

# Online Supplementary Appendix

## Shaping Institutions

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### B Additional Extensions

This Online Appendix discusses additional extensions of the baseline model. Appendix B.1 discusses richer action sets. Appendix B.2 discusses evolving formal rules. Appendix B.3 discusses the case in which the benefit from being in power depends on the institutional strength.

#### B.1 Richer Action Sets

While we focused on the simplest case in which a leader faces binary actions, we can consider extensions in which the effect of a leader's actions on the institutional strength is more nuanced. We consider two ways in which one can extend our baseline model.

First, there is a degree to which a leader's action affects the norm. Thus, the leaders' available actions are in  $[0, 1]$ , where  $a_t$  denotes the degree to which the leader abuses the position. The dynamics of institutional strength would be given by the same equation (i.e., Equation (1)). The characterization of the leader's decision then would depend on the assumptions on the replacement probability  $\lambda(a_t, N_t)$ . There are cases in which the decision of the leader is still characterized by Theorem 1. For instance, the degree of abuse would not affect the replacement probability for any  $a_t > 0$ . Formally, (i)  $\lambda(a_t, N_t) = \lambda_1(N_t)$  for all  $a_t \in (0, 1]$  and it is non-decreasing in  $N_t$ ; and (ii)  $\lambda_0(N_t)$  is non-increasing in  $N_t$  as in our baseline model. Otherwise, when an increase in the degree of abuse increases the replacement probability (i.e., when  $\lambda(a_t, N_t)$  is convex in  $a_t$ ), there would also be cases in

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which the leader gradually increases the degree of abuse (the size of  $a_t$ ) as the institutional strength decreases, the mechanism of which is somewhat akin to the convex adjustment-cost models of investment.

Second, one can capture different kinds of norms, for instance, the strengthening or undermining the independence of media and that of the supreme court. Thus, a leader's action is a vector  $a_t \in \{0, 1\}^n$ , and the institutional strength also takes an  $n$ -dimensional vector. The replacement probability depends on the vector of actions and norms. This could allow the possibility for the leader to abuse certain norms first, for example eroding the freedom of the press or augmenting patronage and taking more extreme actions such as intervening the courts once the overall level of scrutiny is low.

## B.2 Evolving Formal Rules

In our baseline model, formal rules have two roles. First, formal rules  $\bar{N}$  determine the initial institutional strength  $N_1$ . Second, formal rules possess the reversion-to-the-mean effect on the dynamics of institutional strength through Expression (1). For the first role, our main results would not change when the initial institutional strength is given arbitrarily by  $N_1 \in (N_L, N_H)$ . For the second role, we have shown that even if the formal rules have a persistent effect on norms (i.e., even with the reversion-to-the-mean effect), institutions may exhibit path dependence.

Here, we briefly discuss cases in which the strength of formal rules at time  $t$  is given by  $\bar{N}_t$  instead of the time-invariant parameter  $\bar{N}$ . While it is an interesting research avenue to study the evolution of formal rules themselves and their effects on the long-run dynamics of institutional strength, here we restrict attention to simple extensions under which our main results remain to hold.<sup>1</sup> The first case is that the variations in  $(\bar{N}_t)_{t \in \mathbb{N}}$  are small. This would correspond to the case in which the opportunities to change the formal rules arrive infrequently. Since the institutional strength  $N_{t+1}$  increases if and only if the current leader respects the institution, the leader's actions continue to be constant over time and thus our main results would qualitatively hold.

More generally, suppose that a bounded process  $(\bar{N}_t)_{t \in \mathbb{N}}$  has “stickyness” in the following sense: (i) there exists  $\bar{N}^*$  such that if  $\bar{N}_t \geq \bar{N}^*$  for some  $t \in \mathbb{N}$  then  $\bar{N}_{t+1} \geq \bar{N}^*$ ; and (ii) there exists  $\bar{N}_*$  such that if  $\bar{N}_t \leq \bar{N}_*$  for some  $t \in \mathbb{N}$  then  $\bar{N}_{t+1} \leq \bar{N}_*$ . The first assumption states that there exists a level of formal rules such that if the level of formal rules is at least as high as the threshold level, then the level of formal rules is never below the threshold in the future. That is, we assume that there exists a level of formal rules which can sustain

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<sup>1</sup>For the studies of the evolution of legal rules, see, for instance, Gennaioli and Shleifer (2007) and Niblett et al. (2010).

its level. The second assumption is the opposite. That is, we assume that there exists a level of formal rules which can never improve upon its level. Under these three assumptions on  $(\bar{N}_t)_{t \in \mathbb{N}}$ , when the institution is sufficiently strong (weak), a leader's action would be constant over time, and the long-run evolution characterized by Theorem 2 would still hold.

Note that the assumptions allow for an intermediate region in which formal rules can react to abuses. For example, after the norm on term limits was broken by President Roosevelt in 1940, the Twenty-Second Amendment to the United States Constitution was introduced in 1951 to limit a President to two terms.

Conversely, autocrats can change the formal rules to allow for indefinite tenure. For example, in Venezuela, Chávez managed to abolish term limits in 2009. It is worth noting that Chávez illegally used the resources of the State to accomplish his goals. According to opposition figure Leopoldo López, “we aren't competing against a political party, we're competing against an entire state and all of the power it can wield” (Walter and Cancel, 2009).

To capture these two phenomena, we briefly consider the case in which an incumbent leader's action consists of two actions  $(a_t, \bar{a}_t) \in \{0, 1\}^2$  as discussed in Online Appendix B.1. Only for ease of exposition, we assume:

$$\begin{aligned} N_{t+1} &= (1 - \delta)N_t + \delta\bar{N}_t + (1 - 2a_t)\gamma \text{ and} \\ \bar{N}_{t+1} &= (1 - \delta)\bar{N}_t + \delta\bar{N} + (1 - 2\bar{a}_t)\bar{\gamma}. \end{aligned}$$

We extend Expression (1) so that  $\bar{N}_t$  may depend on time, and the current leader has a choice to either strengthen or weaken the formal rules by  $\bar{\gamma} = \gamma$ .

So far, if the initial conditions  $N_1$  and  $\bar{N}_1$  are given by  $\bar{N}$  and each leader's action satisfies  $a_t = \bar{a}_t$ , then the dynamics of  $(N_t)_{t \in \mathbb{N}}$  and  $(\bar{N}_t)_{t \in \mathbb{N}}$  are the same. There are two differences between the informal and formal rule dynamics. The first is that we keep the specification of the leader's payoff function so that it does not depend on the strength of the formal rules  $\bar{N}_t$ . The second comes from the fact that leaders undermine informal institutions because they are more invisible to the voters. This can be accommodated through functional forms on  $\lambda(a_t, \bar{a}_t, N_t, \bar{N}_t)$ . Given these two differences, a decrease in  $\bar{N}_t$  has two effects: (i) it indirectly lowers the institutional strength  $N_{t+1}$ ; and it increases replacement through  $\lambda$ . Consequently, when the institutional strength or the honesty parameter is sufficiently high, there would be no benefit from lowering the strength of the formal rules. That is, the current leader would take  $(a_t, \bar{a}_t) = (0, 0)$ . In contrast, when the institutional strength or the honesty type is sufficiently low, the current leader would take  $(a_t, \bar{a}_t) = (1, 1)$  when the replacement probability is sufficiently low. In the intermediate case, when the cost of

increasing the replacement probability outweighs the effect of decreasing the institutional strength through the formal rules, the current leader would take  $(a_t, \bar{a}_t) = (1, 0)$ . This would give more nuanced dynamics: a leader would start with undermining informal rules, and then would undermine the formal rules once she is cemented. Also, the switch from  $\bar{a}_t = 1$  to  $\bar{a}_{t+1} = 0$  is more likely than the one from  $a_t = 1$  to  $a_{t+1} = 0$  when the current leader is replaced. While these extensions are interesting, our baseline model can capture our main point of the leader’s incentive to undermine informal rules in a clear-cut manner.

### B.3 Endogenous Payoff from Being in Power

While we have assumed that the benefit  $b$  of being in power is constant over time, it may be natural to consider the case in which the benefit depends on the current action  $a_t$  or the institutional strength  $N_t$ . First, the benefit  $b$  may depend on the current action if the abuse action corresponds to stealing state-resources. Introducing  $b_0 = b(a_t)$  when  $a_t = 0$  and  $b_1 = b(a_t)$  when  $a_t = 1$  would not change our main results. Second, suppose that the benefit  $b = b(N_t)$  is non-decreasing in  $N_t$ . In this case, there are two opposing effects on the continuation play after abusing. Firstly, abusing today makes abusing tomorrow less attractive as it decreases the payoff from abusing tomorrow. Secondly, abusing today makes abusing tomorrow more attractive as it decreases the payoff from law-abiding tomorrow. Which effect dominates depends on the specification of the payoff of being in power, the replacement probability, and the current institutional strength. As long as the second effect dominates, our main results are robust to such consideration (the simplest case in which this holds is when  $\lambda$  is constant). Third, consider the case in which  $b$  depends both on  $a_t$  and  $N_t$ . In this case, if we normalize the benefit by  $b(N_t, 1) = 0$ , for any functional form of  $b(N_t, 0)$  as long as it is non-decreasing in  $N_t$  (roughly, the relative benefit of being in office from respect is weakly increasing in the institutional strength), then our main results continue to hold.

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