Are Non-competitive Elections Good for Citizens?*

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Abstract

Many regimes, particularly autocracies, hold elections where the ruling regime's victory is a foregone conclusion. This paper provides a formal analysis of how these *non-competitive* elections affect citizen welfare compared to a non-electoral baseline. To do so, I first develop a game-theoretic framework that captures many extant theories of why regimes hold non-competitive elections, which are modeled solely as a public signal of the regime's strength. Incumbents hold non-competitive elections to *signal strength* or *gather information* which allows the regime to manage political interactions more effectively. However, even though non-competitive elections are a useful tool for (autocratic) regimes, they are also valuable to citizens. This is because citizens can utilize the information generated by the election as well and may receive more transfers, less repression, or more responsive policy than they would with no elections.

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The global spread of elections over the past two centuries – and, in particular, the past 50 years – is almost certainly the most important change in how people are governed over this time span, if not the most significant and rapid change to political institutions in history (Przeworski et. al., 2013). Recent increases in the proportion of countries holding elections have been particularly pronounced in authoritarian, or at least not entirely democratic, regimes (e.g., Levitsky and Way 2002; Gandhi and Lust-Okar 2009; Magaloni and Kricheli 2009). Still, defined broadly enough, regimes that hold elections with substantial restrictions on participation or competition are not a new phenomenon nor an aberration, but the modal category over the past two centuries (Miller, N.d.; Przeworski et. al., 2013).

Many have lamented the existence (and, arguably, the rise) of regimes that combine authoritarian rule with manipulated elections: in the first sentence of the introduction to an edited volume on the topic, Schedler (2006) refers to electoral authoritarianism as a "specter haunting the developing world." If elections are rigged to the point that the incumbent's victory is always a forgone conclusion, many of the positive effects attributed to democracy – such as placing in power "good" leaders and inducing those leaders to represent citizens effectively – may be weaker or absent. Still, this does not address the potentially more relevant comparison of whether citizens are better off in a regime that such *non-competitive* elections than they would be in an authoritarian regime with no elections at all. This question is not just of theoretical importance given the often heated debates in the policy community about whether developing countries should be encouraged to hold elections (e.g., McFaul, 2004; Gershman and Allen, 2006; Carothers, 2011).

In order to answer how non-competitive elections affect citizens, I first provide a formal framework to capture and clarify several recent arguments about why regimes choose to hold these elections (e.g., Magaloni, 2006; Cox, 2009; Rozenas, 2011; Blaydes, 2011; Egorov and Sonin, 2011; Little, 2012). More specifically, I develop a series of related models that

ask why a powerful actor with the ability to decide whether or not an election is held – referred to here as the *incumbent* – would choose to do so. The unifying assumption of the framework is that elections merely reveal a public signal of the incumbent *strength* before a political interaction with a representative citizen. Elections can serve two purposes for the regime. First, those who know they are popular (and those who want to mimic the popular types) can hold elections to *signal strength* (Magaloni, 2006; Simpser, 2013; Egorov and Sonin, 2011). Second, elections *gather information* which the incumbent can use to rule more effectively (Magaloni, 2006; Lust-Okar, 2006; Cox, 2009; Rozenas, 2011).

The welfare implications for the citizen are determined by comparing his expected payoff with an election versus his payoff when no election is held. I highlight three main welfare effects of the regime holding an election. First, the citizen benefits from knowing the information revealed by the election. For example, a citizen considering joining anti-regime protests benefits from knowing when the regime is weak enough that the protests will be large, and when the regime is strong enough that they are better off staying home. (Several other reasons why being better informed can make citizens substantially better off are detailed below.) Second, as is typical in signaling models, elections held as a costly signal are inefficient from the incumbent perspective, so elections held for this reason weaken autocratic regimes on average.[1] Third, the information gathered by the election may induce the incumbent to grant more or more efficient concessions (or, alternatively, repress less). While the models highlight some potential mechanisms by which non-competitive elections can harm citizens, the bulk of the theoretical evidence suggests the answer to the titular question is "yes" (or, at least, "better than previously thought").

[1]This fact is more directly a statement about how elections affect the *regime's* welfare, but I informally argue that this fact can indirectly benefit citizens as well.

1 Related Work and Overview

Scholarly attention to non-competitive elections and authoritarian institutions more generally has sharply risen in recent years (e.g., Magaloni, 2006; Gandhi and Lust-Okar, 2009; Blaydes, 2011; Levitsky and Way, 2012; Pepinsky, 2013). Previously dismissed as theater to placate domestic or international audiences, we now have numerous strategic theories of why elites with the power to decide whether an election is held would choose to do so, generally with an informational approach.

While the modeling presented here is consistent with much of this recent work on non-competitive elections, I reach a different conclusion than much of the extant literature on whether such elections are good for citizens. Past work has often framed these elections as a "instruments of authoritarian rule rather than instruments of democracy" (Schedler, 2006, pg. 3), and pointed out their failings relative to more competitive, democratic elections (e.g., Levitsky and Way, 2002; Magaloni, 2006; Lust-Okar, 2006). On the other hand, more recent empirical work has shown that within authoritarian regimes, institutions like parties, elections and legislatures are positively correlated with good outcomes like economic growth, investment, and even life expectancy (e.g., Wang and Yao, 2007; Wright, 2008; Gehlbach and Keefer, 2011; Miller, 2014). However, without a strong theory for why these institutions are chosen by regimes, determining the direction of causality is problematic (Pepinsky, 2013). Here I show theoretically that citizens are generally better off under a regime holding non-competitive elections than a regime that does not hold elections at all, even in a model where the decision to hold an election is endogenous.

To clarify scope, the goal here is not to explain competitive elections where incumbent leaders give up power upon losing or democratization more generally.[2] Instead I focus

[2]That is, I do not directly address many aspects of democracy or democratization to focus on when elections are held and electoral rules followed. Democratizing has many effects on policies that impact the incumbent decision to open up the political system such as tax rates, redistribution, and public goods provision (among many others, Acemoglu and Robinson 2000, Bueno de Mesquita et al. 2003). However, it is

on *non-competitive* elections, where the possibility of an incumbent loss is negligible (see Hyde and Marinov 2012 and Levitsky and Way 2012 for two recent similar but more detailed definitions of competitiveness). Further, when discussing welfare implications for citizens, the comparison is between non-competitive elections and no elections, not non-competitive and competitive elections.

I also do not explicitly model other decisions surrounding non-democratic elections which recent formal work analyzes in a related informational framework, such as fraud and other manipulation (e.g., Fearon, 2011; Little, N.d.; Rozenas, 2011; Egorov and Sonin, 2011; Simpser, 2013; Gehlbach and Simpser, 2014), election monitoring (Fearon, 2011; Little, 2012, N.d.; Svolik and Chernykh, 2012), and compliance with electoral rules (Little, Tucker and LaGatta, 2012; Svolik and Chernykh, 2012).

The remainder of the paper proceeds as follows. Section 2 presents a baseline model of a non-competitive election as a public signal, which highlights why such an election can be good for citizens but not incentive-compatible for the incumbent. Sections 3-4 extend this model to show why incumbent regimes may hold elections to signal strength and gather information, but that elections held for these reasons are still likely good for citizens. Section 5 discusses the welfare effects of elections held for other reasons, and section 6 concludes.

2 A Baseline Model of Elections as Signals

The models developed here all center around an interaction between an incumbent regime and a representative citizen, and share the following structure. After the incumbent chooses whether or not to hold an election and the potential result is revealed, she plays an *underlying game* with the citizen.[3] (I refer to the incumbent with female pro-

not clear why these policy reforms can only be implemented in a political system centered around elections.

[3]The model is easiest to interpret when the incumbent is powerful enough to decide whether an election is held. In cases where the bureaucracy or courts could plausibly prevent the incumbent from suspending

nouns and the citizen with male pronouns.) The general dynamics modeled underlying game represents whatever political interactions are most relevant to the incumbent leadership, such as bargaining over rents with elites, distributing patronage, dealing with citizen protests, or policy-making in general.

Other than imposing a cost upon the incumbent, the electoral decision has no impact on the order of moves or the payoffs in this underlying game. Victory in elections "merely reveals ...the will of a significant unit, a will which already existed" (Simmel, 1950, pg. 246). The public information generated by the election will affect beliefs about the incumbent strength, and hence how the incumbent and citizen play the underlying game.

Formally, the models all have two actors, an incumbent I and a citizen C. First, Nature selects the incumbent strength $\omega \in [0, 1]$ from a common prior $f_\omega(\omega)$. This strength can reflect factors such as genuine popularity, the ability to mobilize voters (legally or illegally), and repressive capacity.

Next, the incumbent can pay cost $k \geq 0$ to hold an election. Denote this decision $h \in \{0, 1\}$, where $h = 0$ means not holding an election and $h = 1$ means holding an election. At a minimum, the k term corresponds to the physical cost of holding an election, which in contemporary elections ranges between \$1 to \$10 per registered voter (Lopez-Pintor and Fischer, 2005). In addition to the physical costs, the k term can capture any effects variance in the effective cost of elections not directly modeled in this paper, such as a reduced cost if leaders intrinsically valuing ruling democratically or receive more foreign aid when holding elections.

If an election is held, the both actors observe the result e, where $0 \leq e \leq 1$. Let $f_e(e)$ be the marginal density and $F_e(e)$ the cumulative density of the election result. This result is most easily interpreted as the incumbent vote share. Still, as the focus here is on the

elections, the incumbent would need to be interpreted more broadly as a coalition powerful enough to make this decision. See Dragu and Polborn (2013) for a model where compliance with incumbent orders that violate constitutions may (or may not) be violated.

informational content of elections, facts like turnout, the number of spoiled ballots, or the reaction of domestic or international election monitors could be equally or more important. By assumption, there is no critical threshold that determines whether the incumbent wins or loses; i.e., the election is purely informational. This is how the model formalizes the non-competitiveness of the election: either the incumbent is virtually certain to surpass a formal victory threshold – say, $e = .5$ is required for victory and $F_e(.5)$ is arbitrarily small – or the incumbent would refuse to accept defeat (for example, as in Burma in 1990 or Algeria in 1991).

The central assumption in the models is that the election result provides public information about the incumbent strength (ω). For the modeling done in the main text, the fact that the election is informative is captured by assuming that the expected belief about the regime's strength conditional the result e, written $\mathbb{E}_\omega[\omega|e]$, is strictly increasing in e. I also define the *informativeness* of the election as the variance of this conditional expectation:

Definition The *informativeness* of the election is $\mathbb{V}_e[\mathbb{E}_\omega[\omega|e]]$.

When the belief about the regime strength does not change much for different election results, $\mathbb{V}_e[\mathbb{E}_\omega[\omega|e]]$ will be low, meaning the election result is not informative. When the the posterior belief can be highly affected by the election result, $\mathbb{V}_e[\mathbb{E}_\omega[\omega|e]]$ is high, meaning the election is more informative.

As it underpins all of the arguments made in the paper – both about why elections are held and how they affect citizens – this assumption merits particular attention. Some scholars have argued that nondemocratic electoral institutions "exist but yield no meaningful contestation for power" and "simply serve as to legitimate an existing autocratic leadership" (Levitsky and Way, 2002). Journalistic accounts are often even more blunt, for example, a description of a recent election in Bahrain as reflecting "a new and troubling trend in the Arab world: the free but unfair – and rather meaningless – election" (Hamid,

2010).

However, few if any elections are truly meaningless or uninformative. Leading up to Vladimir Putin's victory in the Russian presidential election in 2012, the dissident oligarch Mikhail Khodorkovsky wrote that "whereas we might be reasonably sure of the result, we should not assume that there is little at stake" (Khodorkovsky, 2012). Further, the candidates themselves behave as if even very non-competitive elections are meaningful, spending "large amounts of time and money on everything from lavish banquets and gifts to campaign materials and votes" (Lust-Okar, 2006, pg. 457). Even if a regime always gets above 90% of the vote, citizens may make a different inference the regime's genuine popularity or ability to manufacture a favorable result if the final tally is 96% rather than 92%.

For this approach to prove useful, the election must be followed by some political interaction that is affected by beliefs about the incumbent strength (the "underlying game"). Before introducing more complexity, consider a game with one move: the citizen choosing a level of *support* s. The support level can take on any value between zero and one, where $s = 0$ means giving as little support (or taking as much anti-regime action) as possible and $s = 1$ means giving as much support as possible. The citizen wants to provide high levels of support to strong incumbents – whether out of fear or a genuine belief that strong regimes should be supported – and the incumbent wants the citizen to provide high levels of support.

While some of the technical results in the appendix use a much more general class of citizen utility functions, for the main text I use the following functional form. Suppose that (1) the incumbent will either survive in office or not for reasons exogenous to the citizen support decision, and (2) the citizen wants to provide support to the incumbent if she survives but not if she falls. More specifically, suppose the incumbent survives with

probability ω, and the citizen utility is:

$$u_C = \begin{cases} -(1-s)^2 & \text{if incumbent survives} \\ -s^2 & \text{otherwise} \end{cases}$$

That is, if the incumbent survives, the citizen is hurt by withholding support ($s < 1$), and if the incumbent falls the citizen is hurt by giving support ($s > 0$).[4] Given the incumbent survives with probability ω, this simplifies to:

$$u_C(s;\omega) = -\omega(1-s)^2 - (1-\omega)s^2 \tag{1}$$

This payoff structure could reflect many political interactions with different identities for the citizen and interpretations of the incumbent strength. If the citizen is a high-ranking member of the military, being willing to support a coup could correspond to giving low support, and actively initiating a coup giving even lower support. For a more ordinary citizen, giving high support could correspond to paying taxes (with the implication that stronger regimes can enforce tax law more effectively), showing up at pro-regime rallies, or refraining from joining anti-regime protests.

The incumbent gets a partial payoff $b(s,\omega)$ ("benefit") that is increasing in the level of support and her strength. In this section I also assume incumbent utility is additively separable in these components, and hence can be written $b(s,\omega) = b_s(s) + b_\omega(\omega)$, where b_s and b_ω are increasing. So, the incumbent payoff as a function of her decision to hold an election (h), support level s, and strength ω is:

$$u_I(h;s,\omega) = b_s(s) + b_\omega(\omega) - hk$$

[4]Squaring the distance from 0 or 1 implies an increasing marginal cost to "picking the wrong side," which tends to make the citizen choose interior support levels.

One way to interpret the incumbent utility in light of the citizen payoff is that she gets an immediate payoff from the citizen support, and in addition a payoff that is increasing in the probability of survival.[5]

The solution concept for this and subsequent models is Perfect Bayesian Equilibrium (PBE). The first order condition for the optimal level of support is given by:

$$\begin{aligned} &- \mathbb{E}_\omega[\omega|\cdot]2(1-s^*) - (1-\mathbb{E}_\omega[\omega|\cdot])2s^* = 0 \\ &s^* = \mathbb{E}_\omega[\omega|\cdot], \end{aligned}$$

where $\mathbb{E}_\omega[\omega|\cdot]$ is the expected belief about the incumbent strength, potentially as a function of the election result. The objective function is globally concave, so the unique optimal support level with no election is $s_0^* = \mathbb{E}_\omega[\omega]$ and with an election the unique optimal level of support is $s_1^*(e) = \mathbb{E}_\omega[\omega|e]$.

Given the citizen strategy, the incumbent expected payoff when not holding an election is:

$$\mathbb{E}_\omega[u_I(0; s_0^*, \omega)] = b_s\left(\mathbb{E}_\omega[\omega]\right) + \mathbb{E}_\omega[b_\omega(\omega)]$$

and the expected payoff for holding an election is:

$$\mathbb{E}_{\omega,e}[u_I(1; s_1^*(e), \omega)] = \int_{e=0}^{1} b_s(\mathbb{E}_\omega[\omega|e]) f_e(e) de + \mathbb{E}_\omega[b_\omega(\omega)] - k$$

So, the incumbent prefers to hold an election if $\mathbb{E}_{\omega,e}[u_I(1; s_1^*(e), \omega)] \geq \mathbb{E}_\omega[u_I(0; s_0^*, \omega)]$, or

$$k \leq \int_{e=0}^{1} b_s\left(\mathbb{E}_\omega[\omega|e]\right) f_e(e) de - b_s\left(\mathbb{E}_\omega[\omega]\right) \equiv \Delta_b \tag{2}$$

[5]The fact that the incumbent strength directly enters her utility function will not affect the equilibrium behavior until the information gathering model.

By the assumption that the election is informative, the incumbent will get more support and hence a higher payoff when the election result indicates she is stronger than in the prior (e such that $\mathbb{E}_\omega[\omega|e] > \mathbb{E}_\omega[\omega]$), and less support when the election lowers the belief about her strength. The Δ_b term, which compares the payoff from the support given without an election to average payoff from the support as a function of the election result, captures the "lottery" effect of elections. In the baseline model, the incumbent holds an election if this effect is positive and larger than the cost k.

Whether the lottery effects makes elections attractive or not depends on the shape of the b_s function:

Proposition 1. *If the citizen utility is given by equation 1 and b_s is concave, then the incumbent will not hold a costly election ($k > 0$)*

(Unless otherwise noted, all proofs are in the appendix.)

If the incumbent has more to lose from a worse-than-expected result than she has to gain from a better-than-expected result – i.e., $b_s(s)$ is concave – she will not want to hold elections as she prefers the relatively moderate amount of support received without an election to the risk of an election that may deliver a poor result.

Welfare Implications of Baseline Model

Next, I analyze the welfare implications of the regime holding an election from the citizen's perspective. Without an election, the expected payoff for the citizen is:

$$\begin{aligned}\mathbb{E}_\omega[u_C(s_0^*;\omega)] &= -\mathbb{E}_\omega[\omega(1-\mathbb{E}_\omega[\omega])^2 + (1-\omega)\mathbb{E}_\omega[\omega]^2] \\ &= -\mathbb{V}_\omega[\omega] - \mathbb{E}_\omega[\omega(1-\omega)]\end{aligned}$$

where $\mathbb{V}_\omega[\omega] = \mathbb{E}_\omega[(\omega - \mathbb{E}_\omega[\omega])^2]$ is the variance of the prior distribution on ω. By a similar calculation, the expected payoff upon observing election result e and choosing the opti-

mal support level is $-\mathbb{V}_\omega[\omega|e] - \mathbb{E}_\omega[\omega(1-\omega)]$, where $\mathbb{V}_\omega[\omega|e]$ is the conditional variance of the posterior belief about the regime strength after observing the election result. The difference between the citizen payoff with an election versus no election is:

$$\mathbb{E}_{e,\omega}[u_C(s_1^*(e);\omega)] - \mathbb{E}_\omega[u_C(s_0^*;\omega)] = \mathbb{V}_\omega[\omega] - \mathbb{E}_e[\mathbb{V}_\omega[\omega|e]] = \mathbb{V}_e[\mathbb{E}_\omega[\omega|e]], \tag{3}$$

where the last equality follows from the law of total variance. So:

Proposition 2. *In the baseline model, the citizens' welfare is strictly higher when the incumbent holds an election. The expected gain from an election is equal to the informativeness of the election ($\mathbb{V}_e[\mathbb{E}_\omega[\omega|e]] > 0$).*

A more strategic intuition behind this result – which is used in the proof that the citizen is better off with a more general utility function in the appendix – is that if the citizen were to choose to give level of support $s_0^* = \mathbb{E}_\omega[\omega]$ for all election results, he would get the same payoff as without an election. So, the information generated by elections can only lead to better decisions.

Given the high level of abstraction in the model, the question of why being better informed about the regime strength is good for citizens deserves emphasis. A first example is the one in the introduction: a citizen considering anti-regime action such as protesting is better off knowing when the regime is weak enough that such an action may succeed (or at least that enough others will take to the streets that doing so is safe) and when they should stay home (Little, 2012).[6] This could also translate to being able to criticize the regime in more minor ways without fear of retribution.

Other benefits to being better informed apply to certain types of citizens. Those running a business could learn about the degree to which they need to comply with state

[6]This does not mean the citizen is *always* better after an election, as sometimes the result will be misleading. Technically, there can be realizations of the election result where $-(\omega - \mathbb{E}[\omega|e])^2 < -(\omega - \mathbb{E}[\omega])^2$.

regulation or bribe agents of the regime. Members of the state apparatus can have a better sense of whether they need to and can get away with committing illegal acts on behalf of the regime (Dragu and Polborn, 2013). More generally, elites may engage in less inefficient conflict if there is more common knowledge about the balance of power (Svolik and Chernykh, 2012). Even if all of the effects described in this and the previous paragraphs are weak or non-existent, the following sections contain some additional ways citizens can benefit from elections outside of this informational channel.

However, these are all moot points if, as indicated by proposition 1, holding an election is not incentive compatible for the regime. The following two sections show that even when the incumbent does strategically choose to hold an election, this does not mean that the citizen is worse off. In fact, his welfare is still generally higher with an election than without an election.

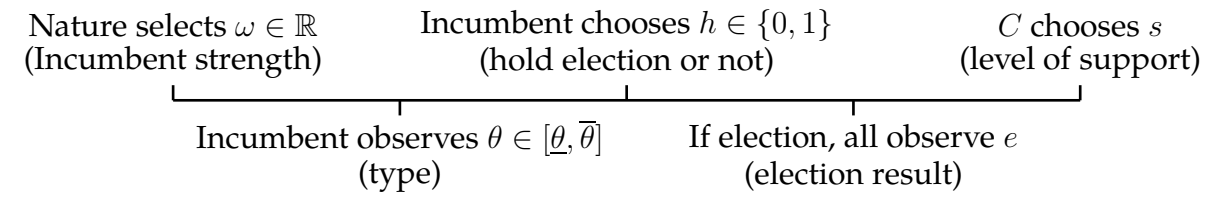
3 The Signaling Model

Several recent papers and books argue that elections can be used to demonstrate the strength of the incumbent regime (Magaloni, 2006; Geddes, 2006; Egorov and Sonin, 2011; Simpser, 2013).[7] The fact that non-competitive elections can signal strength is often used to imply that these elections are bad for citizens, as it can help an autocratic regime maintain firmer control and hence more difficult to constrain from choosing bad policies or remove. I show the opposite: the fact that elections can be used to signal strength *harms* regimes on average, and is good for citizen welfare.

I formalize this signaling argument by analyzing a model identical to the baseline other than the fact that the incumbent observes a signal of her strength (θ) before the decision

[7]Often these arguments focus on fraud. The model does not explicitly incorporate fraud, but if incumbents use fraud to demonstrate their strength they need to first hold an election, so the formulation below serves as a reasonable first step. See (Little, N.d.) for a model of fraud in a related setting.

to hold the election. The order of moves is:



The regime's private signal θ is drawn from the interval $[\underline{\theta}, \overline{\theta}]$, with density $f_\theta(\theta)$, such that the incumbent belief about her strength is increasing in the signal.[8] To avoid the clunkier formulation of "incumbents with (un)favorable private information," in this section I refer to incumbents observing high θ a "strong" types and those observing low θ "weak."[9] It bears emphasis that incumbents observing high θ are not necessarily strong in an *absolute* sense, but stronger than is commonly known. For example, a long-ruling autocrat who privately learns that a key supporter would be willing to defect may be strong in the absolute sense (high $\mathbb{E}_\omega[\omega|\theta]$), but the private information means she is weaker than expected (low θ).

Like the baseline model, the underlying game following the potential election simply involves the citizen choosing a support level s. Let the citizen utility take the form derived above: $u_C(s;\omega) = -\omega(1-s)^2 - (1-\omega)s^2$. To abstract from the lottery effects described above, in this section I use a simple linear utility function for the incumbent: $u_I(h;s,\omega) = s + \omega - hk$.

The incumbent strategy is whether or not to hold an election as a function of her type θ. The citizen strategy is again the level of support to choose (potentially as a function of the election result), but this must also be optimal given the beliefs about the incumbent type. To be a part of a PBE, these beliefs must be consistent with the incumbent strategy on the equilibrium path.

[8] See the appendix for the formalization of the joint density of θ, ω, and e.

[9] See Little (2012) for a comparison between the implications of strength in an absolute and private information sense for when elections tend to be held in the models of that paper and Egorov and Sonin (2011).

The model can have a pooling equilibrium where no types hold an election, a semi-separating equilibrium where some types hold an election, or a pooling equilibrium where all hold an election. As elaborated in the appendix, under general restrictions to the joint distribution of ω, e, and θ and the off-the-path beliefs, the relative payoff for holding an election is always increasing in the type θ. So, incentive compatibility implies that all semi-separating equilibria are of the natural form where the strong types hold an election and the weak types do not, i.e., the incumbent holds an election if and only if $\theta > \hat{\theta}$.

In a semi-separating equilibrium, the citizen's optimal support level without an election is $\mathbb{E}_\omega[\omega|\theta < \hat{\theta}]$. That is, by not holding an election the incumbent reveals that her private signal was less than $\hat{\theta}$, implying she is one of the relatively weak types. The optimal support level with an election with result e is $\mathbb{E}_\omega[\omega|e, \theta > \hat{\theta}]$. This action is conditioned on both e and $\theta > \hat{\theta}$, which means that the citizen learn about the incumbent strength by the election result as well as the fact that the incumbent chose to hold an election in the first place.

The expected payoff to type θ' for not holding an election in a semi-separating equilibrium is $\mathbb{E}_\omega[\omega|\theta < \hat{\theta}] + \mathbb{E}_\omega[\omega|\theta']$. This type's expected payoff when holding an election is $\int_{e=0}^{1} \mathbb{E}_\omega[\omega|e, \theta > \hat{\theta}] f_e(e|\theta')de + \mathbb{E}_\omega[\omega|\theta'] - k$. Since the relative payoff to holding an election is increasing in the incumbent type, the equilibrium condition is that the marginal type (i.e., $\theta' = \hat{\theta}$) is indifferent between holding an election and not, which simplifies to:

$$k = \int_{e=0}^{1} \mathbb{E}_\omega[\omega|e, \theta > \hat{\theta}] f_e(e|\hat{\theta})de - \mathbb{E}_\omega[\omega|\theta < \hat{\theta}] \equiv \Delta(\hat{\theta}) \tag{4}$$

$\Delta(\hat{\theta})$ represents the increase in the expected level of support from holding an election for the marginal type. So, there is a semi-separating equilibrium where elections sometimes happen if and only if the election cost k lies in the range of $\Delta(\hat{\theta})$.

As formalized in the appendix, under a fully informative election the relative payoff to

the marginal type $\Delta(\hat{\theta})$ is continuous and strictly increasing in $\hat{\theta}$. Intuitively, as more types hold an election, the decision to do so is less informative, and hence the relative benefit to holding an election decreases. In fact, as nearly no types hold an election, $\Delta(\hat{\theta}) \to 0$: the weakest type has her weakness fully revealed whether she holds an election (which is perfectly informative) as if she does not hold, revealing herself as the weakest type. On the other hand, when only the strongest type holds an election, the citizen knows that the regime is exactly the strongest type, and hence the difference in expected support for this type when holding an election is $\mathbb{E}_\omega[\omega|\overline{\theta}] - \mathbb{E}_\omega[\omega]$ (this part holds even when the election is noisy). So, there is a unique $\hat{\theta}$ solving equation 4 and hence a unique semi-separating equilibrium if $0 < k < \mathbb{E}_\omega[\omega|\overline{\theta}] - \mathbb{E}_\omega[\omega]$.

As usual, checking for pooling equilibria requires specifying off-the-path beliefs. Using a refinement analogous to the D1 criterion (Cho and Kreps, 1987) (formally defined in the appendix), upon observing an unexpected election the citizen must infer that the incumbent is the strongest type, and upon observing no election when all types are expected to pool on holding the citizen infers the incumbent is the weakest type. With this refinement, there is a pooling equilibrium where no types hold an election if and only if the cost is above the upper bound on k for the existence of a semi-separating equilibrium, and there is a pooling equilibrium where all hold an election if and only if the election cost is below the lower bound for the existing of a semi-separating equilibrium. So:

Proposition 3. *If the election is fully informative, then there is a unique PBE meeting the D1-like refinement of the citizen off-the-path beliefs:*
i. if elections are not costly $(k \leq 0)$*, all types hold an election,*
ii. if the cost of holding an election is intermediate $(0 < k < \mathbb{E}_\omega[\omega|\overline{\theta}] - \mathbb{E}_\omega[\omega])$*, the equilibrium is semi-separating, where stronger types hold an election, and*
iii. if elections are sufficiently expensive $(k \geq \mathbb{E}_\omega[\omega|\overline{\theta}] - \mathbb{E}_\omega[\omega])$ *no types hold an election.*

If the election is not perfectly informative then the technical analysis is less straight-

forward, but this change generates only one important substantive difference.[10] When the election is perfectly informative and nearly all types hold an election, the weakest type gets the same level of support when revealing her weakness by not holding an election as she does when holding an election. However, when the election is noisier, the lowest type is better off holding an election – she will tend to do poorly, but also sometimes get election results typical for a higher type – than fully revealing her weakness by not holding an election. As a result:

Proposition 4. *If the election is not fully informative, then the upper bound on k for which all types pool on holding an election is strictly positive.*

That is, there can be a pooling equilibrium where all types choose to hold elections even if doing so is costly, providing a plausible explanation for the near-universality of elections in the contemporary world. This follows from the fact that the election transmits information in two ways: the decision to hold *and* the result itself. When the election result itself is less informative, more of the signaling comes from the decision to hold, and less from the result. If this is the case, it is more tempting for weaker types to mimic the strong types by holding an election, knowing that even though they will generally perform poorly this does not demonstrate their weakness as much has not holding an election in the first place.

In addition to providing an explanation for the near-universality of elections, The logic of the pooling equilibrium derived provides an explanation of elections in communist regimes where the ruling party consistently won elections with a near 100% turnout and vote share – precisely the elections that motivate some to doubt the notion that they generate information. That is, even if elections always happen in equilibrium (and, informally, the ruling regime rigs the election enough to ensure a near "perfect" result), this does not

[10]The main challenge is that the Δ function is not necessarily decreasing, so there can be multiple semi-separating equilibria. Still, the important qualitative patterns hold.

render the choice to run these elections meaningless. In fact, it is precisely in these cases that the citizen would learn the most about the incumbent strength should she unexpectedly suspend elections (or perform poorly). That is, even if no information is conveyed by the decision to hold an election (or the result) *in equilibrium*, elections may be always held precisely because not doing so would send a strong signal of weakness.

Welfare Implications of the Signaling Model

As in the baseline, the citizen welfare is a function how much he knows about the incumbent strength, in this section from both the decision to hold an election as well as the election result itself.

To streamline the welfare analysis, write the pooling equilibria as the limiting cases as $\hat{\theta} = \overline{\theta}$ (none hold) and $\hat{\theta} = \underline{\theta}$ (all hold).[11] The citizen *ex ante* expected payoff is:

$$\mathbb{E}_{\omega,\theta,e}[u_C(s^*;\omega,\hat{\theta})] = -(F_\theta(\hat{\theta})\mathbb{V}_\omega[\omega|\theta<\hat{\theta}] + (1-F_\theta(\hat{\theta}))(\mathbb{E}_e[\mathbb{V}_\omega[\omega|e,\theta>\hat{\theta}]])) - \mathbb{E}_\omega[\omega(1-\omega)].$$

So, the change in citizen welfare as $\hat{\theta}$ increases is:

$$\begin{aligned}\frac{\partial \mathbb{E}[u_C]}{\partial \hat{\theta}} = &-F_\theta(\hat{\theta})\frac{\partial \mathbb{V}_\omega[\omega|\theta<\hat{\theta}]}{\partial \hat{\theta}} - f_\theta(\hat{\theta})(\mathbb{V}_\omega[\omega|\theta<\hat{\theta}] - \mathbb{E}_e[\mathbb{V}_\omega[\omega|e,\theta>\hat{\theta}]]) \\ &- (1-F_\theta(\hat{\theta}))\frac{\partial \mathbb{E}_e[\mathbb{V}_\omega[\omega|e,\theta>\hat{\theta}]]}{\partial \hat{\theta}} \end{aligned} \tag{5}$$

The three terms in equation 5 highlight three effects of fewer types holding an election (i.e., increasing $\hat{\theta}$). (See the appendix for more details on the signing of these expressions.) First, the decision *not* to hold becomes less informative (the $-F_\theta(\hat{\theta})\frac{\partial \mathbb{V}_\omega[\omega|\theta<\hat{\theta}]}{\partial \hat{\theta}}$ term, which is negative). However, the opposite is true for the contingency when an election is held: since fewer types do so, holding conveys more information even absent the additional

[11] Since $\theta = \underline{\theta}$ and $\theta = \overline{\theta}$ are measure zero events, the equilibrium outcome for these types has no effect on the *ex ante* welfare.

information gleaned from the result itself (the $-(1-F_\theta(\hat{\theta}))\frac{\partial \mathbb{E}_e[\mathbb{V}_\omega[\omega|e,\theta>\hat{\theta}]]}{\partial \hat{\theta}}$ term, which is positive). Finally, fewer types holding an election means citizens get this additional information less often, which tends to make the citizen less informed (the $f_\theta(\hat{\theta})(\mathbb{V}_\omega[\omega|\theta < \hat{\theta}] - \mathbb{E}_e[\mathbb{V}_\omega[\omega|e,\theta>\hat{\theta}]])$ term, which is generally negative).

While these effects can move in opposite directions, three facts about the welfare implications hold for *any* distribution meeting the general assumptions specified in the appendix.

First, the citizen is better off in a pooling equilibrium where all hold an election than an pooling equilibrium where no types hold an election. To see this, note that as $\hat{\theta} \to \underline{\theta}$ the citizen payoff is the same as the equilibrium with no election in the baseline, and as $\hat{\theta} \to \underline{\theta}$ the payoff is the same as when an election is (always) held in the baseline. So, this follows from proposition 2.

Second, if the election is perfectly informative, then $\mathbb{E}_e[\mathbb{V}_\omega[\omega|e,\theta>\hat{\theta}]] = 0$, and hence:

$$\frac{\partial \mathbb{E}[u_C(s^*;\omega,\hat{\theta})]}{\partial \hat{\theta}} = -\left(F_\theta(\hat{\theta})\frac{\partial \mathbb{V}_\omega[\omega|\theta<\hat{\theta}]}{\partial \hat{\theta}} + f_\theta(\hat{\theta})\mathbb{V}_\omega[\omega|\theta<\hat{\theta}]\right) < 0$$

So, under a perfectly informative election, citizen welfare is strictly increasing in the probability of holding an election.

Third, if the citizens learns more from the fact that the incumbent is the weakest type than they would from the weakest type holding an election, the most information is transmitted in a semi-separating equilibrium. That is, citizens may learn more in an equilibrium where elections are not always held if the information they gain from the weakest types not holding an election is stronger than what they would learn if these types hold an election.

Summarizing:

Proposition 5. *In the signaling model:*

i. citizen welfare in the pooling equilibrium where all types hold an election is strictly higher than the pooling equilibrium where no types hold an election,
ii. if the election is fully informative, citizen welfare is strictly increasing in the probability of an election, and
iii. if $f_\theta(\underline{\theta})(\mathbb{E}_e[\mathbb{V}_\omega[\omega|e]]) - \mathbb{V}_\omega[\omega|\theta = \underline{\theta}]) > \frac{\partial \mathbb{E}_e[\mathbb{V}_\omega[\omega|e,\theta>\hat{\theta}]]}{\partial \hat{\theta}}\Big|_{\theta=\underline{\theta}}$*, then the optimal equilibrium for the citizen is a semi-separating equilibrium.*

Perhaps more surprising are the welfare implications of the signaling model for the *incumbent*. It is tempting to think that the ability to signal strength with elections make them a valuable tool for regimes, and much past work has made this argument (Schedler, 2006; Magaloni, 2006; Pepinsky, 2013). However, for the ability to signal strength with elections to sometimes convince the citizen and others that the regime is stronger than previously thought, there must be contingencies under which the decision to hold (or not hold) an election and the result lead the citizen to believe the regime is weaker than expected.

In the semi-separating equilibrium (again, where the pooling equilibria are special cases where $\hat{\theta} \to \underline{\theta}$ and $\hat{\theta} \to \overline{\theta}$), the probability of not holding an election is $F_\theta(\hat{\theta})$, and these types get an expected payoff $2\mathbb{E}_{\omega,\theta}[\omega|\theta < \hat{\theta}]$. The probability of holding an election is $1 - F_\theta(\hat{\theta})$, and these types get an average payoff $\mathbb{E}_{e,\theta}[\mathbb{E}_\omega[\omega|\theta > \hat{\theta}, e]] + \mathbb{E}_\omega[\omega|\theta > \hat{\theta}] - k = 2\mathbb{E}_{\omega,\theta}[\omega|\theta > \hat{\theta}] - k$. So, the incumbent *ex ante* expected payoff is:

$$\begin{aligned}\mathbb{E}_{\omega,\theta,e}[u_I(\hat{\theta})] &= F_\theta(\theta)(2\mathbb{E}_{\omega,\theta}[\omega|\theta < \hat{\theta}]) + (1 - F_\theta(\hat{\theta}))(2\mathbb{E}_{\omega,\theta}[\omega|\theta > \hat{\theta}] - k) \\ &= 2\mathbb{E}_\omega[\omega] - (1 - F_\theta(\hat{\theta})k, \end{aligned} \tag{6}$$

where the equality follows from the law of iterated expectations.[12] Equation 6 shows that both the *average* level of support given by the citizen and the average regime strength in any

[12]In particular, for any random variables θ and e, $\mathbb{E}_{\theta,e}[\mathbb{E}_\omega[\omega|\theta, e]] = \mathbb{E}_\omega[\omega]$.

equilibrium of the signaling model are both exactly $\mathbb{E}_\omega[\omega]$, as it was in the baseline model with the same utility function. That is, any gains accruing to types that appear stronger as a result of the signaling effect of elections are perfectly offset by other types that appear weaker. That some (if not all) types are hurt by signaling is not novel or unique to the signaling model here; in fact, it is discussed extensively in the first formalization of costly signaling (Spence, 1973). However, the distributional consequences and *ex ante* inefficiency of signaling has important implications when applied to non-competitive elections that have been largely ignored.

In particular, there is a significant difference between the often-conflated claims that (1) elections are held to signal strength, and (2) the ability to signal strength with elections systematically increases the duration of nondemocratic regimes. The first claim follows from the logic of the model here, but the second does not: if anything, the more elections are held, the fewer resources the regime has to spend on other ways to stay in power. So, on average, the presence of elections as a tool to signal strength *harms* regimes:

Proposition 6. *In the signaling model, the* ex ante *payoff for the incumbent is strictly decreasing in the probability that an election is held.*

Proof Follows immediately form equation 5.

To pick a prominent example, it is plausible that the PRI in Mexico's "high turnout and huge margins of victory signaled to elites that the ruling party's electoral machine was unbeatable" (Magaloni, 2006, pg. 9) by consistently exceeding expectations; in fact, by focusing on a particularly long-lived regime it seems likely that they generally did. However, among the universe of cases where canceling elections was largely out of the question – corresponding to the pooling equilibrium where all types hold an election – the citizen makes no inference about the incumbent strength by the decision to hold itself.

More generally, if elections are primarily about signaling strength, we can not infer from the fact that they are nearly universally held that this state of affairs is helpful to autocrats. In fact, the pooling equilibrium where all hold an election is the *worst* for incumbents in terms of *ex ante* expected welfare, as in this equilibrium all pay the cost to hold an election and none look stronger as a result of this decision.

However, the second motivation for holding an election explored here – gathering information – *can* systematically help regimes rule longer and more effectively.

4 The Information Gathering Model

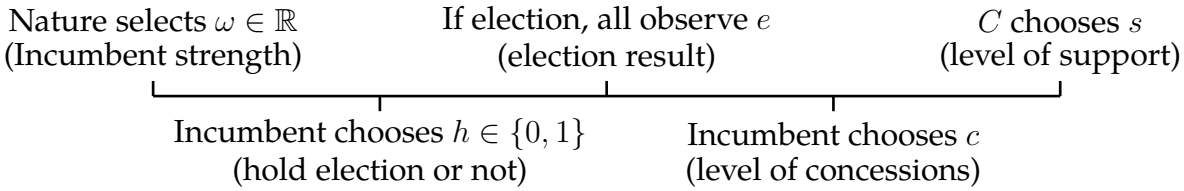
The baseline and signaling models focus on how the information revealed by elections affects the citizen behavior, but the regime can use this information as well. If the incumbent can leverage additional information about her strength to play the underlying game more effectively, this provides a second informational incentive to hold elections. However, and again in contrast to much non-formal work making this type of argument, I show that elections held for this reason do not necessarily make citizens worse off than they would be with no election.

Some key problems leaders need to solve to stay in power are being able to manage intra-elite competition (Brownlee, 2007; Blaydes, 2011), distribute patronage (Lust-Okar, 2006), buy off potential challengers (Wintrobe, 1990; Gandhi, 2008), make promises credible (Myerson, 2008; Gehlbach and Keefer, 2011), and know when to step down from power (Cox, 2009; Rozenas, 2011). While not all of the cited theories explicitly incorporate incomplete information, uncertainty over, say, the type and magnitude of concessions required to maintain power surely hurts the incumbent.

For example, legislatures and elections not only provide a forum for co-opting the opposition (Gandhi and Przeworski, 2006; Malesky and Schuler, 2010), but provide this fo-

rum while generating information to make this co-option more efficient (Cox, 2009; Boix and Svolik, 2013). Similarly, if the underlying game emphasizes the relationship between the incumbent and local or other lower-level members of her party, electoral results – either the local results in national elections or results for local elections – inform the incumbent about the loyalty and competence of party officials (Blaydes, 2011) or even individual citizens (Hsieh et al., 2011).

The details of how these arguments should be formalized vary by the type of information gathered and for what purpose. Here I pick a particularly straightforward model that builds on the baseline in a natural way. The actors are still the incumbent and a citizen, and the order of moves is:



Compared to the signaling model, this game removes the incumbent private information and adds a stage after the election where she chooses a level of concessions to grant $c \in [0, \bar{c}]$. Following this choice, the citizen choosing a level of support. In this section let the citizen utility function be:

$$u_C(s; \omega, c) = -\omega(1 - s)^2 - (1 - \omega)s^2 + c$$

So, in addition to wanting to pick a level of support close to the true regime strength, the citizen also wants a high degree of concessions. This does not affect the citizen equilibrium behavior: by sequential rationality, he still chooses $s_0^* = \mathbb{E}[\omega]$ without and election and $s_1^*(e) = \mathbb{E}[\omega|e]$ with an election. However, the c term will matter when discussing welfare implications.

The incumbent utility function in this section is:

$$u_I(h, c; s, \omega) = b(s, c, \omega) - hk.$$

As above, the incumbent pays a cost k to hold an election. The benefit function is now affected by the concession level c in addition to s and ω. As above, I assume that the benefit is strictly increasing in the level of support ($\frac{\partial b}{\partial s} > 0$). Next, assume that for any s and ω there exists a unique optimal level of concessions $c^*(s, \omega)$ such that $b(s, c^*(s, \omega), \omega) > b(s, c', \omega)$ for any $c' \neq c^*(s, \omega)$. For the technical results all that matters is that c^* is not constant in s and ω, but for interpretational ease suppose the optimal concession is strictly decreasing in the level of support and the regime strength, i.e., $c^*(s, \omega)$ is strictly decreasing in s and ω. That is, the need to give concessions is increasing when the regime is weaker and the citizen gives less support.

Without an election, the incumbent payoff knows the level of support will be s_0^* but does not know her strength, and hence the optimal concession maximizes:

$$c_0^* = \arg\max_c \int_{\omega=0}^{1} b(s_0^*, c, \omega) f_\omega(\omega) d\omega$$

Since c is on a compact interval a maximizer must exist, to avoid extraneous cases I assume the maximizer is unique.

To simplify the analysis, I only consider the case where the election is fully informative, and in particular where $e = \omega$.[13] So, $s_1^*(e) = e$, and by sequential rationality the optimal concession level upon holding an election is $c_1^*(e) = c^*(e, e)$.

Since $e = \omega$, the payoff for not holding an election given the optimal concession and

[13] Analyzing the model where there is residual uncertainty about the regime strength after an election would require stronger functional form assumptions, without obviously overturning any conclusions reached in the fully informative case. As discussed below, this assumption does not affect the formal analysis of the citizen welfare.

support level can be written:

$$\mathbb{E}_e[u_I(0, c_0^*; s_0^*, e)] = \int_{e=0}^{1} b(\mathbb{E}_\omega[\omega], c_0^*, e) f_e(e) de$$

and the expected payoff for holding an election and making the optimal concession is:

$$\mathbb{E}_e[u_I(1, c^*(e); e, e)] = \int_{e=0}^{1} b(e, c^*(e), e) f_e(e) de - k$$

The difference between these payoffs (other than the exogenous cost k) is that both the support level and concession level vary when an election is held, while only the true regime strength is uncertain without an election. The overall difference between the expected incumbent payoff when holding an election and without an election can be expressed with the following decomposition:

$$\begin{aligned}\mathbb{E}_e[u_I(1, c_1^*(e); e, e)] - \mathbb{E}_e[u_I(0, c_0^*; s_0^*, e)] = &\underbrace{\left(\int_{e=0}^{1} b(e, c^*(e), e) f_e(e) de - \int_{e=0}^{1} b(e, c_0^*, e) f_e(e) de\right)}_{\Delta_g} \\ &+ \underbrace{\left(\int_{e=0}^{1} b(e, c_0^*, e) f_e(e) de - \int_{e=0}^{1} b(\mathbb{E}_\omega[\omega], c_0^*, e) f_e(e) de\right)}_{\Delta_v} \\ &- k\end{aligned}$$

The first term, Δ_g, captures the value of the information gathered by the election. Formally, it measures the difference between the average benefit when making the optimal concession for each election result and the average benefit that the incumbent would receive if holding an election but always giving the same concession as she would without an election. Since the regime makes a better concession in equilibrium unless the optimal concession happens to be exactly c_0^*, which can only be true for one election result, $\Delta_g > 0$.

The second term, Δ_v, captures the effect of the increased volatility in support when

holding an election. Formally, this term is the difference between the payoff the regime would get when holding an election but always choosing c_0^* and when holding not holding an election and choosing c_0^*. This can not be directly signed given the assumptions above, but for reasons discussed in the baseline model, is negative if the regime is risk-averse in the level of support they receive. Regardless, the decision to hold an election in the information gathering model can be characterized as follows:

Proposition 7. *In the information gathering model, the incumbent holds an election if* $k < \Delta_g + \Delta_v$.

Rather than derive more formal results (which would require imposing more assumptions on the incumbent payoff and distract from the focus on citizen welfare), I provide some general intuitions for when the Δ terms may be high or low. As discussed in the baseline model, the Δ_v term will be high when the incumbent is hurt by more volatile levels of support, i.e., if b is concave in s.

Δ_g is high when the regime gets a much higher payoff when making the optimal concession given what they have learned from the election result than they would being unresponsive to the election. That is, when the information gathered by the election is useful for choosing how much to concede. More generally, knowing when to grant concessions or give up power is just one aspect of the incumbent's ruling strategy that she must make under uncertainty. For example the election could be modeled as providing information not only about the incumbent strength in an entire country, but by region (Blaydes, 2011), polling station, or even individual vote choices (Hsieh et al., 2011). Learning this more detailed information could aid the incumbent in knowing where to target transfers or which of her local agents are particularly loyal and competent. Δ_g is high when this information is particularly valuable to the regime.

Welfare Implications of the Information Gathering Model

In the information gathering model, the regime's decision to hold an election affects citizen welfare in two ways. First, as in the previous models, the citizen has more information with an election. As in the baseline, this gain equal to the informativeness of the election $\mathbb{V}_e[\mathbb{E}_\omega[\omega|e]]$. (In the case of a fully informative elections, this is equal to $\mathbb{V}_\omega[\omega]$, but for the purposes of analyzing citizen welfare this assumption is not necessary.) However, the citizen also gets a different level of concessions after an election is held ($c_1^*(e)$) than with no election (c_0^*). Combining these two effects gives the following:

Proposition 8. *The citizen welfare is higher with an election if* $\mathbb{E}_e[c_1^*(e)] + \mathbb{V}_e[\mathbb{E}_\omega[\omega|e]] > c_0^*$.

Proof By familiar arguments, the citizen expected payoff without an election is $-\mathbb{V}_\omega[\omega] - \mathbb{E}[\omega(1-\omega)] + c_0^*$, and with an election is $-\mathbb{E}_e[\mathbb{V}_\omega[\omega|e]] - \mathbb{E}[\omega(1-\omega)] + \mathbb{E}_e[c_1^*(e)]$. Subtracting the former term from the latter (and applying the law of total variance) gives the result. ∎

The assumptions made about the incumbent utility function are not strong enough to make a comparison between the average concession level with and without an election. The effect of an election on the level of concessions is two-fold. First, with an election, the incumbent makes her concession decision with more information about her strength. Second, holding an election leads to more volatile concession levels. The second effect is assumed away with the linear specification here, but presumably could hurt citizens if they are risk-averse in whatever is being conceded.

There are reasons to believe the first effect could lead to more or fewer concessions. For example, a regime may not find it worth making transfers (e.g., subsidies, public goods) at all without knowing where they will be most effective, plausibly increasing the amount of transfers after holding an election. Conversely, a regime that would give transfers to

a wider set of citizens without the election may learn which subset will be particularly swayed by transfers, leading to fewer overall.

While theoretically indeterminate, some recent empirical evidence indicates authoritarian regimes that hold elections grant more concessions or choose other policies more favorable towards citizens than their non-electoral counterparts. Miller (2014) finds that authoritarian regimes with some multi-party competition perform better in health care and education, among other welfare-enhancing outcomes. Several recent empirical papers on authoritarian legislatures – which can generate information in a similar fashion as executive elections – find evidence they serve an information gathering role analogous to elections as modeled here, with similarly positive welfare implications. Malesky and Schuler (2010) analyze questions asked in Vietnam's parliament, concluding that "even in a single-party authoritarian state, the institutional responsibilities of delegates may lead them to respond to the concerns of constituents." The informational framework can also incorporate arguments that authoritarian legislatures are used to constrain regimes in order to encourage investment (Wright, 2008; Gehlbach and Keefer, 2011).

The information gathered by elections can also be used to affect "policies" harmful to citizens, such as repression or withholding public goods as punishment. For example, a database of individuals that signed petitions in 2002-2003 for a recall election of Hugo Chávez was sold on the streets of Caracas and distributed by the regime as an "enemies list." This led to job market discrimination that, according to estimates by Hsieh et al. (2011), reduced the earnings of opposition supporters by 5%. On the other hand, the regime may repress or withhold public goods in an indiscriminate fashion with the information learned from the election.

Further, reasoning outside the model, if the concessions represent changing some policy to placate citizens, having more information about the citizen's preferences may lead to unambiguously better choices. So, while the information gathering model provides a

less clear-cut picture on citizen welfare, the bulk of the theoretical and empirical evidence tentatively suggests that non-competitive elections held for this reason are better than no elections at all.

5 Elections Held for Other Reasons

While the formal framework presented here captures a great deal of existing theories about why non-competitive elections are held, it is inevitably not an exhaustive treatment. Further, there are certainly welfare effects of these elections which are not highlighted in the formalization. So, before concluding, I briefly consider two other explanations of non-competitive explanations and the potential effects of regimes substituting from other technologies that can be used to signal strength and gather information.

First, elections can be held due to international pressure (Levitsky and Way, 2012; Miller, 2014) or because rulers have a normative commitment to democracy. These motivations can be superficially incorporated into the models by assuming they lower the exogenous cost of holding an election k, which would not overturn any of the central results. However, elections held for these reasons could certainly be conducted in a different fashion than those held for domestic strategic considerations. For example, elections held due to external pressure may be rushed, or induce leaders to pay more attention to the appearance of the election rather than setting up rules that will make the process fairer or more informative for everyone. Still, there is no obvious reason to think that elections held for these reasons should lead to fundamentally different conclusions.

Second, Fearon (2011) argues that elections are held as they provide a focal point for citizens to protest against leaders that do not do so (or do not provide sufficient public goods). This "authoritarian accountability" mechanism clearly leaves citizens better off, as they get more transfers than in a dictatorial equilibrium. The accountability argument is

also tied to work demonstrating that authoritarian regimes with legislatures tend to grow faster and attract more investment, again, effects that broadly help citizens (Gandhi, 2008; Gehlbach and Keefer, 2011; Miller, 2014).[14] Elections held for accountability reasons may have an even more unambiguously positive affect on citizen welfare.

The models also do not allow for the possibility that the ability to signal strength and gather information with elections allows regimes to substitute away from other technologies that can achieve these goals. There are multiple ways that incumbent regimes can signal their strength, such as holding rallies or repression. In the case of repression, substituting to elections should unambiguously increase citizen welfare, though in the case of other ways to signal strength the effect is less clear.

Similarly, there are many ways for incumbent leaders to gather information about their strength or popularity. Some of these – such as internal polling or hiring more secret police – generate more private information for the incumbent which can not be used by citizens, plausibly making elections better from a welfare perspective. Other more public ways to generate and gather public information – such as granting more press freedom (Egorov, Guriev and Sonin, 2009), tolerating low level protests (Lorentzen, 2013), or allowing public deliberation (Chen and Xu, 2013) – could play a similar role as elections do here. Substituting away from these technologies could plausibly be bad for citizens. Still the fact that holding elections – particularly if not too heavily rigged – provides a rich amount of information valuable to both the regime and others at least tentatively suggests that all are better off in a regime choosing to do so.

[14]Though see Malesky, Schuler and Tran (2012) for a field experiment that exposes some potential negative consequences of this accountability mechanism.

6 Conclusion

It would be too strong to conclude from the formal analysis (or any theoretical exercise) that non-competitive elections are unambiguously good for citizens. Still, the modeling does show that some concerns about non-competitive elections are overblown, and highlights positive effects of non-competitive elections that are rarely if ever made in the existing literature, painting a substantially more optimistic picture than the conventional wisdom.

Much of the backlash against democracy promotion – and, more specifically, *election* promotion – focuses on the failures of imperfect elections compared with how they occur in advanced democracies (Gershman and Allen, 2006). However, if we believe that these regimes would not hold elections at all absent Western pressure, the appropriate comparison to make when determining whether such promotion is a good idea is not between flawed elections and perfect elections, but flawed elections and no elections. Even if true democracy is the best outcome for citizens, allowing competitive elections with a level playing field and following rules may not be incentive compatible for the elites who must be willing to abide by democratic procedure. Holding non-competitive elections can be both incentive compatible for the regime – particularly if subsidized by outside actors – and make citizens better off than they would be with no elections at all.

References

Acemoglu, Daron and James A. Robinson. 2000. "Why Did the West Extend the Franchise? Democracy, Inequality, and Growth in Historical Perspective." *The Quarterly Journal of Economics* 115(4):1167–1199.

AFP. 2013. "Equatorial Guinea votes in polls criticised as a 'sham'." AFP Wire Service, May 26, 2013.

Athey, Susan. 2002. "Monotone comparative statics under uncertainty." *The Quarterly Journal of Economics* 117(1):187–223.

Blaydes, Lisa A. 2011. *Elections and distributive politics in Mubarak's Egypt*. Cambridge University Press.

Boix, Carles and Milan Svolik. 2013. "The Foundations of Limited Authoritarian Government: Institutions and Power-sharing in Dictatorships." *Journal of Politics* 75(2):300–316.

Brownlee, Jason. 2007. *Autoritarianism in an Age of Democratization*. Cambridge University Press.

Bueno de Mesquita, Bruce, Randolph Siverson, James Morrow and Alastair Smith. 2003. *The Logic of Political Survival*. MIT Press.

Carothers, Thomas. 2011. *Aiding democracy abroad: the learning curve*. Carnegie Endowment.

Chen, Jidong and Yiqing Xu. 2013. "On Deliberative Authoritarian Governance." Manuscript.

Cho, In-Koo and David M Kreps. 1987. "Signaling games and stable equilibria." *The Quarterly Journal of Economics* pp. 179–221.

Cox, Gary W. 2009. "Authoritarian Elections and Leadership Succession, 1975-2004." Manuscript.

Dragu, Tiberiu and Mattias Polborn. 2013. "The Administrative Foundation of the Rule of Law." *The Journal of Politics* 75(4):1038–1050.

Egorov, Georgy and Konstantin Sonin. 2011. "Incumbency Advantage in Non-Democracies." MPSA 2011 Annual Meeting Paper.

Egorov, Georgy, Sergei Guriev and Konstantin Sonin. 2009. "Why Resource-poor Dictators Allow Freer Media: A Theory and Evidence from Panel Data." *American Political Science Review* 103(4):645–668.

Fearon, James D. 2011. "Self-Enforcing Democracy." *Quarterly Journal of Economics* 126(4):1661–1708.

Gandhi, Jennifer. 2008. *Political Institutions Under Dictatorship*. Cambridge University Press.

Gandhi, Jennifer and Adam Przeworski. 2006. "Cooperation, Cooptation, and Rebellion Under Dictatorships." *Economics and Politics* 18(1):1–26.

Gandhi, Jennifer and Ellen Lust-Okar. 2009. "Elections Under Authoritarianism." *Annual Review of Political Science* 12:403–422.

Geddes, Barbara. 2006. "Why Parties and Elections in Authoritarian Regimes." American Political Science Association Annual Meeting Paper.

Gehlbach, Scott and Alberto Simpser. 2014. "Electoral Manipulation as Bureaucratic Control." *Americal Journal of Political Science* Forthcoming.

Gehlbach, Scott and Philip Keefer. 2011. "Investment without democracy: Ruling-party institutionalization and credible commitment in autocracies." *Journal of Comparative Economics* 39:123–139.

Gershman, Carl and Michael Allen. 2006. "The assault on democracy assistance." *Journal of Democracy* 17(2):36–51.

Hamid, Shadi. 2010. "Arab elections: free, sort of fair... and meaningless." Foreign Policy, October 27, 2010.

Hsieh, Chang-Tai, Edward Miguel, Daniel Ortega and Francisco Rodriguez. 2011. "The Price of Political Opposition: Evidence from Venezuela's Maisanta." *American Economic Journal: Applied Economics* 3(2):196–214.

Hyde, Susan D and Nikolay Marinov. 2012. "Which Elections Can Be Lost?" *Political Analysis* 20(2):191–210.

Khodorkovsky, Mikahil. 2012. "What Is at Stake in the Russian Election?" International Herald Tribune, February 26, 2012.

Levitsky, Steven and Lucan A. Way. 2012. *Competitive Authoritarianism: Hybrid Regimes After the Cold War*. Cambridge University Press.

Levitsky, Steven and Lucan Way. 2002. "The rise of competitive authoritarianism." *Journal of democracy* 13(2):51–65.

Little, Andrew T. 2012. "Elections, Fraud, and Election Monitoring in the Shadow of Revolution." *Quarterly Journal of Political Science* 7(3):249–283.

Little, Andrew T. N.d. "Fraud and Monitoring in Noncompetitive Elections." Forthcoming, Political Science Research and Methods.

Little, Andrew T., Joshua Tucker and Tom LaGatta. 2012. "Elections, Protest and Alternation of Power." Presented at the 2012 European Political Science Association Meeting.

Lopez-Pintor, Rafael and Jeff Fischer. 2005. *Cost of Registartaion and elections (CORE) Project*. Center for Transitional and Post-Conflict Governance, International Foundation for Election Systems (IFES).

Lorentzen, Peter L. 2013. "Regularizing Rioting: Permitting Public Protest in an Authoritarian Regime." *Quarterly Journal of Political Science* 8(2):127–158.

Lust-Okar, Ellen. 2006. "Elections under authoritarianism: Preliminary lessons from Jordan." *Democratization* 13(3):456–471.

Magaloni, Beatriz. 2006. *Voting for Autocracy: Hegemonic Party Survival and its Demise in Mexico*. Cambridge University Press.

Magaloni, Beatriz and Rith Kricheli. 2009. "Political Order and One-Party Rule." *Annual Review of Political Science* 13:123–143.

Malesky, Edmund and Paul Schuler. 2010. "Nodding or Needling: Analyzing Delegate Responsiveness in an Authoritarian Parliament." *American Political Science Review* 104(3):1–21.

Malesky, Edmund, Paul Schuler and Anh Tran. 2012. "The adverse effects of sunshine: a field experiment on legislative transparency in an authoritarian assembly." *American Political Science Review* 106(04):762–786.

McFaul, Michael. 2004. "Democracy promotion as a world value." *Washington Quarterly* 28(1):147–163.

Miller, Michael K. 2014. "Electoral Authoritarianism and Human Development." Manuscript.

Miller, Michael K. N.d. "Democratic Pieces: Autocratic Elections and Democratic Development since 1815." Forthcoming, British Journal of Political Science.

Myerson, Roger B. 2008. "The Autocrat's Credibility Problem and Foundations of the Constitutional State." *American Political Science Review* 102(1):125–139.

Pepinsky, Thomas. 2013. "The Institutional Turn in Comparative Authoritarianism." Forthcoming, British Journal of Political Science.

Przeworski et. al., Adam. 2013. "Political Institutions and Political Events (PIPE) Data Set." Department of Politics, New York University.

Rozenas, Arturas. 2011. "Forcing Consent: Information and Power in Non-Democratic Elections." Manuscript.

Schedler, Andreas. 2006. The Logic of Electoral Authoritarianism. In *Electoral Authoritarianism: The Dynamics of Unfree Competition*. Lynne Riener.

Simmel, Georg. 1950. *The Sociology of Georg Simmel*. Free Press. Translated, edited, and with an introduction by Kurt H. Wolff.

Simpser, Alberto. 2013. *Why Governments and Parties Manipulate Elections: Theory, Practice, and Implications*. Cambridge University Press.

Spence, Michael. 1973. "Job Market Signaling." *The Quarterly Journal of Economics* 87(3):355–374.

Svolik, Milan and Svitlana Chernykh. 2012. "When Are Election Outcomes Self-Enforcing? How Third-Party Institutions Shape Incentives for Electoral Manipulation and Post-Election Protest." Mansuscript.

Wang, Shuna and Yang Yao. 2007. "Grassroots democracy and local governance: Evidence from rural China." *World Development* 35(10):1635–1649.

Wintrobe, Ronald. 1990. "The Tinpot and the Totalitarian: An Economic Theory of Dictatorship." *American Political Science Reivew* 84(3).

Wright, Joseph. 2008. "Do authoritarian institutions constrain? How legislatures affect economic growth and investment." *American Journal of Political Science* 52(2):322–343.

Appendix

Proof of proposition 1

This is a special case of proposition 10, proved below.

More General Baseline Assumptions

To show that the analysis in the main text does not depend on the specific citizen utility function and information structure, consider the following more general formulation. The sequence of moves is the same as above, but now the only restriction on the citizen utility function is that it meets a *single crossing condition*:

Assumption 1. *For any* $s_1 < s_2$ *and* $\omega_1 < \omega_2$ $u_C(s_2;\omega_1) > u_C(s_1;\omega_1)$ *implies* $u_C(s_2;\omega_2) > u_C(s_1;\omega_2)$

To be able to derive results with this assumption, I make a more precise assumption about the informativeness of the election:

Assumption 2. *If* $f_\omega(\omega|e)$ *is the conditional density of* ω *given* e,[15] *then for any* $e_1 < e_2$ *and* $\omega_1 < \omega_2$*:*

$$\frac{f_\omega(\omega_2|e_2)}{f_\omega(\omega_1|e_2)} > \frac{f_\omega(\omega_2|e_1)}{f_\omega(\omega_1|e_1)}$$

That is, the conditional density as a function of e has the monotone likelihood ratio property.

By Theorem 2 in Athey (2002), the single crossing condition combined with monotone likelihood ratio dominance property of the election result and incumbent strength gives the following:

[15] I subscript both marginal and conditional distributions with the random variable in question, with the arguments clarifying what if anything is being conditioned.

Proposition 9. *Given assumptions 1-2, then citizen level of support is weakly increasing in the election result.*

This establishes more general conditions under which the citizen will behave at least as favorably towards the incumbent following higher election results.

To determine when the incumbent holds an election in this general setting, it is useful to break down the impact of this choice into two effects. First, the citizen has more information about the incumbent strength when making his support decision after an election. In the parameterization in the main text, this did not matter because the citizen always chooses a support level equal to his *average* belief about the incumbent strength. However, it may be more natural to assume that the citizen is more apt to support the status quo – i.e., the incumbent – under high levels of uncertainty. This can be formalized as follows:

Definition Let s_0^* be the optimal level of support without an election and $s_1^*(e)$ be the optimal level of support with an election. The citizen is *risk averse in withholding support* if $s_0^* \geq \int_{e=0}^{1} s_1^*(e) f_e(e) de$.

This states that the average level of support when given more information (i.e., the election) is lower than the level of support with less information.[16]

Second, without an election the incumbent always obtains whatever level of support is justified by the prior, while she is uncertain about what level of support she will receive when holding an election. So, holding an election induces *more* uncertainty from the perspective of the incumbent. By standard results, this will tend to make an election less appealing if b_s is concave. Combining these effects, a more general version of proposition 1:

Proposition 10. *In the baseline model, if 1) b_s is concave, and 2) the citizen is risk averse in withholding support, then the incumbent will not hold a costly election.*

[16] An alternative derivation with an assumption about how the citizen behaves after the median election result is available upon request.

Proof The incumbent payoff for not holding an election is $b_s(s_0^*)+\mathbb{E}_\omega[b_\omega(\omega)]$ and the payoff for holding an election is $\int_{e=0}^{1} b(s_1^*(e))f_e(e)de+\mathbb{E}_\omega[b_\omega(\omega)]-k$. The risk averse in withholding support condition and combining Jensen's inequality with the concavity of b_s implies :

$$b_s(s_0^*) \geq b_s\left(\int_{e=0}^{1} s_1^*(e)f_e(e)de\right) \geq \int_{e=0}^{1} b_s(s_1^*(e))f_e(e)de.$$

(If $s_1^*(e)$ is non-constant, the second inequality will be strict.) So for any $k > 0$,

$$b_s(s_0^*) + \mathbb{E}_\omega[b_\omega(\omega)] > \int_{e=0}^{1} b(s_1^*(e))f_e(e)de + \mathbb{E}_\omega[b_\omega(\omega)] - k$$

and hence the incumbent gets a higher payoff from not holding an election. ∎

Finally, consider the welfare effects of holding an election in this setting. If the citizen strictly prefers to give support level $s_1^*(e)$ to s_0^* for some election results, he is better off with an election:

Proposition 11. *Let* $E_s : \{e : \int_{\omega=0}^{1} u_C(s_1^*(e);\omega)f_\omega(\omega|e)f_e(e) > \mathbb{E}_\omega[u_C(s_0^*;\omega)]\}$. *If* $Pr(e \in E_s) > 0$, *then then the citizen expected payoff is strictly higher with an election.*

Proof Write the citizen expected payoff with an election as:

$$\int_{e=0}^{1}\int_{\omega=0}^{1} u_C(s_1^*(e);\omega)f_\omega(\omega|e)f_e(e)d\omega de$$

If $Pr(e \in E_s) > 0$, then for a set of election results with positive measure this is strictly higher than the average payoff when always choosing s_0^*:

$$\int_{e=0}^{1}\int_{\omega=0}^{1} u_C(s_0^*;\omega)f_\omega(\omega|e)f_e(e)d\omega de = \mathbb{E}_\omega[u_C(s_0^*;\omega)]$$

Which is the expected payoff with no election. ∎

The Signaling Model

Recall the incumbent payoff is $u_I(h; s, w) = s + \omega - hk$. The citizen payoff is $u_A = -\omega(1-s)^2 - (1-\omega)s^2$, hence he chooses the support level equal to his expected belief which must be consistent with the incumbent strategy and Bayes' rule.

Assume the following about the joint distribution of ω, e, and θ

Assumption 3. *i. For any $\Theta \subseteq [\underline{\theta}, \overline{\theta}]$, $f_e(e|\Theta)$ has full support on $[0,1]$ and $\mathbb{E}_\omega[\omega|e,\Theta]$ is continuous and strictly increasing in e,*
ii For any $\theta_2 > \theta_1$, the conditional distribution $f_e(e|\theta_2)$ first order stochastic dominates $f_e(e|\theta_1)$.
iii. For any $E \subset [0,1]$, $\mathbb{E}_\omega[\omega|e \in E, \theta]$ is continuous and strictly increasing in θ.
iv. For any $E_1 \subseteq E_2 \subseteq E$ and $\Theta_1 \subseteq \Theta_2 \subseteq \Theta$, $\mathbb{V}_\omega[\omega|E_1,\Theta_1] \leq \mathbb{V}_\omega[\omega|E_2,\Theta_2]$.

Parts i-iii put a useful restriction on the form of the equilibrium (part iv, which states that the conditional variance of ω is decreasing when there is more information about e and θ, is only used when discussing welfare implications):

Lemma 1. *i. In any PBE, the relative payoff to holding an election is increasing in θ.*
ii. Any PBE to the signaling model is of the form "hold an election if and only if $\theta > \hat{\theta}$" where $\hat{\theta} \in [\underline{\theta} - \epsilon, \overline{\theta}]$ for any $\epsilon > 0$.

Proof For part i, let $\Theta \subseteq [\underline{\theta}, \overline{\theta}]$ be the types that hold an election in equilibrium. Then the citizen best responses are $s_0^* = \mathbb{E}_\omega[\omega|\theta \notin \Theta]$ and with election result e is $s_1^*(e) = \mathbb{E}_\omega[\omega|e, \theta \in \Theta]$. So the difference between the payoff for holding an election and not for type θ' is:

$$\int_{e=0}^{1} \mathbb{E}_\omega[\omega|e,\theta \in \Theta] f_e(e|\theta')de - \mathbb{E}_\omega[\omega|\theta \notin \Theta]$$

The only place that θ' shows up is in the conditional density of e. By assumption 3, $\mathbb{E}_\omega[\omega|e,\theta \in \Theta]$ is increasing in e and the conditional distribution of e under higher θ' first

order stochastic dominates the distribution of e under lower θ', so the expression is increasing in θ', proving part i.

Part ii follows from that fact that in any semi-separating equilibrium not of this form, there exist types θ_1 and θ_2 such that $\theta_1 < \theta_2$ and type θ_1 holds an election by type θ_2 does not, a contradiction by part i. The pooling on holding an election equilibrium is captured by $\hat{\theta} = \underline{\theta} - \epsilon$ for any $\epsilon > 0$ and the pooling on no election equilibrium by $\hat{\theta} = \overline{\theta}$. ∎

So, we only need to check for pooling equilibria and semi-separating equilibria where the stronger types hold an election.

In order to pin down off the path beliefs for the pooling equilibria, I make the following additional assumptions:

Assumption 4. *If any of the following requirements identify a unique belief about the incumbent type, then the belief about the incumbent strength must be given by the conditional distribution of ω given this belief (and the election result, when applicable):*
i. In a pooling equilibrium where all hold an election, fix the citizen response to no election as s_0^*. For any $\Theta \subset [\underline{\theta}, \overline{\theta}]$ and $\theta' \in [\underline{\theta}, \overline{\theta}]$, if the expected payoff for type θ' holding an election strictly less than the payoff for holding an election for all types in Θ, the the citizen posterior belief that the incumbent type is in Θ upon observing no election must be 0.
ii Upon observing an off-the-path election, the citizen expected belief about ω is weakly increasing in e, and for some $\epsilon > 0$, $\mathbb{E}_\omega[\omega|e = 1 - \epsilon] > \mathbb{E}_\omega[\omega|e = \epsilon]$
iii In any pooling equilibrium where no type holds an election, for any $\Theta \subset [\underline{\theta}, \overline{\theta}]$ and $\theta' \in [\underline{\theta}, \overline{\theta}]$, if the expected payoff for holding an election given (1) for type θ' is strictly greater than the payoff for holding an election for all types in Θ, the the citizen posterior belief that the incumbent type is in Θ must be 0.

Conditions i and iii are analogous to the D1 criterion, and condition ii implies that the citizen responds to off-the-path elections in a manner analogous to on-the-path elections.

Combining the assumptions on the joint distribution of ω, e, and θ:

Lemma 2. *i. In a pooling equilibrium where no type holds an election, the citizen must infer the incumbent is type $\overline{\theta}$ when holding an election.*
ii. In a pooling equilibrium where all types hold an election, the citizen must infer the incumbent is type $\underline{\theta}$ when not holding an election.

Proof The first part follows from the fact that all types below $\overline{\theta}$ would get a strictly lower expected payoff from deviating to an election than the highest type, so the citizen must place probability zero on the possibility that $\theta < \overline{\theta}$ and hence believes that $\theta = \overline{\theta}$ with probability 1. The second part follows from analogous reasoning. ∎

Proof of proposition 3

To derive the range of Δ, first consider the limiting case where nearly no types hold an election:

$$\lim_{\theta \to \overline{\theta}} \Delta(\theta) = \int_{e=0}^{1} \mathbb{E}_{\omega}[\omega|e, \overline{\theta}] f_e(e|\overline{\theta}) - \mathbb{E}_{\omega}[\omega] = \mathbb{E}_{\omega}[\omega|\overline{\theta}] - \mathbb{E}_{\omega}[\omega] > 0.$$

That is, when only the strongest type holds an election, holding an election sends the signal that the incumbent is exactly the strongest type and not holding an election is uninformative. When nearly all types hold an election, the marginal type is the weakest type, giving:

$$\lim_{\theta \to \underline{\theta}} \Delta(\theta) = \int_{e=0}^{1} \mathbb{E}_{\omega}[\omega|e] f_e(e|\underline{\theta}) de - \mathbb{E}_{\omega}[\omega|\underline{\theta}] \geq 0$$

If the election is completely informative (e.g., if $e = \omega$), the integral simplifies to $\mathbb{E}_{\omega}[\omega|\underline{\theta}]$ and hence $\Delta(\underline{\theta}) = 0$.[17]

[17] More precisely, what matters is if the election reveals all of the private information held by the regime. I.e., if $e = \theta$, then the integral simplifies to $\mathbb{E}_{\omega}[\omega|\underline{\theta}]$ even if the private information is noisy.

As derived in the main text, a separating equilibrium must meet $\Delta(\hat{\theta}) = k$. The Δ function has the following properties:

Lemma 3. *If the election is fully informative (e.g., $e = \omega$), then $\Delta(\hat{\theta})$ is continuous and increasing in $\hat{\theta}$, with $\Delta(\underline{\theta}) = 0$ and $\Delta(\overline{\theta}) = \mathbb{E}_\omega[\omega|\overline{\theta}] - \mathbb{E}_\omega[\omega] \equiv \overline{k}_s$.*

Proof The continuity and values at the end points follow directly by the definition of Δ and assumption 3. To show Δ is increasing, it is easier to compare:

$$\frac{\partial}{\partial\hat{\theta}}\left[\mathbb{E}_\omega[\omega|\hat{\theta}]F_\theta(\hat{\theta})\right] = \mathbb{E}_\omega[\omega|\hat{\theta}]f_\theta(\hat{\theta}) + F_\theta(\hat{\theta})\int_0^1 \omega\frac{\partial f(\omega|\hat{\theta})}{\partial\hat{\theta}}d\omega$$
$$\frac{\partial}{\partial\hat{\theta}}\left[\mathbb{E}_\omega[\omega|\theta < \hat{\theta}]F_\theta(\hat{\theta})\right] = \int_0^1 \omega f(\omega|\hat{\theta})f_\theta(\hat{\theta})d\omega = \mathbb{E}_\omega[\omega|\hat{\theta}]f_\theta(\hat{\theta}) < \frac{\partial}{\partial\hat{\theta}}\left[\mathbb{E}_\omega[\omega|\hat{\theta}]F_\theta(\hat{\theta})\right]$$

where F_θ is the marginal cumulative density function of θ. So $\mathbb{E}_\omega[\omega|\hat{\theta}] - \mathbb{E}_\omega[\omega|\theta < \hat{\theta}]$ is monotonically increasing from 0 to $\mathbb{E}_\omega[\omega|\overline{\theta}] - \mathbb{E}_\omega[\omega] = \overline{k}_s$ as $\hat{\theta}$ increases from $\underline{\theta}$ to $\overline{\theta}$. □

By lemma 2, for there to be a pooling equilibrium with no election the binding constraint is that the highest type – which gets payoff $\mathbb{E}_\omega[\omega|\overline{\theta}]$ – prefers to not deviate when the citizen behaves as if all types do not hold an election and hence his best response to no election is $s_0 = \mathbb{E}_\omega[\omega]$. This condition is:

$$\mathbb{E}_\omega[\omega] \geq \mathbb{E}_\omega[\omega|\overline{\theta}] - k$$

Define the k such that this is met with equality $\overline{k}_s \equiv \mathbb{E}_\omega[\omega|\overline{\theta}] - \mathbb{E}_\omega[\omega]$, hence the condition for a no election equilibrium is $k \geq \overline{k}_s$.

Next, suppose there is a pooling equilibrium where all types hold an election. The binding constraint is that the weakest type prefers to hold an election if the citizen infers she is the weakest type upon deviating by lemma 2. This condition is $\mathbb{E}_\omega[\omega|\underline{\theta}] - k \geq \mathbb{E}_\omega[\omega|\underline{\theta}]$, so the condition for this equilibrium is $k \leq 0$.

The existence and uniqueness in part iii follows immediately from lemma 3. To show the proportion of types holding an election is decreasing in k:

$$\frac{\partial \hat{\theta}}{\partial k} = -\frac{\frac{\partial}{\partial k}\left[\mathbb{E}_\omega[\omega|\theta < \hat{\theta}] - \mathbb{E}_\omega[\omega|\hat{\theta}] + k\right]}{\frac{\partial}{\partial \hat{\theta}}\left[\mathbb{E}_\omega[\omega|\theta < \hat{\theta}] - \mathbb{E}_\omega[\omega|\hat{\theta}] + k\right]} = \frac{-1}{\frac{\partial}{\partial \hat{\theta}}\left[\mathbb{E}_\omega[\omega|\theta < \hat{\theta}] - \mathbb{E}_\omega[\omega|\hat{\theta}]\right]}$$

The denominator is negative as $\frac{\partial}{\partial \hat{\theta}}\left[\mathbb{E}_\omega[\omega|\hat{\theta}]\right] > \frac{\partial}{\partial \hat{\theta}}\left[\mathbb{E}_\omega[\omega|\theta < \hat{\theta}]\right]$. So as k is increasing, the threshold goes up and fewer types hold an election, completing part iii. ∎

Imperfectly Informative Elections

If the election is completely uninformative, it is not necessarily the case that $\Delta(\overline{\theta}) > \Delta(\underline{\theta})$, so clearly Δ is not necessarily strictly increasing. If Δ is not monotone, there may be multiple intersections with k and hence multiple equilibria. However, if we parameterize the informativeness of the election in any standard fashion, Δ will be continuous and increasing in $\hat{\theta}$ for sufficiently informative elections by continuity.

To prove proposition 4, write $\Delta(\underline{\theta})$ as:

$$\begin{aligned}\Delta(\underline{\theta}) &= \int_0^1 \mathbb{E}_\omega[\omega|e] f_e(e|\underline{\theta}) de - \mathbb{E}_\omega[\omega|\underline{\theta}] \\ &= \int_0^1 \left(\mathbb{E}_\omega[\omega|e] - \mathbb{E}_\omega[\omega|\underline{\theta}, e]\right) f_e(e|\underline{\theta}) de\end{aligned}$$

As long as there is a subset of E that is not measure zero such that $\mathbb{E}_\omega[\omega|e] - \mathbb{E}_\omega[\omega|\underline{\theta}, e] > 0$ – that is, the election result will not fully reveal that the incumbent is the weakest type, then it follows that $\Delta(\underline{\theta}) > 0$, proving proposition 4.

Citizen Welfare Implications and proof of Proposition 5

The signs on the components of equation 5 are determined by part iv of assumption 3, which guarantees:

$$\frac{\partial \mathbb{V}_\omega[\omega|\theta < \hat{\theta}]}{\partial \hat{\theta}} \geq 0$$
$$\frac{\partial \mathbb{E}_e[\mathbb{V}_\omega[\omega|e, \theta > \hat{\theta}]]}{\partial \hat{\theta}} \leq 0$$

It is not possible to always sign $\mathbb{V}_\omega[\omega|\theta < \hat{\theta}] - \mathbb{E}_e[\mathbb{V}_\omega[\omega|e, \theta > \hat{\theta}]]$, as if the election is not fully informative and few hold an election the citizen may forma more precise estimate of ω without an election.

Parts i-ii of proposition 5 follow immediately from the analysis in the main text. For part iii, first note $\mathbb{E}[u_C]$ is continuous in $\hat{\theta}$, and by part i $\mathbb{E}[u_C(\underline{\theta})] > \mathbb{E}[u_C(\overline{\theta})]$. So, a sufficient condition to ensure that u_C is not maximized at $\underline{\theta}$ is:

$$\left.\frac{\partial \mathbb{E}[u_C]}{\partial \hat{\theta}}\right|_{\theta=\underline{\theta}} = -f_\theta(\underline{\theta})(\mathbb{V}_\omega[\omega|\theta = \underline{\theta}] - \mathbb{E}_e[\mathbb{V}_\omega[\omega|e]]) - \frac{\partial \mathbb{E}_e[\mathbb{V}_\omega[\omega|e, \theta > \hat{\theta}]]}{\partial \hat{\theta}} > 0$$

which is equivalent the condition given in the statement of the proposition.