Planning for the "Expected Unexpected": Work and Retirement in the U.S. After the COVID-19 Pandemic Shock

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Abstract:

This chapter analyzes the implications of the unexpected 2020-2021 COVID-19 pandemic for work and retirement in the U.S. The pandemic induced the greatest loss of jobs in the shortest period of time in U.S. history. A slow economic recovery would surely have endangered work longer/retire later policies that seek to adjust the finances of Social Security retirement to an aging population. Boosted by the huge CARES (March 2020) and ARPA (April 2021) rescue packages, the early recovery from the COVID-19 recession was faster and stronger than the recovery from the 2007-2009 Great Recession. Even so, the pandemic greatly altered the job market, with workers suffering from long COVID having difficulty returning to work and more workers working from home. In its immediate effect and potential long-run impact, the pandemic recession/recovery is a wake-up call to the danger that shocks from the natural world pose to work and retirement. Realistic planning for the future of work and retirement should go beyond analyzing socioeconomic trends to analyzing *expected unexpected* changes from the natural world as well.

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Introduction

"The best-laid schemes o' Mice an' Men / Gang aft agley." – Robert Burns, 1785

Most analyses of work and retirement and of the private and public investments that finance retirement are rooted in extrapolations of ongoing demographic, economic, and technological trends, and increasingly of predictions of global warming as well.

The main demographic trend affecting work and retirement in America is greater longevity. Longer lives flatten the age structure of the population and raise the number of retirees per worker,[1] threatening the financial viability of pay-as-you-go Social Security systems.

The main economic trend affecting work and retirement is the slow growth of real earnings, decoupled from productivity and accompanied by high and rising inequality. Continual indexing of Social Security can maintain retirees' living standards but require higher taxes if earnings are relatively stagnant.

The main technological trend affecting work is the inexorable advance of AI robotics that creates better machine substitutes for human workers and concurrent digitalization of work which allows new software to spread automation from blue-collar to white-collar work, with the potential for increased productivity and earnings

The main climate trend is global warming, which may create a tipping point disaster that permanently alters the Earth's geology and ecosystems, endangering the "natural capital" of soil, air, water and living things that helps create productive economies.

The unexpected COVID disaster reminds us, however, that the world does not change solely through on-going or expected trends that we can build into our future plans. The world also changes through unforeseeable shocks that upend the "best-laid schemes o' mice and men."

Building on the impact of the COVID experience on the labor market and economy, I argue that realistic planning for the future of work must go beyond analyzing ways to respond to foreseeable demographic, economic, technological, and climate trends. Realistic planning must also assess ways to respond to unexpected shocks from the natural world, building the *expected unexpected* into our plans for the future, despite the uncertainty about the timing and form of those shocks.

My analysis begins by documenting the unexpected disaster that the pandemic wreaked on employment in March-April 2020, the partial recovery of employment through spring 2021, and government efforts to find the most efficacious path to a healthy recovery. I argue that the pandemic recession should be seen not as a once-in-a-century rare event to be put into history books per the 1918 flu pandemic, but as a wake-up call to a future of discontinuous shocks from the natural world, and to the need to plan for such shocks.

The COVID-19 Pandemic's Impact on Labor Markets

"Unimagined just a few short months ago, the ongoing COVID-19 pandemic has upended our entire planet, quickly challenging past assumptions and future certainties... possibly ushering in a new epoch of pandemics" (Morens and Fauci 2020).

COVID-19 hit the U.S. in March 2020. The lesson from China and the EU, which experienced COVID cases first, was that quick decisive action was critical to control the virus. The U.S. responded slowly and indecisively. After denying the problem, President Trump favored, then opposed, public health recommendations, declared he was in charge, then abdicated responsibility to state governments, and blamed the Obama Administration, Democratic governors, WHO, and China for the explosion of cases and deaths. After pushing for

warp speed development of a vaccine, the President switched gear to propose untested medicines, bleach, sunlight, and miracles as cures.

By the end of the first year of the pandemic, the U.S. accounted for 19.1 percent of the cumulated world deaths from COVID – 4.4 times our share of the world's population,[2] despite being the world leader in health spending and biomedical research.[3]

To slow the spreading disease, states and localities introduced *non-pharmaceutical interventions*: wearing masks; social distancing; staying at home; self-quarantining; and isolating vulnerable groups. In March and April 2020, much of the country shut down businesses deemed not essential and introduced stay-at-home policies for residents. Combined with public fear of infections, this produced a discontinuous shrinkage of economic activity that showed up in the greatest loss of jobs in the shortest period in U.S. history. As illustrated in Figure 1, the ratio of employment to the civilian population aged 16+ fell by a bit under 10 percentage points from 61.1 in pre-pandemic February 2020 to 51.3 in April 2020. The actual number employed (not seasonally adjusted) dropped by 24.7 million in the Current Population Survey of households (which includes the self-employed), and by 20.7 million in the Current Employment Statistics survey of establishments (limited to workers employed by firms).[4]

[FIGURE 1]

The loss of jobs was concentrated in a set of industries that normally experience only modest cyclic job losses. Table 1 shows the change in employment in major industries from pre-COVID February 2020 to the trough of job loss in April 2020, and the recovery through September 2020 measured by employment relative to the February 2020 level. Ratios below 1.00 imply employment below February 2020 employment. One minus the ratio is the percentage change in employment from its pre-pandemic February level.

The pandemic recession job loss by industry diverges greatly from job loss in previous recessions. Employment nearly halved from February 2020 to April 2020 in traditionally acyclic leisure and hospitality industries while falling much less in traditionally highly cyclic manufacturing and construction. Job loss was minimal in finance, professional services and the federal government, as digitalization of white-collar work and the Internet permitted widespread work from home.

The massive job loss in the pandemic added to an ongoing 21st century trend in U.S. employment that has arguably received less attention than it deserves: the country's fall from being one of the top advanced countries in employment per person of working age to a much lower position in country rankings. In the 1990s, the U.S. was hailed for its great success in creating jobs. Many analysts credited its high employment rate to an "employment at will" job system that allowed firms to change employment quickly with little role for the social dialogue among firms, unions, and governments that most advanced countries used to govern the labor market. At the end of the 20th century, the U.S.'s 0.74 employment rate of adults aged 15 to 64 led all advanced countries, except for lightly populated Norway (0.78) and Denmark (0.76) (OECD 2021).

However virtuous employment-at-will may be in booming times, the Great Recession and ensuing recovery revealed its deficiencies when the economy weakens. In the Great Recession, the U.S. lost a greater fraction of jobs than most other countries and had a relatively slow job recovery as well, which dropped the U.S.'s employment rate to the middle of the pack, where it remained through the pandemic recession and recovery. In the first quarter of 2021, the U.S.'s employment to population ratio was 0.69 – five points lower than in 2000 – behind the rate of Switzerland (0.80), Germany (0.76), Norway (0.74), Denmark (0.74), Sweden (0.76), Canada

(0.72), the UK (0.75), Australia (0.74), and New Zealand (0.74), and marginally above Ireland (0.68) (OECD 2021).

The flip side of the huge job loss was the greatest increase in workers seeking unemployment insurance (UI) in U.S. history. As illustrated in Figure 2, the number of job losers making new UI claims jumped from less than 0.3 million in the week of March 14 to 3 million in the following week. Over the next two weeks, the number of new claimants jumped again to 6 million. Most firms told laid-off workers they would be recalled when the economy returned to normal, so that over three-quarters of job losers expected a quick recall with only a short need for UI support (Washington Post May 7, 2020).

[FIGURE 2]

With prescience that the pandemic recession created greater need for financial support forworkers and their families than a normal recession, in March 2020 Congress enacted the Coronavirus d, Relief, and Economic Security Act (CARES), which boosted UI and gave cash payments to individuals and families.[5] Many states placed a moratorium on the eviction of tenants who could not pay rent during the crisis. This was followed by a federal moratorium (O'Connell 2021; USAGov 2021). Absent CARES, the concentration of job loss among lower-paid workers would have increased poverty and inequality. But the wages of many low-paid job losers were so low that the emergency support gave them higher incomes than their normal work, which reduced poverty and inequality, albeit briefly (Cortes and Forsythe 2020; Han, Meyer, and Sullivan 2020a; Parolin et al. 2020). Congress also enacted a Paycheck Protection Program to loan funds to small businesses for payroll and other costs, with unclear effects on jobs.

In May 2020, as the number of cases and deaths from COVID-19 fell, states and localities lifted or loosened stay-at-home policies and allowed more businesses to operate. Employment increased greatly through June and July. Many firms rehired their laid-off workers,

which fed President Trump's "gut" feeling that the economy was heading for a rapid V-shaped recovery.[6] But the disruption of economic activity was too great to reverse direction and return to full employment within a few weeks. June and July's rapid job growth decelerated in fall 2020 while the numbers jobless and on UI remained high. In early October 2020, more than 9.6 million people received state UI payments – six to seven times as many as had been on UI a year earlier. Even as employment grew, layoffs continued at a high rate, producing roughly three-quarters of a million UI initial claimants per week in October.

Six months later, in April 2021, newspapers headlined the "good news" that initial claimants dropped to 613,000 per week (U.S. Department of Labor 2021). But the good news was relative to the April 2020 collapse. A year after the pandemic recession the April 2021 number of claimants was still three times the April 2019 number and close to the peak monthly number of claimants in the Great Recession.[7] Throughout summer and fall of 2021, the number of unemployment claimants greatly exceeded pre-pandemic levels and the employment-population ratio remained about 2 percentage points below its pre-pandemic level.

Employment did not bounce back as rapidly as it had fallen in part because economies are intertwined networks of firms and consumers in which activities in one sector or area propagate to other sectors and areas, albeit with lags. Firms that cut activities in April 2020 purchased fewer intermediate goods and services from suppliers, who in turn reduced purchases from their suppliers, and so on along the supply chain. Loss of sales forced suppliers and suppliers of suppliers to lay off workers. The job losers spent less on goods and services, shrinking economic activity further. Indoor venues where proximity of customers could readily spread the disease such as restaurants and sporting and artistic events suffered loss of revenues that forced many to close.

At the state level, the interconnection of economic activities across geographic areas spread the economic effects of the pandemic even to states with relatively few COVID-19 cases in the first wave of the pandemic. A case in point is Iowa, whose state government rejected policies to fight the disease by significantly restricting economic behavior. The state government refused to lock down businesses and forbid local governments from mandating masks.[8] Still Iowa suffered major job losses. In fall 2020, UI claims were three times their pre-COVID levels, while employment was 4.1 percent lower in February 2021 than in February 2020 (Iowa Workforce Development 2021a; 2021b).

A New Inequality

The pandemic created a *new form of labor market inequality* that threatens to keep inequality in the U.S. high:[9] inequality by collar and place of work – between primarily white-collar workers able to work from home and blue-collar and service workers whose jobs required them being proximate to other workers or customers at a work site.

Table 2 documents the new form of inequality in terms of the proportion of workers who worked at home due to the pandemic given by the Current Population Survey from May 2020 through the following year t for the nine major non-agricultural occupations in US statistics, and for farming, fishery, and forestry occupations as well.

[TABLE 2]

Column 1 shows the proportion of employed workers who reported that *they worked from home for pay as a result of the pandemic* as a 12-month average between May 2020 and April 2021. The work-from-home figures are based on questions that the Bureau of Labor Statistics added to the Current Population Survey (CPS) on the impact of pandemic on work from home. Over the entire period 43 percent of employed managers, 42 percent of professionals, 27 percent

of office and administrative support, and 19 percent of sales workers reported that they were working from home compared to less than 5 percent of workers in other primarily blue-collar and service occupations.

Column 2 records employment at the bottom of the recession in April 2020 relative to the February 2020 pre-pandemic baseline. It shows a massive loss of jobs in blue-collar and service occupations with minimal possibility to work-from-home compared to minimal job losses in the white-collar occupations where employees could shift to work-from-home. Finally, Column 3 shows employment in September 2020, after the summary recovery, relative to the February pre-pandemic baseline.t Despite a large jump in blue-collar and service occupation jobs in June, July, and September, the ratios o employment in those occupations relative to the February baseline remained below the comparable ratios for the white-collar jobs.

To what extent, if at all, is the shift of work from the workplace to homes likely to persist? Before the pandemic, fewer than one in ten workers worked at home, so the pandemic increased work-from-home by over three-fold. In the recovery from May 2020 to April 2021 the proportion of employed workers reporting working-from-home halved from 36 percent (May) to 18 percent (April), suggesting that absent another epidemic outbreak, any "new normal" would be below the May peak but still noticeably above the 10 percent pre-pandemic level (Gould and Kandra 2021). if the rate of decline in the number of workers reporting working-from-home due to the pandemic continues for another 2-3 years, at say 10 percent of actual employment, and the 10 percent or so working at home for reasons other than the pandemic remains roughly stablie, on the order of one-fifth of the work force might work from home in the future. Indicative of the potential future response of major firms to work-from-home, in 2021 the CEO of IBM declared a long-term strategy of "hybrid remote work for most employees post the pandemic" (Sonnemaker 2021) – a strategy which reversed IBM's 2017 rejection of work-from-home, which itself ended

nearly 20 years of IBM using work-from-home to save money on office space and commuting time (Kessler 2017).

Education, Gender, Race/Ethnicity, and Age: Demographics of Pandemic Job Loss and Recovery

Because the demographic characteristics of workers vary across occupations, the differing rates of pandemic job losses and recovery job gains among occupations impacted workers differently by demography. Table 3 shows the monthly employment pattern of workers by education, gender, race/ethnicity, and age from February 2020 to the March and April 2020 loss of jobs through the summer-fall recovery – all measured relative to the February base.

[TABLE 3]

Job loss by education was qualitatively similar to job losses in previous recessions, with persons with the least education having the biggest percentage loss of employment and those with bachelor's degrees or more having the smallest percentage job loss. From February to April 2020 employment dropped by 21 percent for workers with less than four years of high school, by 13 percent for high school graduates and by 15 percent for persons with some college education, compared to a 7 percent drop for workers with a BA or more. The data for the summer-fall recovery shows commensurately greater job gains for the biggest job-losing groups, but with none of the demographic groups fully regaining February employment. The main reason for the variation in job losses was the concentration of the less educated in blue-collar and service jobs with little option for work-from-home compared to the concentration of BA or higher workers in management and professional jobs, where work-from-home substituted for working in an office.

Job loss by gender, by contrast, diverged from that in previous recessions. In most recessions, men experience greater job loss than women because men are more likely than

women to work in highly cyclic industries such as manufacturing and construction. In the February to April pandemic recession, employment fell more for women (18 percent) than for men (12 percent), due primarily to the concentration of women in service sector and retail occupations and industries that require workers to interact with other workers and customers, compared to men working in managerial and professional jobs, where digitalization of work and internet connections allowed for extensive work-from-home.

The employment of female workers was also impacted by the increase in demand for household production activities stemming from the closure of schools and daycare centers. The historic role of women in caring for children placed a dual demand on their time that pulled some working mothers from the labor force and reduced the productivity of many others, who kept working but had to care for their children while working at home.[10] In the recovery many faced difficult work-life balance decisions when firms re-opened offices and sought to restore traditional work times.

The last panel in Table 3 distinguishes people by age. In the first months of the pandemic COVID-19 endangered the health of older people the most. The likelihood of being infected, sick, or dying rose monotonically with age. A jarring number of deaths occurred in old-age homes, which were unprepared for the pandemic. By fall 2020, however, the infection rate among older adults fell below the average (Monod et al. 2021), in large part because the medical system, the elderly and their families, and old-age homes had adopted non-pharmaceutical interventions that kept the elderly from interacting with persons with the disease. If they got the disease, however, older persons still had high mortality.

Job losses, by contrast, were largest for younger workers. This happened in part because most firms use “last in, first out” layoff practices, which protect workers with seniority over recent hires, who tend to be disproportionately young. This was also due in part because the

collapse of new hires in the pandemic reduced employment for the young, as those graduating high school and college could not find their first job as had earlier cohorts of new graduates. To add to the employment problem of younger persons, jobs which normally hire young workers offer relatively few opportunities to work from home (Chen and Munnell 2020). From February 2020 to April 2020 employment fell by 37 percent for persons aged 16-19 and 29 percent for those aged 20-24 compared to 13 percent for workers 25-54 and 15 percent for those aged 55 and older. Among older workers, however, those aged 65 and over lost jobs more rapidly than those 25-54, possibly because they chose early retirement in a collapsing job market.

In the fall recovery the youngest had the largest gains in employment, while older workers had smaller gains. This fits with past experience. Once unemployed, workers over 65 tend to take more time to find new employment than younger workers (Neumark, Burn, and Button 2019). In the Great Recession, job losers aged 55 to 64 were the group most likely to exit the labor force, probably via early retirement (Farber 2017). Retirements increased during the pandemic as well (Kolko 2021), reducing the number of older workers.

Finally, the concentration of job losses by occupation, industry, and demography combined to produce greater job losses among lower-paid than higher-paid workers, which would have devastated their incomes absent the emergency government programs. Indeed, the CARES unemployment benefits offset these losses from March 2020 to July 2020 enough to reduce poverty a bit. When a politically divided Congress chose not to extend the benefits after July, however, the low-paid suffered and the rate of poverty rose (Han, Meyer, and Sullivan 2020b).[11]

Recovery, recovery, my ~~kingdom~~ presidency for a rapid recovery

In summer 2020, rapid return to full employment seemed unlikely. The Congressional Budget Office's Economic Forecast expected that unemployment would not fall to 5 percent or below until approximately 2027 and that real GDP would not regain its pre-COVID level per capita until 2023 (CBO, July 2020).[12] Foroni, Marcellino, and Stevanović's (2020) review of other forecasting and now-casting models showed that they concurred that the country faced a slow, painful recovery. None of these models built into their forecasts the rapid development of vaccines nor the possibility of further positive or negative shocks to the economy. All were influenced by the slow recovery from the Great Recession and the inability of the Democrats and Republicans s to come together on an aggressive recovery policy.

What a difference an election can make! The 2020 elections changed the presidency and control of the Senate and opened the door to more activist economic policies that could speed up the recovery. Newly-elected President Biden proposed a $1.9 trillion American Rescue Plan Act (ARPA) of short-run direct relief to families and workers still impacted by the COVID-19 crisis. Like the CARES bill which Congress supported almost unanimously, ARPA sought to maintain living standards for primarily low-income groups. In contrast to CARES, however, ARPA was passed in March 2021 by Democratic legislators over unanimous Republican opposition. Taking account of the passage of ARPA, the likely vaccination of millions in spring and summer 2021 and the possibility that Congress would support some form of long-term investment program on infrastructure, the CBO changed its projections. The 2021 CBO projection anticipated the unemployment rate dropping to 5.0 percent in 2022 – five years *earlier* than its 2020 projection! and remaining below 5 percent thereafter; and real GDP per capita regaining its pre-pandemic level by the end of 2021 (CBO, July 2021, table 2).

Even a strong recovery, however, would leave serious economic problems: a labor participation rate below its pre-COVID level, reflecting the impact of the disease on the longer term health of those afflicted, and changed attitudes toward work and looking for work. The Bureau of Labor Statistics reported in fall of 2021 that 7.9 percent of people who were not in the labor force but said that they wanted to work were prevented from looking for a job because of the COVID-19 pandemic (U.S. Bureau of Labor Statistics 2021). These COVID-19 related problems combined with the trend in the ratio of workers to retirees raised new questions about the viability of the Social Security system and of extant work longer/retire later policies to maintain the system.

Social Security and work longer/retire later policies

Social Security is the centerpiece of U.S. retirement. About 90 percent of retirees receive Social Security, and 57 percent of retirees receiving Social Security rely on it as their major source of retirement income (Brenan 2019). As a tool for reducing poverty, Social Security has been extraordinarily successful, reducing elderly poverty to the lowest rate among age groups (Engelhardt and Gruber 2004; Li and Dalaker 2021, figure 2).

Social Security is a pay-as-you-go inter-generational transfer system in which retiree benefits come largely from the tax payments of existing workers. The viability of the system is thus highly dependent on inter-generational demographic and economic factors. When Social Security gains more in taxes than it pays out, the money is invested in interest-bearing Treasury securities held by the Social Security Trust Fund. When the current workforce pays less in Social Security taxes than the benefits promised to retirees, Social Security taps the Fund to meet the shortfall. From the latter part of the 20th century to 2020, population aging forced Social Security to withdraw money from the Fund to make payments to existing retirees. Prior to the

pandemic the rate of withdrawal was sufficiently large that the agency expected the Fund to deplete entirely by 2035.

Three policy tools exist to deal with the problems of funding retirement in an aging population. The first is to tax existing workers to pay for the increasing number of aged retirees. The second is to reduce the benefits going to retirees. The third and generally preferred way are policies that encourage or force older workers to work longer and retire later.iPeople who work longer and retire later pay more tax money into Social Security funds and take less money out (OECD 2019). Someone who works an additional five years will, for example, pay social security taxes into the Social Security Trust Fund for those five years, and, assuming a given life span, take five years less of benefits. The U.S. and other governments have accordingly adopted various policies to get older persons to work more before retiring, including to work partially after claiming Social Security (Farrell 2019).[13] To deal with the depleting fund in the 1980s Congress legislated gradual increases in the full retirement age for persons born in and after 1960 from age 65 to 67 and smaller increases for persons born earlier. Incentivized to work two or so extra years, Americans aged 55 and older increased their labor participation by about 10 percentage points from 1989 to 2018 (Baily and Harris 2019). This raised the average age of retirement from 64.2 to 67.9 years for men and from 63.4 to 66.5 years for women between 2003 and 2018 (OECD n.d.). Partial work has become common as well. Upwards of 45 percent of Social Security recipient "units" (individuals and married couples) aged 62–64 reported that earnings from employment constituted nearly one-fourth of their total income (Morrissey 2011). Pfau, Tomlinson, and Vernon (2019) simulated the best strategy for older workers to maximize their wealth and found that most can improve their well-being by delaying retirement and working smartly within the rules of the Social Security earnings test.

A working longer/retiring later strategy succeeds, however, only if older workers can maintain employment. In the Great Recession and ensuing sluggish recovery, job-related problems impelled many workers to choose early retirement. Slightly over half of the retirees who retired early reported doing so because they had employment-related problems: job loss (23 percent), organizational changes at their place of employment (15 percent), or unhappiness with their job (13 percent). An additional 9 percent said they retired due to a retirement incentive or buyout. Once unemployed, moreover, older workers are more likely to stay in the labor force than other unemployed workers, seemingly to stave off early retirement (Burtless 2016).

During the pandemic 15 percent of employers reported increases in the number of employees withdrawing from their defined contribution plans and 12 percent reported an increase in employees taking plan loans.[14] These behaviors could push the workers to work longer and delay retirement to rebuild their pension wealth if the recovery continues strong and employees can readily find jobs. The strong recovery notwithstanding, the U.S. Treasury predicted in 2021 that the Social Security Trust Fund will run out of money by 2033 – two years earlier than expected before the pandemic hit. This prediction is based not only on the shrinkage of the labor force and early retirements but also on an expected 1 percent slower growth of productivity per year. Absent improved productivity and employment the U.S. will likely face retirement funding problems in little over a decade (Franck 2021), even without any future pandemic shock or other adverse event.

Conclusion: Planning Work and Retirement for Future Unexpected Shocks

"In preparing for battle I have always found that plans are useless, but planning is indispensable." – credited to Dwight Eisenhower

Prior to COVID-19, future-of-work analyses focused on extrapolations of demographic, economic, and technological trends, and increasingly on projections of global warming as well (ILO 2018). Analyzing the effects of expected developments on work and retirement is a *sine qua non* for planning for the future. But the impact of COVID-19 on work shows that realistic planning must also take into account potential unexpected shocks from the natural world (or elsewhere) that can "gang aft agley" our "best-laid schemes."

How can society plan for unexpected future shocks? If something is unexpected, doesn't that mean it comes as a surprise for which one cannot by definition plan?

The answer to this seeming conundrum lies in the distinction between *unexpected unexpected* events and *expected unexpected* events. It is near impossible to plan for the unexpected unexpected since no one has an inkling of its nature, timing, whatever. But it is possible to plan for expected unexpected shocks by analyzing the ways a "shock" may come and impact work and retirement, even when the timing and detailed characteristics of the shock are unpredictable.

The insurance industry, indeed, is based on the expected unexpected – the car crash, fire, surprise illness – that has some probability of occurring with a range of destructive effects based on earlier similar events. Around the world, defense and security agencies plan for unexpected attacks which may or may not occur in any given period. They try to figure out the capability of possible enemies and ways to respond to possible attacks through war game scenarios and exercises. The expected unexpected may take a different form than the scenarios planned, but per the Eisenhower quote, the exercise of planning may itself improve the ability to deal with unexpected twists and turns.

The COVID-19 "attack" on humanity that upended economies and employment offers an example of an expected unexpected shock for which analysts of work and retirement (and in

most other areas of social and economic decision-making) did not plan. We have built up a stock of knowledge about the COVID-19 virus and about ways to protect persons against it. We know that the virus will mutate quickly and suspect that a successful mutant form will be less harmful to us than the forms that surfaced in 2020-2021, but cannot sure that a more harmful variant may be coming down the pike. Similarly, per Fauci and Morens' coming "new epoch of pandemics," we can expect attacks from other viruses,[15] though we have little clue as to which virus will cause a crisis and when that would be. The story for contagious diseases from bacteria is the same. Bacterial antibiotic resistance is growing but we cannot predict which bacteria will mutate enough to negate our current medicines nor when such a mutation will occur.

Although the science is different, we face a similar problem in the battle against global warming. Our knowledge of climate change is limited to knowing that we will face unexpected shocks of some sort from continued warming, without any surety of the specifics of the shocks. There is growing evidence that we should expect more extreme weather events – fire, floods, storms – and growing concerns that we may face a potential turning point disaster to the environment that will degrade natural capital and thus our productive ability. But we have no reliable prediction of the specifics. In the economic world financial crises are the archetype expected unexpected disaster, as the 2007 implosion of Wall Street reminded us.

What lessons can we draw from the unexpected COVID-19 shock to the job market and economy for planning for the future of work and retirement? What types of policies might we study further as part of our planning process?

I draw four interrelated lessons from the pandemic and our responses to it.

The first lesson is that it almost surely will pay off for the U.S. and other countries to improve the knowledge base of what expected unexpected shocks can do to us. Cutler and Summers (2020) estimated that U.S. losses from the pandemic in lives, GDP, and damage to

health were on the order of $16.9 trillion[16]. This is an amount that easily justifies sizable increases in R&D spending to study the shocks we may face in the future and on plans to deal with those shocks. While positive returns from greater R&D (itself an investment in an expected unexpected) cannot be guaranteed, high stakes justify more spending than low stakes even if only a small share of projects yield fruit. And it is reasonable to expect positive benefits from more research spending on COVID-19, and by extension other possible unexpected disasters. The avalanche of COVID-19 studies that the disease unleashed (Else 2020) shows that biological and medical scientists can shift their research programs quickly to learn about a new enemy. The rapid development of vaccines, which culminated a "25-year journey" working out a messenger RNA strategy (Collins 2021) and "extraordinary multidisciplinary effort" (Fauci 2021) supports greater R&D to reduce the possible losses from the next contagious disease shock, be it viral or bacterial.

The second lesson is that increased spending should extend to social and behavioral sciences. Part of the huge loss in the pandemic was due to socially deleterious human behavior – persons unwilling to undertake non-pharmaceutical interventions such as wearing a mask, social distancing, etc., or to take protective vaccines. Unwillingness to follow the science may be greater in the U.S than in other countries, but opposition to vaccines and mask-wearing in many other countries suggests that many people distrust the expertise of scientists and public health officials around the world, weakening our ability to fight the virus.[17] Accordingly, part of any increase in R&D budgets should go to studies of ways to convince people to follow the science, ranging from social psychology analyses of how "gut intuitions" and moral values influence responses to expert advice (Tavernise 2021), to economic studies of responses to monetary and non-monetary incentives, to sociology studies of the transmission of information and imitation in

networks, to education studies of science teaching, and to marketing/communication studies of consumers' responses to advertising.

The third lesson is that we need to improve the efficacy of social institutions and organizations designed to protect us in several areas. On health, the COVID Tracking Project estimated that over 34 percent of all U.S. COVID-19 deaths occurred among the less than 1 percent of the population in nursing homes and other long-term-care facilities (Curiskis et al. 2021). Early in the COVID-19 outbreak the General Accountability Office (GAO) asked the Department of Health and Human Services to "develop a strategy to capture more complete COVID-19 data in nursing homes retroactively back to January 1, 2020" (Dicken 2021), which at a minimum would prepare those institutions to react more quickly than in 2020. In economic policy, the failure of Florida's unemployment insurance computer system to get money to claimants during the pandemic was an institutional failure of the first order, which the Governor claimed was due to his predecessor rigging the UI system with pointless roadblocks so that people would give up trying to get their money (Wamsley 2020).[18] Research into the effectiveness of all types of organizations responsible for others – schools, daycares, old-age homes, health care systems, and local and state government emergency help agencies – in the COVID-19 crisis should concentrate on helping them respond better to the next crisis shock, whatever form it takes.

A November 2021 editorial in *Science* (Proctor and Geng 2021) captures this lesson succinctly: "COVID-19 has shown the world that 'knowing what to do' does not ensure 'doing what we know.' It demonstrates that intervention discovery is the start, not the end, of the scientific journey." The editorial calls for NIH to create an office of implementation research, but as the problem goes beyond the bio-medical area that is NIH's forte, any such program should involve more government agencies and publicly concerned groups.

My fourth lesson is that planning for social problems likely to be impacted by future expected unexpected shocks, such as work and retirement, needs greater use of two research tools: "societal exercises" to test the effectiveness of organizations to respond to crisis; and computer simulations of policies or mixes of policies that can only be examined on-line. Israel's November 11, 2021, nationwide drill /war game to prepare for the next possible battle against COVID-19 exemplifies what can be done in societal exercises to prepare for an expected unexpected disaster of a particular kind. Recognizing the value in closely monitoring the situation and preparing for a worst case scenario, Israel posited an attack by "omega," a more lethal coronavirus mutant, and tested the response of organizations and people to policy interventions ranging from monitoring omega's spread to lock-downs that would slow its spread to providing economic support for affected workers and their families (Ackerman 2021). Facing an entirely different expected unexpected shock, NASA's Jet Propulsion Lab Center for Near Earth Objects tested the response of its decision-makers to a hypothetical asteroid crashing into earth. NASA forced its team to decide in a short time span on actions to minimize damage from the asteroid crash, and to react to new information coming in at different times (Dvorsky 2021).

The other way to plan for expected unexpected shocks is to develop online simulation models. Such models can combine many determinants with different response parameters to get a wider picture of possible outcomes than in a single societal drill. They can also pinpoint key parameters to which analysts should give greater attention. In the case of future work and retirement, simulations could help assess interactions among the determinants of change – for example, how a new contagious disease shock, which almost surely will depress demand for labor and shift work to homes, might operate in conjunction with extreme weather events, which increase demand for labor, first by emergency workers, and then for construction labor to rebuild infrastructure.

To update Eisenhower's paean to planning, while social exercises and simulations of the future of work and retirement are unlikely to fit the next expected unexpected shock that strikes us, the act of simulating may be indispensable to improving decisions to address that shock.

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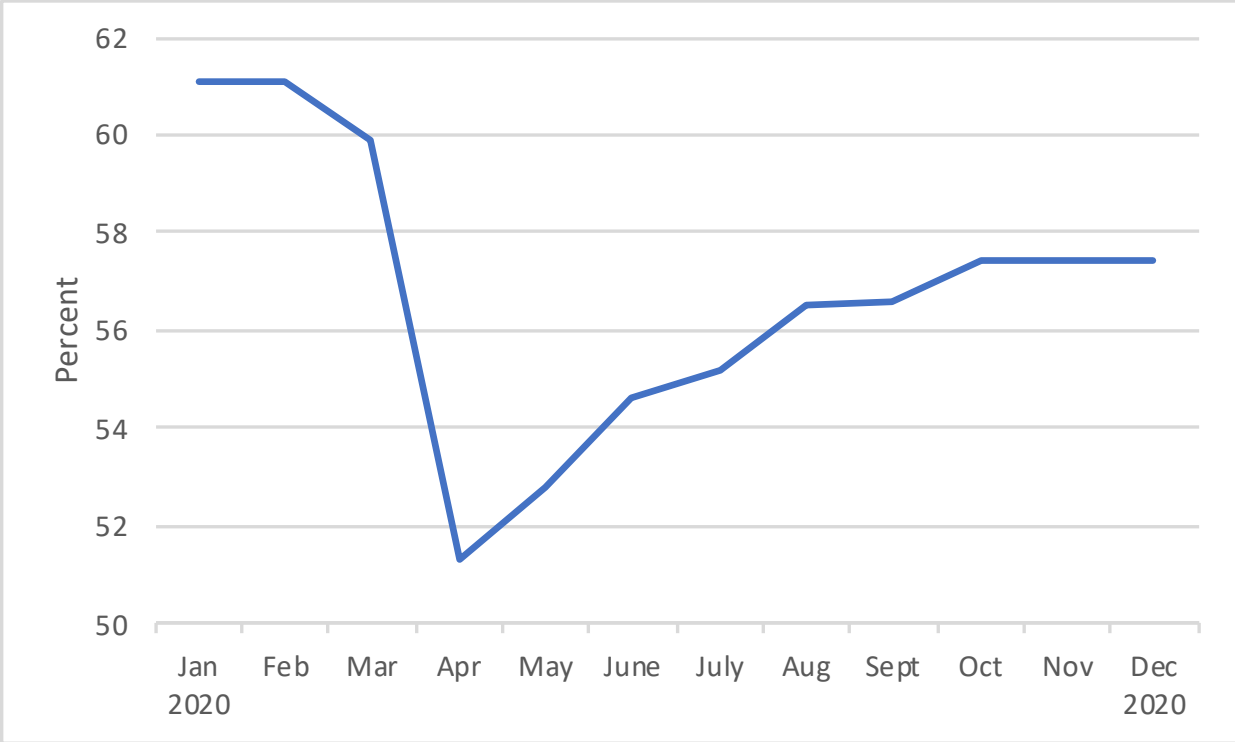
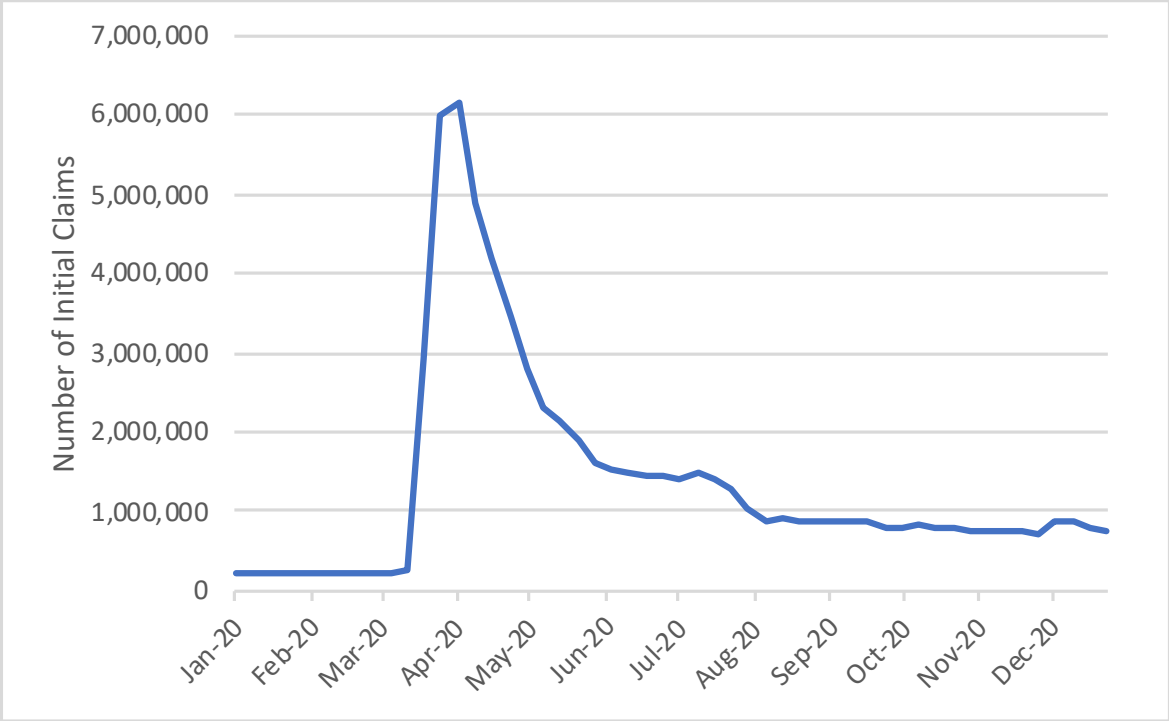
Figure 1. U.S. Employment to Population Ratio in 2020



Source: U.S. Bureau of Labor Statistics, Employment-Population Ratio [EMRATIO], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/EMRATIO, May 24, 2021.

Figure 2. U.S. Workers Losing Jobs Who Made an Initial Unemployment Claim, 2020



Source: U.S. Employment and Training Administration, Initial Claims [ICSA], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/ICSA, May 24, 2021.

Table 1. Level of Employment by Industry Relative to February 2020, Ordered by Loss of Employment through September 2020

Industry	Feb. 2020, number employed (000s)	April 2020 employment relative to Feb. 2020	Sept. 2020 employment relative to Feb. 2020
Leisure and hospitality	16,264	0.52	0.81
Mining and logging	700	0.92	0.88
Education and health	24,711	0.89	0.89
Other services	5,889	0.78	0.92
Local government	14,844	0.95	0.92
Information	2881	0.90	0.93
Durable manufacturing	8,036	0.88	0.95
Professional and business services	21,246	0.94	0.95
Transportation and warehousing	5,610	0.89	0.96
Non-durable manufacturing	4,759	0.91	0.97
State government	5,105	1.01	0.98
Finance	8,797	0.97	0.99
Utilities	544	0.99	0.99
Construction	7,276	0.89	1.02
Federal government	2,848	1.01	1.10

Data for industry from Current Employment Statistics. U.S. Bureau of Labor Statistics,, https://www.bls.gov/webapps/legacy/cesbtab1.htm

Table 2: Level of Employment by Occupation Relative to February 2020, Ordered by Percentage of Workers Working at Home

Occupation (number employed in 000s)	Percent working at home because of COVID (avg., May 2020-April 2021)	April 2020 employment relative to Feb. 2020	Sept. 2020 employment relative to Feb. 2020
White-collar Occupations			
Management, business, and financial (27,926)	42.8	0.95	0.96
Professional (38,218)	41.9	0.91	0.94
Office and administrative support (16,225)	26.5	0.88	0.96
Sales (15,069)	18.8	0.81	0.84
Blue-collar and Service Occupations			
Installation, maintenance, and repair (4,922)	4.8	0.85	0.95
Service (26,223)	4.6	0.69	0.89
Production (8,344)	4.3	0.76	0.92
Construction and extraction (8,154)	3.1	0.80	0.99
Transportation and material moving (11,793)	2.6	0.79	0.89
Farming, fishery, and forestry (1,144)	1.6	0.94	0.84

Source: Percent of employed working at home: Gould and Kandra (2021), Figure D. Employment relative to Feb. 2020: U.S. Bureau of Labor Statistics, Employment by occupation, from Current Population Survey, https://www.bls.gov/webapps/legacy/cpsatab13.htm

Table 3: Level of Employment Relative to February 2020 by Demographic Group

	Feb. 2020, number employed (000s)	Employment compared to Feb. 2020				
EDUCATION*		March	April	May	June	July
Less than HS	8,670	0.97	0.79	0.79	0.83	0.79
High school diploma	34,793	0.96	0.87	0.83	0.88	0.88
Some college	36,061	0.99	0.85	0.88	0.88	0.85
BA or more	59,411	1.00	0.93	0.94	0.96	0.96
GENDER						
Male	83,047	0.98	0.88	0.89	0.89	0.93
Female	74,970	0.98	0.82	0.85	0.92	0.93
RACE/ETHNICITY						
White	121,929	0.99	0.85	0.88	0.92	0.93
Black	19,530	0.97	0.83	0.85	0.87	0.88
Hispanic	28,311	0.97	0.80	0.82	0.88	0.88
Asian	18,327	0.97	0.82	0.82	0.85	0.89
AGE						
16-19	5,012	0.96	0.63	0.75	0.97	1.07
20-24	14,069	0.94	0.71	0.75	0.83	0.86
25-54	101,152	0.99	0.87	0.89	0.91	0.91
55 and older	37,784	0.98	0.85	0.87	0.90	0.91
65 and older	10,847	0.94	0.78	0.81	0.85	0.94

Source: U.S. Bureau of Labor Statistics, The employment situation of the population, from Historical Data Table A-9, Selected Employment Indicators, https://www.bls.gov/webapps/legacy/cpsatab9.htm

The 65 and older figures are the sum of those employed with a disability and with no disability, U.S. Bureau of Labor Statistics, Employed - With No Disability, 65 Years and over, and Employed – With a Disability, 65 Years and over [LNU02075379 and LNU02075600], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/LNU02075379 and https://fred.stlouisfed.org/series/LNU02075600, May 24, 2021.

* For persons aged 25 and older.

Endnotes

1. In 1960, the ratio of U.S. persons aged 25 to 61 to those aged 62 and over was 3.8, giving a large number of workers to pay taxes for retirees. In 2020, the ratio was 2.3. The decline in the ratios requires a rise in taxes or fall in benefits to stabilize pay-as-you-go Social Security. See Urban Institute, Age Distribution of the Population, 1950-2060, https://www.urban.org/sites/default/files/2015/10/09/t2_age_distribution.pdf

2. See Statista (n.d.). The spread of the disease to Brazil and India subsequently reduced the U.S. share of COVID cases and deaths, but did not wipe away the horrific performance of the U.S. in 2020, when many other countries did so much better in controlling the disease.

3. In 2016, the U.S. spent about 8.5 percent of its GDP on health out of public funds, about the same as the average of other comparable countries, but had much higher private spending of 8.8 percent of GDP compared to 2.7 percent on average for other nations. The U.S. leads the world in biomedical research because the National Institutes of Health has the largest research budget.

4. U.S. Bureau of Labor Statistics, All Employees, Total Nonfarm [PAYNSA], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/PAYNSA; and Employment Level [LNU02000000], retrieved from https://fred.stlouisfed.org/series/LNU02000000l; November 23, 2021.

5. CARES provided UI in excess of normal UI; new benefits to self-employed and other workers outside the state-run program; and one-time payments of $1,200 per adult and $500 per child to most households.

6. Trump expressed his feelings in April (https://www.nbcnews.com/politics/donald-trump/trump-predicting-rapid-economic-recovery-experts-say-it-s-not-n1184496) and May (https://nypost.com/2020/05/18/trump-predicts-v-shaped-coronavirus-recovery-as-stocks-soar/).

7. U.S. Employment and Training Administration, Initial Claims [ICSA], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/ICSA, May 24, 2021..

8. On April 3, 2020, Iowa Governor Reynolds argued that the measures taken, including closing schools and some businesses, were equivalent to a mandatory shelter-in-place or stay-at-home directive. On July 7, 2020 Governor Reynolds indicated that local governments could not implement mask requirements because they were not consistent with her public health disaster proclamation. "Covid-19 Pandemic in Iowa," https://en.wikipedia.org/wiki/COVID-19_pandemic_in_Iowa, accessed May 25, 2021.

9. The U.S. stands atop income inequality among advanced countries with levels comparable to those in less developed countries. World Bank (https://data.worldbank.org/indicator/SI.POV.GINI) and OECD data (https://data.oecd.org/ inequality/income-inequality.htm) data show the U.S. with the highest Gini coefficient among high-income countries.

10. For the demands on mothers more broadly, see Agovino (2020) and Cooper (2020).

11. See povertymeasurement.org/COVID-19-poverty-dashboard for poverty trends.

12. These estimates are from Table 1 in Congressional Budget Office (2020), with unemployment in annual averages and real GDP based on changes in annual levels.

13. Social Security allows beneficiaries below full retirement age to earn a certain amount with no reduction in benefits while allowing beneficiaries at or above full retirement age to have unlimited earned income with full benefits.

14. The CARES Act allowed retirees to withdraw up to a set amount from private pensions without the 10 percent early withdrawal penalty, allowed employers to increase the amount workers could borrow from their pension fund, and allowed employees to delay payments for loans received.

15. That 2000-2020 experienced six zoonotic viral attacks on humans – SARS-CoV in 2003, MERS-CoV in 2012, Chikungunya (2014), Zika (2015), H1N1 "swine" flu (2009) and Ebola (2014-2020) in addition to SARS-CoV-2 – gainsays any notion that there is little or no chance of another pandemic in our lifetimes.

16. This is their sum from a Congressional Budget Office (2020) estimate that the pandemic recession cost the U.S. on the order of $7.6 trillion, value-of-life estimates that the near half a million deaths (at the time of their study but higher since) cost $4.4 trillion, and estimates of health costs to persons afflicted by the virus of $4.9 trillion.

17. Government mandates in particular areas that forced people to change behavior – *vide* closing of restaurants and bars – seemed necessary to convince them the viral threat was real enough to change their behavior (Freeman and Li, n.d.). This is particularly important for the U.S. where death rates exploded compared to Australia, Germany, Singapore, and South Korea in part because the U.S. reacted the slowest in mandating behavioral changes (Sebenius and Sebenius 2020). Experimentation with fines or rewards may also be valuable in finding the path to following public health advice (Madani 2021).

18. In March 2021 it was estimated that fixing and maintaining the Florida computer system would cost up to $244 million (Lyons 2021).