Highway Through the Danger Zone:
Thresholds of Democratic Survival and Breakdown

Benjamin Helms[*]
Jonathan Kropko[**]
David Leblang[***]
Anne Meng[****]

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Abstract: It has become an established practice in studies of comparative politics to utilize time-series datasets that code countries as democratic or autocratic according to a particular set of criteria (see Biox et. al 2013, Cheibub et. al 2010, POLITY, and VDEM). Researchers commonly rely on these regime categorizations either for sample selection or in regression analysis. However, most scholars would agree that a country that was coded as democratic for a single year before reverting back to authoritarianism was likely not a true or consolidated democracy for that short period. Yet extremely short democratic spells are quite common in frequently used regime datasets. We propose a solution by developing the Democratic Rootedness Index (DRI), which reports the probability of democratic survival within a specific time frame given a certain amount of time since a democratic transition. DRI reveals that it often takes decades for democracies to become "rooted" – i.e. for the probability of democratic breakdown to decrease significantly. Based on these findings, we urge scholars to be cautious of considering extremely short democratic spells as democracies – such regimes are significantly likely to revert back to autocracies. We propose that scholars use the DRI to identify democratic spells that are too short to be considered rooted democracies and "drop" them when conducting empirical analyses.

*Ph.D. Candidate, Department of Politics, University of Virginia, bch5bs@virginia.edu **Assistant Teaching Professor, School of Data Science, University of Virginia, jkropko@virginia.edu ***Professor, Department of Politics, University of Virginia, dal7w@virginia.edu ****Assistant Professor, Department of Politics, University of Virginia, ameng@virginia.edu

1. Introduction

Democracy is a central concept in political science. Scholars have dedicated large bodies of work to understanding the causes and consequences of democratization (Acemoglu and Robinson 2006, Boix and Stokes 2003, Haggard and Kaufman 2016, Przeworski et al 2000 and many others) as well as democratic erosion and breakdown (Bermeo 2016, Levitsky and Ziblatt 2016, Miller 2019, Svolik 2015). To conduct empirical studies on topics related to democracy, scholars often rely on time-series datasets that code countries as democratic or autocratic according to a particular set of criteria. These regime categorizations often take the form of a democracy dummy (Boix, Miller, and Rosato 2013 or Cheibub, Gandhi, and Vreeland 2010), discrete regime typology (Geddes, Wright, Frantz 2014), or democracy score that is transformed into a dummy variable (i.e. the common practice of coding countries with a POLITY score of 6 and higher as democratic). Democracy variables are therefore hugely consequential for empirical work, as researchers commonly rely on these regime categorizations either for sample selection or in regression analysis.

However, democracy variables do not distinguish between cases where a country is coded as a democracy for one year from cases where a country was coded as a democracy for a hundred years. For instance, Ghana was coded as a democracy between 1978-1979. The United Kingdom has been coded as a democracy from 1885 to the present. Clearly the two-year democratic spell[1] that took place in Ghana is not the same as the 134-year democratic spell that is ongoing in the United Kingdom. By relying on dichotomous democracy variables to construct democratic spells, scholars are not making distinctions between two-year long democracies and

[1] We define a "democratic spell" as an uninterrupted sequence of years for which a country is coded as a democracy by an existing dataset.

134-year long democracies when running empirical tests. In order to truly understand substantive questions surrounding democratization or democratic breakdown, we must first accurately identify the set of democratic spells by disaggregating consolidated democracies from autocracies that merely carry the façade of democratic institutions. When trying to understand the causes of democratization, the case of Britain from 1885 to the present is likely a more appropriate case, rather than Ghana from 1978-1979.[2]

In this article we highlight the dangers of relying on democracy variables to construct democracy spells without considering the duration of the democracy spell. We show that that short-lived democratic spells are *surprisingly common* – and this is true across multiple datasets. In the Boix, Miller, and Rosato (2013) dataset, there are 15 democratic spells that lasted three years or less. In the Cheibub, Gandhi, and Vreeland (2010) dataset, 17 democratic spells lasted three years or less, and in the Geddes, Wright, and Frantz (2014) dataset, 24 democratic spells lasted three years or less.

To address this problem, we argue that scholars should consider the concept of "democratic rootedness" – the likelihood that a democracy will successfully resist reversion to autocracy – when measuring democratic spells. We develop a new index called the Democratic Rootedness Index (DRI) that reflects the extent to which a democracy is rooted in any given year for all countries. We create the DRI by estimating Cox proportional hazards models in which the outcome is the duration of democratic regimes, operationalized using existing dummy democracy variables from (1) Boix, Miller, and Rosato (BMR), (2) Cheibub, Gandhi, and

[2] This is not to say that understanding why Ghana had a brief period of democratic institutions is *not* an important question. We are simply arguing that this is a *different* question, and lots of scholarship has examined the conditions under which electoral authoritarianism arises.

Vreeland (CGV), (3) Geddes, Wright, and Frantz (GWF), (4) POLITY, and (5)V-Dem.[3] The DRI index is a time-series variable that reports the probability that a country will remain a democracy for the next five years, conditional on remaining a democracy up to that point. This conditional probability communicates the extent to which a democracy is safe from reversion to autocracy.

The DRI index reveals that it often takes decades for democracies to become "rooted." We identify a number of interesting thresholds using the DRI data. For instance, it takes 16 years for the probability of democratic survival to pass 90 percent and never fall below this threshold. For the probability of democratic survival to reach 100 percent, this threshold is 70 years. It takes 65 years for the probability of democratic survival to increase monotonically.[4]

We propose that scholars use these thresholds identified by DRI as a principled way to identify democracies in empirical research by adding an *additional time criterion* when identifying regime types. For example, let's say a researcher wants to use the Cheibub, Gandhi, and Vreeland 2010 (CGV) democracy dummy. CGV define a democracy as a regime that satisfies *all* of the following criteria: (1) the executive is selected either by a popular vote or the election of a committee for the purposes of executive selection; (2) the legislative is elected either directly or indirectly by popular election; (3) multiple political parties are legally allowed to exist in the regime and the legislature; and (4) there has been alternation in the party that is currently in power. Based on the DRI index, the researcher may believe that a democracy is not "rooted" until it has remained a democracy for 5 years. Based on this threshold, the researcher

[3] For continuous measures of democracy, such as POLITY or V-Dem we recode these variables as dichotomous measures, using standard conventions (i.e. POLITY ≥ 6 is considered democracy).
[4] These examples are based on the DRI index constructed using the BMR data.

will take the CGV democracy variable and recode democratic spells that last *less than 5 years* as 0's.[5]

To be clear: our proposed solution focuses on *sample selection*. We are *not* proposing a new measure of democracy, nor are we introducing a new way to run regressions for this problem. We argue that DRI offers scholars an additional criterion in which to more accurately identify democracies so that researchers do not draw substantive conclusions about democratization or democratic breakdown based on phantom democracy spells.

2. Diagnosing the Problem

Recent Challenges in the Conceptualization of Democracy

Conventional conceptualizations of democracy typically identify a set of necessary components a country must have to be considered democratic. While we remain agnostic on what combination of components constitutes a democracy, scholars often focus on three: 1) participation of citizens in selecting leaders and policies, 2) free and fair competition in the process of selecting leaders and policies, and 3) protection of civil liberties.[6] Once a country "checks the boxes" on the given components, it can be considered democratic.

Although the concept of "democracy" is distinct from the notion of "democratic consolidation", scholars have increasingly become wary of regimes that simply *appear* democratic but are, in practice, autocracies that have adopted nominally democratic institutions. Broadly speaking, democratic consolidation describes "the challenge of making new democracies secure, of extending their life expectancy beyond the short term, of making them

[5] In this paper, we focus on the use of democracy dummies but note that scholars can also use the DEI index for discounting *continuous* democracy scores as well.
[6] See Collier and Levtisky (1997), Paxton (2000), Przeworksi et al. (2000) for reviews of classic definitions of democracy in the existing literature.

immune against the threat of authoritarian regression, of building dams against eventual 'reverse waves'" (Schedler 1998, 91).

One of the main findings from the recent literature on authoritarian regimes is that leaders strategically adopt democratic seeming institutions, such as constitutions, parties, legislatures, and elections, because such institutions promote authoritarian stability (for instance, see Gandhi 2008, Gandhi and Przeworski 2007, Levitsky and Way 2010, Lust 2010, Magaloni 2006, Meng forthcoming, Svolik 2012 and many others). As Haggard and Kaufman (2016) note, "core features of our very definition of democracy… can become instruments of authoritarian domination" (127). To sum, it is often difficult to know whether regimes that have *appeared* to democratize are true democracies, or whether they are simply autocracies in sheep's clothing.

These problems have become amplified in the post-Cold War era, as authoritarian regimes are now increasingly sophisticated in the strategic adoption of nominally democratic institutions and practices to conceal the true nature of the regime. Therefore, being coded as democratic for a few years often reveals very little about the true nature of the regime. In fact, it is often when democracies are *tested* – i.e. when opposition candidates win elections – do incumbents show their true colors by weakening or removing democratic constraints.

Before we continue, we would like to note that this article puts aside the following two existing debates on the operationalization of democracy. The first debate centers on procedural questions – what kinds of criteria should be included in order to code a country a democratic or non-democratic. Przesorski et al. (2000) advocate for a minimalist stance – one that includes criteria only about the nature of elections political competition. Other scholars such as Diamond, Linz, and Lipset (1990) argue that citizen participation is a crucial aspect of democracy. Finally, scholars such as Diamond (2009) argue that an evaluation of civil liberties should be included in

the operationalization of democracy. We remain agnostic about these debates, and take existing quantitative datasets as given. Given the criteria used to grade regimes, we ask whether time thresholds should exist in order to code a country as a democracy.

A second debate on the operationalization of democracy centers on dichotomous measures versus gradient measures (Collier and Adcock 1999). While many existing studies have used dummy variables to denote whether a regime is democratic or not, POLITY is a frequently used quantitative gradient measure that scores countries on a scale from -10 to 10. In this article, we focus our attention to dichotomous scores of democracy for simplicity and because the majority of quantitative studies employ a dichotomous score.[7] However, our argument does not necessarily have to be limited to dichotomous measures. One could make the same observations about the length of time a regime must have a certain gradient measure before being considered a "real" democracy.

Problems with Dichotomous Measures of Democracy

These conceptual challenges become readily apparent when we examine existing measures of democracy. When scholars empirically explore the causes of democratization or identify cases of democratic transition, they often draw on time-series cross-national, dichotomous measures of regime type. These measures, which have proliferated over time, assign a "1" to country-years that meet a particular set of criteria for democracy and a "0"

[7] We do examine POLITY scores and transform them into dummy variables by following the existing convention of considering a regime with a POLITY score of 6 and higher as a democracy.

otherwise.[8] While these measures allow for easy cross-national analysis and have clear standards for identifying democracy, we argue that they are mismatched with an increasingly accepted definition of democracy that incorporates notions of consolidation. In particular, the dichotomous nature of these indices mean that they treat all country-year observations of democracy as equally consolidated moments.

Yet we intuitively know that not all "ones" are created equal. "1" can reflect a perfectly consolidated democracy, or "1" can represent a democracy with a non-trivial chance of autocratic reversal sometime in the future. This fact makes it problematic to uncritically employ such measures to study what leads to stable, consolidated democracy.[9] If what researchers care about is not just identifying the determinants of short-lived democratic spells, but rather what leads new democracies to become resilient to autocratic reversal, then we need to think harder about the implications of conventional democracy indicators. We need to think about other ways to use the information contained in these indicators to more effectively shine light on "democratization plus consolidation," which is ultimately the object of substantive interest for many researchers.

For instance, dichotomous measures of democracy do not distinguish between the first year of democracy in Ghana in 1978 from the United States in 2008. According to these indices, these observations reflect equally consolidated country-years of democracy. Yet empirically, we know that these observations are not equal: democracy in Ghana reverted to autocracy two years

[8] In this paper, we focus on five specific measures of democracy: Varieties of Democracy (V-Dem); POLITY; Geddes, Wright, and Frantz (GWF); Cheibub, Gandhi, and Vreeland (CGV); and Boix, Miller and Rosato (BMR).

[9] Note that although we focus on dichotomous measures of democracy, the same issue equally applies to gradated measures like Polity or V-Dem. For example, two countries could both score a "9" on Polity while being at very different levels of democratic rootedness.

later, while the United States was at no risk of total autocratic reversion. The result of this mismatch between concept and measurement means that when scholars use dichotomous democracy indicators, they conflate instances of "real" democracy (in which consolidation has occurred) to instances of "fake" democracy (in which it is less certain that consolidation is present). This mismatch may have implications for existing research in the democratization literature, if transitions to democracy in which consolidation did not occur are driving empirical findings. It also suggests that we consider more fine-grained alternative measurement strategies that are better matched to the conceptual definition of democracy scholars have in mind. While some countries consolidate such that their probability of reversion approaches zero, we frequently observe ostensible democratic transitions that quickly fall back into autocratic rule, even if they have the trappings of a lasting democracy (Svolik 2008). When scholars conceptualize democracy, they are arguably more interested in the former rather than the latter. In other words, checking the boxes on the given components of democracy is not sufficient. Instead, that country must check the boxes in ink, rather than pencil, to truly be considered a democracy. This means that it is often necessary to observe a transition over a sufficient period of time, or spell, before declaring that country democratic.

In fact, we show that extremely short democratic spells are quite common in existing datasets. In BMR, there are 33 cases of democracy spells lasting less than 10 years and 15 cases of democracy spells lasting 3 years or less. For CGV, there are 29 cases of democracy spells lasting less than 10 years and 17 cases of democracy spells lasting 3 years or less. For GWF, there are 36 cases of democracy spells lasting less than 10 years and 24 cases of democracy spells lasting 3 years or less. Table 1 displays a list of all democratic spells lasting 3 years or less.

Table 1: Democratic spells of three or fewer years

Boix, Miller, & Rosato	Cheibub, Gandhi, & Vreeland	Geddes, Wright, & Frantz
Bolivia, 1979-1980	Bolivia, 1979-1980	Azerbaijan, 1993-1994
Honduras, 1971-1972	Honduras, 1971-1972	Dominican Rep., 1963-1964
Panama, 1950-1951	Mauritania, 2007-2008	Haiti, 1991-1992
South Korea, 1960-1961	Sierra Leone, 1996-1997	Honduras, 1972-1973
Thailand 1975-1976	South Korea, 1960-1961	Mauritania, 2008-2009
Ghana, 1970-1972	Thailand, 1975-1976	Panama, 1953-1954
Ghana, 1979-1981	Ghana, 1979-1981	Sierra Leone, 1997-1998
Indonesia, 1955-1957	Myanmar, 1960-1962	South Korea, 1961-1962
Myanmar, 1960-1962	Panama, 1949-1951	Syria, 1962-1963
Suriname, 1988-1990	Suriname, 1988-1990	Thailand, 1976-1977
Argentina, 1963-1966	Argentina, 1963-1966	Venezuela, 1948-1949
Argentina, 1973-1976	Argentina, 1973-1976	Ecuador, 1969-1971
Italy, 1919-1922	Burundi, 1993-1996	Ghana, 1980-1982
Niger, 1993-1996	Ghana, 1969-1972	Guinea-Bissau, 2001-2003
Sudan, 1986-1989	Guinea-Bissau, 2000-2003	Myanmar, 1961-1963
	Niger, 1993-1996	Syria, 1948-1950
	Sudan, 1986-1989	Soviet Union, 1992-1994
		Argentina, 1974-1977
		Burundi, 1994-1997
		Ghana, 1970-1973
		Niger, 1994-1997
		Sudan, 1987-1990
		Syria, 1955-1958
		Thailand, 1989-1992

Of course we are not claiming that most scholars believe that a three-year democracy is identical to a hundred-year democracy. We acknowledge that in measuring complex concepts and variables, choices must be made, and some nuance is usually inevitably lost when translating qualitative concepts to quantitative measures. However, we wish to illustrate how frequently these short spells do emerge. Furthermore, these measurement choices may affect substantive findings when researchers use these dichotomous variables that treat all "1" uniformly. In the next section, we propose a solution for this measurement challenge.

3. Creating a Solution

Democratic Rootedness

We argue that scholars should consider the concept of "democratic rootedness" when measuring democratic spells. We defined democratic rootedness as the ability of a country to successfully resist reversion to autocracy after undergoing a democratic transition. This concept is somewhat related to the notion of "democratic consolidation", however we resist using that term because it has become somewhat of a catchall phrase. As Schedler (1998) notes, democratic consolidation has now come to include "such divergent items as popular legitimation, the diffusion of democratic values, the neutralization of antisystem actors, civilian supremacy over the military, the elimination of authoritarian enclaves, party building, the organization of functional interests, the stabilization of electoral rules, the routinization of politics, the decentralization of state power, and introduction of mechanisms of direct democracy, judicial reform, the alleviation of poverty, and economic stabilization" (91-92). Since we are not taking issues with existing *criteria* of democracy, and are instead focusing on the duration or permanence of democracy (according to established datasets), we do not adopt the language of consolidation.

Existing Methodological Approaches

We are not the first to argue that democratization scholars should be sensitive to events that can only be classified as pseudo-democratic spells. Two existing contributions in particular address the same challenges that we've identified, but propose different solutions.

First, Gerring, Thacker, and Alfaro (2012)[10] present a new democracy stock variable that conceives of democracy as a cumulative process rather than a year-by-year score. To create the

[10] Also see Gerring, Bond, Barndt, and Moreno (2005).

democracy stock variable, they "sum each country's score from 1900 to the present year, applying a 1% annual depreciation rate. This means that a country's regime stock stretches back over the course of the twentieth century but that more distant years receive less weight than recent ones" (pg. 6). The Gerring et. al democracy stock variable is useful when estimating the causal effect of an accumulated, deep legacy of democracy on outcomes like growth and human development. However, democracy stock does not straightforwardly offer a means to identify and exclude episodes of pseudo-democratization events from a sample, as our index does. The variable does not concretely measure the probability of autocratic reversal, or indicate the fragility of new democracies. Moreover, while the democracy stock variable is a *new measure* of democracy, the DRI simply offers researchers an *additional criterion* in which to evaluate existing democracy variables.

Second, Svolik (2008) diagnoses a similar problem to the one that we identify and presents a *regression-based* solution. His main concern is that some democracies might persist over time because they are fully consolidated, while others persist simply because of favorable conditions, and still have a non-zero probability of autocratic reversal. He usefully points out that conflating these two types of democracies leads to a misunderstanding of the determinants of democratic consolidation, which is ultimately of theoretical interest. Svolik employs a novel modeling strategy, a split-population survival model, to separate consolidated and non-consolidated democracies. He then estimates the effect of prominent political and economic variables on democratic consolidation only within the sample of fully consolidated democracies, while suggesting that non-consolidated democracies be studied separately. Svolik's approach is an advance over alternatives that pool all democratization episodes together without regard to what we know about longevity and consolidation.

While this approach effectively distinguishes between consolidated and non-consolidated democracies with a novel statistical model, our goal is different. Svolik's goal is to distinguish the factors that lead to actual democratic consolidation rather than just idiosyncratic persistence of democracy, and as a result, uses a survival modeling strategy to produce "split populations." This is not the goal for which the DRI is designed. We instead aim to offer scholars a way to choose a sample of democratization events that excludes short pseudo-democracies that are ultimately unlikely to persist. As a result, we assign all country-year observations of democracy a probability that reflects uncertainty about their level of rootedness at that moment. This gradient measure allows researchers to determine the appropriate range of democratization events that should be included when studying the causes and consequences of democratization.

4. Introducing the Democratic Rootedness Index (DRI)

Creating the Index

The DRI reflects the extent to which a democracy is rooted. By rooted, we generally mean the extent to which a democracy can resist reversion back to autocracy after a democratic transition. We quantify a democracy's rootedness by estimating Cox proportional hazards models. We use these models to estimate the probability that a country will remain a democracy for the next five years, conditional on it having remained a democracy up to that point. This conditional probability communicates uncertainty about the extent to which a democracy is safe from reversion to autocracy. It allows researchers to make more fine-grained distinctions between the strength of different democracies than existing binary indicators. While we present a version of the DRI that considers only the length of time a country has remained a democracy after its transition, our framework easily allows researchers to augment the DRI by incorporating

relevant predictors of democratization and democratic strength. Here, we discuss the steps we take to construct the initial version of the DRI in more detail.

We collect and construct time-series cross-sectional dichotomous democracy indicator data from the following sources used extensively in the democratization literature: Varieties of Democracy; Polity; Geddes, Wright, and Frantz (GWF); Cheibub, Gandhi, and Vreeland (CGV); and Boix, Miller and Rosato (BMR). We convert each indicator to variables that report the duration of democratic spells, which transforms the panel data into cross-sectional data. For example, if an indicator codes the Ghana as democratic in 1970, 1971, and 1972, the variable contains three entries for this time period in which Ghana is a democracy. We collapse the data to have only one entry per country and democratic regime: in this case our entry is 2, representing the two years the democratic regime in Ghana survived. The variable has separate entries for different democratic regimes from the same country, for example, a separate entry for Ghana between 1979 and 1981, and separate entries for different countries. After converting the panel data to regime-level durations, we use the durations as the dependent variable in a Cox proportional hazards model with no covariates.[11] We repeat the process five times, once using each of the five democratic indicators listed above. We then extract the baseline survivor function from each Cox model. From this, we can calculate the probability that a democracy will remain a democracy over the next five years, conditional on it having remained a democracy up to that point, using the following formula:

$$DRI_t = P(democratic\ through\ t+5 \mid democratic\ through\ t) = \frac{S(t+5)}{S(t)}$$

[11] We cannot show coefficient tables for these Cox proportional hazards models because the only parameter is a constant, and the constant is not estimated in a Cox model because it is not separately identifiable from the baseline hazard.

This conditional probability is the DRI.

Because the Cox proportional hazards models employed here do not contain any covariates, the survivor function equals the Kaplan-Meier curve for the data, and the DRI at time *t* is simply a ratio of the number of regimes that survive through time *t+5* divided by number of regimes still surviving at time *t*. For example, if 100 democratic regimes survive 20 years, and of these 100, 90 survive through 25 years, then the DRI at *t=20* is 90/100 = .9. That is, every country whose democracy is 20 years old will have a DRI of .9, regardless of additional factors or context. While this assumption makes the DRI easy to calculate and conceptualize, it is also not in general a feasible assumption. For that reason, the framework can be expanded to take context into account by adding covariates to the Cox models. If the Cox models include, say, economic and political violence variables, then the DRI will generate measurements of the probability of survival for the next five years conditional on both the current duration of the regime and the included economic and political violence variables. That way, if two countries each have 20 year old democratic regimes, the country with a healthier economy and lower levels of political violence can have a higher DRI score than the country with a worse economy and more political violence. This is only one possibility; the DRI framework allows scholars of democratization to include other theoretically relevant variables to estimate the extent to which a democracy is established. We hope to develop a user-friendly statistical package for widely used software platforms that would give users control over what independent variables are used to calculate the DRI. While we give researchers the flexibility to make those choices, the way in which users choose to calculate the DRI would likely depend on whether it is employed as a dependent variable, an independent variable of interest, or a control variable. This package would also allow the researcher to select their preferred democracy indicator in the literature, or

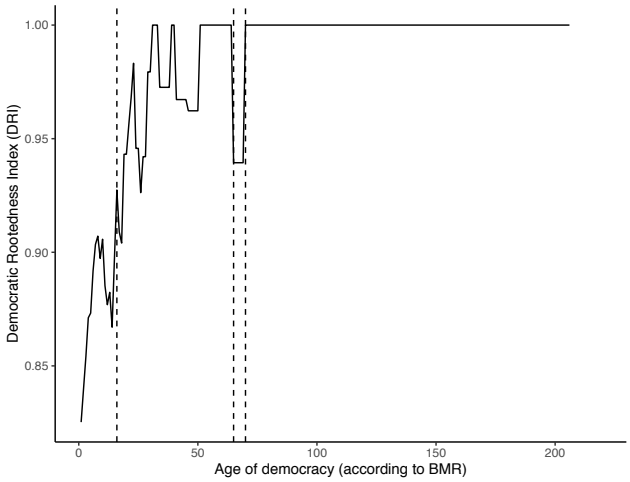

Figure 1: Curve of DRI (based on BMR) over the length of a democratic spell

Notes: The first dotted line identifies the age at which a democracy reaches 0.9 on the DRI, and never falls below 0.9 again. The second dotted line identifies the age at which the DRI *monotonically* increases toward a maximum of 1. The third dotted line identifies the age at which DRI is equal to a maximum value of 1, and never falls below 1 again.

even average across any subset (or all) of them, when estimating the Cox model used to calculate the DRI.

Descriptive Statistics

Figure 1 shows the curve of the DRI over the length of a democratic spell, calculated based on the BMR dichotomous coding of democracies. Given that the DRI is calculated based only on the frequency of failure times for democracies, each democracy at a given age of *n* years will have the same value of the DRI. As a result, while this graph shows the longest continuous spell of democracy coded in the BMR dataset (the United States, starting in 1800), any other democracy at the same age would be represented by the same DRI value. This graph also displays three thresholds or cutoffs of interest, which we discuss below.

Table 2: DRI thresholds of interest

Data source	DRI passes 0.9 and never falls below	DRI monotonically increases toward 1	DRI hits 1 and never falls below
BMR	16 years	65 years	70 years
Polity	16 years	59 years	64 years
CGV	5 years	27 years	29 years
GWF	28 years	42 years	47 years
V-Dem	13 years	53 years	58 years

However, the first finding to note is that the road to hitting a maximum DRI of 1 is "curvy." More technically, the curve of the DRI over the length of a democratic spell is not monotonically increasing. This is itself of note: the graph reveals potential "danger zones" for democratic survival, even well into the life of a democracy.[12] While somewhat intuitive, we believe that our approach is one of the first to principally identify the specific points at which a democracy is at risk of autocratic reversal, even beyond its fledgling years.

We use our index to explore thresholds or cutoffs of interest for researchers in the context of democratic rootedness. These thresholds give us a sense of the point at which democracies can be considered "safe" from authoritarian reversal, depending on the relevant standard. All of these thresholds are displayed in Table 2. We first focus on identifying the age at which a democracy reaches 0.9 on the DRI, and never falls below 0.9 again. In other words, at what age does the probability that a given country remains democratic for the next five years, conditional on having remained democratic up to that point, reach 0.9 and never falls below again? Because they offer

[12] Our use of a Cox proportional hazards survival model, rather than a parametric survival model like a Weibull, is the reason why we are able to identify this "curvy" road to full democratic rootedness. The Cox model, unlike alternative parametric survival models, makes no assumptions about the monotonicity of the hazard function.

a longer time series on which to estimate the DRI, we focus on the two datasets with the longest time series: BMR (which starts in 1800) and Polity (which starts in 1809).

Both of these datasets suggest that this threshold is around the 16th year of a given democratic spell. This threshold is represented by the first dotted line in Figure 1. This cutoff arguably has some face validity. Important to note, however, is that the calculation of this threshold can be dependent on which dichotomous democracy indicator source is used. Using the CGV dataset (which starts in 1946), the DRI reaches 0.9 and never falls below at just five years into a democratic spell. Meanwhile, using GWF data, this threshold is estimated at around 28 years. Using V-Dem's coding of democracies, the estimated threshold is more similar to that of BMR and Polity, at around 13 years. In short, we see a clustering of this threshold at around 13-16 years.[13]

Next, we explore the age at which the DRI monotonically increases toward a maximum of 1. Again, we focus on BMR and Polity. This threshold is represented by the second dotted line in Figure 1. It takes far longer for a democracy to reach this more restrictive threshold: using BMR, we estimated it to be around 65 years, while Polity suggests around 59 years. Once again, the CGV dataset is more optimistic, and suggests that countries monotonically approach a DRI of 1 after 27 years. Using GWF and V-Dem, we estimate this cutoff at 42 and 53 years, respectively.

Finally, we consider an even more restrictive threshold: the point at which the DRI is equal to a maximum value of 1, and never falls below 1 again. This threshold is represented by

[13] These differences may be partially explained by the fact that these datasets have different time series lengths. BMR begins in 1800, and Polity begins in 1809. CGV and GWF both begin in 1946, during the post-war era. Finally, V-Dem begins earlier; in our data, the time series for the longest democratic spell begins in 1921.

the third dotted line in Figure 1. Using BMR and Polity, we basically observe a five-year lag between this threshold and the previous one we discussed.[14] The DRI reaches one and never falls below at 70 years for BMR, and at 64 years for Polity. The CGV estimate remains more optimistic (29 years), and the CGV estimate remains somewhere in the middle (47 years). V-Dem again falls more in line with the others at, 58 years. Overall, these estimated thresholds can give researchers a sense of the age at which we can comfortably consider democracies to be strongly rooted. The flexibility of our approach also means that researchers themselves can use the DRI to calculate their preferred threshold of rootedness.

5. Applying DRI to established datasets: An additional time criterion

We do not propose the DRI to be a replacement for the binary, ordinal, or continuous indicators of democratic quality. Instead, we argue that DRI can be applied to established democracy variables as an *additional time criterion*.

Our motivating goal is to identify the democratic regimes that should not be counted as democratic because they are insufficiently rooted, and are likely to revert to authoritarianism. With the DRI, we can very easily filter the set of democracies in a dataset to those only with a large enough DRI, excluding Ghana in 1978-1979, for instance, from the set of democracies in the analysis. That is, we can use DRI as a principled mechanism for sample selection.

We now walk the reader through a sample use of the DRI. Let's say a researcher wants to study the effects of regime type (democracy versus autocracy) on economic growth and decides to use the Cheibub, Gandhi, and Vreeland (CGV) democracy dummy to identify democracy

[14] This is in part due to the nature of the DRI's construction, which is essentially a conditional probability of surviving for a period of five years.

country	year	CGV	DRI	CGV_DRI
Ghana	1978	0		0
Ghana	1979	1	0.80172451	0
Ghana	1980	1	0.84001571	0
Ghana	1981	0		0
Ghana	1981	0		0
Ghana	1982	0		0
Ghana	1983	0		0
Ghana	1984	0		0
Ghana	1985	0		0
Ghana	1986	0		0
Ghana	1987	0		0
Ghana	1988	0		0
Ghana	1989	0		0
Ghana	1990	0		0
Ghana	1991	0		0
Ghana	1992	0		0
Ghana	1993	1	0.80172451	1
Ghana	1994	1	0.84001571	1
Ghana	1995	1	0.87430198	1
Ghana	1996	1	0.8774065	1
Ghana	1997	1	0.90412326	1
Ghana	1998	1	0.92884031	1
Ghana	1999	1	0.91232771	1
Ghana	2000	1	0.92663866	1
Ghana	2001	1	0.932926	1
Ghana	2002	1	0.94772823	1
Ghana	2003	1	0.94600224	1
Ghana	2004	1	0.96312433	1
Ghana	2005	1	0.95314386	1
Ghana	2006	1	0.93832323	1
Ghana	2007	1	0.94705175	1
Ghana	2008	1	0.9230747	1

Figure 2: Sample spreadsheet using DRI
Notes: "CGV" is the original Cheibub, Gandhi, and Vreeland democracy dummy variable. "DRI" is the Democracy Rootedness Index. "CGV_DRI" is the modified democracy dummy variable, taking into account the additional criterion that all democracies must in place for at least 5 years to be considered a real democracy.

spells. CGV defines a democracy as a regime that satisfies *all* of the following criteria: (1) the executive is selected either by a popular vote or the election of a committee for the purposes of executive selection; (2) the legislature is elected either directly or indirectly by popular election; (3) multiple political parties are legally allowed to exist in the regime and the legislature; and (4) there has been alternation in the party that is currently in power. Based on these criteria, the CGV democracy dummy takes a value of 1 if a country fulfills all four democracy criteria in a particular year. Figure 2 reproduces a sample spreadsheet with the variables being discussed.

Next, the researcher can use DRI to decide which democracy threshold to impose as an additional criterion for her democracy dummy variable. For instance, for CGV, at the 5-year threshold, DRI passes 0.9 and never falls below – in other words, according to the DRI that is constructed using CGV, once a democracy spell reaches 5 years, the probability of that democracy surviving the next 5 years never falls below 90 percent. The probability that DRI reaches 1 and never falls below requires a threshold of 29 years, and the probability the DRI monotonically increases towards one requires a threshold of 27 years.

Let's say that the researcher is satisfied with the threshold of 5 years – she feels confident that democracy spells that last five years or more are not "phantom" democracies or autocracies in sheep's clothing. Based on her chosen threshold, the researcher will take the CGV democracy variable and recode democratic spells that last *less than 5 years* as 0's. In the sample spreadsheet presented in Figure 2, we can see that the researcher re-coded Ghana 1979-1980 as non-democracies (0's), however Ghana 1993-2008 remain coded as democracies (1's), since that democratic spell passed the 5-year required threshold.

6. Substantive Implications: Two applications of DRI for regression analysis and sample selection

In this section, we demonstrate the substantive implications of taking time into consideration. First, we apply to DRI criterion to established democracy variables, and use these modified democracy variables in regressions analyzing the effect of regime type on economic growth. We show that both the *magnitude* of the effect as well as the *significance levels* change across various DRI thresholds. Second, we apply the DRI criterion for sample selection, and demonstrate that levels of democratic erosion change drastically, depending on which set of

countries are considered democracies. The purpose of these two exercises is to demonstrate that the inclusion of short democratic spells has a real effect on substantive questions of the causes and effects of democracy, democratization, and democratic decline.

Using DRI in Regression Analysis: The effect of regime type on economic growth

The question of whether democracy has an effect on economic growth is an extremely well-visited question in political science and economics (for instance see Abramson and Montero 2020; Acemoglu, et al. 2019; Przeworski et al. 2000; and many others). In this section, we revisit this empirical relationship by applying the DRI criterion to measures of democracy. Our goal here is not to adjudicate between the numerous studies on this topic, but instead, to show that the magnitude and significance level of the effect of democracy on growth changes across different democracy duration thresholds.

In tables 3 through 7, we report results from regressions in which the dependent variable is GDP per capital growth, and the main independent variable of interest is democracy. Each table corresponds to an established democracy variable: POLITY, GWF, VDem, BMR, and CGV. We transform continuous democracy measures (POLITY and VDem) into dummy variables using conventional cutpoints, and we retain the dummy variable structure of the remaining democracy measures (GWF, BMR, CGV). We control for GDP per capita and include country fixed-effects and decade dummies for all models. Robust standard errors clustered by country are reported in the parentheses.

For each set of regressions, column (1) reports the estimate using the original democracy dummy. Column (2) reports the estimate using a modified democracy dummy in which the DRI 0.9 threshold has been applied. For instance, for the POLITY dataset, the threshold for which the

DRI passes 0.9 and never falls below is 16 years. Therefore, the democracy dummy reported in Column (2) of Table 3 is one in which we replace POLITY democracy spells that last fewer than 16 years as 0's. Column (3) reports the estimate using a modified democracy dummy in which the criterion that DRI monotonically increases toward 1 is applied. In the case of POLITY, that threshold is reached at 59 years, so we use a modified democracy dummy in which we have replaced democracy spells lasting fewer than 59 years as 0's. Column (4) reports the estimate using a modified democracy dummy in which the criterion that DRI hits 1 and never falls below is applied. In the case of POLITY, that threshold is reached at 64 years, so we modify the democracy dummy accordingly. Finally, column (5) uses a *weighted democracy dummy* where we interact the original democracy score with our DRI variable.

Table 3: POLITY

DV: GDP per capita growth	(1) Original democracy variable	(2) DRI hits 0.9 and never drops below	(3) DRI monotonically increases	(4) DRI hits 1 and never drops below	(5) Weighted democracy variable
polity	60.37				
	(102.1)				
polity_16		0.756			
		(123.9)			
polity_59			-681.0***		
			(197.2)		
polity_64				-719.9***	
				(250.2)	
polity*DRI					72.61
					(121.3)
Observations	5,300	5,300	5,300	5,300	5,300
R-squared	0.136	0.136	0.141	0.140	0.136

Robust standard errors clustered by country in parentheses. Year FE and decade dummies used in all models. *** p<0.01, ** p<0.05, * p<0.1

Table 4: Geddes, Wright, Frantz

DV: GDP per capita growth	(1) Original democracy variable	(2) DRI hits 0.9 and never drops below	(3) DRI monotonically increases	(4) DRI hits 1 and never drops below	(5) Weighted democracy variable
gwf	212.5**				
	(96.14)				
gwf_28		124.8			
		(84.41)			
gwf_42			222.2**		
			(111.4)		
gwf_47				165.4	
				(137.0)	
gwf*DRI					263.6**
					(105.8)
Observations	5,300	5,300	5,300	5,300	5,300
R-squared	0.138	0.136	0.137	0.136	0.138

Robust standard errors clustered by country in parentheses. Year FE and decade dummies used in all models. *** p<0.01, ** p<0.05, * p<0.1

Table 5: VDem

DV: GDP per capita growth	(1) Original democracy variable	(2) DRI hits 0.9 and never drops below	(3) DRI monotonically increases	(4) DRI hits 1 and never drops below	(5) Weighted democracy variable
vdem	102.6				
	(109.1)				
vdem_13		92.47			
		(116.1)			
vdem_53			-702.5***		
			(142.8)		
vdem_58				-581.6***	
				(154.5)	
vdem*DRI					114.2
					(129.1)
Observations	5,300	5,300	5,300	5,300	5,300
R-squared	0.136	0.136	0.143	0.140	0.136

Robust standard errors clustered by country in parentheses. Year FE and decade dummies used in all models. *** p<0.01, ** p<0.05, * p<0.1

Table 6: Boix, Miller Rosato

DV: GDP per capita growth	(1) Original democracy variable	(2) DRI hits 0.9 and never drops below	(3) DRI monotonically increases	(4) DRI hits 1 and never drops below	(5) Weighted democracy variable
bmr	245.3**				
	(102.5)				
bmr_16		-16.44			
		(96.22)			
bmr_65			527.1***		
			(136.0)		
bmr_70				379.9***	
				(104.9)	
bmr*DRI					270.4**
					(113.8)
Observations	5,300	5,300	5,300	5,300	5,300
R-squared	0.138	0.136	0.138	0.137	0.138

Robust standard errors clustered by country in parentheses. Year FE and decade dummies used in all models. *** p<0.01, ** p<0.05, * p<0.1

Table 7: Cheibub, Gandhi, Vreeland

DV: GDP per capita growth	(1) Original democracy variable	(2) DRI hits 0.9 and never drops below	(3) DRI monotonically increases	(4) DRI hits 1 and never drops below	(5) Weighted democracy variable
cgv	467.7***				
	(92.47)				
cgv_5		529.1***			
		(88.93)			
cgv_27			226.8**		
			(93.49)		
cgv_29				169.9*	
				(89.69)	
cgv*DRI					533.3***
					(99.91)
Observations	5,300	5,300	5,300	5,300	5,300
R-squared	0.145	0.150	0.138	0.137	0.146

Robust standard errors clustered by country in parentheses. Year FE and decade dummies used in all models. *** p<0.01, ** p<0.05, * p<0.1

The results demonstrate that the effect of democracy on economic growth varies across different applications of DRI. For the POLITY, VDem, and BMR datasets, not only does the significance levels change across the various specifications, so does the sign: in some models, democracy has a positive effect on growth and in other models, it has a negative effect. For the

GWF and CGV datasets, democracy has a consistent positive effect on growth, but the magnitude of the effect changes across models, as does significance levels.

To sum, these regressions demonstrate that the inclusion of a time criterion for democracy variables has substantive implications in empirical analyses. We remind the reader that our goal is not to illustrates differences in estimates *across* different datasets; instead our goal is to demonstrate differences in estimates *within* the same datasets when we apply various DRI time threshold criterion.

Using DRI in Sample Selection: Democratic erosion

Finally, we also demonstrate how the DRI criterion can affect a researcher's sample selection, which in turn, can influence the outcomes they examine. To do so, we turn to the topic of democratic erosion. There has been a lot of recent literature sounding the alarm about the rise of democratic erosion, defined as "state-led debilitation or elimination of any of the political institutions that sustain an existing democracy", across the globe (Bermeo 2016, 5). Scholars have documented a myriad of ways in which leaders undermine democratic institutions: by denying the legitimacy of elections or of their political opponents, censoring media, curtailing civil liberties, among others (Levitsky and Way 2018, Ginsburg and Huq 2018, and many others).

However, as Ginsburg and Huq aptly note, "Any effort to understand democratic decline must start with a threshold question that is more difficult than first appears. *What, precisely, do we mean by democracy?* And where and when do we observe it in practice? Without a clear sense of what counts as a democracy, we are missing a necessary stepping stone for thinking about democratic decline" (page 7, emphasis added). As we demonstrate in this section, the

addition of the DRI criterion *changes* the sample of democracies, which in turn, *also alters the levels, nature, and timing of democratic erosion* for that democracy sample.

Figure 3 illustrates how levels of democratic erosion change across various democracy samples. For the following set of graphs, we focus on the GWF definition of democracy. Figure 3 graphs the V-Dem Liberal Democracy Score ("v2x_libdem") for three different sample: (1) The set of democracies identified by the original GWF democracy variable, (2) The set of democracies identified by a modified GWF democracy variable in which the requirement that DRI hits 0.9 and never drops below was applied. This criterion required that a democratic spell last at least 28 years in order to remain coded as a string of 1's. (3) The set of democracies identified by a modified GWF democracy variable in which the requirement that DRI hits 1 and never drops below was applied. This criterion required that a democratic spell last at least 47 years in order to remain coded as a string of 1's.

Figure 4 provides graphs of the same three set of democracy samples for the V-Dem legislative oversight score ("v2lgoppart"). Figure 5 provides graphs of the same three set of democracy samples for the V-Dem judicial oversight score ("v2x_jucon"). Figure 6 provides graphs of the same three set of democracy samples for the V-Dem free and fair elections score ("v2x_ v2elfrfair").

The graphs show that the nature and timing of democratic erosion changes as a result of the democracy sample that the researcher uses. For the set of democracies identified by the original GWF democracy variable, the overall liberal democracy score is lower compared with the set of democracies with the 28- or 47-year threshold. Furthermore, the timing of democratic erosion changes across samples as well. The liberal democracy score for the set of democracies identified by the original GWF democracy variable appears to begin decreasing more gradually

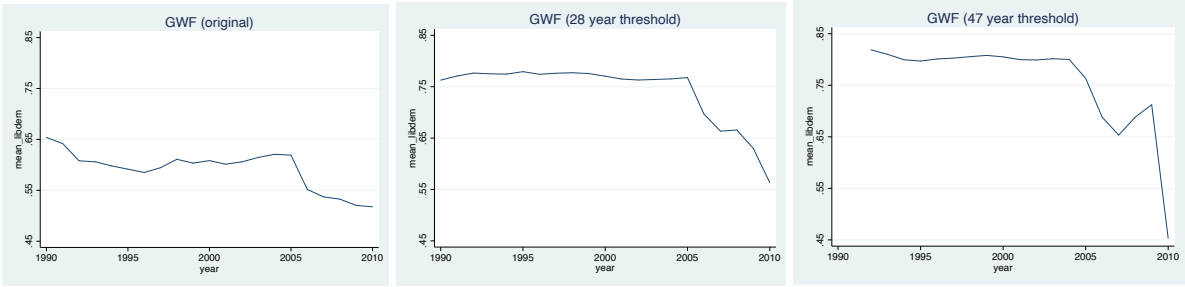

Figure 3: Liberal democracy score

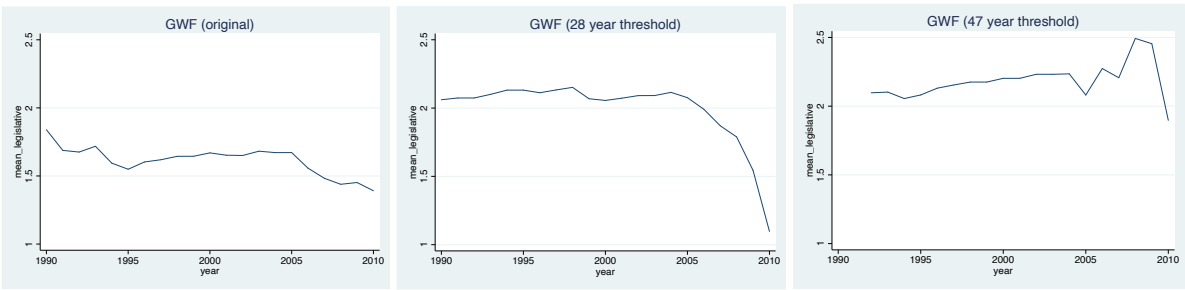

Figure 4: Legislative oversight score

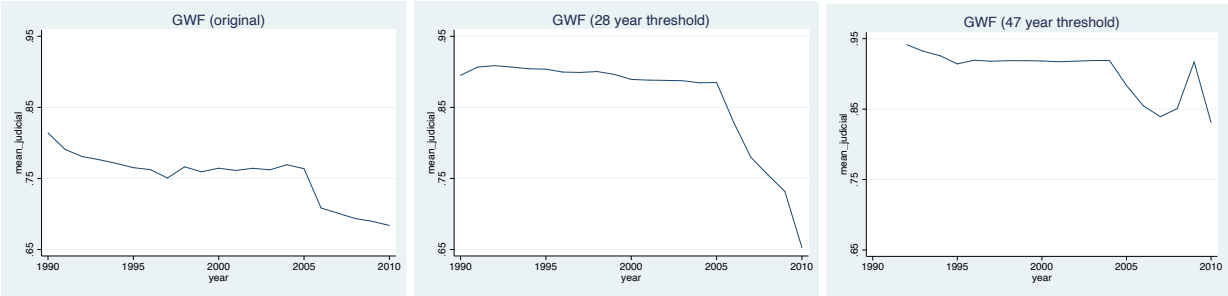

Figure 5: Judicial oversight score

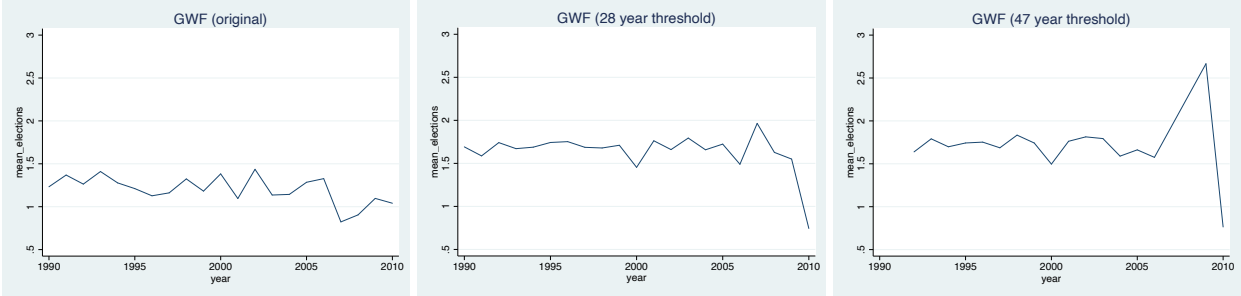

Figure 6: Free and fair elections

in the early 1990s, while for the other two samples, the decrease does not begin until 2005 – and occurs very abruptly when it does. The same trends appear to be true for the legislative and judicial oversight scores.

7. Conclusion

Will write when less tired…

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