National Institute of Economic and Social Research

BE KIND OR TAKE IT ON THE CHIN? POLITICAL NARRATIVES, PANDEMICS, AND SOCIAL DISTANCING

Kartik Anand

Deutsche Bundesbank

Prasanna Gai

University of Auckland

Edmund Lou

Northwestern University

Sherry X. Wu

University of Auckland

NIESR Discussion Paper No. 528

10 March 2021

About the National Institute of Economic and Social Research

The National Institute of Economic and Social Research is Britain's longest established independent research institute, founded in 1938. The vision of our founders was to carry out research to improve understanding of the economic and social forces that affect people's lives, and the ways in which policy can bring about change. Over eighty years later, this remains central to NIESR's ethos. We continue to apply our expertise in both quantitative and qualitative methods and our understanding of economic and social issues to current debates and to influence policy. The Institute is independent of all party political interests.

National Institute of Economic and Social Research
2 Dean Trench St
London SW1P 3HE
T: +44 (0)20 7222 7665
E: enquiries@niesr.ac.uk
www.niesr.ac.uk
Registered charity no. 306083

This paper was first published in March 2021

Be kind or take it on the chin? Political narratives, pandemics, and social distancing

Kartik Anand, Prasanna Gai, Edmund Lou and Sherry X. Wu

Abstract

How does a political leader's messaging during a pandemic influence social distancing by citizens? We model the strategic choice of narrative in a beauty contest setting where the leader seeks to eliminate the disease. The leader's resolve to eliminate the disease affects her narrative in a non-linear way. A resolute leader adopts a highly partisan narrative that identifies strongly with her followers, albeit at the expense of her payoff, while an ambivalent leader with low resolve for eliminating the disease is less partisan. Our result speaks to the debate on the voluntary acceptance of limits to individual liberty during a pandemic.

Keywords: Beauty contests, pandemic, Covid-19, political narratives, leadership

JEL Classifications: D7, D84, D91, H12, I12

Contact details

Anand:	kartik.anand@bundesbank.de
Gai:	p.gai@auckland.ac.nz
Lou:	edmund.lou@u.northwestern.edu
Wu:	xianqing.wu@auckland.ac.nz

BE KIND OR TAKE IT ON THE CHIN?
POLITICAL NARRATIVES, PANDEMICS, AND SOCIAL DISTANCING

KARTIK ANAND[1], PRASANNA GAI[2,3], EDMUND LOU[4], AND SHERRY X. WU[2]

ABSTRACT. How does a political leader's messaging during a pandemic influence social distancing by citizens? We model the strategic choice of narrative in a beauty contest setting where the leader seeks to eliminate the disease. The leader's resolve to eliminate the disease affects her narrative in a non-linear way. A resolute leader adopts a highly partisan narrative that identifies strongly with her followers, albeit at the expense of her payoff, while an ambivalent leader with low resolve for eliminating the disease is less partisan. Our result speaks to the debate on the voluntary acceptance of limits to individual liberty during a pandemic.

Keywords: Beauty contests, pandemic, Covid-19, political narratives, leadership
JEL Codes: D7, D84, D91, H12, I12

1. INTRODUCTION

Political leaders have a disproportionate influence on public behavior, particularly during times of crisis. The Covid-19 pandemic illustrates how narratives – the purposeful portrayal of events that fosters a common view – deployed by political leaders can influence voluntary social distancing by citizens. But the messaging of leaders and their resolve to prioritize public health has varied greatly. Some, notably Prime Minister Ardern of New Zealand, have pursued a strategy of eliminating the virus and garnered widespread support for social distancing

---

Affiliations: [1]Deutsche Bundesbank, Wilhelm-Epstein-Strasse 14, 60431 Frankfurt, Germany; [2]University of Auckland, 12 Grafton Rd, Auckland 1010, New Zealand; [3]Centre for Applied Macroeconomic Analysis (CAMA), Australian National University, Acton ACT 2601, Australia; [4]Northwestern University, 2211 Campus Dr, Evanston, IL 60208, United States. We thank Jagjit Chadha, Piotr Dworczak, Guillaume Gex, Arthur Grimes, Alessandro Pavan, Hamid Sabourian, Bruno Strulovici, Xiaoyun Qiu, Udayan Vaidya, and seminar participants at Northwestern University for helpful comments. The views expressed in this paper are those of the authors and do not necessarily reflect those of the Deutsche Bundesbank or the Eurosystem.

through empathetic communication. Others, such as President Bolsonaro of Brazil and Prime Minister Johnson of the United Kingdom have taken a more sanguine approach towards disease containment—downplaying social distancing and emphasizing the importance of personal liberties. A better understanding of the link between politicians' communication campaigns and individuals' voluntary adoption of preventative measures is, thus, important for policy debate on limiting the spread of the pandemic.

In this paper, we present a model of voluntary social distancing in which citizens care about engaging in the level of social distancing appropriate to them, as well as conforming to the behavior of others around them. But in selecting their level of social distancing, citizens also look to the leader for guidance on how to behave. The leader, thus, has an opportunity to set a narrative that shapes how citizens view public health considerations over their personal liberties. The leader's objective is two-fold: (i) encourage social distancing; whilst (ii) respecting the personal liberties of citizens. Critically, the leader is confronted with a public health constraint – namely to eliminate the disease with a level of confidence that reflects her own resolve to fight the disease.

The leader's resolve to eliminate the disease affects the equilibrium narrative in a non-linear way. A *resolute leader*, for whom public health is imperative, adopts a more *partisan* narrative intent on rallying citizens, particularly her followers. But, since nonpartisan citizens feel compelled to voluntarily give up their personal liberties due to social norms, her exhortation this comes at an excessively large cost to communal welfare and, thus, the leader's reputation. For such a leader, the larger her support base and the greater her charisma, the lower is the emphasis placed on rallying her followers since citizens are more willing to comply. And as citizens adhere more closely to social norms, the leader places an increased emphasis on rallying her followers, since greater strategic complementarity in citizens' actions compels citizens to reduce social distancing.

By contrast, an *ambivalent leader* who is unconstrained by the requirement to eliminate the disease chooses a less partisan narrative that optimally balances the two objectives of encouraging social distancing and respecting citizens' personal liberties. Changes in such a leader's resolve to fight the disease have no effect on the narrative. Moreover, the greater the support base for such a leader, the wider the audience that can be reached and galvanized to socially distance. Thus, communal welfare suffers less as the leader adopts a more partisan narrative. And while greater charisma means that the leader is better able to motivate followers to socially distance, it induces nonpartisan citizens to voluntarily give up on their personal liberties thereby reducing communal welfare. Thus, a highly charismatic leader chooses a less partisan narrative. Finally, partisan exhortations by the leader to her followers are most effective only in those communities where social norms are strongly observed.

Our modeling approach builds on the "beauty contest" framework of Morris and Shin (2002) but is novel in three respects. First, we provide an epidemiological foundation for the fundamental in our model, namely the health status of the community. Citizens choose social distancing levels to match individual health targets that reflect both the community health status as well as their personal biases favoring the preservation of personal liberties over the protection of public health. Second, the epidemiological foundation of the model provides a basis for the public health constraint facing the leader. Since this constraint is stochastic, it introduces chance-constrained optimization (Charnes and Cooper, 1959; Miller and Wagner, 1965) into the beauty contest setup. The leader thus chooses the narrative to maximizes her objectives subject to complying with the disease constraint with some confidence level. And third, our treatment of disease transmission as a constraint enables a shadow price to be attached to efforts to eliminate the disease (Budish, 2020).

Related literature. We contribute to the literature on beauty contests and the Covid-19 pandemic. Bueno de Mesquita and Shadmehr (2020) apply the beauty contest approach to pandemics, focusing on the inertia of social distancing and the role of communication policy in mitigating that inertia. By contrast, our model explores the characteristics of a political narrative that emerges in equilibrium when leaders are faced with a public health constraint. Herrera and Ordoñez (2020) analyze the possible herding of public health policies as international leaders compare their policy performance against each other. While policies become more similar than might be justified on their information value alone, such herding disciplines the actions of policymakers since they place less weight on personal agendas. The aspect of political leadership that we explore in this paper, however, is very different.

Our theoretical analysis complements empirical work on partisanship and social distancing. Grossman et al. (2020) use Twitter data from the US to study how political partisanship influences citizens' decisions on voluntary social distancing following communications by state governors. They find that the effects of tweets to 'stay at home' were more pronounced in Democratic counties, and that Democratic counties were more responsive to Republican governors than Republican counties. Allcott et al. (2020) use smartphone data to show that areas with more Republicans engaged in less social distancing, controlling for other factors such as population density, public policy and Covid cases. Ajzenman et al. (2020) analyze the extent to which social distancing weakened in Brazil, following President Bolsanaro's public dismissal of the risks from Covid-19. They find that his pronouncements were most keenly felt in municipalities that strongly supported the president.

Our paper also relates to the literature examining the role of leadership in facilitating coordination by followers. Dewan and Myatt (2008) analyze how a leader manipulates key elements of her rhetorical strategy, namely clarity and accuracy, to shape the choice set of followers. They find that clarity is preferable to the accuracy of communication since it ensures that all followers interpret the leader's message in the same way, expediting coordination. Bolton et al. (2013) show how a leader's resolve to pursue an ex ante mission statement opens the door to a time inconsistency problem—while the leader would like followers to believe in the mission, followers know that ex post, after they have acted, the leader will revise her strategy in response to new information. Acemoglu and Jackson (2015) explore how social norms shape patterns of compliance and cooperation, although in a dynamic setting that is different from ours.

2. MOTIVATION: A TALE OF TWO ISLAND NATIONS

To situate the model, we consider the political narratives and contrasting approaches of New Zealand and the United Kingdom during the early stages of the pandemic. Our discussion highlights the key ingredients of our theoretical framework and anticipates some of its main findings.

New Zealand. In early 2020, Prime Minister Jacinda Arden of New Zealand entered the final stages of her first term as the leader of a minority coalition government, with an election scheduled for September of that year. At the time, political commentators regarded the outcome as "extraordinarily open and unpredictable", suggesting that Ardern's core political base was relatively small, even though she was consistently ahead in the polls.[1] On Sunday, March 22, following the onset of the Covid-19 pandemic, Ardern addressed the nation in her now famous "Be strong and be kind" speech. Over the coming weeks, her narrative made clear both her government's resolve to eliminate the virus, and the critical role of voluntary social distancing in that elimination strategy:

"The Government's overall public health strategy is... ***elimination****.... Elimination does not mean eradicating the virus permanently, ...rather it means being confident that we have eliminated chains of transmission in our community for at least 28 days.... The most important measures to restrict the spread will remain physical distancing and...these "voluntary" measures are fundamental to the overall response...."*[2]

In her social distancing narrative, Ardern sought to rally citizens by strongly identifying with them. There were frequent references to the "*team of five million*", invocations of community spirit by encouraging citizens to stay at home "*...and act as though you have Covid. This will save lives...*", and an emphasis on "*...we're all in this together*." The narrative appealed strongly to her core base of younger voters, as well as indigenous Maori and migrant populations. It was, moreover, carefully pre-meditated. Before communicating with citizens were carefully run

[1] Guardian (January 28, 2020), "New Zealand election: Jacinda Ardern promises stability as she sets poll date."
[2] Ministry of Health NZ (May 20, 2020), "Covid-19 elimination strategy for Aotearoa New Zealand."

through a large army of speech-writers, government agencies, and focus groups.[3] Although estimates of the level of conformity to social norms in New Zealand were low (Gelfand et al., 2011), the level of public compliance with Ardern's guidance was very high.

Ardern also gave daily press briefings in which she communicated scientific information alongside the Chief Medical Officer. During the early days of the pandemic, when accurate information about the disease (e.g., benefits of wearing face masks) was scant, her emphasis on kindness and inclusiveness encouraged citizens to place public health concerns ahead of concerns about livelihoods. Although New Zealand entered into a relatively short-lived national lockdown and a subsequent, targeted, lockdown in Auckland, Ardern's approval ratings grew and her narrative became more widely accepted. She was able to refocus debate towards reviving the economy and won a landslide victory in the October 2020 general election.

United Kingdom. Prime Minister Boris Johnson of the United Kingdom confronted the Covid-pandemic on the back of a landslide victory in December 2019 UK general election and, as such, a strong mandate from UK citizens. Unlike New Zealand's explicit elimination strategy, his government's initial response to the crisis was to contain the virus through a strategy of "*herd immunity*", with citizens quickly concluding that the government had resigned itself to a large number of deaths.[4] The government, moreover, suggested that "mass gatherings did not have a major impact on virus transmission" and made few efforts to discourage attendance at sporting events and concerts.[5]

In his address to the nation on March 12, 2020, Johnson issued a warning that many families would "*. . . lose loved ones before their time. . . .*" Johnson was interpreted as exhorting citizens to "*take it on the chin*" and that Britain could "*. . . allow the disease, as it were, to move through the population, without taking as many draconian measures.*"[6] He also downplayed the virus—very publicly shaking hands, despite health advice to engage in social distancing:

[3] See, for example, New Zealand Herald (May 10, 2020), "Covid 19 coronavirus: Lockdown a masterclass in mass communication and control."

[4] See, for example, Freedman (2020).

[5] Guardian (April 29, 2020), "Revealed: the inside story of the UK's Covid-19 crisis."

[6] New York Times (March 27, 2020): "Boris Johnson should have taken his own medicine."

"I was at a hospital the other night where I think there were actually a few coronavirus patients and I shook hands with everybody, you'll be pleased to know, and I continue to shake hands."

In contrast to the high and consistent level of resolve exhibited by Jacinda Ardern, Johnson seemed less constrained by the need to contain the disease and deployed a narrative that suited his own best interest. Most commentators appear to have concluded that the nature of his narrative reflected his "libertarian instincts".[7] For example, the Financial Times (November 2, 2020) noted that "*...his signature on any topic is incoherence. He is pro-individual liberty and pro-public health...*" and he "*...insists on seeing what he wants to see....*"[8] Although his resolve varied over the course of 2020, the essence of Johnson's libertarian narrative remained intact and was noticeably less empathetic in its efforts to identify with UK citizens. Although the willingness of UK citizens to conform to social norms was higher than average (Gelfand et al., 2011), public compliance with social distancing was low. In part, this reflected a marked decline in Johnson's popularity since the onset of the pandemic—according to a YouGov poll, the proportion of citizens who view Johnson as performing well declined from 42% in January 2020 to 34% in October 2020. Johnson's inability to reassure voters resulted in reticence to follow social distancing, further waves of Covid cases, and the prospect of recurrent lockdowns to combat the disease.

Figure 1 illustrates the morbidity and mortality rates from Covid-19 in New Zealand and the United Kingdom. Table 1 summarizes the two cases and their relationship to the model. The case studies suggest a relationship between the resolve of the leader to eliminate the disease and the equilibrium narrative deployed. The narrative to socially distance that emerges in equilibrium is also related to the size of the leader's support base and the degree of social conformity in a community.

[7] Guardian (April 29, 2020).

[8] Financial Times (November 2, 2020): "Boris Johnson's mistakes in the pandemic are depressingly familiar."

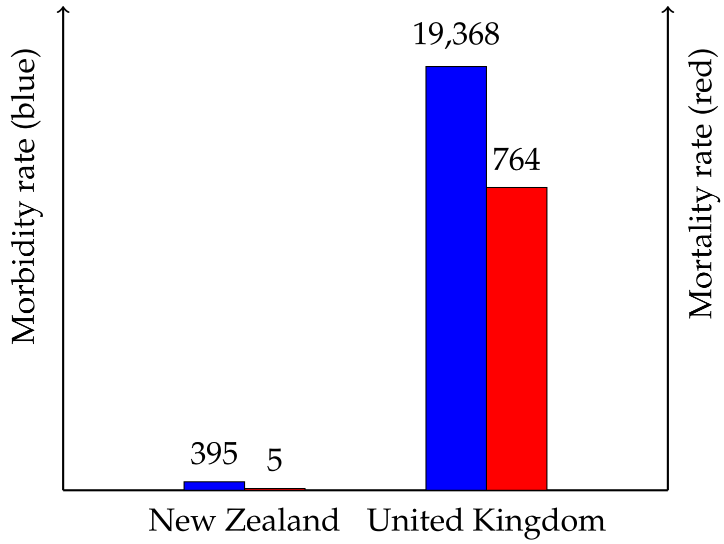


FIGURE 1. Morbidity rate (blue bars, cases per million population) and mortality rate (red bars, deaths per million population) from Covid-19 in New Zealand and United Kingdom at November 12, 2020 (source: Stats NZ, ONS UK, JHU CSSE).

TABLE 1. Two cases and their relationship to the model

Feature of Model	**New Zealand (Jacinda Ardern)**	**United Kingdom (Boris Johnson)**
Initial narrative	"Stay home, save lives"; public health first	"Take it on the chin"; libertarian approach
Public health constraint (willingness to contain the disease $R < 1$)	Elimination strategy; constraint binding	Herd immunity; constraint not binding
Leader's resolve to contain disease	High	Low
Size of support base	Initially moderate; growing over crisis period	Initially large; declining over crisis period
Charisma of leader	High	High
Pressure on citizens to conform to social norms	Below average	Above average
Extent to which leader exhorts citizens to shift their bias over "lives versus livelihoods"	High	Low
Extent to which leader identifies with citizens (partisanship)	High	Low

3. Model

A political leader (pronoun "she") seeks to eliminate the spread of a disease in a community of citizens of unit mass, indexed by $i \in [0,1]$. Neither the leader nor the citizens have any initial information about the transmissibility of the disease and, absent a vaccine, the disease can only be eliminated by *voluntary social distancing*.[9] We interpret social distancing to include precautionary practices (e.g., refusing to shake hands) and economic activity (e.g., avoiding cinemas and theatres). Each citizen chooses an action $a_i \in \mathbb{R}$, which captures the level of social distancing that is in their best interest. A higher action corresponds to greater social distancing. Let $A = \int_0^1 a_i \mathrm{d}i$ be the aggregate level of social distancing in the community.

Before citizens select their actions, the leader commits to a *narrative*, which reflects her *resolve*, $\phi \in (0,1)$ to eliminate the disease.[10] Formally, the narrative is defined by the pair $\{\phi, p\}$, where $p \geq 0$ reflects the *partisan tone* of her narrative, i.e., the extent to which the leader rallies partisan citizens – those who identify strongly with the leader – causing them to put aside their own individual biases about social distancing in favor of the collective enterprise – eliminating the disease.[11] To the extent that citizens care about conforming to social norms, the narrative also indirectly shapes the response of more nonpartisan citizens.

In what follows, the leader selects the partisan tone of her narrative to maximize her payoff subject to the constraint of successfully eliminating the disease with confidence level ϕ. We, thus, put a shadow price – in terms of the loss to communal welfare from overriding citizens' views on personal liberties – to the leader's attempt of eliminating the disease.

[9] We do not consider legal restrictions in the form of "lockdowns" in the model. Goolsbee and Syverson (2020) provide evidence suggesting that social distancing during the early days of the pandemic was more a consequence of voluntary behavior than formal restrictions.

[10] We suppose that the narrative is built on the work of government agencies, speechwriters, pollsters and the like. So once a narrative is chosen, the leader is bound to pursue it.

[11] van Vugt and Ronay (2014) discuss how a leader's narrative influences followers to identify with a common cause.

Eliminating the disease. The basic reproduction number, R_0, is the expected number of secondary infections produced by a typical infected case in a host population where every individual is susceptible (Barrett, 2003; Rothman, 2012). A disease dies out if R_0 is below one. In order to characterize the spread of the disease, it is necessary to distinguish between the distribution of the infectious potential of individuals and the distribution of social connections between people. The evidence for Covid-19 suggests that the driving force behind the spread of disease is a biological heterogeneity in infectiousness – some individuals simply shed the virus to a much greater extent than the average infected person (Bi et al., 2020; Park et al., 2020). We therefore follow Nielsen and Sneppen (2020) and Fukui and Furukawa (2020) and assume that R_0 is drawn from a power-law distribution with density $f(R_0) = R_0^{-2}$. And we suppose that every susceptible citizen has an equal probability of contacting every other individual in the community, i.e., there is homogeneous mixing among citizens.[12]

Let $Q \in (0, 1)$ be the probability that a susceptible citizen does not contract the disease. As citizens observe greater social distancing, the likelihood of the disease being transmitted is lowered. Accordingly, $Q = Q(A)$ is strictly increasing in the aggregate action A.[13] We assume that $Q(A)$ is the standard Gaussian cumulative distribution function. When most citizens practice a high level of social distancing, A is large and $Q(A)$ is close to one—so there is a small probability that the disease is transmitted . But when many citizens behave as if there is no disease, $Q(A)$ is close to zero and the disease spreads. With homogeneous mixing, the number of secondary infections is linearly proportional to $1 - Q(A)$. The effective reproduction number of the disease is, therefore, $R = [1 - Q(A)]R_0$.

The disease is eliminated once $R < 1$ or, equivalently,

$$Q(A) > T = 1 - \frac{1}{R_0}, \tag{1}$$

---

[12] Bansal et al. (2007) discuss how homogeneous mixing gives rough, but reasonable, approximations for many populations in epidemiology.

[13] With homogeneous mixing and social distancing, all citizens interact with each other at the same rate, albeit with reduced close contact. So the transmissibility of the disease through the community is invariant to differences in the behavior of distinct sub-community groups.

where T is the threshold value of $Q(A)$ that leads to the endemic state $R = 1$. Let $\theta = Q^{-1}(T)$, so that (1) can be written as

$$A > \theta. \tag{2}$$

In other words, the disease is eliminated whenever the average level of social distancing exceeds θ, the *health status* of the community. Since R_0 follows a power-law distrubution, all players share a common prior belief that T is uniformly distributed over the unit interval.[14] Accordingly, $\mathbb{P}(\theta < A) = \mathbb{P}(T < Q(A)) = Q(A)$. Thus, the health status is a standard Gaussian random variable with zero mean and unit variance.

Effects of the leader's exhortation. The leader's narrative shapes citizens' attitudes toward the collective public health enterprise over the pursuit of individual personal liberties. We suppose that a proportion, ε, of citizens are *partisan* in the sense that they strongly identify with the leader. Specifically, their attitude, or personal bias, toward "life versus liberty" concerns is swayed by the partisan tone of the leader's narrative. The remaining proportion of citizens, $1 - \varepsilon$, are *non-partisan* and do not re-calibrate how they trade off public health and personal liberties following the leader's narrative. We assume, without loss of generality, that partisan citizens lie on the interval $[0, \varepsilon]$, and let $\delta_i \in \{0, 1\}$ be an indicator function specifying whether a citizen is partisan (1) or not (0).

The payoff function for citizen i is

$$u_i = -(1 - \omega)\left(a_i - \theta - [b_i + \delta_i \chi p]\right)^2 - \omega(a_i - A)^2, \tag{3}$$

where $\omega \in (0, 1)$. The first term in (3) captures the notion that citizens choose their social distancing level to match their *individual health targets*, $\theta + b_i$. A citizen's health target has two components—the health status, θ, and an individual bias, $b_i \in \mathbb{R}$, reflecting their concern about how social distancing contributes to public health versus the erosion of personal liberties. If

[14] Formally, $\mathbb{P}(T \leq t) = \mathbb{P}(R_0 \leq 1/(1-t)) = \int_0^{1/(1-t)} R_0^{-2} \mathrm{d}R_0 = t$.

$b_i > 0$, then citizen i cares greatly about public health and selects a higher level of social distancing than implied by θ. Conversely, if $b_i < 0$, she is more concerned about upholding individual liberties and, hence, adopts a lower action.

Since partisan citizens respond and identify with the leader's narrative, they behave as if their individual bias toward "life versus liberty" considerations was $b_i + \chi p$. The parameter $\chi > 0$ captures charisma, or how compelling the leader's narrative is. As the leader attempts to exhort citizens with a more partisan tone (p becomes larger), she can convince her followers to depart markedly from their preferred approach to social distancing. We refer to $\tilde{b}_i(p) = b_i + \delta_i \chi p$ as citizen i's *galvanized bias*.

The second term in (3) reflects the importance that citizens place on emulating the actions of others. The pressure to conform to the behavior of other citizens may be due to "public shaming" – if a citizen sees nobody outside, then she believes that she may be ostracized for attempting to venture outdoors. Similarly, if the citizen believes that others regard the threat of disease as modest and will, therefore, continue to gather, she also has the incentive to behave the same way. The presence of strategic uncertainty leads citizens to take actions that are close to the average action in the population. This "beauty contest" aspect of social distancing is distinct from accounts that frame social distancing challenges as a public goods problem (e.g. Allcott et al., 2020). The desire for conformity, moreover, makes nonpartisan citizens take higher actions since their partisan counterparts act according to biases that are galvanized by the leader. The weight ω captures the relative importance of conformity for citizen i.

Each citizen receives a private signal about the health status of the community, namely,

$$z_i = \theta + \zeta_i, \tag{4}$$

where ζ_i is an i.i.d. Gaussian noise term with zero mean and precision $\pi_z > 0$. We interpret z_i as private information gleaned by the citizen from a media report, following the leader's narrative and the realization of θ.[15] Finally, we assume that individual biases are i.i.d. with

[15] We also consider a *information channel* where the narrative colors the information that citizens glean from media reports, either by influencing the signal precision or the mean as in Little (2017). In an online appendix, we show

mean $B < 0$ and variance σ_b^2. The bias distribution is common knowledge. Our assumption of a negative mean motivates the role of the leader in the model—under complete information, citizens' actions are inadequate to eliminate the disease.

The leader's problem. In choosing her narrative, the leader seeks to exhort citizens with different biases toward higher levels of social distancing in order to eliminate the disease. But a more partisan narrative comes at a cost – it drives citizens' actions away from their individual health targets thereby lowering communal welfare. Reflecting this tradeoff, the leader's objective function is

$$u_L(p, \boldsymbol{a}, \theta) = A + \int_0^1 u_i(p, \boldsymbol{a}, \theta)\mathrm{d}i, \tag{5}$$

where $\boldsymbol{a} = (a_i)_{i \in [0,1]}$. The first term in (5) is the aggregate social distancing of citizens and the second term is the welfare of the community. Partisan appeals cause citizens to deviate from their individual health targets and hence engender communal welfare losses. Implicitly, we assume that these welfare losses are costly for the leader since they adversely impact her reputation.

Although the leader benefits from higher social distancing by citizens, the aggregate level maybe insufficient to eliminate the disease. We suppose that the leader treats $R < 1$ as a constraint, which allows us to put a shadow price – in terms of welfare loss – for attempting to eliminating the disease. So the leader chooses the partisan tone of her narrative by solving

$$\begin{aligned} \max_{p \geq 0} \quad & \mathbb{E}_L \left[u_L(p, \boldsymbol{a}, \theta) \right] \\ \text{subject to} \quad & \mathbb{P}\left(R < 1 \right) \geq \phi, \end{aligned} \tag{6}$$

where $\mathbb{E}_L[\cdot]$ is the ex-ante expectation taken over all uncertainties. As formulated in (6), the equilibrium actions of citizens are taken into account and the disease constraint is expressed as requiring that the probability with which the disease is eliminated is above confidence level, ϕ, the a measure of the leader's resolve to fight the disease. Expressed in this fashion, the leader's

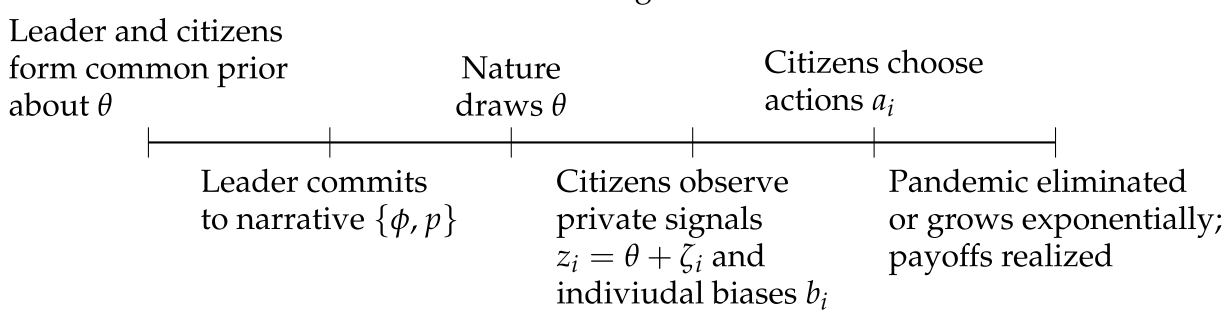
how such an information channel, where a more partisan narrative reduces the precision of private information, does not qualitatively change the results.

problem implies that a highly resolute leader may tolerate a greater communal welfare loss in an effort to eliminate the disease with high probability. The constraint in (6) is akin to the Value-at-Risk (VaR) constraint in the finance literature (e.g., Adrian and Shin, 2014), so we refer to it as a Health-at-Risk (HaR) constraint in what follows.[16]

Timing and equilibrium. Figure 2 shows the timing of events. An equilibrium of the model consists of citizens' strategies and the leader's narrative such that: (i) given any narrative, $\{\phi, p\}$, citizens' interim expected payoff maximizing strategies constitute a Bayesian-Nash equilibrium; and (ii) the optimal narrative solves the leader's problem (6), given citizens' equilibrium strategies.

Solving backward, we first determine the equilibrium strategies for citizens, and then characterize the optimal degree of partisanship in the leader's narrative.

FIGURE 2. Timing of the model.



4. Analysis

Citizens' equilibrium strategies. Given any partisan tone to the leader's narrative, $p \geq 0$, and conditional on private information, z_i, citizen i's optimal strategy is

$$a_i = (1-\omega)\big(\tilde{b}_i(p) + \mathbb{E}_i[\theta|z_i]\big) + \omega\mathbb{E}_i[A|z_i], \tag{7}$$

[16] The constraint is also used in operations research and engineering (Charnes and Cooper, 1959; Miller and Wagner, 1965).

where $\mathbb{E}_i[\cdot]$ is the expectation over both the health status and the biases of other citizens. The posterior mean is given by

$$\mathbb{E}_i[\theta|z_i] = \left(\frac{\pi_z}{\pi_z + 1}\right) z_i \tag{8}$$

corresponds to the best predictor of the health status.

We restrict attention to equilibria in which each citizen's optimal strategy is a linear function of private information , namely

$$a_i = \eta_i + \kappa z_i,$$

where η_i and κ are to be determined in equilibrium. We show that, in the face of the narrative, a citizen's strategy in equilibrium is driven more by her bias and those of others, and less by her private information about the disease.

Since (7) depends linearly on $\tilde{b}_i(p)$, we conjecture that this is also the case for η_i. The aggregate action, A, is therefore a linear function of θ and the aggregate of individual galvanized biases

$$\tilde{B}(p) = \int_0^1 \tilde{b}_i(p)\mathrm{d}i = B + \varepsilon\chi p.$$

Proposition 1 relates a citizen's social distancing in equilibrium to the partisan tone of the leader's narrative, the pressure to conform, and citizens' attitudes toward the "public health vs personal liberty" tradeoff.

Proposition 1. *For a given partisan tone to the leader's narrative, $p \geq 0$, there exists a unique Bayesian-Nash equilibrium in which each citizen's equilibrium strategy is*

$$a_i(z_i, p) = \eta_i(p) + \kappa z_i$$

for all z_i, where

$$\eta_i(p) = (1-\omega)\tilde{b}_i(p) + \omega\tilde{B}(p)$$

and

$$\kappa = \frac{(1-\omega)\pi_z}{(1-\omega)\pi_z + 1}.$$

Proposition 1 makes clear that the intercept term, $\eta_i(p)$, is a convex combination of the individual and galvanized biases, $\tilde{b}_i(p)$ and $\tilde{B}(p)$. Since ω captures the degree of conformity, it is natural that the citizen assigns the same weight to conform with the aggregate galvanized bias of others. The strategic complementarity of citizens' actions means that nonpartisan citizens respond to the partisan tone of the leader's narrative because they know that partisan citizens are receptive to the leader. Partisan citizens, in turn, respond accordingly since they know that nonpartisan citizens will pursue actions in line with what they do. And, as the tone of the leader's narrative becomes increasingly partisan (higher p), it results in a higher $\eta_i(p)$ and, thus, a higher action. We refer to this as the "*rallying effect*" of the leader's narrative. The slope term, κ, is a "tilted predictor" of the health status, θ (Angeletos and Pavan, 2007).

HaR constraint. The aggregate level of social distancing is

$$A(\theta, p) = B + \varepsilon\chi p + \kappa\theta. \tag{9}$$

Under complete information, $A = B + \varepsilon\chi p + \theta$. By (2), the disease is eliminated if and only if $B + \varepsilon\chi p > 0$. If the $B \geq 0$, then the leader need not exhort followers to eliminate the disease. But if $B < 0$, as assumed, then she is obliged to encourage a higher level of social distancing by choosing a more partisan tone to her narative.

Given (9), the HaR constraint can be expressed as

$$\mathbb{P}(R < 1) = Q\big(D(p)\big) \geq \phi,$$

where

$$D(p) = (B + \varepsilon\chi p)[(1-\omega)\pi_z + 1],$$

and $\lim_{p\to\infty} Q\big(D(p)\big) = 1$. As p increases and the leader places greater emphasis on rallying her followers and so $D(p)$ increases, i.e., $D'(p) > 0$. This, in turn, relaxes the HaR constraint for a given level of resolve.

Let $\phi_0 = Q\big(D(0)\big)$ be the probability that the disease is eliminated when $p = 0$. Proposition 2 shows how the HaR constraint behaves in the leader's optimization problem.

Proposition 2. *If $\phi \geq \phi_0$, then the HaR constraint uniquely identifies a threshold*

$$p_H = \frac{1}{\varepsilon\chi}\left[\frac{Q^{-1}(\phi)}{(1-\omega)\pi_z + 1} - B\right],$$

such that for $p \geq p_H$, the constraint holds; for $p < p_H$ the constraint is never satisfied. The threshold, p_H, is strictly increasing in the leader's resolve, ϕ.

Figure 3 illustrates Proposition 2. A leader who wants to be absolutely certain about eliminating the disease is characterized by $\phi = 1$. But as $Q(D(p))$ only asymptotically converges to 1, it follows that there is no finite value for p_H that the leader can employ to satisfy the HaR constraint.

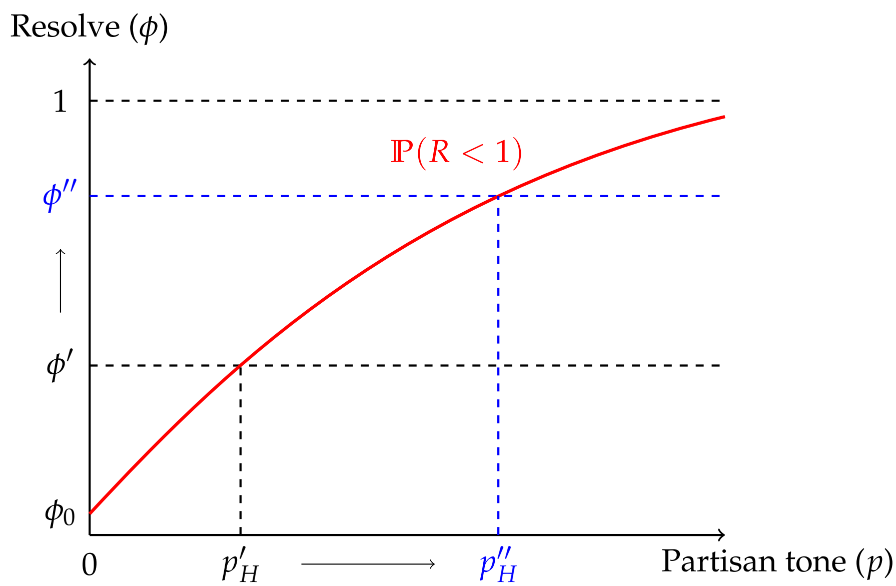


FIGURE 3. The binding HaR constraint pinpoints a unique threshold p_H that characterizes the partisan nature of the leader's narrative.

Equilibrium political narrative. Given citizens' equilibrium strategies $a_i^* = a_i(z_i, p)$, the leader's problem is

$$\max_{p \geq 0} \mathbb{E}_L \left[A(\theta, p) + \int_0^1 u_i(p, \boldsymbol{a}^*, \theta)\mathrm{d}i\right] \tag{10}$$

subject to the HaR constraint, $p \geq p_H$, where

$$\mathbb{E}_L[A(\theta, p)] = B + \varepsilon\chi p \tag{11}$$

and, denoting by $\Xi \equiv -\omega\sigma_b^2 - \frac{1}{(1-\omega)\pi_z+1}$, we have

$$\mathbb{E}_L\left[\int_0^1 u_i(p, \boldsymbol{a}^*, \theta)\mathrm{d}i\right] = (1-\omega)\left[\Xi - \omega\varepsilon(1-\varepsilon)\chi^2 p^2\right]. \tag{12}$$

Expressions (11) and (12) capture the tradeoff facing the leader. The former is the expected aggregate action and indicates that the leader benefits from rallying followers to take a higher level of social distancing, while the latter is a strictly decreasing function of the partisan tone of the leader's narrative, and represents the welfare cost that stems from moving citizens' actions away from their individual health targets. Proposition 3 characterizes the equilibrium.

Proposition 3. *There exists a unique threshold $\widehat{\phi} > \phi_0$, where*

$$\widehat{\phi} = Q\left(\left\{B + \frac{\varepsilon}{2\omega(1-\omega)(1-\varepsilon)}\right\} \cdot \left\{(1-\omega)\pi_z + 1\right\}\right),$$

such that:

(i) *If $\phi < \widehat{\phi}$, the leader is ambivalent: the HaR constraint is slack and the equilibrium partisan tone for the narrative is solved by the unique $p^* = p_U$ that maximizes (10), i.e.,*

$$p_U = \frac{1}{2\omega(1-\omega)(1-\varepsilon)\chi}.$$

(ii) *For $\phi \geq \widehat{\phi}$, the leader is resolute: the HaR constraint binds and $p^* = p_H$ is the the partisan tone for the leader's narrative in equilibrium.*

The equilibrium narrative is depicted in Figure 4. If the leader is ambivalent, $\phi < \widehat{\phi}$, the HaR constraint does not bind. So the partisan tone of the leader's narrative, p_U, optimally balances the increase in social distancing that it engenders versus the loss to communal welfare from nonpartisan citizens voluntarily choosing levels of social distancing that do not accord with their views on preserving personal liberties during the pandemic. But if the leader is resolute, $\phi > \widehat{\phi}$, the HaR constraint binds and the leader is more strident in her appeal to followers, striking a more partisan tone to her narrative, p_H, even though this comes at the expense of a suboptimal level of communal welfare. As $\phi \to 1$, an increasingly partisan tone is required to satisfy the binding constraint. In the limit, the HaR constraint can never be satisfied for a finite p_H.

The critical threshold beyond which the leader is resolute is increasing in the precision of the private information obtained by citizens as well as the aggregate bias. Thus, as citizens become more compelled to place public health concerns over the preservation of personal liberties, or are in possession of more accurate information about the disease, the HaR constraint slackens. In a similar vein, as the mass of followers increases, the critical threshold also increases. Since the leader is more able to rally a larger proportion of citizens, there is less of a need for the leader to sacrifice communal welfare in order to eliminate the disease.

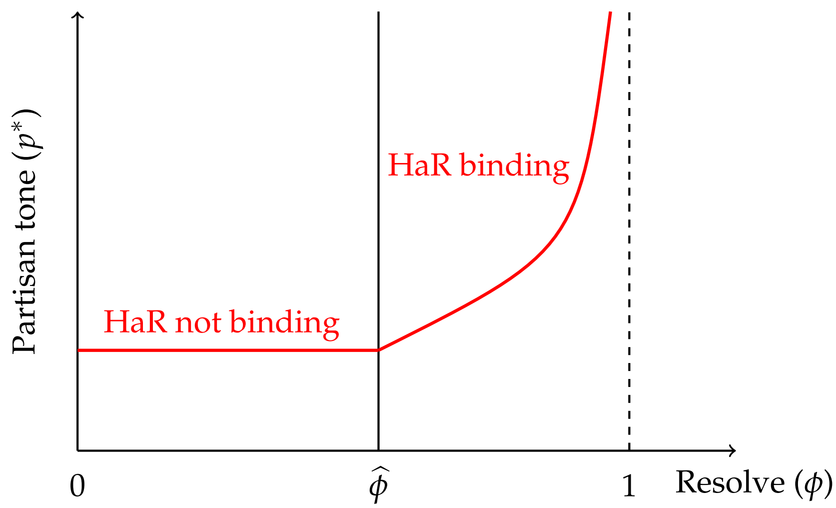


FIGURE 4. The leader's equilibrium narrative.

Comparative statics. Propositions 4 and 5 summarizes how the equilibrium political narrative varies with key model parameters for an ambivalent and resolte leader, respectively.

Proposition 4. *If $\phi \leq \widehat{\phi}$, then the partisan tone of the ambivalent leader's narrative is strictly (i) increasing in ε; (ii) decreasing in χ; (iii) increasing in ω if and only if $\omega > 1/2$.*

When the HaR constraint is slack, the leader prefers a more partisan narrative if she has more followers. The effect of a larger following is two-fold. First, the leader can reach a wider audience with the narrative and, thereby, induce more citizen to socially distance. And second, relatively fewer citizens are made worse off by adopting a higher action since more citizens have higher galvanized biases. This, in turn, compels the leader to strike an even more partisan tone when engaging with the community.

Greater charisma means that the leader is better able to convince her followers to adopt high actions. Given the strategic complementarity of citizens' actions, nonpartisan citizens also increase their actions. As a result, the rallying effect is amplified. But since nonpartisan citizens deviate more from their health targets, they experience greater disutility, and so communal welfare is reduced. Since the effect on communal welfare is dominant, the leader is compelled to weaken the partisan tone of her narrative (i.e., a lower p_U).

Proposition 4 also suggests that when citizens view social conformity as being at least as important as their individual health targets, $\omega > 1/2$, the leader can benefit by galvanizing followers to engage in greater social distancing and, hence, adopts a more partisan narrative as ω becomes larger.

Proposition 5. *If $\phi \geq \widehat{\phi}$, then the partisan tone for the resolute leader's narrative is strictly (i) decreasing in ε; (ii) decreasing in χ; (iii) increasing in ω; (iv) decreasing in B; (v) decreasing in π_z.*

The greater is charisma, the proportion of followers, and the aggregate bias of citizens in favor of health concerns, the higher is the probability of eliminating the disease for any narrative, p. The binding HaR constraint, thus, identifies a smaller p_H. As the precision of the health information that citizens receive increases, there is greater agreement on the measures needed to eliminate the disease. Thus, the leader need not place a great emphasis on rallying citizens. While, when the precision is low, citizens have widely different opinions on what it takes to eliminate the disease. In this case, the leader is better able to coordinate the actions of citizens by choosing a more partisan tone to her narrative.

5. Conclusion

The role of political leaders in coordinating the behavior of their followers is well understood. But political leadership assumes greater salience in the context of a pandemic, requiring much more than just clear statements in order to induce voluntary social distancing by citizens to prevent the spread of disease. The narrative adopted by a leader depends on a range of factors, including the size of her support base, personal charisma, her resolve to tackle the disease, as well as the degree of conformity in society. The communication campaign, in turn, shapes how citizens trade off health and economic considerations.

Our non-linearity result speaks to the important role of trust in the state in motivating citizens to voluntarily comply with public health measures and accept limits to individual liberty (Coker, 2020; Giuliano and Rasul, 2020). As Porter and Porter (1988) emphasize, once the "subtle art of the administratively possible" falls short—and trust is lacking between the state and its citizens—the state is reduced to coercive means to implement public health policy. In our model, when the leader places a high store on physical wellbeing (and declining morbidity and mortality), she is compelled to risk her reputation to identify with citizens and her communication campaign reflects this. By contrast, a leader who attaches low priority to morbidity and mortality does not go out of their way to compel citizens to forsake individual liberties in favor of social distancing. As a result, the collective commitment to social distancing wavers – cases of Covid climb, citizens become more aware of others' noncompliance with public health practices, and the epidemic escalates. There is a risk that the leader is then forced into draconian measures – such as damaging lockdowns – to eliminate the epidemic. We leave empirical analysis of our hypothesis for future work.

References

Acemoglu, D. and M. O. Jackson (2015). History, expectations, and leadership in the evolution of social norms. Review of Economic Studies 82(2), 423–456.

Adrian, T. and H. S. Shin (2014). Procyclical leverage and value-at-risk. Review of Financial Studies 27(2), 373–403.

Ajzenman, N., T. Cavalcanti, and D. Da Mata (2020). More than words: Leaders' speech and risky behavior during a pandemic. Available at SSRN: https://ssrn.com/abstract=3582908.

Allcott, H., L. Boxell, J. Conway, M. Gentzkow, M. Thaler, and D. Yang (2020). Polarization and public health: Partisan differences in social distancing during the coronavirus pandemic. Journal of Public Economics https://doi.org/10.1016/j.jpubeco.2020.104254.

Bansal, S., B. T. Grenfell, and L. A. Meyers (2007). When individual behaviour matters: Homogeneous and network models in epidemiology. Journal of the Royal Society Interface 4, 879–891.

Barrett, S. (2003). Global disease eradication. Journal of the European Economic Association 1(2-3), 591–600.

Bi, Q., Y. Wu, S. Mei, C. Ye, X. Zou, Z. Zhang, X. Liu, L. Wei, S. A. Truelove, T. Zhang, W. Gao, C. Cheng, X. Tang, X. Wu, Y. Wu, B. Sun, S. Huang, Y. Sun, J. Zhang, T. Ma, J. Lessler, and T. Feng (2020). Epidemiology and transmission of COVID-19 in 391 cases and 1286 of their close contacts in Shenzhen, China: A retrospective cohort study. Lancet Infectious Disease 20(8), 911–919.

Bolton, P., M. K. Brunnermeier, and L. Veldkamp (2013). Leadership, coordination, and corporate culture. Review of Economic Studies 80(2), 512–537.

Budish, E. (2020). Maximize utility subject to $R \leq 1$: A simple price-theory approach to Covid-19 lockdown and reopening policy. Working Paper, University of Chicago Booth School of Business.

Bueno de Mesquita, E. and M. Shadmehr (2020). Social norms and social change. Working Paper, University of Chicago and University of Calgary.

Charnes, A. and W. W. Cooper (1959). Chance-constrained programming. Management Science 6(1), 73–79.

Coker, R. (2020). Public health is about trust—something Cummings has wilfully ignored. Guardian, May 27.

Dewan, T. and D. P. Myatt (2008). The qualities of leadership: Direction, communication, and obfuscation. American Political Science Review 102(3), 351–368.

Freedman, L. (2020). The real reason the UK government pursued herd immunity and why it was abandoned. New Statesman. April 1, 2020.

Fukui, M. and C. Furukawa (2020). Power laws in superspreading events: Evidence from coronavirus outbreaks and implications for SIR models. Working Paper, Massachusetts Institute of Technology.

Gelfand, M. J., J. L. Raver, L. Nishii, L. M. Leslie, J. Lun, B. C. Lim, L. Duan, A. Almaliach, S. Ang, J. Arnadottir, Z. Aycan, K. Boehnke, P. Boski, R. Cabecinhas, D. Chan, J. Chhokar, A. D'Amato, M. Ferrer, I. C. Fischlmayr, R. Fischer, M. Fülöp, J. Georgas, E. S. Kashima, Y. Kashima, K. Kim, A. Lempereur, P. Marquez, R. Othman, B. Overlaet, P. Panagiotopoulou, K. Peltzer, L. R. Perez-Florizno, L. Ponomarenko, A. Realo, V. Schei, M. Schmitt, P. B. Smith, N. Soomro, E. Szabo, N. Taveesin, M. Toyama, E. V. de Vliert, N. Vohra, C. Ward, and S. Yamaguchi (2011). Differences between tight and loose cultures: A 33-nation study. Science 332(6033), 1100–1104.

Giuliano, P. and I. Rasul (2020). Compliance with social distancing during the Covid-19 crisis. VoxEU, CEPR, June 18.

Goolsbee, A. and C. Syverson (2020). Fear, lockdown, and diversion: Comparing drivers of pandemic economic decline 2020. NBER Working Paper No. 27432.

Grossman, G., S. Kim, J. M. Rexer, and H. Thirumurthy (2020). Political partisanship influences behavioral responses to governors' recommendations for COVID-19 prevention in the United States. Proceedings of the National Academy of Sciences 117(39), 24144–24153.

Herrera, H. and G. Ordoñez (2020). The political economy of pandemics. Working Paper, University of Warwick and University of Pennsylvania.

Little, A. T. (2017). Propaganda and credulity. Games and Economic Behavior 102(March), 224–232.

Miller, B. L. and H. M. Wagner (1965). Chance constrained programming with joint constraints. Operations Research 13(6), 930–945.

Morris, S. and H. S. Shin (2002). Social value of public information. American Economic Review 92(5), 1521–1534.

Nielsen, B. F. and K. Sneppen (2020). COVID-19 superspreading suggests mitigation by social network modulation. Available at medRxiv: https://www.medrxiv.org/content/early/2020/10/04/2020.09.15.20195008.

Park, S. Y., Y.-M. Kim, S. Yi, S. Lee, B.-J. Na, C. B. Kim, J. il Kim, H. S. Kim, Y. B. Kim, Y. Park, I. S. Huh, H. K. Kim, H. J. Yoon, H. Jang, K. Kim, Y. Chang, I. Kim, H. Lee, J. Gwack, S. S. Kim, M. Kim, S. Kweon, Y. J. Choe, O. Park, Y. J. Park, and E. K. Jeong (2020). Coronavirus disease outbreak in call center, South Korea. Emerging Infectious Diseases 26(8), 1666–1670.

Porter, D. and R. Porter (1988). The enforcement of health: The British debate. In E. Fee and D. M. Fox (Eds.), AIDS: The Burden of History, pp. 97–120. Berkeley and Los Angeles, California: University of California Press.

Rothman, K. J. (2012). Epidemiology: An Introduction (Second ed.). Oxford: Oxford University Press.

van Vugt, M. and R. Ronay (2014). The evolutionary psychology of leadership: Theory, review, and roadmap. Organizational Psychology Review 4(1), 74–95.

Appendix A: Proofs

Proof of Proposition 1: Fix any partisan tone to the leader's narrative $p \geq 0$. Since citizen i's best response, (7), is linear in the galvanized bias $\tilde{b}_i(p)$, and the conditional expectation $\mathbb{E}_i[\theta|z_i]$ is linear in z_i, it is natural to look for an equilibrium strategy that is linear in both $\tilde{b}_i(p)$ and z_i. This, in turn, implies that the equilibrium strategy also depends linearly on the aggregate galvanized bias, $\tilde{B}(p)$. We suppose that

$$a_i = \eta_i + \kappa z_i$$

for some $\kappa \in \mathbb{R}$, where $\eta_i = \eta_i(\tilde{b}_i(p), \tilde{B}(p))$ is a linear function of $\tilde{b}_i(p)$ and $\tilde{B}(p)$. Then it yields

$$A = \int_0^1 \eta_i \mathrm{d}i + \kappa\theta = \psi\tilde{B}(p) + \kappa\theta, \quad \psi \in \mathbb{R},$$

following the convention that the strong law of large numbers holds for a continuum of independent random variables with uniformly bounded variance. Let $\gamma = \pi_z/(\pi_z + 1)$, then $\mathbb{E}_i[\theta|z_i] = \gamma z_i$. Since all citizens know the mean, B, of the bias distribution, citizen i's best response becomes

$$a_i = (1-\omega)\tilde{b}_i(p) + \omega\psi\tilde{B}(p) + [(1-\omega)\gamma + \omega\gamma k]\, z_i. \tag{13}$$

Therefore (13) is a linear equilibrium strategy if and only if ψ and γ solve $1 - \omega + \psi\omega = \psi$ and $(1-\omega)\gamma + \omega\gamma\kappa = \kappa$. It follows that $\psi = 1$ and $\kappa = (1-\omega)\gamma/(1-\omega\gamma)$. Thus we can conclude that

$$\eta_i = \eta_i(p) = (1-\omega)\tilde{b}_i(p) + \omega\tilde{B}(p)$$

and

$$\kappa = \frac{(1-\omega)\pi_z}{(1-\omega)\pi_z + 1},$$

giving the result of Proposition 1. □

Proof of Proposition 3: The leader faces a constrained maximization problem whenever her resolve satisfies $\phi \geq \phi_0$. It is without loss of generality to assume $\phi \geq \phi_0$ and proceed with the proof. Let $U_L(p)$ be the leader's expected payoff given citizens' equilibrium strategies.

The Lagrangian of the leader's problem is

$$\mathcal{L}(p,\lambda) = U_L(p) - \lambda(p_H - p), \tag{14}$$

where λ is the Lagrange multiplier and p_H is the unique threshold identified by the HaR constraint. Then the corresponding Karush-Kuhn-Tucker (KKT) conditions are

$$\begin{cases} \dfrac{\partial \mathcal{L}}{\partial p} = U_L'(p) + \lambda = 0 \\ \lambda \dfrac{\partial \mathcal{L}}{\partial \lambda} = \lambda(p - p_H) = 0 \\ \lambda \geq 0 \\ p \geq p_H \end{cases}. \tag{15}$$

The nonnegativity constraint $p \geq 0$ does not appear here because $p_H \geq 0$.

Case 1: Suppose $\lambda = 0$. Then the first KKT condition implies that $U_L'(p) = 0$. Using (11) and (12), we have

$$U_L'(p) = \varepsilon\chi - 2\omega(1-\omega)\varepsilon(1-\varepsilon)\chi^2 p,$$

It follows directly that $p_U \equiv 1/[2\omega(1-\omega)(1-\varepsilon)\chi]$ solves $U_L'(p) = 0$.

We check if p_U fulfills the HaR constraint (the last KKT condition). Let $\widehat{\phi} = Q(D(p_U))$. By Proposition 2, since p_H is monotone in ϕ, we have $p_U \geq p_H$ if and only if $\phi \leq \widehat{\phi}$. In other words, when $\phi \leq \widehat{\phi}$, the global maximum is achieved at p_U; otherwise the first KKT condition fails whenever $\phi > \widehat{\phi}$.

Case 2: Suppose that $\lambda > 0$. Then the second KKT condition, the complementary slackness equation, implies that $p = p_H$. Moreover, the first KKT condition makes clear that $U_L'(p_H) < 0$. From Case 1, we know this is only possible when $\phi > \widehat{\phi}$. So p_H is the global maximum if and only if $\phi > \widehat{\phi}$.

Observe that p_U remains the global maximum if $\phi < \phi_0$, so we can conclude that the unique maximum, p^*, of the leader's problem is such that $p^* = p_U$ if $\phi \leq \widehat{\phi}$ and $p^* = p_H$ if $\phi > \widehat{\phi}$. □