

To Catch A Dictator: How to Identify Backsliding Governments?¹

Independent Research Essay for EC476: Contracts and Organizations

Faculty Advisor: Dr. Philippe Aghion

1 Abstract

This paper attempts to curate a model for dynamic democratic backsliding, based on the dimension of information suppression and the realized affinity of the population for the government, thus arguing the existence of separating behavior between true democracies and backsliding democracies. The paper presents a belief-updating function for the population based on the information received and the suppression observed. The paper sets up a simulation to empirically observe the dynamic gradual executive aggrandizement with a constant rate of autocratization. This exercise is also done in accordance with the survival of democracy of such governments. The paper also applies the observations of these simulations to the case study of Hungary and the legal precedents of protecting liberal democratic ideals.

¹This thesis has materialized due to the valuable contributions and comments of Dr. Philippe Aghion, Dr. Gilat Levy, and Ms. Cecilia Wood. I would also like to acknowledge the help of Ms. Svetlana Sehgal for her comments that aided in the refining of the paper.

2 Introduction

Modern society has experimented with various styles and methods of governance. Ever since the *Social Contract* was drafted and published, society has attempted to ascertain how to adhere to any such contract. The argument inherently made is that the establishment of any form of government would presuppose the priority of stability². The way legal, philosophical, and political commentators may define the term is highly variant and thus very subjective. For our discussion, we can attribute *stability* in the terms of *the ability of a government to maintain law and order in a non-suppressive fashion*³.

This highlights several issues that the paper attempts to discuss, model, and comment on. One, *to maintain law and order* is a direct linkage to the *state capacity* of the government thus assigned. It can be looked at as almost a necessary condition for the government to exist, given the argument that the lack thereof is anarchy. Only in terms of the first phrase of our working definition, one might deem authoritative governments to be the most stable. The laws are extremely repressive and antagonistic to the actions of detractors, thus infinitely disincentivizing any infractions from law and order. The more authoritative the government in question is, the lower the margin of unpunished deviation from the governmental framework. This framework would be extremely aggressive against its opposition, to the point of almost non-existence of such an opposition.

The argument for democracy comes from the latter phase of our working definition. *Non-suppressive fashion* implies the existence of a system that keeps the governments in check. Here, inherently lies the argument for democracy. The legitimacy of the execution of power that the governing body has over its subjects is judged and evaluated by the subjects themselves. This is achieved in a democracy by regular free and fair elections, representative of the desire and will of the majority. Another system that may assist citizens to cascade action against a suppressive government is an established judiciary designed to ensure the *constitutionality* of the actions in question. The latter system may not exist *de facto* in an authoritative system, since

²The binding of any such contract implies the need for the establishment of order and thus stability. The lack of such a social order is also discussed as a legitimate political system, linked with the concept of Anarchism.

³This is a working definition that the paper refines with further discussions in the context of existing political philosophies

such systems often concentrate power in such a fashion, that they are beyond reproach from citizens, and in some extreme cases, even other governmental institutions. Considering both arguments together on a general level, the argument for democracies to be the most stable form of government is valid and significantly stronger than other possible forms.

The quixotic existence of a *perfect* government implies its roots in the idea of an *idealized meritocracy*⁴. The point of contention has been the same: *what is merit and how to determine it?* Under democracy, the perfect government is held accountable by the subjects and they may define merit in whatever method they may deem fit. This allows for merit to have a continuously updating meaning, which is well-suited to gauge the latest needs of the population. This is not to say that we have achieved the idealized meritocracy we started off for. One of the major problems of democracy, which is also what the paper attempts to model, is the ever-present risk of devolution from a democratic government into a non-democratic government. Such governments in transition are referred to hereafter as *sliding* democracies.

Sliding Democracies as a term can be used to refer to democracies that are transitioning from *true* democracies to non-democratic forms of government. This phenomenon is called *Democratic Backsliding*. This is an important concept for several reasons. One, for this concept to hold, we must conceptualize a *true democracy*. Depending on the definition, the existence of a true democracy may be only idealistic or actually practical. One could rely on the simplistic definition by Schumpeter(1942), “(...) the democratic method is that institutional arrangement for arriving at political decisions in which individuals acquire the power to decide by means of a competitive struggle for the peoples vote”. There are more comprehensive definitions that exist, such as by Dahl (1971), which views popular control over collective decision-making as well as political equality as the core elements of democracy (Boese, 2019). An agreed-upon component of the democratic system is the accountability of the government for its actions toward the citizens (Schmitter and Karl, 1991). A more recent definition of liberal democracy⁵ comes from Ginsburg (2021), defining it as a feature of national political order that can be

⁴A similar argument is made by Thomas Piketty in *Capital in the Twenty-First Century*. Although he makes the point in a different context, it is worth noting that the link between democracy and “meritocracy” is nothing new. However, the argument here tries to engender the existence of democracy as an attempt to achieve the same meritocracy, rather than argue against the existence of the latter, as Piketty did

⁵Henceforth, “liberal democracy” and “democracy” are used interchangeably.

promoted, defended, or undermined by international legal institutions.

There exists a lack of dynamic modeling of the intersections of suppression, government, and democratization. This paper attempts to map and measure government suppression of information provided to the citizens on the basis of pure information that is uncorrelated with the type of government. The citizens can observe two aspects: one, the filtered information by the government, and two, the suppression of information done by the government. The population, as a whole, updates their realized affinity about the government on both of these aspects every time period. This work is a proposed improvement on existing literature upon ideas about revolutions, bringing in the revealing nature of suppression of true democracies. Section 3 looks at the existing relevant literature, Section 4 sets up the model for the citizens under the conditions as described above. Section 5 defines the rules of the simulation accounting for the interactions between the government and the citizens and analyzes the observations made. Section 6 consists of the author’s reflections on the results established through the simulations on both real cases and the future of the protection of liberal democracy. Section 7 rounds up the main arguments made in the essay.

3 Literature Review

Democratic Backsliding has been a very prominent subject among political scientists and economists alike. There exists a debate about the waves of democracy that have occurred in history. A wave of democracy is defined as “any historical period during which there is a sustained and significant increase in the proportion of competitive regimes (democracies and semi-democracies).” (Mainwaring, Pérez-Liñán, 2014). Conversely, there also exists arguments that attempt to explain the absence of complete acceptance of democracies, by inferring that there have been simultaneous waves of autocratization in the 20th century (Skaaning, 2020; Boese et al, 2021).

In fact, the term “autocratization” is often debated in majorly two contexts. One is said to be any movement away from a liberal democracy, espoused by Lührmann and Lindberg (2018).

The contrarian view to this has been presented to define the term in a more independent sense, rather than define the term as the counter-effect of democracy (Cianetti and Hanley, 2021). The former definition is a good working definition but creates a lot of false positives, and creates a paradigm of democratic backsliding.

One of the ways to characterize the revealing behavior of an autocratic government, or a backsliding government, is to observe how the opposition is dealt with by the government. The latter view as discussed above refers to four broad ways a government can be assigned - liberal democracy, defective democracy, electoral autocracy, and closed autocracy. Another problem with characterizing governments is that, unlike in the 20th century, the governments and officials are much more subtle with power-grabbing and backsliding, mainly characterized by executive aggrandizement and the gradual dismantling of the democratic system.

It is often argued that liberal democracy must be the way forward and the only legitimate form of government (Fukuyama, 1992). The reason that we have not achieved that is still open for debate. Apart from the reason described above, there is also a culture-vs-regime differentiation that affects the dynamics of the wave of autocratization or democratization (Welzel, 2021). Welzel claims that value difference within the State affects how the State transitions between democratic and autocratic regime systems. The countries with more emancipative values (Welzel associates these kinds of values with liberal democracies) will uphold democratic values even more and would resist autocratization even if there exists a global wave of the phenomenon.

The response of governments to the opposition can often be used as a signaling mechanism about the competency of the government. Ananyev et. al (2019) discuss how the lesser-competent government would end up utilizing stricter methods of censorship. Such techniques of political survival are also well defined within the defining work of Mesquita et. al (2005), through selectorate theory. This suppression could be direct suppression or obfuscation of information, as was done in China (King, Pan, and Roberts, 2017).

4 Model

4.1 Initial Set up: True Democracy

The model is concerned with the actions of a truly democratic regime with regard to information suppression and how it would suppress with the intention to keep power.

There is an exogenous generation of information about the government, irrespective of the true type of government. The government has the decision to suppress the information to some degree or not, and then pass it on to the citizens. The citizens can observe the suppression degree and the filtered information. The citizens then update their affinity for the government every time period.

For the belief-updating function, there are required assumptions about the behavior of the population. There are essentially two parts to the equation, one is the updated beliefs section and one is the penalty imposed for any form of suppression that is done by the government on the information.

Following the discussion, consider a population that updates its opinion about the government in the following way:

$$\alpha_t = \frac{2\alpha_{t-1} + \frac{\theta}{g(\theta)}}{2} - (g(\theta) - 1)^2,$$

$$\alpha \in [0, 1]$$

$$\alpha_{t-1} \in [1/2, 1]$$

$$\theta \in [-1, 1]$$

$$g(\theta) : [-1, 1] \rightarrow [1, \infty)$$

Here, α_t and α_{t-1} are the affinity⁶ of the population to the government for the current and

⁶Here, "affinity" is defined on two parameters: One, how much does the government enjoy popular support,

the past time period respectively. Both are defined on a scale between 0 and 1, with 0 being the lowest, and 1 being the highest. $g(\theta)$ represents the suppression policy the government undertakes on the basis of θ in the current time period, defined on $[1, \infty)$ showing no to infinite suppression. For the scope of this paper, the government can only suppress information, not amplify it. θ represents the Information parameter, which is independent, exogenous, and uniformly distributed on $[-1,1]$. This is to represent all forms of information that may be positive, neutral, or negative for the government. The population averages the information it receives in the current time period (filtered by the government) and the belief it had in the previous time period. The population also observes the suppression done by the government and penalizes the government with a quadratic cost term.

One striking assumption made is that, given how $g(\theta)$ is calculated, the population does not invert the suppression function and rather updates on $s = \frac{\theta}{g(\theta)}$. The intuition behind this is related to our initial assumption of θ being uncorrelated with the competence of the government. Having the citizens updated on the unfiltered θ , by construction, yields no extra information about the government. The idea is as long as α_{t-1} is greater than $1/2$, the population trusts the filtering process and the government with this responsibility. In the time period where α_t falls below $1/2$, the democratic order breaks down, as noted later.

At the initial time period $t = 1$, α_{t-1} belongs to $[0.5,1]$ for the reason motivated by Selectorate theory. Given that we are observing a truly democratic system that may engage in democratic backsliding post-election in our model, the fact is implied that the government was elected through democratic means. This implies that at least half of the population is in favor of the government. Thus, for the updating to occur in the current time period, the government must still be technically democratic in the sense that the majority is still supportive of the government. This argument is enforced more rigorously through simulations in Section 5.

From the above updating equation, the optimal government policy of suppressing information and two how much can that support be materialized. As shown later in the paper, at a certain level of autocratization, the affinity realized may not factor in the discontent of the population due to suppression, since the autocratic government may have also censored modes of expressing discontent. That is why at certain points, we refer to it as “realized” affinity.

tion through $g(\theta)$ can be expressed, which comes from the following optimization exercise⁷:

$$\max_{g(\theta)} \alpha_t = \frac{2\alpha_{t-1} + \frac{\theta}{g(\theta)}}{2} - (g(\theta) - 1)^2$$

Two things can be derived from this exercise. One of the observations from the above exercise we get is that the government does not suppress information when θ is positive or zero (neutral information). This is in line with the practical understanding of having the government allow positive information to pass through, while negative information is censored.

Two, given that θ is not correlated with government performance and competence, even completely democratic systems would optimally engage in the suppression of information. This is one way to understand reasonable⁸ restrictions to freedom of expression. Practically speaking, any democratically-elected government can justify information censorship or suppression by arguing that the unfiltered information which the population updates on is noisy or not representative of the competency of the government. This is related to the initial discussion of the importance of stability for the government.

4.2 Model with varying levels of democratization

To create a generalized model which extends to all forms of government, on the entire spectrum from true democracies to true autocracies, the following equation⁹ is proposed:

$$\alpha_t = \frac{2\alpha_{t-1} + \frac{\theta}{g(\theta, d)}}{2} - (d(g(\theta, d) - 1))^2$$

“Democratization” for the purpose of the model is a reflection of how dissent can be realized in a population, hence it enters linearly into the cost of the updating function. This is also in tandem with our working definition earlier, discussing *non-suppressive fashion*. d is also restricted to the domain of $[0,1]$, representing the spectrum of democracies that exist, with 1

⁷Refer to Appendix 9.1

⁸“Reasonable” by no way here implies that the government reserves the right to unconstitutionally curb the freedoms of citizens. However, this argument mainly comes through discussions surrounding the trade-off between freedoms and questions of national security.

⁹Proof in Appendix 9.2

being true democracies and 0 being purely autocratic governments.

One inference made from the generalized model is that the government begins to fully suppress information, when θ is -1, even while the government is not completely autocratic ($d > 0$).

Another inference observable is that the general function is positively related to the democratization factor. This means that by keeping $g(\theta, d)$ constant, the population prefers higher democratization.

5 Data and Simulation

5.1 Rules and Objectives

After setting up the model, it can be used to express how the rate of autocratization, i.e. decrease in d , influences the survival of the government over future time periods. Through this simulation, the simulation is run along with different rates of democratic backsliding. For this, thus specified is a simulation with the following parameters for its validity:

- List of variables: $\alpha_t, \alpha_{t-1}, \theta, g(\theta, d), d, t$; where
- The system of equation for the simulation:

$$\alpha_t = \frac{2\alpha_{t-1} + \frac{\theta}{g(\theta, d)}}{2} - (d(g(\theta, d) - 1))^2, \quad \text{where}$$

Under this, the initial conditions defined in Section 4.1 still hold.

- **Simulation Rules:**

1. The initial affinity of the population is picked through a random process ¹⁰in the range $[0.5, 1]$ ¹¹.

¹⁰The simulations are run in MATLAB. Using the randomization function in software often does not generate truly random values, but pseudo-random ones. For more on this, refer to Mathworks' page on "Generating Pseudorandom Numbers"

¹¹Revisiting our discussion in Section 4.1.

2. In the first part of the simulation, the unrestricted movement of α_t must be observed. For this, the simulation is run with the population updating their affinity of the government based on the s and $g(\theta)$ observed.
3. In the second part of the simulation, it runs for a set time period or when $\alpha_t < 0.5$. At this point, the government is no longer democratic. This is done to observe the survival rate of governments of democratic ideas with constant autocratization.¹²
4. The information parameter θ is also randomly generated each time period out of the pre-specified range with equal probability.
5. With every time period, d gradually decreases with a constant decay rate to simulate backsliding. Keeping this in mind, the maximum time periods of simulations for different rates of autocratization are adjusted accordingly.

The above simulation is run multiple times to observe the dynamic behavior of the affinity of the population on the basis of information and government suppression.

5.2 Observations and Analysis

5.2.1 Behavior of α_t and $g(\theta)$

The simulation to observe the behavior of α_t and $g(\theta)$ at different rates of autocratization was conducted. In this, it is observed how the realized affinity for the government and government suppression behaves with different levels of democratization. The rate of autocratization is a simple relation between the number of time periods it takes for a true democracy to become

¹²This follows from the discussion we had earlier about utilizing selectorate theory, which means the ratio of the winning coalition to the selectorate is greater or equal to $1/2$. For simplicity, the simulation applies this strict condition, however, certain flexibility can be in order where α_t can be allowed below this limit a certain number of times.

entirely autocratic. The representative graphs have been presented in Figure 1.

In all cases, increased government suppression along with greater autocratization was observed. Although this result is more volatile with quicker rates, the correlation is much clearer and pronounced with slower rates of autocratization. Another interesting observation made is that with slower rates, in full autocracy, the affinity for the government of the citizen is always higher in the case of $\Delta d = 0.01$. With quicker rates, however, this result has been difficult to observe and volatile to consolidate.

These observations lead to interesting hypotheses. With the former observation with respect to slower rates, this can be viewed as a representative dynamic model for executive aggrandizement, where a democratically-elected the government gradually concentrates power and makes it impossible to be opposed. It shows how, through other means, the democratic element gets reduced and the suppression of information becomes more brazen and explicit. This also shows hints of indoctrination, where the information is so suppressed that the population may not be exposed to negative information at all under an autocratic government.

With the latter observation, the argument of indoctrination continues. In a full autocracy, the government may as well not allow negative information to pass as there is no more accountability of suppression the government must burden. The information updating will only see positive (or neutral) information and move near 1. The population thus would appear appreciative of the autocratic government, given that any form of public or electoral opposition would be impossible.

In the intermediate examples, we see that the affinity of the population ends up lower than what it was initially. This could be due to continuous bouts of extremely negative information, or an incredibly high amount of suppression by the government. This could lead one to postulate that there exists some level of suppression that may not be suitable even with higher forms of autocratization existing. The practical aspects of it may reflect the illusion of democracy. When excessive suppression happens (as discussed above), the population is disillusioned and

utilizes existing means of dissent against the government.

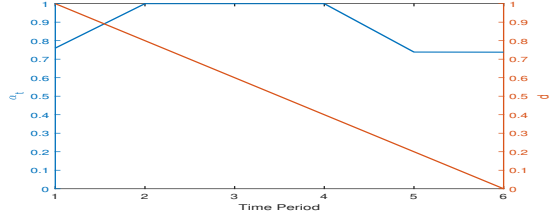
5.2.2 Survival Rates of Backsliding Governments

The second part of the simulation is aimed to measure how quickly governments may become undemocratic with constant autocratization. This is done by running 5000 simulations with randomly generated α_0 values out of $[0.5, 1]$ and observing how long can the system run until one of the stopping conditions is met. The simulation with the slowest rate showed that even such governments end up being undemocratic very early. Part of this could be accounted to the strict condition imposed. The interesting part, however, was that it appeared almost impossible for governments to remain favorably popular and liked in the democratically-biased view of the population. However, it was noted towards the end of the simulation, α_t was always on the higher side for $\Delta d = 0.01$

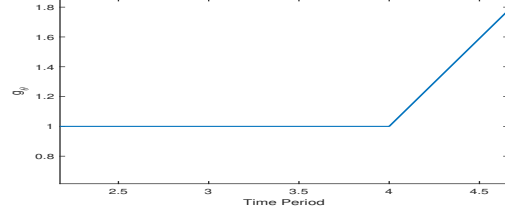
The observation of the second part can be explained by two reasons together. One is the indoctrination of the population, while the other reason may be about realized dissent. There may exist extreme discontent within the population due to the lack of democracy¹³ but this may not be represented or visible due to reasons discussed before. Hence, in spirit, this forwards the argument that the government essentially ceases to be democratic at this point, where there is discontent with the government, but the visibility of the discontent is extremely compromised.

The argument that the paper makes through the second part of the simulation is that democracy is a tighter rope to walk on. Even the intention of slight backsliding immediately compromises democracy. There exists no margin of flexibility with democracy, as seen from the skewed distribution of the survival rates. This is in line with forbearance for democratic ideas, as discussed later.

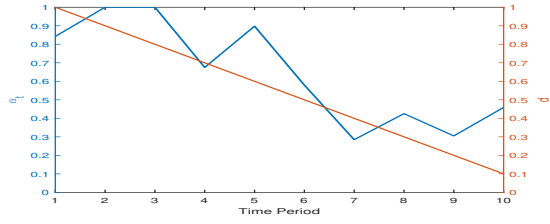
¹³Discontent against a dictator prompts up the question of the "Good Dictator" phenomenon, i.e. a dictator well-liked by the population. This argument falls outside the ambit of this paper since the population is designed to have a pre-supposed preference for democracy as shown in Appendix 9.2.



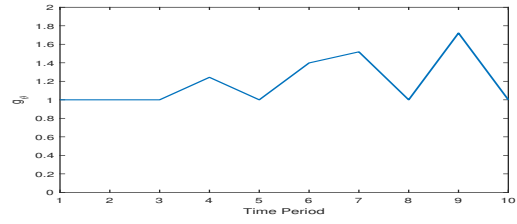
(a) α_t and d at $\Delta d = 0.2$



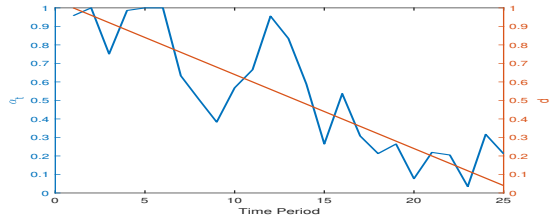
(b) $g(\theta)$ at $\Delta d = 0.2$



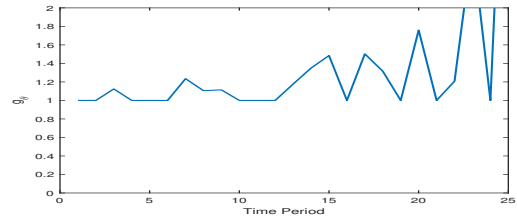
(c) α_t and d at $\Delta d = 0.1$



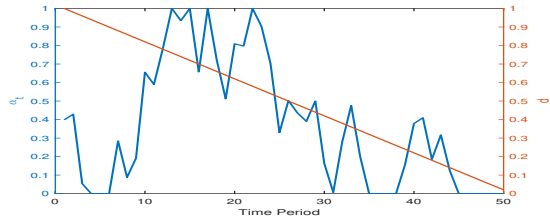
(d) $g(\theta)$ at $\Delta d = 0.1$



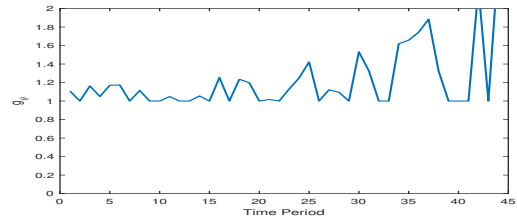
(e) α_t and d at $\Delta d = 0.04$



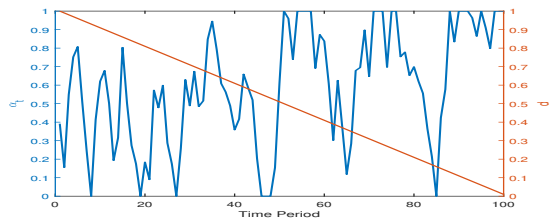
(f) $g(\theta)$ at $\Delta d = 0.04$



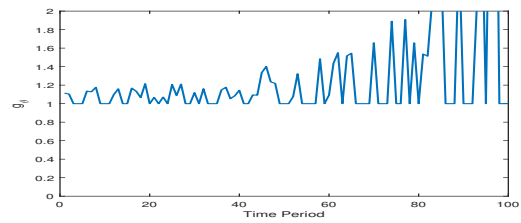
(g) α_t and d at $\Delta d = 0.02$



(h) $g(\theta)$ at $\Delta d = 0.02$



(i) α_t and d at $\Delta d = 0.01$



(j) $g(\theta)$ at $\Delta d = 0.01$

Figure 1: α_t , d and $g(\theta)$ for different rates of autocratization

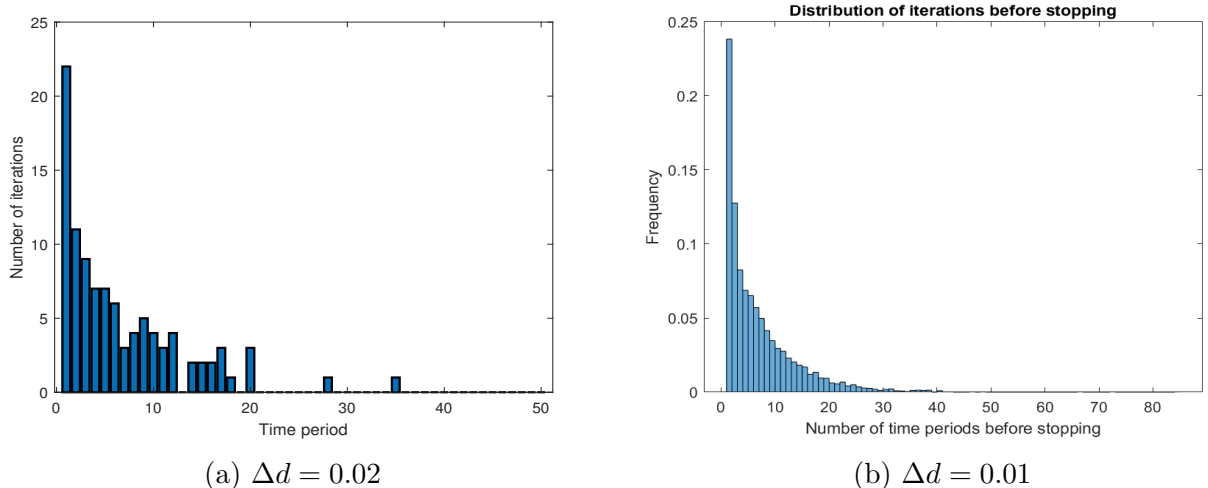


Figure 2: Survival Rates of Democracies for different rates of autocratization

6 Meditations

6.1 Hungary

One of the most prominent current cases of democratic backsliding has been the study of the concentration of power by Viktor Orbán, and his political party, Fidesz. Elected as the Prime Minister of Hungary in 2010, he systematically enrolled his supporters in executive, judicial, and legislative roles, making it impossible to oppose him. This action has come through along with another narrative pushed by Fidesz, which is anti-liberal and labels liberals as foreigners to the national discourse (Herman, 2016).

Hungary is an extreme example of the level of democracy deterioration that has been characteristic of the Central and Eastern European nations (Cianetti, Dawson, and Hanley, 2018). International indices of democracy have noticed some of the largest and sharpest drops in democracy levels here (V-Dem, 2017, Nations in Transit, 2018). This is in tandem with a global trend of populist governments coming to power, also identified as a challenge for liberal democracy.

The gradual democratic backsliding in Hungary has been mainly attributed to the lack of forbearance for democracy by Orbán and the leaders of Fidesz (Cullen, 2022). The blatant disregard for essential tenets of democracy to curate Orbán’s “illiberal democracy”¹⁴ has been a

¹⁴In reference to his speech on 30 July 2014, after winning the elections, ‘And so in this sense the new state

decade-long mission, where the transition to liberal democracy seems difficult without extreme means. This also highlights an ignored caveat of the legal protection of the constitutionality of any sovereign state. Any action taken by Fidesz is yet to be condemned or declared illegal by any judicial institution in Hungary. Given the individuals and the influence that Fidesz has established over these institutions, this also is a distant probability. They are yet to be held in contempt of the Hungarian Constitution because none of the actions are directly forbidden under it. This raises the age-old question in the context of democracy again: *quis custodiet ipsos custodes?* Who guards the guardians of democracy?

6.2 Questions on the protection of liberal democracies

In the analysis of recent history, the waves of autocratization and democratization almost seem arbitrary. Cultural inclinations, poor economic conditions, population disillusionment, and global trends all contribute to these processes. However, the question remains: Is there a way that such autocratic influences and leaders can be avoided?

For that, certain legal precedents are to be analyzed. Several international legal rulings exist that proclaim voting in free and fair elections as a cornerstone of democracy (Venice Commission, 2002)¹⁵, which are concerned with independent election commissions. However, often election commissions may be compromised in ethics and composition, thus failing to enforce the strict conditions required for democracies to function. The law is compromised and incapacitated for nation-states as a prevention technique and only aims to create examples that no future autocrats may heed. There needs to exist prevention machinery to prevent democratic backsliding. The law functions as a prevention mechanism in the sense of dispensing harsh punishment to induce more positive behavior in the long term¹⁶.

that we are constructing in Hungary is an illiberal state, a non-liberal state. It does not reject the fundamental principles of liberalism such as freedom, and I could list a few more, but it does not make this ideology the central element of state organization, but instead includes a different, special, national approach.”

¹⁵The guidelines also make an interesting point about debarring the candidature of certain persons in accordance to the Proportionality Principle, “conditions for depriving individuals of the right to stand for election may be less strict than for disenfranchising them.”

¹⁶One of the most prominent examples is the Nuremberg Trials, which eventually also ended up becoming a precedent for International Criminal Law.

In what ways can the international order protect liberal democracy? The way of the Western sphere has been in accordance with supporting international states or non-state actors against any state that, according to them, moves away from liberal democratic norms. Although this may work idealistically, it has had drastic consequences for all parties involved¹⁷. Historically, such actions are always motivated by ulterior ambitions disguised as humanitarian intervention or establishing democratic rule.

Can there be a more domestic system to maintain democracy? Oftentimes, one of the major signs of democratic backsliding has been the rise of majoritarian and/or populist narratives. The incumbent government attempts to create a divide in the electorate and tries to amass the majority in support and create hostile feelings between the groups. The “Us versus Them” spin on political issues works on populations, more often than one would like. This implies something implicit in our discussion about democracy throughout the paper- the role of the population is to exercise their freedoms and eliminate possible concerns about democratic ideals. There thus exists an onus on the population to uphold democracy, perhaps a greater onus than on any other institution. Hate speech, divisive narratives, and vitriolic rhetoric must not only be cast away but be reprimanded strictly by the voters. The role of the population is not merely passive subjects but guardians. They determine the merit of the system, and on the evaluation, adherence, and forbearance to democracy and the constitution should be prime.

7 Conclusion and Further Scope

The paper curates and augments an arithmetic dynamic model for aligning information suppression policy and realized population affinity for the government with the degree of democratization of the government. The paper elaborates upon the model which observes a population that updates on the information filtered by the government and the suppression it observes. The model displays the government having an optimal suppression policy function which is cubic on the information received. The government does not suppress neutral and positive information and only suppresses negative information, which is generated randomly. The model

¹⁷*Nicaragua v. United States of America*, ICJ, 1986 is probably the most famous legal example of this.

is generalized further on accounting for the policy function on the basis of democratization practiced, which also brings about implicitly how much of population dissent is actually realized. The model is then simulated for different rates of autocratization, which brings about how at slower rates of autocratization, suppression is dynamically modeled. Also, it reveals how in such cases, the realized affinity of the population that prefers democratic means, eventually ends up in higher preference of the government in cases of complete autocracy. The simulation is supported by the survival of democratic ideals in these governments, and it is noted that even with gradual executive aggrandizement, the governments fail to pass off as democracies under the condition specified in the paper. The argument is surmised as identifying the optimal level of suppression practiced by true democracy with forbearance for democracy. The paper concludes with the application of the observations of our model on the case study of Hungary and concludes with remarks on the legal protection and mechanisms in place to protect liberal democratic governments across the world.

The paper sets up further space for discussions of modeling gradual polarization with respect to a heterogeneous population and how it may impact optimal suppression. Such discussion can also be modeled also alongside conflict resolution models between different parties of society. Another possible limitation of this paper may be that it relies on the assumption of suppression policy being visible to the population. This could be done away with, through belief systems where the population has different prior beliefs about the government, associated with their affinity for the same.

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9 Appendix

9.1 The Optimal Level of Suppression by a "True" Democracy

We have our population belief at time t function. The government must maximize this given θ and α_{t-1} through $g(\theta)$. This looks like the following optimization problem:

$$\max_{g(\theta)} \alpha_t = \frac{2\alpha_{t-1} + \frac{\theta}{g(\theta)}}{2} - (g(\theta) - 1)^2$$

From first-order differentiation and maximization,

$$\begin{aligned} \frac{\partial \alpha_t}{\partial g(\theta)} &= \frac{-\theta}{2(g(\theta))^2} - 2(g(\theta) - 1) = 0 \\ \Rightarrow -\frac{\theta}{4} &= (g(\theta) - 1)(g(\theta))^2 \end{aligned}$$

We end up with a cubic equation. The solution for the equation thus depends on θ . Given our discussion in Section 4.1, the right-hand side of the equation would be positive for $g(\theta)$ to be greater than 1, else it would take the value 1.

9.2 Introducing the democratization factor in the updating equation

For the purpose of this paper, the enforcement of democratization on the government comes through the severity of the cost imposed based on the suppression of information that the government practices. Hence, the factor must be added to the cost part of the updating equation.

The factor must also be included in the equation in such a way that the population has an increasing distaste for the autocratization of the government. Hence, the factor is linearly related to the cost, however, it is quadratically related to the public affinity of the government.¹⁸

Hence, the general formula for any form of democratization is:

¹⁸The restriction on d comes from the author's assumption. The factor is intended to represent the entire spectrum of governments, where $d = 1$ represents a "true" democracy and $d = 0$ represents a complete autocratic government. To see this, observe that when $d = 1$, our function becomes equal to that discussed in Section 4.1. Also, when $d = 0$, the suppression cost degenerates to 1. Given that the belief-updating function cannot be greater than 1, the overall population affinity for the government becomes weakly negative. Due to this function, we have also implicitly assumed immense distaste for autocracy as an attribute of our population in this model.

$$\alpha_t = \frac{2\alpha_{t-1} + \frac{\theta}{g(\theta)}}{2} - (d(g(\theta) - 1))^2$$

The affinity of the population changes with d , as they are negatively related:

$$\frac{\partial \alpha_t}{\partial d} = -2d < 0$$

For the relation between the optimum suppression policy and democratization level:

$$\frac{\partial g^*(\theta, d)}{\partial d} = \frac{4d[g^*(\theta, d) - 1]}{\frac{\theta, d}{2[g^*(\theta, d)]^3} - d^2} < 0$$

Hence, we see that at higher levels of democratization, a lower amount of suppression is normally tended, since higher levels are punished more severely.