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Pandemic preparation without romance: insights from public choice

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Abstract
The COVID-19 pandemic, despite its unprecedented scale, mirrored previous disasters in its predictable missteps in preparedness and response. Rather than blaming individual actors or assuming better leadership would have prevented disaster, I examine how standard political incentives—myopic voters, bureaucratic gridlock, and fear of blame—predictably produced an inadequate pandemic response. The analysis rejects romantic calls for institutional reform and instead proposes pragmatic solutions that work within existing political constraints: wastewater surveillance, prediction markets, pre-developed vaccine libraries, human challenge trials, a dedicated Pandemic Trust Fund, and temporary public–private partnerships. These mechanisms respect political realities while creating systems that can ameliorate future pandemics, potentially saving millions of lives and trillions in economic damage.

Keywords Pandemic preparedness · COVID · Wastewater surveillance · Vaccine libraries · Prediction markets · Human challenge trials

1 Introduction

In its size and scope the COVID disaster was unique. COVID killed more Americans than World War I, World War II, the Korean War, the Vietnam War, the Gulf War, the Afghanistan War and the Iraq War *combined*.[1] The COVID disaster was also global. No

[1] COVID Deaths as of June 2024 are confirmed deaths of 1.19 million and estimated excess deaths of 1.46 million. Both figures from https://ourworldindata.org/explorers/coronavirus-data-explorer?uniformYAxis=0&Metric=Excess+mortality+%28estimates%29&Interval=Cumulative&Relative+to+Population=false&Color+by+test+positivity=false&country=~USA based on The Economist (2024) and WHO COVID Dashboard, https://data.who.int/dashboards/COVID19/cases?n=c.

The title riffs of James Buchanan's (2003) introduction to public choice titled, Politics Without Romance. During the pandemic, the author was an advisor to the US government on accelerating vaccines

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country escaped infection.[2] In terms of political economy, however, the COVID disaster was remarkably similar to previous disasters such as the flooding of New Orleans by Hurricane Katrina.

Number of United States military fatalities in major wars	
World war II (1939–1945).	405,399.
World war I (1917–1918).	116,516.
Vietnam war (1965–1973).	58,209.
Korean war (1950–1953).	36,516.
War on terror** (2001-present).	7060.
Gulf war (1990–1991).	258.
Total.	623,958.

American battlefield trust, https://www.battlefields.org/learn/articles/civil-war-casualties

Scholars in the political economy of disaster, such as Sobel and Leeson (2006), Shughart (2011), and Boettke et al. (2007), have identified systematic weaknesses in disaster preparedness rooted in political economy, including a lack of preparation despite numerous warnings, political myopia, shortsightedness, and a fear of error leading to indecision in urgent situations. To this list, I add a unique factor crucial for COVID: the failure to understand exponential growth. Reviewing these weaknesses and the political economy that produces them, I then discuss strategies for better avoiding and preparing for future disasters that respect the reality of institutional weakness. The focus will be on pandemic preparation rather than on policies to be taken during a pandemic such as lockdowns.[3]

1.1 The failure to prepare and political myopia

David Brooks (2005) wrote that "Katrina was the most anticipated natural disaster in American history, and still government managed to fail at every level."[4] Today we might wish to substitute COVID for Katrina as the most anticipated disaster. Consider just three headlines in the scientific literature, "Bats Are Natural Reservoirs of SARS-Like Coronaviruses" (Li et al. 2005), "Planning for the Inevitable: Preparing for Epidemic and Pandemic Respiratory Illness in the Shadow of H1N1 Influenza" Daughtery (2010) and "Killer flu pandemic is inevitable and world is not prepared, says WHO" (Mandal 2019).

Nor was warning about an inevitable killer pandemic limited to scientists. The public was also well-informed. Bill Gates gave a TED talk in 2015 that was seen by millions of people titled "The Next Outbreak: We're Not Ready." CNN in 2017 gave, "Seven reasons why a global pandemic is inevitable." Contagion, a major film released in 2011, accurately dramatized the possibility of a pandemic and the world's response–it was written with epidemiologist Larry Brilliant as a consultant–and did $136.5 million in box office receipts. The cover of the May 15, 2017, issue of Time Magazine featured a lurid image of viruses and the headline, "Warning: We are Not Ready for the Next Pandemic." Time proved correct.

[2] Turkmenistan claims zero cases (as of June 2024) but few experts regard this as credible.

[3] For further work in the public choice tradition on pandemics and public health see Leeson and Thompson (2021), Koyama (2023) and Ryan (2014).

[4] See also Shughart (2006), Sobel and Leeson (2006) and Boettke et al. (2007) for documentation that a Katrina like event in New Orleans was well predicted.

Thus, a COVID-like event was well predicted both in the scientific and popular media.[5,6] As just one measure of the failure to prepare consider that The Strategic National Stockpile (SNS) of personal protective equipment (PPE) was severely inadequate to meet the demands of the COVID-19 pandemic. At the start of the pandemic, the stockpile had only about 35 million N95 masks on hand, far short of the estimated 3.5 billion that would have been needed to adequately protect healthcare workers and first responders. Moreover, much of the stockpile was rotting as the N95 masks were more than 10 years old by the time of the pandemic.[7] If an agency whose primary goal is preparedness is unprepared, it's no surprise that other agencies with different primary goals were also unprepared.

The lack of preparation for events like Katrina, COVID, and other natural disasters should be seen not as isolated failures but as a systemic result of political incentives—stemming from voter and political myopia, uncertainty, visibility issues, and challenges in inference. Politicians, for example, have short time horizons in part because voters have short time horizons (Conconi et. al 2014, Jacobs 2011, Jacobs and Matthew 2012). Politicians are more likely to vote in favor of free trade early in their terms and against free trade as an election approaches, for example, because voters focus on recent experience when casting votes and the costs of free-trade show up in the short run and the benefits in the long run (Conconi et. al 2014). The problem is not just myopia, however. Voters can easily see disaster spending and reasonably evaluate its effectiveness but disaster preparedness is less visible and its efficacy is less certain. If a politician claims he stocked the Strategic National Stockpile can voters know that this is true or that the right items were stocked?

The difficulty voters have in evaluating disaster preparedness and rewarding politicians for promoting disaster preparedness is illustrated by the failure of the Global Health Security (GHS) Index, an index designed by experts to evaluate pandemic preparedness.[8] The

[5] Many disasters are predicted but do not occur. Thus, given a pandemic was predicted, the critical question may be whether the prediction was credible. A full exploration of this subtle question is beyond the scope of this paper but I argue that both Hurricane Katrina and the pandemic predictions were credible, falling into the category of "predictable surprises" (Bazerman and Watkins 2004; see also Irons 2006, on Katrina specifically).

The credibility of these predictions stems first from their grounding in historical data rather than speculative theory. Both events had precedents and near misses that underscored their plausibility. For instance, Hurricane Ivan struck near New Orleans just 11 months before Katrina, a Katrina-scale disaster was only narrowly avoided due to a fortunate change in its path. Similarly, pandemics were repeatedly flagged as looming threats, with warnings arising from SARS in 2003, H5N1 in 2006, H1N1 in 2009, Ebola in 2013, and MERS in 2015 (Harford 2020). Each of these incidents highlighted vulnerabilities that could have resulted in a COVID-like event, depending on variations in the pathogens. Moreover, the struggle between humans and parasites is an enduring theme throughout human history (Harper 2021).

Additionally, the specificity of certain predictions, such as the role of bats and SARS-like coronaviruses, bolstered their reliability. Furthermore, forecasts came from diverse, independent scientists further enhancing their credibility.

The primary challenge, in my view, was not determining the credibility of such predictions but acting effectively to mitigate predicted but rare events.

[6] Pandemic predictions failed in one important respect, not enough attention was given to the possibility of a lab-leak, a hypothesis which now looks like a reasonable possibility for the origin of COVID (e.g. Ridley and Chan 2021). One of the few public statements to this effect was by Lord Martin Rees, former head of British Royal Society who bet against Steven Pinker that "A bioterror or bioerror will lead to one million casualties in a single event within a six-month period starting no later than Dec 31 02020." See https://longbets.org/9/. The bet will likely resolve in Pinker's favor given the difficulties of uncovering the truth but even Pinker agrees that a lab leak is now more likely than not.

[7] On the Strategic National stockpile see the report of the US HHS Office of Inspector General 2023.

[8] This section draws on Omberg and Tabarrok (2014).

GHS index was designed by a panel of 21 experts in virology, public health, and bio-security from 13 countries who created a detailed framework to assess a country's capability to prevent and mitigate epidemics and pandemics. The index was prepared by The Johns Hopkins Center for Health Security (JHU), one of the leading centers on biosecurity and pandemics in the world and was a multi-year extensive effort in data analysis and collection. The index was published in 2019, immediately before the pandemic.

The country that ranked highest for pandemic preparedness in the GHS Overall Index was the United States, with a score of 83.5 out of a possible 100. The country that ranked lowest was Equatorial Guinea, with a score of 16.3. Yet, as Fig. 1 illustrates, Equatorial Guinea, the worst prepared country, had far fewer deaths per million people than did the United States, the best prepared country.

Of course, there are many potentially confounding factors which differ between Equatorial Guinea and the United States. Yet, in an exhaustive survey breaking down the data in a variety of ways and using numerous control variables and other strategies, Omberg and Tabarrok (2022) confirm the impression of Fig. 1 concluding that "almost no form of pandemic preparedness helped to ameliorate or shorten the pandemic."[9] If experts have difficulty evaluating disaster preparedness than the difficulty is surely multiplied for voters but if voters can't evaluate then they can't reward politicians for preparedness. As a result, we shouldn't be surprised that preparedness is not prioritized.

The political problem of disaster preparedness is especially acute for the most useful form, disaster avoidance. The problem with avoiding a disaster is that success often renders itself invisible. The captain of the Titanic is blamed for hitting the iceberg, but how much credit would he have received for avoiding it?

Consider a pandemic. When early actions—such as testing and quarantine, ring vaccination, and local lockdowns—prevent a pandemic, those inconvenienced may question whether the threat was ever real. Indeed, one critic of this paper pointed to warnings about ozone depletion and skin cancer in the 1980s as an example of exaggeration and a predicted disaster that did not happen. Of course, one of the reasons the disaster didn't happen was the creation of the Montreal Protocol to reduce ozone-depleting substances (Jovanović et al. 2019; Tabarrok and Canal 2023). The Montreal Protocol is often called the world's most successful international agreement, but it is not surprising that we don't credit it for skin cancers that didn't happen. I call this the *prophet's paradox*: the more the prophet is believed beforehand, the less they are credited afterward.

The prophet's paradox can undermine public support for proactive measures. The very effectiveness of these interventions creates a perception that they were unnecessary, as the dire outcomes they prevented are never realized. Consequently, policymakers face a challenging dilemma: the better they manage a potential crisis, the more likely it is that the public will perceive their actions as overreactions. Success can paradoxically erode trust and make it more difficult to implement necessary measures in future emergencies. Hence, politicians are paid to deal with emergencies not to avoid them (Healy and Malhotra 2009).

Since politicians are incentivized to deal with rather than avoid emergencies it is perhaps not surprising to find that this attitude was built into the planning process. Thus, the UK COVID Inquiry (2024, 3.17) found that:

[9] Note that Omberg and Tabarrok (2014) are analyzing the efficacy of pandemic preparedness not the efficacy of actions taking after a pandemic begins such as masking, lockdowns or other procedures.

> Planning was focused on dealing with the impact of the disease rather than preventing its spread.

Even more pointedly Matt Hancock testified (UK COVID Inquiry 2024, 4.18):

> Instead of a strategy for preventing a pandemic having a disastrous effect, it [was] a strategy for dealing with the disastrous effect of a pandemic.

1.2 The failure to understand exponential growth

Viral growth is an especially challenging problem because early action is by far the most important but by necessity early action is made in a situation of uncertainty and low information. Consider the early data on COVID in China presented in Table 1. By the week of Jan. 27 there had been just 53 deaths. To put this in perspective there are on the order of 1,150 deaths by auto accident in a typical week in China and over 7000 cancer deaths *per day*.[10] Looking around the world one could easily have pointed to ongoing wars in Afghanistan (802 fatalities a week) or the Mexican drug war (684 fatalities a week) as being of more serious concern, especially to the United States.[11]

Given the small number of deaths, especially in comparison to road, cancer and war deaths, it might have seemed reasonable to pay little attention to COVID in January of 2020. Yet, by mid-January Richard Hatchett, the CEO of CEPI (the Coalition for Epidemic Preparedness Innovations) was contacting as many world leaders as possible, warning them that 50 million people might die in a COVID pandemic. Hatchett did more than vent his fears. On January 22, he gave Moderna $1 million to start working on a COVID vaccine (Kelland 2023; Lewis 2021).

Why was Hatchett concerned when others were not?[12] As an expert in viral diseases, Hatchett understood the mathematics of exponential growth. Start with a single piece of paper 0.004 inches thick. Fold it in half, doubling the thickness. By the 20th fold the paper is 350 feet thick, by the 40th doubling it's more than 69 thousand miles thick. In their review of exponential growth bias, Hutzler et al. (2021) begin by noting that "Humans grossly underestimate exponential growth, but are at the same time overconfident in their (poor) judgement."

During the early weeks of COVID in China, cases and deaths were more than doubling every week. Thus, suggesting there could be billions of infections and many deaths in a matter of months. Of course, the data were unclear. Infections were undercounted and perhaps deaths were as well. Death rates, moreover, cannot double forever. Populations develop immunity. Thus, more complicated mathematical models are needed to predict the course of a disease, even in theory. Moreover, not all would remain the same. In addition to the development of immunities, behaviors change, vaccines and treatments are developed, and viruses mutate. The models must be adjusted. Nevertheless, all that would take time. The early data from China and simple models of doubling were enough to be very worried.

[10] Road deaths in China https://www.statista.com/statistics/276260/number-of-fatalities-in-traffic-accidents-in-china/. For cancer deaths see Han et al. (2024).

[11] https://en.wikipedia.org/wiki/List_of_armed_conflicts_in_2019.

[12] Hatchett's prediction could be discounted as a random guess that looks prescient only in retrospect. But Hatchett was not a random prognosticator. His job as the CEO of CEPI, was precisely to prepare for pandemics so it's reasonable to credit expertise rather than "luck". Noting, of course, that any prediction involves uncertainty.

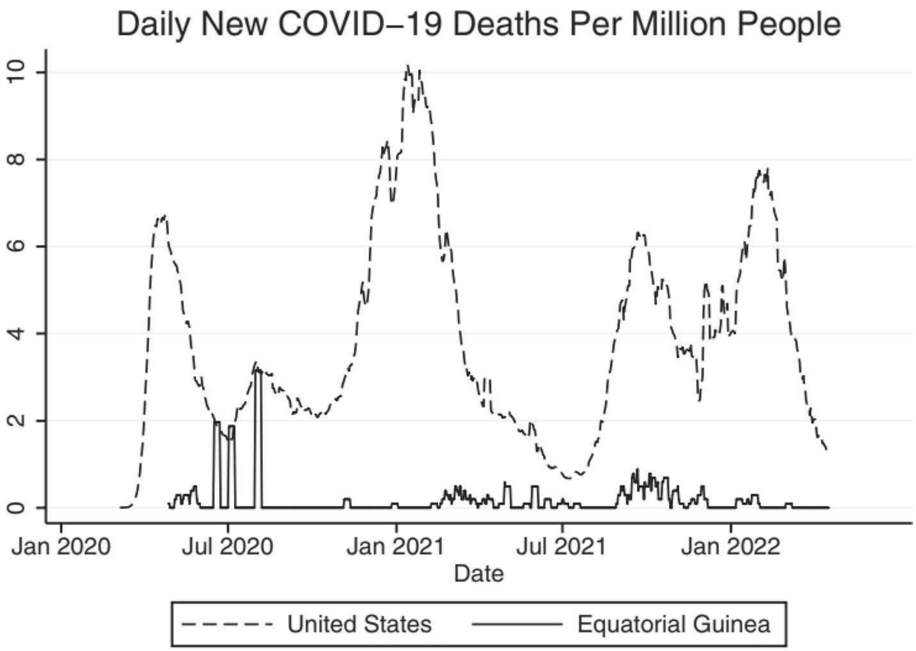

Fig. 1 Dynamics of Coid-19 deaths in the most and least prepared countries

Yet, other than Richard Hatchett, a handful of epidemiologists (the "wolverines"), and the occasional venture capitalist, few in the Western world were worried.[13]

The general lack of concern in the Western world was all the more incongruous because it coincided with the Chinese government taking dramatic and unprecedented action to try to halt the growth in infections. On Thursday, January 23 at 10 am, the entire city of Wuhan was put under quarantine.[14] At the time, this was the largest quarantine in world history. It's notable that on the same day the quarantine began, the WHO said the outbreak in China was *not* a Public Health Emergency of International Concern (PHEIC)—that decision would be reversed on Jan. 30.

As noted, the number of deaths in China during the early weeks was very low and seemingly inconsequential compared to other sources of morbidity and mortality. This makes the speed and forcefulness of China's response surprising.

It has been argued that authoritarian leaders without electoral constraints can respond more swiftly and decisively to emergencies (e.g. Gao and Zhang 2021) but authoritarian systems often suffer from poor information flows. So how did Chinese public health experts quickly communicate with and convince Chinese leaders to act? Furthermore, if

[13] On the Wolverines see Lewis (2021). The venture capitalist Balaji Srinivasan was warning as early as Jan. 30, 2020 of the possibility of a pandemic and the consequences–masking, remote work, shutdown of borders, hotel and tourism industry collapse–in a remarkable tweet storm https://x.com/balajis/status/1222921758375927808. In comparison Farhad Manjoo of the NYTimes was warning "Beware the Pandemic Panic" and "I fear that panic about a *foreign virus* offers society another chance to target marginalized people." (Italics added.) See Manjoo (2020).

[14] Although known as the Wuhan quarantine, other smaller cities in Hubei province were also quarantined.

Table 1 Early timeline of COVID in China. *Source*: OurWorldinData.org

	Confirmed cases	Deaths
Jan. 7, 2020	China Reports New Coronavirus	
Jan. 13	44	1
Jan. 20	80	2
Jan. 27	1,860	53

authoritarian leaders can more easily impose lockdowns, they are presumably also more politically resilient to higher death tolls (Sen 1982; Rummel 2002). Therefore, it is not evident that authoritarian regimes would inherently respond more quickly and forcefully to emergencies. Indeed, the academic literature suggests only modest differences in political regime response to the COVID pandemic with state capacity being a more important variable (e.g. Chen et al. 2023; Stasavage 2020; Sorsa and Kivikoski 2023; Omberg and Tabarrok 2022). The speed of China's response, therefore, remains something of a puzzle.[15] Regardless, a slow response to pandemics should be understood as the norm.

1.3 Fear of error leading to inaction

Fear of error leading to inaction is a common failure mode of government during a disaster. In the Katrina disaster, for example, it took nearly 24 h for the government in New Orleans to declare an emergency *after* the levees had broken. Moreover, it took Federal officials nearly a week to get help on the scene (Sobel and Leeson 2006).

Government's response to the pandemic in the early days was in some ways worse than in previous disasters because governments had repeated warnings from other locations. Leaders in the Western world, especially in the US and the UK, were either reluctant or unable to take proactive measures. Political leaders in each region seemed to act explicitly or implicitly as if each region was unique and that it couldn't or wouldn't happen here.

On March 11, 2020, for example, New York City Mayor Bill de Blasio told New Yorkers not to avoid restaurants and that they should be going about their normal lives.[16] What was remarkable about this was that just one day earlier Italy had been put under quarantine with travel restrictions and bans on outdoor public gatherings. Italy was too far away to be seen as relevant. Closer to home, deaths were rising rapidly in Washington State (Governor Inslee would close schools on March 13). But even Washington State seemed too far away to draw lessons from. The first death in New York state didn't occur till March 14. But then, as Wikipedia[17] notes, the virus "grew exponentially; by March 25, over 17,800 cases had been confirmed in New York City, with 199 deaths."

Mayor de Blasio later faced criticism for his inaction, but his example is noteworthy not because it was unusual, but because it was typical. In case after case, action was not taken until there were *local* deaths. Since deaths lag weeks behind infections, each death signaled that many more infections were already present, making further deaths inevitable. While late action is better than no action, it is far from optimal. Early intervention could have

[15] One theory for China's quick and unusually forceful response is that SARS-COV-II leaked from the Wuhan Coronavirus lab and Chinese leaders were informed earlier and in more forceful terms about the dangers.

[16] E.g. https://ny.eater.com/2020/3/11/21175497/coronavirus-nyc-restaurants-safe-dine-out.

[17] https://en.wikipedia.org/wiki/Timeline_of_the_COVID-19_pandemic_in_New_York_City.

significantly reduced cases and deaths. In a viral process, if you're not too early, you're too late.

Nationally, the story was similar—a fear of error and uncertainty and underappreciation of the mathematics of exponential growth. In January, Wright (2021, p.44) reports that in the White House:

> The public health contingent in the meeting didn't want to make decisions about quarantine or travel bans without definitive intelligence.

Definitive intelligence, of course, could only be obtained after viral growth was beyond containment. Similarly, Lewis (2021, p.40) writes of the US Center for Disease Control's bias against action:

> The root of the CDC's behavior was simple: fear. They didn't want to take any action for which they might later be blamed.

By February of 2020, COVID infections in the United States were doubling every 2 days.[18] By the time decisions were made, the virus was already replicating in the United States and at a far faster rate than testing or quarantining could be deployed.

In the UK the situation was similar. Prime Minister Boris Johnson refused to lockdown before deaths made the utility of lockdown obvious. Kate Bingham the private-sector CEO brought in to head the UK's Vaccine Taskforce (the UK's version of Operation Warp Speed) said:

> There is an obsessive fear of personal error and criticism, a culture of groupthink and risk aversion that stifles initiative and encourages foot-dragging. Government must be braver.

2 Ameliorative efforts

Can anything be done to ameliorate these problems and reduce the costs of a future pandemic? Note that the operative word is ameliorate. The pandemic cost the United States over a million lives and on the order of $18 trillion dollars in output. Thus, it's clear that amelioration can be extremely valuable. A 10% reduction in pandemic costs would have saved over 100,000 lives and $1.8 trillion dollars. A 10% reduction in costs seems feasible. Indeed, other countries had far less costly pandemics.[19]

When designing institutions to respond to a pandemic, we should assume that the problems detailed in the first part of the paper are not easy to solve. In particular, for reasons of political myopia, the difficulties of forecasting exponential growth and fear of error we should assume that politicians and bureaucrats will be slow to act. Therefore, we should aim for institutions that do not require political action.

The literature on policy lags in macroeconomics argues that recognition, decision, and implementation lags can make counter-cyclical fiscal policy ineffective or even counter-productive (e.g., Taylor 2000; Auerbach and Feenberg 2000). One solution is to rely more on "automatic stabilizers." For instance, the unemployment insurance system protects

[18] https://www.danreichart.com/COVID19

[19] The US had approximately 3800 excess deaths per million while the UK had about 10% fewer excess deaths per capita with Germany, France, Sweden, Canada and Japan having far fewer excess deaths per capita. See https://ourworldindata.org/explorers/coronavirus-data-explorer.

workers and injects money into declining economies automatically. While Congress may later extend unemployment insurance, no act of Congress is needed for the system to start functioning. We take inspiration from this literature.

2.1 Wastewater Surveillance

People infected with SARS-CoV-2 shed genetic material from the virus in their feces (Bivins et al. 2020). Wastewater surveillance can detect the presence, concentration and growth of this genetic material before people present clinically.[20] Thus, wastewater surveillance gives public health officials an early warning which can be used to allocate scarce resources and to implement control measures.

More generally, wastewater surveillance can detect a host of viral and bacterial pathogens including influenza viruses, poliovirus, norovirus, hepatitis A and E viruses and bacteria such as Escherichia coli and Salmonella.[21] Wastewater surveillance to monitor antibacterial resistance may be of special importance (Philo et al. 2023; Singer et al. 2023). As with surveillance for SARS-CoV-2, wastewater surveillance more generally can be used to predict disease outbreaks more quickly, track the spread and virulence of pathogens and novel variants of concern, and inform and provide feedback to public health decisions (Wu et al. 2020).

In Israel, for example, an outbreak of wild type polio was successfully detected in sewage. A quick vaccination campaign suppressed the outbreak and meant that the worldwide program towards polio eradication was not interrupted (Brouwer et al. 2018).

Similarly, during the COVID pandemic, scientific teams in Singapore analyzed wastewater and tracked new COVID variants in real time. Singapore's National Environment Agency created an index of viral load and published it weekly (Singer et al. 2023). In this way communicating nationwide trends to the public and providing actionable information.

Wastewater surveillance is relatively cheap compared to sampling individuals since large populations are tested *en masse*. Moreover, wastewater surveillance can be used to track pathogens in populations who may be reluctant to test for fear or inconvenience, e.g. illegal immigrants. Similar techniques may be used to sample wastewater for zoonotic pathogens.

Wastewater surveillance is now used at some 3–4 thousand wastewater treatment plants but there are over one hundred thousand wastewater treatment plants in the world, covering some 2.7 billion people or 35% of the global population (Adhikari and Halden 2022, Singer 2023). The high benefit to cost ratio of wastewater surveillance suggests expanding the program to every major treatment plant. In addition, key hot spots such as cruise ships and international airports would enable real-time monitoring of infectious disease spread.

A wastewater surveillance dashboard from Wuhan, China for example could have given the world many weeks of earlier warning and perhaps avoided the COVID pandemic altogether. Not every country will want to invest in wastewater surveillance, despite the

[20] Wastewater surveillance is so accurate it can lock-on to unusual "cryptic" RNA from a single infected individual (Gregory et al. 2022). Wastewater surveillance has also been used, especially in China, to identify illicit drug use and production. By successively following sewage catchment, police in China were able to identify the locations of clandestine laboratories (Singer et al. 2023).

[21] Wastewater surveillance can also be used to monitor other contaminants such as pesticides and plastics.

relatively low cost, but by automating, packaging and subsidizing "kits" the developed world could encourage widespread wastewater surveillance.

Ideally, automated data collection and real-time public exposure via APIs would offer a live dashboard of global infectious disease trends. One of the lessons of the pandemic and previous disasters is that private actors tend to move more quickly than public ones (Sobel and Lesson 2006). Thus, opening information to the public to assess and analyze is critical. During the pandemic, for example, private projects such as the COVID Tracking Project and the Johns Hopkins University COVID Dashboard became critical resources not just for the public but also for state and federal government bureaucracies (Surowiec 2021).

Governments have often been reluctant to report outbreaks. The Chinese government took months to report the outbreak of SARS, and the Saudi Arabian government was slow to reveal the extent of MERS (UK COVID-19 Inquiry 2024). More recently, the US government has been slow to collect data on H5N1 bird flu as it expands into valuable cow and pig populations (Oliveira 2024). Reluctance to expose can be understandable. Just hours after South Africa reported the identification of the COVID variant of concern B.1.1.529, later named Omicron, Britain, Israel and Singapore banned flights from South Africa. Whether justified or not, such actions reduce the incentive to report so removing the choice to report speeds information dissemination. Real-time exposure of wastewater surveillance via publicly available APIs would bypass government control and reduce recognition lag.[22]

Aside from the inherent value of the information produced, a virtue of publicly available wastewater surveillance data is that it removes information from centralized silos and broadcasts it widely so that pandemic preparedness is not limited by the decision-making capacity and will of a handful of political elites.

2.2 Prediction markets

Wastewater surveillance with public APIs would make dispersed information about parasitic growth widely available and transparent. More generally, prediction markets are good at aggregating and making transparent a variety of dispersed information (Arrow et al. 2008; Wolfers and Zitzewitz 2004). Prediction markets have been shown to be good predictors of election outcomes (Berg et al. 2008), replications of scientific papers (Dreber et al. 2015) and forecasting infectious diseases (Polgreen et al. 2007; Tung et al. 2015).

Tung et al. (2015), for example, found that an Epidemic Prediction Markets (EPM) system they built for forecasting the spread of diseases in Taiwan was more accurate in 701 out of 1,085 prediction events than using the traditional method of historical averages. The main problem with prediction markets in this context is that there is little organic demand for such markets.

Unlike financial markets or sports betting, where participant interest is inherently high, prediction markets for public health issues may not attract sufficient engagement to generate accurate and reliable forecasts. Without enough active participants, these markets suffer from low liquidity and limited information aggregation (Arrow et al. 2008).

To address this challenge, such markets would likely need to be subsidized or incentivized to ensure successful operation. Subsidies could help attract a critical mass of

[22] A government could take a wastewater plant offline but note that there is a significant difference between delaying the reporting of an internal lab report which is easy to do and not publicly verifiable with taking a wastewater plant offline or refusing to join a surveillance program before there is a pandemic. A wastewater surveillance program with public APIs raises the costs of hiding or delaying the release of information.

participants, enhancing the market's predictive power and utility for public health surveillance (Hanson 2006).

In addition to detecting early disease trends, prediction markets could uncover otherwise hidden or opaque information. For example, the WHO, CDC, and many other public health authorities around the world maintained well into the COVID pandemic that airborne transmission was not a significant mechanism of spread. Yet, many scientists with expertise in virology and fluid mechanics strongly disagreed (Morawska et al. 2023). This disconnect arose because public health authorities—who held the microphones the world relied on for guidance—were shaped by historical and sociological factors that reinforced the anti-airborne transmission stance (Jimenez et al. 2022). Prediction markets, by embracing diverse perspectives, could have signaled much earlier that there was no scientific consensus against airborne transmission, only an asymmetry in public messaging.

In short, a key to avoiding the recognition lags of public actors is to enhance the availability of "automatic predictors" like wastewater surveillance and prediction markets. These tools operate continuously and publicly and by so doing strengthen our collective ability to anticipate and respond to public health threats.

2.3 A vaccine library

The most successful response to the pandemic was Operation Warp Speed and the rapid creation of vaccines (Ahuja et al. 2021; Castillo et al. 2021; Mango 2022). Thus, any factor which can speed vaccine design, production, authorization or distribution—ideally without relying on better political actors—is likely to have a high benefit to cost ratio.

On January 11, 2020, data on the genetic code of Sars-COV-II from Yong-Zhen Zhang's lab in China was uploaded to the internet. By January 13 a vaccine had been designed in the United States. A vaccine wasn't authorized in the US, however, until December 11, 2020—the intervening time was due almost entirely to testing. There are two issues worthy of attention. First, how was a vaccine designed so quickly? Second, why did testing the vaccines take so long?

The rapid development of a SARS-CoV-2 vaccine was primarily due to prior research on vaccines for other coronaviruses, such as SARS and MERS (Corbett et al. 2020, Padron-Regaldo 2020).[23] Vaccines for SARS and MERS were never put into production, likely due to limited funding, as these viruses did not explode into global pandemics. However, the shared features of coronaviruses, particularly the infamous "spike protein," allowed earlier research to significantly accelerate the development of the SARS-CoV-2 vaccine.

The 2022–2023 MPox (monkeypox) outbreak, the largest MPox outbreak in world history, provides a similar lesson about the value of research into vaccines by viral family. In July 2022, the WHO declared the MPox outbreak a public health emergency of international concern (PHEIC) as some 87,000 cases caused 140 deaths across 111 countries including more than 30,000 cases and 42 deaths in the United States.[24] MPox, however, dissipated in part because of a rapid vaccination campaign using a vaccine developed for smallpox. Smallpox and MPox are both viruses in the orthopox family and similar enough to be susceptible to the same vaccine.

[23] SARS-COV-II is an RNA virus like HIV and research on HIV also greatly advanced the creation of vaccines for SARS-COV-II (Harris 2022) although the vaccines design for SARS and MERS was more direct.

[24] https://www.cnbc.com/2023/05/11/mpox-who-says-outbreak-no-longer-global-health-emergency.html.

The success in rapidly developing a SARS-CoV-2 vaccine and MPox vaccine due to prior research on related corona and orthopox viruses respectively highlights the value of studying other virus families and designing vaccines in advance. By understanding common features and mechanisms within virus families, scientists can create foundational research that can significantly reduce the time needed to develop effective vaccines during future outbreaks, potentially preventing pandemics and saving many lives.

In 2016, the WHO identified 11 viruses with the greatest potential to cause severe outbreaks. Gouglas et al. (2018) estimated that developing at least one vaccine candidate for each of these viruses up to phase 2a would cost approximately $2.8 to $3.7 billion in total (see also Krammer 2020). Bringing a vaccine candidate up to phase 2a means designing the vaccine and evaluating it for safety and essentially "proof of concept" in small trials. Prior to a significant outbreak, it would not be possible to run phase 3 efficacy trials.

It should be clear that these costs are small, almost trivial, relative to the expected gains. It's notable that SARS-CoV-1 was on the WHO's list. The knowledge gained from *studying* SARS-CoV-1 helped to speed a vaccine for SARS-COV-II but had SARS-COV-I vaccines been developed to Phase 2a prior to the COVID pandemic, for example, we could have likely knocked months off the development process for SARS-COV-II, saving perhaps millions of lives and trillions of dollars worldwide.[25]

More generally, pandemics have become more frequent and more costly (Bernstein et al. 2022). Importantly, this is to be expected. A common "folk model" of disease is that there are a fixed number of diseases and that over time science and technology defeat each disease in turn. This model may be acceptable for diseases caused by genetics, aging, and environmental factors such as cancer, heart disease and diabetes. But pathogenic diseases are caused by enemies that evolve. Pathogenic diseases target us. Moreover, precisely because humans are becoming a healthier, more energy-abundant and more dominant species, we are becoming a richer and more desirable target (Harper 2021). Any win against pathogens should be considered temporary.[26]

Using data on mortality from zoonotic viral emergence since 1918, Bernstein et al. (2022) estimate that the annual expected mortality cost of pandemics ranges from $350 billion to $21 trillion, with higher costs when wealthier countries are impacted. Similarly, they estimate that viral zoonotic disease outbreaks lead to an annual expected GNI loss of approximately $212 billion, with larger losses correlated with higher GNI. These are annualized expected costs, meaning that in some years costs will be lower, while in other years—such as during COVID—they will be significantly higher.

Thus, the annual expected costs of a pandemic are on the order of trillions of dollars, making it worthwhile to invest substantially to mitigate this risk. However, voter and political myopia mean that we are unlikely to invest adequately. Hence, I am focusing on areas where we do not need huge amounts of spending—with consequent high political opportunity costs—to have a significant ameliorative effect on pandemics. Fortunately, wastewater surveillance, prediction markets and pre-developing a library of vaccine candidates for diseases with the highest pandemic potential remains feasible within current political constraints.

[25] Some COVID trials were run concurrently and the situation was somewhat different for each of the vaccine candidates so it's difficult to provide an exact number but several months of acceleration is conservative. See Castillo et al. (2021) on the value of acceleration.

[26] Thus, rather than permanent wins, the eradication of Smallpox and Rinderpest should be seen as major battle victories in the ongoing war against pathogens.

2.4 Human challenge trials

One of the most consequential and peculiar decisions during the pandemic response was the choice to forgo human challenge trials. Instead, COVID vaccines were tested through traditional randomized controlled trials (RCTs) in the field. In an RCT, participants are randomly assigned to either a vaccinated (treatment) group or an unvaccinated (control) group, and both groups resume their normal activities until enough participants contract COVID to establish a statistically significant difference in infection rates.

A major drawback of RCTs in a pandemic is the unpredictability of reaching the infection threshold required for statistical significance. If infection rates are low or participants take steps to avoid exposure, trials can be prolonged, delaying vaccine rollout. While increasing the trial size can reduce these delays, it also increases the cost and complexity of the trials.

In contrast, in a human challenge trial (HCT), participants are randomly split into two groups and all of them are deliberately exposed to the virus, accelerating the timeline for obtaining results. Since participants are deliberately exposed the number of participants in a human challenge trial can be much smaller than in an RCT, perhaps on the order of 50–100. Most importantly, where an RCT might take years to produce results, a HCT can have results in a matter of months or weeks (Eyal and Lipsitch 2021; Nguyen et al. 2021). For a variety of reasons, HCT are not necessarily full substitutes for RCTs, but they are surely complements and should be used in emergencies.

Levine et al. (2021) offer a set of typical reasons why HCTs for COVID were considered problematic and controversial[27]:

> …several factors warrant that special caution must be taken when working with SARS-CoV-2, including the severity of coronavirus disease 2019 (COVID-19), as evidenced by its high case-fatality risk in certain sub-populations (elderly, obese, diabetics, hosts with pulmonary and cardiac disease); severe disease requiring ventilator support, thromboembolic events, and deaths (albeit relatively uncommon) also occur in young adults (although risk factors for these outcomes remain uncharacterized); the high transmissibility of SARS-CoV-2 from person-to-person directly by respiratory droplets and at further distances by airborne droplet nuclei [19]; SARS-CoV-2's ability to remain viable on fomites for hours; since the pandemic began, multiple new clinical presentations of COVID-19 have been described. Finally, as of mid-July 2020, a reliable "rescue treatment" has yet to be identified that can predictably arrest the progression from mild/moderate COVID-19 to serious, life-threatening illness.

To which a logical response is, so? The entire list is a non-sequitur, i.e. irrelevant to the question at hand. A HCT and an RCT both expose participants to disease—trial participants may die in either case.[28] Indeed, it's quite possible and even plausible that more participants die in an RCT than in an HCT because the RCT has to be much larger and less well-monitored.

The primary distinction between a Human Challenge Trial and a Randomized Controlled Trial is not the level of risk to participants but the speed of execution. RCTs are

[27] See also Kahn et al. (2020) on ethical arguments against HCTs.

[28] In the RCT for Pfizer's COVID vaccine 2 people died of COVID in the control group and one died in the treatment group (supplementary data, Thomas et al. 2021).

inherently slower, which significantly increases the risk to non-participants, as delays in generating actionable results can prolong widespread harm. At the height of the pandemic in the United States, for example, thousands of people were dying daily. Thus, speeding vaccines by a matter of weeks could have saved tens of thousands of lives (Bjoerkheim and Tabarrok 2022, 2024).

The reluctance to promote HCTs likely arises from the discomfort physicians feel in making decisions that directly cause harm to participants. The professional ethos of the physician emphasizes protecting patients from harm, making it emotionally and ethically challenging for them to expose participants to risk. A HCT violates the Hippocratic oath.

The problem with HCTs is thus a problem of political economy. The costs of HCTs are concentrated on the trial designers while the benefits are diffused across millions of potential patients. We see evidence for this by comparing the views of trial designers with those of the public. Trial designers (e.g. Levine et al. 2021; Kahn et al. 2020) tend to find HCTs much more problematic than the public. Public opinion surveys in multiple countries show strong support for human challenge trials. Brookman et al. (2021), for example, report[29]:

> We found broad majorities prefer for scientists to conduct challenge trials (75%) and integrated trials (63%) over standard trials. Even as respondents acknowledged the risks, they perceived both accelerated trials as similarly ethical to standard trial designs. This high support is consistent across every geography and demographic subgroup we examined, including vulnerable populations.

An analogy with another problem in political economy suggests a solution. Congressional representatives engage in pork barrel spending because they receive all the benefits of local spending but only 1/535 of the costs. Thus, if you want to reduce pork barrel spending move the locus of decision-making to Presidents who face a more symmetrical balance of benefits and costs (Weingast et al. 1981).

In a similar way, I argue that physicians should not be expected to lobby for human challenge trials because they uniquely face costs from these trials. Thus, move the locus of decision-making to political actors who have more balanced incentives and more familiarity with utilitarian style thinking. A proactive plan to incorporate HCTs into pandemic response should be a part of the U.S. government's toolkit, specifically under the jurisdiction of the Secretary of Health and Human Services. This shift would place the decision to deploy HCTs not in the hands of individual researchers—potentially swayed by personal discomfort—but with a political actor accountable to the public and voters, representing the broader, diffuse interest.

The U.S. military should likewise have a formalized role in pandemic response. In Operation Warp Speed, the military was instrumental, with logistics expert General Gus Perna co-leading alongside civilian vaccine researcher Moncef Slaoui (Mango 2022). The military brings several advantages to pandemic response: first, it is trained to respond swiftly to threats, with rapid mobilization embedded in its protocols. Second, the military operates with a utilitarian perspective, recognizing the need to prioritize collective welfare over individual concerns when necessary. Human challenge trials, for instance, do not present ethical challenges greater than those inherent in deploying soldiers to combat. In short, integrating the military into pandemic response taps into their logistical expertise, experience managing large-scale operations, and their utilitarian mindset.

Moreover, it should be remembered that the US military has a long and distinguished history in vaccinology (Artenstein et al. 2005; Ratto-Kim et al. 2018). In 1777, General

[29] See also Barker et al. (2022).

George Washington ordered the inoculation of U.S. troops against smallpox. Inoculation was a major logistical challenge and tactical risk, as inoculated troops needed time to recover, but Washington understood that smallpox outbreaks could decimate his forces. Since then, the U.S. military has made significant contributions to vaccines for yellow fever, typhoid, pneumococcus, adenovirus, and hepatitis A, among others (Ratto-Kim et al. 2018). This long history in vaccination efforts, makes the military well-suited to play a crucial role in modern pandemic response.[30]

Indeed, the military was one of the few organizations in US society to actively prepare for a pandemic. Prior to the pandemic, the US military bought options on counter-measure drug and vaccine capacity from private manufacturing firms (Belski 2017, US GAO 2017). In normal times, the private firm would keep their facilities "warm" by producing drugs and vaccines for the market, but the DOD had the right to priority access in the event of an emergency. During the pandemic, the DOD-contracted facility was seconded to produce a vaccine from Inovio.[31] The Inovio vaccine was never produced but it's unclear whether this counts as having many shots on goal for which some should be expected to miss or political support of an inefficient firm by political insiders (e.g. Gelles and Murphy 2020, Armstrong 2021). The DOD facility was also not large enough for civilian demand. Nevertheless, the DOD should be credited with foresight and designing the right structure of contract.

Shifting decision-making from physicians to political leaders whose primary responsibility is to the broader public welfare could lead to a more pragmatic approach. Informed by advisors such as military personnel trained in utilitarian reasoning—who face no role-conflict in exposing participants to risk—these leaders could better balance societal benefits against individual risks. Such a shift could increase the likelihood of employing HCTs when appropriate, potentially accelerating critical research and saving lives.

Changing the locus of decision-making on human challenge trials appears to be a modest change well within the realm of the politically possible.

2.5 A pandemic trust fund

Another peculiar aspect of the pandemic was that Operation Warp Speed, the most successful and highest benefit to cost program at fighting the pandemic, had difficulty securing funding (Mango 2022). Instead of being funded directly, Operation Warp Speed had to scrounge for funds from other programs.[32] The problem was not one of tight budgets per se. The US government spent over $5 trillion on pandemic response. Indeed, the US GAO (2023) estimates that on one program alone, the unemployment insurance program, the US spent $100–$135 billion in *fraudulent* payments. Another study found some $280 billion in fraudulent payments across all programs (Lardner et al. 2023). In comparison, Operation Warp Speed spent on the order of $15–$18 billion to produce trillions in value (Castillo et al. 2021).

[30] As noted in the introduction, the SARS-CoV-II virus killed more Americans than most wars. It doesn't seem useful to make a categorial distinction between natural attacks and attacks from other nations but it is also the case that viruses and bacteria could and have been engineered as military weapons which is yet another reason to situate pandemic response with the military.

[31] https://www.jpeocbrnd.osd.mil/Portals/90/fact-sheet_adm.pdf.

[32] In reporting on the movement of such funds the NYTimes argued that the Trump administration "is favoring development of vaccines over treatments for the sickest patients" with the clear implication that the Trump administration was taking risky bets at the expense of dying patients. See https://www.nytimes.com/2020/06/19/health/coronavirus-lung-treatment-funding.html.

The problem wasn't the budget per se but rather that there were a) few pre-authorized funds for a new program like Operation Warp Speed and b) no big constituencies for a new program. Since there were no pre-authorized funds, OWS had to engage in creative accounting and legal interpretation to authorize funds. Moreover, every dollar sent to OWS was seen by someone as a dollar less for their program.[33] In contrast, a program like unemployment insurance could easily be ramped to the tune of $700 billion because the funding was automatic (adding to debt) and because unemployment insurance was popular and easily understood.

As another example, some $60 billion was spent on special programs to pay furloughed pilots, flight attendants, and other airline staff as travel demand plummeted. Why? One factor was that the airlines were already well organized and politically active. The airlines, for example, spent over one hundred million dollars on lobbying in the year *before* the pandemic (Evers-Hillstrom 2020). During the pandemic, the airlines were also joined in their lobbying efforts by the airline unions making for a politically powerful team on both sides of the aisle. The lines of power were also well defined. The airlines knew, for example, which members of Congress sat on the requisite committees and what they needed.

In contrast, OWS was a new program with few concentrated interest groups and no previous lobbying efforts. Although some of the vaccine manufacturers understood lobbying, there was no locus of support in Congress because committee responsibilities for a program like OWS had not been established. OWS was run primarily out of the executive and the DOD. The program was also controversial[34] from the beginning and any lobbying at the time from the vaccine manufacturers would have been highly scrutinized.

The lesson from political economy is that we do not want emergency funds to be drawn, or to be perceived to be drawn, from other programs. Pre-approved legal authority to spend is necessary to quickly address a low-probability, high-cost emergency.[35] One way to do this would be to establish a Pandemic Trust Fund (PTF) nominally composed of say $250 billion in US government bonds.

The PTF would be something of an accounting fiction, similar to the Social Security Trust Fund, but accounting fictions can have real effects. Accounting fictions are like Schelling points that tell political agents who has property rights to what funds in what circumstances. By clearly denoting pandemic spending rights, a pandemic trust fund would avoid budget battles in the event of a pandemic. At $250 billion and 3% interest, a PTF could also generate annual revenues of $7.5 billion for ongoing pandemic spending. Some of this spending would be wasted but sausages and legislation both require pork as an input.

A pandemic trust fund is probably the biggest "ask" of political reform but note that it was designed to have no implications for spending today thus helping to ease the costs of adoption.

[33] See Mango (2022) for a discussion of both of these points and note again https://www.nytimes.com/2020/06/19/health/coronavirus-lung-treatment-funding.html.

[34] Elizabeth Warren, for example, accused Moncef Slaoui of corruption and argued that he should be fired. Many interest groups were worried about pharmaceutical "profiteering," e.g. the group Profits over Pharma. See, https://thehill.com/policy/healthcare/508619-2-billion-vaccine-deal-with-pfizer-raises-pricing-concerns/.

[35] In this section I draw upon Tabarrok (2020).

2.6 Private–public partnerships to deal with emergencies

One problem common to many disasters is the tragedy of the anti-commons, where too many agencies have the power to deny actions, leading to paralysis. Sobel and Leeson (2006) highlight that government agencies often oversee other agencies, creating layers of bureaucracy with overlapping powers. They cite Louisiana Governor Kathleen Blanco who lamented during Hurricane Katrina relief efforts that "[n]o one, it seems, even those at the highest level, seems to be able to break through the bureaucracy."

The UK COVID-19 Inquiry (2024) concurs in this judgment noting:

> …There were too many entities, groups, sub-groups, committees and sub-committees involved with preparedness and resilience. Work was being done by multiple entities at the same time. As is apparent from the 'spaghetti diagrams' and the entities described above, there were a large number of institutions, structures and systems that purported to govern and operate to prepare and build resilience across the UK, and yet there was an overlap between their roles and an absence of clarity about the division of responsibilities.

Thus, in the aftermath of an inadequate government response to an emergency, we often hear calls to reorganize and streamline processes and to establish a single authority with clear responsibility and decision-making power to overcome bureaucratic gridlock. By centralizing authority, it is argued that the government can respond more swiftly and effectively, reducing the inefficiencies caused by a fragmented system.

Yet, the tragedy of the anti-commons was also cited to explain the failure of the government after 9/11. Indeed, the Department of Homeland Security was created to centralize a fragmented system and allow it to act with alacrity. Isn't a pandemic a threat to homeland security?[36] And what about the Swine Flu pandemic of 2009? While not nearly as deadly as the COVID pandemic, 60 million Americans were sickened, some 274 thousand hospitalized with over 12 thousand deaths (Shresha et al. 2011). Wasn't this enough practice to act swiftly?

Rather than advocating for a reorganization of bureaucracies, I propose accepting the tragedy of the anti-commons as an inevitable reality.[37] The tragedy of the commons is an equilibrium outcome of modern-day bureaucracy. Bureaucracy has its reasons and some of those reasons may even be reasonable (Wittman 1995). It is too much to expect the same institution to respond to the ordinary demands of day-to-day politics and to the very different demands of emergencies. Indeed, when an institution evolves to meet the demands of day-to-day politics it inevitably develops culture, procedures and processes that are not optimized for emergencies.

Instead of rearranging organization charts we should focus on what has proven effective: the creation of ad-hoc, temporary, public–private organizations. Two notable examples are Operation Warp Speed in the United States and the British Vaccine Taskforce. These entities were established quickly and operated outside regular government channels, free from the typical procurement, hiring, or oversight rules that hinder standard bureaucracies.

[36] COVID might even have been created in a foreign lab.

[37] At least in the same sense as we accept all political actors are knaves as inevitable, i.e. a prudent assumption (Hume 1742).

Operation Warp Speed, a partnership between the U.S. government and private companies, bypassed traditional bureaucratic constraints and facilitated rapid decision-making, resource deployment, and adaptation to changing circumstances, leading to the swift delivery of vaccines to the public (Tabarrok 2025). Similarly, the British Vaccine Taskforce successfully coordinated efforts between the government, academia, and industry to accelerate vaccine development and distribution in the UK. This task force's ability to operate outside the usual bureaucratic framework allowed it to move quickly and leverage diverse expertise and resources that would have been stifled under normal government procedures.

Operation Warp Speed exemplified the "American Model" of emergency response. Rather than relying on command-and-control or government production, the American Model leverages the tremendous purchasing power of the US government with the agility and innovation of the private sector.[38]

The only problem with the "American Model" was its inconsistent application. Operation Warp Speed was initially conceived by Robert Kadlec, a physician and Air Force officer with extensive knowledge of pandemic preparation, and Peter Marks, an unusually innovative and risk-tolerant director of the FDA's Center for Biologics Evaluation and Research. It received strong support from Alex Azar, the head of HHS and former president of Eli Lilly US, who understood the pharmaceutical industry and how to incentivize it effectively. Mark Esper at the DOD also backed the initiative, providing the necessary manpower and logistical expertise. President Donald Trump was open to experimenting with what was perceived as a high-risk, untested approach to vaccine development. This fortunate alignment of the right people at the right time made Operation Warp Speed possible. Without this unique combination, Operation Warp Speed would not have occurred. Notably, there was no Operation Warp Speed for masks or for rapid tests until very late in the pandemic.

More broadly, responding to a pandemic requires mobilizing resources and knowledge across an entire society. One of the most consequent errors of the early pandemic was that the FDA and the CDC made it more difficult for private organizations to develop COVID tests. The FDA used its emergency powers to put new restrictions on lab-developed tests. The CDC initially proclaimed that only they could test for COVID and, even after botching their own test, they demanded that private labs respect their "intellectual property" to the test, requiring weeks of legal negotiations (Gottlieb 2021). Most importantly, the CDC never had a plan for widespread testing. Widespread testing could only occur by engaging the private labs. Even absent the botched test, the CDC had nowhere near enough capacity to deliver tests to the country, but the CDC was allergic to engaging with the private labs.

The vaccine distribution system also showed the value of engaging, or at the very least not preventing the engagement, of private actors. Operation Warp Speed ended when the vaccines were delivered to the states. Distribution at that point became illegible. No one knew which pharmacies and distribution locales had the vaccine and as people called pharmacy after pharmacy the system broke down under what was equivalent to DDOS attack. Thus, demand could not find supply (McKenzie 2022).

[38] The ultimate example of the American model is when the United States, still emerging from the Great Depression, built the 'arsenal of democracy.' Led by William Knudsen, President of General Motors, mass manufacturing techniques and private enterprise were applied to produce planes, tanks, and munitions in quantities far exceeding those of every other economy, even as U.S. private consumption continued to rise (Herman 2013).

Into the void of distribution stepped private groups such as VaccinateCA, a quickly formed group of technologists who created a website so that patients could find a pharmacy with the vaccine near them for which they were eligible (McKenzie 2022, Kaplan 2021; Otterman 2021). Beginning in CA, VaccinateCA became within months the primary source of vaccine distribution information in the United States, essentially a shadow data infrastructure for the US vaccination effort.

Thus, the recommendation from political economy for emergency response is to embrace the creation of nimble, temporary organizations, free from the ordinary rules of bureaucracy on hiring and procurement. And then kill them after the emergency is over.

3 Discussion

The first part of this article documented political failures that inhibit optimal pandemic preparation. The second part of the article advocated for a list of policies to improve pandemic preparation. It is thus important to discuss whether the advocated for policies are realistic given the inevitable political failures.

A major political failure during the pandemic was the slow response, driven by political inertia, fear of errors in an environment of limited information, and challenges in forecasting exponential growth. We can summarize these as recognition lag and decision lag.

Wastewater surveillance and prediction markets help mitigate recognition and decision lags by delivering earlier and broader access to critical information. Both aspects are important: improving the signal-to-noise ratio speeds recognition, while wider dissemination reduces effective decision lag by alerting many decision makers, both private and public, instead of siloing information in slow-moving bureaucracies.

It is also notable that both programs are cheap, thus reducing the ask from political authorities.

Vaccines were by far the most successful tool to address the pandemic. Vaccines saved upwards of 20 million lives worldwide. Vaccines were also the most important tool to end the lockdowns and closures, among the most controversial of the other policies designed to address the pandemic.[39] Thus, anything that can be done to reduce the implementation lag of vaccines has very high value. Developing vaccine libraries is an obvious way to reduce implementation lag. Moreover, the cost is not high, scientists are eager to do this kind of work, and there is a lobby for science funding from both scientists and vaccine firms. Thus, developing vaccine libraries appears well within the political frontier of what is possible.

Human Challenge Trials would also have reduced the implementation lag of delivering vaccines. Here, following public choice insights, I suggest changing the locus of decision-making from individual researchers upon whom the costs of HCTs are concentrated to a political actor who responds to more diffused and widespread benefits. Assuming the analysis is correct, this seems politically feasible as there are no interest groups with strong preferences about the locus of decision-making on human challenge trials. Moreover, there is a long history of military involvement in vaccine trials and a significant history of this kind of decision-making being made by political actors in emergency situations.

The final two recommendations are a pandemic trust fund and greater use of public–private partnerships during emergencies. The trouble here is not that these recommendations

[39] This paper is not the place to address vaccine mandates but for a variety of reasons including personal liberty considerations and blowback, I would not support vaccine mandates.

are politically infeasible but rather that they would be adopted and used too often. A pandemic trust fund would have eased the hurdles to spending on a new emergency program like Operation Warp Speed. Note that the ask here is to reduce transaction costs rather than advocating for big new programs. Operation Warp Speed was not an expensive program relative to other pandemic spending. The key risk is that the definition of "emergency" would be diluted, leading to premature depletion of the fund.

Similarly, greater reliance on public–private partnerships in emergencies carries risks. Operation Warp Speed succeeded in part because it was implemented and disbanded quickly. However, loosening safeguards such as contracting oversight, which made the program agile, could lead to corruption and abuse if such mechanisms become routine (Tabarrok 2025).

Safeguarding the integrity of the term "emergency" is crucial to avoid these negative outcomes. It should be noted that many interests stand to be harmed by the declaration of an emergency. A declaration of an emergency, for example, makes firms subject to the Defense Production Act. These costs do provide some limit on the declaration of an emergency. Nevertheless, I do not claim to have a solution for such problems but given the extreme costs of an emergency, such as a pandemic, it seems worthwhile to make some efforts in this direction.

4 Conclusions

The COVID-19 pandemic exposed critical weaknesses in global health crisis response, rooted in political myopia, misunderstanding of exponential growth, fear-induced inaction, and bureaucratic gridlock. These issues stem from fundamental political and economic incentives that are unlikely to change.

Rather than attempting to reshape entrenched bureaucracies or alter political incentives, the proposed solutions work within existing constraints. Widespread wastewater surveillance provides early warning without requiring ongoing political attention. Prediction markets surface information that is may be dispersed and otherwise hidden. A pre-developed vaccine library leverages current research funding to create future benefits at low marginal cost. Human challenge trials can be approved and designed in advance by political actors who have greater incentives to cater to diffuse public interests and more familiarity with the utilitarian ethos than individual researchers worried about personal discomforts. A dedicated Pandemic Trust Fund creates a Schelling point for resource allocation, reducing political battles during crises. Temporary public–private partnerships like Operation Warp Speed allow for rapid, flexible responses outside normal bureaucratic channels.

These approaches sidestep the need for sustained political will or bureaucratic reform. Instead, they create systems that can act swiftly and effectively when needed, regardless of the prevailing political climate. By accepting and working within political realities, we can build a more resilient global health infrastructure capable of responding rapidly to future pandemics, potentially saving millions of lives and trillions in economic damage.

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