear, $V(A) = v(x) A$ and $W(A) = w(x) A$. The parameters $v(x)$ and $w(x)$ are conditioned on x, since the exact form of the value function will depend on whether there is innovation or not. Note however that $w(x)$ and $r(x)$ are simply parameters, independent of the state variable, A.
- The condition for the incumbent to innovate, that is, for (3.7) to be greater than (3.8), is:

$$
\begin{aligned}
w(x)\,\alpha AP\left[\frac{1}{2}+\mu\right] &\geq w(x)\,AP\left[\frac{1}{2}+\gamma\mu-(\alpha-1)\right] \\
&\Longleftrightarrow \\
\alpha P\left[\frac{1}{2}+\mu\right] &\geq P\left[\frac{1}{2}+\gamma\mu-(\alpha-1)\right].
\end{aligned}
\tag{3.10}
$$

- When will the incumbent adopt institutional change? First, consider the case $\mu = 0$, where there is no incumbency advantage (i.e., the cost of replacing the incumbent is symmetric around 0). In this case, there is "fierce" competition between the incumbent and the rival. Condition (3.10) then becomes $\alpha P\left[\frac{1}{2}\right] > P\left[\frac{1}{2}-(\alpha-1)\right]$, which is always satisfied since $\alpha > 1$. Therefore, when $\mu = 0$, the incumbent will always innovate, i.e., $x = 1$. By continuity, for μ low enough, the incumbent will always innovate.
- Intuitively, because the rival is as good as the incumbent, and citizens prefer better technology, they are quite likely to replace an incumbent who does not innovate. As a result, the incumbent innovates in order to increase his chances of staying in power. The more general implication of this result is that incumbents

facing fierce political competition, with little incumbency advantage, are likely to innovate because they realize that if they do not innovate they will be replaced.

- Next, consider the polar opposite case where $\mu \geq 1/2$, that is, there is a very high degree of incumbency advantage. In this situation $P\left[\mu + \frac{1}{2}\right] = 1 \geq P\left[\frac{1}{2} + \gamma\mu - (\alpha - 1)\right]$, so there is no advantage from not innovating because the incumbent is highly *entrenched* and cannot lose power. This establishes that highly entrenched incumbents will also adopt institutional change.
- The situation is different however when $\mu \in \left(0, \frac{1}{2}\right)$. Inspection of condition (3.10) shows that for μ small and γ large, incumbents will prefer not to innovate. This is because of the *political replacement effect* in the case where $\gamma > \bar{\gamma}$: institutional change increases the likelihood that the incumbent will be replaced, effectively eroding his political rents (notice that this is the opposite of the situation with $\mu = 0$ when the incumbent innovated in order to increase his chances of staying in power).
- As a result the incumbent may prefer not to innovate in order to increase the probability that he maintains power. The reasoning is similar to the replacement effect in industrial organization emphasized by Arrow (1962): incumbents are less willing to innovate than entrants since they will be partly replacing their own rents. Here this replacement refers to the political rents that the incumbent is destroying by increasing the likelihood that he will be replaced.
- To determine the parameter region where blocking happens, note that there can only be blocking when both $P\left[\frac{1}{2} + \mu\right]$ and $P\left[\frac{1}{2} + \gamma\mu - (\alpha - 1)\right]$ are between 0 and 1, hence respectively equal to $\frac{1}{2} + \mu$ and $\frac{1}{2} + \gamma\mu - (\alpha - 1)$. Then from (3.10), there will be blocking when

$$\gamma > \alpha + \frac{3}{2}\frac{\alpha - 1}{\mu}. \tag{3.11}$$

Hence as $\alpha \to 1$, provided that $\gamma > 1$, i.e., provided that there is a loss of incumbency advantage, there will always be blocking. More generally, a lower gain from innovation, i.e., a lower α, makes blocking more likely.

- It is also clear that a higher level of γ, i.e., higher erosion of the incumbency advantage, encourages blocking of institutional change. This is intuitive: the only reason why incumbents resist institutional change is the fear of replacement. In addition, in (3.11) a higher μ makes blocking more likely. However, note that, as discussed above, the effect of μ on blocking is non-monotonic. As μ increases further, we reach the point where $P\left[\frac{1}{2} + \gamma\mu - (\alpha - 1)\right] = 1$, and then, further increases in μ make blocking less likely—and eventually when $P\left[\frac{1}{2} + \mu\right] = 1$, there will never be blocking.

PROPOSITION: *When μ is sufficiently small or large (political competition very high or very low), the elites will always undertake institutional change. For intermediate values of μ, institutional change may be blocked.*

- As emphasized above, blocking will happen because of the political replacement effect: in the region where blocking is beneficial for the incumbent ruler, the probability that he will be replaced increases when there is institutional change. This implies that the incumbent ruler fails to internalize future increases in output.

4. Political Rents and Institutional Change

- It is straightforward to add rents from holding political power.
- With an argument very similar to the one in the first part of the notes, a greater value of these rents, R, makes institutional change less likely.
- The intuition is simply that institutional change is blocked when it leads a greater probably the of losing power. Greater rents make losing power more costly.

5. External Threats and Institutional Change

- External threats, or the threat of revolution, may force institutional change.
- Here is a simple extension to illustrate this point.
- Suppose that at time t, rulers find out that there is a one-period external threat at $t+1$, which was unanticipated before. In particular, another country (the perpetrator) with technology B_t may invade.
- Whether this invasion will take place or not depends on the level of output in two countries, and on a stochastic shock, q_t. If $\phi B_t - q_t > A_t$, the perpetrator will successfully invade and if $\phi B_t - q_t \leq A_t$, there will be no invasion, so $\phi \geq 0$ parameterizes the extent of the external threat: when ϕ is low, there will only be a limited threat. This formulation also captures the notion that a more productive economy, which produces more output, will have an advantage in a conflict with less productive economy.
- For simplicity, suppose that there will never be an invasion threat again the future, and assume that q_t is uniform between $[0,1]$. Suppose also that $B_t = \delta A_{t-1}$. This implies that there will be an invasion if

$$q_t \leq \phi\delta - 1 - x_t (\alpha - 1),$$

were recall that x_t is the decision of the incumbent to innovate. Using the fact that q_t is uniform over $[0,1]$, and the same definition of the function $P[\cdot]$, we have the probability that the ruler will not be invaded at time t, conditional on x_t, as

$$P[1 - \phi\delta + x_t (\alpha - 1)].$$

The important point here is that the probability of invasion is higher when $x_t = 0$ because output is lower.

- The same reasoning as before immediately establishes that at time t the ruler will innovate if

$$\alpha P\left[\frac{1}{2}+\mu\right]P\left[1-\phi\delta+(\alpha-1)\right]\geq P\left[\frac{1}{2}+\gamma\mu-(\alpha-1)\right]P\left[1-\phi\delta\right]. \tag{5.1}$$

- When $P\left[1-\phi\delta\right]\in(0,1)$, blocking institutional becomes less attractive in the presence of the external threat, because a relatively backward technology increases the probability of foreign invasion. Therefore, in this extended model, the emergence of an external threat might induce innovation in an economy that was other was going to block institutional change.
- An increase in δ or ϕ will typically make blocking less likely. For example, when $\delta\to 0$ or $\phi\to 0$, $P\left[1-\phi\delta\right]\to 1$, threat of invasion disappears and we are back to condition (3.10). For future reference, we state this result as a proposition:

PROPOSITION: *Political elites are less likely to block institutional change when there is a severe external threat (high ϕ) and when the perpetrator is more developed (high δ).*

- The intuition for both comparative statics is straightforward. With a more powerful external threat or a more developed perpetrator, the ruler will be "forced" to allow innovation so as to reduce for an invasion. Therefore, this extension shows how an external threat can induce institutional change.