Credible Communication in Dynastic Government

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Abstract

This paper examines the mechanics of intertemporal information provision in *dynastic governments*. It has been suggested that "horizontal accountability," i.e., a system of governance where auditing functions lie outside the executive branch, can ensure credible disclosure of information. The results here suggest a cautious approach to that view.

Government is modelled as a dynastic sequence of *regimes*. Each regime rules for one period, chooses an expenditure level, then relinquishes power to its successor. When information about past policy choices comes exclusively from the reports of previous regimes, each regime has an incentive to choose its (suboptimal) one shot expenditure policy, and then misrepresent its choice to its successor.

I examine the *credible communication equilibria* taking into account the reporting incentives of an auditor who can independently verify the information each period. In an environment where "liberal" (i.e., those prefering larger government expenditures) and "conservative" (those preferring smaller expenditures) regimes and auditors evolve over time, it is shown that: "conservative" ("liberal") auditors are not credible when the current regime is also "conservative" ("liberal"). Moreover, because information transmission stops when the auditor's and the regime's biases coincide, effective deterrents even in the "good" periods (when the auditor's and the regime's biases differ) are difficult to construct. In all periods the equilibrium requirement of *auditor neutrality* constrains the dynamic incentives for efficient policy choices. The main result shows that these constraints typically bind away from optimal policies in standard constructions of equilibrium.

JEL Codes: C73, D72, D73, D82, H11
Key Words: dynastic government, dynamic policy bias, auditor neutrality, credible communication.

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1 Introduction

A defining characteristic of modern democracies is the periodic and peaceful transfer of power from one regime to the next. For this reason, the "government" in democracies is more accurately characterized as a *dynastic sequence* of decision makers rather than as a single, long lived decision maker. This paper examines the mechanics of information transmission in dynastic government.

Clearly, the disclosure of information across successive administrations of government is not automatic. One reason for this is that a primary (if not exclusive) source of information about past policies comes from previous administrations who have the most direct knowledge of their own activities. Sometimes, governments have incentives to with-hold information. Other times, the internally generated reports may be manipulated or falsified.[1] In either case, the lack of credible information impacts a government's dynamic policy decisions.

In particular, credible information provision plays an especially important role when the "one-shot" incentives of decision makers favor inefficient decisions. For example, a ruler with limited tenure may choose lax environmental enforcement to keep current energy prices low. Alternatively, the ruler may subsidize food prices rather than invest in infrastructure. In both cases, these calculations may produce "present-biased" policies: decisions excessively favor the present at the expense of the future when compared to a system in which rulers can recoup the costs associated with efficient decisions.

This type of bias also arises in fiscal decisions when the decisive voter's preferences changes over time. This is shown by the literature on dynamic, politico-economic models of voting such as Persson and Svensson (1989), Alesina and Tabellini (1990), Krusell and Rios-Rull (1996), Krusell, Quadrini and Rios-Rull (1997), Martimort (1997), and others. A different but related type of present-bias arises directly when rulers have dynamically inconsistent preferences — see, for example, Krusell and Smith (2001).

In each of these cases, tacit cooperation between the different generations of governments can mitigate the bias. However, this cooperation requires accurate information about past

[1] Examples of both with-holding and manipulation are easy to find. For instance:

> The General Accounting Office...said that it will file suit in federal court in the next two to three weeks in an effort to obtain records of the task force that developed the industry-friendly energy policy President Bush announced on May 17. (Washington Post, Jan. 31, 2002, p.A4)

and

> "Marines Charged in Falsifying Records: 8 Officers Names in Osprey Probe" (Washington Post, August 8, 2001, p.A8)

policies.[2] That is, because current regimes' decision rules must use knowledge of past policy choices in order to enforce optimal policies across time, each succeeding administration must have a pretty good idea about what types of policies were chosen by past regimes.

This paper studies the credibility of communication across different administrations of government. We focus specifically on the role of "horizontal accountability," i.e., a system of governance where auditing functions lie outside the executive branch, for ensuring credible disclosure. The need for horizontal accountability has long been advocated by human rights groups such as Transparency International (TI). To these groups, executive appointments of auditors is "like asking the burglar to select the watchdog. [Consequently] political appointments of Auditor-Generals have been the root cause of many problems with integrity systems in various parts of the world."[3] In the literature, justifications for various types of horizontal systems (e.g., separation of powers) can be found in Persson, Roland, and Tabellini (1997) or in Maskin and Tirole (2001) and Laffont and Martimort (1999).[4]

To investigate this issue, we consider a dynamic game model of successive "regimes" that regularly occupy government.[5] Abstracting away from explicit re-election issues, each regime is assumed to consist of a decision maker with one period of tenure. A regime's preferences span the infinite horizon, but it incurs certain costs and benefits only while in power. Each regime chooses an expenditure level without having observed the prior history of expenditures of previous governments. This assumption captures the idea that the present ruler cannot *directly* observe what happens before he arrives, and must therefore rely on communication by past participants and observers.

In this environment it is straightforward to show that with full memory simple trigger strategies could implement dynamically efficient policies if all regimes are patient enough. However, without knowledge of prior actions, there are incentives for each regime to choose a

[2]Tacit cooperation also requires an infinite time horizon. Among aforementioned papers, Krusell and Rios-Rull (1996), Krusell, Quadrini and Rios-Rull (1997), and Krusell and Smith (2001) study these problems in an infinite horizon. Tacit cooperation need not occur in their models because they restrict attention to Markov equilibria.

[3]TI Source Book, 2000, p. 75.

[4]However, explanations by Persson, Roland, and Tabellini (1997) and by Maskin and Tirole (2001) rely on the inclusion of "vertical" accountability systems such the use of voters to discipline politicians (see TI Source Book, 2000 for a discussion of the difference between vertical and horizontal accountability). Laffont and Martimort examine accountability issues with multiple regulatory agencies.

[5]Standard socio-political indices characterize the transfer of power among successive regimes as *regular* if

> "persons not holding national executive office ... obtain such office through legal or conventional means... change [of ruler] is not reported to be accompanied by actual or directly threatened violence or physical coercion and that it conforms to the prevailing conventional procedures of the political system." (See Jodice and Taylor, (1983), p.85.)

suboptimal (one shot) expenditure. Credible information provision therefore becomes crucial for optimal policy decisions.

We first examine the case in which all information comes exclusively from prior governments. We then introduce into the model an outside auditor who can verify the government's reports and actions that period, and must then choose whether to honestly convey this information to the incoming regime. Semi-independent auditors such as the General Accounting Office (GAO) in the U.S. or the National Audit Office (NAO) in the U.K. are common in most democratic countries. The model focuses exclusively on reporting incentives rather than verification ability of the auditor. By having formal authority to audit and substantiate reports of government activities, these auditors provide a potentially valuable cross-checking capability.[6] At issue in each case is whether there exist *credible communication equilibria* in which the reports of the previous regime(s) and/or the auditor coincide with their received information. Credible communication equilibria ensure accurate "institutional memory" which, in turn, is necessary to sustain dynamically optimal policies.

Unexpectedly, the findings of the model are mostly negative.

I. Perhaps not surprisingly, institutional memory cannot be generated purely internally. Without external auditing each regime chooses a suboptimal policy and then misrepresents its choice to its successor. Consequently, only one-shot policies (those that maximize the one-shot return of the current regime) are chosen in any credible communication equilibrium.

II. The presence of an external auditor, even one that can costlessly and perfectly verify the information provided by government, is not itself generally sufficient to sustain optimal policies. Minimally, credible communication requires sufficient "ideological" conflict between auditor and government.

III. Even in those instances when the ideological biases of the government and the external auditor are quite different, optimal policies may not be sustained. They are not sustained when coincident biases can occur too "often" or too "predictably." That is, the regular occurrence of "bad states" of the world (where the biases of auditor and government are coincident) heavily impact reporting incentives in the "good states" of the world.

IV. Finally, regardless of ideological differences, regardless of discount factors, optimal policies cannot be sustained in "standard" constructions of equilibrium.

Together, the results point to a potential weakness with horizontal accountability. That

[6] In the U.S. where there is a formal separation of powers, the GAO monitors and audits the executive branch on behalf of the legislative branch (see `www.gao.gov`). In the U.K. the Auditor-General is an officer of the House of Commons (see National Audit Act of 1983), Section 1-2, or see `www.audit-commission.gov.uk`.

is, even with independent auditing, when incentives for credible communication are taken into account, optimal policy choices are problematic.

To elaborate on these findings, we model a world with two political biases/types. High types or "liberals" are those that prefer, on the margin, relatively larger expenditures. Low types or "conservatives" are those that prefer relatively lower expenditures. Abstracting away from election issues, the biases of both regimes and the auditors are assumed to evolve according to a finite state Markov process. Each period, the current regime must not only concern itself with the dynamic inconsistency, but also the evolution of "type-biases" of the auditor and of future regimes. Depending on the evolution of type-biases, an auditor may share the same ideology or have a different ideology than the current regime.

In this environment, the term *auditor neutrality* is used to refer to a particular necessary condition for credible communication.[7] According to this condition, because all reports are "cheap talk" the auditor must be indifferent between the continuations that follow each of his potential equilibrium reports. However, unlike standard applications of cheap talk models (e.g. Krishna and Morgan (2000), Grossman and Helpman (2001), and others, dating back to Crawford and Sobel (1983)), in the present model the subsequent regime can make no direct inference from reports since the reported policy history does not structurally vary with the bias of either the current regime or the auditor. The auditor is therefore "neutral" with respect to each of his messages once the current regime has committed to a reported policy. Unfortunately, auditor neutrality places severe constraints on the equilibrium set.

First, an independent auditor with the same bias as the regime may be co-opted by the regime. For if the biases coincide, then the auditor has conflicting incentives. On the one hand, the continuation payoffs of an auditor with the same bias coincides with that of a regime, and so a report that punishes the government for poor behavior also punishes the auditor to the same degree. On the other hand, auditor neutrality must hold. But the auditor cannot be neutral and, at the same time, have his report punish the regime. Hence, the auditor will not report deviations. Knowing this, the regime chooses its one shot policy. Hence, auditor neutrality implies that dynamically optimal policies can, at best, only be chosen in periods in which the auditing agency has a political bias different from the current government. Hence, "conservative" ("liberal") auditors never choose to credibly communicate when the current regime is also "conservative" ("liberal").

A second and related constraint arises because *past* information cannot be transmitted in those periods where the auditor bias coincides with that of the regime. Neither the government nor the auditor will credibly report past deviations by previous regimes of the

[7] I adopt this term from an earlier work (Anderlini and Lagunoff (2001)) where the term is used in a related context.

same type unless punishments for past deviations have been exhausted. This means that punishments for past deviations by the same type of regime cannot extend to future periods. Hence, auditor neutrality implies that even in "good periods" where credible communication is possible, one shot policies are chosen if these periods directly precede "bad periods."

Third, even in periods where the biases of regime and auditor differ, auditor neutrality affects the incentives of *future* regimes with the same bias. In particular, auditor neutrality limits the type of polices that can be used in any future punishment for policy deviations. Given this limitation, in many cases a deviation by the current regime cannot be credibly punished by the future regimes. Our main result shows that under certain conditions, optimal policies cannot be sustained when deterrents take the form of *simple penal codes*, a notion introduced by Abreu (1988) whereby all policy deviations are followed by a uniform punishment. This is despite the fact that such deterrents are easy to construct when reporting constraints are not considered.

The paper is organized as follows. Section 2 introduces a baseline model of homogeneous government. A policy bias results from a, by now familiar, dynamic inconsistency. One could interpret dynastic government in the model as a single, dynamically inconsistent player whose rate of intertemporal substitution between the first period payoff and next period differs from the rate of substitution between any other pair of successive payoff-dates. The decision process without memory constraints is therefore equivalent to a particular case of hyperbolic or quasi-geometric discounting.[8] The analogy, however, is imperfect. Because the model here is of a sequence of *distinct* governments, as opposed to a single, dynamically inconsistent one, the analysis lends itself to the full set of dynamic game equilibria (subject to the reporting incentive constraints).[9]

Section 3 extends the analysis to governments with evolving bias. This Section contains the main results outlined above. Section 4 extends the discussion and reviews some related literature. Section 5 is an Appendix with proofs of the main results.

[8]Hyperbolic discounting models are part of a general literature on dynamically inconsistent decision processes dating back to Strotz (1956) and Pollak (1968). Recent examples include Kocherlakota (1996), Asheim (1997), Laibson (1997), Harris and Laibson (2001), and Krusell and Smith (2001).

[9]For this reason, the model is also less susceptible to critiques such as Rubinstein's (2001) directed toward single agent, hyperbolic models.

2 The Baseline Model

2.1 Dynastic Government

Government is assumed to be a "dynastic player" in the following sense. A "government" here consists of sequence of *regimes*. We abstract away from election concerns. At regular intervals, regimes enter and replace their predecessors. For simplicity, we assume that time is discrete and these intervals last one period. At the end of each date t, a new regime denoted by R_t emerges to replace the existing one. Hence, t indexes the regime as well as the calendar date. One interpretation is that of a society with democratic governance, and the length of a period is the length of a constitutionally imposed term limit. Alternatively, one period denotes the tenure of a monarch. Neither interpretation, however, is required in the sequel.

$$\boxed{R_0},\ \boxed{R_1},\ \ldots,\ \boxed{R_t},\ \boxed{R_{t+1}},\ \ldots$$

Figure 1

To start, this Section assumes that the type of government does not change with time (though the identity of any particular regime does change every period). This allows us to focus on a dynamic inconsistency before introducing the added complication of political bias. Examples of this type of homogeneity in modern, democratic societies are not uncommon. Dominant political parties have existed for long periods in Japan and in Mexico despite systematic elections. Nevertheless, the homogeneous case may be viewed as something of a "warm-up" for the subsequent Section when heterogeneous types, i.e., the possibility that distinct regimes evaluate policies within a period differently, is considered.

A "policy bias" occurs in the decision process of these regimes as follows. Each period, $t = 0, 1, 2, \ldots$, the current regime must choose the general level of government expenditures. Expenditure level a_t denotes the expenditures chosen by the date t regime. At each date, the current regime is assumed to care about the discounted value of decisions of present and future expenditure policies, but cares relatively less about future policies than the future regimes who choose those policies. The average discounted dynamic payoff to a date t regime is given by

$$(1-\delta)[v(a_t) + \delta u(a_{t+1}) + \delta^2 u(a_{t+2}) + \cdots ...]$$

where both v and u are both assumed to be single peaked and strictly, differentiably concave, and both attain their maxima at (finite) feasible policies. The parameter δ, which typically has the role of a common discount factor, may also be interpreted as the altruistic

weight assigned to future regimes' decisions. Though not modelled explicitly, the assumption of an interior maximum of both v and u reflects an implicit balanced budget constraint: government spends what it taxes each period.[10]

The payoff u may be interpreted as the "fundamental" utility of expenditure a to a representative citizen governed by these regimes. The payoff v subsumes u but also captures the costs and benefits associated with governing. This presumably includes factors such as the effort associated with pushing through an expenditure through the political process. It may also include payoffs such as rents from lobbyists and contributors and indirect factors such as the political popularity. If for example, a denotes expenditures only on environmental protection, then the function v also builds in the political gains and losses associated with enforcing compliance with the law.[11] Since the current regime is not involved in future decisions, it cares only about the fundamental payoff u in the future. Consequently, the regime's policy choices are distorted toward that initial period and away from future periods. It is in this sense that dynastic government is "present-biased."

Let $\alpha = \{a_t\}_{t=1}^{\infty}$ denote the entire path of expenditure policies, one for each regime in government, over the entire infinite horizon. Finally, let α_t denote the continuation policy path starting from date t. Average discounted payoffs may be expressed recursively as:

$$V(\alpha_t\ ) \ \equiv\ (1-\delta)v(a_t\ ) + \delta U(\alpha_{t+1}\ ) \tag{1}$$

where

$$U(\alpha_t\ ) \ \equiv\ \sum_{\tau=t}^{\infty}(1-\delta)\delta^{\tau-t}u(a_\tau\ ) \tag{2}$$

The dynamic payoff in (1) generates a dynamic inconsistency between current and future incarnations of government. Indeed, the payoff is a generalization of a single decision maker with hyperbolic or quasi-geometric discounting.[12] To see the connection, set $\beta(a_{t+s}, a_t) = u(a_{t+s})/v(a_t)$. Then if $\beta(\cdot)$ is constant in all its arguments, the payoff in (1) is expressed as $v + \beta[\delta v + \delta^2 v + \cdots]$ which is the standard hyperbolic formulation. The decision maker is present-biased since his rate of intertemporal substitution between the first and second

[10]The period-by-period budget balance assumption is not crucial for the analysis, but it is maintained it throughout the paper in order to avoid the introduction of payoff relevant state variables implied by intertemporal budget constraints. Such state variables can be strategically manipulated by one's predecessor in government (e.g., Alesina and Tabellini (1990)). The introduction of intertemporal substitution in the budget is an interesting complication, but one that is not central to role of credible communication in dynastic government. In some cases memory may be "communicated" by manipulating the state, but this only mitigates rather than generally eliminates the policy bias.

[11]The gains and losses associated with "pandering" are more fully explored in an interesting voting model by Maskin and Tirole (2001).

[12]See, for example, Harris and Laibson (1997) or Krusell and Smith (2001).

period payoffs favors the earlier period more than under the rate of substitution between any other pair of adjacent payoff-dates.

Let a^u denote the maximizer of u. The maximizer of v, which we denote by $\underline{a}$ will, henceforth, be referred to the *one-shot policy*. We assume $\underline{a} \neq a^u$. There is no presumption as to whether there is "upward bias" $(a^u < \underline{a})$ or "downward bias" $(a^u > \underline{a})$. To illustrate the either case, suppose $u(a) = K-(B-a)^2$ and $v(a) = K-(B+C-a)^2$ with $-B < C < B < b$. Then, $a^u = B$, and $\underline{a} = B + C$.

A stationary path is a path $\alpha = (a, a, \ldots)$ which replicates the same policy each period. Denote by $\alpha^* = (a^*, a^*, \ldots)$ the path which maximizes payoff $V(\alpha_t)$ to a regime over all stationary paths. Observe from (1) that a^* is chosen to maximize $(1-\delta)v(a) + \delta u(a)$ over all a. It is clear from (1) that the most preferred outcome from the standpoint of the current regime is to "free ride" by choosing $\underline{a}$ in the current period, and have all future regimes choose a^*. The problem is that the one shot policy, which makes a regime better off in current period, also makes it worse off if it is continued in all periods. In this sense, the resulting *one-shot policy path*, denoted by $\underline{\alpha}$, is inefficient. All regimes can be made better off under the "full commitment" solution α^*. Hereafter, α^* is referred to as the *dynamically optimal path*.[13] Clearly, $V(\alpha^*) > V(\underline{\alpha})$. Every regime prefers the dynamically optimal path to the one-shot policy path.

2.2 Institutional Memory

Each successive regime must choose a policy contingent on its information about past behavior. An *equilibrium* of this dynamic game is defined to be a profile of history-contingent policies such that (a) each decision maker's action is optimal given its information, and (b) using Bayes' Rule wherever possible, its forecast of future decision makers' contingent actions is correct. Though this description is informal, it is consistent the formal definition of a *Perfect Bayesian equilibrium*. An equilibrium is said to *sustain* path α (or: α is *sustainable*) if α is the path followed in equilibrium.

If each successive regime can perfectly observe past play then the model is a dynamic game with perfect recall. This is referred to as the *full memory* environment. Using standard repeated game logic, it is easy to construct subgame perfect equilibria in the full memory environment that sustains the dynamically optimal path α^*, provided that all regimes are patient enough. The following result is stated for completeness, although its logic is probably

[13]The term "optimal" is used here with some caution since (1) it assumes that only the welfare of the regimes rather than that of the citizenry matters, and (2) welfare is problematic when government is a dynamically inconsistent player.

familiar to most readers.

Proposition 0 *In the full memory environment, any path α such that $V(\alpha_t) > V(\underline{\alpha}_t)$ at each date t is sustainable. If, however, each regime has no knowledge of past policies, then only the one shot policy path $\underline{\alpha}$ is sustainable.*

The argument in the full memory environment is familiar. The path α^*, for example, is sustained by a trigger strategy whereby all regimes start out providing optimal effort. If at some date some regime deviates, all future regimes revert to one-shot policies. This behavior constitutes an equilibrium if all regimes are patient enough.[14] For example, using the payoff defined in (1), the optimal path α^* is sustainable if

$$(1-\delta)[v(\underline{a}) - v(a^*)] < \delta[u(a^*) - u(\underline{a})].$$

Trigger strategies such as this one in government decisions are fairly standard.[15] By contrast, in an environment without institutional memory, past deviations from prescribed behavior cannot be observed by future regimes. In this case, equilibria requiring "punishments" for bad behavior clearly cannot be constructed. Consequently, if there is no mechanism for transmitting accurate information about past policy choices, each regime chooses its one-shot policy $\underline{a}$ each period.

Naturally, it would not be accurate to say that modern governments have no information about their predecessors in power. No such claim is made here. Instead, one only need emphasize that current decision makers may have little or no *direct* knowledge of past decisions and must therefore rely on reports, communication, etc., from past participants in the process. Consequently, this sequel examines the properties of dynastic government when institutional "memory" requires intergenerational communication. Current actions are therefore reported by members of the current generation to members of future generations.

2.3 Reporting by Government

Clearly, without direct memory, some form of communication is essential to sustain optimal paths. Assume, then, that at the end of each period t, the regime sends a report m_t to the incoming date $t+1$ regime. In turn, the date $t+1$ regime prepares report m_{t+1} to its

[14] Notice that the statement of the Proposition need not make explicit reference to discounting since the requisite discount factor threshold is built in to the inequality in V.

[15] For example, see Chari and Kehoe (1990).

successor, and so on. Each message constitutes "cheap talk."[16] Each regime is assumed to be able to manipulate all available information including reports on past policies as well as current ones.[17] The sequence of actions each period are illustrated in Figure 2.

$$\boxed{R_0} \xrightarrow{m_0} \boxed{R_1} \xrightarrow{m_1} \ldots \boxed{R_t}, \xrightarrow{m_t} \boxed{R_{t+1}} \xrightarrow{m_{t+1}} \ldots$$

Figure 2

No restrictions are placed on the size of the message or on anyone's processing capabilities. In particular, a date t message, m_t, may fully convey the history of behavior, $\{a_1, a_2, \ldots, a_t\}$ through t. The incentives underlying all these reports may be expressed efficiently by a *communication strategy*. A *communication strategy* is a mapping, μ, from last period's report and the current action to this period's report. Write $\mu(m_{t-1}, a_t\ ) = m_t$ to mean that, given the report, m_{t-1}, received by the date t regime upon taking power, and given its current action, a_t, the date t regime chooses to send message m_t on to the next regime. A date t regime is said to *report credibly* if the communication strategy μ correctly reveals the past as it is known by the auditor. That is, credible communication entails

$$\mu(m_{t-1}, a_t\ ) = m_t = (m_{t-1}, a_t\ ). \tag{3}$$

Dynamic incentives for behavior are then expressed by a *behavior strategy*, which is a map σ from reports to actions. Write $\sigma(m_{t-1}\ ) = a_t$ to denote the date t government's policy choice a_t given message m_{t-1}. To set the system in motion, let m_0 denote the null message which inputs into the behavior rule, σ, at $t = 1$. Using this notation, a path α is then defined by

$$a_1 = \sigma(m_0),\ a_2 = \sigma(\mu(m_0, a_1)\ ),\ \ldots, a_{t+1} = \sigma(\mu(m_{t-1}, a_t)\ ), \ldots,$$

Hence, the pair (μ, σ) describes the evolution of policy choices and messages of successive regimes of dynastic government. Dropping time subscripts, a simple recursive expression for beginning-of-period regime payoffs is given by

$$\mathcal{V}(\mu, \sigma|\ m) = (1 - \delta)v(\sigma(m)) + \delta\ \mathcal{U}(\mu, \sigma|\ \mu(m, \sigma(m)\ )\ ) \tag{4}$$

[16]By standard definitions (see Crawford and Sobel (1982)), a report constitutes *cheap talk* if the cost of creating report does not correlate with its substance.

[17]Most of the results do not depend crucially on this. Alternatively, one could have assumed that every report is available, in an unalterable state, to all future generations. However, this seems somewhat restrictive.

where $\mathcal{U}$ is defined by: for any message m'

$$\mathcal{U}(\mu, \sigma|\ m'\ ) = (1-\delta)u(\sigma(m')) + \delta\ \mathcal{U}(\mu, \sigma|\ \mu(m', \sigma(m')\ )\ ) \tag{5}$$

This formulation is analogous to many politico-economic models in that it expresses payoffs as a function of the "state variable" — the message m sent by the prior regime — and the "policy functions" μ and σ. The difference is that m is not directly payoff relevant; it is used as a conditioning device for strategies in the construction of the equilibrium which follows.

Our interest is in whether and to what degree information is transmitted accurately across regimes. A communication strategy, μ, together with behavior strategy, σ, constitutes a *credible communication equilibrium* if all regimes report credibly as according to (3), and if (μ, σ) constitutes a Perfect Bayesian equilibrium. The latter requires that after every message m, $\sigma(m)$ maximizes (4), and after every message m and every policy choice, a, $\mu(m, a)$ maximizes $\mathcal{U}(\mu, \sigma|\ \mu(m, \sigma(m)\ )\ )$.

Can this communication credibly convey past actions? Not surprisingly, when previous regimes are the sole source of information the answer is "no" for all but trivial equilibria. This is stated and proved below.

Proposition 1 *In an environment where information about past policy choices comes exclusively from the reports of past regimes, the only path sustained by a credible communication equilibrium (or any other Perfect Bayesian equilibrium) is the one-shot policy path* $\underline{\alpha}$.

Proof The proof is straightforward. It is included here for completeness. Suppose, by contradiction, that path α is sustained by a credible communication equilibrium (σ, μ) and α satisfies $a_t \neq \underline{a}$ for some t. Let $\tilde{m}_t$ denote the equilibrium path message indicating that a_t was taken in period t as prescribed. The equilibrium payoff to taking a_t and subsequently reporting $\tilde{m}_t$ is given by

$$V(\alpha_t) = (1-\delta)v(a_t) + \delta\ \mathcal{U}(\mu, \sigma|\ \tilde{m}_t\ )\ )$$

But by taking instead the one shot policy $\underline{a}$ at date t then sending $\tilde{m}_t$ just the same, the date t regime receives

$$(1-\delta)v(\underline{a}) + \delta\ \mathcal{U}(\mu, \sigma|\ \tilde{m}_t\ )\ )\ >\ V(\alpha_t).$$

Hence, the path α is not sustainable. $\diamondsuit$

2.4 External Auditing

So far the model assumes that in each period, each regime is the sole source of information. Since regimes have no incentive to report their own deviations, their reports are uninformative. Hence, intertemporal incentives to sustain α^* are destroyed. Government therefore has no internal mechanism for retaining institutional memory.

While it is indeed the case in some countries that there is no independent monitor of government actions, it is useful to extend the model to admit the possibility that an independent auditor (such as a GAO in the U.S. or NAO in the U.K.) can legally investigate, verify, and report on executive branch decisions. For this to happen, the government must be held accountable in some form or another. One possibility is that the auditing is done in a system with separation of powers, whereby one branch of government investigates another (as in the U.S.). Another possibility is that an independent agency has an explicit mandate in the country's constitution (as in Finland).[18]

Assume then that an external auditor can perfectly verify the policy decision of the current regime each period.[19] The auditor is assumed to have the same preferences as that of a representative citizen. Namely, its preferences coincide with the "fundamental" preferences described by u each period. The auditor therefore receives dynamic payoff of $U(\alpha_t)$ if α_t is the equilibrium path expected to follow from t. For the analysis it does not matter whether the auditor is an infinitely lived agent or whether, like the regimes, it lasts only a single period and, consequently, places weight δ on future generations. To fix ideas, the latter is assumed.

After observing the policy choice a_t and the regime's reports m_t, the auditor then verifies that stated information accurately conveys the policy information. It then reports whether or not the regime's reported information is credible. Let r_t denote the report of auditor A_t. The sequence of events is exhibited in Figure 3.

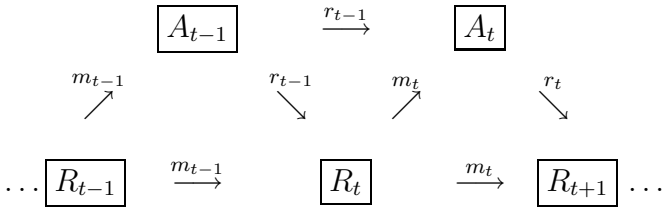


Figure 3: External Auditing Each Period

[18] See www.cagindia.org/writeups/finland.htm.

[19] Since the analysis focuses on reporting incentives, and since the main results are negative, the results do not change if imperfect verification is assumed.

The auditor, like the regime, is not automatically assumed to tell the truth. An auditor's strategy then is a function ρ that maps from past messages, and current policies and messages of government to the auditor's report. Hence, the auditor's report is given by $r_t = \rho(m_{t-1}, r_{t-1}, a_t, m_t)$. The current regime's messages is given by $m_t = \mu(m_{t-1}, r_{t-1}, a_t\ )$. The notion a "credible report" can be extended from the prior subsection. The only modification in the definition comes from the fact that the both current regime and the current auditor must both aggregate the messages of both auditors and regimes from the past. If these sources provide different versions of history, then it is unclear which version of history is the "credible one." The definition is therefore restricted to apply only when all prior messages/reports agree. Formally, an auditor is said to *report (behavior) credibly* if whenever $m_{t-1} = r_{t-1}$,

$$\rho(m_{t-1}, r_{t-1}, a_t, m_t\ ) = (m_{t-1}, a_t) \tag{6}$$

A similar definition can apply to the reporting function, μ, by government.[20]

Behavior and communication can now be fully summarized by the list (μ, ρ, σ). The notation extends in a straightforward way to recursive payoffs $\mathcal{V}$ and $\mathcal{U}$ defined by (4) (5). Notationally, they are now written as $\mathcal{V}(\mu, \rho, \sigma|\ m, r)$ and $\mathcal{U}(\mu, \rho, \sigma|\ m, r)$, respectively. A *credible communication equilibrium* is a Perfect Bayesian equilibrium triple (μ, ρ, σ) which satisfies (a) credible communication , and (b) whenever all reports coincide, the government's behavior depends only on the, presumed credible, past history of policies. Note that a credible communication equilibrium always exists: the path $\underline{\alpha}$ is always sustainable by an equilibrium satisfying (a) and (b).

Unfortunately, the following result demonstrates that, without additional requirements, the presence of an independent auditor who reports as described has no effect on the outcome.

Proposition 2 *The presence of an auditor who verifies reported policies does not effect the outcome. Specifically, the only path sustained by a credible communication equilibrium is the one-shot policy path* $\underline{\alpha}$.

While the Proof is in the Appendix, the informal logic can be described as a conflict between reporting and policy incentives. Suppose that an equilibrium prescribes an action $a_t \neq \underline{a}_t$. Suppose that the regime deviates by choosing its one shot policy, and then "lies" about it by reporting its prescribed action instead. Ideally, the auditor's role in this case would be to deny the government's report and, instead, convey the true information. But because the auditor has the "last say," the auditor must, in fact, be neutral in the sense that

[20]Note that if past regimes and auditors have conspired to lie about past policies, then this lie may passed on honestly by current actors.

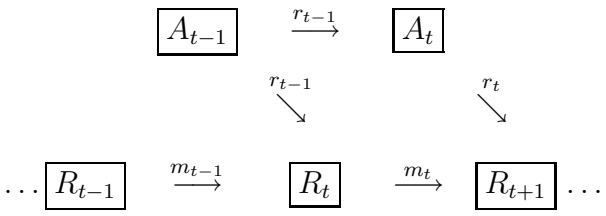
it is indifferent between the consequences of each of its message. In particular, it must be indifferent between the continuation following the report, "the regime took prescribed policy a_t," and the continuation following, "the regime deviated by taking policy a'_t." If this were not the case, then the auditor would send its preferred report, regardless of the truth. This indifference, which we refer to as *auditor neutrality*, is expressed by the equation,

$$\mathcal{U}(\mu, \rho, \sigma \Big| \, m, r = m) \; = \; \mathcal{U}(\mu, \rho, \sigma \Big| \, m, r \neq m)$$

Auditor neutrality is a necessary condition of any credible communication equilibrium. At the same time, the continuation following the truthful message must punish the regime for deviating. The problem is: since both the auditor and the current regime evaluate continuations in exactly the same way, any continuation that punishes the regime must also punish the auditor. Hence, credible deterrence conflicts with auditor neutrality.[21] To satisfy both, imperfect correlation in the continuation preferences between auditor and government is required.

Before moving on, it is worth emphasizing that there is a simple, but uncompelling model of auditing which solves the problem. Suppose that the auditor observes the regime's policy but *does not observe* the regime's reported information. Then a standard cross-checking procedure provides the auditor with the right incentives to reveal the government's policy.

The procedure works as follows. The auditor and the regime simultaneously send reports of past and current policies to the next regime (see Figure 4 below). If the content of the reports are mutually consistent, then the next regime interprets this information as the "true" history and chooses the policy prescribed in equilibrium. If the reports are not consistent, then the incoming government interprets the contradicting data as a "deviation." Since, in the present environment, punishments for deviations effectively punish both the government and the auditor, it not important to identify which of the two messengers "lied." Consequently, any path sustainable in the full memory environment is also sustainable when an auditor is available and all parties can fully commit to use cross checking.



[21] A similar logic was used in Anderlini and Lagunoff (2001) and is also reminiscent of the renegotiation logic in repeated games (see, for example, Farrell and Maskin (1989). Note also that this logic is not sensitive to the timing of reports as long as they are sequenced. If the regime reports last, then the "neutrality condition" applies to it rather than the auditor.

Figure 4: Auditing without Observing the Regime's Report

The study of cross checking mechanisms dates back at least to Maskin (1977). These mechanisms are completely standard in contracting problems.[22] Unfortunately, their application seems inappropriate here. For one thing, most observed auditing arrangements do not conform to the "verification in ignorance" assumption imposed by simultaneous cross checking.[23] More critically, simultaneous cross checking is extremely fragile. *Both* the government and the auditor have incentives to undercut the perfect simultaneity of moves. If, for example, the regime deviates to its one shot policy, then it has an incentive to preemptively "signal" its intent to lie to the next regime. In turn, the auditor has an incentive to wait for this information. Hence, *both* parties prefer to sequence their reports.[24]

3 Heterogeneous Biases

This Section asks whether the reporting incentives and policy incentives can be reconciled if heterogeneous types are introduced. Assume all decision makers (regimes and auditors) one of two political ideologies: "High" or "Low." These ideologies are referred to as "biases" or just "types." Assume $du_H/da > du_L/da$ and $dv_H/da > dv_L/da$ for all a. That is, for high types an incremental increase in expenditures is more highly valued than for low types, and the optimal fundamental policy for high types is always higher than their counterpart for low types. In this sense, the high types may be regarded as having a "liberal" bias while the low types have a "conservative" bias.[25] This assumption, in turn, implies a similar ordering for one shot optimal policies and for dynamically optimal policies, respectively: $a_H^* > a_L^*$, and $\underline{a}_H > \underline{a}_L$.

[22]The adaptation of cross checking mechanisms to dynamic game settings with multi-sender communication is somewhat more recent. Examples are Ben-Porath and Kahneman (1996), Compte (1998), Kandori and Matsushima (1998) and Anderlini and Lagunoff (2001).

[23]The following mission statement of the U.K. auditor indicates that reported as well as actual information is examined: "The NAO [National Auditing Office] scrutinises public spending on behalf of Parliament....audits the accounts of all government departments and agencies as well as a wide range of other public bodies, and reports to Parliament on the economy, efficiency and effectiveness with which government bodies have used public money." (www.nao.gov.uk)

[24]Note that the subsequent regime cannot necessarily condition on the timing of the reports per se, since the stated timing can also be manipulated. Note also that adding more auditors does not solve the problem if all the communication is sequenced. Finally, the main conclusion (though not the details of the proof) hold up if the timing of communication between government and auditor in the sequenced model is reversed.

[25]However, these terms require some caution. For example, policy a may also correspond to some measure of defense spending.

3.1 External Verification with Heterogeneity

Let a_{it} denote a policy taken by a regime of type i in period t. One immediate implication from the previous Section is that sustainability of optimal paths requires that the bias-type of auditor differs from that of the current regime. Formally,

Proposition 3 *In an environment with heterogeneous government subject to independent auditing, a path α is sustainable only if, for each type $i = H, L$ and in each period t for which $a_{it} \neq \underline{a}_{it}$, the type of the auditor differs from i. Consequently, $a_{it} = \underline{a}_{it}$ whenever the regime's and the auditor's type coincide.*

In words, only one shot policies are chosen when there is no difference in type bias. This is true regardless of the history leading up to that state. The proof is immediate from Proposition 2. Ironically, because of auditor neutrality, differences in ideological views between the auditor and the government is necessary to combat differences in time horizon views between governments of different cohorts.

3.2 Dynamically Heterogeneous Biases

We investigate heterogeneous biases when these biases evolve over time. Specifically, assume that types evolve according to a finite state Markov process with transition probability P defined on state space Ω. Each state $\omega \in \Omega$ jointly determines the identity of the current regime and the identity of the current auditor at the beginning of the period. The transition probability of reaching state ω' from state ω is given by $P(\omega'|\omega)$. For convenience, it is assumed that $P(\omega'|\omega) > 0$ for any pair of states. It is also assumed that P is of full rank. The initial state is denoted by ω_0.

This specification for transition of power implies that the outcome of any election/transition is independent of the current government's behavior. This assumption is less restrictive than it appears. If the current government's behavior cannot be immediately observed without verification, then the outcome of the election rests on demographic factors and changes in political attitudes.[26] The stochastic process governing regime types is therefore modelled as a reduced form for an underlying political process that determines the bias of current leaders. Whether "conservative" or "liberal" leaders prevail depends on demographics of the voting population (which is beyond the scope of this analysis). We offer no theory for how this process relates to the one determining the bias of the auditor.

[26] A similar political transition dynamic was specified by Dixit, Grossman, and Gul (2000) in order to study political compromise in a dynamic game of surplus division between two factions.

A strategy triple (μ, ρ, σ) defined in the prior Section can now be extended to depend on states. Formally, policies and reports are now determined by: $a = \sigma(m, r; \omega)$, $m' = \mu(m, r, a; \omega)$, and $r' = \rho(m, r, a, m'; \omega)$, respectively. The definition of credible communication in (6) easily extends to these strategies. With this notation, the payoff to a date t regime of type $i = H, L$ is:

$$\mathcal{V}_i(\mu, \rho, \sigma \Big| \, m, r, \omega \,) \;=\; (1-\delta) v_i(\sigma(m, r; \omega)) \;+\; \delta \sum_{\omega' \in \Omega} P(\omega'|\omega) \mathcal{U}_i(\mu, \rho, \sigma \Big| \, m', r', \omega' \,) \qquad (7)$$

As before, each strategy triple (μ, ρ, σ) induces a path α which is now a random sequence of expenditure policies. The realization of each policy a_t in the sequence depends on the realized state ω_t. Clearly, there are now multiple, stationary "full commitment paths" paths. Call a stationary path *optimal* if it is a solution to

$$\max_a \quad \beta \left[\delta u_H(a) + (1-\delta) v_H(a)\right] \;+\; (1-\beta) \left[\delta u_L(a) + (1-\delta) v_L(a)\right].$$

where $\beta \in [0, 1]$. Note that most *type-stationary paths* — paths in which every regime of a given type always takes the same action — are inefficient from all regimes' point of views since they fail to optimally smooth payoffs streams between the two types.

In the full memory environment, it is straightforward to establish that certain optimal paths are sustainable. In particular, those that are preferred by every regime in every state to the *mutual one-shot policy path* (in which every regime chooses its one-shot policy), are sustained by the obvious trigger strategies if the regimes are patient enough.[27]

In the environment where past policies become known only through communication, possibilities are more limited. Let Ω_{ij} denote the set of all states in which regime $i = H, L$ holds power and is audited by $j = H, L$. Clearly, there are four such sets, Ω_{HH}, Ω_{HL}, Ω_{LH} and Ω_{LL} which exhaust the set Ω.

As shown by Proposition 3, the requirement of auditor neutrality conflicts with the requirement of credible deterrence if there is no type difference between the auditor and the regime. Since only one shot policies are sustainable on states in Ω_{HH} or Ω_{LL}, no stationary optimal path is sustainable.

The "second best" in this case is the set of paths which are stationary on the "good" states in $\Omega_{HL} \cup \Omega_{LH}$. i.e., states in which the auditor's and regime's biases differ. Unfortunately,

[27] In fact, payoffs worse than the one-shot policy may be sustainable since a deviation by, say, type L does not require future type H's to punish themselves (thus possibly rewarding type L's).

the requirement of auditor neutrality places constraints on policy choices even in the good states. We highlight two of these constraints in particular.

First, the presence of "bad" states (i.e., those in $\Omega_{HH} \cup \Omega_{LL}$) inhibits policy incentives in good states. Whenever a state in, say, Ω_{HH} occurs, neither the high type of government nor the high type of auditor will credibly report *past deviations* by previous regimes of the *same* type unless punishments for past deviations have been exhausted. Hence punishments for past deviations by the same type of regime cannot extend to future states that are reached from Ω_{ii}. Information transmission is therefore possible only if the states in Ω_{ii} do not occur too "often."

This same constraint implies that states in $\Omega_{HH} \cup \Omega_{LL}$ are not too "predictable." Suppose, for example, the type-bias process is deterministic. Then deviations by a type H regime at date t cannot be deterred if in date $t+1$ the state is Ω_{HH}. However, this implies that deviations by a type H regime at date $t-1$ cannot be deterred, and so on.

To characterize this constraint more formally, the following standard notation from the theory of Markov chains will prove useful.[28] For each $i, j = H, L$, The first passage time to states in Ω_{ij} is given by

$$T_{ij}^1 = \inf\{t > 0 : \ \omega_t \in \Omega_{ij}\},$$

and the nth passage time[29] by

$$T_{ij}^n = \inf\{t > T_{ij}^{n-1} : \ \omega_t \in \Omega_{ij}\}.$$

Note that by the independent increments property of Markov chains the expected first passage time $E[T_{ij}^1 |\ \omega]$ from a state ω, is also the average delay until the state next enters Ω_{ij}.

Clearly, information about a deviation by type i can only flow if along paths that avoid states in Ω_{ii}. The first passage into these states is given by T_{ii}^1. Consequently, optimal policies can, at best, be sustained on the *conditional passage times*, denoted by $\{Y_{ij}^n\}$, where Y_{ij}^n is the conditional passage time representing the nth passage into Ω_{ij} before the first passage into Ω_{ii}. Formally, set $Y_{ij}^0 = 0$ and for each $n \geq 1$,

$$Y_{ij}^n = \inf\{T_{ii}^1 > t > T_{ij}^{n-1} : \ \omega_t \in \Omega_{ij}\}. \tag{8}$$

Observe that, by definition the expected number of "good states" in which optimal policy choices may be feasible is

$$E[n : Y_{ij}^n < \infty \Big|\ \omega] = E[n : \ T_{ij}^n < T_{ii}^1 \ \Big|\ \omega].$$

[28] A standard source is Norris (1997).

[29] The standard convention is $\inf \ \emptyset = \infty$.

Auditor neutrality therefore requires that this number must be large in order to construct credible deterrents.

A second constraint arises because effective deterrents against policy deviations require the cooperation of future regimes that have the same bias as the deviator. Normally, equilibria in dynamic environment "build in" the one shot incentives into the equilibrium so that the problem of "punishing one's self" does not arise. Here, however, the problem does arise dues to auditor neutrality.

We say a credible communication equilibrium, (μ, ρ, σ), *simple* if, for all states in Ω_{ij}, for any type of policy deviation by regime i, the same "punishment" continuation path is prescribed, and each such path is comprised of finitely many policies. Simple equilibria were introduced formally by Abreu (1988) and are sometimes referred to by their paths as *simple penal codes*. These equilibria do not discriminate between the type of deviation or the specific state. With full information, they do not need to. With full information, a path which is a sufficient deterrent against the maximal deviation in the worst possible state will also suffice against any other deviation in any other state. However, when credible communication constraints are factored in, simple equilibria cannot sustain the stationary paths on the good states.

Proposition 4 *Consider a path α^{**} for this environment that yields a stationary optimal expenditure policy a^{**} in all states $\omega \in \Omega_{HL} \cup \Omega_{LH}$. Suppose that for both types i,*

$$E\left[\delta^{Y^1_{ji}} \middle| \omega\right] u_i(a^{**}) \;<\; v_i(\underline{a}_i) - v_i(a^{**}) \tag{9}$$

Then no simple, credible communication equilibrium can sustain α^{**}.

Proposition 4 establishes a limited impossibility result. Independent auditing is not effective unless the dynamic bias as measured by (9) is large enough and the equilibrium is, in some sense, excessively complex. The auditor's neutrality imposes severe constraints even in the "good periods" in which auditor and regime bias are different. These constraints bind against efficiency in equilibria that use relatively small numbers of internal states. Whether these constraints would bind for any type of equilibria is an open question.

The underlying intuition for the result is roughly the following. Suppose that the state is in Ω_{LH} and the low type of regime deviates in its policy choice. Suppose further that the low type then fails to report the deviation. Because the type H auditor can always corroborate this "lie" the auditor must receive the same continuation as it would if no deviation had occurred. Hence, the path induced by the auditor's credible reporting must give the auditor its equilibrium continuation value. Given the bound on the continuation paths, the same

path must then be used in two distinct states. But with single peaked policy preferences, this is possible if at most two policies are used along the path. One of these policies must be used to punish the deviant regime. However, this requires that future regimes of the same type comply with this punishment. Such compliance by types with the same bias is not possible. Hence, optimal paths are not sustained.

4 Discussion and Relation to the Literature

This paper examines the mechanics of information provision necessary to overcome a dynamic policy bias. The main findings portray difficulties in establishing credible disclosure over time. The negative results are intended to be suggestive rather than definitive. Several factors could help. For one, the introduction payoff-relevant states into the model may allow current governments to directly verify past behavior. For example, durables goods expenditures by past regimes could be inferred from the current capital stock. Another cross checking source therefore becomes available. The reporting incentives are less of a concern if the state of the system partially signals past information.

One other concern is that is that the results are, in a certain sense, "knife-edged." Do reporting incentives break down fully only when auditor type *exactly* coincides with the government's current bias? In fact, for a fixed discount factor, when there are a continuum of biases, this result holds for approximate rather than exactly coincident bias as well. When the biases are close, then punishments that satisfy the indifference condition for the auditor cannot be constructed unless the discount factor is sufficiently close to unity. Hence, for a fixed discount factor, if the bias difference between a "liberal" ("conservative") regime and an auditor is sufficiently close, then the conclusion of Proposition 3 can be shown. Namely, only one shot policies are sustainable in states where "liberal" ("conservative") regimes and auditors are matched.

A few related literatures deserve comment. The first concerns the role of reporting incentives in government. For example, Grossman and Helpman (2001) and Krishna and Morgan (1999) examine the credibility of biased experts or lobbyists in providing information to policy makers. They show that credible communication requires multiple experts who must have diametrically opposed incentives. In the present paper, the "expert" is the previous regime. The key difference is that in our case, the information comes from the past history of play. Hence, unlike standard models of cheap talk (originating with a model by Crawford and Sobel (1983)), the expert's bias in the present model is not correlated with his information. Hence, no direct inferences can be drawn from the messages.

A second related literature examines sources of dynamic policy bias. One source comes from changes in the government's (or current decisive voter's) type over time. This is explored in Persson and Svensson (1989), Alesina and Tabellini (1990), Krusell and Rios-Rull (1996), Krusell, Quadrini and Rios-Rull (1997), and Martimort (1997). An alternative source of bias comes from dynamically inconsistencies of policy makers' preferences (Krusell and Smith (2001)). The present paper includes both sources of policy bias. When the source of bias is limited to the dynamic inconsistency, external auditing is not sufficient to sustain dynamically efficient policies. When the source of bias includes changes in type of decision maker, then external auditing may be effective under certain political processes or certain demographics.

A third literature examines the other types of political accountability such as the role of elections as a way to control behavior of rulers. This is often referred to as "vertical accountability" which is that "the electors, the governed, assert control over the governors." Models of vertical accountability include, for example, Barro (1973), Ferejohn (1986), Austin-Smith and Banks (1989), Persson, et al. (1997), and Maskin and Tirole (2001). Vertical accountability is distinguished from "horizontal accountability" studied in the present paper where the latter is taken to mean that "those who govern... are accountable to other agencies (the watchdogs)." Significantly, vertical accountability is not an effective substitute for external auditing in the model. The reason is that the one instrument of control held by the voters — the threat of electoral loss — actually reinforces rather than mitigates the present-bias.

For other reasons as well, vertical accountability is thought to be an inadequate device to discipline politicians.

> "If the governors cannot achieve re-election through support of a satisfied populace, they achieve it through a combination of secrecy... and the building of systems of patronage. The governors may also indulge in short-term populist acts which may be to the longer term detriment of the public. Not only will politicians tend to stretch the limits of power and authority so as to govern with as little opposition as possible, in some cases they will multiply their interventions simply to prove their own importance." [30]

Yet, given the potential limitations with auditing illustrated in this paper, it is likely that no single isolated form of accountability guarantees efficient policy choices.

[30] TI Source Book, 2000, p. 24.

5 Appendix: Proofs of the Results

Proof of Proposition 2 Let (μ, ρ, σ) denote a credible communication equilibria that sustains path α with $a_t \neq \underline{a}_t$ for some t. In the credible communication equilibrium, the date t regime and auditor sends messages m_t and r_t, respectively, if the regime takes the prescribed policy a_t. If , however, the regime deviates in policy choice by taking $\underline{a}_t$, then alternative messages, say, $\underline{m}_t$ and $\underline{r}_t$ are to be sent. Since the one shot policy $\underline{a}_t$ is preferred in period t, the current regime is deterred from choosing it only if

$$\mathcal{U}(\mu, \rho, \sigma |\ m_t, r_t\ ) > \mathcal{U}(\mu, \rho, \sigma |\ \underline{m}_t, \underline{r}_t\ ) \tag{10}$$

That is, the continuation starting in period $t+1$ after credible reports must punish the regime for a deviation.

Now suppose instead, that after "deviant" policy choice $\underline{a}_t$ the current regime sends the "no deviation" message m_t. Observe that the continuation payoffs to the auditor of the path starting at date $t+1$ must satisfy:

$$\mathcal{U}(\mu, \rho, \sigma |\ m_t, r_t\ ) = \mathcal{U}(\mu, \rho, \sigma |\ m_t, \underline{r}_t\ ) \tag{11}$$

For if the left side of this expression exceeded the right side, then the auditor would send r_t even though the regime had, in fact, deviated in policy choice. In such a case, the regime would surely choose its one shot policy $\underline{a}_t$. On the other hand, if the right side exceeded the left, then the auditor would signal a policy deviation with $\underline{r}_t$ even if the regime had not deviated and was truthful in its message.

Given expressions, (10) and (11), it is clear that the regime should deviate take $\underline{a}_t$ then deviate to m_t in the communication stage. Since (11) describes continuations for both the regime and the auditor, the regime is unaffected by the response of the auditor. By establishing a successful deviation, the premise that (μ, ρ, σ) is a credible communication equilibria is contradicted. ♢

Proof of Proposition 4

Without loss of generality, suppose that $\underline{a}_i < a_i^u, \quad i = H, L$ so that each regime's preference is downward (rather than upward) biased regardless of type-bias. An analogous argument exists when biases are upward. Now suppose by contradiction that (μ, ρ, σ) is a simple, credible communication equilibrium that sustains a stationary optimal policy a^{**} in states $\omega \in \Omega_{HL} \cup \Omega_{LH}$.

By a slight abuse of notation, we express payoffs $V_i(\mu, \rho, \sigma |\ m, r; \omega)$ and $U_i(\mu, \rho, \sigma |\ m, r; \omega)$ in terms of their induced equilibrium paths, $V_i(\alpha; \omega)$ and $U_i(\alpha; \omega)$, respectively.

By the previous Proposition, one shot policies $\underline{a}_i$, $i = H, L$, are always taken in states in Ω_{HH} and Ω_{LL}. Therefore, without loss of generality all references to "paths" below are restricted to policy choices in the states in $\Omega_{HL} \cup \Omega_{LH}$, i.e., those with conflicting ideological bias. Observe, then, that any expected continuation value may be written as a discounted sum of utilities of policies in each of the conditional passage times in Ω_{HL} and Ω_{LH}:

$$E[U_i(\alpha;\omega')\Big|\,\omega] \;=\; E[\sum_{i=H,L}\sum_{j\neq i}(1-\delta)\sum_{n=0}^{\infty}\delta^{Y_{ij}^n}u_H(a_{Y_{ij}^n})\Big|\omega] \tag{12}$$

Here $E[\cdot\Big|\,\omega]$ is the expectation over next period's state ω' conditioned this period's state ω. (Note that the conditional passage times, Y_{ij}^n, rather than unconditional passage times, are used in (12) since information about current policies does not extend beyond the first passage time in Ω_{ii}.)

Now observe that for any two states ω and $\hat{\omega}$ by the stationarity of the equilibrium path (restricted to states in Ω_{HL} and Ω_{LH}),

$$E[U_i(\alpha^{**};\omega')\Big|\,\omega] = E[U_i(\alpha^{**};\omega')\Big|\,\hat{\omega}] = u_i(a^{**})$$

Now fix any state $\omega \in \Omega_{LH}$ so that the low type of regime is matched with a high type of auditor. In order to constitute a credible communication equilibrium, (μ, ρ, σ) must satisfy (a) the type L regime takes the prescribed policy in that period, and (b) whatever the policy choice, the type L regime and the type H auditor truthfully report the policy outcome of the current period.

Working backwards, consider a policy deviation by L to its one shot policy $\underline{a}_L$. Suppose that the type L regime then chose to lie about its choice by reporting that it chose the equilibrium policy a^{**} instead of reporting $\underline{a}_L$. Consider reporting incentives of type H auditor. If the auditor corroborates the lie, then its continuation is $E[U_H(\alpha^{**};\omega')\Big|\,\omega]$. If the auditor reports truthfully, then the simple equilibrium prescribes some punishment path, call it α_H, giving the auditor $E[U_H(\alpha_H;\omega')\Big|\,\omega]$. Clearly, the type H auditor is indifferent between any of the reports it might send. Otherwise, it would send only the message with the highest continuation regardless of the truth. Consequently,

$$E[U_H(\alpha_H;\omega')\Big|\,\omega] \;=\; E[U_H(\alpha^{**};\omega')\Big|\,\omega] \;=\; u_H(a^{**}) \tag{13}$$

But the simple equilibrium prescribes α_H for any deviation and for any state in Ω_{LH}. Consequently, for any two states $\omega, \hat{\omega} \in \Omega_{LH}$, by (13),

$$E[U_H(\alpha_H;\omega')\Big|\,\omega] \;=\; E[U_H(\alpha_H;\omega')\Big|\,\hat{\omega}] \;=\; u_H(a^{**}). \tag{14}$$

Recall that simple equilibria also prescribe a finite number of policies used in each path. Let $\bar{u}$ denote the finite (column) vector of stage payoffs used in path α_H. Now let $\Phi(\omega)$ denote the finite (row) probability vector from the distribution defined in (12). Specifically, if u^k is a component of vector then the average, discounted probability of u^k starting from state ω is:

$$\Phi_k(\omega) = (1-\delta)E\left[\sum_{n=0}^{\infty} \delta^{Z_k^n} \;\Big|\; \omega\right], \tag{15}$$

where Z_k^n is the nth passage time reaching u^k.[31] Hence, (14) can be expressed as

$$\Phi(\omega) \cdot \bar{u}_H = \Phi(\hat{\omega}) \cdot \bar{u}_H = u_H(a^{**}) \tag{16}$$

By the full rank of the Markov transition matrix , it follows that, to satisfy (16), each element of the vector $\bar{u}$ must be identically equal to $u_H(a^{**})$. This means $u_H(a_{Y_{ij}^n}) = u_H(a^{**})$ for all conditional passage times Y_{ij}^n. In other words, the continuation utility to high types in every passage date must be the same and must coincide the equilibrium continuation utility. But since u_H is single peaked, there are at most two policies consistent with the same utility value. One of them is obviously the equilibrium policy a^{**}. Let $\tilde{a}$ denote the other policy.

To sum up, the reporting incentives for the high type of auditor implies either $a_{T_{ij}^n} = a^{**}$ or $a_{T_{ij}^n} = \tilde{a}$ where $u_H(a^{**}) = u_H(\tilde{a})$. Observe that since a^{**} is an optimal policy, the policy $\tilde{a}$ must lie on the far side of type H's peak relative to type L. This means that $\tilde{a} \neq \underline{a}_L$ (the alternative policy is not L's one shot policy), and, in fact, regime L is worse off under the alternative policy $\tilde{a}$:

$$u_L(a^{**}) > u_L(\tilde{a}) \tag{17}$$

As for the policy incentives of type L regime, because type L regimes cannot take their one shot policies along the punishment paths, each must cooperate in their own punishment by choosing either a^{**} or $\tilde{a}$. In order to induce type Ls to cooperate in this way, they must be induced by a terminal reward. Hence, the path α_H can be expressed as a path $\tilde{\alpha}(q)$ with q periods of "punishment" remaining before returning to a terminal path $\tilde{\alpha}(0)$. The value $V_L(\alpha_H;\omega)$ in a simple equilibrium is, therefore,

$$V_L(\alpha_H;\omega) = V_L(\tilde{\alpha}(q);\omega) = (1-\delta)v_L(a) + \delta E[U_L(\tilde{\alpha}(q-1);\omega')\Big|\, \omega] \tag{18}$$

where either $a = a^{**}$ or $a = \tilde{a}$ and $E[U_L(\tilde{\alpha}(q-1);\omega')\Big|\, \omega] > E[U_L(\tilde{\alpha}(q);\omega')\Big|\, \omega]$ in order to induce the type L regime to cooperate in the current period.

In order to show that the policy incentive constraint holds for the type L regime when the prior message-action history is expected to induce maximal punishment in the current

[31] We adopt the convention that $Z_k^0 = 0$ if u^k occurs in state ω and $Z_k^0 = \infty$ otherwise.

period, we assert from (18) that a necessary condition is

$$\begin{aligned}(1-\delta)[v_L(\underline{a}_L) - v_L(a^{**})] &< \delta E\left[U_L(\tilde{\alpha}(q-1);\omega') - U_L(\tilde{\alpha}(q);\omega') \,\middle|\, \omega\right] \\ &= (1-\delta)E\left[\delta^{Y^n_{HL}} \middle|\, \omega\right][u_L(a^{**}) - u_L(\tilde{a})\,]\end{aligned} \tag{19}$$

To understand (19), the left hand side is the minimal one shot gain to a deviation to the one shot policy. If the L regime cooperates in the current period gets at most $u_L(a^{**})$. The right hand side is the loss in expected continuation value from the current deviation. By choosing a^{**} rather than $\tilde{a}$, the punishments must come in states in Ω_{HL} when the high type of regimes hold power. The current choice of a^{**} allows the regime is able to decrement the punishment by one period at some future passage time. Since only two policies, a^{**} and $\tilde{a}$ are used along the path, the loss from deviating against a^{**} is $u_L(a^{**}) - u_L(\tilde{a})$ in some future passage time provided that states in Ω_{LL} are not reached first.

Clearly, (19) contradicts (9). We conclude that α^{**} is not sustainable by the simple, credible communication equilibrium (μ, ρ, σ). ♢♢

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