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Toward a More Strategic National Stockpile

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TOWARD A MORE STRATEGIC NATIONAL STOCKPILE

by: Troy A. Rule*

ABSTRACT

The COVID–19 pandemic exposed major deficiencies in the United States’ approach to stockpiling for emergencies. States, cities, and hospitals across the country had meager inventories of critical medical items on hand when the pandemic first reached U.S. soil, and the federal government’s Strategic National Stockpile proved far too small to serve the country’s needs in the first several months of the crisis. As nationwide shortages spread, many state governments were compelled to bid against each other to procure scarce medical supplies—a distribution approach that disadvantaged low-income and minority communities and left countless healthcare professionals and staff ill-equipped to protect themselves against a deadly virus. These severe supply shortages, which hindered the country’s early pandemic response, have since generated an unprecedented push to reform the nation’s stockpiling policy structure. This Article uses a simple cost-benefit model to highlight shortcomings in the existing U.S. stockpiling policy regime and to identify specific avenues for addressing them. Among other things, U.S. stockpiling policies need to better account for important differences in the rotatability of supplies and should incentivize more private stockpiling of the most rotatable emergency items. Targeted reforms of commandeering laws and price-gouging restrictions could further strengthen private incentives to stockpile and may even help to clarify how states and the federal government share responsibilities in the nation’s stockpiling effort. And much more federal support is needed to incentivize the build-out and maintenance of domestic supply chains for the least-rotatable emergency goods. Such tailoring of policies and programs to better fit the unique attributes of stockpiling activities can help ensure the nation is far better equipped to respond the next time disaster strikes.

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I. INTRODUCTION

Inadequate stockpiles of certain medical items within the United States greatly hindered the nation’s initial response to the novel coronavirus (“COVID–19”) pandemic. In particular, nationwide shortages of N95 respirator face masks, disposable gloves and gowns, and other personal protective equipment (“PPE”) made it difficult for healthcare professionals across the United States to fully protect themselves while treating infected patients.¹ For the country’s heroic frontline medical workers, the impacts of these shortages were devastating: During the pandemic’s first year, the virus claimed the lives of more than 3,600 U.S. doctors, nurses, and other healthcare staff with a large percentage of those deaths occurring within the first three months of the outbreak.²

The medical supply shortages that plagued the United States during early stages of the COVID–19 pandemic exposed major shortcomings in the country’s approach to stockpiling emergency goods. Stockpiled supplies can be vital not only during pandemics but also during a wide array of other potential national emergencies, including natural disasters, chemical or biological attacks, and military conflicts. And although the Strategic National Stockpile, the Defense Production Act, and certain other existing federal policies aided the nation’s response to COVID–19, these tools also clearly fell short in multiple ways. As the United States struggles to emerge from a devastating pandemic while also facing mounting climate change impacts and rising geopolitical instability, the need for more cost-effective and dependable stockpiling policies has never been greater. Fortunately, there are affordable ways to improve the U.S. stockpiling structure so that the country is far better equipped for future emergencies.

This Article uses a simple abstract cost-benefit model to analyze the current U.S. stockpiling policy regime and to identify specific strategies for reforming it. Part II of this Article gives a detailed overview of existing stockpiling-related policies within the United States. Part III describes how deficiencies in this policy regime have impaired the nation’s response to the COVID–19 pandemic. Part IV sets forth and

1. *See Our Key Findings About US Healthcare Worker Deaths in the Pandemic’s First Year*, GUARDIAN (Apr. 8, 2021, 8:59), <https://www.theguardian.com/us-news/ng-interactive/2020/dec/22/lost-on-the-frontline-our-findings-to-date> [<https://perma.cc/BDF3-68W8>] [hereinafter *Deaths in the Pandemic’s First Year*].

2. *See id.*

applies a basic cost-benefit model for stockpiling activities to highlight specific defects in the country's existing stockpiling structure. Part V then argues that the enactment of a new federal stockpiling tax credit program and certain changes to existing commandeering laws could affordably address many of these deficiencies. By strengthening incentives for cities, states, and businesses to voluntarily assist in the national stockpiling effort, such reforms could enable the United States to cost effectively sustain a much more robust and reliable stockpiling system.

II. A PRIMER ON U.S. STOCKPILING POLICIES

Stockpiling—the accumulation of large reserves of goods to guard against major supply or demand shocks—is seldom spotlighted in the legal academic literature but has been practiced for centuries in nations across the world. In the United States, the evolution of stockpiling policies has largely been reactive: The country's greatest stockpiling policy advancements have occurred in the wake of national crises when shortages of certain goods have inflicted widespread harms. As devastating as the COVID-19 pandemic has been, it has generated another such opportunity for the country to take major steps forward in stockpiling policy.

Human civilizations have been collaboratively storing food or other goods for emergency use for thousands of years.³ One of the most familiar accounts of ancient stockpiling appears in the biblical story of Joseph of Egypt. After Joseph interpreted the Pharaoh's dream as foretelling seven years of plentiful harvests followed by seven years of famine, the Pharaoh appointed Joseph to oversee an ambitious grain stockpiling initiative that ultimately spared countless lives.⁴ The ancient Chinese had also established an elaborate food reserve system by 54 B.C.,⁵ some of which eventually inspired similar food stockpiling initiatives in the United States.⁶

Stockpiling is inherently at odds with the efficiency-driven, lean-inventory mindset of modern corporate America, which is precisely why stockpiling policies are more crucial now than ever before. Most manufacturers today rely on complex supply chains to source materials

3. For an insightful primer on the history of stockpiling and theories about its possible impacts on the emergence of human civilizations and its continued importance as a buffer against economic and societal disruptions, see generally Andreas Folkers, *Freezing Time, Preparing for the Future: The Stockpile as a Temporal Matter of Security*, 50 *SEC. DIALOGUE* 493, 493 (2019).

4. See *Genesis* 41:1–57.

5. Derk Bodde, *Henry A. Wallace and the Ever-Normal Granary*, 5 *FAR E.Q.* 411, 413 (1946).

6. For a description of how the ancient Chinese influenced Henry Wallace's development of the "Ever-Normal Granary" program during the Depression Era, see *infra* discussion accompanying notes 12–15.

from hundreds or even thousands of suppliers from across the world,⁷ and many parties along those elaborate chains strive to avoid keeping excess inventories on hand to maximize profits.⁸ However, as the COVID-19 pandemic's severe shortages have shown, this increasingly international, penny-pinching corporate culture can also make the nation much more vulnerable during major crises. Reshaping laws to adapt to these societal shifts is possible but first requires a basic grasp of the history and present landscape of U.S. stockpiling policy.

A. Federal Stockpiling Programs: A Historical Perspective

The U.S. government has been stockpiling large quantities of emergency goods for less than a century, and its commitment to stockpiling has waxed and waned dramatically across that short period. Unfortunately, the federal government's lukewarm stockpiling efforts over the years have been far better than those of most states and local governments. The following subsections outline the evolution and primary features of stockpiling programs in the United States, which today cover a diverse array of essential materials and supplies.

1. Evolving Stockpiles of Military Equipment, Food, and Oil

The U.S. government first began substantially stockpiling goods in the 1920s as part of a new military readiness strategy after the nation suffered under devastating shortages of certain materials during World War I.⁹ Then, in 1939, Congress built significantly upon that initial stockpiling effort by enacting the "Strategic Materials Act," which allocated \$100 million toward the development of a national store of critical wartime production materials—an initiative that continues today through the National Defense Stockpile.¹⁰ Among other things, this massive stockpile holds more than \$1 billion in rare metals critical to the manufacture of various military items.¹¹

7. Leonard Read's famous essay, *I, Pencil: My Family Tree as Told to Leonard E. Read*, masterfully describes the remarkable coordinating power of modern capitalistic markets. See generally Leonard E. Read, *I, Pencil: My Family Tree as Told to Leonard E. Read*, FREEMAN, Dec. 1958, at 32.

8. Even end-users such as hospitals have increasingly embraced just-in-time inventory methods to increase profits in recent years. See Chuck Green, *Hospitals Turn to Just-in-Time Buying to Control Supply Chain Costs*, HEALTHCARE FIN. (May 6, 2015), <https://www.healthcarefinancenews.com/news/hospitals-turn-just-time-buying-control-supply-chain-costs> [<https://perma.cc/C8PF-CZ5W>].

9. COMM. ON ASSESSING THE NEED FOR A DEF. STOCKPILE, NAT'L RSCH. COUNCIL, *MANAGING MATERIALS FOR A TWENTY-FIRST CENTURY MILITARY* 133 (2008) (describing establishment of the War Department's Army and Navy Munitions Board in 1922).

10. *Id.* at 134.

11. See *Strategic Materials*, DEF. LOGISTICS AGENCY, <https://www.dla.mil/HQ/Acquisition/StrategicMaterials/About/OurOffices/> [<https://perma.cc/KAH7-92VB>] (describing how the Defense Logistics Agency Strategic Materials provides "sound stewardship" for the National Defense Stockpile by storing "[forty-two] commodities with a current market value of over \$1.1 billion," which includes "zinc, cobalt, and

Although the U.S. government has also maintained vast reserves of grain and other food commodities for most of the past century, it recently ended its storage of food reserves. The country's first major governmental food storage program—the “Ever-Normal Granary”—was conceived during the Great Depression Era by Henry A. Wallace, who served as the Secretary of Agriculture under President Franklin D. Roosevelt.¹² Secretary Wallace attributed his inspiration for the national granary to the Chinese, who had first instituted a similar grain storage program almost two millennia earlier.¹³ The enormous grain reserves of the Ever-Normal Granary were thought of as a tool for stabilizing food commodity prices and thus were not primarily used for protection against emergency shortages.¹⁴ Nonetheless, supplies stockpiled under the program proved extremely valuable during multiple national crises.¹⁵ Congress eventually replaced the Ever-Normal Granary with other food stockpiling programs, including the Food Security Wheat Reserve¹⁶ and then the Food Security Commodity Reserve.¹⁷ However, in the 1990s, Congress converted the nation's food reserve into the Bill Emerson Humanitarian Trust (“Trust”), a food aid program focused mainly on responding to crises overseas.¹⁸ And in 2008, the United States Department of Agriculture (“USDA”) sold off all remaining food in the Trust, leaving the nation today with no

chromium” as well as “more precious metals such as platinum, palladium, and iridium”); Anshu Siripurapu, *The State of U.S. Strategic Stockpiles*, COUNCIL ON FOREIGN RELS., <https://www.cfr.org/backgrounder/state-us-strategic-stockpiles> (June 15, 2020, 11:04 AM) [<https://perma.cc/NH32-DU5V>].

12. Joseph S. Davis, *The Economics of the Ever-Normal Granary*, 20 J. FARM ECON. 8, 8 (1938) (describing Henry Wallace's longtime interest in the idea of an ever-normal granary upon entering Roosevelt's cabinet and characterizing the idea as Wallace's “brain-child”).

13. See Bodde, *supra* note 5, at 411–13 (quoting a Henry Wallace letter stating that he first encountered the idea of an “ever-normal granary” when reading a doctoral thesis that described the use of such a system under that name in China in 54 B.C.).

14. See *id.* at 420–21 (listing the five functions of the Ever-Normal Granary program, which included “[p]romoting efficient production” and “[b]alancing the flow of market supplies”).

15. Harold F. Breimyer, *Agricultural Philosophies and Policies in the New Deal*, 68 MINN. L. REV. 333, 347 (1983) (noting that the “larger-than-normal stock” accumulated under the Ever-Normal Granary program “proved advantageous” during World War II and “in the mid-1970s when foreign countries purchased unprecedented amounts of our grain and cotton, emptying our larder”).

16. See Food Security Wheat Reserve Act of 1980, Pub. L. No. 96-494, 94 Stat. 2575 (codified as amended at 7 U.S.C. § 1736f-1).

17. See Food Security Commodity Reserve Act of 1996, Pub. L. No. 104-127, 110 Stat. 959 (codified as amended at 7 U.S.C. § 1736f-1).

18. 7 U.S.C. § 1736f-1; see generally *The Bill Emerson Humanitarian Trust*, USAID, <https://www.usaid.gov/news-information/fact-sheets/bill-emerson-humanitarian-trust> (Aug. 14, 2018) [<https://perma.cc/7YRP-DGSQ>] (“The Bill Emerson Humanitarian Trust . . . allows [the] Office of Food for Peace [] to respond to unanticipated food crises abroad, when other . . . resources are not available.”).

federal grain reserves—a vulnerability that has drawn scorn from some food security advocates.¹⁹

By contrast, the U.S. government is presently maintaining enormous petroleum reserves. Congress authorized the creation of the Strategic Petroleum Reserve (“SPR”) in the mid-1970s in the aftermath of the historically disruptive 1973 Arab Oil Embargo.²⁰ The SPR has an oil storage capacity of roughly 714 million barrels, which is kept in underground salt caverns along the Gulf Coast.²¹ This vast storage space was already nearly 90% full as of April 2020 with about 635 million barrels stored,²² and weakened oil demand during the COVID-19 pandemic only increased the U.S. oil reserves even further.²³ The national average price for unleaded fuel fell below \$2 per gallon in April 2020—a full dollar lower than just a year earlier—and at one point, futures contract prices for West Texas Intermediate oil even dipped briefly into negative territory.²⁴ In an effort to help relieve the supply glut, the Trump Administration went so far as to lease tens of millions of barrels of SPR storage capacity to nine private oil companies—a move that frustrated some industry groups that claimed it was an unfair subsidy that disadvantaged private petroleum storage

19. See Sue Kirchhoff, *Surplus U.S. Food Supplies Dry Up*, ABC NEWS (May 3, 2008, 10:15 AM), <https://abcnews.go.com/Business/story?id=4770135&page=1> [<https://perma.cc/M46L-DQ88>] (describing how a “coalition of religious and farm groups” had sent an “open letter to Congress . . . warn[ing] that low [food] supplies increase the risk of hunger and . . . calling for creation of a strategic grain reserve”).

20. See Off. of Fossil Energy, *Strategic Petroleum Reserve Frequently Asked Questions (FAQs)*, U.S. DEP’T ENERGY, <https://www.energy.gov/fe/services/petroleum-reserves/strategic-petroleum-reserve/spr-quick-facts-and-faqs> [<https://perma.cc/6NXY-CBME>]; see also *Oil Embargo, 1973–74*, OFF. HISTORIAN, <https://history.state.gov/milestones/1969-1976/oil-embargo> [<https://perma.cc/U9YN-PD4B>] (“The 1973 Oil Embargo acutely strained a U.S. economy that had grown increasingly dependent on foreign oil.”).

21. See PHILLIP BROWN, CONG. RSCH. SERV., STRATEGIC PETROLEUM RESERVE: RECENT DEVELOPMENTS, CONGRESS.GOV 1, <https://crsreports.congress.gov/product/pdf/IN/IN11373> (June 9, 2020) [<https://perma.cc/DX6Y-6GZH>]; Off. of Fossil Energy & Carbon Mgmt., *Strategic Petroleum Reserve: About the SPR*, U.S. DEP’T ENERGY, <https://www.energy.gov/fe/services/petroleum-reserves/strategic-petroleum-reserve> [<https://perma.cc/WE7Y-QT4J>].

22. See BROWN, *supra* note 21, at 1.

23. Grant Smith & Julian Lee, *Historic Oil Glut Amassed in the Pandemic Almost Gone*, BLOOMBERG: MKTS., <https://www.bloomberg.com/news/articles/2021-04-18/historic-oil-glut-amassed-during-the-pandemic-has-almost-gone> (Apr. 21, 2021, 2:25 AM) [<https://perma.cc/D7Z4-DPPG>].

24. See Peter Splendorio, *Gas Selling for Under \$1 per Gallon in 13 States as National Prices Plummet During Coronavirus Quarantines*, N.Y. DAILY NEWS (Apr. 19, 2020, 6:24 PM), <https://www.nydailynews.com/coronavirus/ny-coronavirus-gas-prices-20200419-6uvja5pxbvaxtozm4l3372aewy-story.html> [<https://perma.cc/WW5Q-55LG>]; Pippa Stevens, ‘Scary,’ ‘Visceral,’ ‘Unprecedented’: Traders Describe Oil’s Wild Week and Fall to Negative Prices, CNBC, <https://www.cnbc.com/2020/04/25/scary-visceral-unprecedented-traders-describe-oils-wild-week-and-fall-to-negative-prices.html> (Apr. 27, 2020, 9:17 AM) [<https://perma.cc/KZD6-ZWVC>].

companies.²⁵ These leases, together with the U.S. government's leasing of millions of barrels of space to the Australian government, brought the SPR very close to full capacity.²⁶

One unique element of the U.S. oil-stockpiling policy is its international commitment to maintain a certain minimum inventory level. For more than forty-five years, the United States has been a member of the International Energy Agency ("IEA"), a coalition of roughly thirty countries designed to promote a more secure global oil supply.²⁷ All IEA member countries have joined the "Agreement on an International Energy Programme," which obligates each member country to maintain a stockpile of oil equal "to at least [ninety] days of net oil imports."²⁸ After a major global oil supply shock, IEA members can assent to the coordinated release of stockpiled oil to alleviate shortages.²⁹ Interestingly, although some food security advocates have called for a similar global food reserve program, there is presently no international group akin to the IEA focused on preventing global shortages of food or medical supplies.³⁰

25. See Timothy Gardner, Laila Kearney & Laura Sanicola, *Nine Companies Rent U.S. Emergency Oil Reserve Space for 23 Mln Barrels: Official*, REUTERS, <https://www.reuters.com/article/us-global-oil-usa-spr/nine-companies-rent-23-million-barrels-worth-of-space-in-us-emergency-oil-reserve-official-idUSKBN22C03Q> (Apr. 29, 2020, 7:54 PM) [<https://perma.cc/HYB5-2WV9>] (quoting an industry group letter alleging that the Trump Administration's leasing of SPR space to private companies "constitutes a subsidized storage service that could place private commercial storage operators at a competitive disadvantage").

26. See Sonali Paul, *Australia to Spend \$60 Million Buying Oil to Store in U.S. Reserve*, REUTERS, <https://www.reuters.com/article/us-australia-oil/australia-to-spend-60-million-buying-oil-to-store-in-us-reserve-idUSKCN2240AA> (Apr. 21, 2020, 10:07 PM) [<https://perma.cc/K4JP-XD9J>].

27. See *Membership*, INT'L ENERGY AGENCY, <https://www.iea.org/about/membership> (Jan. 26, 2021) [<https://perma.cc/32HZ-XFAS>]; *United States*, MISSION INT'L ENERGY AGENCY, <https://www.iea.org/countries/united-states> [<https://perma.cc/G5SB-LDJM>]; INT'L ENERGY AGENCY, <https://www.iea.org/about/mission> (Nov. 26, 2020) [<https://perma.cc/EBF2-245N>].

28. See *Oil Security*, INT'L ENERGY AGENCY, <https://www.iea.org/areas-of-work/ensuring-energy-security/oil-security> (Nov. 27, 2019) [<https://perma.cc/JSE6-EAEU>].

29. See *id.*

30. *E.g.*, Corazon T. Aragon, *The United Nations Must Manage a Global Food Reserve*, U.N. CHRON., <https://www.un.org/en/chronicle/article/united-nations-must-manage-global-food-reserve> [<https://perma.cc/84PK-BHRP>] (describing certain regional rice reserve programs and arguing that climate change and reductions in agricultural land are creating a need for the United Nations to create and govern a regional or global food reserve). *But see* Pablo Arrocha Olabuenaga & H.E. Juan Ramón de la Fuente, *Mexico's Initiative to Ensure Global Access to Medicines, Vaccines and Medical Equipment to Face COVID19*, JUST SEC. (Apr. 29, 2020), <https://www.justsecurity.org/69916/mexicos-initiative-to-ensure-global-access-to-medicines-vaccines-and-medical-equipment-to-face-covid19/> [<https://perma.cc/M6AY-TJ66>] (describing a United Nations resolution to promote international cooperation during COVID-19 by "ensuring fair access to medicines, vaccines[,] and equipment, [and] preventing speculation and undue stockpiling that may hinder access to these essential materials").

2. Emergency Medical Supplies: The Strategic National Stockpile

Less than a quarter century ago, Congress finally added medical supplies to the federal government's list of significantly stockpiled items by authorizing the build-out of a reserve now known as the Strategic National Stockpile ("SNS"). The SNS traces its origins to a federal bioterrorism preparedness program instituted by the Clinton administration in the late 1990s.³¹ In 1999, the Centers for Disease Control and Prevention ("CDC"), operating under U.S. Department of Health and Human Services ("HHS") oversight, established and began managing the "National Pharmaceutical Stockpile"—a program focused primarily on storing medical items that would be critical for responding to a major biological attack.³²

Congress broadened the scope of the nation's medical supply stockpile shortly after the 9/11 terrorist attacks to cover a wider range of potential threats, and the stockpile's mission has gradually continued to expand since that time. Provisions in the Bioterrorism Response Act of 2002 and the Homeland Security Act of 2002 rebranded the program as the "Strategic National Stockpile."³³ Provisions in that legislation also expressly widened the scope of the program's mission, directing the SNS to provide "for the emergency health security of the United States, including the emergency health security of children and other vulnerable populations."³⁴ The SNS initially stockpiled mostly antitoxins, vaccines, antibiotics, nerve agent antidotes, and other highly specialized medicines that would be valuable if there were a major chemical, biological, radiological, nuclear, or explosive attack on U.S. soil.³⁵ Over time, however, the SNS began fulfilling increas-

31. See Ryan R. Kemper, *Responding to Bioterrorism: An Analysis of Titles I and II of the Public Health Security and Bioterrorism Preparedness and Response Act of 2002*, 83 WASH. U. L.Q. 385, 393–94 (2005).

32. *Id.* The Public Health Service Act has long authorized HHS to declare and assist in federal responses to public health emergencies. See Public Health Service Act, 42 U.S.C. § 247d.

33. See Kemper, *supra* note 31, at 394 n.43 (citing Public Health Security and Bioterrorism Preparedness and Response Act of 2002, Pub. L. No. 107-188, § 121, 116 Stat. 594, 611–13 (2002), and Homeland Security Act of 2002, Pub. L. No. 107-296, § 503(b), 116 Stat. 2135, 2213 (2002)).

34. Public Health Security and Bioterrorism Preparedness and Response Act of 2002, Pub. L. No. 107-188, § 121, 116 Stat. 594, 612 (2002); see also Lindsay F. Wiley, *Adaptation to the Health Consequences of Climate Change as a Potential Influence on Public Health Law and Policy: From Preparedness to Resilience*, 15 WIDENER L. REV. 483, 503 (2010) ("Notably, Congress gave the SNS a considerably broader mission than the [National Pharmaceutical Stockpile] . . .").

35. NAT'L BIODEFENSE SCI. BD. & OFF. OF PUB. HEALTH PREPAREDNESS & RESPONSE BD. OF SCI. COUNS., *ANTICIPATED RESPONSIBILITIES OF THE STRATEGIC NATIONAL STOCKPILE (SNS) IN THE YEAR 2020: AN EXAMINATION WITH RECOMMENDATIONS*, U.S. DEP'T HEALTH & HUM. SERVS. 1, <https://www.phe.gov/Preparedness/legal/boards/nbsb/recommendations/Documents/nbsb-bsc-sns-2020-final.pdf> [<https://perma.cc/K52B-P5DD>]; Nell Greenfieldboyce, *Why Even a Huge Medical Stockpile Will Be of Limited Use Against COVID-19*, HOUS. PUB. MEDIA (Mar. 15, 2020, 11:39 AM), <https://www.houstonpublicmedia.org/npr/2020/03/15/>

ingly vital roles in federal responses to other types of emergencies, including hurricanes, earthquakes, and outbreaks of viruses such as H1N1, Ebola, and the Zika virus.³⁶ As the mission of the SNS changed, its burgeoning inventory of more than 1,000 different types of medical supplies also evolved to include significantly more non-pharmaceutical goods, including greater quantities of PPE.³⁷

When COVID-19 reached the United States in early 2020, a handful of undisclosed and presumably guarded warehouses throughout the country housed much of the federal government's \$8 billion SNS inventory.³⁸ A small fraction of the SNS's inventory has long been stored in "push packages"—fifty-ton collections of life-saving items that are supposedly capable of being delivered to any part of the U.S. within twelve hours.³⁹ Most of the remaining inventory is stored by the SNS directly or by private vendors or manufacturers under government contracts.⁴⁰ According to one report, a substantial proportion

814121891/why-even-a-huge-medical-stockpile-will-be-of-limited-use-against-covid-19/ [https://perma.cc/TM5C-6VYR].

36. Greenfieldboycce, *supra* note 35; Shannon Pettypiece, *Trump's Use of Medical Stockpile Veers from Past Administrations, Leaving States in the Lurch*, NBC NEWS, <https://www.nbcnews.com/politics/white-house/trump-s-use-medical-stockpile-veers-past-administrations-leaving-state-n1177786> (Apr. 6, 2020, 6:59 PM) [https://perma.cc/ZV9Y-M8PF].

37. See Farhad Manjoo, *How the World's Richest Country Ran Out of a 75-Cent Face Mask*, N.Y. TIMES (Mar. 25, 2020), <https://www.nytimes.com/2020/03/25/opinion/coronavirus-face-mask.html> [https://perma.cc/4TY5-WP5Z] (noting that Congress approved funding in 2006 to add tens of millions of N95 masks and other PPE to the SNS); Lena H. Sun, *Inside the Secret U.S. Stockpile Meant to Save Us All in a Bioterror Attack*, WASH. POST (Apr. 24, 2018, 5:00 AM), <https://www.washingtonpost.com/news/to-your-health/wp/2018/04/24/inside-the-secret-u-s-stockpile-meant-to-save-us-all-in-a-bioterror-attack/> [https://perma.cc/W7T6-BCES] (reporting that the SNS "inventory exceeds 1,000 categories of drugs and other items").

38. Nell Greenfieldboycce, *Inside a Secret Government Warehouse Prepped for Health Catastrophes*, NPR (June 27, 2016, 4:56 AM), <https://www.npr.org/sections/health-shots/2016/06/27/483069862/inside-a-secret-government-warehouse-prepped-for-health-catastrophes> [https://perma.cc/5LKC-GDVP] ("The location of these warehouses is secret. How many there are is secret. (Although a former government official recently said at a public meeting that there are six.) And exactly what's in them is secret."); Melissa Quinn, *What You Need to Know About the Strategic National Stockpile*, CBS NEWS (Apr. 7, 2020, 4:17 PM), <https://www.cbsnews.com/news/q-a-with-greg-burel-former-director-of-the-strategic-national-stockpile/> [https://perma.cc/8PEA-WS9G] (quoting former SNS director Greg Burel as describing the stockpile as an "\$8 billion inventory of various materials, including things like antibiotics, antitoxins, antidotes, vaccines, medical surgical material, [and] federal medical stations" as well as "ventilators and other products").

39. Don Reisinger, *What's in the Strategic National Stockpile, the US Reserve of Life-Saving Materials Stashed in Secret Warehouses That Experts Worry Isn't Big Enough*, BUS. INSIDER (Apr. 14, 2020, 4:40 PM), <https://www.businessinsider.com/strategic-national-stockpile-location-items-inside-history-size-2020-4> [https://perma.cc/EF2S-W3ZM].

40. Chem. Hazards Emergency Med. Mgmt., *Strategic National Stockpile*, U.S. DEPT HEALTH & HUM. SERVS., <https://chemm.nlm.nih.gov/sns.htm> (Oct. 7, 2021) [https://perma.cc/SUA2-ZNV4]; STEPHEN D. PRIOR, NAT'L SEC. HEALTH POL'Y CTR., WHO YOU GONNA CALL?: RESPONDING TO A MEDICAL EMERGENCY WITH THE

of the stockpile is in “vendor managed inventor[ies]” that are “under the control and management of selected, pre-qualified vendors” and “designed to arrive [twenty-four to thirty-six] hours after SNS deployment,” suggesting that often the SNS does not physically possess supplies that respond to certain threats.⁴¹ However, the agency does maintain ownership of even these third-party-managed inventory items.⁴²

In the decade preceding the COVID-19 outbreak, SNS inventories for certain key stockpile items slowly depleted as funding flattened and the federal government deployed SNS supplies for emergencies but never restocked them. For instance, even though the SNS distributed large quantities of PPE and other pandemic-related emergency supplies in response to the 2009 H1N1 outbreak, Congress never appropriated funding to replace items used in that effort.⁴³ In fact, from 2010 to 2018, federal appropriations for the SNS hovered between \$477 and \$596 million even though the SNS distributed tens of millions of dollars’ worth of supplies in response to multiple disasters during those years.⁴⁴

B. Spotty State-Level Stockpiling

Although state governments tend to be much better than the federal government at stashing away cash for rainy days,⁴⁵ most states have historically been relatively poor stockpilers of essential goods.

STRATEGIC NATIONAL STOCKPILE, DEF. TECH. INFO. CTR. 4 (June 2004), <https://apps.dtic.mil/dtic/tr/fulltext/u2/a476356.pdf> [<https://perma.cc/34S7-4CMK>].

41. PRIOR, *supra* note 40, at 4.

42. See Chem. Hazards Emergency Med. Mgmt., *supra* note 40.

43. Quinn, *supra* note 38.

44. See Dinah Voyles Pulver & Erin Mansfield, *Rare Look at Stockpile Handouts Shows Which States Got Ventilators, Masks Amid Coronavirus*, USA TODAY, <https://www.usatoday.com/story/news/investigations/2020/04/10/rare-look-stockpile-shows-which-states-got-supplies-amid-covid/5126900002/> (Apr. 10, 2020, 11:23 AM) [<https://perma.cc/37DP-XRCN>] (reporting that the “stockpile’s budget reached a high of \$596 million in 2010, then dropped year after year until reaching a low of \$477 million in 2013” and that although “[m]uch of the funding was restored the following year, . . . the budget stayed flat at about \$575 million through 2018”).

45. See Jared Walczak & Janelle Cammenga, *State Rainy Day Funds and the COVID-19 Crisis*, TAX FOUND. (Apr. 7, 2020), <https://taxfoundation.org/state-rainy-day-funds-covid-19/> [<https://perma.cc/48P8-K7RV>] (detailing the revenue stabilization funds of U.S. states, which had balances with a median of 8% of states’ general fund expenditures as of early 2020). In contrast, the U.S. government has not balanced its budget for nearly two decades and had accumulated debts exceeding \$26 trillion by June 2020. Joseph Zeballos-Roig, *The National Debt Tops \$26 Trillion for the First Time as the Federal Government Ramps Up Coronavirus Relief Spending*, BUS. INSIDER (June 14, 2020, 7:30 AM), <https://www.businessinsider.com/national-debt-total-trillion-record-federal-government-coronavirus-spending-2020-6> [<https://perma.cc/64C9-CDED>]; Jim Dexter, *CNN Fact Check: The Last President to Balance the Budget*, CNN: POL. TICKER (Feb. 3, 2010, 4:36 PM), <https://politickerticker.blogs.cnn.com/2010/02/03/cnn-fact-check-the-last-president-to-balance-the-budget/> [<https://perma.cc/635W-M5K3>].

Because responsibility for the national defense resides primarily with the federal government, states generally do not stockpile large amounts of military equipment. States also have not historically stockpiled much food or petroleum.

Numerous state governments in the United States do have a history of stockpiling some emergency medical items, although most of these state-level stockpiles were comparatively small and had been neglected in the years leading up to the COVID-19 outbreak. One 2008 report noted that there were “robust pharmaceutical stockpiles in many states” as of that time and that nearly half of states had “ordered [100%] of their calculated antiviral stockpile requirements for treatment of sick individuals.”⁴⁶ Over subsequent years, however, numerous state stockpiles gradually degraded to the point that by the time COVID-19 hit U.S. soil, many of these stockpiles consisted mostly of expired items the federal government had provided in response to the 2009 H1N1 influenza outbreak.⁴⁷ Facing budgetary constraints and a general lack of political support for large government expenditures to store medical items that may never get used, many states during the 2010s had increasingly allowed their stockpiles to wither and seemed content to rely simply on the federal government’s SNS for backup supplies if a major public health crisis were to ever arise.⁴⁸

C. *Shrinking Private Stockpiles and Growing Reliance on Foreign Supply Chains*

As government medical stockpiles languished in the years preceding the COVID-19 pandemic, hospitals’ and medical equipment vendors’ growing use of just-in-time inventory methods similarly depleted private stockpiles. Although there is very limited publicly available information regarding the inventories of U.S. hospitals and medical vendors,⁴⁹ those inventories have long been trending toward danger-

46. Chris Logan, *Pandemic Preparedness in the States: An Assessment of Progress and Opportunity*, NAT’L GOVERNOR’S ASS’N CTR. FOR BEST PRACS. 5 (Sept. 2008), https://transition.fcc.gov/pshs/docs/clearinghouse/best-practices/National_Governors_Association_PANDEMIC_ASSESSMENT_0809.pdf [https://perma.cc/8LCF-YRUF].

47. See David A. Lieb & Cuneyt Dil, *Review: State Stockpiles Were Depleted Before the Virus*, MERCURY NEWS, <https://www.mercurynews.com/2020/04/23/review-state-stockpiles-were-depleted-before-the-virus/> (Apr. 23, 2020, 3:33 PM) [https://perma.cc/ZSU9-7EGN] (reporting that a “review of more than [twenty] states found that before the coronavirus outbreak[,] many had at least a modest supply of N95 masks, gowns, gloves[,] and other medical equipment” but that those supplies “were often well past their expiration dates—left over from the H1N1 influenza outbreak a decade ago”).

48. See *id.* (quoting a New Hampshire state health commissioner as conceding that her state “very much rel[ie]d] on the national stockpile for anything more than . . . a week” of stockpiled supplies).

49. See Blake Farmer, *Coronavirus Pushes Hospitals to Share Information About Stocks of Protective Gear*, KAISER HEALTH NEWS (Mar. 13, 2020), <https://khn.org/>

ously low levels. Indeed, the potential pandemic-related risks associated with hospitals' increased use of just-in-time inventory methods were drawing criticism more than a decade before COVID-19 reached the United States.⁵⁰

The U.S. healthcare industry's vulnerability to major supply or demand shocks for essential goods is further aggravated by the fact that the supply chains for such items are increasingly international in scope. Tragically, the actual cost savings achieved by importing essential medical supplies rather than manufacturing them domestically are often modest at best.⁵¹

III. COVID-19'S IMPACT ON U.S. MEDICAL STOCKPILES

After under-prioritizing its medical stockpiles for decades, the United States was abruptly forced to rely on them in early 2020 as COVID-19 spread rapidly throughout the country. For weeks, numbers of confirmed coronavirus cases, hospitalizations, and deaths rose exponentially in many parts of the United States.⁵² Because COVID-19 is highly contagious, N95 respirator masks, disposable gloves, face shields, isolation gowns, and other PPE are critical means of protecting healthcare professionals working near infected patients.⁵³ Ventilators and related supplies are also crucial for treating the debilitating respiratory symptoms associated with the disease.⁵⁴

news/coronavirus-pushes-hospitals-to-share-information-about-stocks-of-protective-gear/ [https://perma.cc/SUX9-VNCM] (noting that “no one knows what, beyond [the SNS], is available in the private sector” and that “[t]he issue is getting hospitals comfortable sharing information about their preparedness—information that, until now, they have considered confidential”). The CDC has funded a project to develop a nationwide hospital inventory tracking system accessible to CDC officials that would help address this data gap. *See id.*

50. See Bernard Wysocki Jr. & Sarah Lueck, *Just-in-Time Inventories Make U.S. Vulnerable in a Pandemic*, WALL ST. J. (Jan. 12, 2006, 12:01 AM), <https://www.wsj.com/articles/SB113703203939544469> [https://perma.cc/G3VE-CT2T].

51. See Lauren Feiner, *States Are Bidding Against Each Other and the Federal Government for Important Medical Supplies—and It's Driving Up Prices*, CNBC, <https://www.cnbc.com/2020/04/09/why-states-and-the-federal-government-are-bidding-on-ppe.html> (Apr. 11, 2020, 8:44 AM) [https://perma.cc/E4FP-8WPC] (quoting Stanford medicine and economics professor Kevin Schulman, who stated that often U.S. companies save only “pennies . . . by going to international suppliers” for medical masks and similar equipment).

52. For detailed and up-to-date information on the spread of COVID-19 cases and deaths throughout the United States and throughout the world, see *Cumulative Cases*, JOHN HOPKINS U. & MED.: CORONAVIRUS RES. CTR., <https://coronavirus.jhu.edu/data/cumulative-cases> (June 17, 2021, 6:49 AM) [https://perma.cc/LSV9-UW5Q].

53. See *COVID-19: Control and Prevention*, OCCUPATIONAL SAFETY & HEALTH ADMIN., <https://www.osha.gov/SLTC/covid-19/controlprevention.html> [https://perma.cc/5JLY-9HYM].

54. A federal executive order and corresponding HHS notice prohibiting the hoarding of certain COVID-19-related supplies applied, among other things, to “Ventilators . . . ventilator tubing connectors, and ventilator accessories.” See Exec. Order No. 13910, 85 Fed. Reg. 17,001 (Mar. 23, 2020); see also Notice of Designation of

And nasopharyngeal swabs were essential in early 2020 for the most well-developed forms of virus testing at that time.⁵⁵ Accordingly, demand for these and certain other medical items spiked dramatically in early 2020 as COVID-19 hospitalizations escalated across the nation.

A. *Crippling Shortages and Soaring Prices*

When hospitals, state governments, municipalities, and the U.S. government scrambled in early 2020 to stock up on N95 masks, PPE, and other essential medical items to respond to the nation's COVID-19 outbreak, severe shortages soon crippled markets. Some opportunistic hoarders hoping to profit from the crisis appear to have exacerbated the shortage problems.⁵⁶ Others hoarded supplies out of fear,⁵⁷ triggering herding effects that may have made shortages even worse.⁵⁸

As the pandemic progressed, shortages of additional types of medical supplies began hampering response efforts. In particular, shortages of nasopharyngeal swabs, testing media, and other materials slowed virus infection testing and antibody testing in the United States.⁵⁹ And by the summer of 2020, there were also growing concerns that shortages of certain materials could hinder the country's ability to vac-

Scarce Materials or Threatened Materials Subject to COVID-19 Hoarding Prevention Measures, 85 Fed. Reg. 17,592 (Mar. 30, 2020).

55. See Katie Thomas, *The Latest Obstacle to Getting Tested? A Shortage of Swabs and Face Masks*, N.Y. TIMES, <https://www.nytimes.com/2020/03/18/health/coronavirus-test-shortages-face-masks-swabs.html> (July 23, 2020) [<https://perma.cc/RRR2-G3EE>].

56. See, e.g., Rebecca Davis O'Brien, *New York Businessman Charged with Price Gouging on Coronavirus Protective Equipment*, WALL ST. J. (Apr. 24, 2020, 5:39 PM), <https://www.wsj.com/livecoverage/coronavirus-2020-04-24/card/u7yz8BUDkdIV9IXeqWrs> [<https://perma.cc/WV5V-3PDE>].

57. See, e.g., Doug Whiteman, *'No Toilet Paper, Again?!' Shortages and Hoarding Pop Up as COVID Delta Surges*, YAHOO! (Aug. 22, 2021), https://www.yahoo.com/now/no-toilet-paper-again-shoppers-235000819.html?guccounter=1&guce_referrer=aHR0cHM6Ly93d3cuZ29vZ2x1LmNvbS8&guce_referrer_sig=AQAAALdu2nywKu57xXpVG8kREc-_jElqCiXjtvQKxsmM0XxYYR9KGEYblSj-TUIQYulIS3mM-E_t0R7ZBPmoWKmb3VFC1RGZmfUSwHJGEKLzlfWom2-tq1zncG8d8aqrenJYm0WvRkgOt2LTIVbGtLwUXBm221rfsfVX7PdCScnA7uwFu [<https://perma.cc/YR7J-AYJ7>].

58. See Shi-Ling Hsu, *Climate Triage: A Resources Trust to Address the Inequality in a Climate-Changed World*, 50 ENV'T L. 97, 112-13 (2020) (explaining that "hoarding begets hoarding, so that once it starts, it becomes very difficult to stop" and that "[e]ven if some selfless individuals refrain at first, their fear will build as they see others hoarding, in turn creating enormous pressure to join in the hoarding").

59. Nick Paul Taylor, *Widespread Shortages for COVID-19 Test Materials Persist*, POLL SAYS, MEDTECH DIVE (May 29, 2020), <https://www.medtechdive.com/news/widespread-swab-covid-19-test-materials-shortages-persist-poll-says/578831/> [<https://perma.cc/L3M6-34RZ>]; see also Katherine J. Wu, *'It's Like Groundhog Day': Coronavirus Testing Labs Again Lack Key Supplies*, N.Y. TIMES, <https://www.nytimes.com/2020/07/23/health/coronavirus-testing-supply-shortage.html> (Aug. 15, 2020) [<https://perma.cc/M32L-TJRW>] ("Labs across the country are facing backlogs in coronavirus testing thanks in part to a shortage of tiny pieces of tapered plastic.").

minate its population against the virus once researchers developed an effective COVID-19 vaccine.⁶⁰

1. Confusion Over the Federal Government's Stockpiling Role

Many hospitals and state governments across the United States that had relied on the SNS for backup medical supplies during previous public health crises expressed frustration when SNS inventories proved far too meager to support the nation's response to COVID-19. The pandemic was so severe and widespread that neither the federal government, the states, nor the private sector had stockpiled nearly enough medical supplies to fight it safely and effectively. For instance, according to one report, when the pandemic broke out on U.S. soil, the SNS held only about 1% of N95 masks that HHS anticipated the country would need.⁶¹

Not surprisingly, the federal government and various state governments each sought to deflect political blame for the nation's inadequate medical stockpiles. Federal Emergency Management Agency ("FEMA") Administrator Pete Gaynor advised state and local emergency managers to "not wait for the PPE from the [f]ederal government to show[]up" and to instead "[t]ake aggressive action . . . to source [their] own" supplies.⁶² When multiple governors railed back against FEMA's hands-off approach and asserted that states had never borne the responsibility to stockpile for emergencies,⁶³ President Trump labeled these governors as "complainers" and quipped that they "should have been stocked up and ready long before th[e] crisis hit."⁶⁴

The uncertainty over state governments' share of the national stockpiling duties was particularly obvious in April 2020 when the SNS abruptly revised language on its website. The website had formerly stated that "[w]hen state, local, tribal, and territorial responders re-

60. See Sarah Owerhohle, *The 'Biggest Challenge' Won't Come Until After a Coronavirus Vaccine Is Found*, POLITICO: CORONAVIRUS, <https://www.politico.com/news/2020/05/11/coronavirus-vaccine-supply-shortages-245450> (May 11, 2020, 6:28 PM) [<https://perma.cc/RWD2-R45Y>] (arguing that the "nation's supply chain isn't anywhere close to ready" to produce a COVID-19 vaccine if one is found).

61. Rhea Mahbubani, *US Medical Workers Will Need 3.5 Billion Face Masks if the Coronavirus Reaches Pandemic Status. Right Now, the Country Only Has 1% of That Number.*, BUS. INSIDER (Mar. 4, 2020, 4:15 PM), <https://www.businessinsider.com/usa-1-percent-3-billion-face-masks-needed-coronavirus-pandemic-2020-3> [<https://perma.cc/D7TG-TGZK>].

62. Pete Gaynor, *FEMA Administrator March 27, 2020, Letter to Emergency Managers Requesting Action on Critical Steps*, FEMA (Mar. 27, 2020), <https://www.fema.gov/news-release/2020/03/27/fema-administrator-march-27-2020-letter-emergency-managers-requesting-action> [<https://perma.cc/Y35Y-RLBB>].

63. See, e.g., Lieb & Dil, *supra* note 47 (reporting Michigan Governor Gretchen Whitmer stated that her "state had counted on the federal government to be prepared for a pandemic" and quoting her stating that it had "never been the role and the assumption" for states to bear that responsibility).

64. *Id.*

quest federal assistance . . . , the stockpile ensures that the right medicines and supplies get to those who need them most during an emergency.”⁶⁵ However, senior Trump advisor Jared Kushner directly contradicted this language in a White House press briefing, declaring that the SNS is actually “supposed to be [the federal government’s] stockpile; it’s not supposed to be states’ stockpiles that they then use.”⁶⁶ Within a day after Kushner made this statement, the SNS revised language on its website, recharacterizing the SNS as a mere “short-term stopgap buffer” intended to “supplement state and local supplies during public health emergencies.”⁶⁷ Regardless of whether these revisions were reasonable, their message was clear: State governments could not rely on the SNS to furnish most of the medical supplies they would need to address the COVID–19 crisis.

2. Expired or Defective SNS Supplies

Sadly, a significant proportion of the goods the SNS did distribute to states and localities across the United States during early stages of the COVID–19 pandemic were in disrepair or were too old for health-care professionals to safely use. Although some officials have claimed that the SNS routinely rotates its inventories to prevent such quality problems,⁶⁸ reports during the peak of the nationwide shortages described SNS shipments containing thousands of unusable items.⁶⁹ The SNS sent roughly 6,000 surgical masks to Alabama in early 2020 that were severely damaged by dry rot and had 2010 expiration dates.⁷⁰ HHS also sent 170 ventilators to California that did not work upon arrival.⁷¹ Sources later revealed that the federal government had al-

65. Daniel Dale, *Trump Administration Edits National Stockpile Website a Day After It Contradicted Jared Kushner*, CNN: POL., <https://www.cnn.com/2020/04/03/politics/stockpile-website-edited-kushner-claim/index.html> (Apr. 3, 2020, 6:07 PM) [<https://perma.cc/JC23-226S>].

66. Ben Gittleson, *After Kushner Says ‘It’s Our Stockpile,’ HHS Website Changed to Echo His Comments on Federal Crisis Role*, ABC NEWS (Apr. 3, 2020, 6:50 PM), <https://abcnews.go.com/Politics/kushner-stockpile-hhs-website-changed-echo-comments-federal/story?id=69936411> [<https://perma.cc/5NLA-5GY7>].

67. Dale, *supra* note 65.

68. *See, e.g.*, Reisinger, *supra* note 39 (quoting former SNS director Greg Burel, who stated that “SNS material is constantly managed and rotated for disposal when it is ultimately expired”).

69. *See, e.g.*, Joyce Frieden, *Strategic National Stockpile Needs Overhaul*, MEDPAGE TODAY (June 24, 2020), <https://www.medpagetoday.com/publichealthpolicy/healthpolicy/87244> [<https://perma.cc/F3NW-D58D>] (quoting New Hampshire Senator Maggie Hassan during a Senate committee hearing as complaining that many supplies her state’s healthcare workers received from the SNS during the COVID–19 pandemic “were unusable or were expired”).

70. *See, e.g.*, Kim Chandler, *Some States Receive Masks with Dry Rot, Broken Ventilators*, AP (Apr. 3, 2020), <https://apnews.com/article/kate-brown-virus-outbreak-us-news-ap-top-news-ca-state-wire-f43781b64bacd6aa094d9404f4ab91a4> [<https://perma.cc/W3UT-U349>].

71. Sara Murray & Scott Glover, *Nation’s Stockpile Proves To Be No Match for a Pandemic*, CNN POL., <https://www.cnn.com/2020/05/06/politics/strategic-national->

lowed a major ventilator maintenance contract to lapse, causing more than 2,100 SNS ventilators to be unusable when the pandemic broke out.⁷² State government officers in Oregon, Colorado, and New Hampshire also reported receiving medical supplies or equipment from the SNS that had expired or were not operational.⁷³

The numerous reports of SNS shipments of expired or defective items during the COVID-19 pandemic corroborate information HHS officials have since provided regarding the state of the SNS when the pandemic broke out. Among other things, HHS admitted that roughly five of the twelve million N95 respirator masks stored in the SNS as of early 2020 had expired.⁷⁴ These and other failings prompted sharp criticism of the SNS from some elected officials over what they have characterized as ineffective management of federal stockpile resources.⁷⁵

3. Price Controls and Bidding Wars

The federal government's passive approach to the medical supply shortages that COVID-19 caused also created a disjointed marketplace for these items dominated by price-gouging restrictions and interstate-bidding wars. Several state governments implemented policies in early 2020 temporarily prohibiting private parties from charging even modestly increased prices for N95 masks, PPE, and other essential medical goods. Meanwhile, out of desperation, many of these same state governments ultimately bid and paid astronomically high prices for such items when the federal government's reluctance to nationally coordinate the procurement and distribution of supplies pitted states against each other in auction-like bidding battles.⁷⁶

Price-gouging restrictions imposed in the early stages of the U.S. COVID-19 pandemic across much of the country outlawed sales of

stockpile-coronavirus-trump-invs/index.html (May 6, 2020, 7:37 PM) [<https://perma.cc/A3JB-78VS>] (reporting that "California received 170 ventilators from the federal stockpile that were not in working condition").

72. David E. Sanger, Zolan Kanno-Youngs & Nicholas Kulish, *A Ventilator Stockpile, with One Hitch: Thousands Do Not Work*, N.Y. TIMES, <https://www.nytimes.com/2020/04/01/us/politics/coronavirus-ventilators.html> (Apr. 20, 2020) [<https://perma.cc/3J4A-B79T>].

73. Chandler, *supra* note 70.

74. Tim Dickinson, *The Unmasking of America: How the Trump Administration's Negligence Deprived Healthcare Workers of N95 Masks in a Pandemic*, ROLLING STONE (June 11, 2020, 11:56 AM), <https://www.rollingstone.com/politics/politics-features/n95-masks-trump-covid19-coronavirus-health-care-workers-ppe-1013132/> [<https://perma.cc/M4VE-7NE5>].

75. See, e.g., Frieden, *supra* note 69 and accompanying text.

76. Some politicians sharply criticized the White House's unwillingness to help federally govern the procurement and distribution of critical medical items. E.g., Pulver & Mansfield, *supra* note 44 (quoting New York Congresswoman Carolyn Maloney's assertion that the Trump Administration was "leaving states to fend for themselves, to scour the open market for these scarce supplies, and to compete with each other and federal agencies in a chaotic, free-for-all bidding war").

certain essential medical items at excessively high prices. Several states have price-gouging statutes on the books that automatically kick in during declared disasters to prohibit individuals or businesses from selling certain goods for more than 10 to 25% above pre-disaster prices.⁷⁷ State-level enforcement of these price-gouging laws began applying to essential medical supplies in some states relatively soon after the pandemic took hold.⁷⁸ President Trump also issued an executive order in March 2020 authorizing the federal enforcement of price-gouging restrictions,⁷⁹ and the U.S. Department of Justice clearly signaled its intention to follow the President's order and police against such actions.⁸⁰

Ironically, the price ceilings created under these various price-gouging statutes and orders failed to protect numerous state governments from paying exorbitantly high prices for some critical medical items. Once it became clear that the SNS could not furnish adequate quanti-

77. *E.g.*, ALA. CODE § 8-31 (1975) (setting forth the Alabama Unconscionable Pricing Act, which prohibits sales at more than 25% above pre-disaster prices during a declared emergency); OR. REV. STAT. § 401.965 (2009) (delineating Oregon's emergency price-gouging law, which caps price increases at 15% above the prevailing price before an abnormal market disruption); CAL. PENAL CODE § 396(e) (West 2021) (criminalizing sales at prices more than 10% above pre-emergency prices in California). For a more detailed description of state price-gouging restrictions, see generally John Johnson, George Korenko & Matthew Milner, *Are Pandemic Sellers Actually Violating Price-Gouging Laws?*, LAW360 (Apr. 2, 2020, 5:41 PM), <https://www.law360.com/articles/1259189> [<https://perma.cc/5TM3-UYFB>]. See also Kendra L. Berardi, Ian T. Clarke-Fisher & Edward J. Heath, *Responding to Government Inquiries Related to Price Gouging During the COVID-19 Pandemic*, NAT'L L. REV. (Mar. 30, 2020), <https://www.natlawreview.com/article/responding-to-government-inquiries-related-to-price-gouging-during-covid-19-pandemic> [<https://perma.cc/U2X8-GHF4>] (describing emergency price-gouging restrictions in Connecticut, New York, Massachusetts, and Rhode Island).

78. As early as March 2020, some state attorneys general were already beginning to bring enforcement claims against alleged price-gougers. See, e.g., John L. Mone & Terry Wallace, *Price-Gouging Allegation Leaves 750,000 Face Masks in Limbo*, ABC NEWS (Mar. 26, 2020, 8:22 PM), <https://abcnews.go.com/Health/wireStory/price-gouging-allegation-leaves-750000-face-masks-limbo-69826848> [<https://perma.cc/G8NB-QAF5>] (describing the Texas Attorney General Office's lawsuit against a Houston auctioneer for arranging auctioned sales of N95 masks at prices well above the pre-pandemic range).

79. Exec. Order No. 13,910, 85 Fed. Reg. 17,001, § 2(a)(i) (2020) (conferring authority to the HHS Secretary to take actions to prevent the private accumulation of scarce health and medical resources "for the purpose of resale at prices in excess of prevailing market prices").

80. Press Release, U.S. Dep't of Just., Department of Justice and Department of Health and Human Services Partner to Distribute More Than Half a Million Medical Supplies Confiscated from Price Gougers (Apr. 2, 2020), <https://www.justice.gov/opa/pr/department-justice-and-department-health-and-human-services-partner-distribute-more-half> [<https://perma.cc/CA74-4QAL>] (quoting U.S. Attorney General William Barr as stating that "[i]f you are amassing critical medical equipment for the purpose of selling it at exorbitant prices, you can expect a knock at your door" and that "[t]he Department of Justice's COVID-19 Hoarding and Price Gouging Task Force is working tirelessly around the clock . . . to ensure that bad actors cannot illicitly profit from the COVID-19 pandemic facing our nation").

ties of these supplies to the states, many state governments started competing aggressively against each other and against the federal government to purchase the items from private vendors.⁸¹ In this frenzied environment, bulk prices for essential medical items skyrocketed. For instance, N95 masks, which had been widely available in bulk for less than \$1 per mask before the COVID-19 outbreak, were selling in April 2020 for upwards of \$8 each.⁸² State officials in New York were reportedly paying twenty cents for disposable medical gloves that would have normally cost them less than five cents.⁸³ And ventilators that would typically cost about \$12,000 each were selling for as much as \$65,000 each.⁸⁴

4. Socially Unjust Distribution Outcomes

The nation's widespread intergovernmental bidding wars for scarce medical items during the early stages of the COVID-19 pandemic were not only inefficient; they also contributed to the unjust distribution of critical resources during a major public health emergency. As state and city governments with the greatest buying power bought up

81. David A. Lieb, *States Give Few Details on Billions Spent on Virus Supplies*, AP NEWS (May 25, 2020), <https://apnews.com/article/mo-state-wire-wa-state-wire-illinois-pa-state-wire-virus-outbreak-da2557fb40996097f4dbb927ce5a0a04> [<https://perma.cc/2GBN-UHPH>] (reporting that “[s]tates are spending billions of dollars stocking up on medical supplies such as masks and breathing machines during the coronavirus pandemic” and that many have “set aside purchasing safeguards amid a scramble for supplies” and are “clos[ing] emergency deals . . . to ensure orders aren’t diverted elsewhere”); see also Joel Rose, *A ‘War’ For Medical Supplies: States Say FEMA Wins By Poaching Orders*, NPR (Apr. 15, 2020, 4:18 PM), <https://www.npr.org/2020/04/15/835308133/governors-say-fema-is-outbidding-redirecting-or-poaching-their-medical-supply-or> [<https://perma.cc/U5C6-8BUU>] (claiming that FEMA was outbidding state and local governments in bidding wars for critical medical supplies and thereby “driving up the price of those supplies for everybody” and that it is “leaving states and hospitals even more desperate to find what they need”).

82. Feiner, *supra* note 51 (reporting that state officials in Idaho had seen N95 respirator masks “going for nearly \$8 apiece” and that the items would “typically run about a dollar per mask”); see also Press Release, Anthony Brown, Congressman, Brown-Warren Introduce Legislation to Nationalize the Medical Supply Chain (May 1, 2020), <https://anthonybrown.house.gov/news/documentsingle.aspx?DocumentID=899> [<https://perma.cc/8LSM-UH3G>] (citing a recent Society for Healthcare Organization Procurement Professionals study finding that “the cost of N95 masks increased from \$0.38 to \$5.75 each (1,513% increase), vinyl exam gloves increased \$0.02 to \$0.06 (300% increase), isolation gowns increased \$0.25 to \$5.00 (2000% increase), and reusable face shields increased from \$0.50 to \$4.00 (900% increase)” during the U.S. COVID-19 outbreak).

83. Lydia DePillis & Lisa Song, *In Desperation, New York State Pays Up to 15 Times the Normal Prices for Medical Equipment*, PROPUBLICA (Apr. 2, 2020, 1:20 PM), <https://www.propublica.org/article/in-desperation-new-york-state-pays-up-to-15-times-the-normal-price-for-medical-equipment> [<https://perma.cc/4ZK2-JPM7>].

84. Courtney Subramanian, *How a Frantic Trek to a McDonald’s Parking Lot Shows the Scramble States Face for Coronavirus Supplies*, USA TODAY, <https://www.usatoday.com/story/news/politics/2020/04/18/coronavirus-creates-ppe-bidding-war-states-like-illinois-new-york/5144652002/> (Apr. 19, 2020, 1:51 PM) [<https://perma.cc/8C88-2Y3M>].

supplies, socioeconomically disadvantaged areas across the country—many of which had large minority group populations—disproportionately suffered.⁸⁵ The money-driven nature of how essential medical goods were distributed during the pandemic similarly disadvantaged smaller rural health clinics and communities that were often outbid by larger and more creditworthy buyers, causing those clinics and communities to struggle to secure supplies as well.⁸⁶

Less access to critical medical supplies was likely one of many factors that led to disproportionately higher rates of COVID-19-related illness and death among racial and ethnic minority groups during the pandemic's early stages. An April 2020 CDC report involving 580 COVID-19 patients found that 33% of hospitalized patients at that time were Black/African American even though that group comprised just 18% of the relevant population.⁸⁷ The report likewise found much higher virus-related death rates among Black/African American and Hispanic/Latino groups.⁸⁸ And a different report issued in April 2021 found that a majority of U.S. healthcare workers who died during the first year of the pandemic “identified as people of color.”⁸⁹ Comparatively poor access to the PPE needed to prevent disease transmission likely contributed to these disparities—particularly in many socioeconomically disadvantaged nursing homes across the country, residents of which were predominantly members of racial or ethnic minority groups.⁹⁰

85. See Feiner, *supra* note 51 (noting that “[u]nder the current structure, states with greater resources have an advantage in procuring medical supplies”).

86. See DePillis & Song, *supra* note 83 (noting that the nationwide “bidding wars” for critical medical items are “raising concerns that facilities with shallow pockets, like rural health clinics, won’t be able to obtain vital supplies”).

87. Shikha Garg et al., *Morbidity and Mortality Weekly Report: Hospitalization Rates and Characteristics of Patients Hospitalized with Laboratory-Confirmed Coronavirus Disease—COVID-NET, 14 States, March 1–30, 2020*, CTRS. FOR DISEASE CONTROL & PREVENTION (Apr. 17, 2020), <https://www.cdc.gov/mmwr/volumes/69/wr/mm6915e3.htm> [<https://perma.cc/6UAZ-6QEK>].

88. Dana Sparks, *Coronavirus Infection by Race: What’s Behind the Health Disparities?*, MAYO CLINIC (Aug. 7, 2020), <https://newsnetwork.mayoclinic.org/discussion/coronavirus-infection-by-race-whats-behind-the-health-disparities/> [<https://perma.cc/9WJK-FNR9>] (reporting that “the COVID-19 death rate among Black or African American people was 92.3 deaths per 100,000 people and for Hispanic or Latino people 74.3 per 100,000 people”).

89. *Deaths in the Pandemic’s First Year*, *supra* note 1.

90. Robert Gebeloff et al., *The Striking Racial Divide in How Covid-19 Has Hit Nursing Homes*, N.Y. TIMES, <https://www.nytimes.com/article/coronavirus-nursing-homes-racial-disparity.html> (June 14, 2021) [<https://perma.cc/2A3W-SSBG>] (describing how staff “lacked adequate protective gear” in many nursing homes, including in a predominantly Black facility in Baltimore County where “workers said they were given rain ponchos and nylon hair bonnets in early April[] after Maryland required all nursing homes to provide the staff with protective equipment” and reporting a similar delay in the provision of face masks to staff at a California nursing home that had a large population of Latino residents).

5. Political Favoritism and Punishing of the Most Prepared States

Federal government officials' apparent willingness to allow political interests to influence their procurement and distribution of essential medical supplies also drew heavy criticism during the COVID-19 outbreak. For example, several Democrat-controlled states reportedly received only a fraction of their requested medical items from the SNS in early March 2020 while Florida—a key battleground state for Trump's re-election campaign—quickly received its full order of supplies.⁹¹ When federal officials took similar actions in Colorado, a Democratic Congresswoman from that state characterized the Trump Administration's approach to allocating SNS supplies as “playing politics with public health.”⁹²

Accusations of political favoritism also arose after federal government officials awarded large new medical equipment supply contracts to numerous questionable or inexperienced vendors, some of whom had connections to the then-President.⁹³ For instance, the Administration purportedly awarded several large contracts to a Tennessee company that had never contracted with the government but was led by a major donor to Trump's presidential campaign and to the Republican National Committee.⁹⁴ It also awarded a lucrative supply contract to a company newly formed by Trump's former Deputy Chief of Staff—someone who had no prior history of securing government contracts

91. Toluse Olorunnipa et al., *Governors Plead for Medical Equipment from Federal Stockpile Plagued by Shortages and Confusion*, WASH. POST (Mar. 31, 2020, 2:39 PM), https://www.washingtonpost.com/politics/governors-plead-for-medical-equipment-from-federal-stockpile-plagued-by-shortages-and-confusion/2020/03/31/18aadda0-728d-11ea-87da-77a8136c1a6d_story.html [<https://perma.cc/GN25-NDLG>] (quoting an anonymous official's statement that “[t]he president knows Florida is so important for his reelection,” so “[h]e pays close attention to what Florida wants”).

92. Press Release, Diana DeGette, Congresswoman, Rep. DeGette on President Trump's Ventilator Distribution Mismanagement (Apr. 8, 2020), <https://degette.house.gov/media-center/press-releases/rep-degette-on-president-trump-s-ventilator-distribution-mismanagement> [<https://perma.cc/NNW3-M32P>].

93. Weakened federal oversight of government contracting for medical supplies during the pandemic has reportedly helped to enable abuses in this area. See generally Josh Salman and Nick Penzenstadler, *Hundreds of Millions of Dollars Goes to COVID-19 Contractors Accused of Prior Fraud*, USA TODAY, <https://www.usatoday.com/in-depth/news/investigations/2020/07/07/covid-19-contracts-overlook-fraud-claims-masks-sanitizer-and-ppe/5352886002/> (Jan. 26, 2021, 10:54 PM) [<https://perma.cc/KD5V-J2WV>] (reporting that hundreds of millions of dollars in government contracts for medical supplies have recently gone to “vendors that have been accused of defrauding taxpayers”).

94. Casey Tolan, *Federal Agencies Turn to Untested Suppliers for Big PPE Contracts*, CNN, <https://www.cnn.com/2020/05/27/politics/coronavirus-federal-contracts-ppe-suppliers-problems-invs/index.html> (May 27, 2020, 8:37 AM) [<https://perma.cc/98SJ-FQPJ>] (noting AvMEDICAL CEO Troy Mizell's donations to President Trump and the Republican National Committee and subsequent securing of major medical supply contracts).

and who ultimately supplied hundreds of thousands of unusable face masks.⁹⁵

Meanwhile, the federal government's approach to distributing SNS supplies seemed to sometimes punish those state governments that had stockpiled more emergency health supplies before the crisis. According to one FEMA official in April 2020, the agency was redirecting shipments of essential medical items away from certain areas of the country based in part on "how much equipment a state already has in storage."⁹⁶ At a moment when nearly every state faced major shortages, this policy of providing more supplies to states that had prepared less surely sparked frustration among officials in more prepared states. Questionable allocation strategies also emerged at the state government level, with one state even contemplating the use of a lottery system to divvy out scarce medical items in the face of severe shortages.⁹⁷ Such arbitrary approaches to distributing critical emergency goods were not only arguably unfair; they also sent confusing signals to state and local governments regarding the potential rewards of building their own stockpiles.

B. *Below-Market Compensation for Commandeered Supplies*

The federal government and several state governments also responded to COVID-19-related medical supply shortages by issuing orders authorizing themselves to commandeer privately owned goods. In some cases, these "commandeering laws" directly or indirectly empowered governments to pay artificially low compensation when seizing private property.

1. Legally Prescribed Under-Compensation

Although some state commandeering laws in effect during the COVID-19 pandemic required that compensation for seized goods be based on the temporarily higher prices that then prevailed in the market, at least one state expressly authorized compensation based on lower pre-pandemic prices. Executive orders issued in two adjacent

95. Jeffery Martin, *Dem Reps Call for HHS Investigation of \$3 Million Contract That Provided Potentially Unusable Masks to Navajo Nation*, NEWSWEEK (May 26, 2020, 10:37 PM), <https://www.newsweek.com/dem-reps-call-hhs-investigation-3-million-contract-that-provided-potentially-unusable-masks-1506672> [<https://perma.cc/P7HT-AFBC>].

96. Katharine Q. Seelye et al., *Doctors and Governors Vie for Masks in Cloak-and-Dagger Deals*, N.Y. TIMES (Apr. 20, 2020), <https://www.nytimes.com/2020/04/20/us/coronavirus-states-masks.html> [<https://perma.cc/7JNM-DY9T>].

97. Elizabeth Cohen, Arman Azad & Betsy Klein, *California Tells Hospitals to Consider Having a Lottery for Sought-After COVID-19 Drug*, CNN, <https://www.cnn.com/2020/05/14/health/california-hospitals-covid-drug-lottery/index.html> (May 14, 2020, 7:02 PM) [<https://perma.cc/FQB8-KR69>] (describing the California Department of Public Health's lottery system, which it recommended in response to shortages of Remdesivir, a drug believed to help treat some COVID-19 symptoms).

northeastern states during the COVID–19 pandemic exemplify this major difference in compensation approaches. New York Governor Andrew Cuomo’s executive order on commandeering powers required compensation “at the rates prevailing in the market at the time of acquisition.”⁹⁸ In contrast, Pennsylvania Governor Tom Wolf’s April 2020 order authorizing the Pennsylvania Emergency Management Agency (“PEMA”) to seize critical medical goods and distribute them to those in greatest need included the following language regarding compensation:

The compensation price of PPE, pharmaceuticals, and other medical resources shall be the average price at which the same or similar consumer goods or services were obtainable in the affected areas during the last seven days immediately prior to March 6, 2020.⁹⁹

For obvious reasons, the prevailing market prices for PPE and other essential medical items in the week preceding March 6—the date on which Governor Wolf announced Pennsylvania’s first confirmed COVID–19 case and issued a disaster emergency declaration—were surely far lower than those in early April when the state had accumulated more than 11,500 confirmed cases and was reporting several hundred new cases per day.¹⁰⁰ However, neither Governor Wolf nor other Pennsylvania officials offered a clear justification for their pre-pandemic-level compensation approach.¹⁰¹

2. Indirect Under-Compensation Due to Price Controls

Commandeering laws applicable in certain other U.S. states and at the federal government level during the COVID–19 pandemic did not expressly prescribe how to calculate compensation for seized items but did leverage other laws in ways that arguably also led to under-compensation.¹⁰² In particular, some states’ temporary price controls

98. N.Y. Exec. Ord. No. 202.14 (Mar. 7, 2020), <https://www.governor.ny.gov/news/no-20214-continuing-temporary-suspension-and-modification-laws-relating-disaster-emergency> [<https://perma.cc/JQP6-4JAC>].

99. Pa. Exec. Ord. No. 2020-408 (Apr. 8, 2020), <https://www.governor.pa.gov/wp-content/uploads/2020/04/20200408-GOV-Critical-Medical-Resources-Order.pdf> [<https://perma.cc/Z5UC-MMV7>].

100. See Greg Pickel, *A Month of Coronavirus in Pa.: From 1 Case to 11,500. How Long Until It Peaks?*, PENN LIVE (Apr. 6, 2020), <https://www.pennlive.com/news/2020/04/a-month-of-coronavirus-in-pa-from-1-case-to-11500-how-long-until-it-peaks.html> [<https://perma.cc/AY3T-PKKF>] (stating that Pennsylvania reported its first two COVID–19 cases on March 6, 2020, and had more than 11,500 cases as of April 5 of that year).

101. *E.g.*, Pa. Exec. Ord. No. 2020-408, *supra* note 99.

102. New Jersey is an example of a state that authorized commandeering of medical supplies in response to the COVID–19 pandemic but did not specify how compensation for seized items would be calculated. See N.J. Exec. Ord. 113 (Apr. 2, 2020), <https://www.governor.pa.gov/wp-content/uploads/2020/04/20200408-GOV-Critical-Medical-Resources-Order.pdf> [<https://perma.cc/F5UL-XL6A>] (authorizing New Jersey’s Director of Emergency Management to “take or use personal services and/or real or personal property, including medical resources, for the purpose of protecting

on essential goods enabled state government agencies to commandeer items at steep discounts.

California's approach to compensating citizens for commandeered medical supplies during COVID-19 exemplified this type of indirect under-compensation structure. Governor Gavin Newsom's April 2020 executive order prohibiting price gouging generally defined it as any sale of an emergency item at a price that is 10% higher than the seller's February 2020 offer price.¹⁰³ However, the executive order expressly exempted sales to state government entities from these anti-price-gouging restrictions, meaning that Californian citizens and businesses could still sell or forfeit goods to state or local government entities for compensation that exceeded pre-pandemic prices by well more than 10%.¹⁰⁴ Taken together, these two provisions created incentives for holders of essential medical items in California to actively seek to sell or turn over the items only to state or local government buyers whose exemptions systematically allow them to offer artificially low purchase prices and still outbid all private buyers.

Temporary price-gouging restrictions imposed at the federal level during the COVID-19 pandemic similarly enabled federal agencies to under-compensate citizens and businesses for commandeered goods. Under the Stafford Disaster Relief and Emergency Assistance Act, President Trump's declaration of a national emergency due to the pandemic in March 2020 temporarily empowered FEMA to begin commandeering medical items as needed to respond to the crisis.¹⁰⁵ The Trump Administration also imposed temporary federal price-gouging restrictions during that same month, effectively creating temporary price ceilings for some of the same goods FEMA was authorized to commandeer.¹⁰⁶

Although federal constitutional law is unclear regarding how courts must calculate compensation for commandeered goods during crises, one line of cases does arguably support California's and FEMA's approach of compensating at artificially low price-ceiling rates when such controls are in place. The U.S. Supreme Court analyzed a similar

or promoting the public health, safety, or welfare" and adding that "[c]ompensation shall be provided following the procedures established by the Disaster Control Act, N.J.S.A. App. A:9-51"); *see also* N.J. STAT. ANN. § A:9-51.7 (West 2021) (requiring the New Jersey state government to compensate the holders of private property that the state seizes in response to an emergency but not specifying how to determine the amount of compensation due for such seizures beyond "just compensation").

103. Cal. Exec. Ord. No. N-44-20 (Apr. 3, 2020), <https://www.gov.ca.gov/wp-content/uploads/2020/04/4.3.20-EO-N-44-20.pdf> [<https://perma.cc/65N5-UXNZ>].

104. *See id.*

105. *See* 42 U.S.C. § 5196(i)(1) (authorizing FEMA's Administrator to "procure by condemnation or otherwise . . . materials and facilities for emergency preparedness, with the right to take immediate possession thereof"). As discussed, federal officials made clear during the early stages of the pandemic that they would aggressively prosecute hoarders and price gougers.

106. *See supra* note 79 and accompanying text.

issue in *U.S. v. Commodities Trading Corp.*, a 1950 case disputing the amount of compensation due after the U.S. War Department requisitioned 760,000 pounds of black pepper from a private company during World War II.¹⁰⁷ Because of the war, the U.S. Office of Price Administration (“OPA”) had imposed dollars-per-pound price ceilings on a long list of goods, including pepper.¹⁰⁸ When the War Department requisitioned the company’s pepper, the Department claimed it was obligated to pay only the OPA’s artificially low ceiling price as just compensation.¹⁰⁹ The company disagreed, arguing it was entitled to a much higher compensation rate based on the likely market value of the pepper once the OPA price ceilings were removed.¹¹⁰ The Court held for the War Department, finding that government entities “should be able to buy goods fulfilling their wartime needs at the prices fixed for other purchasers” and noting the “crucial importance of this . . . to limit inflation and prevent profiteering.”¹¹¹ The Court majority went on to explain:

[S]hould judicial awards of just compensation be uniformly greater in amount than ceiling prices, expectations of pecuniary gains from condemnations might prompt many owners to withhold essential materials until the Government requisitioned them. We think the congressional purpose and the necessities of a wartime economy require that ceiling prices be accepted as the measure of just compensation, so far as that can be done consistently with the objectives of the Fifth Amendment.¹¹²

Although the specific OPA price ceilings prescribed during World War II are quite different from the mostly percentage-based-price-gouging restrictions imposed during the COVID–19 pandemic, it is quite possible that compensation payments based on such restricted prices would be upheld on similar rationales. Regardless of their constitutionality, however, such artificially low payouts can contribute to undesirable policy outcomes for reasons explored in more detail in Part IV below.¹¹³

C. *Calls for New Medical Stockpiling Policies*

The severe medical supply shortages that hampered U.S. efforts to respond to the COVID–19 pandemic generated an unprecedented level of interest in reforming the nation’s approach to emergency stockpiling. Among other things, these challenges prompted Congress to dramatically increase its funding of the SNS. Provisions of the

107. *United States v. Commodities Trading Corp.*, 339 U.S. 121, 122 (1950).

108. *Id.*

109. *Id.*

110. *See id.* at 122–23.

111. *Id.* at 124–25.

112. *Id.* at 125.

113. *See, e.g., infra* text accompanying note 177.

Coronavirus Aid, Relief, and Economic Security (“CARES”) Act, enacted in March 2020, authorized the HHS Secretary to expend up to \$16 billion on medical supplies for the SNS¹¹⁴—an amount roughly twenty-five times greater than Congress’ annual appropriation to the SNS in recent years.¹¹⁵

A handful of federal legislators also soon began promoting various legislative reforms to U.S. stockpiling policies, most of which called for major expansions of the federal government’s role in the national stockpiling effort. One bill introduced in April 2020 sought to create an entirely new agency—the “Emergency Office of Manufacturing for Public Health”—within HHS.¹¹⁶ This new agency would have authority to acquire patents for emergency medical supplies from private stakeholders and contract with private manufacturers to produce those items or manufacture them on its own for eventual distribution to federal, state, and local health systems.¹¹⁷ A second introduced bill sought to go even further and designate the federal government as the “sole buyer, vendor, owner and distributor of critical medical equipment during the COVID-19 pandemic and all future national health emergencies.”¹¹⁸

As the COVID-19 pandemic wore on, continuing worldwide shortages of medical supplies also increasingly prompted calls for new U.S. policies to support the buildout of domestic supply chains for critical emergency goods. Under the Defense Production Act, the President of the United States already possesses powers to commandeer private industry assets for the manufacture of essential goods during crises—a power President Trump exercised to some degree.¹¹⁹ However, there were still widespread PPE shortages in healthcare facilities across the country several months after the COVID-19 outbreak began, suggesting that these executive powers alone were not

114. CARES Act, Pub. L. 116-136, Div. B, Title VIII, 134 Stat. 281, 553–61 (2020).

115. See Reisinger, *supra* note 39 (noting that Congress had allocated \$610 million to the SNS in 2019 and \$620 million in 2020).

116. See Press Release, Elizabeth Warren, Senator, Warren, Schakowsky to Introduce Legislation to Publicly Manufacture Personal Protective Equipment, Prescription Drugs, Other Medical Supplies (Apr. 30, 2020), <https://www.warren.senate.gov/newsroom/press-releases/warren-schakowsky-to-introduce-legislation-to-publicly-manufacture-personal-protective-equipment-prescription-drugs-other-medical-supplies> [<https://perma.cc/2BC5-24EJ>].

117. S. 3847, 116th Cong. (2020).

118. Press Release, Anthony Brown, *supra* note 82 (describing introduction of the proposed “Pandemic Response and Interstate Cost Equity Act of 2020” or “PRICE Act” in May 2020).

119. Aishvarya Kavi, *Virus Surge Brings Calls for Trump to Invoke Defense Production Act*, N.Y. TIMES (July 22, 2020) <https://www.nytimes.com/2020/05/21/us/coronavirus-nursing-homes-racial-disparity.html> [<https://perma.cc/KH29-4M9B>] (“President Trump used the [Defense Production Act] to press General Motors to begin production of ventilators.”).

enough to safeguard the nation against long-term shortages.¹²⁰ Sensing growing frustration over prolonged medical supply shortages, then-Democratic presidential nominee Joe Biden introduced a plan in July 2020 focused on helping move supply chains for several types of essential goods “back to U.S. soil.”¹²¹ A Senate bill introduced that same month likewise sought to use investment tax credits to stimulate domestic manufacturing projects for certain PPE.¹²² After his election, President Biden continued his push for greater government investment in stockpiling resources, proposing to allocate nearly \$1 billion in new funding to the SNS.¹²³

IV. MODELING STOCKPILING INCENTIVES

The nation’s inadequate stockpiling of the supplies needed to respond to the COVID–19 pandemic is attributable in part to shortcomings in the policy regime that presently governs the U.S. stockpiling effort. The country’s excessive reliance on federally owned medical stockpiles unjustifiably increases the per-unit stockpiling costs of many rotatable emergency items. These elevated costs, together with certain externality problems and behavioral biases, have long resulted in underinvestment in public and private stockpiling. Uncertainty about the division of stockpiling duties among the SNS, state governments, and the private sector has likewise deterred efficient levels of stockpiling. Price-gouging restrictions and certain types of commandeering policies have even further weakened incentives for private entities to stockpile. And the nation’s increasing reliance on international supply chains to meet its demand for essential medical

120. See, e.g., Geoff Mulvihill & Camille Fassett, *Protective Gear for Medical Workers Begins to Run Low Again*, ASSOCIATED PRESS (July 7, 2020), <https://apnews.com/481d933b0caa6f5fc61f466c86d4777b> [<https://perma.cc/QK6G-QLK2>] (quoting National Nurses United president Deborah Burger as stating that “[w]e’re five months into this and there are still shortages of gowns, hair covers, shoe covers, masks, [and] N95 masks”); Naomi Martin, *It’s Like Pulling Teeth’: There’s Still a PPE Shortage—and a Second Wave Could Send Medical Workers into Crisis Mode*, BOS. GLOBE, <https://www.bostonglobe.com/2020/06/21/nation/dangerous-shortages-protective-gear-persist-mass-hospitals-clinicians-say/> (June 21, 2020, 10:35 PM) [<https://perma.cc/UVR2-WS7L>] (describing continued widespread shortages of PPE).

121. See Will Weissert, *Biden Wants U.S. to Produce More of Its Own Pandemic Supplies*, ASSOCIATED PRESS (July 7, 2020), <https://apnews.com/642660dbc67fbb16260a27f2f89418d8> [<https://perma.cc/C5D5-P5H5>]; see also *The Biden Plan to Rebuild U.S. Supply Chains and Ensure the U.S. Does Not Face Future Shortages of Critical Equipment*, JOEBIDEN.COM, <https://joebiden.com/supplychains/> [<https://perma.cc/M8XQ-WUHG>].

122. See Press Release, Lindsay Graham, Senator, Graham, Capito, Rounds Introduce Legislation to Move PPE Supply Chain from China to the United States (July 22, 2020), <https://www.lgraham.senate.gov/public/index.cfm/press-releases?ID=0664466C-D1E6-4A4B-A3CA-DBEF3716DD5B> [<https://perma.cc/M7PB-QHEU>].

123. Noah Weiland & Margot Sanger-Katz, *The C.D.C. Would Get a Significant Increase in Funding Under Biden’s Spending Plan.*, N.Y. TIMES (Apr. 9, 2021), <https://www.nytimes.com/2021/04/09/us/hhs-cdc-spending.html> [<https://perma.cc/7KVR-WC92>].

goods has made it much more difficult for the nation to address long-term emergency shortages.

In this moment of unprecedented interest in reforming the nation's stockpiling policy structure, it is worthwhile to more methodically consider the distinct economic incentives at play in stockpiling decisions. Like almost any activity, stockpiling involves specific costs and benefits, and rational, self-interested actors are likely to engage in it only to the extent they believe the expected benefits of doing so exceed the costs.¹²⁴ On similar reasoning, all else equal, the U.S. stockpiling system will become more cost-efficient and better able to affordably safeguard the country as it reduces per-unit stockpiling costs or increases per-unit stockpiling benefits for emergency items. The following simplified, two-state cost-benefit model for stockpiling decisions is a useful framework for identifying and examining potential means of improving the nation's stockpiling policy structure. Although this Article uses the hypothetical example of a hospital administrator stockpiling respirator masks to illustrate the workings of the model, the core principles illustrated through the example are equally applicable to private and public stockpilers of a wide range of emergency items.

Suppose hypothetically that during a period when there is no active public health emergency, an administrator at a private for-profit hospital is seeking to determine the optimal number of N95 respirator masks to store in the hospital's emergency stockpile. The hospital's objective is to build a private stockpile just large enough to cover all of the hospital's mask needs in the unlikely event of a major disaster requiring unusually high quantities of masks. Assume further that the hospital is profit-maximizing and has perfect information regarding all relevant costs and risk probabilities associated with this stockpiling decision. And assume, for simplicity, that masks cannot appreciate in value while stockpiled but may temporarily take on heightened value when they are needed as part of a major crisis response.

124. Concededly, the specific costs and benefits to a stockpiler of stockpiling a given item for a given period are likely to vary greatly depending on the total quantity stockpiled, so it would be more precise to state that a rational stockpiler will continue growing its stockpile so long as its marginal benefit of doing so exceeds its marginal cost. The private marginal cost of stockpiling a particular type of item for a year is the incremental change in total stockpiling costs borne by a stockpiler from storing one additional unit of the item for that period. The private marginal benefit of stockpiling the item is the incremental change in total expected benefits accruing to the stockpiler from storing one additional unit of the item for one year. For simplicity, this Article intentionally employs a basic cost-benefit model rather than a more rigorous marginal cost-benefit analysis approach. The general observations that are the main takeaways from this simplified framework would nonetheless hold true under a more complex marginal cost-benefit analysis.

A. *The Costs of Stockpiling*

The total cost (C) of stockpiling an N95 respirator mask or any other given item is the sum of three primary categories of costs: warehousing costs (c_w), opportunity costs (c_o), and depreciation costs (c_d). For any given item, let:

- C = the total cost of stockpiling one unit of the item for one calendar year;
- c_w = the direct costs of physically storing the item for one year;
- c_o = the highest risk-free annual return the stockpiler foregoes by stockpiling the item for one year rather than investing its value; and
- c_d = the actual decrease in the stockpiled item’s market value after one year of storage, estimated as the non-emergency value (M) of the stockpiled item divided by the number of years (N) of the item’s shelf life.

Under these assumptions, expressed mathematically:

$$C = c_w + c_o + c_d \qquad \text{Equation (1)}$$

All three of the specific types of stockpiling-related costs delineated in Equation (1) are influenced by various factors, including some stockpiling policies. Policy changes that reduce or offset any one of these costs can thus potentially improve the efficiency of the nation’s stockpiling system. The following are descriptions of each of these three types of costs and of some of the main factors affecting them.

1. Warehousing Costs

Warehousing costs (c_w), defined in this model as the direct costs of physically storing a given item for one year, are relatively difficult to manipulate through stockpiling policies. Warehousing costs tend to be based primarily on the rental value of the lowest-cost space where an item may be properly stored and kept acceptably available for emergency use. Any expenditures required to physically safeguard, manage, and maintain stored goods also constitute warehousing costs.¹²⁵

Calculating warehousing costs is generally straightforward. Suppose, for example, that the annual fair market rent is \$5,000 for the lowest-cost adequate storage space available to the hypothetical hospital described above and that this space has capacity to store 100,000 respirator masks. Dividing the first of these figures by the second figure reveals that under these assumptions, the hospital’s annual per-unit warehousing cost for masks is:

125. The contracted ventilator maintenance mentioned above is one example of such a maintenance-related warehousing cost. See Sanger et al., *supra* discussion 72 accompanying note 72.

$$\$5,000 \div 100,000 = \$0.05.$$

Some commonly stockpiled items have characteristics that justifiably involve higher per-unit warehousing costs for reasons that are wholly exogenous to the general stockpiling policy structure. National security concerns associated with some stockpiled supplies, such as nuclear materials, military weapons, or anti-viral drugs, justify higher per-unit expenditures to safely guard the nation's stockpiles of these items. All else equal, per-unit warehousing costs also tend to be higher for larger items. And whether particular types of items require a climate-controlled storage space, enhanced security, or periodic maintenance can likewise affect warehousing costs in ways that are largely independent of the policies surrounding them.

On the other hand, certain factors affecting per-unit warehousing costs may be influenced by stockpiling policies. In particular, economies of scale can often decrease per-unit warehousing costs as the total quantity stored increases—a relationship that weighs in favor of stockpiling policies that advantage large, centralized stockpiles over smaller, distributed ones.¹²⁶

2. Opportunity Costs

The opportunity costs (c_o) of stockpiling, which exist because stockpiling an item precludes a stockpiler from investing the item's value elsewhere and earning a positive return, are also difficult to alter through stockpiling policy. The opportunity cost of stockpiling any given item can be calculated by multiplying the item's monetary value by the highest risk-free return the stockpiler could have earned by instead investing that value over the stockpiling period. For example, if respirator masks cost \$1 each and our hypothetical hospital's risk-free real return on investable assets is 4% per annum,¹²⁷ the hospital's opportunity cost (c_o) of stockpiling one mask for one year is:

126. As other researchers have observed, policies that favor more centralized stockpiling models, with a smaller number of total warehouses and more items stored at each, might help to lower aggregate warehousing costs by harnessing these scaling effects. See WILLIAM J. BAUMOL & ALAN S. BLINDER, *MACROECONOMICS: PRINCIPLES AND POLICY* 140 (13th ed. 2015) (applying basic geometry principles to warehouse buildings to show that “the very nature of warehousing creates technological relationships that lead to economies of scale”). Potential economies of scale in warehousing are one of many factors typically considered in private supply-chain design. See, e.g., Kerstin Baumgartner, André Fuetterer & Ulrich W. Thonemann, *Supply Chain Design Considering Economies of Scale and Transport Frequencies*, 218 *EUR. J. OPERATIONAL RSCH.* 789, 789 (2012) (outlining a “multi-product supply chain design model” that accounts for economies of scale in warehousing).

127. The 4% figure used in this hypothetical example is arbitrary and used strictly for illustrative purposes. One relatively recent study suggests that hospitals have average returns on investable assets of about 4.6% per year but that those returns fluctuate widely from year to year. See Kelly Gooch, *Healthcare Organizations Report Highest Investment Return Since 2013*, BECKER'S HOSP. CFO REP. (Sept. 13, 2018),

$$\$1.00 \times 0.04 = \$0.04.$$

Like warehousing costs, opportunity costs are based on factors that are not heavily influenced by stockpiling policies. Average returns on investable assets—the primary factor affecting the opportunity costs of stockpiling—do vary somewhat among stockpilers, but these modest variations largely depend on factors that are beyond the reach of stockpiling programs and laws.¹²⁸ Accordingly, the analysis and policy recommendations in this Article largely ignore these costs.

3. Depreciation Costs

Depreciation costs (c_d) are the most malleable category of stockpiling costs and thus warrant particular attention when structuring stockpiling policies. The depreciation cost of stockpiling an item for one year is the decrease in the item's actual market value that is attributable to its storage and non-use over that period. Although the true depreciation costs of stockpiling vary by item and are rarely linear across time, it is sufficient for the illustrative purposes of this model to apply a simple straight-line depreciation approach to evenly distribute these costs over an item's shelf life.¹²⁹ This is done by dividing the market value (V_0) of the stockpiled item at the time of acquisition by the number of years (N) of the item's total shelf life based on manufacturer specifications or applicable regulations.¹³⁰ To illustrate, suppose the market value of a given respirator mask when a stockpiler initially purchases it (V_0) is \$1 and that the mask has a shelf life of five years (N), after which its value drops to \$0. Based on these assumptions, the annual straight-line depreciation cost (c_d) associated with storing this item would be:

$$c_d = (V_0/N) = \$1.00/5 \text{ years} = \$0.20.$$

<https://www.beckershospitalreview.com/finance/healthcare-organizations-report-highest-investment-return-since-2013.html> [<https://perma.cc/6RBQ-8T76>].

128. For instance, many government entities are comparatively low-credit-risk borrowers with access to tax-favored government financing options and thus may incur slightly lower opportunity costs from stockpiling than major private corporations.

129. The straight-line depreciation method under Generally Accepted Accounting Principles ("GAAP"), which is employed here solely for its simplicity, is the most ubiquitous and basic accounting depreciation method. Keela Helstrom, *GAAP Depreciation Methods*, HOUS. CHRON., <https://smallbusiness.chron.com/gaap-depreciation-methods-55425.html#:~:text=straight%20Line%20Method,by%20its%20estimated%20useful%20life> [<https://perma.cc/TA64-8CFH>] (outlining the straight-line depreciation method and describing it as "the most common GAAP method used to depreciate a company's assets").

130. See *id.*

4. Total Per-Unit Stockpiling Cost

Using Equation (1) and the hypothetical cost measures used above, it is now possible to calculate this fictional hospital's total annual cost of stockpiling one N95 respirator mask. Specifically:

$$C = (c_w + c_o + c_d) = (\$0.05 + \$0.04 + \$0.20) = \$0.29.$$

As this calculation suggests, much of the total per-unit cost of stockpiling an item is often attributable to depreciation costs. Fortunately, as will be shown below, rotating stockpiled supplies and using or selling them before they lose value can offset these costs, thereby increasing the net benefits of stockpiling activities.¹³¹

B. *Factors Affecting the Expected Benefits of Stockpiling*

The specific benefits of stockpiling an item are often more difficult to characterize and measure than stockpiling costs. For some types of goods, the benefits resemble those of an insurance policy: Stockpiling these goods is primarily a way to guard against the low-probability risk of major loss resulting from not having the item during an emergency. This "insurance policy" depiction of stockpiling benefits seems fitting for highly specialized pharmaceutical items such as epinephrine auto-injector pens in a school classroom where some students have severe peanut allergies.¹³² The benefits of stockpiling anti-viral drugs, anti-radiation drugs, and special military weapons also seem consistent with this "insurance policy" conception of stockpiling. Such items truly save the day if a relevant emergency occurs; but if not, they go unused and eventually expire, and the stockpiler is simply grateful to have never actually needed them.

For many other types of goods, however, the benefits of stockpiling more closely resemble those of an investment that offers a low-probability prospect of generating a large return. This "investment" view of stockpiling benefits arguably better describes the advantages of storing many nonpharmaceutical or everyday items such as surgical gloves, food grains, crude oil, or pallets of bottled water. Stockpilers can easily sell off these types of items or put them to productive use in the ordinary course of their activities if no relevant emergency occurs—an important source of alternative value that seldom accompanies most insurance policies.¹³³ Moreover, even during emergencies it

131. See discussion *infra* Section IV.B.1.

132. For basic information on epinephrine pens and potential legal obligations for some schools and day care centers to keep them on hand, see generally Marie Plicka, *Mr. Peanut Goes to Court: Accommodating an Individual's Peanut Allergy in Schools and Day Care Centers Under the Americans with Disabilities Act*, 14 J.L. & HEALTH 87 (1999).

133. Most familiar types of retail insurance policies—such as fire insurance and car insurance—lack this type of alternative value although it should be noted that there are a few exceptions. For example, many types of life insurance policies give policy-

is often possible, with some extra cash and effort, to acquire these types of items from others and thereby avoid major losses from their absence—another attribute that makes stockpiling them more like a speculative investment than an insurance policy. Because this Article focuses primarily on stockpiling policy reforms involving this second category of more generic goods, the cost-benefit model that follows adopts this latter characterization and generally frames stockpiling as an investment.

The expected benefits of stockpiling a given item are largely a function of (1) the probability of an emergency requiring use of the item, (2) the item’s temporarily increased value in the context of that emergency, (3) the proportion of the stockpile that is consistently rotated and used or sold, and (4) any additional psychological or other benefits attributable solely to the stockpiler’s subjective risk preferences. Accordingly, for any given item, let:

- B = the total expected benefit of stockpiling the item for one calendar year;
- p = the probability that an emergency requiring use of the stockpiled item will occur during the next year;¹³⁴
- V_e = the stockpiled item’s temporarily elevated value to its owner in the context of a relevant emergency;¹³⁵ and
- A = any additional value the stockpiler gains from storing the item that is directly attributable to the stockpiler’s subjective risk preferences.

Applying these definitions—and assuming for now that the stockpiler never rotates or uses any stockpiled items unless there is a major emergency—the expected annual benefit (B) of stockpiling one unit of a given item is as follows:

$$B = p (V_e) + (1-p)(0) + A \qquad \text{Equation (2)}$$

holders an option to surrender their policy in exchange for a cash payout while still alive and some secondary markets for such insurance policy interests have even emerged in recent years. For a discussion of legal issues surrounding those markets, see generally Peter Nash Swisher, *Wagering on the Lives of Strangers: The Insurable Interest Requirement in the Life Insurance Secondary Market*, 50 TORT TRIAL & INS. PRAC. L.J. 703, 703 (2015).

134. It follows from the provided definition of p that $(1-p)$ represents the probability that no emergency requiring use of the stockpiled item will occur during the next year.

135. A single item such as an N95 respirator mask could obviously prove useful in various types of emergencies, each of which has a different probability of occurring. Similarly, the anticipated elevated value of a given item in the context of a disaster likely varies a lot depending on the type of disaster (e.g., a mask may have an elevated value of \$1.50 in a severe influenza season or an elevated value of \$10 in the context of a major biochemical attack). For simplicity, this model uses only variables p and X to represent the weighted sums of these probabilities and temporarily heightened values.

Equation (2) expresses the fact that as the likelihood (p) of an emergency requiring the use of the stockpiled item grows, the expected benefit (B) of stockpiling proportionally increases. B likewise increases proportionally as the item's anticipated mid-emergency value (V_e) grows. And B increases as the stockpiler's risk preferences shift such that the stockpiler derives more of this additional type of value (A) from stockpiling the item.¹³⁶ The stockpiler's inventory rotation practices—the other important factor affecting B —were referenced only in the assumptions for Equation (2) but will be fully integrated into the expected benefits formula below. The following materials use examples involving the hypothetical hospital described above to demonstrate how each of the four factors just outlined can affect the expected benefits of stockpiling an item.

1. The Stockpiler's Rotation Practices

The expected benefits of stockpiling depend heavily on the degree to which the stockpiler rotates and sells or uses its stockpiled goods before their value diminishes. A numeric example helps to illustrate this relationship. Suppose there is a 5% chance (p) that a catastrophic event will occur during the coming year necessitating our hypothetical hospital's use of a stockpiled \$1 respirator mask and that the temporarily heightened value of the mask (V_e) during such a crisis would be \$5. There is a far greater likelihood—expressed as $(1-p)$ in Equation (2) and equal to 95% in this example—that no emergency will occur and the hospital will thus not use the mask during that period.

Assuming again, for now, that the hospital does not rotate and sell or use any of its stockpiled masks before they expire, the only actual value the hospital gains from stockpiling the mask in a non-emergency year is any non-pecuniary benefit (A) resulting from the hospital's risk preferences.¹³⁷ Applying Equation (2) from above, if the hospital's subjective risk preferences make it willing to annually pay \$0.01 per mask (A) to have the mask on hand, then the hospital's expected benefit (B) of stockpiling one mask for one year would be:

$$B = (0.05)(\$5.00) + (0.95)(\$0.00) + \$0.01 = \$0.26.$$

Because this \$0.26 benefit (B) is less than the hypothetical hospital's \$0.29 cost (C) of stockpiling a mask calculated above, the hospital would expect to incur a net loss of \$0.03 by stockpiling the mask for that year and would thus elect not to stockpile it under these assumptions.

Fortunately, the benefits of rotating stockpiled inventories of an item can offset some or all of the depreciation costs associated with

136. For the full discussion of this additional benefit, see generally discussion *infra* Section IV.B.4.

137. See generally *infra* Section IV.B.4.

stockpiling it, thereby increasing the net benefits of stockpiling and promoting more voluntary stockpiling activities. However, not all commonly stockpiled goods are easy to rotate, and many are hardly rotatable at all. Because rotatability varies so much from item to item and can greatly impact net stockpiling benefits, it is critically important to account for these differences when structuring stockpiling policies.¹³⁸

The rotatability of a stockpile of any good is primarily a function of three measures: (1) the quantity of the item the stockpiler believes it could need for a relevant crisis (its “stockpile requirement”), (2) the quantity of the item the stockpiler can annually use up or sell off and replace during non-crisis periods (its “annual demand”), and (3) the number of years of the item’s shelf life (its “shelf life”). Using these three measures for any given good, it is possible to calculate a stockpiler’s “rotatability factor” (*R*)—a standardized measure that can be used to compare rotatability among various stockpile items. Specifically, for any item:

$$R = \frac{(\text{annual demand}) \times (\text{years of shelf life})}{(\text{stockpile requirement})}$$

To illustrate: Suppose that our hypothetical hospital anticipates it could need up to 100,000 respirator masks if a relevant crisis were to arise. Assume further that the hospital annually uses 5,000 masks when there is no crisis, that the hospital cannot sell masks to others, and that the masks each have a shelf life of five years. Based on these figures, the hospital’s rotatability factor (*R*) for respirator masks is as follows:

$$\frac{(5,000 \times 5)}{100,000} = 0.25$$

A 0.25 rotatability factor (*R*) indicates that the hospital is capable of rotating up to 25% of its stockpile requirement of the item. As *R* increases, the proportion of the stockpile that is rotatable also rises.

Incorporating this rotatability factor (*R*) into Equation (2) is the final step to fully constructing a basic stockpiling cost-benefit model. Assuming again that respirator masks have a five-year shelf life (*N*), perfectly rotating the masks would require that the hospital use or sell at least one-fifth of its stockpiled mask inventory per year and fully

138. Some CDC-funded educational materials on the SNS suggest that the agency does at least consider a good’s “rotation capability for going back into the commercial market” when deciding which goods to add to the national stockpile. Oak Ridge Associated Universities, *Receiving, Distributing, and Dispensing Strategic National Stockpile Assets: A Guide for Preparedness, Version 11*, CDC 14, https://www.orau.gov/sns/v11/ReceivingDistributingDispensingSNSAssets_V11.pdf [<https://perma.cc/N25W-WHBJ>].

recoup the original \$1 purchase price (V_0) for every rotated mask. Expressed mathematically, such perfect rotating practices would generate an annual “rotation benefit” equal to (V_0/N) per mask in non-crisis years. However, the hospital’s rotatability factor (R) of 0.25 for masks denotes that the hospital cannot perfectly rotate them. Multiplying the hospital’s per-mask rotation benefit by R in the expected benefits formula accounts for this fact by counting rotation benefits only for that proportion of the mask stockpile that the hospital can actually rotate during non-crisis periods. Specifically, the formula becomes:

$$B = (p)(V_e) + (1-p)(V_0/N)(R) + A \quad \text{Equation (3)}$$

Plugging the hypothetical figures from above into this new Equation (3):

$$B = (0.05)(\$5.00) + (0.95)(\$0.20)(0.25) + \$0.01 = \$0.3075$$

Because this new expected benefit measure of roughly \$0.31 exceeds the stockpiler’s \$0.29 cost (C) from above, stockpiling the mask becomes cost-justified under these new assumptions so long as the hospital consistently rotates as many masks as it is capable of rotating.

Goods that have the highest rotatability factors tend to be consumable items that the stockpiler routinely uses up or sells in large quantities even when there is no relevant crisis. Importantly, many of the most disruptive medical supply shortages in the United States during the COVID-19 pandemic have involved relatively rotatable non-pharmaceutical goods, including surgical masks, disposable gloves, shoe covers, and hair covers.¹³⁹ Food grains, crude oil, and critical minerals are other examples of highly rotatable goods that have historically been included in some emergency stockpiles.

Certain other types of commonly stockpiled items have relatively low rotatability factors. Many durable goods, such as the medical ventilators that were in short supply during the COVID-19 pandemic, are comparatively less rotatable because they are designed for repeated use and are thus replaced less frequently. Some other types of commonly stockpiled goods, such as many antiviral or anti-radiation drugs, have very low rotatability factors because they are seldom used outside the context of a major crisis.¹⁴⁰

139. See Mulvihill & Fassett, *supra* note 120.

140. Interestingly, there are legal constraints on the rotation of some stockpiled SNS antivirals for use during seasonal influenza outbreaks or for other more predictable uses—constraints that have drawn criticism from some researchers. *E.g.*, INST. OF MED., ANTIVIRALS FOR PANDEMIC INFLUENZA: GUIDANCE ON DEVELOPING A DISTRIBUTION AND DISPENSING PROGRAM 33 (2008) (arguing that the “fact that rotating stocks is not allowed” for many SNS antivirals “precludes the possibility of considering alternatives that could have economic and preparedness benefits” and constrains the SNS “in ways that are counterproductive to effective preparedness”).

Between these two ends of the rotatability spectrum are emergency supplies that might be described as somewhat rotatable. N95 respirator masks, face shields, surgical isolation gowns, and nasopharyngeal swabs probably fall into this category because hospitals do use these items in non-crisis periods but need far more of them when responding to certain types of public health emergencies. For instance, according to one report, the nation collectively uses only about 25 million respirator masks annually during non-crisis periods,¹⁴¹ meaning that if these masks have five-year shelf lives, the largest number the nation could routinely rotate is about 125 million. In contrast, a 2015 CDC-sponsored study estimated that the country could need upwards of 3.5 billion such masks to respond to a severe, year-long pandemic.¹⁴² Based on these figures, the nation’s rotatability factor (R) for these masks is roughly:

$$\frac{(25\text{million})(5)}{3.5\text{ billion}} = 0.036$$

This relatively low rotatability factor means that even the most well-executed rotation practices could offset only about 3.6% of the depreciation costs associated with adequately stockpiling these masks. For items like these with low rotatability factors, fully rotatable stockpiles alone are incapable of adequately equipping the country to respond to disasters so supplemental policy strategies are needed to make up the difference.¹⁴³

If a stockpiler can perfectly rotate its stockpiled inventory of an item, its rotatability factor (R) for that item equals the factor’s maximum value of 1.00.¹⁴⁴ When R equals 1.00, it is particularly easy to demonstrate how rotating stockpile inventories offsets depreciation costs and increases net stockpiling benefits. Substituting (V_o/N) for (c_d) in Equation (1) and pairing that equation with Equation (3) reveals that if a stockpiler is perfectly rotating its stockpile of a given item, the expected benefits (B) of stockpiling will exceed the costs (C) and thus warrant stockpiling whenever:

$$C_w + C_o + (V_o/N) < p (V_e) + (1-p)(V_o/N)(1.00) + A$$

141. Dickinson, *supra* note 74 (reporting that “N95 mask usage is relatively uncommon; a typical hospital might only use 6,000 N95 masks over a full year, with national demand reaching about 25 million masks a year”).

142. *Id.*

143. In particular, it is often necessary to maintain robust domestic supply chains and dispatchable production capacity for difficult-to-rotate emergency stockpile items. For a discussion of policy strategies for pursuing that objective, see generally *infra* notes 209–20 and accompanying text.

144. Because it is not possible for stockpilers to gain more than 100% of possible rotation benefits, rotatability factors exceeding 1.00 must be capped at that value when inserted into Equation (3).

Subtracting $(1-p)(V_0/N)$ from both sides of this inequality then simplifies it to:

$$C_w + C_o + p(V_0/N) < p(V_e) + A. \quad \text{Equation (4)}$$

Such simplification is possible because rotating 100% of a stockpile fully offsets the depreciation costs associated with stockpiling in all years when there is no emergency requiring use of the stockpiled item. Inserting the hypothetical valuations from above into this simplified expression in Equation (4) highlights just how much perfectly rotating goods can increase the net benefits of stockpiling:

$$\begin{aligned} \$0.05 + \$0.04 + (0.05)(\$0.20) &< (0.05)(\$5.00) + 0.01 \\ \$0.10 &< \$0.26. \end{aligned}$$

As these calculations show, adding the assumption that the hospital perfectly rotated its stockpile of masks increased the hospital's per-unit net expected benefit ($B - C$) of stockpiling the masks from $-\$0.03$ to $\$0.16$.¹⁴⁵ As will be shown in Part V below, policies that encourage and facilitate the rotation of a greater proportion of the country's stockpiled goods could similarly do much to increase the efficiency and effectiveness of the nation's stockpiling system.¹⁴⁶

2. The Stockpiled Item's Anticipated Emergency Value

The heightened value (V_e) a stockpiler expects a given stockpile item to temporarily have during a crisis can also greatly impact the expected benefits of stockpiling, and certain policy strategies can likewise have profound effects on this variable. For example, as highlighted above, although respirator masks were widely available for about \$1 each (V_0) before the COVID-19 outbreak, there were reports of sales at roughly \$8 apiece (V_e) during the pandemic.¹⁴⁷ A core benefit of stockpiling any item is the potential to use or sell the item in an emergency while it holds such elevated value. Accordingly, laws that restrict stockpilers' ability to capture that additional value can reduce V_e and thereby weaken incentives to stockpile.¹⁴⁸

3. The Probability of a Crisis Requiring the Stockpiled Item

The probability (p) that an emergency will occur that temporarily increases the value of an item can also affect the expected benefit of

145. This reference to a $-\$0.03$ net benefit refers to the difference between per-unit stockpiling costs ($\$0.29$) and benefits ($\0.26) calculated in Section IV.B.1 above when it was assumed that the hospital rotated none of its mask stockpile.

146. See discussion *infra* Section V.A.1.

147. Feiner, *supra* note 52; see also *supra* note 82 and accompanying text.

148. Some examples of such laws are examined in depth in Part IV below. See discussion *infra* Section IV.C.2.

stockpiling it, and presently such probabilities are relatively high for several types of commonly stockpiled goods. As of May 2021, the COVID-19 pandemic continued to strain the U.S. health care system, and the country faced discouragingly high virus infection rates despite the deployment of effective vaccines.¹⁴⁹ Moreover, even long before COVID-19 reached American soil, experts had been warning of growing pandemic risks in the United States because of climate change and increased urbanization.¹⁵⁰ Heightened geopolitical risks involving the United States and its allies have likewise strengthened the likelihood of military conflicts, terrorist attacks, or other human-caused public emergencies in recent years.¹⁵¹ These and other factors suggest that the probabilities (p) associated with many types of stockpiled emergency goods are presently at relatively high levels and are likely to remain elevated for the foreseeable future.

It also bears mentioning that heuristic biases can distort perceptions of p in ways that ultimately affect stockpiling policy. Behavioral economists have long emphasized that individuals are often excessively optimistic and irrationally under-protect themselves from low-probability risks.¹⁵² Humans likewise often exhibit myopic behavior, excessively focusing on near-term costs and benefits and over-discounting future ones.¹⁵³ These observable behavioral tendencies might excessively weaken political support for government-funded stockpiling initiatives during periods when there has not recently been a major crisis requiring stockpiled supplies and no such crisis seems to be looming on the horizon. In the words of one researcher, “You’re basically investing in events that are ultimately unlikely to ever oc-

149. Jeff Wise, *The Pandemic’s Lethal Twilight*, INTELLIGENCER (May 3, 2021), <https://nymag.com/intelligencer/2021/05/when-will-the-covid-19-pandemic-end.html> [<https://perma.cc/KJ98-MMVR>].

150. See, e.g., Kenneth L. Meyer, *Confronting the Pandemic Superthreat of Climate Change and Urbanization*, 63 ORBIS 565, 571 (2019) (arguing that a combination of climate change and increased global urbanization as creating a growing “pandemic superthreat” in the United States).

151. Although it is difficult to quantify the magnitude of the nation’s heightened geopolitical threats, well-regarded measures of such risks suggest that they are elevated. For instance, as of June 2020, the Blackrock Geopolitical Risk Index had been more than two standard deviations above the five-year average for nearly two years. See *Geopolitical Risk Blackboard*, BLACKROCK (May 2021), <https://www.blackrock.com/corporate/insights/blackrock-investment-institute/interactive-charts/geopolitical-risk-dashboard> [<https://perma.cc/2LP9-U4UD>].

152. See Christine Jolls, *Behavioral Economic Analysis of Redistributive Legal Rules*, 51 VAND. L. REV. 1653, 1659–60 (1998) (describing excessive optimism).

153. See William Hubbard, *The Debilitating Effect of Exclusive Rights: Patents and Productive Inefficiency*, 66 FLA. L. REV. 2045, 2061 (2015) (noting that “[e]mpirical studies indicate . . . that individuals discount future events at a much higher rate and value present costs and benefits substantially more than those in the future”) (citing Oren Bar-Gill, *Seduction by Plastic*, 98 NW. U. L. REV. 1373, 1395–99 (2004)).

cur [I]t's very hard to convince people . . . on a continuous basis [to] fund x, y[,] and z activities just in case it happens."¹⁵⁴

On the other hand, some of the same heuristic biases just described can also strengthen political support for stockpiling programs in the immediate aftermath of major crises by temporarily causing voters and elected officials to place greater priority on stockpiling-related issues.¹⁵⁵ When a recent and costly emergency shortage is fresh in citizens' minds, myopic tendencies may temporarily make them more willing to support new stockpiling policies to better safeguard against such pain in the future. This effect was visible after the initial COVID-19 outbreak as states and localities across the country invested unprecedented amounts to stockpile emergency supplies.¹⁵⁶ A small silver lining in the COVID-19 pandemic is that it has presently created such a window of opportunity for advancing stockpiling policy in the United States.

4. The Stockpiler's Risk Preferences

The final variable in Equation (2), labeled as *A*, represents any additional benefits accruing to stockpilers that are attributable solely to stockpilers' subjective risk preferences. Although *A* can be difficult to measure, it theoretically equals any amount a stockpiler would be willing to pay to stockpile an item that exceeds the objective probability-based expected value of stockpiling it.

Regardless of whether they view stockpiling as protection against a risk or as a speculative investment, many stockpilers derive additional benefits from stockpiling that would be unaccounted for in a purely objective expected-benefits formula. The behavioral economics field

154. See Feiner, *supra* note 51 (quoting Mahshid Abir, a University of Michigan emergency physician and senior policy researcher at the Rand Corporation).

155. See Christine Jolls, Cass R. Sunstein & Richard Thaler, *A Behavioral Approach to Law and Economics*, 50 STAN. L. REV. 1471, 1477 (1998) (describing how the "availability heuristic," by which "the frequency of some event is estimated by judging how easy it is to recall other instances of this type," can cause individuals to "conclude, for example, that the probability of an event (such as a car accident) is greater if they have recently witnessed an occurrence of that event than if they have not") (citing AMOS TVERSKY & DANIEL KAHNEMAN, JUDGMENT UNDER UNCERTAINTY: HEURISTICS AND BIASES 3, 11 (Daniel Kahneman, Paul Slovic & Amos Tversky eds., 1982)).

156. See, e.g., Evan Symon, *Senator Who Killed 2011 PPE Stockpile, Authors New 90-Day PPE Requirement*, CAL. GLOBE (June 21, 2020, 8:07 AM), <https://californiaglobe.com/section-2/senator-who-killed-2011-ppe-stockpile-authors-new-90-day-ppe-requirement-bill/> [<https://perma.cc/E7LE-WQXT>] (describing new support in California legislature for greatly expanding the state's stockpiling program); Peter Krouse, *Cuyahoga County Council Committee Approves No-Bid Deal for Storage Area to Stockpile PPE*, CLEVELAND.COM, <https://www.cleveland.com/news/2020/07/cuyahoga-county-council-committee-approves-no-bid-deal-for-storage-area-to-stockpile-ppe.html> (July 1, 2020) [<https://perma.cc/QE66-5KJR>] (reporting a city council's plans for an unprecedented public investment to acquire a local stockpiling facility site).

known as “prospect theory” submits that individuals tend to exhibit risk-averse behavior in choices involving a low-probability risk of a major loss and risk-seeking behavior in choices involving a low-probability chance at a major windfall.¹⁵⁷ Prospect theory helps to explain, among other things, why individuals routinely purchase insurance policies at prices that exceed actuarial rates and buy tickets for lotteries or raffles that have low payout ratios.¹⁵⁸ Equations (2) and (3) above include the variable *A* to acknowledge this additional type of stockpiling-related benefit, but otherwise this Article largely ignores *A* because it is difficult to significantly shift such risk preferences through stockpiling policies.

C. *Applying the Cost-Benefit Model to Critique Existing Stockpiling Policies*

The stockpiling cost-benefit model just outlined provides a useful framework for evaluating the nation’s existing stockpiling policy structure. As the nation learned during the COVID–19 pandemic, stockpiling policies can greatly impact public health and safety during a major crisis, and the existing U.S. stockpiling policy regime has significant room for improvement. The following materials use insights from the cost-benefit model from above to highlight four distinct shortcomings in the U.S. stockpiling policy structure.

1. Over-Centralized Stockpiling of Rotatable Supplies

One major deficiency of the nation’s current stockpiling system is its excessive reliance on a single federal government agency to own and store most of the nation’s stockpile of rotatable emergency items. As shown mathematically above, regularly rotating and using or selling stockpiled items before their value declines is a key way to limit per-unit stockpiling costs for highly rotatable goods.¹⁵⁹ Storing some fraction of a nation’s stockpile requirement of rotatable supplies in massive federally owned facilities may be justifiable for national security purposes, but otherwise high-volume private sellers and users of these

157. Chris Guthrie, *Prospect Theory, Risk Preference, and the Law*, 97 Nw. U. L. REV. 1115, 1118 (2003) (noting that “[i]ndividuals tend to make risk-seeking choices when selecting between options that appear to be low-probability gains and risk-averse choices when selecting between options that appear to be low-probability losses” and that “this empirical finding conflicts with rational choice theory, which generally assumes either risk neutrality or risk aversion in the face of both gains and losses (whether low-probability or not)”). Prospect theory was first introduced by Nobel laureate Daniel Kahneman and Amos Tversky in a landmark article in 1979. See generally Daniel Kahneman & Amos Tversky, *Prospect Theory: An Analysis of Decision Under Risk*, 47 ECONOMETRICA 263 (1979).

158. HENRY N. BUTLER, CHRISTOPHER R. DRAHOZAL & JOANNA SHEPHERD, *ECONOMIC ANALYSIS FOR LAWYERS* 298 (3d ed. 2014) (describing prospect theory as holding that “most people are risk seeking with gains (they play the lottery) and risk averse with losses (they buy insurance)”).

159. See discussion *supra* Section IV.B.1.

items are arguably better situated to stockpile and rotate them. Even when the SNS uses “vendor-managed inventory” contracts to enlist private companies to help stockpile its goods, the SNS generally retains ownership of the goods, so incentives to rotate are weaker than they could be if the goods were privately owned.¹⁶⁰ Ironically, recent directives issued in China suggest that even the communist Chinese government seems to increasingly recognize the untapped potential of involving private citizens and businesses in nationwide stockpiling efforts.¹⁶¹

Although custodians of the SNS purport to regularly rotate and maintain all of its stockpiled goods,¹⁶² numerous reports of expired or otherwise unusable shipments of SNS medical supplies during the COVID-19 pandemic cast serious doubt on those claims.¹⁶³ In fairness, the U.S. government is not unique in struggling to rotate its centralized national medical stockpile: Accounts of large quantities of expired or unusable goods in the medical stockpiles of other developed Western Nations such as Canada and the United Kingdom also surfaced during the COVID-19 pandemic.¹⁶⁴ The enormity of the SNS and the fact that the agency itself does not routinely use large

160. See *supra* discussion accompanying notes 41–42.

161. See Alexandra Sternlicht, *China Tells Citizens to Stockpile Masks for Preparedness*, FORBES (May 28, 2020, 4:55 PM), <https://www.forbes.com/sites/alexandra-sternlicht/2020/05/28/china-tells-citizens-to-stockpile-masks-for-preparedness/#b80df4216009> [<https://perma.cc/T7M4-89NZ>] (noting that the Chinese government’s recent announcements calling for citizens and businesses to build their own stockpiles are “a sharp contrast to countries including the United States that have warned citizens not to stockpile masks” and noting that the Chinese government is “building a three-prong emergency resource reserve plan, reliant on business, family[,] and governmental stockpiles”).

162. Often, stockpiled goods have already expired when the SNS rotates them out, and they thus have little value. See, e.g., Reisinger, *supra* note 39 (“The goal is to have acquisitions in place to fill-behind expiring product as it is cycled out due to expiry.”).

163. See Dickinson, *supra* note 74 (noting that at the beginning of the COVID-19 outbreak in the United States, the SNS had about “12 million [N95] masks, and 5 million of these were past their expiration date, leaving the [SNS] with just 7 million reliable masks”); see also Frieden, *supra* note 69 (quoting New Hampshire Senator Maggie Hassan as complaining that many supplies received from the SNS during the COVID-19 pandemic “were unusable or were expired” and that “[i]t’s not enough to say we have a stockpile; our stockpile has to be sufficient, and it has to be up to date”).

164. Alex Finnis, *Millions of Pieces of PPE in UK Stockpile Were Out of Date When Coronavirus Hit*, INEWS.CO.UK, <https://inews.co.uk/news/health/ppe-coronavirus-out-of-date-expired-respirators-masks-covid-19-2847235> (July 13, 2020, 4:29 PM) [<https://perma.cc/JKA6-8J4Q>] (reporting that “[a]lmost 80 per cent of respirators and more than half of the UK’s supply of facemasks had expired” in the country’s stockpile when the virus outbreak began); Geoff Leo, *Depleted National Stockpile Leaves Canada Reliant on China for Masks, Gowns and Other Supplies During Pandemic*, CBC, <https://www.cbc.ca/news/canada/saskatchewan/ppe-import-china-shortage-1.5552426> (May 6, 2020) [<https://perma.cc/RQU2-93BU>] (describing the government-sanctioned widespread use of expired N95 masks from stockpiles in Canada due to shortages and noting that Ottawa officials alone had dumped 2 million expired N95 masks into a landfill in 2019).

quantities of many highly rotatable stockpile items simply make consistently rotating such goods an arduous task.¹⁶⁵ As former SNS Director Greg Burel noted, it would help if the SNS “had [the] ability to ‘sell off’ stock as it nears its expiration date . . . and invest in new stock,” but “[r]ight now we don’t have that option.”¹⁶⁶

2. Price-Gouging and Commandeering Laws That Weaken Incentives to Stockpile

Another shortcoming of the existing U.S. stockpiling policy structure is that it often weakens incentives to privately stockpile by capping the prices of essential items during emergencies. As highlighted above, demand and supply shocks can cause prevailing market prices for emergency items to temporarily spike during major crises.¹⁶⁷ To combat these effects and deter extortionary behavior, price-gouging restrictions often kick in during major disasters that provisionally impose price ceilings on sales of emergency goods.¹⁶⁸ Some commandeering laws that empower governments to seize privately owned supplies during disasters can similarly create price ceiling effects by authorizing governments to compensate citizens and businesses for seized items based on pre-disaster market prices.¹⁶⁹

Most laws that cap the prices of essential goods during crises are well-intended attempts to address positive externality problems that might otherwise promote the unjust or inefficient allocation of critical items.¹⁷⁰ Consider, for instance, a nurse at a retirement home facility that is contemplating whether to purchase her own large supply of N95 respirator masks during a pandemic so that she can use a new one each time she comes in physical contact with a different facility resident.¹⁷¹ Frequently using new respirator masks in that setting not only

165. See Frieden, *supra* note 69 (quoting Rand Corporation senior policy researcher Daniel Gerstein: “[R]otation of stocks is a big deal; it’s a very expensive process. The federal government is spending about \$570 million a year to maintain the stockpile and restock where necessary.”).

166. *Id.*

167. See *supra* discussion accompanying notes 82–84.

168. For additional details on the federal price-gouging restrictions and some state-level restrictions imposed during the COVID–19 pandemic, see *supra* notes discussion accompanying notes 77–80.

169. For specific examples of these types of commandeering laws, see *supra* discussion accompanying notes 99–106.

170. For a basic introduction to positive externality problems, see generally J.J. Laffont, *Externalities*, in *THE NEW PALGRAVE DICTIONARY OF ECONOMICS* 192–93 (Steven N. Durlauf & Lawrence E. Blume eds., 2d ed. 2008) (describing positive externalities); see also Berardi et al., *supra* note 77.

171. N95 mask shortages have been a major problem for retirement facilities throughout the country during the COVID–19 pandemic. *E.g.*, Jordan Rau, *Nursing Homes Run Short Of COVID-19 Protective Gear as Federal Response Falters*, NPR (June 11, 2020, 5:30 PM), <https://www.npr.org/sections/health-shots/2020/06/11/875335588/nursing-homes-run-short-of-covid-19-protective-gear-as-federal-response-falters> [<https://perma.cc/S66J-HQHC>] (citing Centers for Medicare & Medicaid Ser-

better protects the nurse against contracting the virus; it also benefits every resident in the facility by reducing the odds that the nurse will spread the disease to others.¹⁷² However, because the nurse does not capture or “internalize” all of these external benefits, she may instead rationally opt not to buy the masks and to wear less-expensive surgical masks provided by her employer that provide far less virus protection.¹⁷³ Temporarily capping the prices of items that are most critical to slowing the spread of a highly contagious virus can theoretically mitigate this type of externality problem and thereby promote more optimal levels of use of these otherwise more expensive items. Such price restrictions might also promote social justice by making critical supplies more affordable for socioeconomically disadvantaged communities.

Unfortunately, laws that impose temporary price ceilings on sales of essential items during emergencies can also unintentionally weaken *ex ante* incentives to engage in efficient levels of voluntary stockpiling. It is easy to illustrate these distortive effects through numerical examples featuring the same hypothetical hospital featured above. Suppose that this hospital has a rotatability factor of 1.00 for masks and resides in a jurisdiction whose laws strictly prohibit sales of the masks at more than 20% above pre-disaster market prices during an officially declared emergency. Such a restriction would preclude the hospital from legally selling off any masks it did not need during a crisis at the temporarily crisis-elevated market price (V_e) of \$5. Such inability to legally sell off extra masks in that context would reduce the value of V_e on the right side of Equation (4) above from \$5 to as low as \$1.20.¹⁷⁴

vides records indicating that “711 nursing homes reported having run out of N95 masks, and 1,963 said they had less than a week’s worth” during the COVID-19 pandemic as of June 2020).

172. See Mayo Clinic Staff, *How Well Do Face Masks Protect Against Coronavirus?*, MAYO CLINIC (May 18, 2021), <https://www.mayoclinic.org/diseases-conditions/coronavirus/in-depth/coronavirus-mask/art-20485449> [https://perma.cc/3AYU-E5WA] (noting that an “[N95 mask] offers more protection than a medical mask does because it filters out both large and small particles when the wearer inhales”). The CDC has specifically advised healthcare professionals in assisted care facilities to wear N95 masks when coming into close contact with any resident with a fever or other symptoms consistent with COVID-19. *Considerations for Preventing Spread of COVID-19 in Assisted Living Facilities*, CTRS. FOR DISEASE CONTROL & PREVENTION, <https://www.cdc.gov/coronavirus/2019-ncov/hcp/assisted-living.html> (May 29, 2020) [https://perma.cc/Y5DR-D8SY].

173. See Apoorva Mandavilli, *Medical Workers Should Use Respirator Masks, Not Surgical Masks*, N.Y. TIMES, <https://www.nytimes.com/2020/06/01/health/masks-surgical-n95-coronavirus.html> (June 26, 2020) [https://perma.cc/QF4L-X3NS] (describing a World Health Organization-funded analysis of 172 studies that concluded that “N95 and other respirator masks are far superior to surgical or cloth masks in protecting essential medical workers against the coronavirus”).

174. To be clear: The precise value of V_e in this example is likely some amount greater than \$1.20 but is difficult to pinpoint because it depends on multiple additional factors. The hospital itself may value the mask for its own internal use during a crisis at an amount exceeding \$1.20. On the other hand, the price-gouging restriction

Of course, substituting this much lower value for V_e also greatly diminishes the total expected benefit (B) of stockpiling the item. Specifically, this benefit (B)—which was \$0.26 per mask when V_e equaled \$5—would become:

$$\begin{aligned} &(0.05)(\$1.20) + 0.01 \\ &= \$0.07. \end{aligned}$$

By shrinking the expected benefit of stockpiling the mask from \$0.26 to as low as \$0.07, the price-gouging restriction would extinguish the hospital's incentive to incur the \$0.10 cost (C) of stockpiling it.¹⁷⁵

Most commandeering laws can also serve valid public purposes of helping to efficiently and equitably distribute essential items during disasters, but if such laws under-compensate citizens for seized goods, they can similarly reduce V_e and discourage private stockpiling. To illustrate: Suppose that instead of being subject to a price-gouging restriction, our hypothetical hospital resides in a jurisdiction with commandeering laws. These laws specifically allow the government to unilaterally acquire essential medical items from private owners during declared emergencies at their pre-emergency price (V_o). Suppose further that there is only a 20% chance the state will exercise this power against the hospital in a relevant emergency and a corresponding 80% chance the state will not exercise it. Under these revised assumptions, and assuming again that $V_o = \$1$ and $V_e = \$5$, the existence of this commandeering power would reduce the expected benefit (B) on the right side of Equation (4) as follows:

$$\begin{aligned} &(0.20)(0.05)(\$1.00) + (0.80)(0.05)(\$5.00) + 0.01 \\ &= \$0.01 + \$0.20 + \$0.01 \\ &= \$0.22. \end{aligned}$$

would protect the hospital from others' price-gouging and could enable the hospital to acquire masks at lower prices during an emergency, placing some downward pressure on the value of V_e . Regardless, the point of the example remains intact: Adding a price-gouging restriction almost invariably reduces V_e by taking away a stockpiler's option to sell off unneeded stockpiled masks during emergencies at much-higher mid-crisis prices.

175. As at least one scholar has noted, the disincentivizing effects illustrated in this numeric example are visible in real-life stockpiling decisions. *See, e.g.*, Russ Roberts, *Price Gouging Could Actually Fix Our Face Mask Shortage*, MARKER (May 4, 2020), <https://marker.medium.com/price-gouging-could-actually-fix-our-face-mask-shortage-e85abb16b75e> [<https://perma.cc/V2WA-97SN>] (arguing that higher market prices for scarce items during a disaster “give people an incentive to prepare for the future because they know that a stockpile is worth a lot in a crisis” while preventing sales at such prices “discourages people from stockpiling for a future pandemic”).

As this calculation shows, commandeering laws that under-compensate private owners do reduce the expected benefits of stockpiling but not as sharply as comparable price-gouging restrictions because of the possibility that the state will not opt to exercise its commandeering powers in a relevant crisis.¹⁷⁶

Price-gouging restrictions and under-compensating commandeering laws do not only deter stockpiling before an emergency occurs; they can also motivate some stockpilers to take actions during crises that further exacerbate shortages. In particular, such laws can motivate stockpilers to hoard or hide their inventories of critical goods rather than selling them into private markets or helping governments to easily commandeer them at artificially low prices. Such laws can also slow the flow of critical emergency resources to their highest-valued uses by diluting price signals during crises that might otherwise spur increased production of temporarily scarce goods.¹⁷⁷ An ideal stockpiling policy regime would preserve the desirable functions of commandeering laws and price-gouging restrictions while limiting the counterproductive side effects of these policies.

3. Diminished Stockpiling Incentives Due to Misconceptions About the SNS

Yet another downside of the nation's existing stockpiling policy structure is its failure to clearly allocate stockpiling-related duties and privileges among the federal government, states, and the private sector. A misplaced belief that the SNS would distribute as many medical supplies at pre-disaster prices as any state, city, or hospital might need during a disaster appeared to further deter many states, cities, and businesses from adequately stockpiling in the years preceding the COVID-19 pandemic.¹⁷⁸ And although the pandemic proved the fallacy of this presumption, it remains unclear how stockpiling roles are legally allocated among the federal government, subnational govern-

176. Specifically, the price-gouging restriction reduced the per-unit expected benefit of stockpiling from \$0.26 to \$0.07, and the commandeering law merely reduced it from \$0.26 to \$0.22. Of course, this example assumed a 20% probability that the government would exercise its commandeering power. Assuming a higher probability would have strengthened the commandeering law's deleterious effect.

177. Other commentators writing before and during the pandemic have emphasized this downside of price-gouging restrictions. See, e.g., Mark Klock, *Unconscionability and Price Discrimination*, 69 TENN. L. REV. 317, 334 n.115 (2002) (arguing that an Alabama statute prohibiting sales of essential items at more than 25 percent above pre-disaster prices "exacerbates a shortage of emergency supplies by encouraging their depletion for non-emergency uses"); Roberts, *supra* note 175 ("If you hold prices down artificially when masks are in high demand, you destroy the financial incentive to make more masks. You also destroy any incentive to create excess capacity or stockpiles for a future pandemic.").

178. This confusion over the allocation of stockpiling duties is highlighted in detail in Part III above. See generally discussion *supra* Section III.A.1.

ments, and the private sector—an uncertainty that only further weakens incentives for valuable private stockpiling.¹⁷⁹

A false perception that the SNS is ready and able to furnish back-up supplies as needed distorts stockpiling incentives in ways that are also frameable within the stockpiling cost-benefit model set forth above. Specifically, an expectation that the SNS will step in and provide supplies for free or at pre-emergency prices during crises reduces would-be stockpilers' anticipated crisis-period value (V_e) for such items. The effect of this lower V_e figure is largely the same as the effect of price-gouging restrictions shown above: It decreases the expected benefit (B) of state, local, and private stockpiling and thus reduces these parties' incentives to voluntarily stockpile.¹⁸⁰

4. Under-Investment in Domestic Supply Chains for Less-Rotatable Emergency Items

One other major deficiency in the existing U.S. stockpiling policy structure is its failure to support and preserve the nation's capacity to ramp up domestic production of essential goods during crises. The only cost-effective way to prepare for a long-lasting spike in demand for a difficult-to-rotate emergency item is to maintain such capacity. Unfortunately, before the COVID-19 outbreak, most of the ventilators, respirator masks, testing kit supplies, and other relatively difficult-to-rotate medical items that fell into short supply during the pandemic's early stages were produced primarily outside the United States or with internationally sourced materials.¹⁸¹ This reliance on international supply chains made it difficult for the United States to quickly ramp up domestic production of these goods.

The country's longtime dependence on overseas supply chains for many essential medical items is also attributable to a basic positive externality problem.¹⁸² Would-be domestic manufacturers of emer-

179. The significant need to clarify the allocation of stockpiling duties among the federal government, states, and localities was a major point of emphasis during a June 2020 U.S. Senate Committee hearing focused on the SNS. See Frieden, *supra* note 69 (quoting Senator Ron Johnson as complaining that the name of the SNS is “misleading” because it falsely “implies we’ve got this massive amount of well-thought-out supplies and we’ve got them adequately stocked to handle a pandemic” and quoting a senior policy researcher’s assertion that the SNS needs “[a] new mission statement, codified in law and not subject to the whims of any administration, . . . to signal the capacities and limits of the SNS”).

180. To review these effects, see generally *supra* notes 174–75 and accompanying text.

181. See Keith Bradsher, *China Dominates Medical Supplies, in This Outbreak and the Next*, N.Y. TIMES (July 5, 2020), <https://www.nytimes.com/2020/07/05/business/china-medical-supplies.html?action=click&module=relatedLinks&pgtype=article> [<https://perma.cc/BYW4-GUA2>] (highlighting China’s majority share of the global production market for many essential medical items and the potential challenges that creates for the United States).

182. An externality arises whenever “the activity of one entity . . . directly affects the welfare of another in a way that is not transmitted by market prices.” Harvey S.

gency items have historically had no way to fully internalize the broader “social” benefits of sourcing and producing critical materials domestically—including that of enabling the country to more quickly and easily increase domestic manufacturing in response to emergency shortages. The predictable result of this externality problem has been suboptimally low levels of private investment in domestic production capacity for many key emergency items with lower-priced foreign producers largely dominating U.S. markets for these goods.¹⁸³

Policies that address this positive externality problem and better sustain adequate domestic supply chains and production capacity for essential emergency goods are critical to ensuring the nation is prepared for long-lasting global public health crises akin to the COVID–19 pandemic.¹⁸⁴ An ability to swiftly kick-start the manufacture of large quantities of essential goods is crucial in emergencies that persist for several months and cause worldwide shortages that prompt other countries to hoard key materials and production equipment for use within their own borders.¹⁸⁵

V. REFORMING THE U.S. STOCKPILING POLICY STRUCTURE

As the COVID–19 crisis made painfully clear, the United States’ existing approach to stockpiling for emergencies has plenty of room for improvement. The nation’s stockpiles of several highly rotatable medical items proved to be woefully inadequate during the pandemic’s early phases. These failures have likewise prompted concerns that the country’s existing policy structure similarly falls short in sup-

Rosen, *PUBLIC FINANCE* 86 (5th ed. 1999). A “positive” externality problem exists when an activity generates benefits for at least one outside party that are not internalized through market forces by the party or group directly engaged in the activity. *See id.*

183. Basic microeconomic theory identifies underproduction as the primary market failure resulting from positive externalities. *See, e.g.*, Christopher J. Coyne & Peter T. Leeson, *Who’s to Protect Cyberspace?*, 1 *J.L. ECON. & POL’Y* 473, 479 (2005) (“In the case of positive externalities, the primary actor does not internalize all benefits of his action. Theoretically, positive externalities will be undersupplied on the market . . .”).

184. The lack of such domestic capacity grew increasingly apparent as the nation struggled to address supply shortages for certain critical goods several months after the COVID–19 pandemic began. Benjamin Siegel & Josh Margolin, *Doctors, Nurses Warn of Another Protective Gear Shortage as Coronavirus Surges*, ABC NEWS (July 15, 2020, 9:52 AM), <https://abcnews.go.com/Health/doctors-nurses-warn-protective-gear-shortage-coronavirus-surges/story?id=71778380> [<https://perma.cc/R743-VEFC>] (reporting that FEMA disclosed in July 2020 that the nation’s demand for surgical isolation “gowns ‘outpaces current U.S. manufacturing capabilities[.]’ and that there is no U.S.-based manufacturing for synthetic rubber gloves”).

185. Such international hoarding likely hindered the broader global COVID-19 pandemic response. *See generally* Andrea Shalal, *80 Countries Are Hoarding Medical Supplies—Here’s Why It Damages the Global Response to COVID-19*, WORLD ECON. F. (Apr. 24, 2020), <https://www.weforum.org/agenda/2020/04/wto-report-80-countries-limiting-exports-medical-supplies> [<https://perma.cc/BYCC9-2ZHQ>].

porting the public and private stockpiling of food, critical electronics, certain infrastructure-related materials, and other essential goods.¹⁸⁶

Fortunately, many deficiencies currently plaguing the U.S. stockpiling system could be addressed through affordable reforms designed to better engage the nation's vast private sector resources in the stockpiling effort. These reforms would ideally supplement rather than replace most existing SNS initiatives and might also help in the buildout of new U.S. stockpiling programs for food grains and certain other goods. The following materials outline the details of such potential reforms and their advantages over the country's current stockpiling policy regime.

A. *Stockpiling Tax Credits for Rotatable Emergency Supplies*

Enacting a new federal income tax credit program to promote the private stockpiling of rotatable emergency supplies could do much to cost-effectively expand the nation's stockpile of these items. As emphasized in Part III above, excessive reliance on the SNS to stockpile many rotatable medical items has historically generated unnecessary depreciation costs within the nation's stockpiling system.¹⁸⁷ Private companies that routinely use or sell large quantities of rotatable emergency supplies are in a far better position than a single centralized federal agency to offset these costs by maintaining and rotating their own stockpiles. Many such companies may also be better situated and incentivized to develop innovations that reduce depreciation costs by extending the shelf lives of emergency items or putting such items to alternative uses.

In recent decades, most private medical facilities throughout the United States have employed "just-in-time" inventory management methods and thus kept relatively few back-up supplies of emergency medical items on hand.¹⁸⁸ It is hardly surprising that healthcare facilities have embraced these methods, which can often increase net profits by avoiding the depreciation costs, warehousing costs, and

186. See Kirchoff, *supra* note 19; see also Weissert, *supra* note 121 (describing Joe Biden's plan to "reinforce stockpiles" of not just medical items but also of "energy and grid resilience technologies, semiconductors and key electronics, [and] telecommunications infrastructure and raw materials").

187. See discussion *supra* Section III.B.1.

188. Yossi Sheffi, *Commentary: Solving the Health-Care Equipment Supply Shortage*, WALL ST. J. (Apr. 10, 2020, 6:00 AM), <https://www.wsj.com/articles/commentary-solving-the-health-care-equipment-supply-shortage-11586512801> [<https://perma.cc/4YYV-DDJW>] (arguing that hospitals' use of just-in-time inventory principles, which call for "lean inventories and tight connections between companies and their suppliers," has made supply chains for many essential medical supplies "vulnerable to unexpected and large-scale disruptions" and citing hospitals' use of these principles as "one of the main reasons the coronavirus pandemic has crippled health[care] supply chains").

opportunity costs associated with excess inventories.¹⁸⁹ Many health-care facilities have likewise historically seen few emergency preparation advantages in maintaining their own private stockpiles due to misplaced beliefs that the SNS could step in and furnish scarce supplies during a major disaster.

A well-structured federal income tax credit program could make private stockpiling a far more appealing investment for high-volume users and vendors of rotatable emergency supplies. Tax credit programs have a long history of successfully driving targeted types of private investment in other policy areas such as affordable housing and renewable energy development and could offer similar benefits in the context of stockpiling policy.¹⁹⁰ The COVID-19 pandemic is already prompting some hospital systems to consider building out their own medical supply stockpiles.¹⁹¹ Sophisticated software-based systems are also increasingly available to help heavy users and sellers of medical items more efficiently rotate their inventories of supplies.¹⁹² Introducing a new tax credit program could build on this momentum and motivate healthcare providers and medical goods vendors across the country to replace just-in-time inventory management methods with stockpiling activities. As described below, legislators could even design the tax credit program to enable the quick and easy commandeering of essential goods during crises while preserving private incentives to stockpile.

1. Structuring the Credits to Promote Continuous Stockpiling

The federal renewable energy production tax credit (“PTC”), which has attracted billions of private investment dollars into U.S. wind en-

189. *See id.* (noting that using just-in-time inventory methods “reduces manufacturing and supply chain costs” and that “[w]hen hospital [just-in-time] supply chains run as advertised, the savings in those costly and high-stakes systems can be substantial”).

190. Rigel C. Oliveri, *Vouchers and Affordable Housing: The Limits of Choice in the Political Economy of Place*, 54 HARV. C.R.-C.L. L. REV. 795, 803 (2019) (describing the federal Low-Income Housing Tax Credit Program, which has existed since its legislative enactment in 1986 as “[o]ne of the most successful supply-side mechanisms to increase the amount of affordable housing”); David A. Domansky, *The Indefatigable Power of Wind: A Practical Treatment of Development of Wind Projects*, 55 ROCKY MOUNTAIN MIN. L. INST. 5-1, 5-6 (2009) (calling the federal Production Tax Credit a “key driver of wind project development”).

191. *E.g.*, Alma Gaul, *Quad-City Hospitals Feel Secure About PPE Now*, MUSCATINE J. (June 20, 2020), https://muscatinejournal.com/news/local/quad-city-hospitals-feel-secure-about-ppe-now/article_5a6db6e7-e2be-5e95-84e8-4e2fd18e7611.html [<https://perma.cc/LEA5-2PZJ>] (quoting a hospital administrator describing how its hospital system is “creating a 90+ day stockpile of PPE supplies”).

192. Rachel Z. Arndt, *Hospital Supply Inventory Management Creating a Cottage Industry for Technology*, MOD. HEALTHCARE (July 28, 2018, 1:00 AM), <https://www.modernhealthcare.com/article/20180728/TRANSFORMATION02/180729935/hospital-supply-inventory-management-creating-a-cottage-industry-for-technology> [<https://perma.cc/J8WP-4GL3>] (describing hospitals’ increasing use of tailored inventory management software).

ergy development over the past quarter century, is a useful starting point for designing a new federal stockpiling tax credit (“STC”) program.¹⁹³ The PTC’s structure enables it to continue incentivizing its targeted activity for many years into the future. Rather than providing a single, one-time tax credit based on a taxpayer’s initial investment in the development of a wind farm, the PTC program awards tax credits year after year on a cents-per-kilowatt-hour basis to encourage ongoing electricity generation at such projects for at least a decade after they commence operations.¹⁹⁴ A new STC program could similarly promote continuous stockpiling by awarding income tax credits for the stockpiling of certain prescribed items on a cents-per-unit-per-year basis. For example, the program might allow an eligible taxpayer to claim a four-cents-per-year credit for each stockpiled respirator mask or a six-cents-per-year credit for each stockpiled surgical isolation gown. These credits would directly increase the expected benefit (*B*) of stockpiling and thereby promote more voluntary private stockpiling activity in the United States.

Federal legislation creating a new STC program would need to clearly specify which goods qualify and require that taxpayers claiming credits only use storage facilities and practices that conform to manufacturers’ recommendations. To limit administrative costs associated with the program, such legislation could likewise require that taxpayers stockpile some minimum quantity of an eligible good to register for and claim any STCs.¹⁹⁵ To certify compliance with the STC program’s eligibility standards, taxpayers hoping to claim the STC could be required to submit an application and receive an HHS “Notice of Registration” before the commencement of any given tax year to be eligible for credits that year. The HHS, with possible assistance from state health departments, could likewise have statutory authority to audit and inspect private medical stockpiles and issue penalties for false or fraudulent STC claims.¹⁹⁶

193. Certain other types of renewable energy development commenced before the end of 2020, including closed-loop biomass and geothermal energy projects, also qualified for the PTC as of July 2020. For a detailed primer on the renewable energy production tax credit program, see generally MOLLY F. SHERLOCK, R43453 THE RENEWABLE ELECTRICITY PRODUCTION TAX CREDIT: IN BRIEF, CONG. RSCH. SERV. 1, <https://sgp.fas.org/crs/misc/R43453.pdf> (Apr. 29, 2020) [<https://perma.cc/82XC-ZPBR>].

194. *Id.*

195. Such minimum standards might also make it easier during emergencies for government officials to commandeer large quantities of essential supplies as described in more detail below. See *infra* notes 197–98 and accompanying text.

196. State agencies have long conducted healthcare facility inspections on behalf of the federal Centers for Medicare and Medicaid Services, and federal law requires that reports summarizing violations uncovered during such inspections be made publicly available. See generally 42 C.F.R. § 401.133 (2011). To explore the Association of Health Care Journalists’ website providing easy access to many of these reports, see *Search Hospital Inspections*, ASS’N HEALTH CARE JOURNALISTS, <http://www.hospitalinspections.org/> (Apr. 2021) [<https://perma.cc/9LUY-ZP5P>].

To ensure that registered STC stockpiles are spread geographically across the country, federal regulators could also issue state-by-state caps on available STCs for qualifying stockpile items. For decades, an analogous state-by-state tax credit allocation approach has helped to promote geographic diversity among projects receiving the federal low-income housing tax credit.¹⁹⁷ Capping the total dollar amounts of STCs claimable in each state for various items would not only help to geographically distribute private emergency stockpiles; it would also make the federal government's annual cost of funding the STC program more predictable.¹⁹⁸ After publicly announcing these caps, the HHS—again with possible help from state health departments—could initially approve eligible STC registrants on a first-come, first-served basis until each state reached its maximum credit allocation. To preserve stockpilers' investment incentives, those who successfully claimed credits in the immediately preceding year could thereby qualify for priority when applying to renew their STC registration in the subsequent year.

2. Calculating the Credits and Their Cost

A simple numerical example helps to illustrate how an STC program could affordably expand the nation's stockpile of rotatable emergency supplies. Suppose the HHS has set a target of ensuring that at least 10 million N95 respirator masks were stockpiled at all times in the state of Illinois. If the agency were to purchase and store that quantity of masks within the state on its own or through vendor-managed inventories, the acquisition costs alone would total several million dollars. The HHS would then also have to regularly rotate and find private buyers for the masks as they aged to avoid depreciation costs—a task that has historically proven difficult for the agency.¹⁹⁹

The federal government could more affordably achieve the same objective of ensuring that Illinois has 10 million stockpiled N95 masks using the potential STC program described above. If the STC program had been enacted and offered credits for stockpiled N95 masks at a rate of four cents per mask per year, the HHS could pursue its target

197. For basic information about the federal Low Income Housing Tax Credit and the population-based, state-by-state approach to allocating that credit, see MARK P. KEIGHTLEY, AN INTRODUCTION TO THE LOW-INCOME HOUSING TAX CREDIT, CONG. RSCH. SERV. 1–2, 4, <https://crsreports.congress.gov/product/pdf/RS/RS22389> [<https://perma.cc/9LJX-X2K4>].

198. For instance, if Congress has allocated \$660 million to STC program for an upcoming year and the total U.S. population were 330 million, there would be roughly \$2.00 per citizen available to fund the program. HHS could easily use this \$2.00 figure to calculate state-by-state STC caps such that a state with 5 million citizens qualified for up to \$10 million in total credits. The agency could then further delineate which specific proportions of that total available allocation are available for stockpiling N95 masks, isolation gowns, shoe covers, and the like.

199. These challenges in rotating SNS-owned supplies are described in detail above. See *supra* Section III.A.2.

of 10 million masks by making \$400,000 in STCs available to taxpayers for stockpiling N95 masks in the state. The HHS could then award these credits on a first-come, first-served basis to taxpayers who met specific registration criteria. Limits on the number of tax credits any one taxpayer could claim in a state could further help to ensure that registered STC stockpiles are owned by a diverse collection of taxpayers and are geographically distributed throughout each state. Most STC registrants would presumably be medical goods vendors or healthcare companies capable of more easily offsetting depreciation costs associated with their stockpiles through consistent rotation practices.

Calculating a taxpayer's earned STCs for any given year and type of item would be a relatively simple exercise. If, for example, an Illinois hospital had successfully registered to claim STCs for storing 500,000 masks in a given year, multiplying this quantity by the \$0.04 annual per-unit tax credit amount would yield income tax credits totaling \$20,000. If the hospital were to store each registered mask for four years before rotating it out for in-house use before it expired, the hospital would be able to claim a total of \$0.16 for storing it over that four-year period—a significant cost savings given that the wholesale price for such masks is typically less than \$1.

Although an STC program would certainly require new federal government expenditures, those relatively modest expenditures could be a worthwhile and cost-effective means of better equipping the country for future crises. In the years leading up to the COVID-19 pandemic, the federal government's annual funding of the SNS was in the range of \$500 million to \$600 million per year.²⁰⁰ By comparison, the U.S. Department of Defense's proposed 2020 budget was \$718 billion—more than one thousand times larger than historic annual SNS budgets.²⁰¹ Modestly increasing federal stockpiling budgets through programs such as a new STC would seem a comparatively small price to pay to safeguard American lives especially in light of the fact that as of September 2021, roughly 645,000 U.S. citizens had died from COVID-19.²⁰²

200. Doug Palmer, *U.S. Medical Stockpile Wasn't Built to Handle Current Crisis, Former Director Says*, POLITICO (Apr. 8, 2020, 2:53 PM) <https://www.politico.com/news/2020/04/08/national-stockpile-coronavirus-crisis-175619> [<https://perma.cc/N2B2-VKFJ>] (reporting that the SNS annual budget “ranged around \$500 million to \$600 million” under the Obama administration and that the “Trump [A]dministration initially followed that pattern, requesting \$575 million for the stockpile for both fiscal 2018 and 2019”).

201. See *Long-Term Implications of the 2020 Future Years Defense Program*, CONG. BUDGET OFF. (Aug. 2019), <https://www.cbo.gov/publication/55500> [<https://perma.cc/Y7WC-6MJZ>].

202. John Elflein, *Total Number of Cases and Deaths from Coronavirus (COVID-19) in the United States as of September 4, 2021*, STATISTA (Sept. 6, 2021), <https://www.statista.com/statistics/1101932/coronavirus-covid19-cases-and-deaths-number-us-americans/> [<https://perma.cc/9N66-59WE>].

B. *Special Commandeering Rules for STC-Registered Stockpiles*

Because the STC program just described would rely on private parties to own and store far more of the nation's emergency stockpiles, it would also rely more on commandeering powers during major crises to aid the government's redistribution of STC-registered items to those in greatest need. Unfortunately, as highlighted above, private stockpilers who believe they will be under-compensated for seized goods under commandeering laws may be motivated to hide or hoard critical supplies during emergencies.²⁰³ Such under-compensating commandeering laws can also deter private stockpiling altogether by reducing the expected benefits of stockpiling activities.²⁰⁴

As outlined below, one way to support the increased use of commandeering powers under an STC program while mitigating the distortive effects of commandeering laws would be to require that governments pay enhanced compensation when seizing STC-registered items. The program's enabling legislation could also limit the hoarding and hiding of items during crises by authorizing heavy penalties for taxpayers who failed to promptly make STC-registered items available after a commandeering request. And certain other legislative provisions described below might even clarify the allocation of stockpiling-related duties and privileges between states and the federal government.

1. Requiring Enhanced Compensation for Seized Goods

Congress could mitigate the adverse effects of commandeering laws on private stockpiling by requiring that governments pay enhanced, stipulated compensation—such as triple an item's pre-disaster fair market value—when commandeering STC-registered supplies. Such an enhanced compensation requirement would increase V_e and improve the net benefits of private stockpiling, thereby further strengthening stockpiling incentives. An enhanced compensation requirement could also make STC-registered stockpilers more willing to cooperate with commandeering actions during crises, enabling governments to more swiftly locate and procure essential supplies when they are needed most. If STC registrants were required to report their per-unit prices paid for STC-registered goods during the registration process, such a rule could also reduce disputes over the compensation due for commandeered items.

Although an enhanced compensation requirement for STC-registered stockpile items would provide compensation in excess of what

203. See *supra* notes 176–77 and accompanying text.

204. The threat of commandeering with under-compensation reduces V_o , diminishing the expected benefits of stockpiling and thereby weakening incentives to privately stockpile. This adverse effect of commandeering laws on private stockpiling is explained in detail in Part III above. See *supra* notes 176–77 and accompanying text.

stockpilers paid for seized items, this approach would likely be defensible as “just compensation” under the Takings Clause. Given that there were price spikes of 800% or higher for certain emergency goods during the COVID–19 pandemic, some might argue that stipulating even triple compensation for commandeered items could actually under-compensate some private stockpilers in severe crises.²⁰⁵ However, a rule requiring triple compensation would be far more “just” than the pre-disaster-price-based compensation approach employed in some jurisdictions. And there is plenty of precedential support for statutory provisions requiring compensation at more than 100% of fair value in special situations.²⁰⁶

Congress could even enact provisions in its STC program enabling legislation that empowers the HHS, FEMA, or other federal agencies to unleash STC-registered private stockpiles into the marketplace without ever exercising commandeering powers. For instance, such provisions could authorize the HHS during a major emergency to issue notices temporarily authorizing private stockpilers in certain crisis-affected states or counties to use or sell specified percentages of certain STC-registered supplies without any tax penalty. These notices could even exempt such sales from any relevant price-gouging restrictions so long as sale prices stayed below the STC program’s stipulated triple-compensation amounts. This type of alternative emergency response strategy could facilitate the speedy injection of much-needed supplies into targeted markets during disasters, thereby easing shortages and enabling federal agencies to allocate more government-owned resources to the hardest-hit or most under-privileged communities.

2. Clarified Federal and State Government Roles

Certain other rules capable of being integrated into a new STC program could clarify the allocation of stockpile-related roles and privileges between states and the federal government. For example, the program’s enabling legislation could expressly preempt states’ use of commandeering powers to seize STC-registered items without express federal authorization. Armed with such preemptive powers, the federal government would have discretion to temporarily delegate lim-

205. See *supra* discussion accompanying note 82.

206. So long as recitals in the federal legislation effectively articulate the rationale for providing reasonably enhanced stipulated compensation, such approach would likely not violate the Takings Clause “just” compensation requirement. Multiple state statutes have long authorized compensation of up to 150% fair market value for certain types of property. See, e.g., MO. REV. STAT. § 523.001(2), 523.039 (2006) (authorizing 125% eminent domain compensation for qualifying properties to account for the “heritage” value). For a detailed review of state laws authorizing or requiring compensation exceeding fair market value, see generally Maria M. Maciá, *Pinning Down Subjective Valuations: A Well-Being-Analysis Approach to Eminent Domain*, 83 U. CHI. L. REV. 945, 950–56 (2016).

ited commandeering authority to targeted states and only as to certain specific STC items during emergencies. These temporary delegations could additionally require that states use the same enhanced triple-compensation terms that would apply if a federal agency were commandeering the items.

Another plausible way to clarify state and federal government stockpiling roles through STC program legislation would be to make certain STC-related powers hinge on official declarations of state or national emergencies.²⁰⁷ For example, the STC program's enabling legislation could provide that if a state government has officially declared an emergency within its boundaries but the federal government has not declared a national emergency, the state is temporarily empowered to commandeer STC-registered items within its borders as needed at the federal program's stipulated compensation rates. The legislation could then further provide that if the federal government declares a national emergency, states' commandeering powers over STC-registered supplies automatically terminate, and states can thus commandeer only non-STC-registered items or seek to purchase supplies directly from the SNS.

An STC program's enabling legislation could even encourage state and city governments to invest more into maintaining their own public stockpiles through provisions that more clearly protect such stockpiles from federal commandeering. Reports of such federal commandeering of state government supplies surfaced during early stages of the COVID-19 crisis.²⁰⁸ In the absence of statutory protections against these actions, the threat that a federal agency might seize subnational government stockpiles and under-compensate for them reduces V_e for states and municipalities and thus deters these entities' incentives to stockpile. Simple statutory language that expressly shields state- and city-owned emergency stockpiles from federal commandeering powers could easily eliminate this threat and thus encourage more subnational government stockpiling.

C. *Maintaining Domestic Supply Chains for Essential Supplies*

In addition to all the reforms just described, one other category of federal government support seems essential to developing a reliable U.S. stockpiling structure: policies that subsidize the buildout and

207. State governments and some municipal governments have power to declare an official state of emergency within their jurisdictions, and certain federal government officials have similar powers to declare national emergencies. See James G. Hodge, Jr. & Kim Weidenaar, *Public Health Emergencies as Threats to National Security*, 9 J. NAT'L SEC. L. & POL'Y 81, 82–83 (2017).

208. E.g., Polly Mosendz, *Governors Consider Consortium to Skirt FEMA Dysfunction (I)*, BLOOMBERG L. (Apr. 9, 2020, 6:46 PM), <https://news.bloomberglaw.com/coronavirus/governors-consider-supply-consortium-to-skirt-fema-dysfunction> [<https://perma.cc/WLQ6-WCL7>] (reporting that “[i]n an effort to restock, FEMA has been commandeering supplies from states”).

maintenance of domestic supply chains for many emergency items. Sustaining the nation's capacity to swiftly ramp up high-volume domestic production is particularly crucial for those essential goods that are difficult to rotate or are susceptible to prolonged shortages during drawn-out crises.

Relying solely on fully rotatable stockpiles is seldom a viable stockpiling strategy for emergency items with low rotatability factors.²⁰⁹ For these difficult-to-rotate goods, policymakers generally must supplement rotatable stockpiling with two additional strategies: (1) maintaining some non-rotatable stockpiles with contents that are regularly discarded and replaced as they expire and (2) otherwise sustaining the domestic capacity to quickly produce large quantities of these items in the event of a prolonged shortage.

Certain types of non-rotatable supplies, such as nerve agent antidotes, are needed so immediately after a crisis hits that merely having the ability to rapidly kickstart the production of them is not acceptable emergency preparation.²¹⁰ For these goods, the SNS's existing practice of centrally stockpiling enough to support an initial emergency response is probably the only acceptable approach despite its relatively high net cost.

For most other difficult-to-rotate emergency goods, however, the most cost-effective stockpiling strategy may be to maintain domestic supply chains capable of supporting high-volume production of such items on short notice. A wide variety of policy strategies are capable of sustaining these domestic supply chains. As highlighted in Part III above, some federal legislators have recently floated proposals calling for federal ownership and control of domestic supply chains for certain essential goods.²¹¹ In contrast, some others have proposed policies that would incentivize private companies to build out and maintain these supply chains on U.S. soil.²¹² Because they leverage market forces, these private-sector-focused policies would likely be more cost-effective.

209. To review what constitutes a "rotatability factor" and how it is measured, see generally *supra* discussion accompanying notes 138–29.

210. The CDC website advises that two common types of nerve agent antidotes "must be administered within minutes to a few hours (depending on the agent) following exposure to be effective." Nat'l Inst. for Occupational Safety & Health, *SARIN (GB): Nerve Agent*, CTDS FOR DISEASE CONTROL & PREVENTION (May 12, 2011), https://www.cdc.gov/niosh/ershdb/emergencyresponsecard_29750001.html#:~:text=ANTIDOTE%3A%20Atropine%20and%20pralidoxime%20chloride,injections%20of%20%2DPAM%20Cl [<https://perma.cc/QXV4-RNUR>].

211. See *supra* discussion accompanying notes 116–118.

212. Frieden, *supra* note 69 (quoting former SNS Director Greg Burel as arguing that the federal government has a "responsibility to expand public private partnerships so we can understand what it's going to take to get the private sector to come back and do more manufacturing" and noting Senator Rob Portman's frustration that the federal government "doesn't seem to be doing the obvious things to re-shore our PPE . . .").

It may even be possible to incentivize the maintenance of domestic supply chains for targeted emergency items by adding additional features to the possible STC program described above. For instance, provisions in the STC program's enabling legislation could require STC registrants to certify during registration that a specified minimum percentage of their stockpiled inventories of qualifying goods were fully sourced and manufactured in the United States.²¹³ These minimum required percentages of domestically sourced goods could then gradually increase over time according to a prescribed schedule, generating predictable market demand growth and thereby helping to support greater private investment in domestic supply chains for targeted items.²¹⁴

A separate "domestic manufacturing investment tax credit program" comparable to the highly successful investment tax credit program for solar energy development is another plausible strategy for driving the private development of domestic supply chains for hard-to-rotate emergency goods.²¹⁵ This type of program, which actually appeared in some form in a 2020 Senate bill entitled the "Restoring Critical Supply Chains and Intellectual Property Act," would award income tax credits for qualifying private investments in domestic supply chain development activities involving certain prescribed emergency goods.²¹⁶ Unfortunately, as of early 2021, Congress had not yet enacted this bill nor multiple other proposed bills aimed at supporting domestic supply chains for emergency medical goods,²¹⁷ and the re-

213. Existing "Made in the USA" certification standards, including some promulgated by the Federal Trade Commission, could assist in the development of such requirements for stockpiled goods. See Lisa Smith, *What It Takes to Be 'Made in the USA'*, INVESTOPEDIA, <https://www.investopedia.com/articles/economics/12/made-in-the-usa.asp> (Aug. 6, 2020) [<https://perma.cc/W5QD-4AR9>].

214. Such gradual increasing of standards over time is a common regulatory strategy for promoting continued innovation in a particular area. The federal vehicle fuel economy standards are one example of a use of this approach. See The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021–2026 Passenger Cars and Light Trucks, 85 Fed. Reg. 24,174, 24,175–76 (Apr. 30, 2020) (to be codified at 40 C.F.R. pts. 86 and 600) (increasing fuel economy standards by 1.5% per year through the year 2026).

215. See *Fact Sheet: Solar Investment Tax Credit (ITC)*, SOLAR ENERGY INDUS. ASS'N (Jan. 2020), https://www.seia.org/sites/default/files/2020-01/SEIA-ITC-Fact-sheet-2020-Jan_1.pdf [<https://perma.cc/74PC-N3AW>] ("[T]he U.S. solar energy industry has grown by more than 10,000%" since enactment of the Solar Investment Tax Credit in 2006.).

216. Restoring Critical Supply Chains and Intellectual Property Act, S. 4324, 116th Cong. § 48D (2020) (authorizing a 30% income tax credit for eligible investments in domestic PPE manufacturing development projects).

217. See Chris Galford, *U.S. Sens. Portman, Peters Introduce Bill to Demand Long-Term Contracts for American-Made PPE*, HOMELAND PREPAREDNESS NEWS (Apr. 26, 2021), <https://homelandprepnews.com/stories/67444-u-s-sens-portman-peters-introduce-bill-to-demand-long-term-contracts-for-american-made-ppe/> [<https://perma.cc/D4CS-4UWT>] (describing the proposed "Make PPE in America Act" and "U.S. Pharmaceutical Supply Chain Review Act").

sulting policy uncertainty was again threatening the long-term stability of that industry.²¹⁸

Regardless of how Congress opts to support the maintenance of domestic supply chains for difficult-to-rotate emergency items, it could further bolster this effort by also supporting more public and private research focused on increasing the rotatability of emergency goods. Any new innovation that extends the shelf life of an emergency item directly increases that item's rotatability factor, thereby reducing its net per-unit stockpiling cost and strengthening incentives to stockpile it.²¹⁹ Federally funded programs focused on finding valuable alternative uses for difficult-to-rotate goods could similarly reduce net stockpiling costs for these items.²²⁰

VI. CONCLUSION

The COVID-19 pandemic exposed major deficiencies in the U.S. stockpiling policy structure and prompted widespread calls for reform. As helpful as the SNS and other existing U.S. stockpiling efforts were during the first few months of the U.S. COVID-19 outbreak, they were ultimately unable to equip the nation's healthcare professionals to safely and effectively fight the virus. The consequences of these failures took a devastating toll as shortages of medical protective gear and testing materials hindered the nation's response to an unprecedented national crisis.

Fortunately, affordable policy reforms are available that could ensure the United States is much better prepared for future emergencies. As the simple cost-benefit model employed in this Article shows, the nation's present stockpiling approach fails to incentivize private companies to stockpile even though many businesses could be cost-

218. See Andrew Edgecliffe-Johnson, *Manufacturers Warn U.S. Must Do More to Maintain Fragile PPE Production*, FIN. TIMES (Apr. 13, 2021), <https://www.ft.com/content/c04571c0-69d9-49a6-b1a0-40a6cfa892fe> [<https://perma.cc/5V22-GVUW>].

219. For instance, an innovation that doubled the shelf life (N) of a respirator mask from five years to ten years in the hypothetical hospital example from Part III would have increased its rotatability factor from 0.25 to 0.50. See *supra* discussion accompanying notes 127–28. Innovations that would allow emergency responders to replace disposable high-use items with reusable versions can have similar effects. See, e.g., Anne Trafton, *Engineers Design a Reusable, Silicone Rubber Face Mask*, MIT NEWS (July 9, 2020), <http://news.mit.edu/2020/reusable-silicone-rubber-face-mask-0709> [<https://perma.cc/X6XU-XFT6>] (describing MIT researchers' development of a respirator mask that, unlike typical N95 masks, is “designed to be easily sterilized and used many times”).

220. For example, stockpiled respirator masks that are approaching expiration might be usable as ordinary surgical masks or have suitable alternative uses in other industries such as building construction. See, e.g., Peter Grant, *COVID-19 Face Masks: A Survey of US Construction Companies*, SAFESITE (May 1, 2020), <https://safesitehq.com/face-masks-construction-survey/> [<https://perma.cc/CVF7-YANZ>] (describing how certain types of N95 masks that are not suitable for protection against COVID-19 may provide “the first wave of affordable resupply for construction companies working around hazardous dust”).

effective and meaningful contributors to the national stockpiling effort. In particular, the federal government's highly centralized stockpiling system—which was originally designed for storing non-rotatable pharmaceuticals—is poorly suited for storing many highly-rotatable items that could more efficiently be stockpiled in the private sector. A new federal stockpiling tax credit program and the other potential policy changes advocated in this Article could help to remedy these deficiencies by leveraging private resources to support a more robust, resilient national stockpiling system. In the wake of the nation's worst public health crisis in over a century, there has arguably never been a more opportune time to reshape U.S. stockpiling policies. Enacting bold reforms now could help to ensure that the nation is far better equipped to respond the next time disaster strikes.