DISCUSSION PAPER SERIES

DP16562

Complexity and the Reform Process

Massimo Morelli and Dana Foarta

PUBLIC ECONOMICS

ISSN 0265-8003

Complexity and the Reform Process

Massimo Morelli and Dana Foarta

Discussion Paper DP16562
Published 16 September 2021
Submitted 15 September 2021

Centre for Economic Policy Research
33 Great Sutton Street, London EC1V 0DX, UK
Tel: +44 (0)20 7183 8801
www.cepr.org

Complexity and the Reform Process

Abstract

Reform processes commonly involve professional bureaucrats drafting policies to be adopted by political decision makers. Conflicts of interest between these two groups may give rise to pandering in policymaking. We expand the standard pandering setup in two directions. First, we allow for policies to differ in their complexity. Second, we model the dynamic consequences of reforms, where a complex (simple) policy complexifies (simplifies) the legislative environment in which subsequent policies are drafted. We show that pandering motivates inefficient complex policies, which beget complexity in the legislative environment. We derive conditions under which the complexity build-up is bounded. Stabilization around an intermediate level of complexity is achieved under high uncertainty around the type of policy reform suited to current conditions and around the bureaucracy's capacity to implement it. When complex reforms are expected to be the right ones but bureaucratic capacity is uncertain, the legislative environment may enter a trap of ever increasing complexity.

JEL Classification: N/A

Keywords: N/A

Massimo Morelli - massimo.morelli@unibocconi.it
Bocconi University and CEPR

Dana Foarta - ofoarta@stanford.edu
Stanford Graduate School of Business and CEPR

Complexity and the Reform Process*

Dana Foarta Massimo Morelli

September 14, 2021

Abstract

Reform processes commonly involve professional bureaucrats drafting policies to be adopted by political decision makers. Conflicts of interest between these two groups may give rise to pandering in policymaking. We expand the standard pandering setup in two directions. First, we allow for policies to differ in their complexity. Second, we model the dynamic consequences of reforms, where a complex (simple) policy complexifies (simplifies) the legislative environment in which subsequent policies are drafted. We show that pandering motivates inefficient complex policies, which beget complexity in the legislative environment. We derive conditions under which the complexity build-up is bounded. Stabilization around an intermediate level of complexity is achieved under high uncertainty around the type of policy reform suited to current conditions and around the bureaucracy's capacity to implement it. When complex reforms are expected to be the right ones but bureaucratic capacity is uncertain, the legislative environment may enter a trap of ever increasing complexity.

Keywords: Dynamic Pandering, Regulatory Complexity, Bureaucratic Capacity, Incremental Reforms, Policy Cycles.
JEL codes: D73, D82

*Foarta: Stanford Graduate School of Business and CEPR, email: ofoarta@stanford.edu. Morelli: Bocconi University, IGIER and CEPR, email: massimo.morelli@unibocconi.it. We wish to thank Avidit Acharya, David Baron, Pierpaolo Battigalli, Jon Bendor, Steve Callander, Jack Fanning, Gabriele Gratton, Niall Hughes, Matthew O. Jackson, Giovanna Invernizzi, Dan Levin, Federico Masera, Eric Maskin, Marco Ottaviani, Vincent Pons, Carlo Prato, Ken Shotts, Peter Sorensen, Fernando Vega-Redondo, Richard van Weelden, and (virtual) seminar participants at Bocconi, Brown, EUI, Harvard-MIT, Stanford GSB, UNSW, University of Zurich, ASSET, and the APSA Virtual Formal Theory Seminar for useful suggestions. We acknowledge support from the European Research Council grant 694583. Julien Manili provided excellent research assistance. The usual disclaimer applies.

1 Introduction

Reforming public institutions and improving their response to complex public policy challenges has been at the forefront of current debates. Increased specialization and focus on expertise in bureaucratic agencies means that they should produce technocratic policy solutions. Yet, policies drafted by expert bureaucrats must be approved by political decision makers. If the bureaucratic solutions come into conflict with the goals of the political principal, distortions are likely to arise. In particular, a bureaucrat might want to persuade a political decision maker to adopt a welfare-enhancing policy reform, even if the reform hurts the politician's constituency. To achieve this, the bureaucrat may strategically pander and craft a reform proposal that seems less costly for the politician. This type of pandering to persuade has long been recognized in the political economy literature. However, the focus on the static choice of policy misses a key aspect of pandering in the legislative or regulatory domain: its impact on the complexity of policy and the dynamics of policymaking. For instance, in order to persuade the political decision maker, the bureaucrat may add exemptions for certain groups or contingencies, so as to soften the reform's impact on the politician's constituency. While useful for getting the reform passed, these changes add undue complexity to policy. The effects are not limited to the policy's implementation costs. Dynamically, once the policy is adopted, it becomes part of the legislative domain. It adds another layer to existing policies, potentially complicating the legislative environment: any future policy reforms are evaluated within the legislative environment created by previous reforms.

In this paper, we address the dynamic implications of pandering when current policy reforms affect the evolution of policymaking. We focus on policy complexity as the dynamic link between reform periods. We explore how much inefficiency and increased legislative complexity should be attributed to distortions generated by pandering. The model provides insight on the conditions necessary to avoid sliding into a Kafkaesque trap of ever-increasing complexity.

We start from a standard pandering-to-persuade framework. In each period of a discrete time game, a short-lived proposer offers a reform to a short-lived decision maker. The latter must decide whether to adopt it or not. The proposer has private information relevant for the decision maker's payoff from adopting the reform. The proposer wants the reform adopted, whereas the decision maker would like to adopt a reform only if it is better for her than the status quo. We extend the pandering model along two dimensions.

First, we allow reforms to differ in terms of their complexity. A reform may be either simple or complex. A complex reform is costlier and complicates the future legislative environment. We build a minimal setting in which complex reforms may sometimes be preferable to the decision maker, and in which they may be used strategically in pandering. The reform type is observable to all. What is uncertain is its suitability for the current conditions and its bureaucratic implementation cost. The proposer has better information about both of these dimensions. Specifically, he privately observes a state of the world that determines which reform type is best suited for the decision maker given the current conditions. For instance, if an emissions-cutting reform will have a high incidence on industries in a politician's constituency, then a complex reform which adds exemptions in her constituency is preferable for that politician, as it reduces her political costs. The proposer also has private information about his own capacity to implement the reform. A reform's implementation cost decreases in both its simplicity as well as in the proposer's capacity. Overall, a complex reform is beneficial when it is implemented by a high capacity proposer, and it is efficient if, additionally, the reform type matches the state of the world.

Second, we consider the long-lasting dynamic consequences of reform adoption. Each period, the decision maker evaluates the reform proposal and decides whether to adopt it or not. Her evaluation consists of observing the reform's type and a signal about the state of the world. Every adopted reform adds to the legislative environment. If a simple reform is adopted, then the legislative environment becomes less complicated. This means that next period's policy problem becomes easier for the decision maker: evaluating a new reform will deliver a more precise signal about the state of the world. Conversely, if a complex reform is adopted, it makes next period's evaluation problem more difficult: evaluating a new reform will deliver a noisier signal to the decision maker. We trace the dynamic implications of this process for the type of reforms that are proposed and for the efficiency of policymaking.

We begin by showing that the within-period pandering motive leads to inefficient complex reforms when the uncertainty about the proposer's capacity is highest. Every period, the proposer strategically offers the reform type most likely to be adopted. When the decision maker expects high implementation capacity, she will adopt any reform proposal, and thus the proposer offers the reform best suited to the state of the world. When proposer capacity is expected to be low, the decision maker only favors simple proposals, with low implementation cost. The strategic proposer in turn only drafts such reforms. When the decision maker has high uncertainty about the proposer's capacity, her decision is contingent on her expectation that a high capacity proposer will offer a complex reform. She would like to adopt a complex reform from this proposer, as his lower implementation cost ensures a positive payoff. This generates the pandering incentive for the high capacity proposer. By strategically drafting a complex reform, regardless of the actual state of the world, he ensures that the decision maker is positively inclined to adopt the reform. Then, the low capacity proposer may also mimic and offer a complex reform. This leads to inefficient reforms in equilibrium, by both high and low capacity proposers.

Pandering through inefficient complex reforms has dynamic implications. Complex reforms feed into a more complicated legislative environment for future policymaking. However, this does not necessarily lead to a cascade of ever increasing complexity: the build-up of inefficient reforms may slow down and even reverse due to the dynamics it generates. As the information environment becomes more complicated, the quality of the decision maker's information declines. This makes her more willing to adopt simplifying reforms, as these have lower expected costs. The proposer strategically responds with a simple reform, which reduces the complexity in the legislative environment. But once the decision maker can extract better information about the state of the world, she expects the high capacity proposer to offer a complex reform. Then, pandering materializes complex reforms. This makes the system fluctuate around an intermediate level of legislative complexity. A stabilizing effect emerges that provides a natural limit to the complexity build-up. This limit is reached sooner if expected proposer capacity is higher.

The stabilizing effect emerges whenever inefficient complex reforms are proposed and there is high uncertainty about the state of the world. It is not obtained if the state of the world is clearly expected to suit complex reforms and the proposer's expected capacity is sufficiently high. In such cases the decision maker has a strong prior that complex reforms are beneficial. She is unlikely to change her belief after her evaluation. This motivates pandering with complex reforms. Thus, inefficient complex reforms are proposed and adopted, the information environment becomes noisier, the decision maker is even less likely to change her belief, leading to a 'complexity trap'.

The proposer's informational advantage is key for understanding whether the dynamics will lead to stabilization versus a complexity trap. The high capacity proposer panders when there is high uncertainty around his implementation capacity. Additionally, if there is also high uncertainty around the state of the world, the proposer has a larger informational advantage over the decision maker. Under these conditions, the 'checks and balances' feature of policymaking kicks in, and stabilization ensues, precluding a Kafkaesque trap of ever-increasing complexity. Otherwise, in policy domains with relatively clear expectations on the need of complex reforms and high expected political costs of reforms, complexity begets complexity. In both cases, however, our results point to a clear policy implication for reducing the likelihood of inefficiently complex reforms: reducing uncertainty around the implementation capacity of proposers. In applied terms, this points to more transparent evaluations of organizational capacity in bureaucratic agencies. Reducing uncertainty around the incidence of reforms may instead backfire, creating more willingness for political decision makers to adopt complex reforms.

Our main results are presented for the case where proposers and the decision makers are short lived. This allows us to highlight the main mechanism for the evolution of complexity, which is that short-sighted pandering changes the legislative environment for future policymaking. This is arguably first-order in the legislative or regulatory context, where any one regulator's impact on the volume of policy is limited, but the build-up of rules and regulations directly affects policymaking. In our resulting equilibrium, policy simplifications emerge even though the decision maker herself is not reaping the benefit of a simpler future policymaking environment. Policy complexity also emerges even though the proposer himself is not reaping the benefit of building a reputation for capacity.

We explore in two extensions how our mechanism interacts with forward-looking motivations. If the decision maker is forward-looking, then she becomes less willing to adopt any reform, slowing down the pace of reforms. The proposer's short-sighted pandering generates similar dynamics, including the stabilization around intermediate complexity and the complexity trap. If the proposer is forward-looking and derives a benefit from reputation building, the results depend on the strength of the reputational incentives. At one extreme, once any reform is implemented, its payoff is perfectly informative of the proposer's capacity, precluding any future use of pandering. Then, only efficient complex reforms are offered and adopted moving forward. In the other case, past reforms are not perfectly informative of proposer capacity. The high capacity proposer then derives a reputational advantage from a complex reform, as this reform is costlier for the low capacity type to mimic. This amplifies pandering, making a complexity trap more likely. Strong incentives to build a reputation therefore increase the use of pandering and produce inefficient legislative complexity.

Related Literature. We build on the pandering literature and its applications in political economy (Canes-Wrone et al., 2001; Maskin and Tirole, 2004; Acemoglu et al., 2013; Che et al., 2013). We expand in two directions. First, we allow policies differ in their complexity. Second, we consider the dynamics of policy build-up. Reforms adopted each period provide the dynamic links between periods by either complicating or simplifying the information environment for future decision makers. By adding these extensions to the standard pandering setup, we can examine its dynamic implications through the policy build-up channel.

The reforms in our model have the general feature of being incremental (Dewatripont and Roland, 1992, 1995; Callander, 2011), in that policy change happens gradually – a proposer cannot propose something that massively increases or decreases complexity in one step. Incrementalism emerges endogenously in Kawai et al. (2018), in an evolutionary model where entanglements and interdependencies among policies make it very difficult to make grand reforms. Entanglements and interdependencies create incrementalism and a bias in favor of policy complexity. Then, policies that start complex tend to become ever more complex, whereas simple policies stay simple forever. In contrast, our framework does not consider entanglements, we show when a stabilization mechanism emerges, where each policy domain cycles endogenously between simplification and complexification.

Central to our model is the view that complex reforms complicate the legislative environment. Complexity of the environment refers to the difficulty for the decision maker to discern the consequences of a proposed reform. This notion of complexity is introduced and analyzed in a general model in Asriyan et al. (2020). Here, the policymaking environment requires adjustment along two dimensions: First, the consequences of a policy depend on the state of the world, so that a complex reform is not always worse than a simple reform; second, the complexity of the environment is history dependent, given reforms adopted previously.[1]

The results of our model relate to empirical findings in the recent literature on the relationship between legislative complexity and efficiency. The Kafkaesque equilibrium of inefficient legislative complexity described in Gratton et al. (2021) emerges in our model under the combination of intermediate implementation capacity (that maps the intermediate valence of politicians in Italy) and high expected need for complex reforms (that maps the large demand for reforms in Italy post 1992). These conditions generate the dynamics of increasing complexity documented empirically. In another context, Ash et al. (2020) find efficient legislative complexity that favors economic growth. This is obtained in our model under high expected proposer capacity. The high capacity condition maps to the study's description of improved transmission of information across jurisdictions about good reforms and how to implement them. Put together, these empirical findings highlight the key importance of considering the internal organization of government and the asymmetric

[1] In our model, the complexity of the environment is a consequence of the reform, it is not directly chosen by the proposer. For a model where the proposer directly chooses it, see Perez-Richet and Prady (2011). For the literature that examines complexity from the angle of computational costs, see Oprea (2020).

information about the capacity of proposers in driving legislative complexity.

The paper is organized as follows. Section 2 presents the model, Section 3 characterizes the static equilibrium, Section 4 contains the dynamic analysis, and Section 5 discusses the legislative application and links to empirical evidence. Section 6 extends the model to allow for longer lived agents or a single proposer-decider. Section 7 concludes, and all proofs are in the Appendix.

2 Model

Consider an environment in which a proposer drafts a reform y to a status quo policy, and a decision maker (DM) who either adopts or rejects the reform.

The proposer privately observes a state of the world $\theta \in \{\theta^S, \theta^C\}$, where state θ^S calls for a simple reform and state θ^C calls for a complex reform. State θ^C occurs with publicly known probability $\kappa \in (0,1)$. The proposer also privately observes his implementation capacity $P \in \{A, B\}$, where A denotes a high-capacity proposer, B denotes a low-capacity proposer, and $P = A$ with publicly known probability $\pi \in (0,1)$.

The proposer drafts a reform $y \in \{y^S, y^C\}$. A reform y^S is 'simple'. It has a low implementation cost and reduces the noise in the information environment, as further described below. A reform y^C is 'complex'. It has a higher implementation cost and it increases the noise in the environment, as further described below.[2] The reform's type has payoff implications for the DM, whereas the proposer's goal is to get the reform adopted: he receives a payoff normalized to 1 if the reform y is adopted and 0 otherwise.

The decision maker receives the reform proposal y, and she observes a signal $\rho \in \{s, c\}$ about θ, with precision $1 - z$, where $z \in \left[z^{\min}, \frac{1}{2}\right]$, and $z^{\min} > 0, z^{\min} \to 0$. The value z is as a measure of the noise (or complexity) of the $DM's$ information environment.[3] Afterwards she decides whether to adopt the reform ($d = 1$) or not ($d = 0$). If she rejects the reform,

[2] A simple policy may be mapped to a policy that contains few or no contingencies. For instance, it may take the form "take action x if condition w". A complex reform maps to a policy with multiple contingencies. For instance, it may specify "take action x if condition w, action x' if w', and action x'' if w''."

[3] We assume strict inequality because at $z = 0$ there is no imperfect information about θ.

the status quo is kept and the $DM's$ payoff is normalized to 0. If she adopts the reform, her payoff depends on whether the reform's type is what the state of the world calls for, as well as on the proposer's implementation capacity:

$$u(y, \theta, P) = v - e(y, \theta) - c(y, P), \tag{1}$$

where $v > 0$ is the baseline social benefit of the reform; the term $e(y, \theta)$ is the cost of not matching the reform type to the state of the world, with $e(y^S, \theta^S) = e(y^C, \theta^C) = 0$, $e(y^S, \theta^C) > 0$, and $e(y^C, \theta^S) > 0$; the term $c(y, P)$ is the policy's implementation cost, which decreases in proposer capacity and increases in reform complexity.

In principle, a low cost $e(y, \theta)$ or $c(y^C, P)$ relative to the baseline benefit would have the DM willing to adopt the proposed reform regardless of the proposer's implementation capacity or the state of the world. We focus our analysis on the more interesting case in which adopting the 'wrong' reform given θ and P is worse for the DM than keeping the status quo. In particular, we are interested in capturing two key aspects of reform choice. First, complex reforms may generate more political rents, by enabling politicians to offer exemptions and contingencies to different lobbying constituencies; this implies a lower political cost of adopting y^C in state θ^S than of adopting y^S in state θ^C. Second, complexity comes with higher bureaucratic implementation cost, and this cost becomes inefficiently high when the proposer has low implementation capacity. We capture these restrictions in the following assumption:

Assumption 1 The costs $e(y, \theta)$ and $c(y, P)$ satisfy

$$c(y^C, B) > v > c(y^S, B) \geq c(y^C, A) \geq c(y^S, A) \geq 0, \tag{2}$$

$$e(y^S, \theta^C) + c(y^S, A) > v > e(y^C, \theta^S) + c(y^C, A), \tag{3}$$

$$c(y^C, B) \geq e(y^S, \theta^C) + c(y^S, B). \tag{4}$$

The above conditions imply that a simple reform yields higher utility for the DM than the status quo when the state is θ^S (condition 2). A complex policy is beneficial for the DM if the state is θ^C and $P = A$ (condition 3). Otherwise, if $P = B$, the implementation cost is too high, making a complex reform worse for the DM (conditions 2 and 4).

An Example. For concreteness, we provide the following example of payoffs that satisfy the above criteria, and which we will use to illustrate our results graphically. Consider the case when $e(y^S, \theta^C) = v + l$, $e(y^C, \theta^S) = a$, $c(y^S, A) = c(y^S, B) = c(y^C, A) = 0$, $c(y^C, B) = v + l$, with $0 < a < v < v + l$. This example is summarized in the following payoff matrix for the DM.

Proposer A

	$\theta^{\mathbf{S}}$	$\theta^{\mathbf{C}}$
$\mathbf{y^S}$	v	$-\,l$
$\mathbf{y^C}$	$v - a$	v

Proposer B

	$\theta^{\mathbf{S}}$	$\theta^{\mathbf{C}}$
$\mathbf{y^S}$	v	$-\,l$
$\mathbf{y^C}$	$-l - a$	$-\,l$

Dynamics. The above reform process is repeated every period over an infinite horizon with periods $t \in \{0, 1, 2, ...\}$. A reform that is adopted in period t changes the status quo. It also changes the precision of the information available to the DM in the following period, z_{t+1}. Adopting a complex reform reduces the $DM's$ information precision, whereas adopting a simple reform increases the $DM's$ information precision:

$$z_{t+1} = \begin{cases} \min\{z_t + \Delta, \frac{1}{2}\} & \text{after } y^C \text{ is adopted,} \\ \max\{z_t - \Delta, z^{\min}\} & \text{after } y^S \text{ is adopted,} \end{cases} \tag{5}$$

where $\Delta > 0$. The evolution of z_t implies that complex reforms change the information environment, by making it costlier for the DM to acquire information. The noise z_t increases after y^C is adopted, until the upper bound of $\frac{1}{2}$ is reached, at which point the noise is maximal, rendering the signal fully uninformative. It decreases after y^S is adopted, until the lower bound of $z^{\min}$, at which the noise is minimal.

We assume that both the DM and the proposer live for only one period. In the next period, there is a new DM and nature independently draws another proposer. In Section 4, we relax this assumption to allow for a DM or a proposer with a longer tenure.

2.1 Equilibrium Concept

Fixing any initial condition with a given triplet (κ, π, z), we define the Pure Strategy Perfect Bayesian Equilibrium for the reduced form of the repeated game given state z as follows.

Definition 1 *A profile of strategies $r(\cdot|\cdot) : \{\theta^S, \theta^C\} \times \{A, B\} \to \{y^S, y^C\}$, $d(\cdot|\cdot) : \{y^S, y^C\} \times \{s, c\} \to \{0, 1\}$ is a Pure Strategy Perfect Bayesian Equilibrium if there exists a profile of assessments (μ^1, μ^2) such that:*

- *(Bayes' consistency) $(\mu^1(\cdot|\theta))_\theta \in [\bar{\Delta}(\{s, c\})]^\theta$ with $\mu^1(s|\theta^S) = (1 - z)$ and $\mu^1(c|\theta^C) = (1 - z)$; and $(\mu^2(\cdot|y, \rho))_{y,\rho} \in [\bar{\Delta}(\{\theta^S, \theta^C\} \times \{A, B\})]^{y,\rho}$ is obtained whenever possible via Bayes' rule from the prior $\mu^2(\cdot) \in \bar{\Delta}(\{\theta^S, \theta^C\} \times \{A, B\} \times \{c, s\})$. Specifically, for every $y \in r(\theta|A) \cup r(\theta|B)$ and $\rho \in \{c, s\}$, we have for every θ and P,*

$$\mu^2(\theta, P|y, \rho) = \frac{\mu^2(\theta, P, \rho)}{\mu^2(\{(\theta', P', \rho) : r(\theta'|P') = y\})}.$$

- *(Proposer's equilibrium best reply) For every P and θ,*

$$\forall y \in \{y^S, y^C\}, \quad \sum_\rho d(r(\theta|P)|\rho)\mu^1(\rho|\theta) \geq \sum_\rho d(y|\rho)\mu^1(\rho|\theta);$$

- *(DM's equilibrium best reply) For every ρ and y,*

$$\forall \bar{d} \in \{0, 1\}, \quad \sum_{\theta,P} u(d(y|\rho), \theta, P)\mu^2(\theta, P|\rho, y) \geq \sum_{\theta,P} u(\bar{d}, \theta, P)\mu^2(\theta, P|\rho, y).$$

Let $PBE(\kappa, \pi, z)$ denote the set of strategies that satisfy Definition 1. Since players live for only one period, a profile of strategies in period t constitute a Perfect Bayesian Equilibrium if and only if they are in $PBE(\kappa, \pi, z_t)$. For each t, we select from $PBE(\kappa, \pi, z_t)$ the best equilibrium for the period-t DM. This is equivalent to picking the best equilibrium for the DM period-by-period. We denote this best equilibrium by $BPBE(\kappa, \pi, z)$. If our selection delivers multiple equilibria, we select the one that minimizes the future noise z. That is, between two payoff equivalent actions, one where y^S is proposed and one where y^C is proposed, we select the equilibrium with y^S, stacking the deck against complexity.

2.2 Benchmark

We begin by establishing a benchmark against which our results can be compared. Consider the case in which implementation capacity is observable to the DM.

Proposition 1 (Observable Proposer Type) *When the proposer's implementation capacity is observable, in the $BPBE$:*

1. *If $P = A$, the proposer offers y^S when $\theta = \theta^S$ and y^C when $\theta = \theta^C$; the DM adopts the reform with probability one.*

2. *If $P = B$, the proposer offers y^S in both states; the DM's decision is*

$$d(c, y^S|B) = 1 \text{ iff } \kappa \leq \frac{z(v - c(y^S, B))}{z(v - c(y^S, B)) - (1 - z)(v - e(y^S, \theta^S) - c(y^S, B))}, \tag{6}$$

$$d(s, y^S|B) = 1 \text{ iff } \kappa \leq \frac{(1 - z)(v - c(y^S, B))}{(1 - z)(v - c(y^S, B)) - z(v - e(y^S, \theta^S) - c(y^S, B))}, \tag{7}$$

$$d(s, y^C|B) = d(c, y^C|B) = 0. \tag{8}$$

This benchmark is equivalent to setting $\pi = 1$ or $\pi = 0$. If $\pi = 1$, the proposer's implementation capacity is high, and a reform that matches the state of the world gives a positive payoff to the DM. The proposer then offers the reform that matches the state of the world, and it is adopted. If $\pi = 0$, implementation capacity is low, which makes complex reforms worse for the DM than the status quo. Proposer B only offers y^S and the DM adopts y^S only if the state is sufficiently likely to be θ^S. Notice that, with observable implementation capacity, any complex reform is efficient: it is offered only when the state of the world calls for it, and when such a reform offers the highest payoff for the DM.

In the next section we will show how uncertainty over implementation capacity leads to two sources of inefficiency from complex reforms: a complex reform being proposed when the state is θ^S and a complex reform being proposed by proposer B.

3 Static Analysis

In each period t, we derive the $BPBE$ given (κ, π, z_t). To solve for the equilibrium, we first examine the DM's decision given a proposer's strategy. Afterwards, we derive the proposer's choice given the DM's beliefs. Finally, we impose consistency between the proposer's strategy and the DM's beliefs.

For any fixed z, no PBE with positive probability of reform adoption is sustainable for all possible values (κ, π). In fact, we obtain four different equilibria where each equilibrium is a $BPBE$ in a subset of the (κ, π) space. The following Proposition describes each $BPBE$ and the boundaries within which it is the best equilibrium in the (κ, π) space, for a fixed z.

Proposition 2 *Given any* $z \in \left[z^{\min}, 1/2\right]$, *there exist thresholds* $\pi_1(\kappa, z), \pi_2(\kappa, z), \pi_3(\kappa, z)$ *and* $\bar{\kappa}(z)$ *such that the pure strategy* $BPBE(\kappa, \pi, z)$ *has the following form:*

1. ***(Simplification)*** *If* $\pi \geq \pi_1$, *proposer* A *offers* y^S *after* θ^S, *and* y^C *after* θ^C; *proposer* B *offers* y^S *in both states, and the* DM *adopts the proposal:*

$$r_A(\theta|z) = y^C \textit{if and only if } \theta = \theta^C; \quad r_B(\theta|z) = y^S; \quad d(\rho, y|z) = 1. \tag{9}$$

2. ***(Matching)*** *If* $\pi \in [\pi_2, \pi_1)$, *both proposer types offer* y^S *after* θ^S, *and* y^C *after* θ^C, *and the* DM *adopts the proposal:*

$$r_A(\theta|z) = r_B(\theta|z) = y^C \textit{if and only if } \theta = \theta^C; \quad d(\rho, y|z) = 1. \tag{10}$$

3. ***(Complexification)*** *If* $\pi < \pi_1$ *and* $\pi \in [\pi_3, \pi_2)$, *proposer* A *offers* y^C *in both states,*

proposer B offers y^S after θ^S and y^C after θ^C, and the DM adopts the proposal:

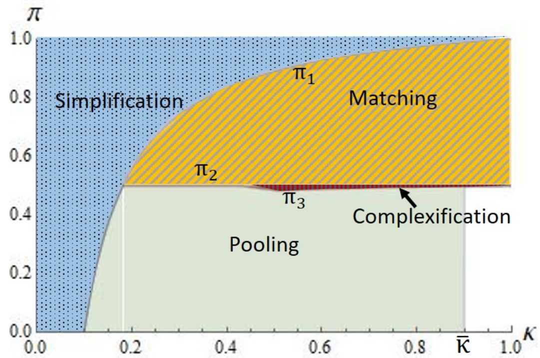
$$r_A(\theta|z) = y^C; \quad r_B(\theta|z) = y^C \text{ if and only if } \theta = \theta^C; \quad d(\rho, y|z) = 1. \tag{11}$$

4. ***(Pooling)*** *If $\pi < \min\{\pi_1, \pi_3\}$, both proposer types offer y^S in both states, and the DM adopts conditional on $\rho = s$ and $\kappa \leq \bar{\kappa}$:*

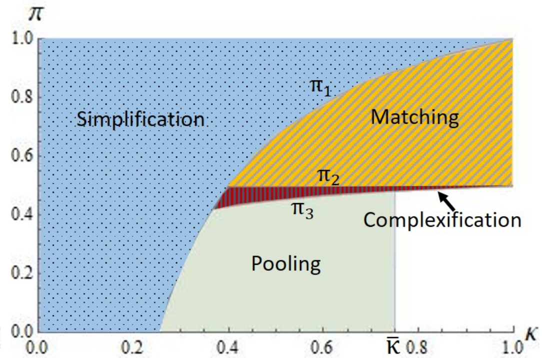
$$r_A(\theta|z) = r_B(\theta|z) = y^S; \quad d(\rho, y^S|z) = \mathbb{1}_{\{\rho=s \text{ and } \kappa\leq\bar{\kappa}\}}; \quad d(\rho, y^C|z) = 0. \tag{12}$$

These four different equilibria are illustrated in Figure 1 in the (κ, π) space, for the specification of payoffs provided in our example, given a low z (Panel a), a medium z (Panel b), and a high z (Panel c). Notice first that the Matching and Pooling equilibria are exactly the two equilibria present in our benchmark Proposition 1. The Matching equilibrium exists for π sufficiently high, and the Pooling equilibrium is the $BPBE$ for π sufficiently low. This extends the logic of the benchmark: when the proposer is sufficiently likely to have high capacity ($\pi \geq \pi_2$), a reform y^C is expected to deliver a positive payoff for the DM. It is then sustainable to have the reform's type match the state of the world. If π is low, the proposer's implementation capacity is expected to be low, which means a complex reform is expected to be too costly for the DM. Only y^S is offered, and the DM adopts the reform as long as state θ^S is sufficiently likely.

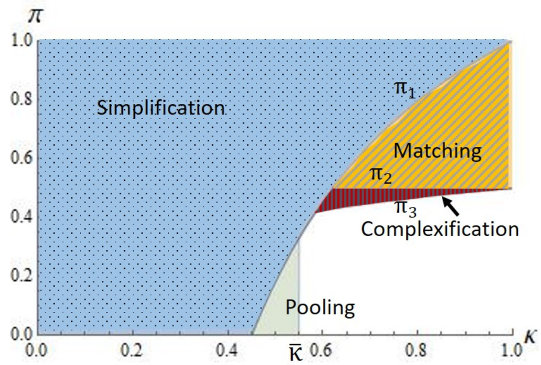
In the benchmark case, Matching is played only by proposer A and Pooling only by proposer B. An important difference here compared to the benchmark is that both player types play the Matching (Pooling) equilibrium when this is the $BPBE$. This is costly for the $DM's$, as she only prefers that equilibrium play for one player type. The uncertainty over the proposer's implementation capacity can be used to deliver a better outcome for the DM. The above Proposition shows how this uncertainty creates two opportunities for increasing the decision maker's expected welfare. First, the Simplification equilibrium does better than the Matching equilibrium by having proposer B only offer y^S. It ensures that a proposer with low implementation capacity does not propose a complex reform. This equilibrium play still



(a) Low noise: $z = 0.1$



(b) Medium noise: $z = 0.25$



(c) High noise: $z = 0.45$

Figure 1: Illustrates the $BPBE$ in the parameter space (κ, π): Simplification in the blue (dotted) area, Matching in the yellow (diagonal stripes) area, Complexification in the red (vertical stripes) area, Pooling with acceptance conditional on $\rho = s$ in the green (solid) area, and Pooling with rejection of reforms in the white area. In this and all subsequent figures, $l = v = 1$ and $a = 0.35$.

leads to a loss for the DM when the proposer is type B and the state is θ^C. The expected payoff is nonetheless positive as long as the probability that $P = B$ and $\theta = \theta^C$ is not too high. The value $\pi_1(\kappa, z)$ captures the minimum probability that $P = A$ at which the $DM's$ expected payoff is positive given this equilibrium play. This is the value of π at which she is indifferent between adopting and rejecting when her signal is $\rho = c$. The threshold $\pi_1(\kappa, z)$ increases in κ, as a higher probability that the state is θ^C implies a higher probability of a loss for the DM. The threshold decreases in z, since a noisier signal $\rho = c$ receives less weight in the DM's posterior belief on the probability that $\theta = \theta^C$. If she believes θ^C is less likely, she tolerates a lower probability that $P = A$.

Second, the Complexification equilibrium can deliver a higher expected utility to the decision maker compared to the Pooling equilibrium. The DM obtains a positive payoff when proposer A offers a reform y^C, and this can sustain an equilibrium in which any reform proposal is adopted, proposer A offers y^C, and proposer B offers the reform that matches the state of the world. The DM only losses if $P = B$ and $\theta = \theta^C$. The threshold $\pi_3(\kappa, z)$ denotes the minimum probability that $P = A$ at which the DM expects a positive payoff from the reform even after a signal $\rho = c$. This threshold is increasing in κ and decreasing in z: the probability of a negative payoff is higher when θ^C is more likely and when the signal $\rho = c$ is more precise.

To sum up, when π is high, the Simplification equilibrium eliminates complex reforms by proposer B, averting inefficient implementation costs. On the other hand, when π is intermediate, the Complexification equilibrium increases the likelihood of complex reforms, as proposer A only offers the complex reform, leading to inefficiency due to mismatching the state of the world and due to higher implementation costs compared to a simple reform. This dual effect is summarized in the following Proposition.

Proposition 3 *Uncertainty over the proposer's implementation capacity has the following implications about the efficiency of a complex reform:*

1. *If $\pi \geq \pi_1$, only efficient complex reforms are proposed and adopted: only in state θ^C by proposer A;*

2. *If $\pi_3 \leq \pi < \pi_1$, inefficient complex reforms are offered and adopted: by proposer B in state θ^C and, if $\pi_3 \leq \pi < \min\{\pi_1, \pi_2\}$ also by proposer A in state θ^S;*

3. *If $\pi < \min\{\pi_1, \pi_3\}$, efficient complex reforms are not offered: y^S is offered for all θ.*

When implementation capacity is expected to be high, all reforms are adopted, and there is no incentive for the proposer to offer an inefficient complex reform. When expected capacity is low, complex proposals are rejected, so even efficient ones are not offered. When the DM faces high uncertainty over the proposer's capacity (intermediate π), she is willing to adopt a complex reform if she believes it is sufficiently likely to come from proposer A. This gives proposer A the incentive to pander by offering the complex reform in state θ^S, when it is inefficient. It also gives proposer B the incentive to offer the complex reform, which is inefficient regardless of state.

4 The Dynamics of Complexity

In this section, we consider the dynamics that short-sighted pandering produces for the complexity of the legislative environment. Adopting a reform in period t has long-lasting effects. Adopting y^S reduces z_{t+1}, while adopting y^C increases z_{t+1}. The endogenous change in z shifts the boundary between equilibrium regions in the (κ, π) space, as illustrated in the three panels of Figure 1. Bounds $\pi_1(\kappa, z)$, $\pi_3(\kappa, z)$, and $\bar{\kappa}(z)$ decrease as z increases.[4] We will show below that the dynamics implied by these endogenous shifts have two main implications, in different regions of the parameter space. In one case, they provide a stabilization mechanism that limits the increase in complexity. In the other case, they generate a complexity trap where complexity begets complexity.

Stabilization. We discuss first the stabilizing effect. Increasing z lowers bound $\pi_1(\kappa, z)$ and expands the region where complex reforms are efficient given the equilibrium play (Simplification). At (κ, π_1), increasing z makes the DM more willing to adopt a reform after $\rho = c$, as a noisier signal receives less weight in the $DM's$ belief about the probability of state θ^C. With less precise information, the DM has a more porous sifter through which to filter reform proposals. This results in more proposals getting adopted and no need for the proposer to offer an inefficient reform. Conversely, lowering z increases $\pi_1(\kappa, z)$ and contracts the region of the parameter space where the Simplification equilibrium is sustainable.

The shifting of bound $\pi_1(\kappa, z)$ as z changes means that, starting in the equilibrium where complex reforms are inefficient (Complexification or Matching), we can endogenously move to the equilibrium where complex reforms are efficient (Simplification), and then eventually go

[4] The bound π_2 is independent of z, as the equilibrium play reveals the state of the world.

back to the starting equilibrium. In fact, we can derive the parameter values for which such an oscillation is expected. Cycling between equilibria emerges whenever the equilibrium play in a $BPBE$ leads, in expectation, to a switch to a new $BPBE$ as z evolves endogenously. In the new $BPBE$, the equilibrium play leads, in expectation, to a switch back to the original $BPBE$. A necessary condition for a location (κ, π^*) to be in the Simplification $BPBE$ for some values of z and in the Matching $BPBE$ for other values of z is that $\pi^* > \pi_1(\kappa, 1/2)$. Similarly, the necessary condition for a location (κ, π^*) to be in the Simplification $BPBE$ for some values of z and in the Complexification $BPBE$ for other values of z is $\pi^* > \pi_4(\kappa)$, where $\pi_4(\kappa)$ is defined as the value at which curves $\pi_1(\kappa, z)$ and $\pi_3(\kappa, z)$ intersect.[5]

Proposition 4 *For intermediate values of π and κ, the endogenous evolution of z produces cycling between an equilibrium where only efficient complex reforms are adopted and an equilibrium where inefficient complex reforms are adopted:*

1. *Between the Simplification and the Matching equilibria if*

   $\frac{1}{2} < \kappa < \frac{1}{2\pi}$ *and* $\max\{\pi_2, \pi_1(\kappa, \frac{1}{2})\} < \pi$.

2. *Between the Simplification and the Complexification equilibria if*

   $\max\left\{\frac{1-2\kappa}{2(1-\kappa)}, \pi_4(\kappa), \pi_1(\kappa, \frac{1}{2})\right\} < \pi < \min\{\pi_2, \pi_1(\kappa, z^{\min})\}$.

Cycling between equilibria is expected in a non-trivial region, illustrated in Figure 2. The frequency of these cycles is higher when the boundaries between equilibrium regions move on average faster in the direction that generates cycles. In our case, this means that y^S is proposed on average more often in the Simplification $BPBE$ and y^C is proposed on average more often in the Matching (or Complexification) $BPBE$. As the conditions above show, cycling between equilibria requires that in expectation z_t oscillates around an intermediate value $z^*(\kappa, \pi)$. As cycling occurs around $\pi_1(\kappa, z)$, the value z^* is derived from the implicit condition that $\pi_1(\kappa, z^*) = \pi$. We summarize this insight below and describe how z^* changes with κ and π.

[5] For each κ, we find the value $z(\kappa)$ at which $\pi_1(\kappa, z) = \pi_3(\kappa, z)$ and then set $\pi_4(\kappa) = \pi_1(\kappa, z(\kappa))$ or 0 if such a $z(\kappa) \in \left[z^{\min}, 1/2\right]$ does not exist.

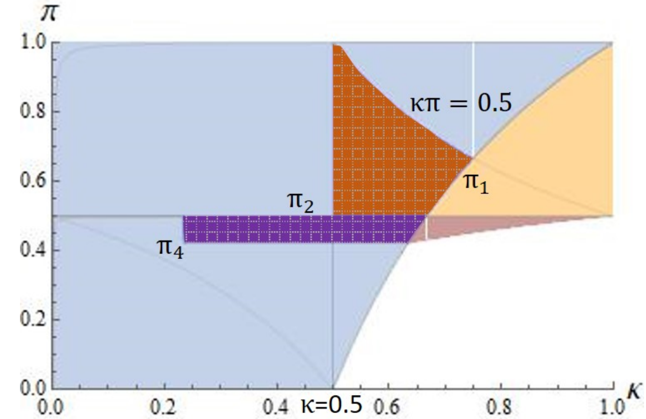


Figure 2: Illustrates the regions where cycling occurs between the Simplification and the Matching equilibria (orange grid) and between the Simplification and Complexification equilibria (violet grid).

Corollary 1 *Cycling happens around an intermediate complexity of the environment $z^*(\kappa, \pi)$. This value increases if the proposer is expected to be of lower ability (lower π) or if the state of the world is expected to favor complex reforms (higher κ).*

When the proposer is more likely to have low capacity, or the state is more likely to be θ^C, the cycling happens around a higher z^*. This means that the DM has less precise information on average. This result comes in contrast with the standard intuition that a decision maker would be more likely to adopt a potentially costly reform y^C when she has more precise information. The result emerges because cycling here happens due to the change in the proposer's strategy, while the DM adopts the reform non-contingently on her signal. The proposer adapts his strategy to ensure reform adoption. For cycling to exist, the DM must choose to not make use of her signal. If the DM is more likely to receive a negative payoff, either due to lower π or higher κ, the information provided by the signal is more valuable. For her to not use this information, the signal must be less precise.[6].

Finally, a remaining question is how long the system will stay in the equilibrium with efficient complex reforms before crossing into the equilibrium with inefficient complex reforms. The frequency of these fluctuations is measured as the expected number of transitions over

[6]As we show in Section 6, any cycling that could emerge in the absence of pandering relies on the signal being used, which leads to the opposite prediction, that the complexity of the environment z increases in π.

a given time period T:

$$\lim_{T\to\infty} \mathbb{E}\left[\sum_{t=1}^{T} \frac{\{t : r_P(\cdot|z_{t-1}) \neq r_P(\cdot|z_t) \wedge d(\cdot,\cdot|z_{t-1}) = d(\cdot,\cdot|z_t)\}}{T} |z_0\right]. \tag{13}$$

It is driven by how often y^S is expected in the Simplification $BPBE$ and how often y^C is expected in the equilibrium with inefficient complex reforms. If this equilibrium is Matching, the expected frequency of fluctuations increases in κ. If this equilibrium is Complexification, the expected frequency of fluctuations increases in κ if $\pi < \frac{1}{2}$ and decreases in κ otherwise.

Complexity Traps and Path Dependence. We next explore the resulting dynamics outside the stabilization region. We show when inefficient complex reforms beget more inefficient complex reforms, and how this depends on the initial conditions.

Increasing z decreases $\pi_3(\kappa, z)$ and expands the region where complex reforms are most likely to be inefficient (Complexification region). The reason is that less precise information for the DM gives the proposer more power to strategically offer a reform that will be adopted. As z increases, the signal is less informative. The DM is therefore more likely to adopt a reform regardless of signal, as less weight is placed on a signal $\rho = c$.

Starting from (κ, π) in the Complexification equilibrium such that y^C is more likely to be proposed, z will increase on average. Then, the Complexification equilibrium will continue to be sustainable at (κ, π) as $\pi_3(\kappa, z)$ decreases. The resulting dynamics resemble a complexity trap, where inefficient complex reforms generate the low information conditions for more inefficient complex reforms. Conversely, starting in the Simplification equilibrium, if y^S is more likely to be proposed, z is expected to endogenously decrease, further cementing the equilibrium with efficient complex reforms. The following Proposition describes under what conditions we get these paths.

Proposition 5 *The endogenous evolution of z_t results in:*

1. *A "complexity trap" where the system starts and remains in an equilibrium where inefficient complex reforms are adopted, and the complexity of the environment increases*

in the long-run. This happens if $\kappa > \frac{1}{2}$ and $\pi_2 < \pi < \pi_1(\kappa, \frac{1}{2})$.

2. *An "efficiency path" where inefficient complex reforms are adopted with sufficiently low frequency such that the complexity of the environment decreases in the long-run. This happens if $\kappa < \frac{1}{2}$ and $\pi > \max\{\pi_1(\kappa, \frac{1}{2}), \pi_2\}$ or $\pi_1(\kappa, \frac{1}{2}) < \pi < \min\{\pi_2, \pi_4(\kappa, \frac{1}{2})\}$.*

3. *A "path dependent region" where there exist $z^T(\kappa)$ derived from $\bar{\kappa}(z^T) = \kappa$ and a corresponding $\hat{z}^T \geq z^T$ such that starting from any $z_0 > \hat{z}^T$, the system enters a complexity trap, while if $z_0 \leq \hat{z}^T$ the system starts and remains in gridlock, where no reforms are passed. This happens if $\kappa > \frac{1-2\pi}{2(1-\pi)}$, and $\pi_3(\frac{1}{2}) < \pi < \min\left\{\pi_1(\kappa, \frac{1}{2}), \pi_2\right\}$.*

We illustrate these regions in Figure 3 in the (κ, π) space. In each region, we compute which policy is expected to be adopted more often, given the equilibrium strategies. These depend on the proposer's identity and the state of the world. If the proposer is more likely to be type A (high π) or the state of the world is more likely to be θ^C (high κ), then y^C is more likely to be offered and adopted, increasing the complexity of the environment.

In the path dependent region, the initial complexity of the environment determines the path along which z evolves. If there is a sufficiently high likelihood of state θ^C and that the proposer is B, then there is a high probability of a loss from the reform. Thus, starting in an environment with low complexity, the DM can rely on the signal and adopt y^S when $\rho = s$. This further simplifies the environment. Starting with high complexity of the environment, the DM does not follow the noisy signal. If π is sufficiently high, she adopts any proposal, including a complex one, which then creates even more complexity in the environment. If π is sufficiently low, she rejects any proposal, and the status quo remains in place.

5 Discussion

Bureaucratic Pandering. The pandering setup of our model is motivated by the policymaking process. The production of legislation or regulation typically involves a better-informed agent who proposes reforms, which must be adopted by a less-informed political

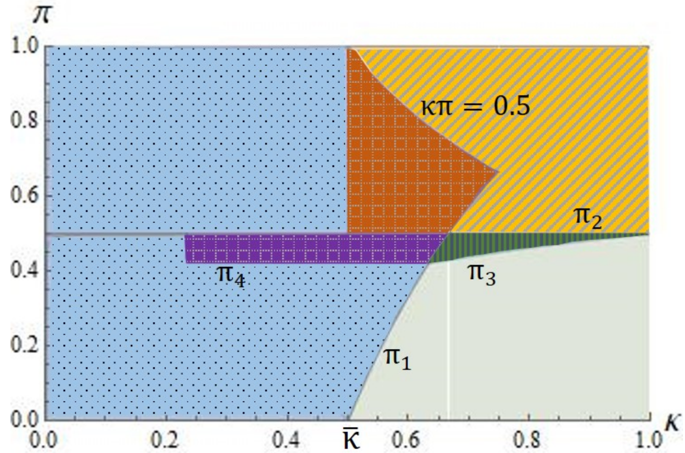


Figure 3: Illustrates the long-run expected evolution of z. In the blue (dotted) region, z is expected to decrease towards $z^{\min}$. In the yellow (diagonally striped) region, z is expected to increase towards $\frac{1}{2}$. In the orange (grid) region, long-run z oscillates around z^* for any starting z_0. In the violet (grid) region, long-run z oscillates around z^* if $BPBE(\kappa, \pi, z_0)$ is Complexification, and otherwise weakly decreases. In the dark green (vertically striped), if $BPBE(\kappa, \pi, z_0)$ is Complexification, then z is expected to increase towards $\frac{1}{2}$, and otherwise (weakly) decrease. In the light green (solid) region, the $BPBE(\kappa, \pi, z_0)$ is Pooling and z does not increase on the equilibrium path.

decision maker. In the United States, both at the state and federal levels, the proposer is oftentimes a bureaucrat, who has expertise on the topic, that is, better information on the relevant state of the world θ (Bendor and Meirowitz, 2004).[7] Moreover, the bureaucrat is tasked with the implementation of any adopted reforms, and therefore his implementation capacity P is consequential for the reform's outcome. The decision maker is a politician, who can vote to adopt or reject the reform. The politician is electorally accountable for the reform's effects, while the bureaucrat is not, which explains their different objectives. The politician's electoral benefit depends on the reform's outcome among her voters, so both on the distributional consequences of the reform and the bureaucracy's capacity. A bureaucrat who is motivated by career concerns may find implementing the reform valuable, but is not directly impacted by the outcome of that reform, as shown empirically by Shepherd and You (2020) in the U.S. context.

[7]For instance, Cates (1983), as quoted in Ting (2009), provides the following anecdote: faced with a proposal to reform Social Security in 1950, Senator Eugene Millikin (R,CO) complained that "[t]he cold fact of the matter is that the basic information is alone in possession of the Social Security Agency. There is no private actuary...that can give you the complete picture...I know what I am talking about because I tried to get that."

In parliamentary systems, like in many European countries, the proposer is usually a politician, in the legislature or in the executive. The decision maker is the relevant majority leader in the parliament, who controls the vote over its adoption. The proposer politician may have the sole interest of getting a bill passed if he is strongly office-motivated. In that case, showing legislative activity signals competence to voters or furthers his career prospects (Canes-Wrone et al., 2001; Gratton et al., 2021). The majority party leadership instead may be evaluated electorally based on the reform's outcome. The outcome depends both on the economic incidence of the reform (θ) and the implementation costs created by the proposer.

Our model focuses on an intuitive source of dynamics in the legislative context, given the cumulative nature of legislation. Reforms change the existing body of legislation. Complex reforms make the body of legislation more complicated and difficult to navigate. This in turn impacts the information environment of future policymaking, as new policy proposals must be evaluated against the existing body of legislation. Legislative persistence introduces dynamic linkages for bureaucratic pandering. A policy strategically drafted to be adopted by the current political principal has long-lasting effects. The results from Section 4 show that the pandering induced dynamics may provide a stabilizing force that limits the growth of complexity over time. For a non-trivial set of cases, the build-up of complexity sets the stage for more simple reforms to be proposed. Complexity traps, where legislation becomes increasingly complex, are still possible, but only if complex reforms are likely to be called for given the state of the world and the bureaucratic agency is expected to have sufficiently high capacity.

Empirical connections. Next, we discuss the implications of the model for recent empirical findings on the evolution of complexity and its relationship to efficiency and growth. Studies from different institutional contexts and time periods show potentially opposing effects of increasing complexity on the quality of legislative outcomes. On the one hand, higher legislative complexity has been shown to accompany lower quality legislation and worse bureaucratic efficiency. Gratton et al. (2021) examine the production of legislation in Italy during the First Republic (1948-1992) and the Second Republic (1992-2017). They show that higher political instability in the Second Republic is associated with lower quality and more complex legislation compared to the First Republic. They rationalize these findings by noting that higher political instability shortens the expected political horizon of legislators. This means that voters are called to evaluate the performance of legislators before their legislative proposals are fully implemented. This in turn incentivizes incompetent politicians to propose bad quality legislation, in order to appear hard-working and competent to voters. Therefore, as in our model, proposers derive a benefit if their reform is adopted, regardless of its contents. The increase in the production of low quality laws is then shown to have increased the complexity of the legislation and decreased bureaucratic efficiency. This Kafkaesque loop determines endogenously a reduction of the expected quality of proposals.

On the other hand, higher legislative complexity in terms of reforms containing more contingent clauses and detail has been shown to accompany higher efficiency and economic growth in the context of the U.S. states over the period 1965-2012 (Ash et al., 2020). The estimated effect is larger when economic uncertainty is higher, i.e., the state of the world is more uncertain. They rationalize these findings by noting that state-level legislation in the U.S. is competitive, which leads to better information about which reforms are good given what has worked in other states. In our model, this would map to a higher expected quality of proposals, π.

At first glance, the above results present a puzzle as to when reforms that increase legislative complexity are desirable. Our model sheds light on this puzzle. Consider an industry for which both in Italy and the U.S. in the late 80's there is the same relatively high likelihood κ that complex reforms are needed. Let both countries have also the same initial value π, at which we are in the Simplification $BPBE$ described in Proposition 2, close to the π_1 curve. A political instability shock like the one documented for the Italian case in the early 90's (and the consequent loop) generated a drop in the reduced form expected quality of proposals (π in our model), bringing the polity in the bad Complexification region. It is exactly for intermediate values of π that we have unnecessary and low quality complexifications with negative welfare consequences. In the case of U.S. states, high inter-state competition in the 20th century generated contagion and learning that increased the expected quality of proposals, π, bringing it higher up in the Simplification region. This determined an increase in legislative complexity, as policy y^C is more likely when the type is more likely to be A, as well as an increase in welfare. We summarize this insight in the following remark, where we assume that the $DM's$ payoff corresponds to the social benefit of reforms.

Remark 1 *Positive shocks that increase the expected capacity of proposers (and quality of proposals) produce efficient legislative complexity. Negative shocks that decrease the expected capacity of proposers (and quality of proposals) produce inefficient legislative complexity.*

6 Extensions and Robustness

In this section, we describe how the results of the model change if we modify it along three key dimensions. First, we show that having a long-lived decision maker does not change the qualitative results regarding complexity, but reduces the overall likelihood of reforms being adopted. Second, if the proposer is long-lived and has reputation concerns, short-term pandering exacerbates the use of inefficient complex reforms. Finally, we consider what happens without pandering, if the decision maker can draft the reform herself. We use this alternative case to emphasize the centrality of pandering for our main results. We summarize the results below and present the detailed analysis in the Appendix.

6.1 Dynamics with Long-Lived Decision Makers

We modify the model to allow for the DM to serve for multiple consecutive periods (i.e., multiple terms) $T > 1$, discounting the future at rate $\beta \in (0, 1)$. The rest of the model is unchanged.

The equilibrium in this extended model may be derived by backward induction. In the last period of the DM's tenure, the game is the same as described in the previous sections. Proposition 2 describes the $BPBE$ given any (κ, π, z). In the period before last, the DM

anticipates next period's outcome given the endogenous evolution of z. For instance, if the proposed reform is y^S, adoption would reduce z next period, leading to the equilibrium play corresponding to $BPBE(\kappa, \pi, z-\Delta)$. This results in an expected continuation payoff $\beta\mathbb{E}\left[u(y|\theta, P, z-\Delta)\right]$. Rejection of the reform, however, keeps the same z in the next period. The expected continuation payoffs in case of adoption versus rejection are different if the change in z changes the equilibrium play or the payoffs implied by the equilibrium play. Otherwise, the DM expects the same payoff for either z or $z-\Delta$. Given the equilibrium regions described in Proposition 2, the $BPBE$ changes for locations (κ, π) around the boundaries between $BPBEs$, whereas the expected payoff is a function of z only in the Pooling $BPBE$.

Performing the above analysis around the bounds between $BPBEs$ for time periods $t \in \{1, ..., T\}$, we find that the bounds $\pi_{1,t}(\kappa, z)$, $\pi_{3,t}(\kappa, z)$ and $\bar{\kappa}_t(z)$ are (weakly) increasing in t, whereas $\pi_{2,t}$ is constant and equal to the value derived for the one-term DM. The main effect of adding each additional period to the $DM's$ tenure comes through the effective increase in the DM's outside option. This makes the DM less willing to adopt reforms. As the $DM's$ tenure is longer, the regions where the $BPBE$ is Simplification or Complexification are smaller, whereas the region where it is Pooling is larger. Thus, the dynamic inefficiency with a long-lived DM comes in the form of more rejection of reforms and less drafting of efficient complex reforms. The benefit is slower growth in the complexity of the environment.

6.2 Dynamics with Long-Lived Proposers

Next, we allow for the proposer to be long-lived, while the DM's tenure is one period. This introduces reputational gains as another motive for pandering. We model the reputational benefit by assuming that the proposer derives a payoff $\mu' \cdot R$, where μ' is the DM's belief about the proposer's high capacity, given the history of reforms and outcomes. The payoff $R > 0$ is the reduced form representation of the benefit of a promotion or an outside option that the proposer can access given high reputation.[8]

[8] We assume that $R < 1$, so that the proposer prefers to have his reform adopted each period, even if adoption does not reveal his type to the DM.

The effect of a longer tenure for the proposer only comes into play if in the next period $\mu' \in (0,1)$. That is, given Assumption 1, only if $c(y^S, A) = c(y^S, B)$. Otherwise, if $c(y^S, A) \neq c(y^S, B)$ the DM can infer from last period's outcome the type of proposer. Then, the equilibrium play in the first period is the same as in the case of a one-term proposer, and the equilibrium in the second period is the same as in the benchmark with observable types, summarized in Proposition 1.

If $c(y^S, A) = c(y^S, B)$, then proposer B may be able to pool with proposer A. Harnessing the reputational benefit gives proposer A a stronger signaling motive for choosing a complex reform, as the outcome of this reform reveals his type to the DM. Thus, in the Simplification and Matching equilibria, the proposer is no longer indifferent between y^S and y^C. Proposer A gains from offering y^C in order to reveal his type, while proposer B gains from offering y^S in order to hide his type from the DM. The diverging incentives mean that these equilibria unravel. The Complexification and Pooling remain the only sustainable $BPBEs$. The immediate implication is that the stabilizing effect from the dynamics of z is eliminated. The benefit to using complex reforms for signaling purposes persists as z increases, leading to complexity build-up. The Complexification equilibrium is also the one where inefficient complex reforms are adopted. We no longer have the benefit of equilibria where complex reforms are efficient, unless the proposer's type has been revealed and $P = A$. In this case, equilibrium play in the second period is the same as in the benchmark with observable types. Reputational concerns therefore expand the production of inefficient complex reforms.[9]

6.3 Dynamics without Pandering

The strategic incentives existent in the pandering setup give distinct predictions. To show this, we compare our setting to having a singular proposer-decider who chooses a reform before the identity of the implementer is revealed. As in our main model, the proposer-decider has a prior π that the implementer will have high capacity.

[9]This last result is also obtained in other models of expert communication under reputational concerns (Ottaviani and Sørensen, 2006b,a): High capacity proposers produce more complex reforms, as these increase their expected reputational payoff.

Without a strategic proposer, the decision maker's choice resumes to picking a simple reform y^S if θ^S is sufficiently likely, i.e., if κ is low or $\rho = s$, and complex reform y^C if θ^C and $P = A$ are sufficiently likely, i.e., if κ is high, $\rho = c$ and π is sufficiently high. Otherwise, if she expects θ^C and $P = B$, she will choose to keep the status quo.

Once pandering is eliminated, the inefficiencies stemming from the strategic drafting of proposals disappear. However, the DM also loses a source of additional information, as the reform choice no longer offers any indication about the state of the world or the proposer's capacity. As such, the equilibrium with only efficient complex reforms is no longer possible. Another difference from the main model is that the stabilizing effect due to the dynamics of complexity is not guaranteed. Some cycling between y^S and y^C can emerge here as well, but for different reasons than in the main model. There can, for instance, be cycling between adopting a reform and keeping the status quo after $\rho = c$.[10] This result has a straightforward intuition: as the decision maker receives more precise information, she acts on that information to adopt a more risky, complex reform. As the information becomes less precise, the decision maker keeps the safe status quo. In contrast to the cycling obtained in the main model, this cycling is driven by the decision maker conditioning reform y^C on the precision of her information. This also implies that the $z^{**}(\kappa, \pi)$ around which cycling happens in this case increases in the probability that the implementer has high capacity. In our main model the cycling emerges when the decision maker is not making decisions contingent on her signal. This leads to the contrasting result: For a (κ, π) where there is cycling in both models, a high complexity $z^*(\kappa, \pi)$ in the main model implies low complexity $z^{**}(\kappa, \pi)$ here, and vice-versa.

Dynamically, eliminating pandering does not lead to everywhere higher or to everywhere lower expected complexity of the environment (z). On the one hand, for intermediate κ and π, pandering increases complexity because it supports the Complexification equilibrium, where inefficient complex reforms are offered. On the other hand, for higher π, pandering

[10]When z is high, the signal $\rho = c$ is less informative, and the DM is not willing to take a risk of choosing y^C, as it only delivers a benefit if the state is θ^C. She then keeps the status quo after $\rho = c$. After signal $\rho = s$, the DM chooses y^S, as state θ^S is sufficiently likely. Implementing y^S decreases z, which in turn makes the signal more informative. This induces the DM to choose y^C after $\rho = c$.

reduces complexity because it supports the Simplification equilibrium. In this equilibrium, the proposer's additional information about the state of the world is leveraged to have y^S adopted when $P = B$, even if the state θ^C is more likely ex-ante.

In terms of policy implications, there is a debate on whether shifting the authority over approving the details of reforms from legislators to regulators will result in more simplification (as argued by Teles, 2013) or whether it would increase instability (as argued by Besley and Mueller, 2018), and by extension complexity, as the environment becomes more uncertain. Our results bring a note of caution to both these theses. As shown above, complexity comparisons depend on the fundamentals.

7 Concluding Remarks and Future Directions

In this paper we have expended a pandering setup along two dimensions. First, we have endowed the proposer with a choice between proposing simple reforms, with few or no contingencies, or proposing complex reforms, involving many contingencies. Second, we considered the dynamic implications of this policy choice. We showed that inefficient complex reforms are most likely when the expected capacity of the proposer is intermediate. Such moderate expectations of bureaucratic capacity allow for complex rules to be adopted, even if they may contain bad or unnecessary provisions. Over time, complex reforms increase the complexity of the legislative environment. This, in turn, changes the types of reforms that can be adopted. For a large set of intermediate parameter values, the dynamics imply a stabilizing effect to the build-up of complexity. The increase in complexity occurs only up to an intermediate level. This level is increasing in the probability that the proposer has low capacity, a finding that highlights the negative spillovers from the perception of incompetent proposers. Moreover, when the expected need for complex reforms is high, but the uncertainty about the capacity of proposers is also high, the system exhibits path dependence: starting from high legislative complexity, steady increases in complexity are to be expected; else, complexity does not increase. The model allows us highlight the implications of pandering for the evolution and efficiency of legislative complexity.

In future research, the model may be connected more closely to the literature on endogenous incompleteness of contracts (Tirole, 1999). Adopting a complex reform can be mapped to making a contract more complete. This may be beneficial or it may be detrimental, depending on the alignment of interests between proposer and decision maker. A regulator may decide not to introduce a proposed completion of a contract for lack of trust that the benefits from the additional contingencies will truly outweigh the costs of writing them and the costs of enforcing them. For instance, the regulator may think that the costs may be on everybody whereas the benefits might be concentrated in the proposing interest group only. Endogenous incompleteness is more likely to emerge (in a setting consistent with our model) when the complexity of the environment is high. This hint could be explored further and complements the results obtained when endogenous incompleteness is due to writing costs alone (Battigalli and Maggi, 2002).

In future research we could also consider additional instruments that proposers may use. Complexity traps emerge when uncertainty about proposer capacity is highest, and that is when high-capacity proposers may want to reduce complexity of their reforms if they could additionally provide hard information (for instance, referential advice as in Callander et al., 2020). Relatedly, a proposer may want to link multiple complementary reforms. Complementarities would reduce the incentive of decision makers to adopt any one complex reform, given the uncertainty around whether all connected reforms will also be adopted.

Lastly, our framework has focused on incremental reforms only. A next step would be to also consider the alternative of radical reforms. The incremental dynamics of reforms could then be contrasted to the dynamics of major policy changes. In line with the view of Acemoglu and Robinson (2019), our model suggests that the continuous process of incremental reforms may stop when the perception is that more elaborate reforms would be necessary but the elite of proposers is perceived to be bad or captured (low trust in institutions and low confidence in expertise in their terminology). Such situations are exactly those where the world of incremental reforms stops and the chapter of institutional regime change begins.

References

Acemoglu, D., Egorov, G., Sonin, K., 2013. A political theory of populism. The Quarterly Journal of Economics 128, 771–805.

Acemoglu, D., Robinson, J.A., 2019. The narrow corridor: States, societies, and the fate of liberty. Penguin Books.

Ash, E., Morelli, M., Vannoni, M., 2020. More laws, more growth? evidence from u.s. states. CEPR DP15629 .

Asriyan, V., Foarta, D., Vanasco, V., 2020. The good, the bad, and the complex: Product design with asymmetric information. CEPR Discussion Paper No. DP14307 .

Battigalli, P., Maggi, G., 2002. Rigidity, discretion, and the costs of writing contracts. American Economic Review 92, 798–817.

Bendor, J., Meirowitz, A., 2004. Spatial models of delegation. American Political Science Review 98, 293–310.

Besley, T., Mueller, H., 2018. Institutions, volatility, and investment. Journal of the European Economic Association 16, 604–649.

Callander, S., 2011. Searching and learning by trial and error. American Economic Review 101, 2277–2308.

Callander, S., Lambert, N.S., Matouschek, N., 2020. The power of referential advice. Working Paper .

Canes-Wrone, B., Herron, M.C., Shotts, K.W., 2001. Leadership and pandering: A theory of executive policymaking. American Journal of Political Science , 532–550.

Cates, J.R., 1983. Insuring Inequality: Administrative Leadership in Social Security, 1935-54. University of Michigan Press.

Che, Y.K., Dessein, W., Kartik, N., 2013. Pandering to persuade. American Economic Review 103, 47–79.

Dewatripont, M., Roland, G., 1992. Economic reform and dynamic political constraints. The Review of Economic Studies 59, 703–730.

Dewatripont, M., Roland, G., 1995. The design of reform packages under uncertainty. The American Economic Review , 1207–1223.

Gratton, G., Guiso, L., Michelacci, C., Morelli, M., 2021. From weber to kafka: Political instability and overproduction of laws. American Economic Review .

Kawai, K., Lang, R., Li, H., 2018. Political kludges. AEJ: Microeconomics 10, 131–58.

Maskin, E., Tirole, J., 2004. The politician and the judge: Accountability in government. American Economic Review 94, 1034–1054.

Oprea, R., 2020. What makes a rule complex? American Economic Review 110, 3913–51.

Ottaviani, M., Sørensen, P.N., 2006a. Professional advice. Journal of Economic Theory 126, 120–142.

Ottaviani, M., Sørensen, P.N., 2006b. Reputational cheap talk. The Rand journal of economics 37, 155–175.

Perez-Richet, E., Prady, D., 2011. Complicating to persuade. mimeo .

Shepherd, M.E., You, H.Y., 2020. Exit strategy: career concerns and revolving doors in congress. American Political Science Review 114, 270–284.

Teles, S.M., 2013. Kludgeocracy in America. National Affairs 17, 97–114.

Ting, M.M., 2009. Organizational capacity. J. Law Econ. Organ. 27, 245–271.

Tirole, J., 1999. Incomplete contracts: Where do we stand? Econometrica 67, 741–781.

A Proofs

A.1 Proof to Proposition 1

If the type is $P = A$, the action profile that maximizes $DM's$ payoff is $r_A(\theta^S, z) = y^S$, $r_A(\theta^C, z) = y^C$, and $d(\rho, y) = 1$. Given observability of the proposer's capacity, only the second component of the belief system (as defined in Definition 1) matters, and the above matching behavior by proposer A is sustainable as a PBE with the belief that regardless of the signal the probability that the state is θ^C when observing $y^C(y^S)$ is 1(0).

If the type is $P = B$, adopting a complex reform is a weakly dominated strategy for the DM. The action profile that maximizes $DM's$ payoff is one where the proposer only offers y^S. The belief that the state is θ^C is determined by Bayes rule as follows:

$$\mu(\theta^C|s) = \frac{z\kappa}{(1-z)(1-\kappa) + z\kappa}, \tag{14}$$

$$\mu(\theta^C|c) = \frac{(1-z)\kappa}{z(1-\kappa) + (1-z)\kappa}. \tag{15}$$

The DM expects to gain from adopting a policy y^S if

$$\text{after } \rho = s\text{: } v - (1 - \mu(\theta^C|s))e(y^S, \theta^S) - \mu(\theta^C|s)e(y^S, \theta^C) - c(y^S, B) \geq 0, \tag{16}$$

$$\text{after } \rho = c\text{: } v - (1 - \mu(\theta^C|c))e(y^S, \theta^S) - \mu(\theta^C|c)e(y^S, \theta^C) - c(y^S, B) \geq 0. \tag{17}$$

This implies that the strategy that maximizes $DM's$ payoff is

$$d(y^S, s, z|B) = 1 \iff \kappa \leq \frac{(1-z)(v - c(y^S, B))}{(1-z)(v - c(y^S, B)) - z(v - e(y^S, \theta^S) - c(y^S, B))} \tag{18}$$

$$d(y^S, c, z|B) = 1 \iff \kappa \leq \frac{z(v - c(y^S, B))}{z(v - c(y^S, B)) - (1-z)(v - e(y^S, \theta^S) - c(y^S, B))} \tag{19}$$

$$d(y^C, \rho, z|B) = 0. \tag{20}$$

Thus, offering only y^S is a weakly dominant strategy for proposer B and the above is a PBE.

A.2 Proof of Proposition 2

The decision maker's strategy Given a proposal y, signal ρ and noise z, the DM adopts it if her expected utility gain is positive: $\mathbb{E}\left[u\left(y, \theta, P\right)|z, \rho\right] \geq 0$.

We list below all the possible pure strategy equilibria where there is a positive probability of adoption by the DM:

1. (Simplification) We begin with the equilibrium where $r_B(\theta^S) = r_B(\theta^C) = y^S$, $r_A(\theta^S) = y^S$, $r_A(\theta^C) = y^C$, and $d(y, \rho) = 1$ for all y and ρ.

Since y^C signals proposer type A and state θ^C, it is optimal for the DM to adopt the proposal.

Upon observing y^S, there are 3 possibilities: (θ^C, B), (θ^S, A), and (θ^S, B). We need to derive the posterior beliefs $\mu^2(\cdot|y^S, \rho)$ on these elements for both signals in order to derive conditional expected payoff of accepting.

For signal $\rho = s$, we have using Bayes' rule updating from the prior $\mu^2(\cdot)$:

$$\begin{aligned}\mu^2(\theta^C, B|y^S, s) &= \frac{\mu^2(\{(\theta^C, B, s)\})}{\mu^2(\{(\theta^C, B, s), (\theta^S, B, s), (\theta^S, A, s)\})} \\ &= \frac{z\kappa(1-\pi)}{z\kappa(1-\pi) + (1-z)(1-\kappa)(1-\pi) + (1-z)(1-\kappa)\pi} \\ &= \frac{z\kappa(1-\pi)}{z\kappa(1-\pi) + (1-z)(1-\kappa)}\end{aligned}$$

and the other two (positive) probabilities are obvious from the denominator of the second line.

For signal $\rho = c$, we have

$$\begin{aligned}\mu^2(\theta^C, B|y^S, s) &= \frac{\mu^2(\{(\theta^C, B, c)\})}{\mu^2(\{(\theta^C, B, c), (\theta^S, B, c), (\theta^S, A, c)\})} \\ &= \frac{(1-z)\kappa(1-\pi)}{(1-z)\kappa(1-\pi) + z(1-\kappa)(1-\pi) + z(1-\kappa)\pi}\end{aligned}$$

Accepting y^S is a best reply for the DM after signal ρ if

$$\sum_{(\theta,P)} u(y^S, \theta, P)\mu^2(\theta, P|y^S, \rho) \geq 0.$$

For signal $\rho = s$, the *DM* adopts if

$$\pi \geq \pi^S \equiv \frac{-\kappa \cdot z \cdot \left[v - e\left(y^S, \theta^C\right) - c(y^S, B)\right] - (1-\kappa) \cdot (1-z) \cdot \left[v - c(y^S, B)\right]}{(1-\kappa) \cdot (1-z) \cdot [c(y^S, B) - c(y^S, A)] - \kappa \cdot z \cdot [v - e\left(y^S, \theta^C\right) - c(y^S, B)]}. \tag{21}$$

For signal c, the *DM* adopts if

$$\pi \geq \frac{-(1-z)\kappa \cdot u(y^S, \theta^C, B) - z(1-\kappa) \cdot u(y^S, \theta^S, B)}{-(1-z)\kappa \cdot u(y^S, \theta^C, B) - z(1-\kappa) \cdot u(y^S, \theta^S, B) + z(1-\kappa) \cdot u(y^S, \theta^S, A)}$$

which is equivalent to

$$\pi \geq \pi_1^C = \frac{-(1-z)\kappa \cdot [v - e(y^S, \theta^C) - c(y^S, B)] - z(1-\kappa) \cdot [v - c(y^S, B)]}{-(1-z)\kappa \cdot [v - e(y^S, \theta^C) - c(y^S, B)] + z(1-\kappa) \cdot [c(y^S, B) - c(y^S, A)]}.$$

Finally, $z \leq 1/2$ implies $\pi_1^C \geq \pi_1^S$.

2. (Matching) $r_B(\theta^S) = r_A(\theta^S) = y^S$**, and** $r_B(\theta^C) = r_A(\theta^C) = y^C$, $d(\rho, z) = 1$.

After observing y^S, $\Pr\left(\theta = \theta^S | y^S\right) = 1$, and $\mathbb{E}\left[u\left(y^S, \theta^S, P\right)|z, \rho\right] > 0$, so the DM adopts with probability one. After observing y^C, the DM adopts if

$$\pi \geq \frac{c(y^C, B) - v}{c(y^C, B) - c(y^C, A)} \equiv \pi_2. \tag{22}$$

Clearly,

$$\frac{\partial \pi_2}{\partial z} = 0. \tag{23}$$

The DM's expected payoff given this equilibrium play is

$$U^{(2)} = v - \kappa\pi c\left(y^C, A\right) - \kappa(1-\pi)c\left(y^C, B\right) - (1-\kappa)\pi c\left(y^S, A\right) - (1-\kappa)\left(1-\pi\right)c\left(y^S, B\right). \tag{24}$$

3. (Complexification) $r_B(\theta^S) = y^S$**,** $r_B(\theta^C) = y^C$ **and** $r_A(\theta^S) = r_A(\theta^C) = y^C$, $d(\rho, z) = 1$.

After observing y^S, the $DM's$ belief about θ given Bayes' Rule is $\Pr\left(\theta = \theta^S | y^S\right) = 1$. Then, $\mathbb{E}\left[u\left(y^S, \theta^S, P\right)|z, \rho\right] > 0$ and with probability 1. After observing y^C, the DM adopts in the following cases:

- after $\rho = s$, if

$$\pi \geq \pi_3^S \equiv \frac{-\kappa z\left[v - c\left(y^C, B\right)\right]}{\kappa z\left[c\left(y^C, B\right) - c\left(y^C, A\right)\right] + (1-\kappa)\left(1-z\right)\left[v - e\left(y^C, \theta^S\right) - c\left(y^C, A\right)\right]}. \tag{25}$$

- after $\rho = c$, if

$$\pi \geq \pi_3^C \equiv \frac{-\kappa\left(1-z\right)\left[v - c\left(y^C, B\right)\right]}{\kappa\left(1-z\right)\left[c\left(y^C, B\right) - c\left(y^C, A\right)\right] + (1-\kappa)z\left[v - e\left(y^C, \theta^S\right) - c\left(y^C, A\right)\right]}, \tag{26}$$

  and

$$\frac{\partial \pi_3^C}{\partial z} = \frac{\kappa\left[v - c\left(y^C, B\right)\right](1-\kappa)\left[v - e\left(y^C, \theta^S\right) - c\left(y^C, A\right)\right]}{\left\{\kappa\left(1-z\right)\left[c\left(y^C, B\right) - c\left(y^C, A\right)\right] + (1-\kappa)z\left[v - e\left(y^C, \theta^S\right) - c\left(y^C, A\right)\right]\right\}^2} < 0. \tag{27}$$

Since $\frac{1-z}{z} \geq \frac{z}{1-z}$, we have $\pi_3^C \geq \pi_3^S$. Thus, this equilibrium exists if $\pi \geq \pi_3^C$. The DM's expected payoff given this equilibrium play is

$$U^{(3)} = v - \pi c\left(y^C, A\right) - \kappa(1-\pi)c\left(y^C, B\right) - (1-\kappa)\pi e\left(y^C, \theta^S\right) - (1-\kappa)\left(1-\pi\right)c\left(y^S, B\right). \tag{28}$$

4. (Pooling)

(a) Equilibrium with $r_B(\theta^S) = r_B(\theta^C) = r_A(\theta^S) = r_A(\theta^C) = y^S,\ d\left(\rho, z|y^S\right) = 1, d\left(\rho, z|y^C\right) = 0$.

The DM's adoption condition reduces to

1. If $\rho = s$:

$$\begin{aligned}&(1-z)(1-\kappa)\left[v - \pi c\left(y^S, A\right) - (1-\pi)\, c\left(y^S, B\right)\right]\\&+ z\kappa\left[v - \pi e\left(y^S, \theta^C\right) - \pi c\left(y^S, A\right) - (1-\pi)\, e\left(y^S, \theta^C\right) - (1-\pi)\, c\left(y^S, B\right)\right] \geq 0.\end{aligned} \tag{29}$$

2. If $\rho = c$:

$$\begin{aligned}&z(1-\kappa)\left[v - \pi c\left(y^S, A\right) - (1-\pi)\, c\left(y^S, B\right)\right]\\&+(1-z)\,\kappa\left[v - \pi e\left(y^S, \theta^C\right) - \pi c\left(y^S, A\right) - (1-\pi)\, e\left(y^S, \theta^C\right) - (1-\pi)\, c\left(y^S, B\right)\right] \geq 0.\end{aligned} \tag{30}$$

An equilibrium with pooling on y^S (for all θ) and probability one of adoption exists if

$$\kappa \leq \kappa^{pool} \equiv \frac{z \cdot \left[v - \pi \cdot c\left(y^S, A\right) - (1-\pi) \cdot c\left(y^S, B\right)\right]}{(1-z) \cdot e\left(y^S, \theta^C\right) - (1-2z) \cdot \left[v - \pi \cdot c\left(y^S, A\right) - (1-\pi) \cdot c\left(y^S, B\right)\right]}. \tag{31}$$

Notice also that

$$\begin{aligned}den\left(\frac{\partial \kappa^{pool}}{\partial z}\right) = &-\left[v - \pi \cdot c\left(y^S, A\right) - (1-\pi) \cdot c\left(y^S, B\right)\right]\\&\cdot\left[v - e\left(y^S, \theta^C\right) - \pi \cdot c\left(y^S, A\right) - (1-\pi) \cdot c\left(y^S, B\right)\right] > 0,\end{aligned} \tag{32}$$

and thus

$$\frac{\partial \kappa^{pool}}{\partial z} > 0.$$

The DM's expected payoff is

$$U^{(4a)} = v - \kappa \cdot e\left(y^S, \theta^C\right) - \left[\pi \cdot c\left(y^S, A\right) + (1-\pi) \cdot c\left(y^S, B\right)\right]. \tag{33}$$

(b) Equilibrium with $r_B(\theta^S) = r_B(\theta^C) = r_A(\theta^S) = r_A(\theta^C) = y^S,\ d\left(s, z|y^S\right) = 1, d\left(c, z|y^S\right) = 0,\ d\left(\rho, z|y^C\right) = 0$.

Given the above adoption conditions after each ρ, an equilibrium with adoption conditional on $\rho = s$ exists if

$$\kappa^{pool} \leq \kappa \leq \bar{\kappa} \equiv \frac{(1-z) \cdot \left[v - \pi \cdot c\left(y^S, A\right) - (1-\pi) \cdot c\left(y^S, B\right)\right]}{(1-2z) \cdot \left[v - \pi \cdot c\left(y^S, A\right) - (1-\pi) \cdot c\left(y^S, B\right)\right] + z \cdot e\left(y^S, \theta^C\right)}, \tag{34}$$

and the DM's off path belief $\Pr\left(P = B|y^C\right) = 1$.

Also,

$$den\left(\frac{\partial\overline{\kappa}}{\partial z}\right) = (1-z)\left[v - \pi\cdot c\left(y^S,A\right) - (1-\pi)\cdot c\left(y^S,B\right)\right]$$
$$\left\{v - \pi\cdot c\left(y^S,A\right) - (1-\pi)\cdot c\left(y^S,B\right) - e\left(y^S,\theta^C\right)\right\} < 0, \quad (35)$$

and so

$$\frac{\partial\overline{\kappa}}{\partial z} < 0.$$

The DM's expected payoff given the equilibrium play with unconditional adoption is

$$U^{(4b)} = (z\cdot\kappa + (1-z)\cdot(1-\kappa))\cdot v - z\cdot\kappa\cdot e\left(y^S,\theta^C\right)$$
$$-\left[z\cdot\kappa + (1-z)\cdot(1-\kappa)\right]\cdot\left[\pi\cdot c\left(y^S,A\right) + (1-\pi)\cdot c\left(y^S,B\right)\right].$$

5. Pooling on y^C:
(a) Equilibrium with $r_B(\theta^S) = r_B(\theta^C) = r_A(\theta^S) = r_A(\theta^C) = y^C$, $d\left(\rho,z|y^S\right) = 0$, and $d\left(\rho,z|y^C\right) = 1$.

If the proposer only offered y^C the DM's adoption decision reduces to:

- After $\rho = c$:

$$\pi \geq \pi_5^C \equiv \frac{\left[z(1-\kappa) + (1-z)\kappa\right]\left(c\left(y^C,B\right) - v\right) + z(1-\kappa)e\left(y^C,\theta^S\right)}{\left[z(1-\kappa) + (1-z)\kappa\right]\cdot\left[c\left(y^C,B\right) - c\left(y^C,A\right)\right]}. \quad (36)$$

- After $\rho = s$:

$$\pi \geq \pi_5^S \equiv \frac{\left[(1-z)(1-\kappa) + z\kappa\right]\left(c\left(y^C,B\right) - v\right) + (1-z)(1-\kappa)e\left(y^C,\theta^S\right)}{\left[(1-z)(1-\kappa) + z\cdot\kappa\right]\cdot\left[c\left(y^C,B\right) - c\left(y^C,A\right)\right]}. \quad (37)$$

If $\pi \geq \pi_5^S(\kappa,z)$, then the $DM's$ optimal decision is to adopt y^C regardless of signal. This equilibrium is sustained by the off path belief that $\Pr\left(P = B, \theta = \theta^C|y^S\right) = 1$.

The DM's expected payoff is

$$U^{(5a)} = v - (1-\kappa)\cdot e\left(y^C,\theta^S\right) - \left[\pi\cdot c\left(y^C,A\right) + (1-\pi)\cdot c\left(y^C,B\right)\right]. \quad (38)$$

(b) Equilibrium with $r_B(\theta^S) = r_B(\theta^C) = r_A(\theta^S) = r_A(\theta^C) = y^S$, $d\left(\rho,z|y^S\right) = 0$, $d\left(s,z|y^C\right) = 0$, $d\left(c,z|y^C\right) = 1$.

If $\pi \in [\pi_5^C, \pi_5^S)$, then the DM adopts contingent on $\rho = c$. This equilibrium is sustained by the off path belief that $\Pr\left(P = B, \theta = \theta^C|y^S\right) = 1$.

The DM's expected payoff is

$$U^{(5b)} = ((1-z)\kappa + z(1-\kappa)) \cdot v - z(1-\kappa) \cdot e\left(y^C, \theta^S\right) \\ - \left[(1-z)\kappa + z(1-\kappa)\right] \left[\pi \cdot c\left(y^C, A\right) + (1-\pi) \cdot c\left(y^C, B\right)\right]. \quad (39)$$

6. Equilibrium with $r_B(\theta^S) = r_B(\theta^C) = y^C$, $r_A(\theta^S) = y^S$, $r_A(\theta^C) = y^C$, $d(\rho, z) = 1$.
After y^S, $\Pr\left(P = A, \theta = \theta^S | y^S\right) = 1$, and so $u\left(y^S, \theta^S, A\right) > 0$. The DM thus adopts y^S with probability 1. After y^C, the DM adopts if

- after $\rho = c$:

$$\pi \geq \frac{-(1-z)\kappa\left[v - c\left(y^C, B\right)\right] - z(1-\kappa)\left[v - e\left(y^C, \theta^S\right) - c\left(y^C, B\right)\right]}{(1-z)\kappa\left[c\left(y^C, B\right) - c\left(y^C, A\right)\right] - z(1-\kappa)\left[v - e\left(y^C, \theta^S\right) - c\left(y^C, B\right)\right]}. \quad (40)$$

- after $\rho = s$:

$$\pi \geq \frac{-z\kappa\left[v - c\left(y^C, B\right)\right] - (1-z)(1-\kappa)\left[v - e\left(y^C, \theta^S\right) - c\left(y^C, B\right)\right]}{z\kappa\left[c\left(y^C, B\right) - c\left(y^C, A\right)\right] - (1-z)(1-\kappa)\left[v - e\left(y^C, \theta^S\right) - c\left(y^C, B\right)\right]}. \quad (41)$$

Thus, the DM adopts if

$$\pi \geq \pi_6 \equiv \frac{-z\kappa\left[v - c\left(y^C, B\right)\right] - (1-z)(1-\kappa)\left[v - e\left(y^C, \theta^S\right) - c\left(y^C, B\right)\right]}{z\kappa\left[c\left(y^C, B\right) - c\left(y^C, A\right)\right] - (1-z)(1-\kappa)\left[v - e\left(y^C, \theta^S\right) - c\left(y^C, B\right)\right]}. \quad (42)$$

The DM's expected payoff is

$$U^{(6)} = v - \kappa\pi c\left(y^C, A\right) - (1-\pi)c\left(y^C, B\right) - (1-\kappa)\pi c\left(y^S, A\right) - (1-\kappa)(1-\pi)e\left(y^C, \theta^S\right). \quad (43)$$

7. Equilibrium with $r_B(\theta^S) = r_B(\theta^C) = y^C$ **and** $r_A(\theta^S) = r_A(\theta^C) = y^S$, $d(\rho, z) = 1$.
After y^C, $\Pr\left(P = A | y^S\right) = 1$, and so $\mathbb{E}\left[u\left(y^S, \theta, A\right) | z, \rho\right] > 0$. Thus, the DM adopts y^C with probability 1. After y^S, the DM adopts if

- after $\rho = c$:

$$\kappa \leq \frac{z \cdot \left[v - c\left(y^S, B\right)\right]}{-(1-z) \cdot \left[v - e\left(y^S, \theta^C\right) - c\left(y^S, B\right)\right] + z \cdot \left[v - c\left(y^S, B\right)\right]} \equiv \kappa^7, \quad (44)$$

- after $\rho = s$:

$$\kappa \leq \frac{(1-z) \cdot \left[v - c\left(y^S, B\right)\right]}{-z \cdot \left[v - e\left(y^S, \theta^C\right) - c\left(y^S, B\right)\right] + (1-z) \cdot \left[v - c\left(y^S, B\right)\right]}. \quad (45)$$

This equilibrium is sustainable if $\kappa \leq \kappa^7$. The expected utility for the DM is

$$U^{(7)} = v - \pi c\left(y^C, A\right) - (1-\pi)c\left(y^S, B\right) - \left[\kappa \cdot (1-\pi) + (1-\kappa)\pi\right] e\left(y^S, \theta^C\right). \tag{46}$$

Ranking of Equilibria for the DM. We make the following observations:

Claim 1. $U^{(1)} > U^{(2)}$.

Proof: $U^{(1)} - U^{(2)} = \kappa \cdot (1-\pi) \cdot \left[c\left(y^C, B\right) - e\left(y^S, \theta^C\right) - c\left(y^S, B\right)\right]$, and from Assumption 1, $c\left(y^C, B\right) \geq e\left(y^S, \theta^C\right) + c\left(y^S, B\right)$, which implies $U^{(1)} - U^{(2)} \geq 0$.

Claim 2. $U^{(2)} > U^{(3)}$.

Proof: $U^{(2)} - U^{(3)} = (1-\kappa) \cdot \pi \cdot \left[c\left(y^C, A\right) - c\left(y^S, A\right)\right] + (1-\kappa) \cdot \pi \cdot e\left(y^C, \theta^S\right) \geq 0$, since $c\left(y^C, A\right) \geq c\left(y^S, A\right)$.

Claim 3. $U^{(2)} > U^{(6)}$ and $\pi_6 > \pi_2$.

Proof:

$$U^{(2)} - U^{(6)} = (1-\kappa)(1-\pi)\left[c\left(y^C, B\right) - c\left(y^S, B\right)\right] + (1-\kappa)(1-\pi)\, e\left(y^C, \theta^S\right) > 0. \tag{47}$$

Notice that $c\left(y^C, B\right) - c\left(y^C, A\right) - c\left(y^C, B\right) + v = v - c\left(y^C, A\right) > 0$, so

$$\pi_6 > \frac{c\left(y^C, B\right) - v}{c\left(y^C, B\right) - c\left(y^C, A\right)} = \pi_2, \tag{48}$$

and therefore equilibrium (6) exists whenever equilibrium (2) also exists.

Claim 4. $U^{(2)} > U^{(5)}$ and $\pi_5^C(\kappa, z) > \pi_2$.

Proof: If $\pi > \pi_5^S$, then

$$\begin{aligned} U^{(2)} - U^{(5)} = {} & [z \cdot \kappa + (1-z) \cdot (1-\kappa)] \cdot v - \kappa \cdot \pi \cdot c\left(y^C, A\right) - \kappa \cdot (1-\pi) \cdot c\left(y^C, B\right) \\ & - (1-\kappa) \cdot \pi \cdot c\left(y^S, A\right) - (1-\kappa) \cdot (1-\pi) \cdot c\left(y^S, B\right) + z \cdot (1-\kappa) \cdot e\left(y^C, \theta^S\right) \\ & + [(1-z) \cdot \kappa + z \cdot (1-\kappa)] \cdot \left[\pi \cdot c\left(y^C, A\right) + (1-\pi) \cdot c\left(y^C, B\right)\right]. \end{aligned} \tag{49}$$

Note that $c\left(y^C, B\right) - c\left(y^C, A\right) - c\left(y^C, B\right) + v = v - c\left(y^C, A\right) > 0$, so

$$\pi_5^C(\kappa, z) > \frac{c\left(y^C, B\right) - v}{c\left(y^C, B\right) - c\left(y^C, A\right)} = \pi_2. \tag{50}$$

Since $\pi > \pi_2$,

$$U^{(2)} - U^{(5)} > (1-\kappa) \cdot \left[v - \pi \cdot c\left(y^S, A\right) - (1-\pi) \cdot c\left(y^S, B\right)\right] + z \cdot (1-\kappa) \cdot e\left(y^C, \theta^S\right) \geq 0. \tag{51}$$

Claim 5. $U^{(1)} > U^{(7)}$ and $\pi_1(\kappa^7, z) = 0$.

Proof: First,

$$U^{(1)} - U^{(7)} = (1-\kappa)\cdot\pi\cdot\left(c\left(y^C, A\right) - c\left(y^S, A\right) + e\left(y^S, \theta^C\right)\right) > 0. \tag{52}$$

Second,

$$\begin{aligned}\pi_1\left(\kappa^7\right) = &-\frac{z\cdot\left[v - c\left(y^S, B\right)\right]\cdot(1-z)\cdot\left[v - e\left(y^S, \theta^C\right) - c(y^S, B)\right]}{(1-z)\cdot e\left(y^S, \theta^C\right) - (1-2z)\cdot\left[v - c\left(y^S, B\right)\right]}\\ &- \frac{(1-z)\cdot e\left(y^S, \theta^C\right) - (1-z)\cdot\left[v - c\left(y^S, B\right)\right]}{(1-z)\cdot e\left(y^S, \theta^C\right) - (1-2z)\cdot\left[v - c\left(y^S, B\right)\right]}\cdot z\cdot\left[v - c(y^S, B)\right] = 0.\end{aligned} \tag{53}$$

Thus, equilibrium (7) exists whenever equilibrium (1) also exists.

Claim 6. $U^{(1)} > U^{(4a)}$ and $\pi_1(\kappa^{pool}, z) = 0$.
Proof: First,

$$\begin{aligned}U^{(1)} - U^{(4a)} &= \kappa\cdot\pi\cdot\left[-c\left(y^C, A\right) + e\left(y^S, \theta^C\right) + c\left(y^S, A\right)\right]\\ &= \kappa\cdot\pi\cdot\left[v - c\left(y^C, A\right) - \left(v - e\left(y^S, \theta^C\right) - c\left(y^S, A\right)\right)\right] > 0.\end{aligned} \tag{54}$$

Second,

$$\pi_1\left(\kappa^{pool}\right) = \frac{\pi_1\cdot\left[c(y^S, B) - c\left(y^S, A\right)\right]\cdot e\left(y^S, \theta^C\right)}{\left\{\begin{array}{c}\left[e\left(y^S, \theta^C\right) - \left[v - \pi c\left(y^S, A\right) - (1-\pi)\,c\left(y^S, B\right)\right]\right]\left[c(y^S, B) - c(y^S, A)\right]\\ -\left[v - \pi c\left(y^S, A\right) - (1-\pi)\,c\left(y^S, B\right)\right]\left[v - e\left(y^S, \theta^C\right) - c(y^S, B)\right]\end{array}\right\}}, \tag{55}$$

and the only solution to this equation is $\pi_1 = 0$. To verify this,

$$\begin{aligned}\pi_1\left(\kappa^{pool}\left(\pi=0\right)\right) &= \frac{\left\{\begin{array}{c}z\left[v - c\left(y^S, B\right)\right](1-z)\left[e\left(y^S, \theta^C\right) + c(y^S, B) - v\right]\\ -(1-z)\left[c\left(y^S, B\right) + e\left(y^S, \theta^C\right) - v\right]z\left[v - c(y^S, B)\right]\end{array}\right\}}{\left\{\begin{array}{c}z\left[v - c\left(y^S, B\right)\right](1-z)\left[e\left(y^S, \theta^C\right) + c(y^S, B) - v\right]\\ +(1-z)\left[c\left(y^S, B\right) + e\left(y^S, \theta^C\right) - v\right]z\left[c(y^S, B) - c(y^S, A)\right]\end{array}\right\}} \qquad (56)\\ &= 0. \qquad (57)\end{aligned}$$

Claim 7. $U^{(1)} > U^{(4b)}$.
Proof:

$$\begin{aligned}U^{(1)} - U^{(4b)} = &\kappa\cdot\left[v - \pi\cdot c\left(y^C, A\right) - (1-\pi)\cdot c\left(y^S, B\right) - (1-\pi)\cdot e\left(y^S, \theta^C\right)\right]\\ &+ z\cdot(1-2\kappa)\cdot\left[v - \pi\cdot c\left(y^S, A\right) - (1-\pi)\cdot c\left(y^S, B\right)\right] + \kappa\cdot z\cdot e\left(y^S, \theta^C\right).\end{aligned} \tag{58}$$

Then

$$
\begin{aligned}
&U^{(1)} - U^{(4)} \geq 0 \\
&\iff \pi \geq \frac{\kappa \left[c\left(y^S, B\right) + e\left(y^S, \theta^C\right) - v \right] + z(1-2\kappa)\left[c\left(y^S, B\right) - v \right] - \kappa z e\left(y^S, \theta^C\right)}{\kappa\left[c\left(y^S, B\right) + e\left(y^S, \theta^C\right) - c\left(y^C, A\right) \right] + z(1-2\kappa)\left[c\left(y^S, B\right) - c\left(y^S, A\right) \right]}. \quad (59)
\end{aligned}
$$

Note that

$$
\frac{\kappa \left[c\left(y^S, B\right) + e\left(y^S, \theta^C\right) - v \right] + z(1-2\kappa)\left[c\left(y^S, B\right) - v \right] - \kappa z e\left(y^S, \theta^C\right)}{\kappa\left[c\left(y^S, B\right) + e\left(y^S, \theta^C\right) - c\left(y^C, A\right) \right] + z(1-2\kappa)\left[c\left(y^S, B\right) - c\left(y^S, A\right) \right]} < \pi_1. \quad (60)
$$

So $U^{(1)} > U^{(4b)}$ whenever the Simplification equilibrium exists.

Claim 8. $U^{(2)} > U^{(4b)}$.
Proof:

$$
\begin{aligned}
U^{(2)} - U^{(4b)} = &\kappa \left[v - \pi c\left(y^C, A\right) - (1-\pi) c\left(y^C, B\right) \right] \\
&+ z(1-2\kappa)\left[v + \pi c\left(y^S, A\right) + (1-\pi) c\left(y^S, B\right) \right] + z\kappa e\left(y^S, \theta^C\right). \quad (61)
\end{aligned}
$$

We have

$$
v - \pi \cdot c\left(y^C, A\right) - (1-\pi) \cdot c\left(y^C, B\right) > 0 \quad (62)
$$

if

$$
\pi > \frac{c\left(y^C, B\right) - v}{c\left(y^C, B\right) - c\left(y^C, A\right)} \equiv \pi_2, \quad (63)
$$

so $U^{(2)} - U^{(4)} > 0$ for all $\pi > \pi_2$.

Claims 3-6 imply that equilibria (5)-(7) and (4a) cannot be $BPBEs$. Then, from Claims 1 and 2 it follows that $U^{(1)}(\kappa, z) > U^{(2)}(\kappa, z) > U^{(3)}(\kappa, z)$. From Claims 7 and 8 it follows that $U^{(1)}(\kappa, z) > U^{(2)}(\kappa, z) > U^{(4b)}(\kappa, z)$.

Finally, it remains to compare $U^{(3)}$ and $U^{(4b)}$.

Claim 9. $U^{(3)} > U^{(4b)} \Leftrightarrow z \geq \overline{z}(\kappa)$, where the threshold satisfies $\overline{z}(\kappa) \geq z^{\min}$ and $\frac{\partial \bar{z}(\kappa)}{\partial \kappa} < 0$.
Proof:

$$
\begin{aligned}
U^{(3)} - U^{(4)} = &\pi \cdot \left[v - c\left(y^C, A\right) - e\left(y^C, \theta^S\right) \right] + \pi \cdot \kappa \cdot \left[c\left(y^C, B\right) + e\left(y^C, \theta^S\right) - v \right] \\
&- \pi \cdot (1-\kappa) \cdot \left[v - c\left(y^S, A\right) \right] - \kappa \cdot \left[c\left(y^C, B\right) - v \right] \\
&+ z \cdot (1-\kappa) \cdot \left\{ (1-\pi) \cdot \left[v - c\left(y^S, B\right) \right] + \pi \cdot \left[v - c\left(y^S, A\right) \right] \right\} \\
&+ z \cdot \kappa \cdot \left\{ (1-\pi) \cdot \left[c\left(y^S, B\right) + e\left(y^S, \theta^C\right) - v \right] + \pi \cdot \left[c\left(y^S, A\right) + e\left(y^S, \theta^C\right) - v \right] \right\}. \quad (64)
\end{aligned}
$$

Thus, $U^{(3)} - U^{(4)}$ is increasing in z. For $z \to 0, U^{(3)} - U^{(4)} < 0$ since otherwise $U^{(3)} - U^{(4)} >$

0 requires

$$\kappa > \frac{\pi \cdot \left[c\left(y^C, A\right) + e\left(y^C, \theta^S\right) - c\left(y^S, A\right)\right]}{\pi \cdot \left[c\left(y^C, A\right) + e\left(y^C, \theta^S\right) - c\left(y^S, A\right)\right] + v - \pi c\left(y^C, A\right) - (1-\pi)\, c\left(y^C, B\right)} > 1. \tag{65}$$

We have $U^{(3)} - U^{(4)} > 0$ if

$$\pi \geq \frac{\kappa\left[c\left(y^C, B\right) - v\right] - z\left\{(1-\kappa)\left[v - c\left(y^S, B\right)\right] - \kappa\left[e\left(y^S, \theta^C\right) + c\left(y^S, B\right) - v\right]\right\}}{\left\{\begin{array}{c} \kappa\left[c\left(y^C, B\right) + e\left(y^C, \theta^S\right)\right] - c\left(y^C, A\right) - e\left(y^C, \theta^S\right) \\ +\left[z(1-\kappa) - z\kappa\right]\left[c\left(y^S, B\right) - c\left(y^S, A\right)\right] + (1-\kappa) c\left(y^S, A\right) \end{array}\right\}}, \tag{66}$$

that is, if $\pi \geq \pi_3^*$, where π_3^* is defined as

$$\pi_3^* = \frac{-\kappa u\left(y^C, \theta^C, B\right) - z(1-\kappa) u\left(y^S, \theta^S, B\right) + z\kappa u\left(y^S, \theta^C, B\right)}{\left\{\begin{array}{c} u\left(y^C, \theta^S, A\right) - \kappa u\left(y^C, \theta^S, B\right) - \left[z(1-\kappa) - z\kappa\right]\left[u\left(y^S, \theta^S, B\right) - u\left(y^S, \theta^S, A\right)\right] \\ -(1-\kappa) u\left(y^S, \theta^S, A\right) \end{array}\right\}}. \tag{67}$$

Then let

$$\pi_3^P = \left\{\begin{array}{cc} \pi_3^* & \text{if } \kappa \leq \overline{\kappa} \\ 0 & \text{otherwise} \end{array}\right. . \tag{68}$$

If $\kappa > \overline{\kappa}$, then clearly $0 = \pi_3^P \leq \pi_3^C$. If $\kappa \leq \overline{\kappa}$, we have $\pi_3^P \leq \pi_3^C$ if

$$\frac{\kappa\left[c\left(y^C, B\right) - v + ze\left(y^S, \theta^C\right)\right] - z\left[v - c\left(y^S, B\right)\right]}{\left\{\begin{array}{c} \kappa\left[c\left(y^C, B\right) + e\left(y^C, \theta^S\right) - c\left(y^S, A\right) - 2z \cdot \left[c\left(y^S, B\right) - c\left(y^S, A\right)\right]\right] \\ +z\left[c\left(y^S, B\right) - c\left(y^S, A\right)\right] + c\left(y^S, A\right) - c\left(y^C, A\right) - e\left(y^C, \theta^S\right) \end{array}\right\}}$$
$$\leq \frac{-\kappa(1-z)\left[v - c\left(y^C, B\right)\right]}{\kappa(1-z)\left[c\left(y^C, B\right) - c\left(y^C, A\right)\right] + (1-\kappa) \cdot z\left[v - e\left(y^C, \theta^S\right) - c\left(y^C, A\right)\right]}. \tag{69}$$

Solving for z, the above inequality holds whenever z is above a threshold $\bar{z}(\kappa)$, which satisfies $\frac{\partial \bar{z}(\kappa)}{\partial \kappa} < 0$. So if $U^{(3)}(z, \kappa) > U^{(4)}(z, \kappa)$, then $U^{(3)}(z, \kappa') > U^{(4)}(z, \kappa')$ for any $\kappa' > \kappa$. Also, if $U^{(3)}(z, \kappa) < U^{(4)}(z, \kappa)$, then $U^{(3)}(z, \kappa') < U^{(4)}(z, \kappa')$ for any $\kappa > \kappa' > \kappa^{pool}$.

This implies that equilibrium (3) gives the DM a higher payoff than equilibrium (4b) whenever $\pi(\kappa, z) \geq \pi_3(\kappa, z) \equiv \max\left\{\pi_3^C(\kappa, z), \pi_3^P(\kappa, z)\right\}$.

In sum, the Best Perfect Bayesian equilibrium may take forms $(1), (2), (3)$, or $(4b)$, with the boundaries between these regions given by π_1, π_2, π_3, and $\bar{\kappa}$.

Other proposer strategies. Notice that the other possible pure strategies are not part of an equilibrium in which there is a positive probability of acceptance. Specifically, if all proposers offer y^S after θ^C and y^C after θ^S, the DM would surely reject after y^S. Thus, this cannot be an equilibrium. Similarly, consider the case where proposer A chooses y^S in all states and proposer B chooses y^S after θ^S and y^C after θ^C (or y^C in both states). After y^C, the DM rejects with probability 1. Thus, this cannot be an equilibrium.

Example. We list below the relevant thresholds in the context of our running example:

$$\pi_1 = 1 - \frac{v}{l} \cdot \frac{1-\kappa}{\kappa} \cdot \frac{z}{1-z}, \tag{70}$$

$$\pi_2 = \frac{l}{v+l}, \tag{71}$$

$$\pi_3^C = l \cdot \frac{(1-z)\cdot\kappa}{(1-z)\cdot\kappa\cdot(v+l)+(v-a)\cdot z\cdot(1-\kappa)}, \tag{72}$$

$$\pi_3^P = \frac{\kappa\cdot(1-z)\cdot l-(1-\kappa)\cdot z\cdot v}{\kappa\cdot(v+l)-(1-\kappa)\cdot a}, \tag{73}$$

$$\kappa^{pool} = \frac{z\cdot v}{z\cdot v+(1-z)\cdot l}, \tag{74}$$

$$\bar{\kappa} = \frac{(1-z)\cdot v}{(1-z)\cdot v+z\cdot l}. \tag{75}$$

A.3 Proof of Proposition 3

The result follows from Proposition 2:

1. If $\pi > \pi_1$, then the $BPBE$ is Simplification, and so $r_B(\theta^S) = r_B(\theta^C) = y^S$, and $r_A(\theta^S) = y^S$, $r_A(\theta^C) = y^C$, $d(\rho, z) = 1$. The reform y^C is proposed only by proposer A in state θ^C.
2. If $\pi_3 < \pi < \pi_1$, the $BPBE$ is either Matching or Complexification. In either equilibrium, $r_B(\theta^C) = y^C$ and $d(\rho, z) = 1$.
3. If $\pi < \min\{\pi_1, \pi_3\}$, then the $BPBE$ is Pooling, and $r_B(\theta^S) = r_B(\theta^C) = r_A(\theta^S) = r_A(\theta^C) = y^S$.

A.4 Proof of Proposition 4

Consider a starting value $z_0 \in [z^{\min}, 1/2]$ for the noise at time $t = 0$. Cycling occurs in the following case: starting at any $t \geq 0$, there exist t' and t'' with $t < t' < t''$ such that z' is the expected value of z at time t' given $BPBE(\kappa, \pi, z_t)$ and z'' is the expected value of z at time t'' given $BPBE(\kappa, \pi, z_t)$, and for t', $r_P(\theta|\kappa, \pi, z_t) \neq r_P(\theta|\kappa, \pi, z')$ or $d(\rho, y|\kappa, \pi, z_t) \neq d(\rho, y|\kappa, \pi, z')$, while for t'', $r_P(\theta|\kappa, \pi, z_t) = r_P(\theta|\kappa, \pi, z'')$ and $d(\rho, y|\kappa, \pi, z_t) = d(\rho, y|\kappa, \pi, z'')$. That is, starting from the $BPBE(\kappa, \pi, z_t)$, for noise z' reached in expectation at some time t' on the equilibrium path, $BPBE(\kappa, \pi, z')$ does not call for the same best equilibrium strategy profile as $BPBE(\kappa, \pi, z_t)$. For noise z'' reached in expectation at some time $t'' > t'$ on the equilibrium path such that $BPBE(\kappa, \pi, z_{t''})$ calls for the same best equilibrium strategy profile as $BPBE(\kappa, \pi, z_t)$.

As π_2 is not a function of z, and $\pi_3(\kappa, z) < \pi_2$, it follows the $BPBE$ for $\pi \geq \pi_2$ can only be Simplification or Matching. Thus, cycling involving the Matching $BPBE$ can only happen between Matching and Simplification, for those locations (κ, π) where both equilibria may exist for some values of $z : \pi \geq \pi_1(\kappa, 1/2)$. For this case, consider the boundary $\pi_1(\kappa, z)$, and a value $z' \in \left[z^{\min}, 1/2\right]$. For $\pi_1(\kappa, z) \geq \pi_2$, the $BPBE$ is Simplification when $z \geq z'$ and Matching when $z < z'$. Then, z_t, for $t \in \{1, 2, ...\}$ is expected to evolve as follows:

$$z_t = \max\{\min\{z_{t-1} + \Pr(y^C, d = 1) \cdot \Delta - \Pr(y^S, d = 1) \cdot \Delta, 1/2\}, z^{\min}\} \tag{76}$$

Thus, z_t is expected to decrease if $\Pr(y^C, d\,(\rho, z) = 1) < \Pr(y^S, d\,(\rho, z) = 1)$, and it is expected to increase if $\Pr(y^C, d\,(\rho, z) = 1) > \Pr(y^S, d\,(\rho, z) = 1)$. For the Simplification $BPBE$, given the equilibrium strategies, $\Pr(y^C, d\,(\rho, z) = 1) < \Pr(y^S, d\,(\rho, z) = 1)$ reduces to

$$\kappa \cdot \pi < \kappa \cdot (1 - \pi) + (1 - \kappa), \tag{77}$$

or

$$\kappa < \frac{1}{2\pi}. \tag{78}$$

If $z_t < z$ such that $\pi \leq \pi_1(\kappa, z)$, then the equilibrium play switches to the Matching $BPBE$, and $\Pr(y^C, d\,(\rho, z) = 1) > \Pr(y^S, d\,(\rho, z) = 1) \Leftrightarrow \kappa > 1 - \kappa$. Thus,

$$\kappa > \frac{1}{2}. \tag{79}$$

If condition (79) is satisfied, z_t is expected to increase, which lowers $\pi_1(\kappa, z_t)$. Then, for $z_{t'} \geq z$, $\pi \geq \pi_1(\kappa, z)$, and the $BPBE$ switches to Simplification. Thus, under conditions (78) and (79), we obtain cycling in expectation.

Next, consider cycling between Simplification and Complexification. For this to be possible, a necessary condition is that a location (π, κ) may be in a Simplification $BPBE(\kappa, \pi, z)$ for some z and in a Complexification $BPBE(\kappa, \pi, z')$, where $z \neq z'$. Let $\pi_4(\kappa)$ be defined as follows. Let $\kappa^0 \geq 0$ denote the value of κ at which $\pi_1(\kappa^0, z^{\min}) = 0$. Notice that $\pi_3(0, z) = 0$, so that $\pi_3(\kappa^0, z) \geq 0$, while $\pi_1(1, z) = 1$ and $\pi_3(1, z) = \pi_2 < 1$. Thus, by the Intermediate Value Theorem, for each z, there exists $\kappa^z \in [0, 1]$ such that κ^z is the minimum value of κ at which $\pi_1(\kappa^z, z) = \pi_3(\kappa^z, z)$. Moreover, as π_1 and π_3 are continuously decreasing in z and increasing in κ, it follows that $\kappa^z(z)$ is continuous and increasing in z. The maximum κ^z is then the value $\kappa^{1/2}$ at which $\pi_1(\kappa, \frac{1}{2}) = \pi_3(\kappa, \frac{1}{2})$. Then, let z^κ be the inverse of κ^z. The bound $\pi_4(\kappa)$ is given by

$$\pi_4(\kappa) = \left\{ \begin{array}{c} \pi_1(\kappa, z^\kappa) \text{ if } \kappa^0 \leq \kappa \leq \kappa^{1/2}, \\ 0 \text{ otherwise} \end{array} \right. \tag{80}$$

Then, any location (κ, π) such that

$$\max\{\pi_1(\kappa, 1/2), \pi_4(\kappa)\} < \pi(\kappa, z) < \min\left\{\pi_2, \pi_1(\kappa, z^{\min})\right\}, \tag{81}$$

satisfies the property that for some z'', the $BPBE$ is Simplification for $z > z''$ and Complexification for $z \leq z''$. Consider such a location and $z_0 \in \left(z^{\min}, \frac{1}{2}\right)$ for which $\pi_1(\kappa, z_0) \leq \pi$. In the Complexification $BPBE$, given the equilibrium strategies, the condition $\Pr(y^C, d\,(\rho, z) =$

1) > Pr($y^S, d(\rho, z) = 1$) reduces to

$$\kappa + (1-\kappa)\cdot\pi > (1-\kappa)\cdot(1-\pi). \tag{82}$$

Thus,

$$\kappa > \frac{1-2\pi}{2(1-\pi)}. \tag{83}$$

Then, under conditions (78) and (83), we obtain, in expectation, cycling between Simplification and Complexification given z_0 such that $\max\{\pi_1(\kappa, 1/2), \pi_4(\kappa)\} < \pi(\kappa, z_0) < \min\left\{\pi_2, \pi_1(\kappa, z^{\min})\right\}$.

Finally, notice that if $\partial\pi^P/\partial z > 0$, then cycling is possible between the Complexification and Simplification *BPBEs*. Yet, as the Simplification equilibrium involves no complex reform, it is not relevant to the cycling considered in this proposition (between equilibria with efficient complex reforms and equilibria with inefficient complex reforms).

A.5 Proof of Corollary 1

Notice that z^* is given by the solution to the equation

$$\pi = \frac{-\kappa\cdot(1-z^*)\cdot\left[v - e\left(y^S,\theta^C\right) - c(y^S,B)\right] - (1-\kappa)\cdot z^*\cdot\left[v - c(y^S,B)\right]}{(1-\kappa)\cdot z^*\cdot\left[c(y^S,B) - c(y^S,A)\right] - \kappa\cdot(1-z^*)\cdot\left[v - e\left(y^S,\theta^C\right) - c(y^S,B)\right]}. \tag{84}$$

Thus,

$$\begin{aligned}\pi\cdot(1-\kappa)\cdot z^*\cdot\left[c(y^S,B) - c(y^S,A)\right] - \pi\cdot\kappa\cdot(1-z^*)\cdot\left[v - e\left(y^S,\theta^C\right) - c(y^S,B)\right]&\\ = -\kappa\cdot(1-z^*)\cdot\left[v - e\left(y^S,\theta^C\right) - c(y^S,B)\right] - (1-\kappa)\cdot z^*\cdot\left[v - c(y^S,B)\right],&\end{aligned} \tag{85}$$

$$z^* = \frac{(1-\pi)\,\kappa\left[e\left(y^S,\theta^C\right) + c(y^S,B) - v\right]}{(1-\pi)\,\kappa\left[e\left(y^S,\theta^C\right) + c(y^S,B) - v\right] + (1-\kappa)\left[v - (1-\pi)\,c(y^S,B) - \pi c(y^S,A)\right]}. \tag{86}$$

From (86), it follows immediately that

$$\frac{\partial z^*}{\partial \pi} = \frac{\kappa\left[e\left(y^S,\theta^C\right) + c(y^S,B) - v\right](1-\kappa)\left[c(y^S,A) - v\right]}{\left\{(1-\pi)\,\kappa\left[e\left(y^S,\theta^C\right) + c(y^S,B) - v\right] + (1-\kappa)\left[v - (1-\pi)\,c(y^S,B) - \pi c(y^S,A)\right]\right\}^2} < 0, \tag{87}$$

and

$$\frac{\partial z^*}{\partial \kappa} = \frac{1+\kappa}{\left\{(1-\pi)\left[e\left(y^S,\theta^C\right) + c(y^S,B) - v\right] + (1-\kappa)\left[v - (1-\pi)\,c(y^S,B) - \pi c(y^S,A)\right]\right\}^2} > 0. \tag{88}$$

A.6 Proof of Proposition 5

Consider the region where $\pi \in \left[\pi_2, \pi_1(\kappa, \frac{1}{2})\right)$. The $BPBE$ in this region is the Matching $BPBE$ for all z. Starting from any noise z_0 in period $t = 0$, for each t and on-path z_t, we have $r_P(\theta|z_0) = r_P(\theta|z_t)$ and $d(\rho, y|z_0) = d(\rho, y|z_t)$. Hence, in any period t, $r_P(\theta^C|z) = y^C$. Moreover, $\kappa > 1/2$ implies that the frequency of complex reforms is higher than that of simple reforms, leading to long-run $z \to 1/2$ as $t \to \infty$.

Next, consider the region where $\kappa < 1/2$ and $\pi > \pi_2(z_0)$. In this region, if $\pi > \pi_1(\kappa, z_0)$, by equation (78), starting from z_0, z_t is expected to decrease given the equilibrium strategies in the Simplification $BPBE$. Given $\partial\pi_1(\kappa, z)/\partial z < 0$, and $\lim_{z^{\min}\to 0} \pi_1\left(\kappa, z^{\min}\right) = 1$, it follows that there exists $t > 0$ such that $\pi_1(\kappa, z_t) > \pi$, and the $BPBE$ switches to Matching. In the Matching $BPBE$, given $\kappa < 1/2$, $\Pr(y^C, d(\rho, z) = 1) < \Pr(y^S, d(\rho, z) = 1)$, and therefore simple reforms occur more frequently than complex reforms, leading to long-run $z \to z^{\min}$ as $t \to \infty$. In the region where $\kappa < 1/2$ and $\pi_1 < \pi < \min\{\pi_2, \pi_4\}$, the equilibrium is Pooling, since $\lim_{z\to 0} \bar{\kappa} = 1$ and $\pi_1(\bar{\kappa}, 1/2) = 0$. Only reform y^S is proposed, and it is adopted whenever $\rho = s$. Thus, $z \to z^{\min}$ as $t \to \infty$.

Finally, consider the path dependence region. Notice that the bounds for π place location (κ, π) it in the Complexification $BPBE$, and the lower bound on κ corresponds to equation (83). Thus, $\Pr(y^C, d(\rho, z) = 1) > \Pr(y^S, d(\rho, z) = 1)$. Moreover, as $\kappa \geq \bar{\kappa}$, $\pi_3 = \pi_3^C$. Then, let $\widehat{z}^T$ denote the value at which $\pi = \pi_3(\kappa, z)$. If $z_0 > \widehat{z}^T$, the $BPBE$ at (κ, π) is Complexification, and $\Pr(y^C, d(\rho, z) = 1) > \Pr(y^S, d(\rho, z) = 1)$ implies that $\lim_{t\to\infty} \mathbb{E}[z_t] = \frac{1}{2}$. If $z_0 \leq \widehat{z}^T$, then the $BPBE$ at (κ, π) is Pooling with $d(\rho, y) = 0$ for all ρ, y. Then $z_t = z_0$ for all $t \geq 0$.

B Extensions and Robustness

B.1 Dynamics with Longer-Lived Decision-Makers

In this section, we modify the model to allow for the DM to serve for $T > 1$ consecutive periods (i.e., multiple terms), discounting the future at rate $\beta \in (0, 1)$. The rest of the model is unchanged, so that in each period of her tenure, the DM encounters a new Proposer.

Proposition 6 *If the DM serves for T consecutive terms, then for $t = \{0, 1, 2, ..., T\}$, $\pi_{1,t}(\kappa, z)$, $\pi_{3,t}(\kappa, z)$, and $\bar{\kappa}_t(z)$ are weakly increasing in t, whereas $\pi_{2,t}(\kappa, z)$ is constant and equal the value for a one-term DM. The values $\pi_{1,T}(\kappa, z)$, $\pi_{3,T}(\kappa, z)$, and $\bar{\kappa}_T(z)$ are the same as for a one-term DM.*

The main effect of adding each additional period to the $DM's$ tenure comes through the effective increase in the DM's outside option. The implication for reform adoption and the evolution of the environment's complexity is summarized in the following corollary.

Corollary 2 *When each DM serves for T consecutive periods, efficient complex reforms are less likely to be adopted. The expected complexity of the environment is (weakly) lower in the long-run compared to the case when each DM serves for one period.*

B.1.1 Proofs

Proof of Proposition 6. We solve for the equilibrium recursively. In period T of the $DM's$ tenure, the bounds $\pi_{1,T}, \pi_{2,T}, \pi_{3,T}$ and $\overline{\kappa}_T$ are the same as for a one-term DM.

Consider the problem in period $t = T-1$ of the $DM's$ tenure. The DM adopts y^C given (κ, π, z) if

$$\mathbb{E}\left[u\left(y^C|\theta, P, z_t, \rho\right)\right] + \beta \cdot \mathbb{E}\left[u(y|\theta, P, \max\{z_t + \Delta, 1/2\})\right] \geq 0 + \beta \cdot \mathbb{E}\left[u(y|\theta, P, z_t)\right], \quad (89)$$

where $u\left(y^C|\theta, P, z_t, \rho\right)$ is the $DM's$ utility in period t, and $u(y|\theta, P, \max\{z_t + \Delta, 1/2\})$ is the $DM's$ utility in period T.

The DM adopts y^S if

$$\mathbb{E}\left[u\left(y^S|\theta, P, z_t, \rho\right)\right] + \beta \cdot \mathbb{E}\left[u(y|\theta, P, \min\{0, z_t - \Delta\})\right] \geq 0 + \beta \cdot \mathbb{E}\left[u(y|\theta, P, z_t)\right]. \quad (90)$$

If $\pi \geq \pi_2$, then the expected utilities $\mathbb{E}\left[u(y|\theta, P, z_t)\right]$, $\mathbb{E}\left[u(y|\theta, P, \min\{0, z_t - \Delta\})\right]$, and $\mathbb{E}\left[u(y|\theta, P, \min\{0, z_t + \Delta\})\right]$ differ only for $\pi_{1,T}(\kappa, z_t + \Delta) < \pi < \pi_{1,T}(\kappa, z_t - \Delta)$. Consider first the case where $\pi_{1,T}(\kappa, z_t) < \pi < \pi_{1,T}(\kappa, z_t - \Delta)$. If the players play the Simplication PBE, then after y^S, the DM adopts and $\pi < \pi_{1,T}(\kappa, z_t - \Delta)$. The $BPBE$ in period T is then Matching. If the DM rejects $\pi > \pi_{1,T}(\kappa, z_t)$, and the $BPBE$ is Simplification. The DM is indifferent between adopting and rejecting y^S after $\rho = c$ (when the expected utility in the current period is lowest) if

$$\begin{aligned}\mathbb{E}\left[u\left(y^S|\theta, P, z_t, \rho = c\right)\right] = \beta \cdot \mathbb{E}\left[u(y|\theta, P, z_t)|\text{Simplification}\right] \\ - \beta \cdot \mathbb{E}\left[u(y|\theta, P, \min\{0, z_t - \Delta\}|\text{ Matching})\right] \geq 0. \quad (91)\end{aligned}$$

As $\mathbb{E}\left[u\left(y^S|\theta, P, z_t, \rho\right)\right] = 0$ at $\pi_{1,T}(\kappa, z_t)$ and $u\left(y^S|\theta, P, z_t, \rho\right)$ is increasing in π, it follows that $\pi_{1,t}(\kappa, z_t) \geq \pi_{1,T}(\kappa, z_t)$.

If $\pi < \pi_2$, then we have the following cases:

1. If $\pi > \pi_{1,T}(\kappa, z_t - \Delta)$ or $\pi_{3,T}(\kappa, z_t - \Delta) < \pi < \pi_{1,T}(\kappa, z_t + \Delta)$, then the equilibrium play in period T does not differ based on period t's reform decision.

2. If $\pi_{1,T}(\kappa, z_t) < \pi < \pi_{1,T}(\kappa, z_t - \Delta)$ and $\pi < \pi_{3,T}(\kappa, z_t - \Delta)$, assume the players play the Simplification PBE at (κ, π) . If a proposal is rejected, z_t is unchanged next period, and the $BPBE$ at (κ, π) in period T is Simplification. If y^C is adopted, the $BPBE$ at (κ, π) is Simplification in the next period, as $\pi_{1,T}(\kappa, z_t + \Delta) < \pi_{1,T}(\kappa, z_t)$. If y^S is adopted, the $BPBE$ at (κ, π) in period T is Pooling. The DM is indifferent between adopting and rejecting y^S after $\rho = c$ (when the expected utility in the current period is lowest):

$$\begin{aligned}\mathbb{E}\left[u\left(y^S|\theta, P, z_t, \rho = c\right)\right] = \beta \cdot \mathbb{E}\left[u(y|\theta, P, z_t)|\text{Simplification}\right] \\ - \beta \cdot \mathbb{E}\left[u(y|\theta, P, \min\{0, z_t - \Delta\}|\text{ Pooling})\right] \geq 0. \quad (92)\end{aligned}$$

As $\mathbb{E}\left[u\left(y^S|\theta, P, z_t, \rho\right)\right] = 0$ at $\pi_{1,T}(\kappa, z_t)$ and $u\left(y^S|\theta, P, z_t, \rho\right)$ is increasing in π, it follows that $\pi_{1,t}(\kappa, z_t) \geq \pi_{1,T}(\kappa, z_t)$.

3. If $\max\{\pi_1(\kappa, z), \pi_3(\kappa, z)\} < \pi < \pi_1(\kappa, z - \Delta)$: assume the players play the Simplification PBE. If a proposal is rejected, the $BPBE$ at (κ, π) in period T is Simplification. If y^C is adopted, the $BPBE$ in period T is Simplification. Thus, the continuation play has is unchanged. If y^S is adopted, the $BPBE$ in period T is Complexification. If it is rejected, the the $BPBE$ in period T is Pooling. The DM is indifferent between adopting and rejecting y^S after $\rho = c$ (when the expected utility in the current period is lowest) if

$$\mathbb{E}\left[u\left(y^S|\theta, P, z_t, \rho = c\right)\right] = \beta \cdot \mathbb{E}\left[u(y|\theta, P, z_t)|\text{Simplification}\right] - \beta \cdot \mathbb{E}\left[u(y|\theta, P, \min\{0, z_t - \Delta\}|\text{Complexification})\right] \geq 0. \quad (93)$$

As $\mathbb{E}\left[u\left(y^S|\theta, P, z_t, \rho\right)\right] = 0$ at $\pi_{1,T}(\kappa, z_t)$ and $u\left(y^S|\theta, P, z_t, \rho\right)$ is increasing in π, it follows that $\pi_{1,t}(\kappa, z_t) \geq \pi_{1,T}(\kappa, z_t)$.

4. If $\pi < \min\{\pi_{1,T}(\kappa, z), \pi_{3,T}(\kappa, z)\}$ and $\bar{\kappa}_T(z_t) < \kappa < \bar{\kappa}_T(z_t - \Delta)$. Assume the players play the Pooling PBE with rejection. If a proposal is rejected, then the $BPBE$ in period T is also Pooling with Rejection. If it is adopted, then the $BPBE$ in period T is Pooling with adoption if $y = y^S$ and $\rho = c$. The expected utility for the DM from rejection is 0. The expected utility for the DM from adoption is $\mathbb{E}\left[u(y|\theta, P, \min\{0, z_t - \Delta\}|\text{Pooling})\right] > 0$. The DM is indifferent if

$$\mathbb{E}\left[u\left(y^S|\theta, P, z_t, \rho = s\right)\right] + \beta\mathbb{E}\left[u(y|\theta, P, \min\{0, z_t - \Delta\}|\text{Pooling})\right] = 0. \quad (94)$$

As $\kappa \to \overline{\kappa}_T$, $\mathbb{E}\left[u\left(y^S|\theta, P, z_t, \rho = s\right)\right] \to 0$. Since $\mathbb{E}\left[u\left(y^S|\theta, P, z_t, \rho = s\right)\right]$ decreases in κ, it follows that $\overline{\kappa}_t > \overline{\kappa}_T$.

5. If $\pi < \min\{\pi_{1,T}(\kappa, z), \pi_{3,T}(\kappa, z)\}$ and $\kappa < \bar{\kappa}_T$ or $\kappa > \bar{\kappa}_T(z - \Delta)$, assume that the players play the Pooling PBE with conditional adoption if $\kappa < \bar{\kappa}_T$ and with rejection if $\kappa > \bar{\kappa}_T(z - \Delta)$. Then, adoption of y^S reduces z. The expected utility in the Pooling equilibrium (weakly) decreases in z. Hence, a lower z (weakly) increases the $DM's$ expected utility in the second period. Then, adopting y^S is still preferable to rejecting if $\kappa < \bar{\kappa}_T$. If $\bar{\kappa}_T(z - \Delta) < \kappa$, the period T expected utility is the same regardless of the first-period action. In sum, the $DM's$ problem in period t is unchanged from the case of a short-lived DM.

6. If $\pi_3(\kappa, z) < \pi < \pi_1(\kappa, z)$, and $\pi > \pi_1(\kappa, z + \Delta)$: assume the players play the Complexification $BPBE$ at (κ, π).[11] If a proposal is rejected, then the $BPBE$ in period T

[11]For the analysis in the Complexification $BPBE$, notice first that $\mathbb{E}\left[u(y|\theta, P, z_t)\right]$, $\mathbb{E}\left[u(y|\theta, P, \min\{0, z_t - \Delta\})\right]$, and $\mathbb{E}\left[u(y|\theta, P, \min\{0, z_t + \Delta\})\right]$ differ only around the bounds $\pi_{1,T}(\kappa, z_T)$ and $\pi_{3,T}(\kappa, z_T)$.

is also Complexification. If y^S is adopted, the $BPBE$ next period is Complexification. Hence, if y^S is proposed, it yields a positive expected payoff in the current period, and the same expected continuation payoff as rejection. Thus, it is adopted. If y^C is adopted given $\rho = c$, the $BPBE$ next period is Simplification. The $DM's$ expected payoff from Simplification is higher than under Complexification. Thus, the total expected payoff from adopting y^C is higher in terms of the current period payoff and in terms the expected continuation payoff. Then, the Complexification equilibrium is sustainable if $\pi(\kappa, z) \geq \pi_3(\kappa, z)$.

We have shown in the proof to Proposition 2 that $\frac{\partial \pi_3^C}{\partial z} < 0$. Yet, $\frac{\partial \pi_3^P}{\partial z} \gtrless 0$. Then:

(a) If $\frac{\partial \pi_3^P}{\partial z} \leq 0$ and $\pi_{3,T}(\kappa, z) < \pi < \min\{\pi_{3,T}(\kappa, z_t - \Delta), \pi_{1,T}(\kappa, z)\}$: assume the players play the Complexification PBE. If a proposal is rejected, the $BPBE$ in period T is Complexification. If y^C is adopted, the $BPBE$ in period T is Complexification. Thus, the continuation game is the same. If y^S is adopted, the $BPBE$ next period is Pooling. In the Complexification equilibrium, a proposal y^S only comes from type B in state θ^S. Thus it pays off $u(y, \theta, P) > 0$. The DM is prefers adopting to rejecting if

$$u\left(y^S|\theta^S, B, z_t\right) \geq \beta \cdot \mathbb{E}\left[u(y|\theta, P, z_t)|\text{Complexification}\right] - \beta \cdot \mathbb{E}\left[u(y|\theta, P, \min\{0, z_t - \Delta\}|\text{Pooling})\right]. \quad (95)$$

But $\mathbb{E}\left[u(y|\theta, P, z_t)|\text{Complexification}\right] - \mathbb{E}u(y|\theta, P, \min\{0, z_t - \Delta\}|\text{Pooling}) \to 0$ as $\pi \to \pi_{3,T}(\kappa, z_t)$, so for $\Delta \to 0$. This implies that the Complexification equilibrium is sustainable for all $\pi_{3,t}(\kappa, z) \geq \pi_{3,T}(\kappa, z)$, where the relation holds with equality for small Δ.

(b) If $\frac{\partial \pi_3^P}{\partial z} > 0$ and $\pi_{3,T}(\kappa, z) < \pi < \min\{\pi_{3,T}(\kappa, z_t + \Delta), \pi_{1,T}(\kappa, z)\}$: assume the players play the Complexification PBE. If a proposal is rejected, the $BPBE$ in period T is Complexification. If y^S is adopted, the $BPBE$ in period T is Complexification. Thus, the continuation game is the same. If y^C is adopted, the $BPBE$ next period is Pooling. In the Complexification equilibrium, a proposal y^C yields $\mathbb{E}\left[u(y^C|\theta, P, z_t)\right] \geq 0$. The DM is indifferent between adopting and rejecting if

$$\mathbb{E}\left[u(y^C|\theta, P, z_t)\right] = \beta \cdot \mathbb{E}\left[u(y|\theta, P, z_t)|\text{Complexification}\right] - \beta \cdot \mathbb{E}\left[u(y|\theta, P, \min\{0, z_t + \Delta\}|\text{Pooling})\right] > 0. \quad (96)$$

Since $\mathbb{E}\left[u(y^C|\theta, P, z_t)\right]$ increases in π, it follows that $\pi_{3,t}(\kappa, z_t) \geq \pi_{3,T}(\kappa, z_t)$.

Performing the same analysis for periods $t = T-2$, $T-3$, ... gives the result that

$$\pi_{1,0}(\kappa, z_0) \geq \ldots \geq \pi_{1,T}(\kappa, z_t), \quad (97)$$

$$\pi_{3,0}(\kappa, z_0) \geq \ldots \geq \pi_{3,T}(\kappa, z_t), \quad (98)$$

$$\bar{\kappa}_0(z_0) \geq \ldots \geq \bar{\kappa}_T(z_0) \quad (99)$$

Proof of Corollary 2 The bound $\pi_{1,t}(\kappa, z)$ is decreasing in the $DM's$ tenure, reaching the value for a one-term DM only in period T. Thus, the region where the Simplification $BPBE$ is sustainable is smaller for $t < T$, thereby reducing the region where $r_B(\theta^S) = r_B(\theta^C) = y^S$ and $r_A(\theta^S) = y^S$, $r_A(\theta^C) = y^C$, $d(\rho, z) = 1$.

The bound $\bar{\kappa}_t(z_t)$ is also decreasing in the $DM's$ tenure, reaching the value for a one-term DM only in period T. Thus, the region where the $BPBE$ is Pooling with rejection of all proposals is larger for $t < T$. Given Proposition 5, the change from the Simplification $BPBE$ to the Pooling $BPBE$ does not change the long-run complexity. The change from Rejection to Pooling with conditional adoption decreases long-run complexity. Thus, overall, expected long-run complexity decreases.

B.2 Dynamics with Long-Lived Proposers

Next, we consider the complementary case in which the proposer is long-lived, while the DM's tenure is one period, as in the main model. We assume that the proposer lives for two periods. In the second period, he derives a benefit proportional to his reputation, $\mu' \cdot R$, where μ' is that period DM's belief about the proposer's type, given the history of events in the previous period. The payoff $R > 0$ is the reduced form representation of the benefit of a promotion or an outside option that the proposer can access given high reputation. We assume that $R < 1$, so that the proposer prefers to have his reform adopted each period.

The effect of a longer tenure for the proposer only comes into play if in the next period $\mu\prime \in (0, 1)$. That is, given Assumption 1, if $c(y^S, A) = c(y^S, B)$. Otherwise, if $c(y^S, A) \neq c(y^S, B)$ the DM can infer from last period's outcome the type of proposer. In this case, the equilibrium play in the first period of the proposer's tenure cannot change the $DM's$ inference of the type in the second period. Then, the equilibrium play in the first period is the same as in the case of a one-term proposer. The equilibrium play in the second period is the same as in the benchmark with observable types, summarized in Proposition 1.

The benefit that comes from reputation means that proposer A gains more from offering a complex reform than a simple reform, whenever both these reforms have the same likelihood of adoption. Thus, in the Simplification and Matching equilibria, proposer A is no longer indifferent between y^S and y^C. Reform y^C, if adopted, allows for the outcome to reveal the proposer's type. Hence, proposer A can gain R in the second period. For proposer B, however, the benefit from building reputation has the opposite effect. He now weakly prefers offering y^S, if both reforms have the same probability of acceptance. Thus, the Complexification and Pooling are the only sustainable $BPBEs$. To derive the bounds in the parameter space where each of these two equilibria is the $BPBE$, we define $\kappa^{43}(z)$ as the maximum value of κ below which the $BPBE$ is Pooling on y^S where the proposals y^S are accepted for any ρ. We then obtain the following characterization of the $BPBEs$ given (κ, π, z).

Proposition 7 *If the proposer lives for two periods and has reputational concerns, then the* $BPBE(\kappa, \pi, z)$ *in the first period of the Proposer's tenure is:*

1. *(Complexification) If* $\pi \geq \pi_3(\kappa, z)$ *and* $\kappa > \min\left\{\kappa^{43}, \kappa^{pool}\right\}$*:* $r_A(\theta|z) = r_B(\theta|z) = y^S$*:* $r_A(\theta|z) = y^C$, $r_B(\theta^C|z)y^C$, $r_B(\theta^S|z) = y^S$, $d(y, \rho|z) = 1$.

2. *(Pooling on* y^S *with unconditional adoption) If* $\kappa < \min\left\{\kappa^{43}, \kappa^{pool}\right\}$*:* $r_A(\theta|z) = r_B(\theta|z) = y^S$, $d(y, \rho|z) = 1$.

3. *(Pooling on* y^S *with conditional adoption) If* $\pi < \pi_3(\kappa, z)$ *and* $\kappa \geq \kappa^{pool}$: $r_A(\theta|z) = r_B(\theta|z) = y^S$, $d(y, \rho|z) = \mathbb{1}_{\{\rho=s, \kappa \leq \bar{\kappa}(z)\}}$.

The above result highlights that reputational concerns lead to more unnecessarily complex reforms, chosen by proposer A in order to signal his type. Then, in the Complexification equilibrium, proposer B also offers more complex reforms, in order to ensure adoption. The result is higher complexity and more low quality reforms whenever κ is above a minimum threshold. Otherwise, for low κ, the incentive of proposer B to pool with the better type leads to an equilibrium where all proposals are simple.

In the second period of the proposer's tenure, if the Complexification equilibrium was played in the previous period, then the proposer's type is revealed. Thus, the DM adopts any reform if $P = A$ and only adopts a reform y^S from $P = B$ if state θ^S is sufficiently likely (as in the Pooling equilibrium). If the Pooling equilibrium was played in the previous period, then there is no learning about the proposer's type, and we return to the stage game presented in the main model.

B.2.1 Proof of Proposition 7

For each period $t \geq 0$, let $h_t = \{y_{t-1}, \theta_{t-1}, d_{t-1}, \rho_{t-1}\}$ denote the history of events from period $t-1$. The proposer's payoff is given by

$$V^P(y|\theta, z_t) = d(\kappa, \pi, z_t) + \Pr(P = A|h_t) \cdot R, \tag{100}$$

where $V \in (0, 1)$ is the reputational payoff for the proposer.

Notice that given Assumption 1, if $c\left(y^S, A\right) \neq c\left(y^S, B\right)$, then the proposer's type is revealed with probability one under any history h_t. Thus, the play in period $t-1$ does not affect the continuation game. Thus, the equilibrium in the first term of the proposer's tenure is the same as for the one-term proposer. The equilibrium in the second period of the proposer's tenure is that same as in the benchmark with observable types.

Assumption 1 allows for the case where $c\left(y^S, A\right) = c\left(y^S, B\right) = c^S$, in which case there is an incentive for proposer B to pool with proposer A in offering y^S. In this case,

$$\Pr(P = A|h_t) = \begin{cases} 1, \text{ if } y_{t-1} = y^C \text{ and } r_A(\theta|z_{t-1}) = y^C, \\ 1, \text{ if } y_{t-1} = y^S \text{ and } r_A(\theta|z_{t-1}) = y^S, \ r_B(\theta|z_{t-1}) = y^C, \\ \pi, \text{ if } y_{t-1} = y^S \text{ and } r_A(\theta|z_{t-1}) = r_B(\theta|z_{t-1}) = y^S, \\ 0, \text{ otherwise.} \end{cases}$$

Given $\Pr(P = A|h_t)$, consider the proposals in the first period of the proposer's tenure. If the DM adopts any proposal with probability one, then it is a dominant strategy for Proposer A to offer y^C. Thus, any equilibrium with probability of adoption 1 must have $r_A(\theta|z_t) = y^C$. Proposer B has a strict gain from proposing y^S if and only if $r_A(\theta|z_{t-1}) = y^S$. Otherwise, he is indifferent. Thus, the possible equilibria where the DM adopts with probability one are (i) Complexification; (ii) Pooling on y^C; and (iii) Pooling on y^S with $\kappa < \kappa^{pool}$, where κ^{pool} is given in (31).

Equilibrium (ii) is not a $BPBE$, as it is dominated by the Complexification equilibrium for the DM. The $DM's$ expected utility from Pooling at y^S with acceptance unconditional on ρ is $U^{(4a)}$ given in 33. This is higher than the expected utility from Complexification (given in $U^{(3)}$ in (28)) if

$$\kappa < \kappa^{43} \equiv \frac{\pi \cdot \left[c\left(y^C, A\right) + e\left(y^C, \theta^S\right) - c\left(y^S, A\right)\right]}{\pi \cdot \left[c\left(y^C, B\right) + e\left(y^C, \theta^S\right) - c\left(y^S, B\right)\right] + c\left(y^S, B\right) + e\left(y^S, \theta^C\right) - c\left(y^C, B\right)} \tag{101}$$

Thus, for

$$\kappa \leq \min\left\{\kappa^{43}, \kappa^{pool}\right\}. \tag{102}$$

If the DM adopts conditional on signal in the equilibrium with Pooling on y^S, then $\kappa \in \left(\kappa^{pool}, \bar{\kappa}\right]$, and the $DM's$ expected utility is higher than under Complexification if $\pi < \pi_3(\kappa, z)$. Thus, the $BPBE$ in the first period of the Proposer's tenure takes the form:

1. (Complexification) If $\pi \geq \pi_3(\kappa, z)$ and $\kappa > \min\left\{\kappa^{43}, \kappa^{pool}\right\}$: $r_A(\theta|z) = r_B(\theta|z) = y^S$: $r_A(\theta|z) = y^C$, $r_B(\theta^C|z)y^C$, $r_B(\theta^S|z) = y^S$, $d(y, \rho|z) = 1$.

2. (Pooling on y^S with unconditional adoption) If $\kappa < \min\left\{\kappa^{43}, \kappa^{pool}\right\}$: $r_A(\theta|z) = r_B(\theta|z) = y^S$, $d(y, \rho|z) = 1$.

3. (Pooling on y^S with conditional adoption) If $\pi < \pi_3(\kappa, z)$ and $\kappa \geq \kappa^{pool}$: $r_A(\theta|z) = r_B(\theta|z) = y^S$, $d(y, \rho|z) = \mathbb{1}_{\{\rho = s, \kappa \leq \bar{\kappa}(z)\}}$.

B.3 Dynamics without Pandering

Our model can be viewed through the lens of a checks and balances system: the proposer, whether a politician or an interest group, cannot have his policy implemented unless it is approved by a veto player, DM. In this section, we compare this setting to having a singular proposer-decider who chooses a reform before the identity of the implementer is revealed. Several applications fit the case without 'checks and balances'. For instance, consider procurement contracts: The decision maker, a government agency, designs a contract to be carried out by a contractor with ex-ante unknown type. The reform is in essence an incomplete contract, to which the decision maker decides how many contingencies to add, that is, how much to complete the contract. A simple reform produces a less complete contract,

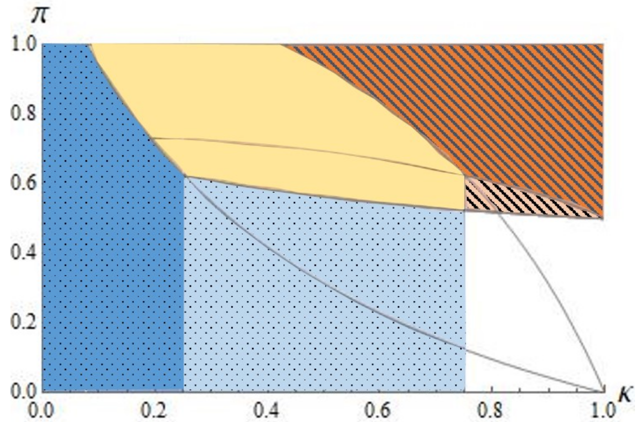


Figure 4: Illustrates the single decision maker's policy choice given $z = 0.25$. In the dark blue (dotted) region, y^S is chosen regardless of signal, in the light blue (dotted) region, y^S is chosen after $\rho = s$ and the status quo is kept after $\rho = c$. In the dark orange (striped) region, y^C is chosen regardless of signal, in the light orange (striped) region, y^C is chosen after $\rho = c$ and the status quo is kept after $\rho = s$. In the yellow (solid) region, y^S is chosen after $\rho = s$ and y^C is chosen after $\rho = c$. In the white region, the status quo is kept regardless of signal.

while a complex reform produces a more complete contract. The singular DM cannot observe state θ. She only receives signal ρ, with noise z. Afterwards, the DM chooses the policy that maximizes her expected utility (y^S, y^C, or the status quo).

The decision maker's optimal choice at each (κ, π) is illustrated in Figure 4. We first summarize the results, and then detail below how we obtain these results under the more general specification of our model.

Summary. If the probability of a loss from reform y^S is low (state θ^S likely), then the decision maker adopts reform y^S regardless of signal, as it is most likely to fit the state of the world. If state θ^C is likely, and competence is expected to be high (π is high), the decision maker chooses y^C regardless of signal. For intermediate values of κ, there is high uncertainty about the state of the world, and the decision maker relies on her signal to choose policy. She chooses policy y^S after signal $\rho = s$. After $\rho = c$, she expects state θ^C to be more likely. In that case, she wants to implement policy y^C only if competence is likely (high π), and maintain the status quo otherwise. Finally, if κ is very high, the DM expects state θ^C. If there is high uncertainty about competence (intermediate π), then she uses the signal to choose y^C after $\rho = c$ and maintain the status quo otherwise. If she expects low competence, then a reform is expected to produce a loss, and she therefore keeps the status quo regardless of signal.

Analysis. After signal $\rho = s$, the decision maker gets the following expected utility:

- if she implements y^S:

$$\frac{(1-z)\cdot(1-\kappa)}{(1-z)\cdot(1-\kappa)+z\cdot\kappa}\cdot\left[\pi\cdot u\left(y^S,\theta^S,A\right)+(1-\pi)\cdot u\left(y^S,\theta^S,B\right)\right] \\ +\frac{z\cdot\kappa}{(1-z)\cdot(1-\kappa)+z\cdot\kappa}\cdot\left[\pi\cdot u\left(y^S,\theta^C,A\right)+(1-\pi)\cdot u\left(y^S,\theta^C,B\right)\right]. \quad (103)$$

- if she implements y^C:

$$\frac{(1-z)\cdot(1-\kappa)}{(1-z)\cdot(1-\kappa)+z\cdot\kappa}\cdot\left[\pi\cdot u\left(y^C,\theta^S,A\right)+(1-\pi)\cdot u\left(y^C,\theta^S,B\right)\right] \\ +\frac{z\cdot\kappa}{(1-z)\cdot(1-\kappa)+z\cdot\kappa}\cdot\left[\pi\cdot u\left(y^C,\theta^C,A\right)+(1-\pi)\cdot u\left(y^C,\theta^C,B\right)\right]. \quad (104)$$

After signal $\rho = c$, the decision maker gets the following expected utility:

- if she implements y^S:

$$\frac{z\cdot(1-\kappa)}{(1-z)\cdot\kappa+z\cdot(1-\kappa)}\cdot\left[\pi\cdot u\left(y^S,\theta^S,A\right)+(1-\pi)\cdot u\left(y^S,\theta^S,B\right)\right] \\ +\frac{(1-z)\cdot\kappa}{(1-z)\cdot\kappa+z\cdot(1-\kappa)}\cdot\left[\pi\cdot u\left(y^S,\theta^C,A\right)+(1-\pi)\cdot u\left(y^S,\theta^C,B\right)\right]. \quad (105)$$

- if she implements y^C:

$$\frac{z\cdot(1-\kappa)}{(1-z)\cdot\kappa+z\cdot(1-\kappa)}\cdot\left[\pi\cdot u\left(y^C,\theta^S,A\right)+(1-\pi)\cdot u\left(y^C,\theta^S,B\right)\right] \\ +\frac{(1-z)\cdot\kappa}{(1-z)\cdot\kappa+z\cdot(1-\kappa)}\cdot\left[\pi\cdot u\left(y^C,\theta^C,A\right)+(1-\pi)\cdot u\left(y^C,\theta^C,B\right)\right]. \quad (106)$$

Since $z \leq \frac{1}{2}$, notice that

$$\frac{(1-z)\cdot(1-\kappa)}{(1-z)\cdot(1-\kappa)+z\cdot\kappa} \geq \frac{z\cdot(1-\kappa)}{(1-z)\cdot\kappa+z\cdot(1-\kappa)}. \quad (107)$$

Thus, the decision maker is in one of the following six cases:

1. Implements y^S regardless of signal if the expected utility after $\rho = c$ is positive. That

is, $u\left(y^S,\theta^S,A\right)\neq u\left(y^S,\theta^S,B\right)$ or $u\left(y^S,\theta^C,A\right)\neq u\left(y^S,\theta^C,B\right)$,

$$\pi\geq\pi^{sb0}(\kappa,z)\equiv \frac{-z\left(1-\kappa\right)u\left(y^S,\theta^S,B\right)-\left(1-z\right)\kappa u\left(y^S,\theta^C,B\right)}{z\left(1-\kappa\right)\left[u\left(y^S,\theta^S,A\right)-u\left(y^S,\theta^S,B\right)\right]+\left(1-z\right)\kappa\left[u\left(y^S,\theta^C,A\right)-u\left(y^S,\theta^C,B\right)\right]}, \tag{108}$$

or otherwise

$$\kappa\leq\kappa^{sb0}(z)\equiv\frac{z\cdot u\left(y^S,\theta^S,B\right)}{z\cdot u\left(y^S,\theta^S,B\right)-\left(1-z\right)\cdot u\left(y^S,\theta^C,B\right)}, \tag{109}$$

and if y^S is preferred to y^C after $\rho=c$:

$$\pi\leq\pi^{sb}(\kappa,z)\equiv \frac{z\left(1-\kappa\right)\left[u\left(y^S,\theta^S,B\right)-u\left(y^C,\theta^S,B\right)\right]+\left(1-z\right)\kappa\left[u\left(y^S,\theta^C,B\right)-u\left(y^C,\theta^C,B\right)\right]}{\left\{\begin{array}{c} z\left(1-\kappa\right)\left[\left[u\left(y^S,\theta^S,B\right)-u\left(y^C,\theta^S,B\right)\right]-\left[u\left(y^S,\theta^S,A\right)-u\left(y^C,\theta^S,A\right)\right]\right] \\ +\left(1-z\right)\kappa\left[\left[u\left(y^S,\theta^C,B\right)-u\left(y^C,\theta^C,B\right)\right]+\left[u\left(y^C,\theta^C,A\right)-u\left(y^S,\theta^C,A\right)\right]\right]\end{array}\right\}}. \tag{110}$$

Thus, if $u\left(y^S,\theta^S,A\right)\neq u\left(y^S,\theta^S,B\right)$ or $u\left(y^S,\theta^C,A\right)\neq u\left(y^S,\theta^C,B\right)$, then

$$\pi\in\left[\pi^{sb0}(\kappa,z),\pi^{sb}(\kappa,z)\right].$$

If $u\left(y^S,\theta^S,A\right)=u\left(y^S,\theta^S,B\right)$ and $u\left(y^S,\theta^C,A\right)=u\left(y^S,\theta^C,B\right)$, then

$$\pi\leq\pi^{sb}(\kappa,z)\text{ and }\kappa\leq\kappa^{sb0}(z).$$

2. Implements y^C regardless of signal if the expected utility after $\rho=s$ is positive:

$$\pi\geq\pi^{cb1}(\kappa,z)\equiv \frac{-\left(1-z\right)\left(1-\kappa\right)u\left(y^C,\theta^S,B\right)-z\kappa u\left(y^C,\theta^C,B\right)}{\left(1-z\right)\left(1-\kappa\right)\left[u\left(y^C,\theta^S,A\right)-u\left(y^C,\theta^S,B\right)\right]+z\kappa\left[u\left(y^C,\theta^C,A\right)-u\left(y^C,\theta^C,B\right)\right]}, \tag{111}$$

and if y^C is preferred to y^S after $\rho = s$:

$$\pi \geq \pi^{cb}(\kappa, z) \equiv \frac{(1-z)(1-\kappa)\left[u\left(y^S, \theta^S, B\right) - u\left(y^C, \theta^S, B\right)\right] + z\kappa\left[u\left(y^S, \theta^C, B\right) - u\left(y^C, \theta^C, B\right)\right]}{\left\{\begin{array}{c} (1-z)(1-\kappa)\left[u\left(y^S, \theta^S, B\right) - u\left(y^C, \theta^S, B\right)\right] + z \cdot \kappa\left[u\left(y^S, \theta^C, B\right) - u\left(y^C, \theta^C, B\right)\right] \\ -(1-z)(1-\kappa)\left[u\left(y^S, \theta^S, A\right) - u\left(y^C, \theta^S, A\right)\right] - z \cdot \kappa\left[u\left(y^S, \theta^C, A\right) - u\left(y^C, \theta^C, A\right)\right] \end{array}\right\}}. \tag{112}$$

Thus, she implements y^C regardless of signal if

$$\pi \geq \max\left\{\pi^{cb1}(\kappa, z), \pi^{cb}(\kappa, z)\right\}. \tag{113}$$

3. Implements y^S after $\rho = s$ and y^C after $\rho = c$ if

   (i) the expected utility is higher than from y^S than from y^C after $\rho = s$ and from y^C than from y^S after $\rho = c$,

$$\pi \in \left(\pi^{sb}, \pi^{cb}\right); \tag{114}$$

   (ii) the expected utility is positive from adopting the reforms according to this strategy:

$$\pi > \pi^{cb0}(\kappa, z) \equiv \frac{-z(1-\kappa)u\left(y^C, \theta^S, B\right) - (1-z)\kappa u\left(y^C, \theta^C, B\right)}{z(1-\kappa)\left[u\left(y^C, \theta^S, A\right) - u\left(y^C, \theta^S, B\right)\right] + (1-z)\kappa\left[u\left(y^C, \theta^C, A\right) - u\left(y^C, \theta^C, B\right)\right]}, \tag{115}$$

   and (iii) if $u\left(y^S, \theta^S, A\right) \neq u\left(y^S, \theta^S, B\right)$ or $u\left(y^S, \theta^C, A\right) \neq u\left(y^S, \theta^C, B\right)$,

$$\pi > \pi^{sb1}(\kappa, z) \equiv \frac{-(1-z)(1-\kappa)u\left(y^S, \theta^S, B\right) - z\kappa u\left(y^S, \theta^C, B\right)}{(1-z)(1-\kappa)\left[u\left(y^S, \theta^S, A\right) - u\left(y^S, \theta^S, B\right)\right] + z\kappa\left[u\left(y^S, \theta^C, A\right) - u\left(y^S, \theta^C, B\right)\right]}, \tag{116}$$

   while otherwise

$$\kappa \leq \kappa^{sb1}(z) \equiv \frac{z \cdot u\left(y^S, \theta^C, B\right)}{(1-z) \cdot u\left(y^S, \theta^S, B\right) - z \cdot u\left(y^S, \theta^C, B\right)}. \tag{117}$$

   To sum up: the *DM* implements y^S after $\rho = s$ and y^C after $\rho = c$ if

   - if $u\left(y^S, \theta^S, A\right) \neq u\left(y^S, \theta^S, B\right)$ or $u\left(y^S, \theta^C, A\right) \neq u\left(y^S, \theta^C, B\right)$,

$$\max\left\{\pi^{cb0}(\kappa, z), \pi^{sb}, \pi^{sb1}(\kappa, z)\right\} < \pi < \pi^{cb}. \tag{118}$$

- if $u\left(y^S,\theta^S,A\right)=u\left(y^S,\theta^S,B\right)$ and $u\left(y^S,\theta^C,A\right)=u\left(y^S,\theta^C,B\right)$

$$\max\left\{\pi^{cb0}(\kappa,z),\pi^{sb}\right\}<\pi<\pi^{cb}, \tag{119}$$
$$\kappa\leq\kappa^{sb1}\left(z\right). \tag{120}$$

4. implements y^S after $\rho=s$ and keeps status quo after $\rho=c$ if

   (i) the expected utility is positive after adopting y^S when $\rho=s$: if $u\left(y^S,\theta^S,A\right)\neq u\left(y^S,\theta^S,B\right)$ or $u\left(y^S,\theta^C,A\right)\neq u\left(y^S,\theta^C,B\right)$, $\pi>\pi^{sb1}(\kappa,z)$,and otherwise $\kappa<\kappa^{sb1}\left(z\right)$;

   (ii) the expected utility is higher after y^S than after y^C if $\rho=s$:

$$\pi<\pi^{cb}(\kappa,z), \tag{121}$$

   and

   (iii) the expected utility is negative if either y^C or y^S is adopted when $\rho=c$:

$$\pi<\pi^{cb0}(\kappa,z), \tag{122}$$

   and if $u\left(y^S,\theta^S,A\right)\neq u\left(y^S,\theta^S,B\right)$ or $u\left(y^S,\theta^C,A\right)\neq u\left(y^S,\theta^C,B\right)$,

$$\pi<\pi^{sb0}(\kappa,z), \tag{123}$$

   or otherwise

$$\kappa>\kappa^{sb0}(z), \tag{124}$$

   To sum up, the DM implements y^S after $\rho=s$ and keeps status quo after $\rho=c$ if:

   - when $u\left(y^S,\theta^S,A\right)\neq u\left(y^S,\theta^S,B\right)$ or $u\left(y^S,\theta^C,A\right)\neq u\left(y^S,\theta^C,B\right)$,

$$\pi^{sb1}(\kappa,z)<\pi<\min\left\{\pi^{cb0}(\kappa,z),\pi^{cb}(\kappa,z),\pi^{sb0}(\kappa,z)\right\}, \tag{125}$$

   - when $u\left(y^S,\theta^S,A\right)=u\left(y^S,\theta^S,B\right)$ and $u\left(y^S,\theta^C,A\right)=u\left(y^S,\theta^C,B\right)$

$$\pi<\min\left\{\pi^{rbh}(\kappa,z),\pi^{cb}(\kappa,z)\right\} \tag{126}$$
$$\kappa\in\left(\kappa^{sb0},\kappa^{sb1}\right) \tag{127}$$

5. Implements y^C after $\rho=c$ and keeps status quo after $\rho=s$ if

   (i) the expected utility is positive after adopting y^C when $\rho=c:\pi>\pi^{cb0}(\kappa,z)$;

   (ii) the expected utily is higher after y^C than after y^S if $\rho=c:\pi>\pi^{sb}(\kappa,z)$;

   (iii) the expected utility is negative if either y^C or y^S is adopted when $\rho=s$:

$$\pi<\pi^{cb1}(\kappa,z) \tag{128}$$

and if $u\left(y^S,\theta^S,A\right)\neq u\left(y^S,\theta^S,B\right)$ or $u\left(y^S,\theta^C,A\right)\neq u\left(y^S,\theta^C,B\right)$,

$$\pi<\pi^{sb1}(\kappa,z) \tag{129}$$

or otherwise

$$\kappa>\kappa^{sb1}\left(z\right). \tag{130}$$

To sum up, the DM implements y^C after $\rho=c$ and keeps status quo after $\rho=s$ if:

- when $u\left(y^S,\theta^S,A\right)\neq u\left(y^S,\theta^S,B\right)$ or $u\left(y^S,\theta^C,A\right)\neq u\left(y^S,\theta^C,B\right)$,

$$\max\left\{\pi^{sb}(\kappa,z),\pi^{cb0}(\kappa,z)\right\}<\pi<\min\left\{\pi^{cb1}(\kappa,z),\pi^{sb1}(\kappa,z)\right\}, \tag{131}$$

- when $u\left(y^S,\theta^S,A\right)=u\left(y^S,\theta^S,B\right)$ and $u\left(y^S,\theta^C,A\right)=u\left(y^S,\theta^C,B\right)$

$$\max\left\{\pi^{sb}(\kappa,z),\pi^{cb0}(\kappa,z)\right\}<\pi<\pi^{cb1}(\kappa,z)\text{ and }\kappa>\kappa^{sb1} \tag{132}$$

6. Keeps the status quo if none of the above conditions hold.

Cycling between regions happens if endogenous changes in z move a location (κ,π) between two of the above six regions. Notice that under the conditions of Assumption 1, $u\left(y^S,\theta^C,B\right)\geq u\left(y^C,\theta^C,B\right)$, π^{cb}, π^{cb1}, $\pi^{sb1}(\kappa,z)$ and κ^{sb0} decrease in z, while π^{sb}, π^{cb0}, $\pi^{sb1}(\kappa,z)$ and κ^{sb0} increase in z. Thus, cycling cannot happen between region (3) or (6) and any other region. It is possible, however, to construct examples where cycling may occur between two other regions, where at least in one region the DM chooses the reform conditional on the signal ρ. For example, consider the case where $u\left(y^S,\theta^S,A\right)=u\left(y^S,\theta^S,B\right)$ and $u\left(y^S,\theta^C,A\right)=u\left(y^S,\theta^C,B\right)$, $\kappa^{sb0}\leq\frac{1}{2}\leq\kappa^{sb1}$ and $\pi^{cb1}\geq\pi^{cb0}\geq\pi_2$. These properties imply that cycling between regions can occur starting from the region $\kappa\in\left(\frac{1}{2},\kappa^{sbl}\right)$ and $\pi\in\left(\pi^{cb0},\pi^{cb1}\right)$, at some $z\in(z^{\min},\frac{1}{2})$. Then, starting from such a point (κ,π), the DM implements y^S after $\rho=s$ and keeps the status quo otherwise. Thus, expected z falls. This in turn reduces π^{cb0}. Then, at some z^{**}, $\pi^{cb0}(\kappa,z^{**})\leq\pi$, i.e., the location crosses into the region where the DM implements y^S after $\rho=s$ and y^C after $\rho=c$. The average z is expected to increase if $\rho=c$ is more likely than $\rho=s$, i.e., if $z\cdot(1-\kappa)+(1-z)\cdot\kappa>(1-z)\cdot(1-\kappa)+z\cdot\kappa$. This reduces to the condition that $\kappa>\frac{1}{2}$.

In the region where there is cycling at location (κ,π), it happens around z^{**} where $\pi=\pi^{cb0}(\kappa,z^{**})$. Given (115),

$$z^{**}(\kappa,\pi)=\kappa\cdot\frac{\pi\cdot u\left(y^C,\theta^C,A\right)+(1-\pi)\cdot u\left(y^C,\theta^C,B\right)}{\kappa\cdot u\left(y^C,\theta^C,A\right)-(1-\kappa)\cdot u\left(y^C,\theta^S,A\right)} \tag{133}$$

Then, $\frac{\partial z^{**}(\kappa,\pi)}{\partial\pi}>0$. Moreover, as $\pi\to\pi_2$, $z^{**}\to 0$.

Consider now comparing z^{**} to the z^* from the main model. Let (κ,π) be a location in the parameter space that satisfies the conditions for cycling both in the main model and in the model with a single decision maker. Then, from (86), $z^*(\kappa, \pi)$ decreases in π. As $\pi \to \pi_2$, $z^* > z^{**} \to 0$. Also, notice that as $\pi \to 1$, the expression for $z^{**}(\kappa, \pi)$ increases above 1. Thus, there exists some $\pi^{**} < 1$ such that $z^{**}(\pi^{**}) = \frac{1}{2}$. Hence, some some π^* such that $\pi_2 < \pi^* < \pi^{**}$, we have $z^* > z^{**}$ if $\pi < \pi^*$, and $z^* < z^{**}$ if $\pi > \pi^*$.

Expected welfare. The problem with a single decision maker has policy y^C as part of the solution only for $\pi \geq \pi^{cb0} > \pi_2$. For those values of π, in the main model, y^C is proposed only after θ^C. Policy y^C delivers a higher expected payoff when used only after θ^C than when used after any θ or after $\rho = c$. Thus, in the region in which policy choice is contingent on signal, the Simplification / Matching $BPBE$ yields higher welfare, as y^C is implemented only in the state θ^C. For $\pi < \pi^{cb0}$, the outcome with a single-decision maker can be achieved in an equilibrium of our main model (the Pooling equilibrium). Yet, the main model allows for the Complexification equilibrium in a region where the decision maker would implement the play from the Pooling or the Rejection regions. Since these equilibria are possible in the main model for those parameter values, it must be the case that the DM expects higher welfare under the Complexification equilibrium.

Long-run complexity of the legislative environment. Consider each of the regions:

1. where she implements y^S regardless of signal, z decreases on average until it reaches the lower bound $z^{\min}$.

2. where she implements y^C regardless of signal z increases on average until it reaches the upper bound $\frac{1}{2}$.

3. where she implements y^S after $\rho = s$ and y^C after $\rho = c$, the average z increases if

$$z \cdot (1 - \kappa) + (1 - z) \cdot \kappa \geq (1 - z) \cdot (1 - \kappa) + z \cdot \kappa, \tag{134}$$

   i.e., if $\kappa \geq \frac{1}{2}$, and average z decreases otherwise.

4. where she implements y^S after $\rho = s$ and keeps the status quo after $\rho = c$, average z decreases.

5. where she implements y^C after $\rho = c$ and keeps the status quo after $\rho = s$, average z increases.

6. where she keeps the status quo after any signal, z remains at its initial value z_0.

Outside any cycling region, if average z decreases, then it decreases until it reaches the lower bound $z^{\min}$. If average z increases, then it increases until it reaches the upper bound $\frac{1}{2}$. Comparing the main model to the single decision maker, the Complexification region in the main model has $z_\infty > z^{\min}$, while in the case of a single decision maker, the same region, with $\pi < \pi_2$, has $z_\infty = z^{\min}$. Then, at $\kappa = 1/2 + \epsilon$, with $\epsilon \to 0$, and $\pi \in (\pi_2, \pi^{cb0})$, the main model is in the Simplification region with $z_\infty = z^{\min}$, while, as shown in the example above, the model with a single decision maker allows for cycling with $z_\infty > 0$.