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# What Can We Learn from the 1918 Pandemic? Careful Economics and Policy Lessons from Influenza

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# WHAT CAN WE LEARN FROM THE 1918 PANDEMIC? CAREFUL ECONOMICS AND POLICY LESSONS FROM INFLUENZA

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## ABSTRACT

Economists and policymakers have turned to the 1918 Spanish flu for guidance on the COVID-19 crisis, and some have been cheered by the example of its sharp post-pandemic economic recovery. Policymakers have also been encouraged to use lockdowns and school closures (called non-pharmaceutical interventions, or NPIs) in part by research showing that 1918's NPIs saved lives while aiding the subsequent economic recovery. I review a wide range of research to caution that our own recovery will likely be harder and slower because of how the economy has evolved. I conclude by discussing pro-recovery policy that account for post-1918 economic changes.

**JEL Classification Code:** N00, I18, J20, R10

**Key Words:** COVID-19, Spanish Flu, Recessions, Labor Market Policies

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The COVID-19 pandemic marks a global health and economic crisis that threatens the lives and livelihoods of hundreds of millions of people. Economists and policymakers have little previous experience to draw on for guidance, save the distant example of the 1918 Spanish Flu pandemic. Conventional wisdom has nevertheless rapidly coalesced around three lessons from the 1918 experience: 1) pandemics cause a sharp economic contraction followed by a sharp recovery; 2) nonpharmaceutical interventions (NPIs) like lockdowns and social distancing are, on net, economically beneficial; and 3) NPIs help ensure that normalcy can be rapidly reestablished even in a globalized world. Additionally, there seems to be considerable focus on what can be learned from the highly lethal wave that occurred in Fall 1918, and less consideration that the Spanish Flu inflicted multiple waves on the world.

Yet how much can we really learn from a disaster that occurred so long ago? I argue here that some of this conventional wisdom may have been too hasty. Historically, pandemics generally share two common after-effects. The first is that there is significant long-term health damage in the surviving population, which can lower labor force participation during the recovery. The second is that since little capital is destroyed, returns on stocks, bonds, and other assets are usually depressed in the aftermath. However, while it seems likely that the first will hold true this time, the second may well not, as the economy has evolved considerably since 1918. In this brief, I review the best available evidence to highlight what we can and cannot glean from the Spanish Flu, and I argue that COVID-19 may well be the pandemic that breaks the mold.

The current pandemic's effects on labor and asset markets will be distinct for several reasons: the more interconnected nature of today's global economy, critical medical and public health advances, and more sophisticated economic policy tools. Also critical to understanding the

differences this time around is that COVID-19 disproportionately kills people aged 60 and over, with exceptionally high mortality among those 70 and over, while the Spanish Flu and other pandemics killed large numbers of workers in the prime of life. This difference has important consequences for what we can expect from a postpandemic recovery. I conclude with a discussion of what economic policies can help once the health crisis has passed.

## **BRIEF HISTORY OF THE 1918 PANDEMIC**

The Spanish Flu (January 1918 through June 1919) was among the most lethal known pandemics in recorded history: estimates range from 17 to 100 million fatalities globally, but consensus estimates hover between 40–50 million people.<sup>1</sup> The disease progressed in three waves: a virulent but not particularly lethal first wave (January through June 1918), the infamously lethal second wave (September through December 1918), and a third wave (February through June 1919) that more closely resembled the first. The Spanish Flu was a truly global pandemic, with recorded cases spanning from the remote Svalbard archipelago of Norwegian Arctic islands to Samoa in the South Pacific.

The origins of Spanish Flu are unknown, but the first recorded cases of what is accepted as the 1918 influenza were in Haskell County, remote southwest Kansas, in January 1918. A local doctor quickly ascertained that the county was beset by a particularly virulent strain of influenza, and published his findings in *Public Health Reports*, a publication of the U.S. Public Health Service.<sup>2</sup> By March 4, 1918, the virus had spread to Camp Funston (now Fort Riley) in

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<sup>1</sup> Historians and epidemiologists believe that only the Great Bubonic Plague of the fourteenth century killed more people: estimates range from 75–200 million people in Eurasia, or about one quarter of the world's population at the time.

<sup>2</sup> Unfortunately, his reports were only published in April 1918, and so came too late to stop the Spring 1918 wave.

eastern Kansas, carried by WWI draft inductees preparing for deployment to Europe. The virus then seemed to essentially ride the rails, diffusing along the routes soldiers were taking from rural Kansas to the East Coast. By March 11, it was in Queens, New York. Troop transports then carried it across the Atlantic so that by April the virus had arrived in England and France. Medical professionals at the time made note of a particularly virulent strain of influenza, but the mortality rate among prime-age adults in the first wave was fairly low, so it did not stir much alarm (Barry 2004).

This first wave largely receded over July and August, but sporadic reports continued over the summer of influenza in Europe (Barry 2004). By September, a more lethal form had evolved, possibly among the soldiers along the Western Front. This wave appears to have diffused simultaneously from Boston, Massachusetts; Brest, France; and Freetown, Sierra Leone out to the rest of their respective regions. Mortality rates and death totals were highest during the second wave spanning Fall 1918—more people died in 24 weeks than in the 24 years of the AIDS epidemic (Garrett 2007). Finally, the pandemic concluded with a third, weaker wave that swept over the world in between 1919-1920.

## **EPIDEMIOLOGICAL INFORMATION ON COVID-19 VERSUS THE SPANISH FLU**

COVID-19 first emerged in Wuhan, People's Republic of China, in what is thought to be at least November 2019 (Cohen, January 2020). The first known hospitalized patient was admitted on December 1, 2019 (ibid.), and the virus rapidly spread throughout Wuhan and surrounding Hubei Province. The authorities began locking down Hubei on January 23 and expanded lockdown procedures throughout the rest of the country shortly thereafter. Major outbreaks soon appeared in South Korea, Iran, and Italy. Multiple simultaneous hotspots

emerged in other countries such as the United States, Spain, and most of the rest of the countries in Western Europe, and Ecuador. The World Health Organization (WHO) officially declared COVID-19 a global pandemic on March 11. As of this writing, it has spread throughout almost every country in the world, with at least 165,600 known fatalities.

While much important information is still unknown about COVID-19, or the Spanish Flu for that matter, there are a couple of relatively well-established facts germane to understanding the postpandemic economic recovery. Both are primarily respiratory diseases that can damage the lungs and heart.<sup>3</sup> Case fatality rates (CFR) for both diseases aren't firmly established, but some studies have put estimates for both close to 2 percent (Taubenberger and Morens 2006; Wu and McGoogan, February 2020). This is very high, but fortunately nowhere near as ghastly a threat as Ebola, the bubonic plague, or even SARS.<sup>4</sup>

Otherwise, the two diseases appear different in several important respects. While the Spanish Flu famously killed prime-age males at the highest rates, COVID-19's CFR rapidly rises with age, particularly for those aged 60 and over. Indeed, according to recent Italian data, COVID-19's CFR ultimately reaches a striking 20 percent among those age 90 and above.<sup>5</sup> Most cases among children and teenagers appear to be asymptomatic, and it is rarely lethal in prime-age adults. The exact reasons for this age pattern are currently unknown.<sup>6</sup>

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<sup>3</sup> Perhaps another similarity is that COVID-19 may prove as difficult to inoculate against as influenza. Influenza viruses generally have very high mutation rates, often causing strains to emerge seasonally that are unrecognizable by the immune system even if you've contracted other influenza strains before. Coronaviruses as a family of viruses seem to offer partial or limited immunity, as witnessed by the common cold, which is also caused by a coronavirus (Wu, March 2020). Not enough data exists yet on how long the body remains immune to COVID-19, but this is an active area of scientific concern (BBC, April 2020).

<sup>4</sup> SARS, a very close viral cousin of COVID-19, had a case fatality rate of approximately 10 percent (Chan-Yeung and Xu 2003).

<sup>5</sup> See: [https://www.epicentro.iss.it/coronavirus/bollettino/Report-COVID-2019\\_20\\_marzo\\_eng.pdf](https://www.epicentro.iss.it/coronavirus/bollettino/Report-COVID-2019_20_marzo_eng.pdf).

<sup>6</sup> Medical researchers hypothesize that influenza killed those with the strongest immune systems, because it triggered cytokine storms – vicious cycles of more and more releases of white blood cells issuing inflammatory cytokines, where each round of inflammation triggers yet another immune response until the patient dies of the consequences of inflammation. COVID-19 has also been documented to provoke cytokine storms, but not at a high enough incidence to recreate the mortality-by-age pattern of the Spanish Flu.

There is no reliable medical evidence yet on long-term morbidities caused by COVID-19, but this could be a huge medical and economic problem for many years to come. While the majority of prime-age adults will survive contracting COVID-19, some fraction may be left permanently disabled, knocking them out of the labor force.

We do not have much evidence on how the 1918 pandemic affected the long-term health of survivors, but medical researchers at the time believed the survivors were more likely to have neurological damage (Barry 2004). More recent studies have found that 1918 flu survivors had higher later-life mortality and rates of coronary heart disease (Azambuja 2004; Mamelund 2003). Perhaps the best evidence on long-term health effects of coronavirus exposure comes from the 2003 epidemic of SARS, a close genetic cousin of COVID-19 that caused about 10,000 cases worldwide (Zhou et al., February 2020). Follow-up studies found that most patients had no long-term health effects, but a small fraction of them were left with severe chronic health conditions, including reduced pulmonary function and bone damage (Zhang et al. 2020). Furthermore, 8 percent of non-health care workers had not returned to work two years after falling ill; for health care workers, that number reached nearly 30 percent (Ngai et al. 2010). Health care workers also suffered from higher rates of posttraumatic stress disorder (PTSD) and occupational burnout, and they were more likely to have reduced patient contact and work hours in response (Maunder et al. 2006). Quarantines had negative effects on psychological health across the population, leading to elevated rates of PTSD and depression that grew more severe the longer the quarantine lasted (Hawryluck et al. 2004).



## ECONOMIC AND SOCIAL LESSONS FROM THE 1918 FLU PANDEMIC

The economic recovery from the 1918 flu pandemic was, by most measures, relatively sharp and fast (Burns and Mitchell 1946; Velde, April 2020). This kind of sharp and fast recovery might well be the exception instead of the rule: the end of the pandemic shortly followed the end of World War I, so some of the recovery was likely due to a peace dividend after a short recession caused by the wind down of the war industry and demobilization. Nevertheless, the pandemic affected the population in specific ways that economists have used as a benchmark to examine the recovery of other postepidemic economies.

The 1918 pandemic decreased the prime-age working population without meaningfully changing the underlying capital stock. Classic economic theory holds that in these circumstances, inflation-adjusted wages would rise while the rate of return on capital would fall, consistent with labor becoming scarce relative to capital (Jordà, Singh, and Taylor 2020). In 1918, this phenomenon was especially pronounced among manufacturing firms in urban areas, which were particularly hard hit (Garrett 2007). In this context, short-term mobility frictions would mean that manufacturing wages would enjoy higher growth, which appears to have occurred at least in the United States (Garrett 2009). In the United States, states with higher death rates appear to have had stronger growth during the recovery (Brainerd and Siegler 2003), possibly because of this wage effect.

Another important pattern from the 1918 pandemic is that it hit hardest in urban areas and among nonwhites. In our own time, one worrying phenomenon is the growth of coronavirus clusters in some of the poorest urban areas, such as Detroit, New Orleans, and Albany, Georgia—especially since cities have far higher shares of poor people of color than they did in 1918. Mortality statistics in 1918 break out racial groups only into white and nonwhite, but this

can be assumed to correspond to white and black in most states and cities outside of the West Coast and parts of the Mountain West and Great Plains.<sup>7</sup> The evidence is nonetheless clear that the mortality rate among nonwhites, chiefly blacks, was much higher in absolute terms than for whites (Garrett 2007). Pandemics in general inflict higher mortality rates on the urban poor than any other group (Turchin 2005). The 1918 pandemic was no different, and there is growing evidence that that will be true of COVID-19 as well (Adams, Katz, and Grandpre, April 2020; Oppel, Searcey, and Eligon, April 2020).

The 1918 pandemic may have also reduced the human capital of the generation who were born during its height. Several papers have investigated whether the 1918 epidemic exerted a permanent, negative shock to the cohort that was *in utero* during the outbreak (Almond 2006; Almond and Mazumder 2005; Beach, Ferrie, and Saavedra 2018; Brown and Thomas 2018). The literature has not definitively resolved the question, because the pandemic coincided with a marriage market shock of many young men being deployed to Europe during the outbreak, skewing the sample of prospective fathers of this cohort toward older, more illiterate men (Brown and Thomas 2018). Nonetheless, in the broader context of the fetal origins literature (Almond and Currie 2011), it cannot be ruled out that COVID-19 represents a negative human capital shock to both existing students and the current *in utero* cohort.<sup>8</sup> Unfortunately, to my knowledge, no research yet exists whether school closures during the 1918–1919 school year negatively impacted human capital attainment of school-aged children, so we have no guidance

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<sup>7</sup> The West Coast had significant Asian American populations, and the Mountain West and Great Plains had significant Native American populations.

<sup>8</sup> At least three recent articles have found circumstantial evidence that fetuses can acquire COVID-19 *in utero* (Zeng, Zia, Yuan, et al., March 2020; Dong, Tian, He et al., March 2020; Zeng, Xu, Fan et al., March 2020). More definitive evidence is needed (Kimberlin and Stagno March 2020), but the health and economic implications could be quite profound.

from the 1918 experience on how the COVID-19-related education disruptions will change the human capital attainment of the in-school cohorts.

Pandemics also have scarring effects on habits, preferences, and cultures. For example, spitting as a socially acceptable custom was already on the decline at the beginning of the twentieth century, but public health campaigns in the midst of the 1918 pandemic that equated spitting with spreading disease killed it off for good (Barry 2004).<sup>9</sup> Industries have already begun to respond to anticipated shifts in consumer demand. Airlines have cut not just current flight schedules, but also their capacity into the summer and fall.<sup>10</sup> There are already calls to change how companies outsource their supply chains, particularly in vital industries.<sup>11</sup> As the virus progresses, there will likely be more of these calls to change how business is done.

Last, it is worth considering how changes in the national and global economy might sharpen or slow our expected recovery, relative to the 1918 experience. The 1918 pandemic unquestionably contracted the real economy, likely on the order of 6 percent of GDP and 8 percent of private consumption (Barro, Ursua, and Wang, March 2020). This prompted large, if temporary, declines in the returns on stocks and short-term government bonds (*ibid.*). There is substantial disagreement in the literature on how long-lasting the effects of the 1918 pandemic were on regions and national economies, but a study that sought to synthesize results across 12 different pandemics stretching back to the fourteenth century found that effects lingered for up to 40 years (Jordà, Singh, and Taylor, March 2020). As of this writing, at least one prominent study

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<sup>9</sup> Many commentators have suggested that East Asia's relatively effective COVID-19 response can be credited to the SARS epidemic, which normalized mask-wearing in public (Friedman, April 2020).

<sup>10</sup> This story is evolving as of this writing, but American Airlines slashed its summer schedule by 10 percent as early as March 10 (Sider, March 2020).

<sup>11</sup> American politicians calling for onshoring of U.S. medical supply chains include the following: Sen. Marco Rubio (R-Florida), Sen. Elizabeth Warren (D-Massachusetts), and Gov. Andrew Cuomo (D-New York) (Williams, April 2020).

estimates that the upcoming recession will entail a 0.3 percent *permanent* decline in real GDP (Eichenbaum, Rebelo, and Trabandt, March 2020).

## **LESSONS AND POLICY RESPONSES**

For our own time, our national and global economic circumstances may be too different to offer reassurances that we can expect a similarly prompt recovery as the 1918 one. This has not prevented three premature lessons from 1918 from entering popular discourse: 1) there is little trade-off between health and the economy, 2) we can expect a sharp postpandemic recovery, and 3) NPIs are the thing most needed to manage one big wave of infections. In line with the second of these lessons, conventional wisdom in some quarters has coalesced around the hope of a 1918-style “V-shaped” recovery. This hope is witnessed perhaps most viscerally in the stock market, in which, as of this writing, the S&P 500 Index is still 23 percent higher than the day President Trump was inaugurated in January 2017, when the unemployment rate was 4.7 percent. Today, our best guess is that unemployment is about 16 percent (Morath, May 2020).

Below, I discuss in more detail these points of conventional wisdom, explain why they may be ill-founded, and highlight some policy responses that might better anticipate how to expedite the recovery process.

### **Conventional Wisdom No. 1: Local Recovery Trajectories Are Favorable After Stronger Nonpharmaceutical Interventions**

This conventional wisdom is firmly grounded in the large body of evidence reviewed above from the 1918 pandemic that local NPIs were beneficial to local economies. While policymakers have taken some comfort from this past experience, they nonetheless remain concerned about restarting local economies as quickly as possible when the outbreak is brought

under control. However, the reality then and now is that the nature of the modern economy inescapably eases virus transmission (Adda 2016). The COVID-19 pandemic has vividly illustrated how density, urbanization, travel, and international trade are all vectors for outbreaks to begin anew. It is equally unimaginable that we would try to completely halt travel until a vaccine is mass produced. Recession fears must thus be counterbalanced by the possibility of unleashing a second wave of infections, resulting in yet another round of economically harmful NPIs.

The 1918 experience does offer some promise, but there are limits to what we can learn from the past here. While there have been deep flaws with testing and other policy issues in the U.S. response, federal policymakers and scientists have nevertheless responded more vigorously than their 1918 counterparts and have attempted to fight the virus in its first wave. By contrast, the federal government's response in 1918 was essentially nonexistent. The armed forces resisted any distraction from the war effort. President Woodrow Wilson never once publicly acknowledged the outbreak, most likely fearing it would harm morale (Barry 2004).<sup>12</sup> Public health establishments in many cities were run by cronies of machine politicians, and were usually men of little expertise. Trained medical researchers also struggled to respond, as there was mass confusion during the height of the crisis over whether the causal agent was an influenza virus or a pneumococcus bacterium.

Today, our medical abilities are unquestionably better. While temporizing leadership have often prevailed, policymakers worldwide have, in the main, actively drawn on the 1918

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<sup>12</sup> Wilson was implored by his closest confidant, Dr. Cary Grayson, in October 1918 to pause troop transports across the Atlantic, which were resulting in extraordinarily high death rates of conscripted young men during or after the voyage. He refused on the grounds that news of a halt would boost German morale. The only response made by the Army was to cancel the upcoming draft (Barry 2004).

experience to craft better responses.<sup>13</sup> In particular, they have relied on evidence showing that places that used NPIs aggressively in 1918 had lower mortality rates and recovered faster (Bootsma and Ferguson 2007; Correia, Luck, and Verner 2020). This is largely good news, as the United States has heavily relied on NPIs to slow the transmission of COVID-19. Such efforts are undoubtedly needed to stem an even greater number of deaths, and this, in and of itself, is good for our economic health as well. As Bill Gates said recently, “There really is no middle ground, and it’s very tough to say to people, ‘Hey, keep going to restaurants, go buy new houses, ignore that pile of bodies over in the corner.’”<sup>14</sup>

While there is no question our stronger, more effective NPIs are working (Friedson et al., April 2020; Harris, April 2020), they are also generating huge up-front economic costs (Scherbina, March 2020; Stock, March 2020). In 1918, this trade-off between health and wealth had a clear economic rationale because who bore NPI’s costs and benefits was better aligned. Governments then were largely trying to save their soldiers and most productive taxpayers, whereas now they’re largely trying to save older individuals who are generally already out of the labor force. With relatively few prime-age workers dying, wages are unlikely to rise in the aftermath to help make prime-age workers financially whole.

Furthermore, policymakers may need to grapple with consequences of NPIs that economics studies of 1918 NPIs have not been able to shed light on. The more effectively NPIs work, the larger the immunologically naïve population they leave behind after restrictions are lifted. Best estimates from around the world are that only between 2 and 30 percent of the

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<sup>13</sup> E.g., Governor Cuomo Press Conference, April 7, 2020. Transcript: <https://www.governor.ny.gov/news/video-audio-photos-rush-transcript-amid-ongoing-covid-19-pandemic-governor-cuomo-announces-9>, last accessed April 8, 2020.

<sup>14</sup> Theodore Schleifer, “Bill Gates Says We Can’t Restart the Economy Soon and Simply ‘Ignore that pile of bodies over in the corner,’” *Vox Recode*, March 24, 2020. URL: <https://www.vox.com/recode/2020/3/24/21192638/coronavirus-bill-gates-trump-reopen-business>, last accessed April 7, 2020.

population in various hard-hit locales have contracted and survived COVID-19 (Vogel, April 2020). A handful of especially proactive cities in 1918 experienced this exact problem and were forced to impose multiple rounds of NPIs to tame influenza recurrences (Bootsma and Ferguson 2007). We do not have good evidence from 1918 on whether cities that had to impose NPIs multiple times experienced greater economic suffering, but few economists or policymakers seem to believe that multiple lockdown rounds would be a good idea. Multiple rounds of lockdowns seem likely perpetuate the uncertainty and disemployment that have been fueling the current COVID-19 recession.

Thus, the conventional wisdom on NPIs might be drawing too firm a lesson from 1918. It may very well be the case that cities or states with stricter, longer-lasting NPIs fare worse in the recovery. In lieu of a cure or a mass-produced vaccine, one idea is to have laid-off workers employed during the crisis as contact-tracing workers (Hershbein, April 2020). Singapore's resurgence in COVID-19 cases shows that contact tracing is not a bulletproof-guarantee against a fresh outbreak (Beech, April 2020), but contact tracing is a far less economically costly NPI than lockdowns and closures, and it can also help address the grim unemployment situation.

## **Conventional Wisdom No. 2: We Can Expect a Sharp Recovery**

While there are a range of forecasts, some commentators have reviewed the studies discussed above on the 1918 flu and other epidemics and concluded that most recoveries are fast (*e.g.* Birritteri, March 2020). This has led to talk in the media and among political leaders of a “V-shaped” recovery (Lynch, April 2020). If there *is* to be a V-shaped recovery, it will be coming out of a very deep hole. While we still only have a limited idea of how much economic damage we have already endured, preliminary data is sobering. One study estimates that about 20 million jobs had been lost by April 6 (Coibion, Gorodnichenko, and Weber, April 2020), and

Upjohn Institute estimates show that some states like Michigan are seeing as much as 23 percent of their wage and salaried workforce file for unemployment benefits (Horrigan, et al., April 2020). As of this writing, at least one estimate is that the upcoming recession will entail a 0.3 percent *permanent* decline in real GDP (Eichenbaum, Rebelo, and Trabandt, March 2020).

Optimism for a fast recovery based on the experience of past pandemics may be unwarranted. Past disease outbreaks, including the 2009 H1N1 swine flu, the 2002-2003 SARS, and the 1957 avian flu, were either not truly global in scale (SARS) or not sufficiently lethal to employ mass-scale NPIs (1957 and 2009 flus). They thus represent poor comparisons for what we're living through now. The 1918 flu still represents the best comparison, but even so, macroeconomic circumstances at the time were unique. The world was just finishing a large-scale global conflict that had severely disrupted international shipping. Demobilization reintroduced millions of young men back into local labor markets, softening somewhat the blow of local labor market shortages caused by the disease. These circumstances don't apply today.

Even setting aside technological growth, our economy has also evolved. A much larger share of output and employment is now in person-to-person services, rather than manufacturing or farming, and demand for services is likely to recover more slowly as people change their social habits in response to reinfection fears. As mentioned above, COVID-19 appears to be causing particularly pervasive outbreaks in cities that are already poor and economically depressed, which will both necessitate longer NPIs while ensuring that local recoveries will start from a lower economic base. Last, the scale of trade and international business is much larger, both nationally and globally, than in 1918, and cities that depend more heavily on flows of people and goods are at greater risk of needing to impose additional rounds of economically damaging NPIs.



Additionally, labor supply and labor demand have changed radically since 1918, and in ways that make conditions less favorable for workers in a postpandemic landscape. COVID-19 seems likely to leave marks on three parts of the labor force: 1) younger workers who face “recession scarring” on their long-term career prospects (Rothstein 2019; Stuart 2019); 2) an additional number of prime-age workers left with disabling medical complications; and a pool of older workers who suffer some income, wealth, and COVID-caused health shocks.<sup>15</sup> As the Great Recession attests, none of these factors are easily reversed after a severe downturn.

Thus, while a fast, sharp recovery is somewhat less likely than the 1918 experience would have us believe, there are still plenty of actions federal, state, and municipal policymakers can take to hasten the return to economic normalcy. Unquestionably, prorecovery macroeconomic policy has made huge strides since the 1910s, and this is a reason for optimism. Currently, as my colleague Tim Bartik has pointed out in numerous forums (e.g., Blasakovitz, April 2020), the real-time federal response seems to be too sluggish to ensure a V-shaped recovery. Many banks and businesses have complained that the federal program designed to prop up small-business payrolls has been too poorly designed to allow banks to quickly infuse small businesses with loans (Lane, April 2020). Continued aggressive action by the federal government is needed to prop the economy. Such action could include further income support payments, small business loans, and disaster unemployment assistance.

Unfortunately, few policies are available to address recession scarring, but there are other approaches that can speed up labor force recovery. Education levels are globally far higher today than in 1918 and are more consequential for people’s lifetime earning potential (Tan 2019), and

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<sup>15</sup> COVID-19’s effects on the overall size of the U.S. population seem likely to be relatively small: about 60,000 deaths are currently expected by August, or about 0.02 percent of the 2019 U.S. population (Institute for Health Metrics and Evaluation, April 2020). In contrast, the Spanish Flu is estimated to have killed about 650,000 Americans—about 0.5 percent of the population.

local job training and education programs exist to help laid-off workers upgrade their skills during the recession (Miller-Adams, April 2020). Beyond education, sector-focused approaches might be more effective in the recovery period than worker-focused approaches. Health care workers appear to be a subgroup that will bear relatively high rates of death, disability, and posttraumatic stress disorder. Programs begun now to help affected health care workers recover may pay dividends later on. Furthermore, construction, transportation, and other industries may lose skilled workers from work stoppages. If the 2008 recession is any guide, some workers and businesses may leave these industries permanently, constraining supply well into the future (Kusisto 2018; Rappoport 2017). President Trump's suggestion to take advantage of ultra-low interest rates to enact an infrastructure bill is well worth considering in this context.<sup>16</sup> Tourism and travel-related services might experience a persistent negative shock, and targeted relief would seek to transition workers and capital to other sectors where possible.

Older workers and the elderly face a completely different economic landscape than these populations did in the aftermath of the 1918 pandemic. In 1918, life expectancy at birth was 48.4 years for men and 54.0 for women (Noymer and Garenne 2000),<sup>17</sup> pensions were rare, and old-age social insurance was nonexistent.<sup>18</sup> The elderly were the poorest part of the adult population, namely because they could draw no labor income and most owned (at best) only their own homes. People aged 65 and over today are more numerous, are far better educated, have more

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<sup>16</sup> Donald J. Trump, March 31, 2010, Twitter: <https://twitter.com/realDonaldTrump/status/1245000074167541761>.

<sup>17</sup> In 1918, these figures dropped to 36.6 and 42.2.

<sup>18</sup> It is reasonable to assume that long-term side effects among COVID-19 survivors in this age group may be relatively high, given that hospitalization rates rise rapidly after the age of 60. How many will be impaired will depend on factors like COVID-19's ultimate prevalence in the population, its posttreatment clinical profile, and how quickly a vaccine can be developed or herd immunity established. Life expectancy briefly fell after the 1918 pandemic (Noymer and Garenne 2000), and it is not unreasonable to assume that the same will occur now and that per capita Medicare expenditures might rise.

assets and income, and many are working longer than ever before. The current recession threatens to undo some of this progress.

We are too early into both the recession and pandemic to make well-reasoned predictions about what might happen to labor force participation, but even healthy older workers may face significant headwinds if they wish to work longer to recoup wealth losses. Older workers are not immune to the mass layoffs afflicting younger workers, and they usually take longer to become reemployed (Chan and Stevens 2001). Unfortunately, it is too early in the crisis to know whether older workers might be able to hope for a recovery in asset markets to compensate for a sluggish labor market.

Local housing markets will also initially bear a heavy burden from the COVID-19 fallout. This shock will be exacerbated by the impact of many deaths concentrated in a short period of time among older Americans, who have the highest homeownership rates. COVID-19 causes deaths in geographic clusters, meaning that houses will be returned to market also in local clusters. During this recession, some markets will thus witness increases in the supply of vacant homes even as demand falls.

For wealthier, supply-constrained cities, this may represent only a transitory shock as the pandemic passes. Pent-up demand among millennials for homeownership in the San Francisco Bay Area, New York City, Boston, and other areas will probably ensure that newly vacant houses will be bought quickly. Even in less-supply-constrained but still prosperous cities like Atlanta, Houston, and others, there is little reason to expect that existing demand among younger adults won't quickly reestablish equilibrium in local housing markets.

By contrast, struggling cities with weak housing demand face sustained declines in property tax receipts and greater blight. Their distress is likely to be exacerbated relative to the

rest of the country as the COVID-19 pandemic mimics the 1918 influenza and falls most heavily on poor, urban people of color. NPIs may be in place even longer in these cities than elsewhere, deepening the economic damage. There was no analogue for Flint or Detroit in 1918—large cities with chronically depressed local economies—and we should be hesitant to draw positive comparisons from the Spanish Flu in these cases. Heavily afflicted cities like Detroit and New Orleans have excess housing relative to their populations (Plyer 2011; Poethig et al. 2017).<sup>19</sup> In a postpandemic environment, dedensification and strategic shrinkage may become even more important. Federal legislators could also acknowledge the unique distress facing poor, declining cities hit hard by COVID-19 by creating a land and infrastructure grant program. My colleagues Tim Bartik and Brad Hershbein and their co-authors, Mark Muro and Bryan A. Stuart, have proposed several policy ideas for explicit regional assistance.<sup>20</sup> These include grants to shore up hard-hit state and local governments' finances; 15 percent tax credits to all employers for the costs of maintaining jobs in excess of 90 percent of the employer's 2019 level; this tax credit could be increased to 30 percent in heavily impacted areas (Bartik, March 2020). Cities can use this money to buy vacant houses, make infrastructure repairs, and perhaps create new public parks that can be useful in future crises. Grant money can also be used to defray the costs to the cities of waiving property tax liens on the houses of the deceased. This will help clear any backlog in the local housing inventory and mitigate blight.

Perhaps the most important postpandemic segment of the labor market we should address is the newly disabled. As of the end of 2018, of the 5.9 million claimants of Social Security Disability Insurance (SSDI) under the age of 65, only a small fraction—about 173,000—have

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<sup>19</sup> As of this writing, April 8, 2020, New Orleans, Detroit, and Albany, Georgia, are all currently ranked in the top 10 highest case rates per capita in the country (Datar and Huddle, April 2020).

<sup>20</sup> Link here: <https://www.brookings.edu/research/three-steps-the-government-needs-to-take-in-a-coronavirus-recession/>.

disabilities involving infectious diseases or respiratory system illness (Social Security Administration 2019). Based on current case projections of infections, if we assume that 1 percent of COVID-19 infections lead to a long-term qualifying disability, the number of SSDI claimants in the those two categories would be expected to rise by 16 percent.<sup>21</sup> Another, likely larger, group will increase claims for post-trauma anxiety disorders from direct experience with the virus and also from the negative effects of the long quarantines.

COVID-19 may cause other long-term disabilities that we are not yet aware of. As mentioned above, the Spanish Flu appears to have increased the risk of coronary heart disease in later life. There are some signs that COVID-19, too, has negative impacts on cardiac health, but it's too early to say how this might impact disability rolls.<sup>22</sup> Fortunately, we have a century's worth of data to mine which could be used to identify likely complications and how to anticipate them. The National Institutes of Health could sponsor dedicated efforts to search for post-COVID-19 complications, possibly in partnership with other nations. This information could then be used to anticipate and treat the complications.

Some disability claimants will likely leave the labor force permanently, while others may be able to rejoin it with targeted occupational or psychological therapies. We have greater rehabilitative tools to aid affected workers than were available in 1918, and if policymakers engage with this issue now, we can hope to achieve better outcomes than were possible in the past.

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<sup>21</sup> Based on a 2,743,826 case count forecasted out through August 4, 2020. Institute for Health Metrics and Evaluation, University of Washington, COVID-19 projections assuming full social distancing through May 2020. Based on April 5 numbers, last accessed April 7, 2020. <https://covid19.healthdata.org/united-states-of-america>.

<sup>22</sup> Gina Kolata, "A Heart Attack? No, It Was the Coronavirus." *New York Times*, March 27, 2020. URL: <https://www.nytimes.com/2020/03/27/health/coronavirus-cardiac-heart-attacks.html>, last accessed April 7, 2020.

### **Conventional Wisdom No. 3: The Fall 1918 Wave is the Most Important Part of the Pandemic We Can Learn From**

COVID-19 has already inflicted unprecedented economic damage on countries around the world, and everyone is eager to avoid fresh outbreaks in their countries. Is there anything we can learn from 1918 to avoid multiple COVID-19 waves? An undue focus on just the Fall 1918 wave can obscure how long the Spanish Flu was active in the population, as reliable outbreak reports span at least a four-year period (Barry 2004). Recurring outbreaks of infectious diseases like cholera, typhoid, and tuberculosis were common before the advent of modern medicine. Even in our own day, Africa's western littoral region stretching from Guinea to the Democratic Republic of the Congo has suffered multiple independent outbreaks of Ebola since the 1970s (Quammen 2014). Given the sheer geographic dispersal of COVID-19 around the world, a subsequent wave seems highly likely after social controls are relaxed and before an effective vaccine is mass produced. East Asian countries like Hong Kong, Singapore, and mainland China are already struggling to prevent fresh outbreaks stemming from infected travelers arriving from abroad (Rich, May 2020). And as mentioned above, our current round of NPIs have saved many lives but also ensured that we are unlikely to be anywhere near herd immunity.

In our present situation, few are expecting a mass-produced vaccine to be widely available until sometime in 2021, but no political leaders want to contemplate enforcing social distancing through December. Public health officials in 1918 were too late to recognize the threat confronting them and were mostly powerless to stop local outbreaks (Barry 2004), and the average NPI lasted only about three months on average (Correia, Luck, and Verner, March 2020). Fortunately, we have a century's worth of technological advances to mitigate the worst consequences of another outbreak occurring before a vaccine is ready.

Policymakers face the same two intertwined problems that also confronted leaders in 1918. First, because social controls are sometimes uncoordinated across and within countries, the odds of a second or even a third wave are high because the virus has been given the opportunity to hide in many potential reservoirs. Second, containing the virus using NPIs entails a wealth/health tradeoff, and the wealth we are drawing down now through widespread shutdowns of economic activity makes summoning the resources and will to fight a second outbreak harder.

Mass antibody testing is a promising policy to help ease the economic and social severity of NPIs and will help the public health establishment identify who is still at risk from a second wave. Even given that the influenza virus mutates at a faster rate than this coronavirus appears to, experts agree that being infected during the Spring 1918 wave conferred full or partial immunity during the fall wave. Several governments are seriously considering mass antibody testing (Horowitz, April 2020). With ramped-up testing capacity, state labs could partner with state Departments of Motor Vehicles to issue “COVID-19 Passes,” which would allow people to continue to work and conduct business even in the event of another outbreak. This promises to significantly reduce economic and social damage from COVID-19 outbreaks until more lasting treatments are found.

Next, identifying and quarantining potential reservoir populations and regions could allow countries to act in a coordinated fashion to reopen their economies, while trying to geographically isolate the virus. In the United States, a total lack of government response to the Spring 1918 wave allowed the virus to spread unchecked throughout the world, which meant that the virus had many places to go “underground” before it reemerged in the fall. State governors should consider not only the spread of the virus within their own state borders, but its potential to jump to other states that are ready to relax social distancing restrictions. Fortunately, state

governors have already begun to coordinate reopening state economies, and similar compacts will be needed to manage any further outbreaks.<sup>23</sup>

Last, we should recognize that some reservoir geographies and populations pose a greater risk than others once controls are relaxed, because they exist in conditions where the virus is encouraged to become deadlier. War zones are notorious for harboring such conditions, and a prominent theory blames the increased lethality of the Fall 1918 wave on World War I (Ewald 1994). Normal civilian life actively selects for milder forms of viruses: slightly sick people still go about their lives, enabling transmission, while sicker people are forced to stay home, infecting few. When the Spanish Flu arrived on the Western Front, it thrived in conditions where the selection pressure was reversed: slightly sick troops would stay in the trenches, but very sick ones would be evacuated to military hospitals on mass transports.

Policymakers can act on this knowledge in three ways. One is that as the developed world recovers, it should prioritize getting testing and treatment to known war zones, such as Libya, Yemen, and Idlib Province in Syria. Second, as the pandemic winds down in urban centers in the rest of the world, testing should ramp up in rural and exurban communities where the virus might be simmering undetected. Third, while the pandemic is still raging, more cities should consider emulating Wuhan's example by opening convalescent centers. These centers allow people who may have been exposed to the virus in the hospital setting to recuperate away from their families. This last policy will ensure that any strains favored in hospitals, the one environment still seeing large flows of people, become less likely to be introduced in the rest of the population as NPIs

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<sup>23</sup> Compacts exist in the Midwest between Illinois, Indiana, Kentucky, Michigan, Minnesota, Ohio, and Wisconsin; on the West Coast between California, Oregon, and Washington State; in the Northeast between Connecticut, Massachusetts, New Jersey, New York, Pennsylvania, and Rhode Island; and in the Mid-Atlantic between the District of Columbia, Maryland, and Virginia.



phase down. These convalescent facilities can also act as emergency housing for doctors and nurses while they work during this emergency, helping prevent transmission to their families.

All in all, it will likely prove almost impossible to completely prevent a second outbreak of COVID-19, but some combination of these policies may well keep it contained enough that the United States and other countries can pursue less economically damaging NPIs—such as test, trace and contact, and individual quarantines—until a vaccine is mass produced.

## **CONCLUSION**

This policy brief looks back to past pandemics, particularly the 1918 influenza pandemic, to review what we can learn about a potential postpandemic economic recovery and what policies we need to consider now to hasten that recovery. The Spanish influenza pandemic of 1918 offers a few relevant lessons, such as the economic harm nonpharmaceutical interventions like lockdowns and closures can cause, the long-term health and human capital impacts on the population, and how to start thinking about subsequent outbreaks.

However, in many other key respects, the recovery from this pandemic will likely look very different. Policymakers, economists, and others should be wary about drawing too many correlative lessons from the 1918 experience. Beyond the obvious gulf in development between now and early twentieth century America, this may well be the first highly lethal pandemic in recorded human history that leaves the size of the labor force more or less unchanged. Older workers stand to bear the brunt of COVID-19, not only in the immediate term through the threat of higher mortality, but also in the longer term through COVID-caused disabilities like impaired lung function. Their retirements are also jeopardized if capital markets are slow to recover, as they traditionally have been from pandemics.

COVID-19's consequences are too multifaceted to anticipate wholly, but there are some policies that can hasten the recovery. Namely, federal, state, and local governments can move to help survivors quickly settle the estates of the victims, offer support to previously strong growth sectors like tourism that are facing a disproportionately prolonged recession, and have workforce development agencies begin programs to aid affected health care workers and the newly disabled in finding their footing in the labor market. While the months before us are tough ones, whatever we can bring ourselves to do now to prepare for life on the other side of our global human tragedy will only hasten our shared recovery.

## REFERENCES

- Adams, Mary L., David L. Katz, and Joseph Grandpre. 2020. "Population-Based Estimates of Comorbidities Affecting Risk for Complications from COVID-19 in the U.S." *MedRxiv* preprint, 03.30.20043919, April 2.
- Adda, Jérôme. 2016. "Economic Activity and the Spread of Viral Diseases: Evidence from High Frequency Data." *Quarterly Journal of Economics* 131: 891–941.
- Almond, Douglas. 2006. "Is the 1918 Influenza Pandemic Over? Long-Term Effects of In Utero Influenza Exposure in the Post-1940 U.S. Population." *Journal of Political Economy* 114: 672–712.
- Almond, Douglas, and Janet Currie. 2011. "Killing Me Softly: The Fetal Origins Hypothesis." *Journal of Economic Perspectives* 25: 153–172.
- Almond, Douglas, and Bhaskar Mazumder. 2005. "The 1918 Influenza Pandemic and Subsequent Health Outcomes: An Analysis of SIPP Data." *American Economic Review* 95: 258–262.
- Azambuja, Maria Inês Reinert. 2004. "Spanish Flu and Early 20th-Century Expansion of a Coronary Heart Disease-Prone Subpopulation." *Influenza and Cardiovascular Disease* 31: 14–21.
- Balaskovitz, Andy. 2020. "'V-shaped' Economic Recovery Unlikely as Recession Could Span Years, Economist Says." *MiBiz*, April 8.

- Barro, Robert J., José F. Ursúa, and Joanna Weng. March 2020. "The Coronavirus and the Great Influenza Pandemic: Lessons from the 'Spanish Flu' for the Coronavirus's Potential Effects on Mortality and Economic Activity." NBER Working Paper No. 26866. Cambridge, MA: National Bureau of Economic Research.
- Barry, John M. 2004. *The Great Influenza: The Epic Story of the Greatest Plague in History*. New York: Viking Penguin.
- Bartik, Timothy J. 2020. "Preserving Jobs Despite the Coronavirus: Encouraging 'Labor Hoarding.'" *Upjohn Institute Research Highlights*, March 17. Kalamazoo, MI: W.E. Upjohn Institute for Employment Research.
- Beach, Brian, Joseph P. Ferrie, Martin H. Saavedra. 2018. "Fetal Shock or Selection? The 1918 Influenza Pandemic and Human Capital Development." NBER Working Paper No. 24725. Cambridge, MA: National Bureau of Economic Research.
- Beech, Hannah. 2020. "Singapore Seemed to Have Coronavirus under Control, until Cases Doubled." *New York Times*, April 20.
- Birritteri, Anthony. 2020. "Economists Discuss Recession, COVID-19, and Recovery." *New Jersey Business Magazine*, March 19.
- Bootsma, Martin C. J., and Neil M. Ferguson. 2007. "The Effect of Public Health Measures on the 1918 Influenza Pandemic in U.S. Cities." *Proceedings of the National Academy of Sciences* 104: 7588–7593.
- Brainerd, Elizabeth, and Mark V. Siegler. 2002. "The Economic Effects of the 1918 Influenza Pandemic." Mimeo.
- British Broadcasting Corporation (BBC). 2020. "Coronavirus: Double Warning over Antibody Tests." BBC, April 18.
- Brown, Ryan, and Duncan Thomas. 2018. "On the Long-Term Effects of the 1918 U.S. Influenza Pandemic." Mimeo.
- Burns, Arthur F., and Wesley C. Mitchell. 1946. *Measuring Business Cycles*. Cambridge, New York: Columbia University Press for the National Bureau of Economic Research.
- Chan, Sewin, and Ann Huff Stevens. 2001. "Job Loss and Employment Patterns of Older Workers." *Journal of Labor Economics* 19: 484–521.
- Chan-Yeung, Moira, and Rui-heng Xu. 2003. "SARS: Epidemiology." *Respirology* 8: Suppl. S9–S14.
- Cohen, Jon. 2020. "Wuhan Seafood Market May Not Be Source of Novel Virus Spreading Globally." *Science Magazine*, January 26.

- Correia, Sergio, Stephan Luck, and Emil Verner. March 2020. “Pandemics Depress the Economy, Public Health Interventions Do Not: Evidence from the 1918 Flu.” Mimeo.
- Datar, Suarabh, and Ryan Huddle. 2020. “Graphics: 10 U.S. Counties with Most Coronavirus Cases (beyond N.Y. and N.J.).” *Boston Globe*, April 7.
- Eichenbaum, Martin S., Sergio Rebelo, and Mathias Trabandt, March 2020. “The Macroeconomics of Epidemics.” NBER Working Paper No. 26882. Cambridge, MA: National Bureau of Economic Research.
- Ewald, Paul W. 1994. *Evolution of Infectious Diseases*. Oxford: Oxford University Press.
- Friedman, Uri. 2020. “Face Masks Are In.” *Atlantic*, April 2.
- Friedson, Andrew I., Drew McNichols, Joseph J. Sabia, and Dhaval Dave. April 2020. “Did California’s Shelter-in-Place Order Work? Early Coronavirus-Related Public Health Benefits.” NBER Working Paper No. 26992. Cambridge, MA: National Bureau of Economic Research.
- Garrett, Thomas A. 2007. “Economic Effects of the 1918 Influenza Pandemic: Implications for a Modern-Day Pandemic.” Mimeo.
- . 2009. “War and Pestilence as Labor Market Shocks: U.S. Manufacturing Wage Growth, 1914–1919,” *Economic Inquiry* 47: 711–725.
- Harris, Jeffrey E. April 2020. “The Coronavirus Epidemic Curve Is Already Flattening in New York City.” NBER Working Paper No. 26917. Cambridge, MA: National Bureau of Economic Research.
- Hawryluck, Laura, Wayne L. Gold, Susan Robinson, Stephen Pogorski, Sandro Galea, and Rima Styra. 2004. “SARS Control and Psychological Effects of Quarantine, Toronto, Canada.” *Emerging Infectious Diseases* 10: 1206–1212.
- Hershbein, Brad J. 2020. “Training Contact Tracing Workers: The Need Right Now.” *Upjohn Institute Research Highlights*, April 17. Kalamazoo, MI: W.E. Upjohn Institute for Employment Research.
- Horowitz, Jason. 2020. “In Italy, Going Back to Work May Depend on Having the Right Antibodies.” *New York Times*, April 4.
- Horrigan, Michael, Jim Robey, Katie Bolter, and Gerrit Anderson. 2020. “More than 1 in 5 Michigan Workers—Over 1 Million People—Have Filed for Unemployment Insurance in Four Weeks,” *Upjohn Institute Research Highlights*, April 16. Kalamazoo, MI: W.E. Upjohn Institute for Employment Research.
- Institute for Health Metrics and Evaluation. 2020. “COVID-19 Projections.” Seattle, WA: University of Washington, April 17.

- Jordà, Òscar, Sanjay R. Singh, and Alan M. Taylor. March 2020. “Longer-Run Consequences of Pandemics.” Working Paper. Davis, CA: University of California, Davis.
- Kimberlin, David W., and Sergio Stagno. 2020. “Can SARS-CoV-2 Infection Be Acquired In Utero?” *Journal of the American Medical Association*. Published online March 26, 2020. doi:10.1001/jama.2020.4868.
- Kusisto, Laura. 2018. “The Next Housing Crisis: A Historic Shortage of New Homes.” *Wall Street Journal*, March 18.
- Lane, Sylvan. 2020. “Five Problems Banks Face in Getting Coronavirus Relief Out the Door.” *The Hill*, April 9.
- Lynch, David J. 2020. “Trump Expects Quick Economic Comeback from Coronavirus, but China’s Incomplete Recovery Hints at Long-Lasting Problems.” *Washington Post*, April 7.
- Mamelund, Sverre-Erik. 2003. “Effects of the Spanish Influenza Pandemic of 1918–19 on Later Life Mortality of Norwegian Cohorts Born about 1900.” Memorandum No. 2003.29, Oslo: University of Oslo, Department of Economics.
- Maunder, Robert G., William J. Lancee, Kenneth E. Balderson, Jocelyn P. Bennett, Bjug Borgundvaag, et al. 2006. “Long-Term Psychological and Occupational Effects of Providing Hospital Healthcare During SARS Outbreak.” *Emerging Infectious Diseases* 12: 1924–1932.
- Miller-Adams, Michelle. 2020. “Retraining Workers in the Post-COVID-19 Economy.” *Upjohn Institute Research Highlights*, April 17. Kalamazoo, MI: W.E. Upjohn Institute for Employment Research.
- Morath, Eric. 2020. “April Jobs Report Likely to Show Highest Unemployment Rate on Record.” *Wall Street Journal*, May 3.
- Ngai, Jenny C., Fanny W. Ko, Susanna S. Ng, Kin-Wang To, Mabel Tong, and David S. Hui. 2010. “The Long-Term Impact of Severe Acute Respiratory Syndrome on Pulmonary Function, Exercise Capacity, and Health Status.” *Respirology* 15: 543–550.
- Noymer, Andrew, and Michel Garenne. 2000. “The 1918 Influenza Epidemic’s Effects on Sex Differentials in Mortality in the United States.” *Population and Development Review* 26: 565–581.
- Oppel Jr., Richard A., Dionne Searcey, and John Eligon. 2020. “Black Americans Face Alarming Rates of Coronavirus Infection in Some States.” *New York Times*, April 7.
- Plyer, Allison. 2011. “Population Loss and Vacant Housing in New Orleans Neighborhoods.” New Orleans: Greater New Orleans Community Data Center.

- Poethig, Erika C., James Gastner, Joseph Schilling, Rolf Pendall, Laurie Goodman, Sameera Fazili, and Bing Bai. 2017. "The Detroit Housing Market: Challenges and Innovations for a Path Forward." Washington, DC: Urban Institute.
- Quammen, David. 2014. *Ebola: The Natural and Human History of a Deadly Virus*. New York: W. W. Norton and Company.
- Rich, Motoko. 2020. "Why Asia's New Wave of Virus Cases Should Worry the World." *New York Times*, May 4.
- Rothstein, Jesse. 2019. "The Lost Generation? Scarring After the Great Recession." Mimeo.
- Scherbina, Anna. March 2020. "Determining the Optimal Duration of the COVID-19 Suppression Policy: A Cost-Benefit Analysis." AEI Economics Working Paper No. 2020-03.
- Sider, Alison. 2020. "Airlines Trim Capacity over Coronavirus Spread; Some Executives Take Pay Cuts." *Wall Street Journal*, March 10.
- Social Security Administration (SSA). 2019. *SSI Annual Statistical Report, 2018*. Washington, DC: Social Security Administration.  
[https://www.ssa.gov/policy/docs/statcomps/ssi\\_asr/2018/ssi\\_asr18.pdf](https://www.ssa.gov/policy/docs/statcomps/ssi_asr/2018/ssi_asr18.pdf) (accessed April 7, 2020).
- Stock, James H. March 2020. "Data Gaps and the Policy Response to the Novel Coronavirus." NBER Working Paper No. 26917. Cambridge, MA: National Bureau of Economic Research.
- Stuart, Bryan. 2019. "The Long-Run Effects of Recessions on Education and Income." Mimeo.
- Tan, Hui Ren. 2019. "A Different Land of Opportunity: The Geography of Intergenerational Mobility in the Early 20th Century U.S." Mimeo.
- Taubenberger, Jeffery K., and David M. Morens. 2006. "1918 Influenza: The Mother of All Pandemics." *Emerging Infectious Diseases* 12(1): 15–22.
- Turchin, Peter. 2005. *War and Peace and War*. Pi Press.
- Velde, François R. April 2020. "What Happened to the U.S. Economy during the 1918 Influenza Pandemic? A View through High-Frequency Data." Federal Reserve Bank of Chicago Working Paper No. 2020-11. Chicago: Federal Reserve Bank of Chicago.
- Vogel, Gretchen. 2020. "Antibody Surveys Suggest Vast Undercount of Coronavirus Infections May Be Unreliable." *Science Magazine*, April 21.
- Williams, Aime. 2020. "U.S. Lawmakers Push to Reclaim Medical Supply Chains from China." *Financial Times*, April 2.

Wu, Katherine J. 2020. “The Coronavirus Spares Most Kids. These Theories Help Explain Why.” *National Geographic*, March 25.

Wu, Zunyou, and Jennifer M. McGoogan. April 2020. “Characteristics of and Important Lessons from the Coronavirus Disease 2019 (COVID-19) Outbreak in China: Summary of a Report of 72,314 Cases from the Chinese Center for Disease Control and Prevention.” *Journal of the American Medical Association* 323: 1239–1242.

Zhang, Peixun, Jia Li, Huixin Liu, Na Han, Jiabao Ju, Yuhui Kou, Lei Chen, Mengxi Jiang, Feng Pan, Yali Zheng. February 2020. “Long-Term Bone and Lung Consequences Associated with Hospital-Acquired Severe Acute Respiratory Syndrome: A 15-Year Follow-Up from a Prospective Cohort Study.” *Bone Research* 8: 1–8.

Zhou, Peng, Zing-Lou Yang, Xian-Guang Wang, Ben Hu, Lei Zhang, et al. February 3, 2020. “A Pneumonia Outbreak Associated with a New Coronavirus of Probable Bat Origin.” *Nature* 579: 270–273.