Transparency, Protest and Political (In)Stability[*]

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Abstract

The collapse of political regimes – both democratic and autocratic – is often brought about through large-scale mobilization and collective action (in the form of strikes and/or protests) by elements of the populace. The willingness of any given member of the public to participate in such actions against her leaders is contingent upon her beliefs about others' willingness to similarly mobilize. In this paper, we examine the effect of a specific form of transparency – the disclosure of economic data by the government to the populace – on citizen belief-formation, and consequently on collective mobilization. We present a theoretical model in which disclosure, under autocratic rule, (1) for a range of parameter values, increases the frequency of mobilization, and, for all parameter values, (2) increases the extent to which mobilization is correlated with incumbent performance. In democracies, by contrast, disclosure increases voter discrimination with respect to government performance, thereby increasing the effectiveness of elections in removing under-performing leaders. Because voting and mobilization

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act as substitute mechanisms in disciplining democratic governments, the risk of mobilization falls in transparency. We empirically test these claims and find that all enjoy robust support. Transparency destabilizes autocracies even as it stabilizes democracies.

More than petards or stilettoes, therefore, words – uncontrolled words, circulating freely, underground, rebelliously, not gotten up in dress uniforms, uncertified – frighten tyrants. But sometimes it is the official, uniformed, certified words that bring about the revolution.

– Ryszard Kapuściński, *Shah of Shahs*[1]

Governments, regardless of the form of political regime, live in the shadow of mass political unrest. At any given moment in time, the public may reject the existing political order and – through action (strikes/protests) in the streets – unseat their rulers or even upend the prevailing political regime. Under autocratic rule, this is one of two forms of threat that sitting leaders must negotiate in their decision-making: Mass mobilization constitutes the threat from below.[2] Autocratic leaders must also be concerned with threats to the existing regime emerging from within their own ruling coalition.[3] In democracies, mass mobilization may serve to enforce the existing political order – the threat of mass protests may ensure leaders comply with unfavorable electoral results and step down from office (Fearon, 2011; Little, Tucker and LaGatta, 2013). Alternatively, mass mobilization – particularly by extremist groups – may threaten continued democratic rule (Lipset, 1959).

However, those who would participate in mass unrest against their political leadership face a critical problem: While protests or strikes that draw universal (or near universal) participation are capable forcing the hand of nearly any form of political leadership, protests that do not pass this threshold may be put down, often quite violently and at considerable cost to participants. The willingness of any one citizen to participate in anti-regime mobilizations is therefore contingent on the willingness of others to similarly participate (Kuran, 1991; Lohmann, 1993). Participation in mobilization is thus subject to strategic complementarities – a given citizen grows more willing to engage in protest as she believes others are similarly willing to mobilize. But what then allows citizens to form shared beliefs in a manner that allows for coordinated protest?

In this paper, we examine the role the informational environment plays in facilitating or inhibiting collective action, and how information thus translates into the stability of political regimes.[4]

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[1]p. 103

[2]Throughout we use the terms mass mobilization, mass unrest, and protests interchangeably. Empirically, we operationalize these terms as strikes or protests.

[3]Svolik (2012) characterizes these threats as 'the problem of authoritarian control' and 'the problem of autocratic power sharing.'

[4]Throughout, we use the term regime to refer to the sitting leadership – either a party or ruling clique. Empirically, we follow Svolik's (2012) definition of an autocratic regime. By contrast, we use the term regime-type to refer to democracy/autocracy.

In particular, we focus on the presence or absence of publicly observable information on governments' economic performance. Publicly observable information plays an outsized role in interactions characterized by strategic complementarities, since such information allows citizens to not only update their beliefs about government performance, but also to update their higher order beliefs – their beliefs about the beliefs held by other citizens (Morris and Shin, 2002).[5] Publicly observable economic information thus facilitates the formation of shared expectations about the likely success of mass mobilization, rendering such mobilization feasible where absent such information it would be impossible.

We contend that, under autocratic rule, the availability of public economic information – which we term transparency – facilitates collective action and so renders autocratic regimes more vulnerable to threats from below.[6] In particular, transparency eases mobilization under economically under-performing autocrats. Economic growth thus plays a greater role in the survival of autocratic regimes when transparency is high. For plausible parameter values in our model, the increased provision of information more generally increases the ability of citizens to mobilize, directly reducing the stability of the autocratic leadership.

Under democratic rule, transparency plays a very different role. Citizens in democracies already encounter an information rich environment, due to the role elections play in informing citizens of the level of popular discontent (Fearon, 2011; Little, Tucker and LaGatta, 2013). Rather than directly influencing the ease of mass mobilization, therefore, transparency indirectly influences this probability through its effects on the electoral process. As more information is made available to citizens, they become better able to electorally sanction under-performing leaders (and reward over-performing leaders) (for a related discussion, see Duch and Stevenson, 2008). Transparency therefore enhances the efficiency of the voting process as a mechanism for removing under-performing leaders. As elections become more efficient at this purpose, the incentive for citizens to engage in mass protest against the current regime declines. Mobilization and voting act as substitute mechanisms for disciplining under-performing leaders. Since transparency improves the efficacy of elections, it reduces the necessity of unrest, stabilizing democratic regimes.

To anticipate our empirical results, we find support for our main theoretical predictions: transparency is associated with an increased risk of autocrat removal (via mass revolt or democratization) and a reduced risk of democratic collapse (transition to autocracy). These findings are associational – they do not demonstrate that transparency *causes* increased protests under autocracy or reduced instability under democracy. Given relatively the relative infrequency of such events

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[5]For an early application of higher order beliefs in a different setting, see Przeworski (1998).

[6]For reasons of analytical crispness, we adopt a narrowly tailored definition of transparency throughout. We recognize that the term can be used more broadly or defined along other lines. We return to this issue below.

and the cross-national nature of these data, proof of causality is extraordinarily difficult. However, we do conduct a number of additional analyses which serve to strengthen our contention that the mechanisms we describe are, in fact, at work.

First, note that the nature of our two main hypotheses helps to reinforce our results against omitted variable bias. For any variable that is correlated with transparency to systematically bias our results, it must have opposing effects on the stability of autocratic and democratic regimes. Our results may be biased by confounds correlated with transparency that enhance (reduce) the stability of *all* regimes, but while such confounds bias our estimates with regards to democracies (autocracies) in our favor, they bias our estimates with regards to autocracies (democracies) in a manner that cuts against our predictions.

We further examine the relationship between transparency, growth, and forms of autocratic instability *not* involving mass unrest.[7] Our theoretical predictions pertain to the threat of mass mobilization, and to the danger such mobilization poses for autocratic rulers. We make no claims regarding other forms of instability; though, we note that Boix and Svolik (2011) contend that transparency should reduce the frequency of coups under autocratic rule. We find that highly transparent autocrats face a *reduced* risk of removal via a coup (conceived of a as plot involving the military or other elites and backed by the threat of force), in keeping with Boix and Svolik's claims. If we examine all forms of autocratic regime removal, transparency's contrasting associations with coups and mass unrest offset, such that there is no association between transparency and the risk of regime collapse overall. Our results therefore indicate that the relationship between autocratic stability and transparency *only* holds for forms of instability mediated by mass unrest. This finding belies the notion that only weak autocrats – those vulnerable to all forms of instability – provide information to the public.

We additionally test the association between transparency and various forms of opposition to autocratic regimes – both forms of opposition that entail mass unrest (anti-government demonstrations, strikes) and those that do not (assassinations, guerrilla movements, revolutions). Our theory makes strong predictions with regards to the relationship between transparency and the former, and we have no *ex ante* reason to anticipate any relationship between transparency and the latter. We find that transparency increases the frequency of demonstrations and strikes and is broadly uncorrelated with other forms of unrest. In these tests, we accomplish several aims. First, we assess model mechanisms more directly than our results with regards to democratic and autocratic collapse allow. Second, we guard against a form of selection bias. If autocratic

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[7]Throughout, we define autocratic instability in terms of the probability that a given regime or ruling clique is removed from its position. This may or may not imply democratization – i.e., instability of the regime-type.

regimes liberalize information provision in order to buy civil peace, estimates of the relationship between transparency and the frequency of strikes and protests would be biased toward a null result. The fact that we detect a positive correlation between transparency and these forms of instability suggests that any such bias cannot be large. Third, we further guard against a spurious relationship between transparency and autocratic stability. If omitted factors correlate with both transparency and threats to autocratic regimes, it is unlikely that these factors would *only* correlate with forms of instability involving mass unrest. Rather, we would expect similar findings with respect to assassinations, coups, guerrilla movements, and revolutions.

These results cannot fully insulate our findings from the threat of endogeneity. Indeed, we acknowledge that endogeneity persists – our estimates are likely to be biased. These tests do, however, suggest that such biases are unlikely to be large and that plausible alternative explanations for any one result cannot systematically explain *all* our empirical findings. This broad set of results thus lends considerable credence to our claims regarding the mechanisms linking transparency and regime stability. Our theory posits that all of the above findings should hold. Few alternative mechanisms can credibly explain the patterns we document.

The paper proceeds as follows: We first outline our argument in greater detail. We then formalize these intuitions using a game theoretic model of collective action and transparency under both autocratic and democratic rule. This model predicts (1) that transparency strengthens the relationship between growth and autocratic instability, (2) that – for a broad range of parameter values – transparency is associated with a greater risk of autocratic collapse (due to pressures from below), (3) that transparency is specifically associated with mass mobilization (strikes, demonstrations), and (4) that transparency is associated with the stability of democratic regimes. We then empirically test all four implications, using a measure of transparency that reflects the reporting/non-reporting of economic data to the World Bank.

Argument

Political regime-typess must be self-enforcing. Actors in the political system – the leadership, opposition and citizens – cannot usually appeal to external enforcement bodies to ensure compliance with constitutional provisions; compliance with institutional rules must emerge rationally in response to the strategies of other players in the political game – institutions must be an equilibrium (Grief, 2006; Przeworski, 2005; Weingast, 1997). The compliance of all actors is ensured by the threat of punishment by other political actors. In some instances, compliance will be ensured by the threat of retaliation by political leaders or parties against other elites that transgress insti-

tutional rules (Myerson, 2008; Przeworski, 2005; Wantchekon, 2004). This possibility represents a threat to leaders from within the political system. In other instances, compliance with political rules is enforced by the threat of unrest from below (Fearon, 2011; Weingast, 1997; Wood, 2000). Citizens' threat to remove sitting political leaders – or even to upend the existing political system – by taking to the streets serves as a constraint on government actions.[8] Variation in the ability of the citizenry to so-mobilize thus plays a critical role in the stability and form of political institutions.

Mass political mobilization has therefore been given a prominent place in explanations for the ousting of political leaders and transitions between regime-types. Nowhere is this more true than in the literature on democratization. Theoretical accounts of democratization often stress the role of revolutionary threats on the part of the masses in securing the extension of suffrage (e.g., Acemoglu and Robinson, 2006; Boix, 2003; Rosendorff, 2001), a claim given weight by empirical research (e.g., Przeworski, 2009). The threat that mass mobilization poses for autocratic leaders and ruling cliques – and the importance of attempts to repress or co-opt the masses – has played a prominent role in writings on authoritarian regimes more generally (e.g., Gandhi, 2008; Svolik, 2012; Wintrobe, 1998). Similarly, under democratic rule, mass mobilization poses a potential threat to both particular political leaders and the established political order. Lipset (1959) in particular notes that mobilization may lead to the upending of democratic rule and the transition to autocracy. More recent works stress that the threat of mass unrest may make democracy self-enforcing – the threat of mass protest may induce incumbent leaders who are voted out of office to step down from power (Fearon, 2011; Little, Tucker and LaGatta, 2013). In these models, the actual manifestation of unrest is indicative of a democratic breakdown – non-compliance by one or more parties with the democratic equilibrium.

If mass unrest plays such a critical role in political stability, what factors make unrest more or less feasible? How do these factors, in turn, influence the stability of ruling cliques and political regimes? We address one such factor – government transparency – in this paper.

Our conception of mass unrest begins with the observation – attributable to Kuran (1991) and Lohmann (1993) – that protest is subject to a collective action problem. The costs any citizen faces from engaging in protest are falling in the number of her fellow citizens who similarly choose to protest – mass unrest is subject to strategic complementarities. These complementarities may arise from the simple logistics of repression – for a given level of government response, the probability that a particular protester is arrested or physically harmed falls as the number of her fellow protesters rises. Or, it may be that the police/military will be unwilling to respond with force

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[8]This conception of threats from below is not confined to formal models of political institutions. Notions of the threat citizen mobilization poses to regimes relate to the concept of 'tacit consent' dating back to Locke (1980/1690).

to a sufficiently large mass of civilians on the streets. Regardless, the costs of protests decline, and the odds of meeting the objective of unseating or forcing compromises from the leadership rise, with turnout.

The willingness of any given citizen to turn out in the streets is therefore dependent on her beliefs about whether her fellow citizens will similarly mobilize. In such an environment, publicly observable information will play a particularly important role in citizen behavior. We particularly focus on the role of publicly observable information on the economic performance of the sitting government. We contend that citizens are more likely to mobilize when they perceive that the ruling clique is mismanaging the economy, either as a result of its attempts to extract rents for members of the ruling elite or simply as the result of incompetence. Publicly available information plays a critical role as it can (1) confirm or refute citizen perceptions of economic mismanagement and, critically, (2) it can also inform citizens about others' beliefs regarding the extent of misman-agement. Each individual is aware of the fact that public information is also available to her fellow citizens, thus such information allows her to better judge others' perceptions of the ruling elite. As citizens become more aware of one another's perceptions, they become better able to judge the willingness of others to mobilize in protest. Public information thus plays an outsize role in shaping the incentives for mobilization (Morris and Shin, 2002).

The role played by the dissemination of economic data – a form of governmental transparency – hinges on political institutions.[9]

Under autocratic rule, elections are either altogether absent or are so heavily manipulated as to ensure the victory of incumbents. Mass unrest is therefore the only mechanism through which pressure from below can unseat incumbent leaders.[10] The incentives to engage in such unrest are highest when the sitting regime has revealed itself to be either predacious or incom-petent – i.e., when its economic performance is poor. As greater amounts of public information on economic performance are made available, citizens are better able to assess the performance of the government. Citizen perceptions align more closely with economic reality. Moreover, when the government's performance is in fact poor, government transparency helps to ensure that cit-izens share a perception of this poor performance – and that they are aware these beliefs are shared. Consequently, as transparency rises, the economic performance of the sitting govern-ment will translate more readily into manifestations of popular unrest. Transparency conditions the relationship between economic outcomes and unrest – making this correlation stronger.

If successfully unseating the sitting government via mass unrest is sufficiently 'difficult' – i.e.,

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[9]We define transparency in detail in the next section.

[10]Note that we do not assume that such unrest results in democratization, merely that it has the potential to unseat autocratic leaders or regimes.

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if the costs to unrest are sufficiently large relative to the benefits of success, or the threshold of participation necessary to unseat the incumbent is sufficiently high – citizens will only engage in protest when highly certain of the government's under-performance. Moreover, they must be similarly certain that this perception is widely shared. Without public disclosure of economic information, this level of certainty is unlikely to be attained – even when the leadership does perform poorly. As the level of transparency rises, the threshold level of certainty necessary to facilitate unrest – certainty both with regards to individual perceptions of government performance and higher order beliefs that these perceptions are shared – is more likely to be attained. Consequently, the unconditional probability of unrest rises with transparency. Autocratic regimes are therefore more likely to be unseated by threats from below as levels of transparency rise.

Under democratic rule transparency plays a quite different role. This is, in part, because the electoral process ensures that democracies are information rich environments.[11] Citizens are able to act upon their perceptions of government performance by voting for or against the incumbent regime, implying that vote returns provide valuable information as to the distribution of discontent in the populace (Fearon, 2011; Little, Tucker and LaGatta, 2013). The disclosure of economic information is therefore likely to play little role in shaping perceptions about the likelihood (or likely success) of mass unrest – this information is already made available through the electoral process. Citizens are most likely to engage in unrest following an election if the electoral process fails to remove (fails to retain) an incumbent who inspires significant levels of discontent (support) (Fearon, 2011; Hafner-Burton, Hyde and Jablonski, forthcoming; Little, Tucker and LaGatta, 2013; Tucker, 2007).

Transparency, rather than influencing the probability of unrest, instead serves to shape voters' decisions at the ballot box. Information on the government's economic performance will shape citizens' incentives to vote for or against the incumbent leadership, since such information is indicative of whether the government is a predatory or incompetent type.[12] As more information is made available, under-performing leaders are more likely to be *voted* out of office, while over-

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[11]Our theory requires two prerequisites of democracy: First, it must be possible to remove incumbents through electoral means. Second, the voting process must be informative – i.e., publicly disclosed vote returns must reflect levels of popular support. These theoretical requirements are in keeping with the definition of our empirical measure of democracy, which is drawn from the *Democracy and Development* (DD) dataset (Cheibub, Gandhi and Vreeland, 2010, 69). It is worth noting that elections may play an informational role even if they fail to meet typical standards of fairness. In models of electoral fraud, Little (2012) and Simpser (2004) demonstrate that election returns may be informative – even perfectly so – in the presence of fraud. So long as citizens correctly anticipate fraud and discount election returns appropriately, elections will serve the information generating role stressed below.

[12]This contention relates to the notion of sociotropic voting in the American electoral behavior literature. For debates on sociotropic voting see Hibbs (2000), Kramer (1983) and Markus (1988). It also relates closely to the notion of the economic vote and the signal extraction problem voters face in assessing leaders' competency based on economic outcomes (Duch and Stevenson, 2008).

performing leaders are more likely to be retained. In essence, the provision of information to the voters increases the efficiency of elections as a mechanism for addressing problems of adverse selection in representative government.

In a democracy, mass unrest and elections act as substitute mechanisms through which the public may sanction the performance of their leaders. The incentives to engage in mass unrest reach their highest when the public perceives that elections were ineffective at removing under-performing incumbents. Since higher levels of transparency ensure that such underachieving incumbents are voted out of office with greater frequency, they also ensure incentive to engage in unrest declines. Transparency thus serves to reinforce the stability of democratic rule.

Defining Transparency

The definition of transparency used here pertains to the collection and disclosure of credible economic data. Such data must be publicly disclosed – and known to be publicly disclosed – if citizens are to update their beliefs not only about government behavior, but also their higher order beliefs about the perceptions of their fellow citizens. These data must be credible if citizens are to update their beliefs about government actions based upon the disclosed information. And they must be aggregated such that the experiences of a broad swath of the population are reflected in the numbers that are presented.

We draw our empirical measure of transparency from the HRV Index (Hollyer, Rosendorff and Vreeland, 2013) – a continuous measure of data disclosure that accurately captures these three aspects of our theoretical notion of transparency. This index is based upon the reporting/non-reporting of data to the World Bank's *World Development Indicators* (WDI) data series (World Bank, N.d.). It summarizes the reporting of 240 variables selected from across the WDI. The reporting of these variables is summarized on a single dimension, through the use of an item response model – where transparency is treated as the latent tendency to report data. The result is a continuous transparency measure (which is unique up to an affine transformation), that covers 125 countries from 1980-2010.

Because the WDI contains aggregate economic data which are collected by national statistical agencies and provided to international organizations, it constitutes a direct measure of the collection and dissemination of aggregate economic data. The disclosure of such data to the World Bank proxies for public disclosure more generally. (In recent years, the World Bank has provided these data directly to the public.) Finally, these data are credible insofar as they survive the scrutiny of the World Bank's review. Observations that are deemed 'questionable' are deleted

from the WDI.[13]

Both the notion and measure of transparency that we employ here are thus narrowly defined. We conceive of transparency simply as the disclosure of data, not as a general conception of 'openness,' which may pertain to any aspect of information transmission in a given polity. Broader conceptions of transparency may encompass the structure of political institutions (Broz, 2002; Dahl, 1971), the role of the media (Adserà, Boix and Payne, 2003; Besley and Burgess, 2002; Djankov et al., 2003), the presence or absence of freedom of information laws (Berliner, 2011; Islam, 2006), or even the role of social or ethnic ties in disseminating information (Grief, 2006; Habyarimana et al., 2009). Alternative measures and conceptions of transparency may be well-suited to address other specific questions. We prefer our measure in this instance because it neatly conforms to the notion of transparency developed in our theoretical model. Our hypotheses concern the extent to which economic data are common knowledge, so data dissemination is the appropriate measure of transparency for this analysis.

Existing Literature

Our paper thus most clearly relates to the literature on protests and mass mobilization – starting with Kuran's (1991) observation of the collective action problems involved in mass mobilization. Lohmann (1993) explicitly deals with the importance of information in such interactions, and with the role of costly signaling in solving collective action problems. A more recent literature on mass protest and collective action similarly emphasizes the informational problems involved in coordinating protests (Bueno de Mesquita, 2010; Shadmehr and Bernhardt, 2011).

Like these more recent works, our theoretical treatment of transparency and mass unrest builds on the mechanics of global games (Carlsson and van Damme, 1993; Morris and Shin, 1998, 2001). Our depiction of the role of transparency owes particularly to Morris and Shin (2002), who emphasize that – in the presence of strategic complementarities – public information plays a dual role, causing observers to update their own beliefs as well as their higher order beliefs about the beliefs of other players.

Our approach differs from existing treatments of protest in that: (1) We explicitly focus on the role of publicly available economic information which is informative of leaders' performance. (2) We incorporate political institutions into our model of protest. Existing findings either assume the

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[13]See the World Bank statements regarding the WDI: http://data.worldbank.org/about/data-programs, accessed March 7, 2011. In some instances, these data are weeded out by the World Bank itself. In others, international organizations that act as intermediaries between the World Bank and national statistical agencies conduct their own quality review.

only outlet for citizens' discontent is via the streets (Bueno de Mesquita, 2010; Shadmehr and Bernhardt, 2011), or focus only on democratic governments and the possibility of protests in the wake of elections (Fearon, 2011; Little, Tucker and LaGatta, 2013).

Our findings with respect to democracy rely on the insight that electoral returns are informative of levels of citizen discontent, and thus may serve to foster protests. This insight owes heavily to Fearon (2011), who demonstrates that the informational role of elections may make democracy self-enforcing. Little, Tucker and LaGatta (2013) build upon this argument, and stress the importance of the informativeness of (absence of fraud from) electoral returns to the existence of a self-enforcing democratic equilibrium – an argument that is given empirical support (with an application to election monitoring) by Hyde and Marinov (forthcoming). A related empirical literature has stressed the importance of elections in mobilizing unrest, particularly in the 'colored revolutions' that hit much of post-Soviet Europe in the early 2000s (Bunce and Wolchik, 2006, 2011; Tucker, 2007).

Our depiction of democracy also hews closely to notions of retrospective voting (Barro, 1973; Ferejohn, 1986) – particularly retrospective voting in the presence of adverse selection (Banks and Sundaram, 1993; Fearon, 1999). We deviate from these theoretical models both through our focus on the informational environment and through the addition of the threat of mass unrest to the game form. Theoretical models of retrospective voting have been given empirical weight in a substantial literature on the economic vote. Here, our contentions relate particularly closely to those of Duch and Stevenson (2008), who examine the signal extraction faced by members of the public when assessing government competence through variations in economic performance. Whereas Duch and Stevenson focus on the role of political and economic institutions in shaping the clarity of the competence signal received by members of the public in a set of highly developed and transparent democracies; we examine a more basic problem of information provision in a wider set of states.

Our findings also speak to an expansive literature on mass unrest and regime stability. Models of autocratic rule (Gandhi, 2008; Svolik, 2012; Wintrobe, 1998) often assume that leaders are constrained by the threat of mass unrest, and must employ co-optation or repression to deal with this threat. Our results suggest when such pressures may be more or less acute. The literature on the stability of political regimes also often assumes the importance of mass (or revolutionary) threats from the populace. This is most obvious in models of democratization, wherein revolutionary activities on the part of the citizenry – or the threat thereof – may give rise either to the direct usurpation of authoritarian regimes or the extension of suffrage (Acemoglu and Robinson,

2006; Boix, 2003; Rosendorff, 2001; Przeworski, 2008).[14] While our results speak to broader forms of autocratic instability than democratization (i.e., we are more concerned with the removal of autocratic leaders via mass unrest than explicitly with the regime-type that follows); our findings are suggestive as to when this revolutionary threat may be more or less powerful.[15] We speak still more directly to the role that mobilization may play in stabilizing or destabilizing democratic regimes (Lipset, 1959).

Finally, we note that our paper closely relates to an account of autocratic stability and transparency *within* autocratic regimes put forth by Boix and Svolik (2011). Like us, Boix and Svolik examine collective action problems in unseating autocratic leaders, and the role the informational environment plays in shaping these interactions. Unlike our paper, however, Boix and Svolik concentrate on threats that emerge from within the ruling regime – i.e., the threat of coups. Their concern is with the contest for power between a dictator and members of his winning coalition, in which the dictator may seek to secretly accrue power at the winning coalition's expense. Other elites constrain this behavior via the threat of coup. Boix and Svolik's conception of transparency differs radically from ours – in their paper, transparency (which is operationalized as the level of institutionalization of the autocratic regime) consists of clear rules of behavior, the violation of which may mobilize a coup. They conclude that this form of transparency stabilizes autocracies by reducing the frequency of coups. We, by contrast, focus on transparency as the public disclosure of economic information, and on the role this disclosure plays in coordinating mass unrest by the populace. We conclude that transparency destabilizes autocracies by increasing the frequency of revolt and democratization.[16]

Model

We offer a model of political protest and mass mobilization in polities where the opportunity to vote in consequential elections is either absent (which we label "autocracies") or present ("democracies"). While we borrow from the literature on global games (Carlsson and van Damme, 1993; Morris and Shin, 2001, 2002), the model we present is not a global game, as it does not satisfy

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[14]Bermeo (1997) examines the competing evidence for the role of mass mobilization in promoting or inhibiting democratization.

[15]Our paper does not speak to the expansive literature on other pressures for regime transition – e.g., structuralist accounts (Huber, Rueschemeyer and Stephens, 1993; Lipset, 1959; Moore, 1966), or the voluntary extension of the franchise (e.g., Lizzeri and Persico, 2004).

[16]In empirical models in which we constrain our attention to autocratic regime failures resulting from coups, we find that transparency is associated with a reduction in coup frequency, in keeping with Boix and Svolik (2011). Our results indicate that information plays radically different roles in inspiring mass unrest and intra-regime violence.

two-sided 'limit dominance ([Bueno de Mesquita](), [2010](), 450). Our approach most closely resembles that of [Bueno de Mesquita]() ([2010]()), which also depicts mass unrest.

Our chief innovation is the introduction of a commonly observed signal of government policy, here meant to depict the disclosure of aggregate economic data. This information is assumed to be unbiased and to be a more precise signal of government policies than individual economic outcomes. We treat the variance of this public signal as a measure of (the inverse of) transparency. All comparative statics are with respect to this variance.

Transparency in Autocracies

Consider an interaction between an autocratic leader L and a mass of citizens. Each citizen is denoted i where i is indexed over the unit interval $i \in [0, 1]$.

Citizens seek to infer the leader's type, which may be either 'good' or 'bad.' Our model is one of adverse selection in government. A leader's type may refer to his level of skill, competence, or honesty. 'Good' leaders will therefore return better economic performance than 'bad' leaders. Citizens may therefore seek to remove 'bad' leaders from office, while retaining 'good' types.

So, L may be of one of two types, $\theta \in \{0, 1\}$. Nature chooses L's type θ where $\theta = 1$ with probability p and $\theta = 0$ with probability $1 - p$. In each period during which she is in office in office, L chooses whether or not to provide a public good $G_t \in \{0, 1\}$, where $t \in \{1, 2\}$ denotes the period of play. L's utility from doing so is a function of her type, such that in each period:[17]

$$u_{L,t}(G_t; \theta) = \begin{cases} 1 \text{ if } G_t = \theta \\ 0 \text{ otherwise} \end{cases}$$

$$u_L = \sum_{t=1}^{2} u_{L,t}(G_t, \theta)$$

L's choice regarding public goods provision $G_t \in \{0, 1\}$ has implications for economic outcomes in the following manner: Each citizen i receives an income $y_{i,t} = G_t g + \epsilon_{i,t}$, where $\epsilon_{i,t} \underset{\text{iid}}{\sim} N(0, \sigma_y^2) \; \forall \; i, t$, and g is a strictly positive constant. The standard deviation of individual outcomes, $\sigma_y > 0$, captures all factors exogenous to government policies that may shift a given citizen's economic welfare. Each citizen observes $y_{i,t}$, but goes not observe the value of G_t. In observing first period income, $y_{i,1}$, the citizen is also receiving a signal about the type of government it is facing, which informs its decision about whether to engage in protest to induce the leader's potential removal.

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[17]Actors do not discount over time. The results would be unchanged by including a discount factor.

In the first period of play, all citizens *also* receive a publicly observable signal of the state of the economy s. We assume that $s = G_1 g + \rho$, where $\rho \sim N(0, \sigma_s^2)$ and $E[\rho \epsilon_{i,t}] = 0 \; \forall \; i, t$, where $\sigma_s > 0$ is the standard deviation of this publicly observed signal. s is meant to depict the role of publicly disclosed aggregate economic data, which enable citizens to form beliefs about government performance. As more information is made available, citizens are better able to discern the role of government policies in shaping economic outcomes – consequently σ_s shrinks.[18] σ_s is thus a measure of the inverse of transparency (i.e., of opacity). As σ_s declines, transparency rises.[19] Since s depicts the public disclosure of *aggregate* economic data, we further assume that $\sigma_s < \sigma_y$.

After receiving her signals (both public and private) of government performance, each citizen i may mobilize in an attempt to overthrow the sitting government, $a_i \in \{0, 1\}$. Let the total number of citizens engaged in collective action be $A \equiv \int_0^1 a_i di$. If A exceeds some exogenous threshold $T \in (0, 1)$, the sitting government will be removed and replaced by a new L, whose type is drawn with the same distribution as the prior leader. We define an indicator function $R(A)$ to denote removal, such that:

$$R(A) = \begin{cases} 1 \text{ if } A \geq T \\ 0 \text{ otherwise.} \end{cases}$$

If a leader is removed, a new one is drawn. The model makes no assumption that democracy emerges.

Engaging in mobilization entails a cost of $\kappa > 0$ for each citizen. However, if the collective protest is successful in removing the sitting leader, each citizen that participates in these protests gains a benefit $\beta > \kappa$. These benefits may be thought of as the psychological returns from participating in the successful overthrow of the *ancien regime*, or as material benefits owing to the likelihood of favors from any new regime that replaces the old. In either case, β represents a

---

[18]Values of σ_s remain strictly positive, however. Citizens are never able to perfectly deduce government competence as a result of economic fluctuations – the fluctuations may derive from factors exogenous to government behavior or as a result of decisions made by lower-level officials insulated from direct accountability to the government (Duch and Stevenson, 2008). Our contention is merely that, *ceteris paribus*, σ_s falls as transparency rises.

[19]Transparency, and hence disclosure is an exogenous parameter in the model, rather than a choice variable for the government. Our focus here is on the role transparency plays in fostering mobilization – i.e., on citizen belief formation and collective action. We model government's decisions to disclose – assuming its implications for leader survival – elsewhere (Hollyer, Rosendorff and Vreeland, 2011). Other work has explored the adoption and importation of transparency-enhancing institutional innovations - such as joining international organizations (IOs) with monitoring and adjudicatory devices (Hollyer and Rosendorff, 2012; Mansfield, Milner and Rosendorff, 2002). A general theory endogenizing the level of transparency conditional on its effects of autocrat survival remain part of this broader research agenda.

form of 'selective incentive' for mobilization (Olson, 1971). Each citizen's utility function is:

$$u_i(y_{i,1}, y_{i,2}, a_i; A) = y_{i,1} + y_{i,2} + a_i[R(A)\beta - \kappa].$$

The order of play proceeds as follows:

1. Nature chooses L's type $\theta \in \{0, 1\}$. The value of θ is revealed to L, but not to any citizen.

2. L chooses whether or not to provide the public good $G_1 \in \{0, 1\}$.

3. Nature chooses $\epsilon_{i,1} \forall i$. Nature additionally chooses the value of ρ. $y_{i,1}$ is revealed to each citizen i, but not to any other citizen. s is revealed to all citizens.

4. Each citizen chooses whether or not to engage in collective action $a_i \in \{0, 1\}$.

5. If $R(A) = 1$, L is replaced and Nature draws the type of its replacement $\theta \in \{0, 1\}$, where $Pr(\theta = 1) = p$.

6. The sitting L chooses the value of $G_2 \in \{0, 1\}$.

7. Nature chooses $\epsilon_{i,2} \forall i$. $y_{i,2}$ is realized for all citizens and the game ends.

While this resembles a global games approach to mass unrest (Angeletos, Hellwig and Pavan, 2007; Casper and Tyson, 2013) the game presented here does not satisfy the two-sided "limit dominance" condition (Morris and Shin, 1998) - there is no type of government for which political action is a dominant strategy for any signal (in fact there are only two types in our model). Consequently, multiple equilibria exist. In particular, two equilibria in which citizens do not condition their behavior on any information revealed during the game co-exist: one in which all citizens always mobilize, the other in which no citizen ever mobilizes. In the former instance, given the strategies of all other players, each i prefers to set $a_i = 1$, and thus obtain the benefits $\beta - \kappa > 0$ of participating in the successful mobilization – regardless of her beliefs about the government's type. Similarly, in the latter, given the strategies of all other citizens, each i prefers to set $a_i = 0$ – and thus avoid the cost $\kappa > 0$ of participating in an inevitably failed mobilization, regardless of her beliefs. We view these equilibria as implausible and/or as uninteresting. It is infeasible for all citizens to believe, with certainty, that their countrymen will all either engage or not-engage in political mobilization; and to believe that this will be the case regardless of the of the performance of the incumbent government.

We instead focus on a third equilibrium. Specifically, we focus on a pure strategy perfect Bayesian equilibrium (PBE) in which each citizen i conditions her mobilization strategy on both

her signals $y_{i,1}$ and s. We also restrict attention to monotone equilibria in which higher signals are interpreted weakly as corresponding to a higher likelihood of a high type leader, and furthermore we restrict attention to equilibria in which each i employs a cut-point strategy: i sets $a_i = 1$ if and only if $y_{i,1}$ is less than some threshold value $\bar{y}$ (Bueno de Mesquita, 2010). This threshold value $\bar{y}$ will be a function of the publicly observable signal (denoted $\bar{y}(s)$).

An equilibrium involving cut-point strategies has several desirable properties relative to the two "pooling" equilibria.[20] The cut-point equilibrium involves citizens acting upon all available information, and the the cut-point equilibrium probabilities of mass mobilization and of regime survival are conditional upon economic performance, which would not be true in the pooling equilibria. This contention enjoys substantial support in the empirical literature (Alesina et al., 1996; Haggard and Kaufman, 1995; Przeworski et al., 2000).

A PBE requires that beliefs of the citizens be consistent with the strategy profile and Bayes' rule, and that the strategy of any citizen and the leader be sequentially optimal given all the beliefs and the strategies of the other citizens (Fudenberg and Tirole, 1991). A cut-point PBE in monotone strategies is characterized by: (1) A threshold $\bar{y}(s) : \mathbb{R} \to \mathbb{R} \cup \{-\infty, \infty\}$, where political action occurs whenever $y_{i,1} < \bar{y}(s)$ for all i. Where $\bar{y}(s) = -\infty$, no citizen will ever mobilize; where $\bar{y}(s) = \infty$, all citizens mobilize. (2) A strategy for L from type- to action-space, $G_t : \{0,1\} \to \{0,1\}$. (3) Posterior beliefs $Pr(\theta = 0|y_{i,1}, s)$. We characterize each of these in turn; but first some preliminary definitions are necessary.

Definition 1. *Define $\bar{y}^*(s)$ implicitly by the value of $y_{i,1}$ that solves*

$$Pr(\theta = 0|y_{i,1}, s)\beta = \kappa. \tag{1}$$

This is the value of the private signal, given a public signal, that would yield posterior beliefs about the type of the leader such that the citizen is indifferent between taking political action and not, given that all the other citizens are behaving the same way. In the appendix, we show that this is well-defined. Using the definition of $\bar{y}^*(s)$ we can now specify $\bar{y}(s)$ as follows (where Φ is the CDF of the standard normal):

---

[20]This is not "pooling" in the traditional sense - where actors of different "types" take the same action. In the equilibria to this game where the voters take the same action, they may do so holding differing posterior beliefs. This is not a signaling game; while the first mover has private information, their action is hidden, and only a noisy signal of that action is observed; nevertheless there are some similarities - the citizens do form posteriors on the type of the first mover, and actions and beliefs must be consistent in equilibrium.

Definition 2. *Define*

$$
\bar{y}(s) = \begin{cases} \infty \text{ if } \Phi(\frac{\bar{y}^*(s)-g}{\sigma_y}) \geq T \\ \bar{y}^*(s) \text{ if } \Phi(\frac{\bar{y}^*(s)}{\sigma_y}) \geq T > \Phi(\frac{\bar{y}^*(s)-g}{\sigma_y}) \\ -\infty \text{ if } \Phi(\frac{\bar{y}^*(s)}{\sigma_y}) < T \end{cases}
\tag{2}
$$

The value of $\bar{y}(s)$ is the cut-point that characterizes the equilibrium, in which all citizens receiving a private signal below the cut-point choose to engage in political action; those with signals higher than $\bar{y}(s)$ stay off the streets. The equilibrium is simply stated as:

Proposition 1. *The following strategies and beliefs constitute a PBE.*

1. $G_t = \theta$ *for* $t = 1, 2$

2. $a_i = 1$ *if* $y_{i,1} \leq \bar{y}(s)$ *and* $a_i = 0$ *otherwise, for all* i

3. $Pr(\theta = 0|y_{i,1}, s) = \dfrac{\phi(\frac{y_{i,1}}{\sigma_y})\phi(\frac{s}{\sigma_s})(1-p)}{p\phi(\frac{y_{i,1}-g}{\sigma_y})\phi(\frac{s-g}{\sigma_s})+\phi(\frac{y_{i,1}}{\sigma_y})\phi(\frac{s}{\sigma_s})(1-p)}$ *for all* i *(Bayes' rule).*

where ϕ is the pdf of the standard normal.

All proofs are in the Appendix.

Intuitions

To develop the intuitions, consider first the leader's decision. The leader always matches his action with his type - this is a dominant strategy. 'Good' leaders maximize both their contemporaneous utility and the probability of retention by providing the public good. 'Bad' types, on the other hand, receive a sufficiently high utility from withholding the public good today to more than offset any reduced probability of retention (and thus the opportunity to withhold the public good tomorrow). Any citizen's problem therefore, is to try to refine the beliefs over the (hidden) action, and hence the type of the leader in office, based on both the private and public signals received.

If $\Phi(\frac{\bar{y}^*(s)}{\sigma_y}) \geq T > \Phi(\frac{\bar{y}^*(s)-g}{\sigma_y})$, the critical mass of protesters needed to remove the incumbent leader is loosely speaking, "moderate". Each citizen, after receiving both her private and public signals, computes her posterior beliefs about the type of leader she is facing, using Bayes' rule. Along the equilibrium path, those citizens receiving a poor signal of the leader's type engage in political action, with the intent to remove him from office. Those receiving a high signal are inclined to believe that the government is of a high type, and would like to preserve the leader

16

Each individual compares their own private signal $y_{i,1}$ with the threshold $\bar{y}(s)$, and protests if $y_{i,1} \leq \bar{y}(s)$.
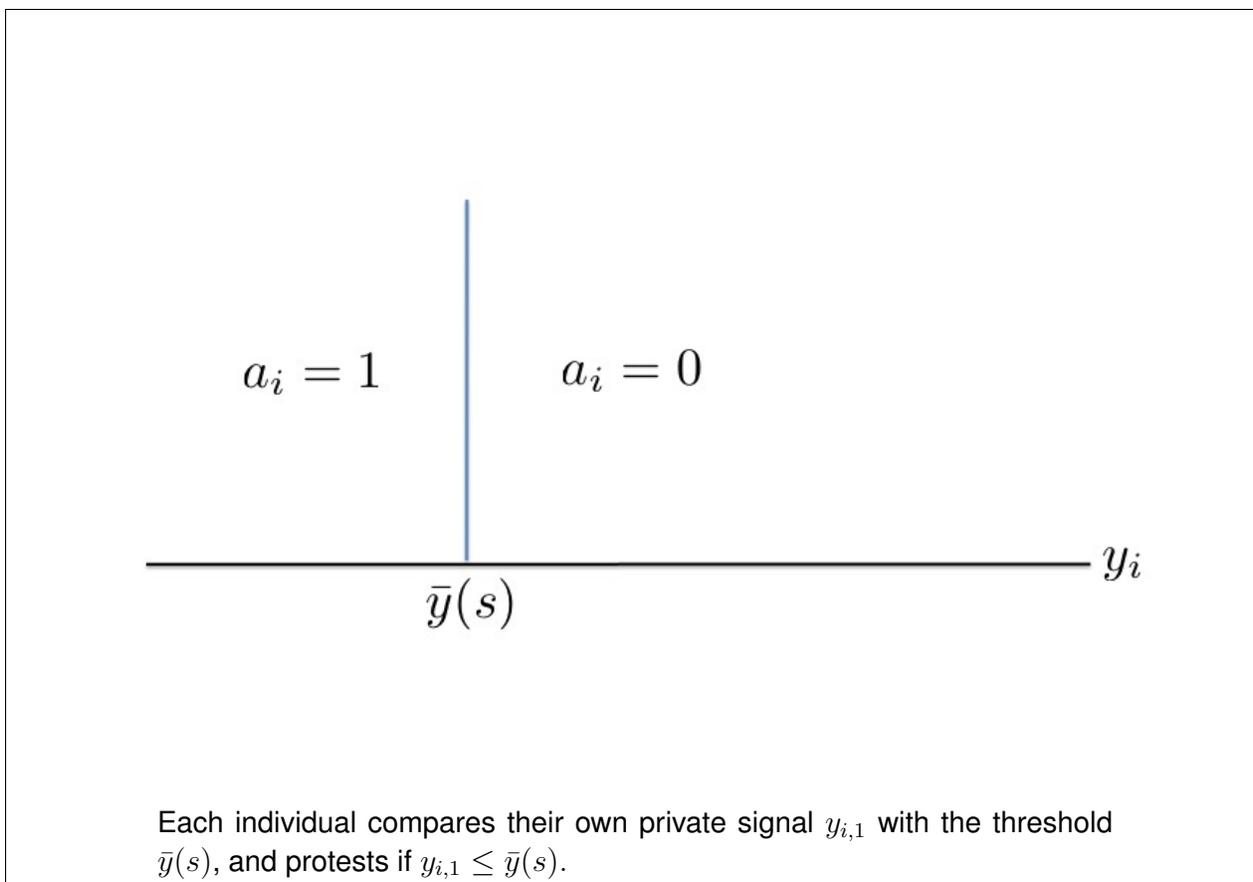
Figure 1: Individual Citizen's Decision

in office, and hence do not protest. Figure 1 demonstrates the individual decision made by any citizen.

Recall that there is a continuum of citizens. Therefore, given the equilibrium threshold, we can compute what fraction of the citizens will protest in equilibrium. This of course depends on the distribution of the private signals. If the leader is truly of type 0 – the "bad" type – the distribution of signals received by the voters has mean zero. Then in Figure 2 we see that the fraction of the population that mobilizes when in fact $\theta = 0$ is given by the blue region, or more precisely, $\Phi\left(\frac{\bar{y}^*(s)}{\sigma_y}\right)$, where Φ is the cdf of the standard normal.

If instead, the leader is actually the "good" type – $\theta = 1$ – then the mean of this distribution is given by $g > 0$. The the distribution is shifted to the right, and the fraction of the population that is mobilized to protest is smaller. In Figure 3 we see that the fraction of the population that mobilizes when in fact $\theta = 1$ is given by the red region, or more precisely, $\Phi\left(\frac{\bar{y}^*(s)-g}{\sigma_y}\right)$.

If the number protesting when the leader is bad (the blue region) is larger than T, the threshold for leader removal, but the number protesting when the leader is good (the red region) is smaller

The blue region is the fraction of population that mobilizes, $\Phi\left(\frac{\bar{y}^*(s)}{\sigma_y}\right)$ when in fact $\theta = 0$, where Φ is the cdf of the standard normal
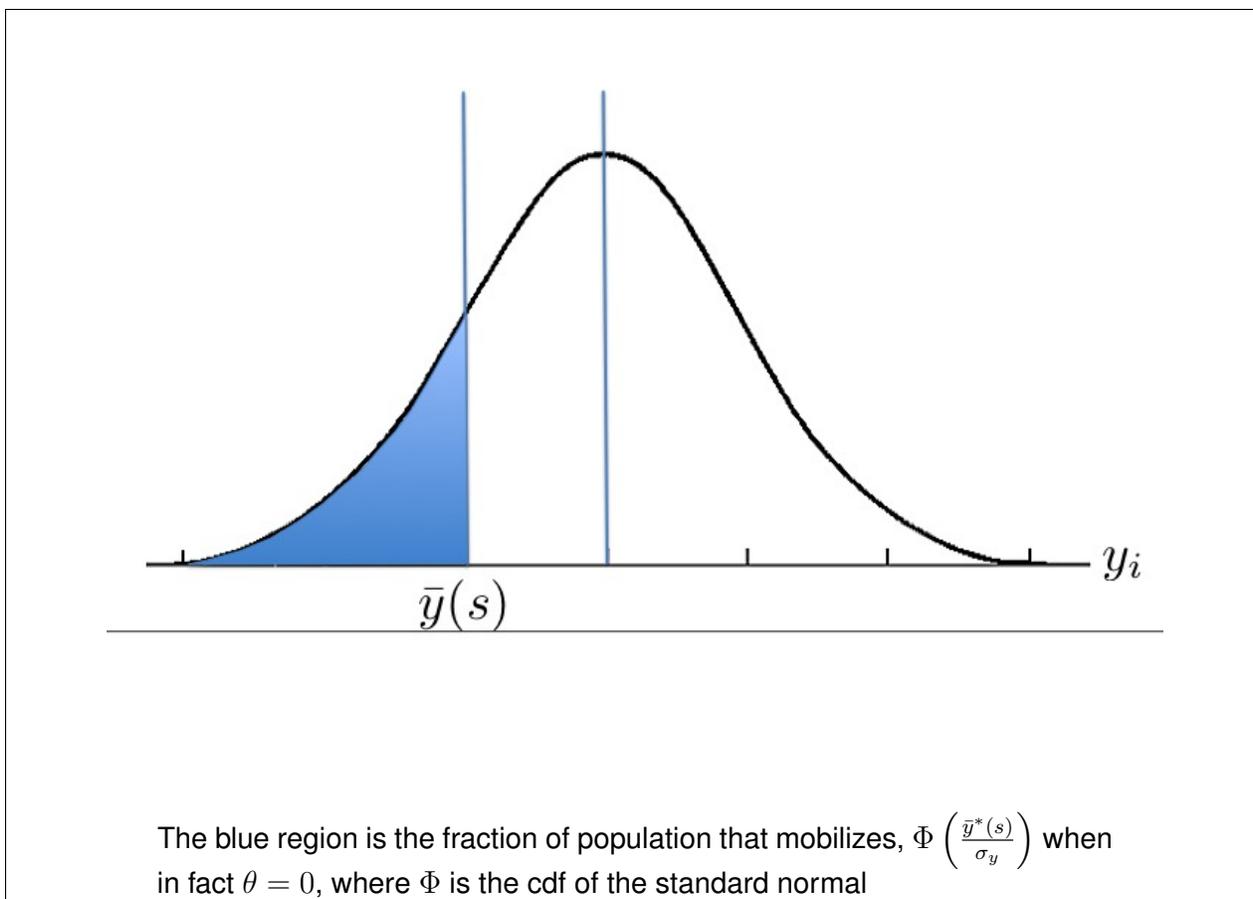
Figure 2: Political action when Leader is "bad"

than T, then under the equilibrium strategies of the citizens, good types are retained and bad types are removed. More precisely, leaders of type $\theta = 1$ are retained, and leaders of type $\theta = 0$ are removed in equilibrium if $\Phi\left(\frac{\bar{y}^*(s)-g}{\sigma_y}\right) \leq T \leq \Phi\left(\frac{\bar{y}^*(s)}{\sigma_y}\right)$.

To ensure that each citizen is playing a best response, we need only check that the threshold is chosen to make recipient of that signal indifferent between mobilization and not. Then $a_i = 1$ if and only if

$$Pr(\theta = 1|y_{i,1}, s)g + Pr(\theta = 0|y_{i,1}, s)[pg + \beta] - \kappa \geq Pr(\theta = 1|y_{i,1}, s)g + Pr(\theta = 0|y_{i,1}, s)pg$$
$$Pr(\theta = 0|y_{i,1}, s)\beta \geq \kappa$$

Considering first the left-hand side of this inequality, the expected utility from engaging in protest: If the leader is "good", $\theta = 1$, then the he will be retained and in the second period he will choose $G_2 = g$ – hence the first term on the left hand side. In the instance that the leader is a bad type,

18
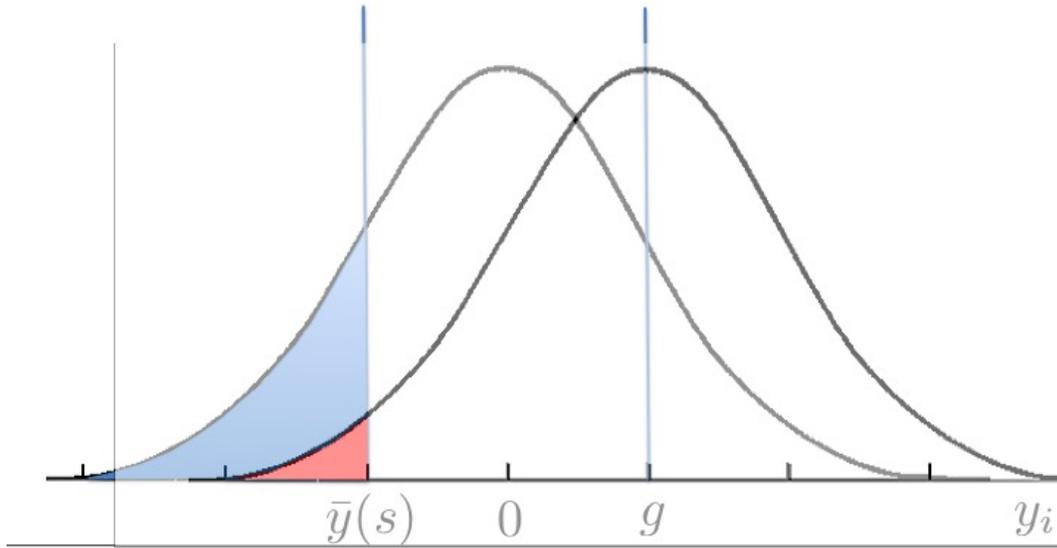
The red region is the fraction of population that mobilizes when the type is "good", $\Phi\left(\frac{\bar{y}^*(s)-g}{\sigma_y}\right)$ when in fact $\theta = 1$.

Figure 3: Political action for both types of leader

$\theta = 0$, the leader is removed in equilibrium. With probability p, a "good" type enters, and chooses $G_2 = g$; otherwise $G_2 = 0$. In addition, there is benefit of joining a successful insurrection, of an amount β, but protest costs κ in any case.

We now turn our attention to the right-hand side, the expected utility from staying off the streets: Recall that there is a continuum of citizens and hence no citizen is pivotal. Hence good leaders are still retained, and poor ones are removed. If the leader is good, the citizen will still receive g if she does not protest; if the leader is bad, the leader is still removed, and (non-protesting) citizen receives g if the leader is replaced with a new good leader, which occurs with probability p. Setting these two conditions equal to each other yields the private signal that leaves the citizen indifferent between protesting and not:

$$Pr(\theta = 0|\bar{y}^*(s), s)\beta = \kappa.$$

The citizen receiving private signal $\bar{y}^*(s)$ is indifferent between protesting and not. Therefore, any

19

citizen receiving a private signal $y_{i,1} \leq \bar{y}^*(s) = \bar{y}(s)$ protests (and doesn't otherwise); and this is a best response to the behavior of the other citizens.

What if it is not the case that $\Phi(\frac{\bar{y}^*(s)}{\sigma_y}) \geq T > \Phi(\frac{\bar{y}^*(s)-g}{\sigma_y})$? If $T \leq \Phi(\frac{\bar{y}^*(s)-g}{\sigma_y})$, the public signal s is sufficiently extreme (and low) to ensure that – even when the government is in fact a 'good' ($\theta = 1$) type – enough of the population will believe the reverse to ensure its removal. Since the distribution of ϵ_i is common knowledge, all citizens will realize this, and will consequently always choose to mobilize, regardless of their private information. For each citizen, its better to join in an uprising that is guaranteed to be successful than not to do so.

Conversely, if $T > \Phi(\frac{\bar{y}^*(s)}{\sigma_y})$, even when the government is in fact a 'bad' type ($\theta = 0$), an insufficient portion of the population will believe this to be the case to ensure its removal. The public signal s is sufficiently high that it will be impossible for a group of requisite size to coordinate an uprising. All citizens will realize this, and will never choose to mobilize, regardless of their private information. This leads to the definition of $\bar{y}(s)$ as in Definition 2 above, and the complete specification of the equilibrium in Proposition 1 above.

Comparative Statics: Enhancing Transparency

Notice that the crucial equilibrium threshold $\bar{y}(s)$ is a function of the public signal, s. Recall that we have an interior equilibrium (where some protest,and some do not) when $\Phi(\frac{\bar{y}^*(s)}{\sigma_y}) \geq T > \Phi(\frac{\bar{y}^*(s)-g}{\sigma_y})$. It will simplify matters if we make use of the following two definitions:

Definition 3. *Define $\underline{s}$ implicitly by $T = \Phi\left(\frac{\bar{y}^*(s)-g}{\sigma_y}\right)$ and $\bar{s}$ by $T = \Phi\left(\frac{\bar{y}^*(\bar{s})}{\sigma_y}\right)$*

In the Appendix, we demonstrate that $\bar{y}(s)$ is monotonic and decreasing in s and that $\lim_{s \to \infty} \bar{y}(s) = -\infty$ and $\lim_{s \to -\infty} = \infty$. These $\bar{s}$ and $\underline{s}$ are well-defined such that $\bar{y}(s) = -\infty$ if $s \geq \bar{s}$ and $\bar{y}(s) = \infty$ if $s \leq \underline{s}$.

For a sufficiently extreme and positive public signal of the government's type ($s \geq \bar{s}$), all citizens will disregard their private information never mobilize. This is true *regardless* of their beliefs about the government's type. Even if a given citizen strongly believes that $\theta = 0$, given this extreme and positive public signal, she knows that it is impossible for enough of her fellow citizens to share this belief for mobilization to ever be successful. Conversely, for a sufficiently extreme and negative signal ($s \leq \underline{s}$), all citizens will always mobilize, even if some strongly believe the government to be a 'good' type. Each citizen knows, given the extreme value of the public signal, that enough of her fellow citizens believe the government to be adopting poor policies that its removal is inevitable. Given that this is the case, each citizen would rather jump on the bandwagon (and gain the benefits of joining the insurrection), rather than holding firm to her

beliefs. Public information thus plays a disproportionate role in shaping citizen behavior. For a similar result, see Morris and Shin (2002).

Notice that, for any $s \geq \bar{s}$, governments of all types are retained. For any $s \leq \underline{s}$, all governments are removed. For any $s \in (\underline{s}, \bar{s})$, governments are removed if they are of type $\theta = 0$ and retained if they are of type $\theta = 1$. Some mobilization will always take place when the public signal is in this interval, but it is only sufficient to overthrow the government when $\theta = 0$.

We can thus characterize the probability of government removal, conditional on its type. When $\theta = 0$, the government will be removed if $s \leq \bar{s}$, which will occur with probability $\Phi(\frac{\bar{s}}{\sigma_s})$. When $\theta = 1$, the government will only be removed if $s \leq \underline{s}$, which will occur with probability $\Phi(\frac{\underline{s}-g}{\sigma_s})$. We can thus define the degree to which the public *en masse* effectively separates good from bad types as the *discrimination* $= \Phi(\frac{\bar{s}}{\sigma_s}) - \Phi(\frac{\underline{s}-g}{\sigma_s})$.

Proposition 2. *Discrimination is strictly increasing in transparency (falling in σ_s).*

As σ_s rises, $\bar{y}^*$ shifts to the right while both the probability density functions depicted grow more tightly distributed around their respective means. The net effect of these two forces is such that the blue region unambiguously increases in size. The size of the red region may either rise or fall. But, the increase in the size of the blue region always outpaces any increase in the size of the red region. Hence the difference between the numbers protesting when the leader is a bad type relative to the number of protestors when the leader is good grows with transparency. The "improved" public signal increases the difference in the turnout for protest when leaders are bad relative to when they are good.

Note that the blue region is always larger than the red – under-performing leaders always attract higher levels of protest than over-performing ones (where under- and over-performing refers to the leader type θ). We interpret this equilibrium effect as implying that autocratic leaders who experience poor economic outcomes are always more likely to be removed than those that experience good outcomes. Proposition 2 tells us that this difference should be rising in levels of transparency. That is, transparency moderates the relationship between economic performance and autocratic collapse.

Corollary 1. *In equilibrium, poor economic performance is associated with autocratic removal; and poor economic performance in more transparent environments leads to even higher likelihood of autocratic collapse in equilibrium.*

For a range of parameter values, we can also derive predictions about the unconditional relationship between transparency and leader survival. This unconditional probability can be expressed as $(1-p)\Phi(\frac{\bar{s}}{\sigma_s}) + p\Phi(\frac{\underline{s}-g}{\sigma_s})$. With probability $1-p$, the government is of type $\theta = 0$, and

it will be removed with probability $\Phi(\frac{\bar{s}}{\sigma_s})$. With probability p, the government is of type $\theta = 1$, and it will be removed with probability $\Phi(\frac{\bar{s}-g}{\sigma_s})$. For a range of parameter values, increasing values of transparency will increase this unconditional probability of successful mobilization:

Proposition 3. *If* $-\frac{\sigma_y}{g}ln(\frac{p\kappa}{(1-p)[\beta-\kappa]}) < \Phi^{-1}(T)$, *then there exists a level of* $\sigma_s \equiv \bar{\sigma}_s$ *such that, the unconditional probability of leader removal is increasing for low levels of transparency* $(\sigma_s \geq \bar{\sigma}_s)$.

Proposition 3 characterizes a sufficient, not a necessary, condition for transparency to have this effect. Transparency increases the risk of leader removal so long as mass mobilization is not too 'easy' – i.e., the threshold for removing the autocrat T is not too low relative to the benefits of successful leader removal. Under these circumstances, the public requires a sufficiently compelling signal of poor government performance in order to mobilize. Remark 1 serves to clarify this requirement:

Remark 1. *As* $\beta \to \kappa$ *the probability of leader removal is rising in transparency for all* $\sigma_s \in \mathbb{R}_+$ *and for all* $T \in (0,1)$.

In the Appendix we show that as $\beta \to \kappa$, we can be sure that $\underline{s} < 0$. Recall that $\underline{s}$ defines the level of the signal such that all citizens mobilize, regardless of their individual posterior beliefs about the leader's type. (Consequently, the leader is removed with certainty.) In other words, as $\beta \to \kappa$, citizens require a sufficiently poor signal of economic performance to ensure mobilization. If, on the other hand, $\underline{s} > 0$ (which occurs when $\beta \gg \kappa$ or T is low), then all citizens mobilize even when the public signal indicates that the economy is performing relatively well. Then the probability (and hence frequency) of a successful mass demonstration is thus very high. Our model doesn't allow us to determine the effect of transparency on leader removal unambiguously in this case. Since incidences of successful mass protest are relatively rare, it therefore seems safe to assume that – at least in the vast majority of cases – the conditions of Proposition 3 are satisfied, and transparency will empirically be associated with an increase in the unconditional probability of autocratic collapse. Similarly, it seems reasonable that the private benefits of participating in a successful insurrection are not that large, suggesting that the conditions of Remark 1 are satisfied, and transparency is associated with increased autocratic leader removal.

Transparency in Democracies

We now turn our attention to the role of transparency under democratic rule. The approach is similar to the autocratic case above, except that citizens can vote before resorting to unrest, and vote returns are publicly disclosed. Just as in the prior model, the political action, which in this

case is a vote, is fully informative of incumbent's type θ, regardless of the level of transparency. Hence in equilibrium, citizens engage in political action if and only if a "bad" type is retained via elections, and since the incumbent's type is fully known at the time the decision to mobilize is made, any political protest is successful at removing the incumbent.

More precisely, the set of actors, L's type space, the action spaces and utilities are unchanged. Citizen actions and utilities during the mobilization period of the game are also identical to the above.

However, prior to the decision to mobilize, each citizen i may cast a vote for or against the incumbent $v_i \in \{0, 1\}$, where $v_i = 1$ denotes a vote for removal. Let the mass of citizens voting for removal be $V \equiv \int_0^1 v_i di$. If $V \geq \frac{1}{2}$, L is removed from office; if $V < \frac{1}{2}$, L is retained. Citizens suffer no direct cost, nor enjoy any direct benefit, from their voting decision. After voting takes place V is revealed to all citizens and to L. If L is retained, citizens may engaged in collective action to bring about her ouster.

The order of play is:

1. Nature chooses L's type, $\theta \in \{0, 1\}$. The value of θ is revealed to L, but not to any citizen.

2. L chooses whether or not to provide the public good $G_1 \in \{0, 1\}$.

3. Nature chooses $\epsilon_{i,1} \forall i$. Nature also chooses ρ. $y_{i,1}$ is revealed to each citizen i, but not to any other citizen. s is revealed to all citizens.

4. Each citizen chooses $v_i \in \{0, 1\}$. $V = \int_0^1 v_i di$ is revealed to all citizens. If $V \geq \frac{1}{2}$, L is removed and replaced by another government, whose type θ is chosen by Nature.

5. If $V < \frac{1}{2}$, each citizen may choose whether or not to engage in collective action $a_i \in \{0, 1\}$. If $A \geq T$, L is removed and replaced by another government, whose type θ is chosen by Nature.

6. The sitting L chooses the value of $G_2 \in \{0, 1\}$.

7. Nature chooses $\epsilon_{i,2} \forall i$. $y_{i,2}$ is revealed to each citizen and the game ends.

This game gives rise to multiple pure strategy perfect Bayesian equilibria. With a continuum of citizens $i \in [0, 1]$, voting decisions may be non-strategic. And, as before, the mobilization stage of the game can give rise to equilibria in which all citizens disregard their information and either always choose to mobilize or always choose not to do so.

As before, we will focus on strategies in which citizens employ all available information in their decision-making. Citizen voting and mobilization strategies will thus be a function of their private

signal $y_{i,1}$, the public signal s, and – in the mobilization stage – of the share of the public voting to remove the incumbent V.

Specifically, we assume that citizen i will vote to remove the incumbent (set $v_i = 1$) if $Pr(\theta = 1|y_{i,1}, s) \leq p$, and will set $v_i = 0$ otherwise – i.e., citizens vote sincerely. This requirement implies that citizens will vote to remove the incumbent when they believe a replacement is more likely to be a 'good' type $\theta = 1$, and that they will vote to retain otherwise. This strategy is commonly assumed in games of retrospective voting involving adverse selection and a continuum of voters, and is analogous to a continuum of voters each choosing their most preferred candidate in games of prospective voting (Cox, 1987; Downs, 1957).

As before, we explore a pure strategy perfect Bayes equilibrium in which citizens employ a cut-point monotone strategy in both the voting and the political action phases of the game. Before we characterize the equilibrium, a definition is necessary.

Definition 4. *Define $\tilde{y}(s)$ implicitly by $Pr(\theta = 1|\tilde{y}(s), s) = p$, and define*

$$
V(s; \theta) = \begin{cases} \Phi(\frac{\tilde{y}(s)}{\sigma_y}) & \text{if } \theta = 0 \\ \Phi(\frac{\tilde{y}(s)-g}{\sigma_y}) & \text{if } \theta = 1. \end{cases}
$$

where Φ is the cdf of the standard normal distribution.

In the appendix we show that $\tilde{y}(s)$ is well defined.

Proposition 4. *The following strategies and beliefs constitute a PBE. For the leader, $G_t = \theta$ for $t = 1, 2$. For the citizens, their voting and mobilization strategies are*

$$
v_i = \begin{cases} 1 & \text{if } y_{i,1} \leq \tilde{y}(s) \\ 0 & \text{otherwise.} \end{cases}
$$

$$
a_i = \begin{cases} 1 & \text{if } V > V(s; 1) \\ 0 & \text{otherwise.} \end{cases}
$$

Beliefs are $Pr(\theta = 0|y_{i,1}, s)$ as in Proposition 1, posteriors after both the private and public signals but before the vote, and after the vote, but before political action:

$$
Pr(\theta = 1|V, s) = \begin{cases} 0 & \text{if } V > V(s, 1) \\ 1 & \text{otherwise.} \end{cases}
$$

Along the equilibrium path, each citizen makes a voting decision conditional on their beliefs about the type of leader they face - based on both their private and public signals. If the posterior beliefs are low - in that the current leader is unlikely to be a "good" type, the citizen votes to remove the leader from office. After the vote, each citizen sees how many voted to remove; since there is a continuum of citizens, and each citizen is using the same cut-point strategy, the number of votes to remove is either $V(s, 0) = \Phi(\frac{\tilde{y}(s)}{\sigma_y})$ or $V(s, 1) = \Phi(\frac{\tilde{y}(s)-g}{\sigma_y})$, with $V(s; 1) < V(s; 0)$ for all s. That is the number of votes to remove a bad type is always larger than the number of votes to remove a good type. If the voter observes the former, she knows the leader is of the bad type, $\theta = 0$; on observing the latter, the voter infers perfectly that $\theta = 1$. The outcome of the vote however maybe that a "bad" leader is reelected if the combination of private and public signals happened to be good draws. In which case, the voters all mobilize to remove the (bad) leader from office. Voters do not mobilize against a good leader should he be reelected.

As before, the leader has a dominant strategy to take an action that matches his type. The voters are assumed to vote sincerely, and mobilization occurs because once it is clear that the leader is to be removed, it is better to be among the protesters than not - in order to receive the benefits of joining a successful insurrection, $\beta - \kappa$. Hence each voter is best-responding to both the actions of the other voters and their information about the type of leader they face. Finally, of course, beliefs are determined by Bayes' rule, and the actions are consistent with those beliefs – hence we have a perfect Bayesian equilibrium.

Analogous to the autocratic case, we would like to explore the effect of transparency on the degree to which the political institutions are able to discriminate between the survival in office of "good" versus "bad" types. In the democratic case, the institution in question is the election: Does transparency enhance the likelihood that "bad" types are removed via the electoral process? The answer is yes.

Definition 5. *Define $\tilde{s}$ implicitly by $\Phi(\frac{\tilde{y}(\tilde{s})}{\sigma_y}) = \frac{1}{2}$ and define $\underset{\sim}{s}$ implicitly by $\Phi(\frac{\tilde{y}(\underset{\sim}{s})-g}{\sigma_y}) = \frac{1}{2}$.*

As before, we show in the appendix that $\tilde{s}$ and $\underset{\sim}{s}$ are well defined. We can now analyze electoral survival much as we treated mobilization above. If $s \geq \tilde{s}$, governments of all types will be reelected. If $s \leq \underset{\sim}{s}$, governments of all types are voted out of office. If $s \in (\underset{\sim}{s}, \tilde{s})$, then governments are voted out of office if and only if $\theta = 0$. We can thus define the probability that a government of type $\theta = 0$ is voted out of office as $\Phi(\frac{\tilde{s}}{\sigma_s})$. And we can define the probability that a government of type $\theta = 1$ is voted out of office as $\Phi(\frac{\underset{\sim}{s}-g}{\sigma_s})$. The extent to which electoral survival is conditioned on policy decisions or, equivalently, a government's type is thus $\Phi(\frac{\tilde{s}}{\sigma_s}) - \Phi(\frac{\underset{\sim}{s}-g}{\sigma_s})$. We term this quantity the level of *electoral discrimination*.

Proposition 5. *The level of electoral discrimination is strictly rising in transparency (falling in σ_s).*

As transparency rises, the probability that a government of type $\theta = 0$ is voted out of office rises; while the probability that a government of type $\theta = 1$ is voted out falls. Empirically, as transparency rises, the extent of economic voting also rises.

In equilibrium, if a low type leader survives in office, the voters mobilize for his "non-conventional" removal. We will use the shorthand "democratic collapse" to describe the instance where a leader is removed by means other than the electoral process. Since mass mobilization to remove the incumbent only takes place when poor leaders are reelected, this probability is given by $(1-p)[1 - \Phi(\frac{\tilde{s}}{\sigma_s})]$ – i.e., the *ex ante* probability that L is a 'bad' type $\theta = 0$ multiplied by the probability that such a type survives the electoral process.

Increases in transparency – reductions in σ_s – will reduce the likelihood of democratic collapse. Since the probability a "bad" government is retained via an election is falling in transparency, so too is the risk of democratic collapse. Transparency improves the role of elections in addressing adverse selection problems in government. And, because protests and elections are substitute mechanisms for addressing such problems, the risk to democracy fall as elections grow more effective.

Proposition 6. *The probability of mass unrest is strictly falling in transparency (rising in σ_s).*

Empirics

We test these claims in the section that follows. After describing our data, we first examine the association between transparency, economic performance, and the collapse of autocratic regimes. We then examine the association between transparency, performance and mass unrest under autocratic rule and compare these results to similar models in which the outcome variable are forms of instability *not* involving mass mobilization. We finally examine the relationship between transparency and the risk of democratic collapse.

Data Description

Our theoretical model depicts authoritarian collapse as the removal (via mass protest) of the authoritarian regime or ruling clique. Empirically, we define such instances of collapse using Svolik's (2012) dataset on the duration of authoritarian regimes. Following Svolik, we define an

instance of authoritarian collapse as the removal of an autocratic leader by an alternative leader or coalition not politically affiliated with the sitting clique. Since our theoretical mechanism operates via mass unrest, we focus particularly on instances of leader removal brought about by mass revolt or that lead to democratization.

An expansive literature examines the causes of democratization – and a considerable portion of this literature treats democratization as the result of the manifestation or threat of popular unrest (for instance, Acemoglu and Robinson, 2006; Boix, 2003; Przeworski, 2009; Rosendorff, 2001). Others (e.g., Ansell and Samuels, 2010; Lizzeri and Persico, 2004; Llavador and Oxoby, 2005) contest this claim. Adjudicating this dispute is well beyond the scope of this paper. We group these two forms of autocrat removal – via mass unrest and via democratization – together simply because separate analysis run on each form of collapse produce similar results (and similar results to the pooled estimates – though with correspondingly increased standard errors owing to the reduced number of failures). Interested readers can find analyses in which we separate these two forms of removal in the Appendix. Given that the data do not identify the process that leads to democratization, and given the small number of failures involved in this analysis, we prefer to pool these forms of autocrat collapse together thereby increasing statistical power.[21]

Since the upending of democratic rule via street protest, by definition, entails the replacement of elected by un-elected leaders (for some period of time), we treat democratic collapse as the transition from democratic to autocratic rule. Our definition of democracy for this purpose is drawn from the *Democracy and Development Revisited* (DD) dataset compiled by Cheibub, Gandhi and Vreeland (2010). The DD dataset uses the coding scheme pioneered in Alvarez et al. (1996), in which democracy is coded as a binary $\{0, 1\}$ indicator equal to 1 if both the legislative and executive branches are selected via competitive elections between contesting political parties. For a country to be considered a democracy, there must be at least one change in the party in power. All years under the same constitutional regime prior to this transfer of power are retroactively coded as democratic.

In addition to the democracy indicator, we draw several control variables from the DD data. In all specifications examining autocratic regimes, we control for an indicator variable $Party \in \{0, 1\}$ equal to one if multiple parties hold positions in the legislature.[22] We include this control

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[21] While Svolik (2012) notes a variety of means through which leaders may be removed from power, he does not explicitly code whether democratization occurs through the threat of unrest or due to some other cause.

[22] This variable is a recoding of an analogous trichotomous indicator $\{0, 1, 2\}$ that appears in the DD dataset, which is equal to 0 if no parties exist, 1 if one (governing) party exists, and 2 if multiple competing parties exist. As we (1) are skeptical that the movement from zero to one party has the same marginal effect as moving from one to multiple parties and (2) believe that the relevant theoretical distinction is between political regimes that allow for political contestation and those that do not, we prefer to recode this variable.

given evidence that autocratic regimes that consist of multiple parties face substantially different risks, and exhibit different behaviors, than those that do not (Gandhi and Przeworski, 2006, 2007; Svolik, 2012). We also draw upon an indicator $Military \in \{0,1\}$, equal to one if the head of government is a representative of the military, given that autocracies headed by the military exhibit differential behaviors from those controlled by civilians (Svolik, 2012; Wright, 2008).[23] In all specifications involving democracies, we control for whether the government is run via a parliamentary system, and another indicator equal to one if the political regime involves a mixed parliamentary/presidential style system. These controls are necessary given that parliamentary and presidential governments have been shown to exhibit different behaviors – and exhibit different properties with respect to accountability (Cheibub, 2007; Gerring and Thacker, 2004; Kunicová and Rose-Ackerman, 2005; Samuels and Shugart, 2003).

In all specifications involving incidents of mass mobilization and unrest, we draw our outcome variables from the *Cross National Time Series Archive* (Banks, 1979), as made available by Bueno de Mesquita et al. (2003). These data consist of counts of the number of anti-government demonstrations, strikes, riots, guerrilla movements, revolutions, assassinations and coups in a given country in a given year. The Banks dataset derives these counts from archives of the *New York Times*. We consider anti-government demonstrations and strikes to be clear manifestations of mass mobilization directed at the government. And we consider coups and assassinations to be clear examples of instability *not* requiring popular mobilization.[24]

Transparency enters into our theoretical model as the (inverse of) the standard deviation of the publicly observable signal of government performance witnessed by all citizens σ_s. Transparency thus pertains to information that is (1) publicly observable – and known to be publicly observable by all actors – and (2) allows citizens to draw accurate inferences regarding government performance. Our empirical measure of this parameter is the HRV Index (Hollyer, Rosendorff and Vreeland, 2013), which measures the extent to which governments collect and disseminate aggregate economic data. The HRV Index is based on the reporting/non-reporting of information to the World Bank's World Development Indicators (WDI) data series. In recent years, these data are made publicly available by the World Bank and, throughout our sample, the disclosure of economic information to the Bank proxies the public dissemination of such data more generally.[25]

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[23]Given the correlation between these institutional features and the method with which the regime represses and co-opts the populace (Gandhi, 2008), we also help to adjust for the possibility that the repressive nature of the autocratic regime induces a spurious correlation between transparency and the risk of protest and collapse.

[24]Riots may also be considered a form of mass mobilization, but often the government is not the target of rioting. Often riots involve clashes between communities and ethnic groups (Scacco, 2008). Consequently, we do not consider rioting to be a manifestation of the type of unrest documented in our model.

[25]We do not expect that many members of the public access such data directly. However, we do expect citizens,

These data allow citizens to make more nuanced inferences about government performance than would be possible in their absence. As more aggregate economic data are made available, citizens will be better able to discern the performance of the economy beyond their given circle of friends, family and acquaintances; to assess the distributional consequences of this performance; and to assess the government's role relative to that of cyclical fluctuations. While these inferences will always be imperfect ($\sigma_s > 0$), increases in the dissemination of aggregate economic data imply that these inferences will improve (σ_s will fall). Finally, it is appropriate to concentrate on the government's disclosure of such data, given that public goods problems in information markets tend to inhibit private dissemination of such aggregated data series.[26]

The HRV index treats transparency as a latent term that determines whether or not a given variable (of 240 variables in the model) is reported to the WDI in a given year – measures of this latent term are extracted based on a item response (IRT) model. The IRT model provides a continuous measure of transparency (which is unique up to an affine transformation) along this scale – which reflects a given government's tendency to disclose the type of data predominant in the WDI. Observations of this index are available at the country-year level for 125 countries over the 1980-2010 interval. For a complete description of our transparency variable, see Hollyer, Rosendorff and Vreeland (2013).

We additionally control for a variety of economic factors. Importantly, we control for GDP *per capita*, measured in thousands of purchasing power parity 2005 US Dollars. This measure is included given the significant debate over modernization theory – the role of economic development in facilitating democratization (see, for instance Acemoglu et al., 2007; Ansell and Samuels, 2010; Boix, 2003; Przeworski and Limongi, 1997; Przeworski et al., 2000). Additionally, we include this term due to the possibility that states' capacity to collect and disseminate data may increase with economic development, so *per capita* income may act as a confound in our specifications. We additionally include measures of economic growth (the percentage change in real GDP *per capita*) in all models as a measure of government's economic performance. Finally, we include a measure of economic openness ($\frac{Exports+Imports}{GDP}$). This control is valuable given potential linkages between economic and political liberalization, and given that open economies are more likely to be subject to exogenous shocks to economic performance than closed, and thus economic performance may be less valuable a signal of government competence as trade dependence rises

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absent such disclosures, to be relatively uninformed of aggregate economic performance.

[26]Elsewhere, Hollyer, Rosendorff and Vreeland (2013), we note that this measure of transparency is a reflection of both states' ability (capacity) and their willingness to disclose data. In this instance, our theoretical interest is only in the amount of information available to citizens, not in the rationale for its provision. (We examine such questions elsewhere, e.g. Hollyer, Rosendorff and Vreeland, 2011). Since, however, state capacity may influence the likelihood of regime collapse, we control for GDP *per capita* in our specification.

(Duch and Stevenson, 2008).

These measures are all drawn from the Penn World Table (PWT) version 6.3 (Heston, Summers and Aten, 2009). The PWT offers several advantages as a measure of economic performance for this study: First, the PWT data are adjusted and interpolated by external researchers with no affiliation to reporting governments (though, the underlying data are still based on national accounts). The PWT can thus be seen as a proxy for true economic performance (G_t or – equivalently – the incumbent's type θ in our model) rather than as a realization of the public signal s. The PWT draws pricing and national accounts data for benchmark countries from the United Nations International Comparisons Program (ICP). The ICP collects pricing data for 400 to 700 items in each benchmark country, in addition to detailed national expenditures data for 150 categories of spending (Summers and Heston, 1991).[27] These values are aggregated to compute national accounts data measured in purchasing power parity (PPP) terms for the benchmark countries in the benchmark year (2005 for PWT 6.3). Statistical models are then used to compute data for non-benchmark countries in non-benchmark years. Pricing data for non-benchmark countries are obtained by surveys conducted by the United Nations International Civil Service Commission and the US State Department (Summers and Heston, 1991). Thus, while PWT data build upon the input of national statistical offices, they also rely heavily on the input of external entities and are distinct from the reported figures of governments.

Second, country time-series included in the PWT are uninterrupted. This is important when employing a measure of data missingness – such as the HRV index – as an explanatory variable. Were missing data present in the PWT, it is likely that missing values would correlate with transparency levels. Listwise deletion would therefore censor variation in a key explanatory variable, potentially inflating standard errors and understating measures of model fit.

Finally, we include a control for fuel exporters, drawn from (Easterly and Sewadeh, 2001). This control is included given the resource curse hypothesis, which finds that fuel exports are strongly negatively correlated with democracy and may promote autocratic longevity (Ross, 1999; Jensen and Wantchekon, 2004).

Transparency, Mass Unrest and Autocratic Instability

In this section of the paper, we test our claims that (1) transparency is associated with an increased probability of the collapse of autocratic leaders and (2) that transparency enhances the

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[27]There are 146 benchmark countries in the PWT 6.3, and 189 countries in the dataset as a whole. See "What is New in PWT 6.3" `http://pwt.econ.upenn.edu/Documentation/PWT_63webac_final.doc`, last accessed April 16, 2013.

association between growth and regime instability. Economic growth maps into the parameter G_t (or, equivalently, the leader's type θ) in our model. In equilibrium, leaders of low-type who perform more poorly in office are more likely to removed – poor growth should predict regime collapse. Proposition 2 establishes that this relationship between growth and collapse should grow stronger as transparency rises. And Proposition 3 establishes that transparency should have a direct effect on increasing the risk of regime removal.

Our empirical interest is in the threat autocratic leaders face from below – the danger that mass mobilization will lead to removal of the ruling clique. Our model does not speak to the threat leaders face from within their own ranks – i.e., the threat of coups or military interventions, nor does it speak to the risks of intervention by foreign powers or resulting from civil wars.[28] Our analysis therefore relies on a Cox competing hazards model of regime removal. Our model estimates the hazard that a regime collapses due to pressures from below – the probability that the ruling clique is unseated by a revolt or transitions to democracy in year t conditional on not already having done so[29] – conditional on covariates. Since authoritarian regimes may also be unseated by other methods, these alternatives act as competing risks. We estimate our model on all autocratic regimes in Svolik's (2012) dataset, but those regimes that exit via other methods are treated as censored after their death.[30] The unit of observation is the autocratic regime-year, where autocratic regimes are defined in accordance with Svolik (2012). (For simplicity, we refer to instances of failure as autocratic collapse below. Except when explicitly noted otherwise, these references are to collapse via revolt or democratization.)

More precisely, our model assumes that covariates shift the baseline hazard up or down according to the function $h_l(t) = h_0(t)e^{\mathbf{X_{l,t}}\beta}$ where l denotes autocratic regime l, t denotes time, $h_o(t)$ is the baseline hazard function, and $\mathbf{X_{l,t}}\beta$ is the product of the data matrix and a corresponding vector of coefficients.[31] Time, in this instance, is defined as the number of years

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[28]We obtain analogous results, in which coefficients are estimated somewhat more precisely, if we instead focus on autocratic to democratic transitions, as defined by the DD dataset (Cheibub, Gandhi and Vreeland, 2010). Results are available from the authors on request.

[29]Let $f(t)$ denote the probability density function of autocratic regime failure (via revolt or democratization) as a function of time t and let $F(t)$ denote the corresponding cumulative distribution function. The hazard rate is defined as $\frac{f(t)}{1-F(t)}$.

[30]For an empirical application and discussion of the competing hazards model see Goemans (2008). This model assumes that hazard of one form of removal is conditionally independent of other forms of removal, an assumption analogous to the IIA assumption in multinomial logit specifications (Gordon, 2002).

[31]We test the assumption that covariates alter the level, but not the shape, of the baseline hazard using Grambsch-Thorneau and Harrell's rho tests of the Schoenfeld residuals. Where these tests indicate violations of the proportional hazards assumption, we adjust the model according to the recommendations of Box-Steffensmeier and Jones (2004) and Keele (2010).

the autocratic regime has served in office.[32]

The Cox model estimates the baseline hazard function $h_0(t)$ non-parametrically based upon the fraction of members of the risk pool who exit at time t. Since we have no theoretical expectations regarding the relationship between the duration of autocratic spells and the probability of autocratic removal, we let the data speak regarding this issue. Time is, in essence, reduced to a nuisance parameter (Beck, Katz and Tucker, 1998).[33]

Our analysis is complicated by the presence of autocratic regimes that have experienced prior instances of instability in the data. Past instability may well influence current stability. Our preferred approach to dealing with this issue is to employ conditional gap time models, in which the baseline hazard is estimated separately for autocratic regimes in states that experienced prior autocratic collapses and those in states that have not (Box-Steffensmeier and Zorn, 2002). In so-doing, we allow both the level and the shape of the baseline hazard to vary depending on past experiences of instability, thereby flexibly modeling the non-Markovian nature of changes in regimes.[34] In one set of models, we separately estimate the baseline hazard conditional on whether or not there has been a prior autocratic collapse; in another, we estimate separate baseline hazards based on the number of instances of collapse;[35] and in a final specification we simply control for whether or not there has been a prior collapse. Prior collapses are coded as any instance of regime removal (by any method) as coded by Svolik (2012) – i.e., the removal of one autocratic leader and his replacement by another leader unaffiliated with the incumbent regime.

Our theoretical expectations are as follows: (1) The probability of collapse (via mobilization) will be higher in more transparent than in less transparent autocracies. (2) Regime collapse grows more likely as economic performance worsens. (3) Economic performance is likely to play a greater role in autocratic survival in transparent, as opposed to opaque, autocracies. We thus

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[32]The duration in office is actually recorded to the day. We divide the number of days served in office by 365.25 to rescale time in a more meaningful fashion.

[33]We prefer the Cox specification over alternatives (e.g., logit models with parametric controls for time, or other parametric survival models) for two reasons: First, unlike logit models, the Cox model readily incorporates censoring in a manner that is particularly critical given the competing hazards faced by autocratic regimes. Second, unlike parametric methods, the Cox specification deals with time dependence in a non-parametric manner. Note finally that the binary nature of our outcome variable argues strongly against the use of fixed-effects or a conditional logit model. Such a model would only be identified off of regimes that experienced failures in the data – which constitute less than 25 percent of our sample. All other regimes (75 percent of the sample) would be dropped from any fixed-effects estimation.

[34]For an empirical application of conditional gap time models in a different context, see Tiernay (2011).

[35]Given the substantial variation in the history of instability in our sample, we code the number of past regime removals as a categorical variable. This variable takes the value 1 if there has never been a prior collapse, 2 if there has been one collapse, 3 if there have been between 2 and 4 collapses, and 4 if there have been more than 4 collapses.

fit a model of the form:

$$h_i(t) = h_0(t)exp(\gamma Transparency_{i,t-1} + \delta Growth_{i,t-1} + \mu Transparency_{i,t-1} \times Growth_{i,t-1} + \mathbf{X_{i,t-1}}\beta)$$

(3)

where $\mathbf{X}\beta$ is a matrix of controls and associated coefficients. All errors are clustered by autocratic regime, to allow for inter-temporal correlation of the error term within autocratic regime spells.

Results from the model described by equation 3 are presented in Table 1. The table reports coefficient values – not hazard ratios – so a positive coefficient indicates that a given covariate increases the risk of autocratic collapse (via revolt or democratization); while a negative coefficient indicates the reverse. The three first columns contain the results from conditional gap time models where the baseline hazard is estimated separately for autocratic-spells that experienced a prior regime collapse (as defined above) and those that did not. The results in the next three columns present coefficients from conditional gap time models where the baseline hazard is separately estimated based on the number of prior regime collapses. And, results in the final three columns are from models simply control for whether or not there was a prior instance of regime collapse. In all models, we include controls for higher order polynomials of economic openness ($\frac{Ec.Openness^2}{100}$, $\frac{Ec.Openness^3}{10,000}$) to adjust for violations of the proportional hazards assumption, in keeping with the recommendations of Keele (2010).

The estimated coefficient on $Transparency$ is large and positive in all models. While the coefficient on this term is not statistically significant in every specification, all estimates place the bulk of the posterior probability mass above zero – p-values range from a high of 0.17 to a low of .05 across all specifications. Our point estimates suggest that a one standard deviation increase in the level of $Transparency$ increases the hazard of autocratic collapse by between 33 and 39 percent.

The coefficient on economic growth is negative and significant in all models. In keeping with theoretical expectations, autocratic governments that inspire rapid economic growth are at lower risk of collapse than those that do not achieve economic success. A one standard deviation increase in the growth rate is associated with a reduction in the risk of revolt of between 20 and 40 percent.

Our theoretical expectations, as outlined in Proposition 2, further contend that the relationship between growth and the hazard of regime collapse should be conditional on the level of transparency. We thus include interactions of growth and transparency in all models. This estimate is negative in nine of the ten models estimated, and is substantively meaningful. Point estimates indicate that a shift in transparency from its median to its maximum values is predicted increase the

Table 1: Cox Models, Autocrat Removal from Below

	Cond. Past Collapse			Cond. Hist. Instability			Control Past Collapse		
Transparency	0.168	0.203*	0.192**	0.167	0.168	0.168	0.159	0.193*	0.193*
	[-0.061,0.397]	[-0.020,0.425]	[0.003,0.381]	[-0.058,0.392]	[-0.048,0.383]	[-0.041,0.377]	[-0.070,0.387]	[-0.033,0.418]	[-0.007,0.393]
Growth	-0.032**	-0.029**	-0.024**	-0.050**	-0.047**	-0.038**	-0.035**	-0.030**	-0.026**
	[-0.057,-0.007]	[-0.051,-0.006]	[-0.045,-0.004]	[-0.095,-0.005]	[-0.089,-0.004]	[-0.073,-0.003]	[-0.062,-0.008]	[-0.054,-0.007]	[-0.048,-0.004]
Transparency × Growth	-0.001	-0.004	-0.003	0.001	-0.001	-0.004	-0.000	-0.003	-0.003
	[-0.031,0.028]	[-0.033,0.026]	[-0.028,0.021]	[-0.032,0.034]	[-0.036,0.033]	[-0.031,0.024]	[-0.032,0.031]	[-0.035,0.029]	[-0.030,0.025]
GDP *per capita*	0.195			0.095			0.144		
	[-0.325,0.716]			[-0.467,0.657]			[-0.284,0.571]		
Ec. Openness	-0.033			-0.031			-0.043*		
	[-0.078,0.011]			[-0.074,0.012]			[-0.090,0.003]		
Ec. Openness[2]	0.026			0.023			0.034		
	[-0.013,0.066]			[-0.016,0.061]			[-0.008,0.077]		
Ec. Openness[3]	-0.006			-0.005			-0.007		
	[-0.014,0.003]			[-0.013,0.003]			[-0.017,0.002]		
Party	0.006	-0.095		-0.200	-0.269		0.121	0.006	
	[-0.897,0.910]	[-0.993,0.803]		[-1.225,0.824]	[-1.256,0.718]		[-0.801,1.042]	[-0.927,0.939]	
Military	0.701*	0.612		0.525	0.498		0.682	0.589	
	[-0.122,1.524]	[-0.169,1.392]		[-0.294,1.345]	[-0.267,1.263]		[-0.140,1.504]	[-0.180,1.357]	
Ever Collapse							0.614	0.564	0.723
							[-0.387,1.616]	[-0.421,1.548]	[-0.211,1.658]
# of Subjects	137	137	143	137	137	143	137	137	143
# of Failures	30	30	31	30	30	31	30	30	31

Cox competing hazards regressions of the hazard of autocratic removal via revolt or democratization. The models depicted in the first three columns, the middle three columns, and the last three columns differ in the manner in which they deal with countries that experienced multiple autocratic failures. Those in the first three columns report a conditional gap time model wherein the baseline hazard is separately estimated for regimes that experience a prior regime failure and for those that did not. Those in the next two columns estimate separate baseline hazards based on a categorical measure that reflects the number of prior collapses. Those in the final three columns simply control for prior collapses, rather than stratifying the baseline hazard. In all models, * denotes significance at the 10 percent level, ** denotes significance at the 5 percent level, and *** denotes significance at the 1 percent level. 95 percent confidence intervals are presented in brackets. All standard errors have been clustered by autocratic regime.

marginal effect of growth by between 25 and 100 percent based on the models that condition on past removals (in the leftmost three columns of Table 1). However, this coefficient is imprecisely estimated and never reaches levels of statistical significance.

Note, however, that the functional form of the Cox model implies an interactive effect of transparency and growth. Because the covariate values shift the hazard rate according to the function $e^{\mathbf{X_{1,t}}\beta}$, a change in a given covariate k has a marginal effect equal to $\beta_k e^{\mathbf{X_{1,t}}\beta}$ – i.e., the marginal effect of a change in any given covariate is conditional on the values of all other covariates. Because the coefficient on $Transparency$ is positive, this implies that a change in $Growth$ will have a larger effect on the probability of collapse as $Transparency$ rises.[36] That is, even without the interactive term, the functional form of our model assumes that the relationship between growth and regime removal is conditional on transparency in the manner expected theoretically.[37] For this reason, it is important to note that a significant coefficient on an interaction term is neither "necessary nor sufficient" to imply a conditional relationship in a nonlinear model (Berry, DeMeritt and Esarey, 2010, 248).[38] To better grasp the relationship between transparency, growth, and autocratic collapse, we plot smoothed estimates of the hazard function – based on Model 8 – for different values of growth and transparency in Figure 4, holding all other variables (with the exception of $Party$ and $Military$, which are held at 0, and $Ever\ Collapse$, which is held at 1) at their means.

As can be seen in Figure 4, a shift from the 10th to the 90th percentile of growth reduces the risk of collapse both when transparency levels are high and low. A shift from the 10th to the 90th percentile of transparency increases the risk of collapse for all values of growth. And the gap between the hazard of autocratic collapse when growth is poor and when it is high increases in magnitude as transparency rises, as is consistent with the prediction of Proposition 2.

The effects of the control variables, by and large, are not statistically significant at conventional levels. We find some limited evidence that economically open autocracies are less subject to removal from below, and some evidence that (former) military leaders are more susceptible, but neither finding is robust across all models.

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[36]More precisely, a change in the growth rate will have a roughly constant effect on the percentage change in the risk of autocratic collapse. Because that risk is elevated when $Transparency$ is high, the absolute value of the change in the risk of collapse for a given change in $Growth$ will rise with $Transparency$.

[37]Estimates without the interaction term are broadly similar to those in which it is included. Results are available from the authors on request.

[38]On this point, also see Ai and Norton (2003), Greene (2010), and Nagler (1991).

Cox Hazard Estimates
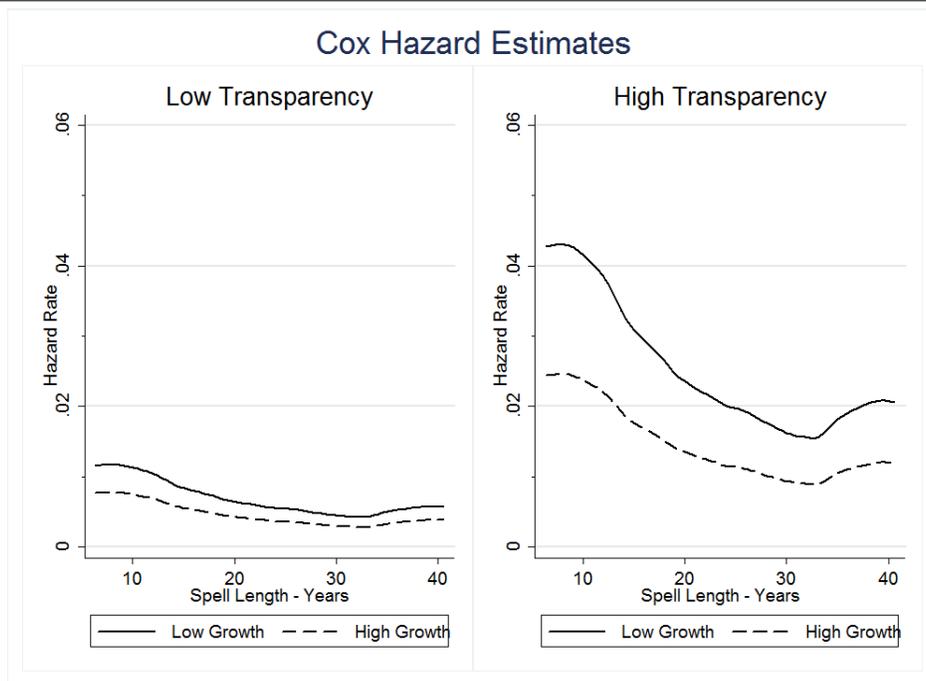
Smoothed estimates of the hazard rate as derived from the Cox Model in Column 8 of Table 1. The figure to the left depicts the change in the hazard rate when growth moves from the 10th percentile to the 90th percentile in the sample when the transparency score is at the 10th percentile observed in the sample. The figure to the right depicts the change in the hazard rate when growth changes from the 10th to the 90th percentile when transparency is at the 90th percentile. All other covariates are held at their mean values – save the $Party$ and $Military$ variables, which are held at 0; and the $Ever\ Collapse$ variable, which is held at 1.

Figure 4: Hazard Rates as a Function of Transparency and Growth

Transparency and Other Forms of Autocrat Instability

Are relatively weak autocratic regimes – those most prone to removal via any method – simply more likely to be transparent? Might the above results be explained by the reform efforts of relatively weak regimes attempting to stave off their ouster?

We assess this possibility below. We do so by examining the relationship between transparency, economic growth, and autocratic instability resulting from threats not involving mass unrest or democratization. Our methods are broadly similar to those described above. Table 2 presents the results of a Cox competing hazards model of the hazard autocratic regimes face from removal via a coup. In contrast to the results in the prior section, a regime fails if a sitting autocratic leader is removed via a coup (which, in Svolik's (2012) data involves a plot by either the military or other elites involving the threat or use of force). Regimes removed via other methods enter the dataset until they collapse, after which they are treated as censored. Table 3 presents the results of Cox regressions of autocratic regime removal (via any method) on transparency, growth and their interaction. As in the above section, we fit conditional gap time models in which the baseline hazard is stratified by whether or not their has been a prior regime collapse, on the number of prior regime collapses, and a final model in which we simply control for prior collapse.

Tables 2 and 3 show starkly contrasting results from those in Table 1, which examines removal via mass unrest or democratization. Table 2 demonstrates that transparency is associated with a *reduced* threat of coups. The coefficient on transparency is negative and large in all specifications, and significant at the 90 percent level or above in all specifications that do not control for GDP *per capita* and economic openness. Furthermore, the coefficient on growth (and its interaction with transparency) is consistently positive in all specifications. That is, growth, transparency, and their interaction have the opposite association with instability as brought about via coups as with instability brought about via unrest.

Table 3 shows that these starkly contrasting results offset one another when one considers the risk autocratic regimes face from all possible threats. Coefficients on transparency, growth and their interaction are never significant. Moreover, the point estimate of the coefficient on transparency is consistently small – approximately equal to zero – and switches signs across the various specifications. Transparency is associated with increased autocratic instability only via threats from below – its relationship to threats emerging from within the regime follows starkly different patterns. This finding argues against the notion that transparency is simply higher in weak autocratic regimes.

Table 2: Cox Models, Autocrat Removal via Coup

	Cond. Past Collapse			Cond. Hist. Instability			Control Past Collapse		
Transparency	-0.127	-0.226*	-0.185**	-0.201	-0.252*	-0.247*	-0.153	-0.222**	-0.181**
	[-0.369,0.114]	[-0.452,0.000]	[-0.348,-0.021]	[-0.592,0.191]	[-0.534,0.030]	[-0.521,0.027]	[-0.399,0.093]	[-0.439,-0.004]	[-0.336,-0.027]
Growth	0.043	0.032	0.032	0.055*	0.039	0.042	0.028	0.029	0.028
	[-0.013,0.098]	[-0.017,0.082]	[-0.009,0.073]	[-0.010,0.120]	[-0.013,0.091]	[-0.009,0.092]	[-0.015,0.071]	[-0.017,0.074]	[-0.011,0.066]
Transparency $times$ Growth	0.000	0.011	0.012	0.019	0.023	0.019	0.001	0.007	0.010
	[-0.033,0.034]	[-0.021,0.043]	[-0.005,0.028]	[-0.034,0.071]	[-0.016,0.062]	[-0.014,0.053]	[-0.031,0.033]	[-0.023,0.037]	[-0.005,0.025]
GDP *per capita*	-1.401			-1.410			-1.321		
	[-3.072,0.269]			[-3.114,0.293]			[-3.005,0.363]		
Ec. Openness	0.033			0.039			0.022		
	[-0.031,0.098]			[-0.022,0.101]			[-0.039,0.083]		
Ec. Openness^2	-0.011			-0.013			-0.004		
	[-0.062,0.040]			[-0.060,0.034]			[-0.057,0.048]		
Ec. Openness^3	0.001			0.001			-0.001		
	[-0.010,0.012]			[-0.008,0.010]			[-0.012,0.011]		
Party	-0.141			-0.410	0.042		-0.183	-0.005	
	[-1.234,0.953]			[-1.537,0.716]	[-1.014,1.098]		[-1.379,1.014]	[-1.232,1.222]	
Military	0.393			0.369	0.660		0.402	0.682	
	[-0.582,1.367]			[-0.527,1.265]	[-0.267,1.588]		[-0.629,1.432]	[-0.365,1.729]	
Ever Collapse							0.486	0.323	0.474
							[-0.546,1.517]	[-0.675,1.321]	[-0.551,1.498]
# of Subjects	137	137	143	137	137	143	137	137	143
# of Failures	16	16	18	16	16	18	16	16	18

Cox competing hazards regressions of the hazard of autocratic removal via coup. The models depicted in the first three columns, and the last three columns differ in the manner in which they deal with countries that experienced multiple autocratic failures. Those in the first three columns report a conditional gap time model wherein the baseline hazard is separately estimated for regimes that experience a prior regime failure and for those that did not. Those in the next two columns estimate separate baseline hazards based on a categorical measure that reflects the number of prior collapses. Those in the final three columns simply control for prior collapses, rather than stratifying the baseline hazard. In all models, * denotes significance at the 10 percent level, ** denotes significance at the 5 percent level, and *** denotes significance at the 1 percent level. 95 percent confidence intervals are presented in brackets. All standard errors have been clustered by autocratic regime.

Table 3: Cox Models, Autocrat Removal via All Methods

	Cond. Past Collapse			Cond. Hist. Instability			Control Past Collapse		
Transparency	0.014	0.003	0.033	0.010	-0.020	-0.005	0.012	0.004	0.035
	[-0.117,0.145]	[-0.134,0.141]	[-0.086,0.152]	[-0.127,0.147]	[-0.163,0.124]	[-0.138,0.129]	[-0.125,0.149]	[-0.141,0.149]	[-0.092,0.161]
Growth	-0.015	-0.014	-0.013	-0.014	-0.014	-0.016	-0.018	-0.016	-0.014
	[-0.041,0.011]	[-0.038,0.011]	[-0.035,0.009]	[-0.050,0.022]	[-0.049,0.021]	[-0.046,0.013]	[-0.046,0.010]	[-0.042,0.011]	[-0.037,0.008]
Transparency × Growth	0.012	0.009	0.005	0.011	0.009	0.005	0.013	0.009	0.004
	[-0.008,0.032]	[-0.010,0.029]	[-0.007,0.017]	[-0.013,0.034]	[-0.014,0.032]	[-0.009,0.020]	[-0.008,0.034]	[-0.011,0.030]	[-0.008,0.017]
GDP *per capita*	-0.270			-0.334			-0.278		
	[-0.708,0.169]			[-0.798,0.130]			[-0.712,0.156]		
Ec. Openness	-0.040***			-0.032**			-0.046***		
	[-0.066,-0.014]			[-0.057,-0.006]			[-0.071,-0.021]		
Ec. Openness^2	0.034***			0.027**			0.038***		
	[0.009,0.059]			[0.004,0.050]			[0.015,0.062]		
Ec. Openness^3	-0.008**			-0.006**			-0.009***		
	[-0.015,-0.002]			[-0.012,-0.001]			[-0.015,-0.003]		
Party	0.384	0.357		0.266	0.256		0.408	0.366	
	[-0.107,0.875]	[-0.129,0.844]		[-0.243,0.775]	[-0.230,0.743]		[-0.100,0.916]	[-0.130,0.861]	
Military	0.057	0.093		0.022	0.075		0.068	0.096	
	[-0.409,0.522]	[-0.361,0.546]		[-0.429,0.474]	[-0.365,0.515]		[-0.400,0.537]	[-0.362,0.555]	
Ever Collapse							0.285	0.289	0.356
							[-0.225,0.795]	[-0.236,0.815]	[-0.144,0.856]
# of Subjects	137	137	143	137	137	143	137	137	143
# of Failures	87	87	93	87	87	93	87	87	93

Cox regressions of the hazard of autocratic removal via any method. The models depicted in the first three columns, the middle three columns, and the last three columns differ in the manner in which they deal with countries that experienced multiple autocratic failures. Those in the first three columns report a conditional gap time model wherein the baseline hazard is separately estimated for regimes that experience a prior regime failure and for those that did not. Those in the next two columns estimate separate baseline hazards based on a categorical measure that reflects the number of prior collapses. Those in the final three columns simply control for prior collapses, rather than stratifying the baseline hazard. In all models, * denotes significance at the 10 percent level, ** denotes significance at the 5 percent level, and *** denotes significance at the 1 percent level. 95 percent confidence intervals are presented in brackets. All standard errors have been clustered by autocratic regime.

Transparency and Unrest

We have thus established that (1) more transparent autocracies are more likely to experience regime failures (in the form of revolts or democratization) than less transparent autocracies and (2) the magnitude of the relationship between growth on the hazard of regime collapse is greater under more transparent regimes. These findings are consistent with theoretical predictions regarding the role of data dissemination, but they constitute only indirect evidence that transparency can lead to mass unrest under autocracy – via revolt or democratization.

To more directly test model mechanisms, we examine the relationship between transparency, economic growth and the frequency of various forms of domestic unrest under autocratic rule: namely, general strikes and anti-government demonstrations. If the theoretical mechanisms we posit are correct, we should observe that mass mobilization is (1) more common in relatively transparent autocracies, and (2) more strongly related to growth when levels of transparency are high.

We also examine the relationship between transparency and forms of unrest *not* involving mass mobilization, such as assassinations, coups, guerrilla warfare, and revolutions, which tend to be executed by a small elite or counter-elite. Our model offers no predictions regarding the relationship between transparency and these alternative forms of unrest. Nonetheless, confidence that our results are driven by the posited mechanism should be reinforced if we do *not* find a systematic relationship between transparency and forms of unrest that do not involve mass mobilization. Were similar relationships to hold across all forms of domestic unrest, it is possible that alternative mechanisms may link transparency to regime instability. If we are able to rule out a relationship between transparency and forms of unrest not involving mass mobilization, we will also rule out a variety of possible mechanisms that might confound our results.

It is particularly important to examine this relationship given the danger of a form of selection bias in our results. One could imagine a competing theoretical account, which holds that citizens demand transparency from autocratic governments. When these governments are relatively weak, they may capitulate to these demands in exchange for greater citizen support. Increases in transparency may be part of more general reform efforts launched by weak autocrats in an effort to buy the complacency of the masses. If these relatively weak autocrats are also more prone to collapse, one might imagine that our results from the previous section were driven by omitted variable bias.

Our results in this section speak to this concern in two ways. First, if weak governments capitulate to citizen demands by granting transparency, the relationship between mass mobilization and transparency will tend to be biased toward zero. Governments only increase levels of trans-

parency to drive down the risk of citizen unrest and would presumably cease such reform efforts if these prove systematically ineffective. So, if we find a positive relationship between transparency and mass-unrest, one must conclude that any such bias must be relatively small – insufficient to overwhelm the mechanisms we examine in our theory. Second, weak autocrats are likely to be prone to a variety of forms of instability – such as coups, guerrilla movements, and revolutions – not just to protests and strikes. Consequently, if we do not observe a relationship between transparency and these other forms of unrest, we can say with increased confidence that the relationship between transparency and democratization is mediated by mobilization and is not confounded by the bargaining power of incumbent autocrats.

To test the relationship between transparency, growth and the incidence of unrest, we rely on country fixed-effects negative binomial regressions of the Banks measures of unrest on the previously described measures of transparency, growth, and their interaction, as well as a host of controls. We employ a negative binomial because the Banks data are measured as count variables (they can assume non-negative integer values only), and because the data are likely to be over-dispersed due to the large number of zero-valued observations. The negative binomial functional form is (close to) a generalization of the Poisson count model. The Poisson constrains the conditional mean of the distribution and its variance to assume the same value $\lambda = e^{\mathbf{X_{c,t}}\beta}$; whereas, the negative binomial permits the value of the variance $(1 + \alpha\lambda)\lambda,\ \alpha \in (0, 1)$ to exceed that of the conditional mean λ.[39]

A fixed-effects negative binomial regression allows the value of the over-dispersion parameter to vary across panels – i.e., α_c replaces α. Consequently, the expected number of instances of unrest for a given set of covariate values is constant across countries, but the variance around that expectation will differ. Note that this type of 'fixed-effects' model differs from typical settings in which each panel is assumed to have its own intercept term, such that the conditional mean varies across panels (for instance, across countries).

Our empirical model is thus:

$$
\begin{aligned}
unrest_{i,t} = FENegBin(&\rho unrest_{i,t-1} + \eta Transparency_{i,t-1} + \zeta Growth_{i,t-1} \\
&+ \xi Transparency_{i,t-1} \times Growth_{i,t-1} + \mathbf{X_{i,t-1}}\nu + \mathbf{T}\iota)
\end{aligned}
\tag{4}
$$

where c denotes country c, t denotes year t, $\mathbf{T}$ denotes a cubic polynomial of time and ι is a vector of associated coefficients, $\mathbf{X_{c,t-1}}$ is a matrix of controls and ν is a vector of associated coefficients. We include a cubic polynomial of time to control for the potential confounding effects

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[39]Note that the negative binomial does not truly nest the Poisson as the value of α is constrained to be positive.

of time trends using a very general functional form. And we include a lagged dependent variable in all specifications to adjust for the dynamics of the data generating process (Beck and Katz, 2011).

Results from the model specified in equation 4 are reported in Table 4. Our regressions alternatively use the number of general strikes, riots, demonstrations, revolutions, guerrilla movements, coups, and assassinations as the outcome variable.

As is evident from these results, increased levels of transparency are robustly associated with more frequent general strikes and demonstrations. The direct association between transparency and the frequency of revolutions, guerrilla movements, coups and assassinations, however, is not significantly different from zero. Transparency seems to therefore have the greatest influence on the frequency of mass protest – and little direct influence on forms of unrest that do not involve similar types of collective action.

As noted above, the interpretation of transparency's role in conditioning the effect of growth on unrest is not straightforward in non-linear models. More precisely, when the estimated coefficient on the $Transparency$ term is large and positive, the functional form of the model contains an implicit interactive effect in which the marginal effect of a change in $Growth$ will be large when values of $Transparency$ are high. Given these difficulties of interpretation, we plot the contemporaneous association between a change in growth rates and unrest at different levels of $Transparency$ in Figures 5-8 below.[40]

As is evident from Figures 5 and 6, transparency plays an important conditioning role with respect to the association between growth rates and the frequency of general strikes and demonstrations. Both strikes and demonstrations are more substantially more frequent under transparent regimes. The role of growth in predicting these forms of unrest is also accentuated when levels of transparency are high. This is most notably true for the frequency of strikes. Demonstrations grow more frequent as transparency rises, but they are not more highly sensitive to economic performance.

By contrast, transparency seems to play little or no conditioning role with respect to the relationship between economic growth and the frequency of riots or assassinations. Assassinations occur with similar frequency in both transparent and non-transparent autocracies. And while assassinations are more common when growth is poor, this is true to a nearly equal extent under both transparent and opaque autocracies.

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[40]These are contemporaneous marginal associations. Note that the inclusion of the lagged dependent variable ensures that the long-term equilibrium associations between unrest and covariates of interest will be several multiples of those depicted in the figures below. Any differences in the marginal effect of growth between highly transparent and highly non-transparent country-years will thus grow in absolute magnitude.

Table 4: Fixed-Effects Negative Binomial Models, Unrest

|	General Strikes	Riots	Demonstrations	Revolutions	Guerrilla	Coups	Assassinations
Lag Unrest	0.217**	0.082***	0.097***	0.181***	0.557***	-0.157	0.030
	[0.002,0.432]	[0.037,0.127]	[0.063,0.131]	[0.102,0.260]	[0.359,0.756]	[-1.035,0.720]	[-0.050,0.109]
Transparency	0.496***	0.142**	0.249***	0.020	0.008	-0.145	0.049
	[0.123,0.868]	[0.006,0.278]	[0.124,0.375]	[-0.062,0.102]	[-0.084,0.100]	[-0.496,0.206]	[-0.119,0.217]
Growth	-0.019	0.007	-0.012	-0.000	0.004	-0.035*	-0.034***
	[-0.048,0.009]	[-0.012,0.027]	[-0.030,0.005]	[-0.011,0.011]	[-0.008,0.016]	[-0.075,0.005]	[-0.054,-0.014]
Transparency × Growth	-0.013	-0.004	0.001	0.002	0.002	-0.015**	-0.009*
	[-0.034,0.007]	[-0.013,0.005]	[-0.007,0.010]	[-0.003,0.006]	[-0.003,0.007]	[-0.028,-0.001]	[-0.018,0.000]
GDP *per capita*	0.464	0.523	0.318	1.006*	0.241	-5.626	0.885*
	[-1.241,2.170]	[-0.327,1.372]	[-0.429,1.065]	[-0.015,2.027]	[-1.034,1.515]	[-17.025,5.773]	[-0.119,1.889]
Ec. Openness	0.001	-0.007*	-0.001	-0.005**	-0.003	0.003	-0.008
	[-0.018,0.020]	[-0.016,0.001]	[-0.008,0.006]	[-0.010,-0.000]	[-0.008,0.003]	[-0.014,0.019]	[-0.019,0.003]
Party	0.802*	0.009	-0.095	-0.014	0.222	1.160***	0.764***
	[-0.017,1.621]	[-0.428,0.446]	[-0.490,0.300]	[-0.336,0.308]	[-0.214,0.658]	[0.385,1.935]	[0.214,1.314]
Military	0.339	-0.219	-0.139	-0.347*	-0.495*	-0.262	0.036
	[-0.532,1.209]	[-0.712,0.274]	[-0.594,0.317]	[-0.743,0.048]	[-1.052,0.062]	[-1.170,0.646]	[-0.653,0.726]
Fuel Exports	-1.502	0.477	-0.313	1.478	0.282	1.437	-0.807
	[-3.977,0.973]	[-0.692,1.645]	[-1.225,0.600]	[-151.412,154.367]	[-209.599,210.163]	[-1210.348,1213.222]	[-2.053,0.439]
Constant	-3.346***	-0.834	-1.050**	9.487	10.496	9.219	0.055
	[-5.626,-1.067]	[-1.970,0.301]	[-2.077,-0.023]	[-47.107,66.080]	[-55.296,76.288]	[-164.458,182.896]	[-1.744,1.854]
Cubic Time Polynomial	✓	✓	✓	✓	✓	✓	✓
#Obs	590	986	1014	1002	671	514	635
#Countries	42	66	70	65	43	33	41

Fixed-effects negative binomial regressions of levels of unrest as a function of transparency and growth. Measures of unrest are drawn from (Banks, 1979). All models include a lagged dependent variable, the coefficient on which is reported in the first row of the table. * denotes significance at the 10 percent level, ** denotes significance at the 5 percent level, and *** denotes significance at the 1 percent level. 95 percent confidence intervals are presented in brackets.

43

Low Versus High Transparency
Predicted Num. of Strikes
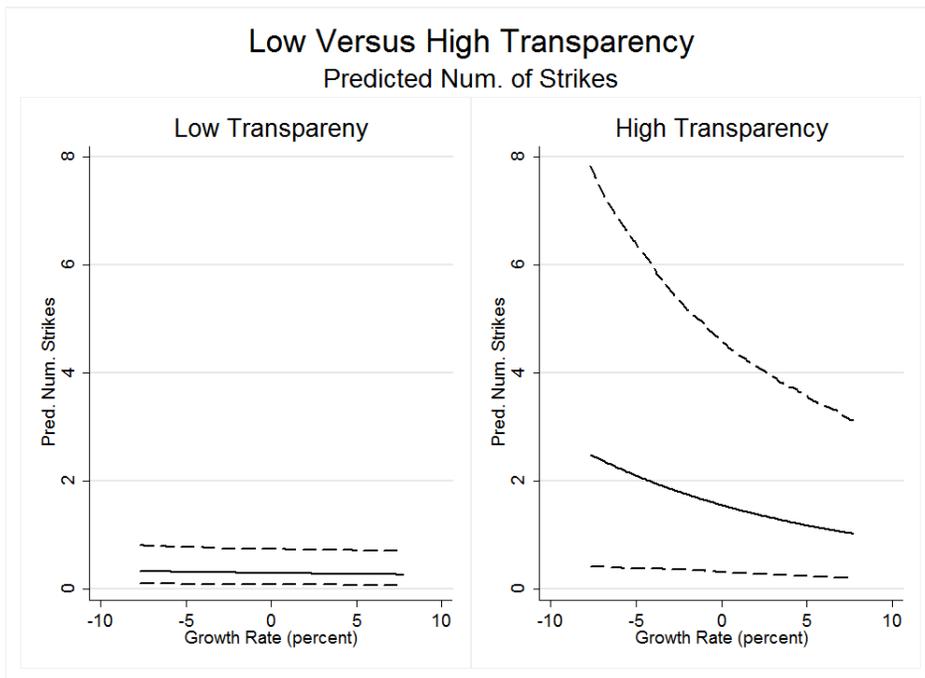
Plots of the contemporaneous expected number of strikes as a function of growth and transparency. Note that these figures represent contemporaneous associations, not differences in the steady-state. The expected number of strikes are plotted on the y-axis, the growth rate is plotted on the x-axis. The graph to the left depicts this relationship when transparency is at its 10th percentile in the sample, the graph to the right depicts the relationship when transparency is at its 90th percentile in the sample. Solid lines depict expected values, dashed lines depict 95 percent confidence intervals.

Figure 5: Expected Number of Strikes as a Function of Growth and Transparency

Low Versus High Transparency
Predicted Num. of Demonstrations
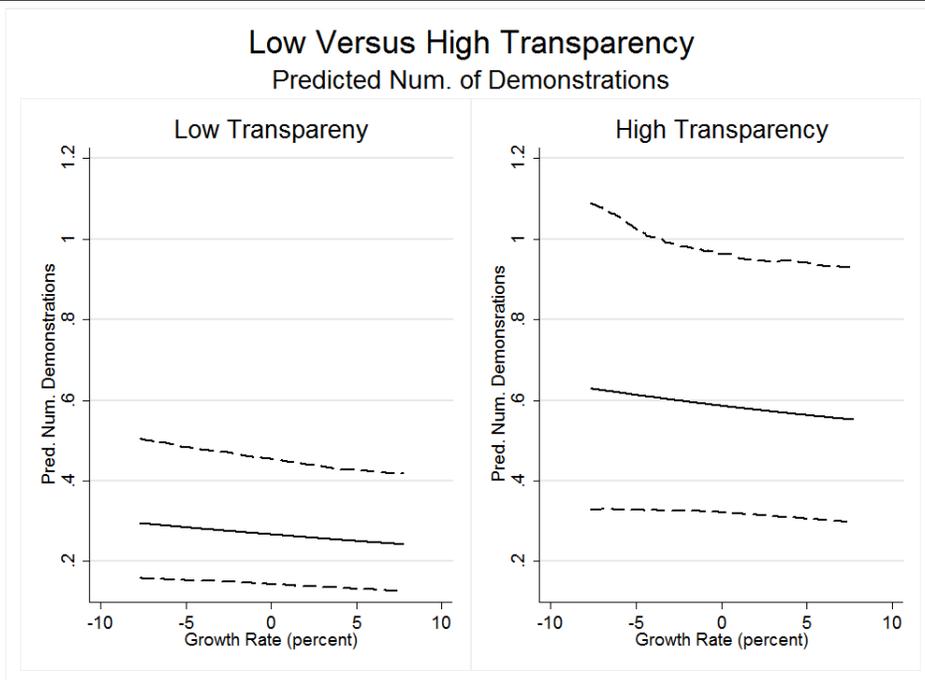
Plots of the contemporaneous expected number of anti-government demonstrations as a function of growth and transparency. Note that these figures represent contemporaneous associations, not differences in the steady-state. The expected number of anti-government demonstrations are plotted on the y-axis, the growth rate is plotted on the x-axis. The graph to the left depicts this relationship when transparency is at its 10th percentile in the sample, the graph to the right depicts the relationship when transparency is at its 90th percentile in the sample. Solid lines depict expected values, dashed lines depict 95 percent confidence intervals.

Figure 6: Expected Number of Demonstrations as Function of Growth and Transparency

Low Versus High Transparency
Predicted Num. of Riots

Plots of the contemporaneous expected number of riots as a function of growth and transparency. Note that these figures represent contemporaneous associations, not differences in the steady-state. The expected number of riots are plotted on the y-axis, the growth rate is plotted on the x-axis. The graph to the left depicts this relationship when transparency is at its 10th percentile in the sample, the graph to the right depicts the relationship when transparency is at its 90th percentile in the sample. Solid lines depict expected values, dashed lines depict 95 percent confidence intervals.

Figure 7: Expected Number of Riots as a Function of Growth and Transparency

Riots, on the other hand, appear to grow slightly (though far from significantly) more frequent as transparency rises. However, these effects are small in magnitude – particularly when compared to the large shift in the frequency of demonstrations and strikes. As noted above, though riots involve some degree of collective action on the part of the public, the mechanisms driving riots differ systematically from those driving forms of unrest more explicitly directed at the regime in power.

These findings are broadly in keeping with the mechanisms posited by our theory. Transparency appears to increase the frequency of – and to enhance the role of economic outcomes in driving – mass mobilization, as manifested in the number of strikes and demonstrations. By con-
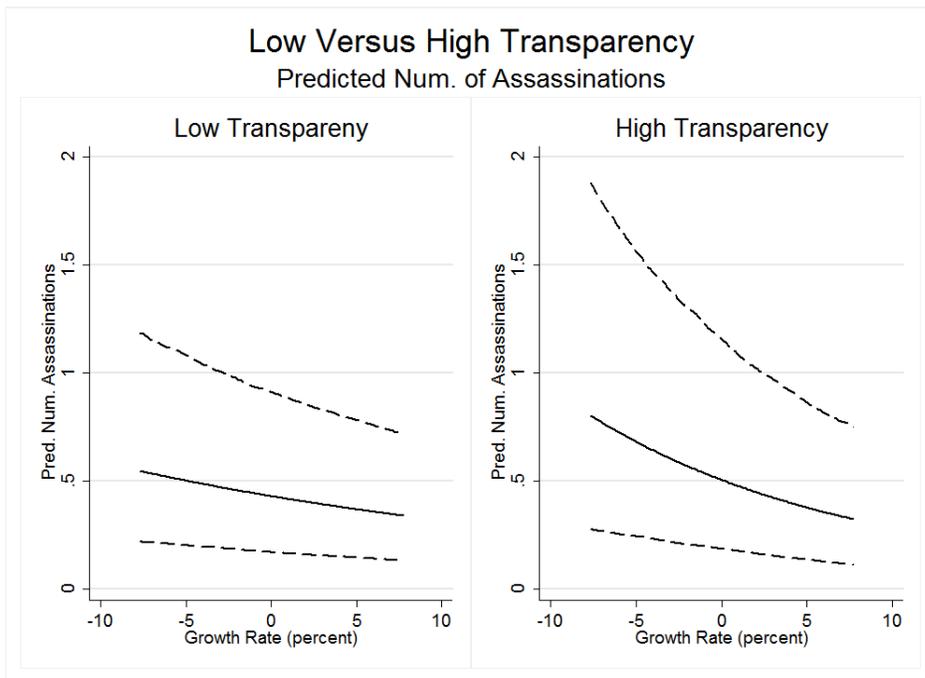
Low Versus High Transparency

Predicted Num. of Assassinations

Plots of the contemporaneous expected number of assassi-
nations as a function of growth and transparency. Note that
these figures represent contemporaneous associations, not
differences in the steady-state. The expected number of
assassinations are plotted on the y-axis, the growth rate is
plotted on the x-axis. The graph to the left depicts this re-
lationship when transparency is at its 10th percentile in the
sample, the graph to the right depicts the relationship when
transparency is at its 90th percentile in the sample. Solid
lines depict expected values, dashed lines depict 95 percent
confidence intervals.

Figure 8: Expected Number of Assassinations as a Function of Growth and Transparency
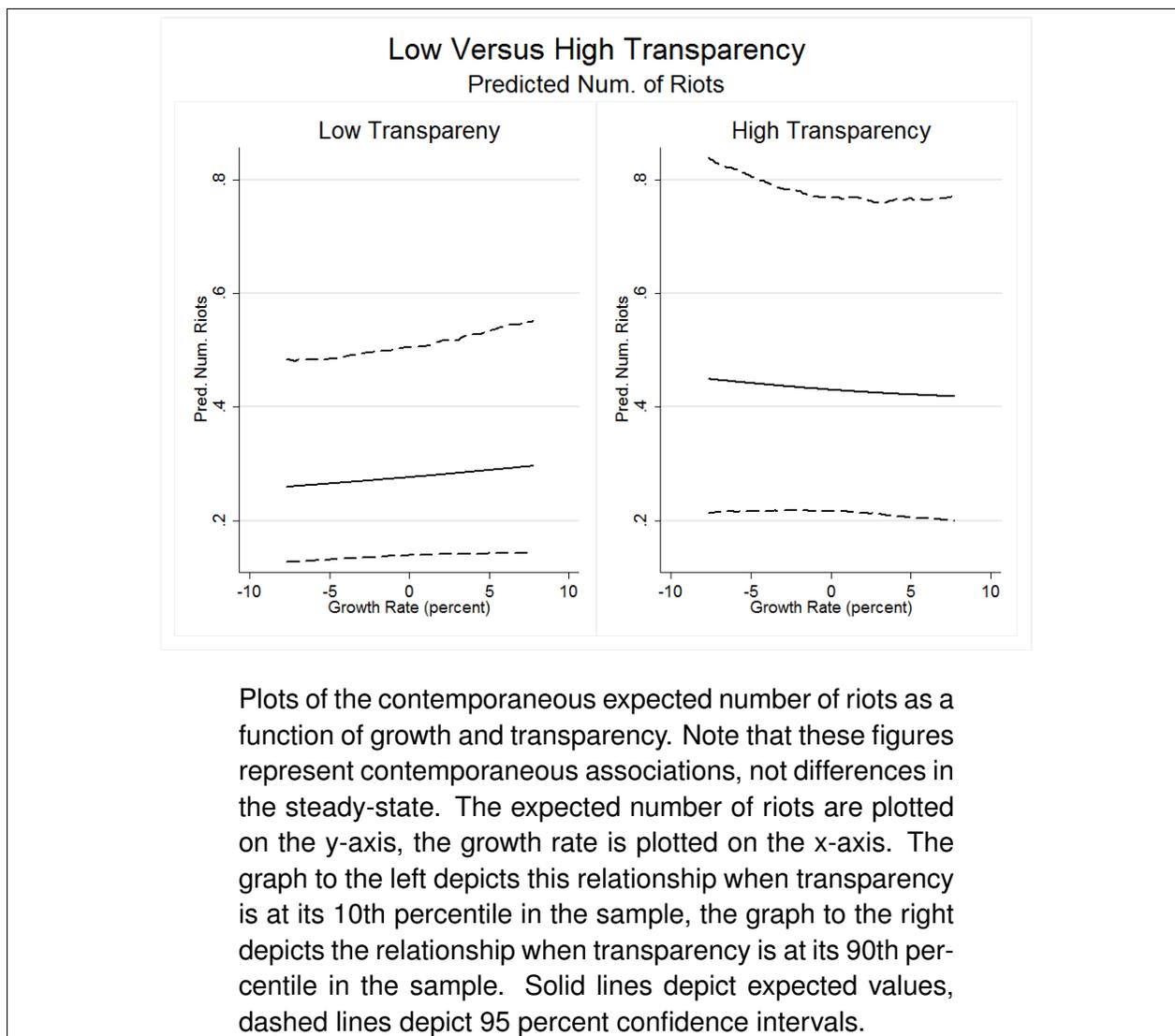
trast, transparency plays little role in predicting the number of assassinations or guerrilla movements and coups.

Transparency and the Stability of Democracies

Proposition 6 contends that transparency should be associated with the stabilization of democratic regimes. Transparent democracies should face a lower hazard of collapse (and transition to authoritarianism) than opaque democracies, due to transparency's role in enhancing the effectiveness of the electoral system. Since mass unrest to unseat democratically elected leaders is driven by the perception that electoral rules fail to unseat rent-seeking or incompetent politicians, enhancing the effectiveness of elections serves to decrease the likelihood of unrest. We test this claim below, using methods broadly similar to our regressions pertaining to autocracies.

In addition to testing comparative statics that emerge from our theoretical model, these models help to reinforce the validity of our other empirical results. If our empirics are biased by the omission of a variable correlated with both transparency and the risk of autocratic collapse, that variable would have to have the opposite association with the risk of democratic collapse to systematically bias results in our favor. Any alternative mechanism that functions identically in both democracies and autocracies would bias one set of results or the other in a direction opposed to our theoretical predictions. We thus boost confidence that our theoretical mechanisms have empirical purchase by testing a variety of propositions with suggest that our key explanatory variable has wildly different implications for regime survival in different institutional settings.

We begin by examining the relationship between the survival of democratic spells and levels of transparency. In contrast to our models pertaining to autocracies, where we consider the removal of a government through mass revolt or democratization, our outcome of interest here is a democratic-to-autocratic transition, which we define using the DD dataset (Cheibub, Gandhi and Vreeland, 2010). The unit of observation is the democratic spell-year, where a democratic spell is defined as one or more continuous years of democratic rule.

As before, we test this relationship using Cox proportional hazards regressions, where the baseline hazard rate is estimated using conditional gap time models. However, because the only means of democratic collapse is an autocratic transition, we do not employ competing hazards models. Moreover, because all democracies have multiple legislative parties, we drop the $Party$ indicator from our regressions. We instead add two indicators for the type of democracy: An indicator equal to 1 for parliamentary democracies, and another indicator equal to 1 for mixed presidential/parliamentary systems. Both variables are also drawn from the DD dataset.

Results from these regressions are presented in Table 5. The first two columns present coeffi-

cient estimates from a conditional gap time model in which the baseline hazard rate is stratified by whether or not there was a prior transition, the next two present similar models stratified based on the number of prior transitions, and the final two present estimates from a model run on democracies that did not experience a prior transition to autocracy between 1870 and 2008. Table 5 presents estimates of coefficient values, not hazard ratios.

As can be seen from Table 5, the coefficient on transparency is consistently negative, large, and significant at the 10 percent level or above. The point estimates suggest that a one standard deviation increase in transparency serves to reduce the hazard of democratic collapse by between roughly 70 to 95 percent. Even with the small number of democratic-to-autocratic transitions in our sample, these estimates are significant at the 90 percent level or above in every specification.

Figure 9 presents estimates of the smoothed hazard function from the model in column 5 of Table 5. The figure to the left presents estimates from when transparency is at its 10th percentile in the sample; while, the figure to the right presents the smoothed hazard when transparency is at its 90th percentile. Dashed lines depict the estimated hazard when growth is at its 10th percentile; solid lines depict the same when growth is at its 90th percentile. As can be readily seen, an increase in transparency is associated with a marked decline in the estimated hazard rate.

These results thus offer support for Proposition 6 – as levels of transparency rise, the risk of democratic collapse sharply declines. Transparency reinforces democracy even as it destabilizes autocracies. Moreover, these results lend increased plausibility to the mechanisms we discuss throughout the paper. While we cannot claim to test any causal relationships, for any mechanism to systematically confound our results, it must have opposing effects in democracies and autocracies.

Conclusion

Increased transparency – in the form of data dissemination – is thus robustly associated with the reduced stability of autocratic regimes. Transparent autocracies experiencing low levels of economic growth are particularly likely to be subject to collapse brought about either via mass revolt or transition to democracy. This association between transparency and regime instability appears to be driven by increased levels of mass mobilization. Transparency is associated with more frequent demonstrations and strikes under autocratic rule, but is not associated with more frequent coups, assassinations, or guerrilla movements.

Contrastingly, transparency is associated with the increased stability of democratic regimes.

49

Cox Hazard Estimates
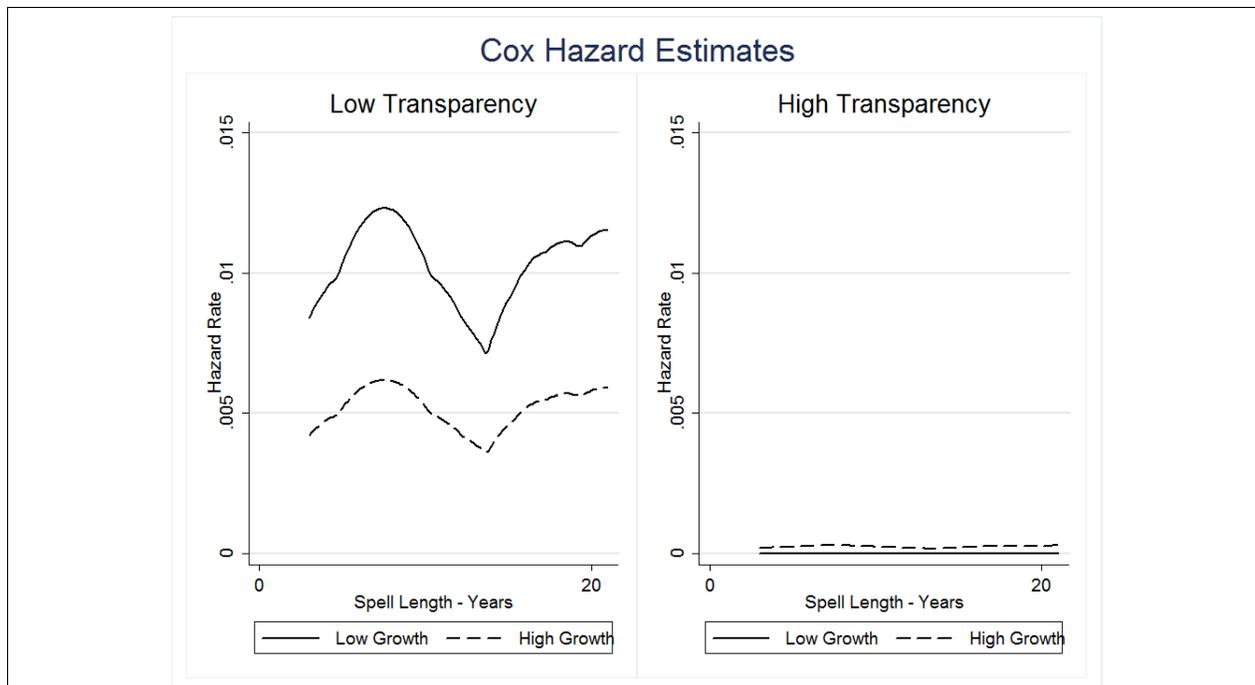
Smoothed estimates of the hazard rate as derived from the Cox Model in Column 5 of Table 5. The figure to the left depict the change in the hazard rate when growth moves from the 10th percentile to the 90th percentile in the sample when the transparency score is at the 10th percentile. The figure to the right depicts the change in the hazard rate when growth changes from the 10th to the 90th percentile when transparency is at the 90th percentile. All other covariates are held at their mean values – save the $Parliamentary$ and $Parliamentary \times t$ variables, which are held at 0.

Figure 9: Dem. Hazard Rates as a Function of Transparency and Growth

More transparent democratic regimes face a far lower risk of collapse than do opaque democracies.

These empirical findings are supportive of our theoretical account, which stresses the importance of data disclosure in coordinating citizen beliefs. Following the collective action accounts of mass mobilization pioneered by Kuran (1991), we argue that unrest is facilitated by focal mechanisms that coordinate citizen beliefs. Without such information, citizens are likely to be highly uncertain not only of the performance of their leaders, but also of other citizens' willingness to mobilize. The information contained in publically available aggregate economic data can serve to coordinate beliefs under autocratic rule. In democracies, vote returns can play this role. But, data disclosure still serves to better inform voters of government behavior, facilitating the sanctioning

of poorly performing rulers through constitutional methods.

These findings have implications for three literatures. First, they reinforce collective action-based accounts of mass mobilization – as opposed to those stressing the importance of structural factors or popular dissatisfaction with the incumbent government alone. Second, they have implications for a substantial literature on democratic transitions. Finally, we contribute to a growing literature on the role of transparency. We stress a novel mechanism by which transparency may affect political processes and government accountability (on transparency and accountability see also Adserà, Boix and Payne, 2003). And our work offers suggestive implications for existing findings that democracies tend to be more transparent than autocracies (Bueno de Mesquita et al., 2003; Hollyer, Rosendorff and Vreeland, 2011).

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Appendix: Proofs of Theoretical Propositions

Transparency in Autocracies

Lemma 1. $\bar{y}^*(s)$ *is well-defined and monotone in* s.

Proof. Definition 2 gives us $Pr(\theta = 0|\bar{y}^*(s), s)\beta = \kappa$. Substituting the posterior probability, conditional on signals s and $\bar{y}^*(s)$, generated by Bayes' rule, yields

$$\frac{\phi(\frac{\bar{y}^*(s)}{\sigma_y})\phi(\frac{s}{\sigma_s})(1-p)}{p\phi(\frac{\bar{y}^*(s)-g}{\sigma_y})\phi(\frac{s-g}{\sigma_s}) + \phi(\frac{\bar{y}^*(s)}{\sigma_y})\phi(\frac{s}{\sigma_s})(1-p)}\beta = \kappa$$

where ϕ is the pdf of the standard normal. Rearranging yields $\bar{y}^*(s) = \frac{g}{2}\left(1 + \frac{\sigma_y^2}{\sigma_s^2}\right) - \frac{s\sigma_y^2}{\sigma_s^2} - \frac{\sigma_y^2}{g}ln(\frac{p\kappa}{(1-p)[\beta-\kappa]})$ which is monotone in s. $\qquad\square$

Proof of Equilibrium Existence

Proof of Proposition 1. The leader has a dominant strategy to match his type. Since $u_{L,t}(G; \theta) = 1$ if $G_t = \theta$, zero otherwise, for $t \in \{1, 2\}$, it is always optimal to set $G_t = \theta$ in each period $t \in \{1, 2\}$ of the game. Following these equilibrium strategies, citizen i sets $a_i = 1$ if $y_{i,1} \leq \bar{y}^*(s)$. Since there is a continuum of citizens, the proportion of citizens that mobilize, i.e. set $a_i = 1$ is either $Pr\{y_{i,1} \leq \bar{y}^*(s)|\theta = 0\}$ or $Pr\{y_{i,1} \leq \bar{y}^*(s)|\theta = 1\}$ depending on the type of leader. That is the proportion of citizens that protest is either $\Phi(\frac{\bar{y}^*(s)}{\sigma_y})$ or $\Phi(\frac{\bar{y}^*(s)-g}{\sigma_y})$ where Φ is the cdf of the standard normal. If $\Phi(\frac{\bar{y}^*(s)}{\sigma_y}) \geq T > \Phi(\frac{\bar{y}^*(s)-g}{\sigma_y})$, L is removed if and only if $\theta = 0$. Then for any citizen i, given the actions of other citizens, and the leader, i will prefer to set $a_i = 1$ iff:

$$Pr(\theta = 1|y_{i,1}, s)g + Pr(\theta = 0|y_{i,1}, s)[pg + \beta] - \kappa \geq Pr(\theta = 1|y_{i,1}, s)g + Pr(\theta = 0|y_{i,1}, s)pg$$

$$Pr(\theta = 0|y_{i,1}, s)\beta \geq \kappa$$

The left hand side is the expected earnings to citizen i of protesting after receiving both her private and public signals. If the leader is a good type, in equilibrium he will survive the protest and implement policies that yield the citizen payoff g in expectation in the second period (the first term). If, on the other hand the leader is a bad type, he is removed for sure, and replaced with a good type with probability p that implements g (a bad type would implement 0). There is also a benefit of β for participating in a successful protest (the second term). Of course political action incurs fixed costs κ. If the citizen does not protest, her payoffs are as on the right hand side.

Since there is a continuum of citizens, no citizen is pivotal. Hence a good leader will survive the protest and implement g in the second period; a poor leader will fall, and be replaced with a good leader with probability p who will institute good policy g.

Therefore, when $\Phi(\frac{\bar{y}^*(s)}{\sigma_y}) \geq T > \Phi(\frac{\bar{y}^*(s)-g}{\sigma_y})$, each citizen optimally protests (given the other citizens and the leader's actions) when $y_{i,1} \leq \bar{y}^*(s)$. If, on the other hand, $\Phi(\frac{\bar{y}^*(s)}{\sigma_y}) < T$, and each citizen i is adopting a strategy of $a_i = 1$ if and only if $y_{i,1} \leq \bar{y}^*(s)$, then L would never be removed. Given that this is the case, the utility from setting $a_i = 1$ is $-\kappa < 0$, and so this cannot be a best response. Thus, $a_i = 0 \;\forall\; i$ if $\Phi(\frac{\bar{y}^*(s)}{\sigma_y}) < T$. We write this as $\bar{y}(s) = -\infty$ when $\Phi(\frac{\bar{y}^*(s)}{\sigma_y}) < T$.

Conversely, if $\Phi(\frac{\bar{y}^*(s)-g}{\sigma_y}) \geq T$, and each citizen i is adopting a strategy of $a_i = 1$ if an only if $y_{i,1} \leq \bar{y}^*(s)$, then L would always be removed, regardless of type. Given that this is the case, the utility from setting $a_i = 1$ is $\beta - \kappa > 0$, the return from not participating. Hence $a_i = 1 \;\forall\; i$ if $\Phi(\frac{\bar{y}^*(s)-g}{\sigma_y}) \geq T$ is a best response. We write this as $\bar{y}(s) = \infty$ when $\Phi(\frac{\bar{y}^*(s)-g}{\sigma_y}) \geq T$.

Together these yield a best response for any citizen as $y_{i,1} \leq \bar{y}(s)$ where $\bar{y}(s)$ is as defined in Definition 2.

Finally, beliefs follow directly from Bayes' rule. $\qquad\qquad\qquad\qquad\qquad\qquad\qquad\square$

Lemma 2. $\bar{s}$ *and* $\underline{s}$ *are well-defined*

Proof. Recall from Lemma 1 that $\bar{y}^*(s)$ is monotonic (and decreasing) in s. Further $\lim_{s\to\infty} \bar{y}^*(s) = -\infty$ and $\lim_{s\to-\infty} \bar{y}^*(s) = \infty$. Since $\Phi(\frac{\bar{y}^*(s)}{\sigma_y})$ $(\Phi(\frac{\bar{y}^*(s)-g}{\sigma_y}))$ are monotonic and increasing in $\bar{y}^*(s)$ and limited below by zero and above by 1, it follows that there exist two values of s, which we define as $\bar{s}$ and $\underline{s}$, such that $T = \Phi(\frac{\bar{y}^*(s)-g}{\sigma_y})$ and $T = \Phi(\frac{\bar{y}^*(\bar{s})}{\sigma_y})$. $\qquad\qquad\square$

Transparency Improves Discrimination

Proof of Proposition 2. Discrimination $= \Phi(\frac{\bar{s}}{\sigma_s}) - \Phi(\frac{s-g}{\sigma_s})$. Firstly, recall that $\Phi(\frac{\bar{y}^*(\bar{s})}{\sigma_y}) = T$. Substituting $\bar{y}^*(s)$ from Lemma 1, and solving we get $\bar{s} = \frac{g}{2}(\frac{\sigma_s^2}{\sigma_y^2} + 1) - \frac{\sigma_s^2}{g}ln(\frac{p\kappa}{(1-p)[\beta-\kappa]}) - \frac{\sigma_s^2}{\sigma_y}\Phi^{-1}(T)$. Similarly, since $\Phi(\frac{\bar{y}^*(\underline{s})-g}{\sigma_y}) = T$, substituion and rearranging leads to $\underline{s} = \frac{g}{2}(1 - \frac{\sigma_s^2}{\sigma_y^2}) - \frac{\sigma_s^2}{g}ln(\frac{p\kappa}{(1-p)[\beta-\kappa]}) - \frac{\sigma_s^2}{\sigma_y}\Phi^{-1}(T)$. Then $\frac{\partial}{\partial\sigma_s}(\frac{\bar{s}}{\sigma_s}) = \frac{g}{2}(\frac{1}{\sigma_y^2} - \frac{1}{\sigma_s^2}) - \frac{1}{g}ln(\frac{p\kappa}{(1-p)[\beta-k]}) - \frac{1}{\sigma_y}\Phi^{-1}(T)$ and $\frac{\partial}{\partial\sigma_s}(\frac{s-g}{\sigma_s}) = \frac{g}{2}(\frac{1}{\sigma_s^2} - \frac{1}{\sigma_y^2}) - \frac{1}{g}ln(\frac{p\kappa}{(1-p)[\beta-\kappa]}) - \frac{1}{\sigma_y}\Phi^{-1}(T)$. To conserve on notation, we will label

$Z \equiv \frac{1}{g} ln \left(\frac{p\kappa}{(1-p)[\beta-\kappa]} \right) + \frac{1}{\sigma_y} \Phi^{-1}(T)$, and hence

$$\frac{\partial}{\partial \sigma_s} \left(\frac{\bar{s}}{\sigma_s} \right) = \frac{g}{2} \left(\frac{1}{\sigma_y^2} - \frac{1}{\sigma_s^2} \right) - Z$$

$$\frac{\partial}{\partial \sigma_s} \left(\frac{s-g}{\sigma_s} \right) = \frac{g}{2} \left(\frac{1}{\sigma_s^2} - \frac{1}{\sigma_y^2} \right) - Z$$

while $\frac{g}{2} \left(\frac{1}{\sigma_s^2} - \frac{1}{\sigma_y^2} \right) > 0 > \frac{g}{2} \left(\frac{1}{\sigma_y^2} - \frac{1}{\sigma_s^2} \right)$, given that $\sigma_s < \sigma_y$. Notice too that

$$\frac{g}{2} \left(\frac{1}{\sigma_s} + \frac{\sigma_s}{\sigma_y^2} \right) - \sigma_s Z = \frac{\bar{s}}{\sigma_s}$$

$$-\frac{g}{2} \left(\frac{1}{\sigma_s} + \frac{\sigma_s}{\sigma_y^2} \right) - \sigma_s Z = \frac{s-g}{\sigma_s}$$

Since $\phi(\cdot)$ is the pdf of a standard normal, we can also notice that

$$\phi\left(\frac{\bar{s}}{\sigma_s} \right) \gtreqless \phi\left(\frac{s-g}{\sigma_s} \right) \Leftrightarrow Z \lesseqgtr 0. \tag{5}$$

Now consider a change in discrimination due to a change in σ_s:

$$\frac{\partial}{\partial \sigma_s} \left[\Phi\left(\frac{\bar{s}}{\sigma_s} \right) - \Phi\left(\frac{s-g}{\sigma_s} \right) \right] < 0 \Leftrightarrow$$

$$\phi\left(\frac{\bar{s}}{\sigma_s} \right) \left[\frac{\partial}{\partial \sigma_s} \left(\frac{\bar{s}}{\sigma_s} \right) \right] < \phi\left(\frac{s-g}{\sigma_s} \right) \left[\frac{\partial}{\partial \sigma_s} \left(\frac{s-g}{\sigma_s} \right) \right] \tag{6}$$

Having defined these preliminaries, we can now evaluate condition 6. Let us first assume $\frac{\partial}{\partial \sigma_s} \left(\frac{\bar{s}}{\sigma_s} \right) > 0$. Notice that, since $\frac{g}{2} \left(\frac{1}{\sigma_y^2} - \frac{1}{\sigma_s^2} \right) < 0$, this implies that $Z < 0$. Condition 6 can thus be expressed as:

$$\frac{\phi\left(\frac{\bar{s}}{\sigma_s} \right)}{\phi\left(\frac{s-g}{\sigma_s} \right)} < \frac{\frac{g}{2} \left(\frac{1}{\sigma_s^2} - \frac{1}{\sigma_y^2} \right) - Z}{\frac{g}{2} \left(\frac{1}{\sigma_y^2} - \frac{1}{\sigma_s^2} \right) - Z}$$

Since $Z < 0$, we know from equation (5) that the LHS of this inequality is strictly less than one. We similarly know that the RHS of this inequality must be strictly greater than one, given that $\sigma_s < \sigma_y$ and the denominator is positive. Thus, this inequality must hold.

Let us now consider the case where $\frac{\partial}{\partial\sigma_s}(\frac{\bar{s}}{\sigma_s}) < 0$. Then condition 6 can be rewritten as:

$$\frac{\phi(\frac{\bar{s}}{\sigma_s})}{\phi(\frac{s-g}{\sigma_s})} > \frac{\frac{g}{2}(\frac{1}{\sigma_s^2} - \frac{1}{\sigma_y^2}) - Z}{\frac{g}{2}(\frac{1}{\sigma_y^2} - \frac{1}{\sigma_s^2}) - Z}$$

When $\frac{\partial}{\partial\sigma_s}(\frac{\bar{s}}{\sigma_s}) < 0$, $\frac{\partial}{\partial\sigma_s}(\frac{s-g}{\sigma_s})$ may be either positive or negative. If it is positive, it is immediately apparent that this inequality must hold – the RHS will be strictly negative, while the LHS (by the definition of a pdf) is strictly positive.

Let us now consider the final possible case, in which $\frac{\partial}{\partial\sigma_s}(\frac{s-g}{\sigma_s}) < 0$. Since $\frac{g}{2}(\frac{1}{\sigma_s^2} - \frac{1}{\sigma_y^2}) > 0$, this implies that $Z > 0$ and $\frac{\frac{g}{2}(\frac{1}{\sigma_s^2} - \frac{1}{\sigma_y^2}) - Z}{\frac{g}{2}(\frac{1}{\sigma_y^2} - \frac{1}{\sigma_s^2}) - Z} \in (0, 1)$. $Z > 0$ implies that $\frac{\phi(\frac{\bar{s}}{\sigma_s})}{\phi(\frac{s-g}{\sigma_s})} > 1$. Thus, the inequality holds.

Hence condition 6 holds for all possible parameter values. Discrimination is therefore be rising in transparency. □ □

Corollary 1 follows directly from the strategies identified in the equilibrium in Proposition 1.

Proof of Proposition 3

Proof of Proposition 3. The unconditional probability of autocratic removal is given by $(1-p)\Phi(\frac{\bar{s}}{\sigma_s}) + p\Phi(\frac{s-g}{\sigma_s})$. This probability is increasing in transparency if the quantity above is decreasing in σ_s. Thus, the unconditional probability of democratization is rising in transparency iff

$$(1-p)\phi(\frac{\bar{s}}{\sigma_s})[\frac{\partial}{\partial\sigma_s}(\frac{\bar{s}}{\sigma_s})] + p\phi(\frac{s-g}{\sigma_s})[\frac{\partial}{\partial\sigma_s}(\frac{s-g}{\sigma_s})] < 0. \tag{7}$$

As we saw in the proof of Proposition 2 above, $\frac{\partial}{\partial\sigma_s}(\frac{s-g}{\sigma_s}) > \frac{\partial}{\partial\sigma_s}(\frac{\bar{s}}{\sigma_s})$. Thus, a sufficient condition for condition 7 to hold is that $\frac{\partial}{\partial\sigma_s}(\frac{s-g}{\sigma_s}) \leq 0$. Recall that

$$\frac{\partial}{\partial\sigma_s}(\frac{s-g}{\sigma_s}) = \frac{g}{2}(\frac{1}{\sigma_s^2} - \frac{1}{\sigma_y^2}) - Z$$

which is monotonic and decreasing in σ_s and converges to $-Z$ as $\sigma_s \to \sigma_y$. Thus, if $Z > 0$, there exists a value $\bar{\sigma}_s$ such that this expression is negative for all $\sigma_s \geq \bar{\sigma}_s$. Finally, $Z > 0$ implies that $\frac{1}{g}ln(\frac{p\kappa}{(1-p)[\beta-\kappa]}) + \frac{1}{\sigma_y}\Phi^{-1}(T) > 0$ or $\Phi^{-1}(T) > -\frac{\sigma_y}{g}ln(\frac{p\kappa}{(1-p)[\beta-\kappa]})$. □

Proof of Remark 1

Proof of Remark 1. From the proof of Proposition 3 above, a sufficient condition for the unconditional probability of autocratic removal to be rising in transparency (falling in σ_s) is $\frac{\partial}{\partial \sigma_s}(\frac{s-g}{\sigma_s}) \leq 0$. Now $\frac{\partial}{\partial \sigma_s}(\frac{s-g}{\sigma_s}) = \frac{g}{2}(\frac{1}{\sigma_s^2} - \frac{1}{\sigma_y^2}) - Z$ and $Z = \frac{1}{g}ln(\frac{p\kappa}{(1-p)[\beta-\kappa]}) + \frac{1}{\sigma_y}\Phi^{-1}(T)$. Then $\lim_{\beta \to \kappa} Z = \infty \; \forall \, T > 0$ and hence $\lim_{\beta \to \kappa} \frac{\partial}{\partial \sigma_s}(\frac{s-g}{\sigma_s}) < 0 \; \forall \sigma_s, T > 0$. □

Transparency in Democracies

Lemma 3. $\tilde{y}(s)$ *is well defined*

Proof. Recall $Pr(\theta = 1|\tilde{y}(s), s) = p$. From Bayes rule,

$$Pr(\theta = 1|\tilde{y}(s), s) = \frac{p\phi(\frac{\tilde{y}(s)-g}{\sigma_y})\phi(\frac{s-g}{\sigma_s})}{p\phi(\frac{\tilde{y}(s)-g}{\sigma_y})\phi(\frac{s-g}{\sigma_s}) + (1-p)\phi(\frac{\tilde{y}(s)}{\sigma_y})\phi(\frac{s}{\sigma_s})}.$$

Then $\tilde{y}(s) = \frac{g}{2}(\frac{\sigma_y^2}{\sigma_s^2} + 1) - \frac{s\sigma_y^2}{\sigma_s^2}$. □

Proof of Equilibrium Existence

Proof of Proposition 4. As before the leader has a dominant strategy to match her type: L's best response is to set $G_t = \theta$ in $t \in \{1, 2\}$. In the voting stage, given the equilibrium strategies of the leader and the other voters, voter i votes against the incumbent (set $v_i = 1$) if and only if $Pr(\theta = 1|y_{i,1}, s) \leq p$. Substituting the equilibrium interim beliefs and simplifying yields the condition that $v_i = 1$ iff $y_{i,1} < \tilde{y}(s)$. So the voter is playing a best response and consistent with beliefs. After the voting is complete, and given these strategies by the voters, the number of votes to remove L is given by $V(\theta; s)$, as defined in Definition 4. Notice that, for any value of s, $V(1, s) < V(0, s)$ – the vote share of the incumbent is strictly lower if she is of type $\theta = 0$ than if she is of type $\theta = 1$. This then implies that – given the public signal – each citizen i can deduce L's type with certainty based on her vote share. More precisely, each citizen i's posterior beliefs will be given by:

$$Pr(\theta = 1|V, s) = \begin{cases} 0 \text{ if } V > V(1, s) \\ 1 \text{ otherwise.} \end{cases}$$

Given these posterior beliefs, in equilibrium, all voters will mobilize if $V > V(1, s)$. If all other voters are mobilizing it is optimal for the $i'th$ voter to mobilize too in order to benefit from participating

in a successful uprising; if the other voters are not mobilizing (which happens when $V \leq V(1, s)$), then there is no benefit to protesting. Hence for voter i a best response is $a_i = 1$ if $V > V(1, s)$ and 0 otherwise. Finally both interim and posterior beliefs follow Bayes' rule. $\qquad \square$

Democratic Discrimination and Transparency

Lemma 4. *$\tilde{s}$ and $\underline{s}$ are well-defined*

Proof. $\Phi(\frac{\tilde{y}(\tilde{s})-g}{\sigma_y}) = \frac{1}{2}$ and $\tilde{y}(s) = \frac{g}{2}(\frac{\sigma_y^2}{\sigma_s^2} + 1) - \frac{s\sigma_y^2}{\sigma_s^2}$ from Lemma 3. Substituting and solving yields $\frac{g}{2}(1 + \frac{\sigma_s^2}{\sigma_y^2}) = \tilde{s}$. Similarly, $\Phi(\frac{\tilde{y}(\underline{s})-g}{\sigma_y}) = \frac{1}{2}$. Substituting and solving yields $\frac{g}{2}(1 - \frac{\sigma_s^2}{\sigma_y^2}) = \underline{s}$. $\qquad \square$

Proof of Proposition 5. Electoral discrimination $= \Phi(\frac{\tilde{s}}{\sigma_s}) - \Phi(\frac{\underline{s}-g}{\sigma_s})$. $\frac{\partial}{\partial \sigma_s}[\Phi(\frac{\tilde{s}}{\sigma_s}) - \Phi(\frac{\underline{s}-g}{\sigma_s})] = \phi(\frac{\tilde{s}}{\sigma_s})\frac{\partial}{\partial \sigma_s}[\frac{\tilde{s}}{\sigma_s}] - \phi(\frac{\underline{s}-g}{\sigma_s})\frac{\partial}{\partial \sigma_s}[\frac{\underline{s}-g}{\sigma_s}]$. Now the first term $\phi(\frac{\tilde{s}}{\sigma_s})\frac{\partial}{\partial \sigma_s}[\frac{\tilde{s}}{\sigma_s}] = \phi(\frac{\tilde{s}}{\sigma_s})\frac{g}{2}(\frac{1}{\sigma_y^2} - \frac{1}{\sigma_s^2}) < 0$ since $\sigma_s < \sigma_y$. The second term $\phi(\frac{\underline{s}-g}{\sigma_s})\frac{\partial}{\partial \sigma_s}[\frac{\underline{s}-g}{\sigma_s}] = \phi(\frac{\underline{s}-g}{\sigma_s})\frac{g}{2}(\frac{1}{\sigma_s^2} - \frac{1}{\sigma_y^2}) > 0$ again since $\sigma_s < \sigma_y$. Hence $\frac{\partial}{\partial \sigma_s}[\Phi(\frac{\tilde{s}}{\sigma_s}) - \Phi(\frac{\underline{s}-g}{\sigma_s})] < 0$. $\qquad \square$

Proof of Proposition 6. Mass unrest takes place in equilibrium if and only if an incumbent of type $\theta = 0$ survives the electoral stage of the game. From the proof of Proposition 5, this probability is $1 - \Phi(\frac{\tilde{s}}{\sigma_s})$. Then $\frac{\partial}{\partial \sigma_s}\left[1 - \Phi(\frac{\tilde{s}}{\sigma_s})\right] = -\phi(\frac{\tilde{s}}{\sigma_s})[\frac{\partial}{\partial s}\frac{\tilde{s}}{\sigma_s}]$. From the proof of Proposition 5 above, $\frac{\partial}{\partial s}\frac{\tilde{s}}{\sigma_s} < 0$. Since ϕ is the pdf of the standard normal (and hence positive), $\frac{\partial}{\partial \sigma_s}\left[1 - \Phi(\frac{\tilde{s}}{\sigma_s})\right] > 0$. The probability of unrest under democracy is falling in transparency. $\qquad \square$

Appendix: Empirical Appendix

Transparency and Autocrat Removal Via Revolt and Democratization Seperately

Table 5: Transparency and the Hazard of Democratic Collapse

	Cond. Prior Transition		Cond. Num. Transitions		No Prior Transition	
Transparency	-0.491**	-0.528***	-0.413*	-0.478***	-1.162***	-1.135***
	[-0.939,-0.042]	[-0.848,-0.209]	[-0.830,0.003]	[-0.773,-0.182]	[-1.953,-0.371]	[-1.838,-0.431]
Growth	-0.158***	-0.130***	-0.162***	-0.135***	-0.082	-0.077*
	[-0.234,-0.082]	[-0.191,-0.069]	[-0.237,-0.087]	[-0.196,-0.074]	[-0.183,0.019]	[-0.167,0.014]
Transparency × Growth	0.023	0.027	0.045***	0.040**	0.127**	0.131**
	[-0.036,0.081]	[-0.045,0.098]	[0.011,0.078]	[0.002,0.079]	[0.020,0.234]	[0.023,0.238]
GDP *per capita*	-2.062*		-1.558		-0.962	
	[-4.291,0.168]		[-3.959,0.844]		[-7.763,5.838]	
Ec. Openness	-0.001		-0.004		-0.022	
	[-0.021,0.019]		[-0.025,0.016]		[-0.076,0.032]	
Parliamentary	2.112***		1.970***		0.955	
	[0.841,3.383]		[0.854,3.086]		[-0.194,2.104]	
Mixed System	0.690		0.626		0.115	
	[-0.586,1.967]		[-0.699,1.951]		[-1.369,1.598]	
# of Subjects	88	88	88	88	53	53
# of Failures	19	19	19	19	8	8

Cox proportional hazards regressions of the hazard of democratic collapse. The models depicted in the first two columns, the middle two columns, and the last two columns differ in the manner in which they deal with countries that experience multiple autocratic spells. Those in the first two columns report a conditional gap time model wherein the baseline hazard is separately estimated for regimes that experience a prior transition and for those that did not. Those in the next two columns estimate separate baseline hazards based on the number of prior transitions. Those in the final two columns examine only autocratic spells that did not experience a prior transition. In all models, * denotes significance at the 10 percent level, ** denotes significance at the 5 percent level, and *** denotes significance at the 1 percent level. 95 percent confidence intervals are presented in brackets. All standard errors have been clustered by democratic spell.

Table 6: Cox Model, Autocrat Removal via Revolt Only

	Cond. Past Collapse			Cond. Hist. Instability			Control Past Collapse		
Transparency	0.344	0.304	0.293	0.427**	0.317	0.292	0.286	0.247	0.281
	[-0.139,0.828]	[-0.139,0.748]	[-0.110,0.696]	[0.010,0.843]	[-0.188,0.822]	[-0.253,0.837]	[-0.220,0.791]	[-0.246,0.740]	[-0.213,0.775]
Growth	-0.037	-0.050*	-0.046	-0.070	-0.057	-0.039	-0.048	-0.052*	-0.050
	[-0.090,0.015]	[-0.103,0.003]	[-0.104,0.011]	[-0.317,0.177]	[-0.182,0.068]	[-0.160,0.082]	[-0.113,0.016]	[-0.111,0.007]	[-0.111,0.010]
Transparency × Growth	-0.020*	-0.025*	-0.023	0.019	0.004	0.003	-0.024	-0.025*	-0.025
	[-0.044,0.004]	[-0.052,0.001]	[-0.051,0.005]	[-0.122,0.159]	[-0.105,0.114]	[-0.095,0.102]	[-0.054,0.006]	[-0.055,0.005]	[-0.057,0.008]
GDP *per capita*	-0.667			0.040			-0.305		
	[-2.216,0.882]			[-1.166,1.245]			[-1.543,0.932]		
Ec. Openness	-0.017			-0.033*			-0.022		
	[-0.051,0.017]			[-0.072,0.005]			[-0.058,0.014]		
Party	-0.420	-0.379		-0.597	-0.557		0.025	0.069	
	[-1.910,1.070]	[-1.616,0.858]		[-2.559,1.365]	[-2.394,1.279]		[-1.419,1.469]	[-1.426,1.564]	
Military	0.148	0.234		0.151	-0.047		0.282	0.472	
	[-1.399,1.695]	[-1.240,1.709]		[-2.153,2.456]	[-1.841,1.747]		[-1.454,2.019]	[-1.078,2.023]	
Ever Collapse							1.011	0.704	0.843
							[-0.856,2.878]	[-1.392,2.800]	[-1.128,2.813]
# of Subjects	137	137	143	137	137	143	137	137	143
# of Failures	6	6	6	6	6	6	6	6	6

Cox competing hazards regressions of the hazard of autocratic removal by mass revolt only. The models depicted in the first three columns, and the last three columns differ in the manner in which they deal with countries that experienced multiple autocratic failures. Those in the first three columns report a conditional gap time model wherein the baseline hazard is separately estimated for regimes that experience a prior regime failure and for those that did not. Those in the next two columns estimate separate baseline hazards based on a categorical measure that reflects the number of prior collapses. Those in the final three columns simply control for prior collapses, rather than stratifying the baseline hazard. In all models, * denotes significance at the 10 percent level, ** denotes significance at the 5 percent level, and *** denotes significance at the 1 percent level. 95 percent confidence intervals are presented in brackets. All standard errors have been clustered by autocratic regime.

Table 7: Cox Model, Autocrat Removal via Democratization Only

	Cond. Past Collapse			Cond. Hist. Instability			Control Past Collapse		
Transparency	0.154	0.171	0.155	0.148	0.150	0.148	0.154	0.166	0.160
	[-0.098,0.407]	[-0.075,0.418]	[-0.043,0.354]	[-0.097,0.392]	[-0.097,0.397]	[-0.072,0.368]	[-0.099,0.407]	[-0.078,0.409]	[-0.040,0.361]
Growth	-0.026**	-0.025**	-0.020*	-0.047**	-0.047**	-0.037*	-0.027**	-0.027**	-0.022*
	[-0.050,-0.003]	[-0.049,-0.002]	[-0.042,0.002]	[-0.090,-0.004]	[-0.091,-0.003]	[-0.075,0.000]	[-0.051,-0.002]	[-0.051,-0.002]	[-0.044,0.000]
Transparency × Growth	0.004	0.005	0.004	-0.002	-0.002	-0.003	0.007	0.007	0.006
	[-0.026,0.035]	[-0.027,0.036]	[-0.024,0.032]	[-0.035,0.031]	[-0.035,0.031]	[-0.029,0.023]	[-0.024,0.038]	[-0.025,0.039]	[-0.024,0.035]
GDP per capita	0.250			0.111			0.143		
	[-0.326,0.827]			[-0.536,0.757]			[-0.292,0.578]		
Ec. Openness	-0.003			-0.001			-0.002		
	[-0.013,0.008]			[-0.012,0.010]			[-0.013,0.009]		
Party	-0.041			-0.161	-0.192		-0.041	-0.081	
	[-1.140,1.057]			[-1.339,1.017]	[-1.282,0.898]		[-1.170,1.087]	[-1.169,1.007]	
Military	0.734			0.661	0.642		0.645	0.607	
	[-0.261,1.728]			[-0.271,1.593]	[-0.248,1.531]		[-0.304,1.593]	[-0.301,1.516]	
Ever Collapse							0.546	0.520	0.674
							[-0.529,1.620]	[-0.444,1.484]	[-0.273,1.621]
# of Subjects	137	137	143	137	137	143	137	137	143
# of Failures	24	24	25	24	24	25	24	24	25

Cox competing hazards regressions of the hazard of autocratic removal by democratization only. The models depicted in the first three columns, the middle three columns, and the last three columns differ in the manner in which they deal with countries that experienced multiple autocratic failures. Those in the first three columns report a conditional gap time model wherein the baseline hazard is separately estimated for regimes that experience a prior regime failure and for those that did not. Those in the next two columns estimate separate baseline hazards based on a categorical measure that reflects the number of prior collapses. Those in the final three columns simply control for prior collapses, rather than stratifying the baseline hazard. In all models, * denotes significance at the 10 percent level, ** denotes significance at the 5 percent level, and *** denotes significance at the 1 percent level. 95 percent confidence intervals are presented in brackets. All standard errors have been clustered by autocratic regime.