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The Impact of COVID-19 on Labor Markets and Inequality

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The Impact of COVID-19 on labor markets and inequality

By Covid economics research team

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Abstract: This paper surveys economic literature largely from 2020 and 2021 on how the COVID-19 pandemic and responses to it affect U.S. income inequality. Established trends of growing inequality may continue roughly as before, involving new technologies, international trade, and the growth of “superstar” firms. Employment, earnings, and schooling were affected differently across demographic groups and occupations. The pandemic disrupted lower-paid, service sector employment most, disadvantaging women and lower income groups at least temporarily, and this may have scarring effects. Government policies implemented in response to the pandemic offset much of the effect on income. Higher-paid workers tend to gain more from continuing opportunities to telework. Less-advantaged students suffered greater educational setbacks from school closures. School and day care closures disrupted the work of many parents, particularly mothers. We conclude that the pandemic is likely to widen income inequality over the long run, because the lasting changes in work patterns, consumer demand, and production will benefit higher income groups and erode opportunities for some less advantaged groups. Telework has increased permanently. High-contact jobs and services may continue to face reduced demand and increased automation. School disruptions have been worse for lower-income students and are likely to have lingering negative effects, which may widen future inequality within more recent birth cohorts. The history of the 1918 flu shows that the effect of a pandemic on inequality in income, education, health, and wealth depends on the nature of the pandemic and on behavioral and policy responses.

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1. Introduction

This paper examines recent economic literature on ways in which the COVID-19 pandemic has affected current and future income inequality in the U.S. It concentrates on the pandemic's impacts on U.S. labor markets, and, to a smaller extent, schooling—both of which have direct implications for income inequality, and both of which have prompted policy responses that affect inequality. The paper emphasizes the pandemic's implications for income inequality with occasional reference to inequality of consumption expenditures or wealth. We review COVID-19-related economic research, largely from working papers issued in 2020 and 2021; less new work has come out in 2022 on these subjects.

The paper begins with background on the trends in inequality observed before the pandemic. Inequality has increased substantially over the last forty years. New technologies, increased international trade, and the growth of “superstar” firms all have tended to provide relatively greater opportunities for more educated, higher income individuals. Next, we review research on the immediate, short-run effects of the pandemic on inequality. The pandemic disrupted lower-paid, service sector employment most, disadvantaging women and lower income groups. This threatened to widen inequality, but economic policies implemented in response to the pandemic more than offset this effect overall, so inequality narrowed. Turning next to the longer run, the pandemic seems likely to widen inequality. Potential reasons include higher-paid workers reaping more advantage from telework, lower-paid workers suffering more scarring from disruptions in employment, and less advantaged students suffering worse educational setbacks from school closures.

2. Background: Long term trends in inequality

Inequality has increased substantially over the last forty years. New technologies, increased international trade, and the growth of “superstar” firms all have tended to provide relatively greater opportunities for more educated, higher income individuals. This section considers the recent literature on these topics.

Estimates of inequality vary widely depending on the concepts, methods, and data used to measure it. For example, income can be measured using household surveys, establishment surveys, or tax records. Many forms of capital income are especially difficult to measure. Estimates of inequality also differ based on whether data are at the person level, household level, or aggregated across groups of individuals or households, and how households of different size are treated. An appendix discusses measures of inequality.

We begin with relatively comprehensive measures of income prepared by Piketty, Saez, and Zucman (2018) and Saez and Zucman (2020). These authors show that widely used household surveys and tax records capture only 60 to 70 percent of national income, and that this proportion has been declining. They seek to measure the distribution of national

income, including all forms of capital income.² Combining aggregate and household-level data, they measure income after taxes and transfers, accounting for the distribution of government expenditures and tax incidence. This more comprehensive approach rests on many assumptions concerning capital income and a number of new data sources.

Piketty, Saez, and Zucman (2018) (PSZ) report that the highest 1 percent of U.S. incomes accounted for 20 percent of total national income in 2014, up from 12 percent in 1980, confirming a trend discussed in the widely cited study of Piketty and Saez (2003). Conversely, the lower 50 percent declined to 12 percent of the total from 20 percent. Redistributive tax and spending policies lifted elderly and middle income groups, but did not increase the share claimed by the lower 50 percent. The lower 50 percent of incomes had virtually no real growth between 1980 and 2014, either pre-tax or post-tax.³ Piketty and Saez (2003) examined inequality in the United States using income tax data from 1913 to 1998. They show that top incomes shares declined during the depression and World War II but increased greatly after 1980. They had suggested, presciently, that because of a decline in progressive taxation, and presumably also because of observed increases in the top 1 percent share of pre-tax income, the concentration of wealth and capital incomes could increase in future years.⁴

Some important changes in the sources of income inequality occurred about 2000. Before 2000, labor income was an important element in higher incomes, but subsequently capital income, especially income from stocks and bonds, became more important.⁵ Educational differences appear to have played a diminishing role, while consolidation of market power played a growing one. Autor, Goldin, and Katz (2020) found that educational wage differentials explained 75 percent of the rise of U.S. wage inequality from 1980 to 2000 but only 38 percent of the continuing rise from 2000 to 2017. In related evidence, Bessen, Denk, Kim, and Righi (2020) find that firms that were industry leaders were more frequently displaced up to 2000, but that leaders were less often displaced after 2000.⁶

Saez and Zucman (2020) summarize recent trends in the distribution of U.S. national income. The national income approach includes many types of capital income, and allocates wealth according to observable data on certain observed income flows, such as dividends.

² The key to measuring inequality on a national income basis is incorporating the full effect of capital. Piketty, Saez, and Zucman (2018) allocate several omitted forms of capital income based on observable data on dividends and other income flows. See Smith, Yagan, Zidar, and Zwick (2019) and Smith, Zidar, and Zwick (2021) for further advances in measuring and understanding the sources of individual capital incomes.

³ In France by contrast, despite similar technology and trade pressures, the lower 50 percent have obtained considerable income growth (Piketty, Saez, and Zucman, 2017).

⁴ The authors find that government redistribution through taxes and transfers has had little impact on their central measures of inequality. Even allowing for these influences, working-age adults in the lower 50 percent of the U.S. income distribution still have had virtually no increase in real income since 1980. Much of government transfers has gone to the elderly or middle-income individuals (PSZ, 2018, page 557).

⁵ Piketty, Saez, and Zucman (2018).

⁶ Relatedly, Song, Price, et al. (2019) show that differences between firms account for a substantial share of earnings inequality, as measured from employer W2 tax forms.

They report that in recent years wealth has become more concentrated. The top 1 percent of wealth holders now own more than 35 percent of total wealth. Wealth holdings have become more important because wealth has grown more rapidly than income or output.⁷

There are many discussions of improvements to the PSZ measures of income inequality. For example, Larrimore et al. (2021) examine a broader concept of income than that typically used in the “national income” literature. They add on estimates of unrealized capital gains on stocks, housing, and other assets, which can be quite substantial. Their measures also include cash transfers and in-kind income, such as the value of owner-occupied homes and health insurance paid by employers or government. They find a smaller increase in the top 1 percent share of income than other studies. Including unrealized capital gains, the share of the top 1 percent increased by 2.1 percent from 1989 to 2016, considerably less than the 6.2 percent increase in the Piketty-Saez data base.

Looking more narrowly at earnings from work, Rothwell (2016) examines the top 1 percent of U.S. wage earners. Many work as doctors, dentists, and lawyers. Rothwell shows that, given a worker’s personal characteristics, earnings are much higher in certain industries, such as law, finance, real estate, and, increasingly, hospitals. Rothwell suggests that lawyers, doctors, and dentists increase their earnings by blocking competition from lower-paid paralegal or paramedical personnel.

Past recessions have particularly harmed lower-wage workers by lowering labor force participation and reducing hours of work. Martin, Munyan, and Wilson (2015) studied 150 recessions in 23 OECD countries. They found that recessions, especially severe recessions, lead to sharply reduced output, often for 5 to 8 years. Output decline reflected reductions in hours worked, not lower productivity. Heathcote, Perri, and Violante (2020) found that U.S. workers at the 50th income percentile soon recovered, but that incomes of workers in the 20th percentile suffered from declining hours worked. Such trends brought about much of the widening inequality in the lower half of the U.S. male earnings distribution. We discuss the covid recession’s distinctive potential scarring effects further in a later section.

Consistent with these findings, Jaimovich and Siu (2020) show that U.S. employment bounced back quickly after the 1970s and 1980s recessions, but that after the 1991, 2000, and 2008 recessions, total employment did not recover quickly. They classify clerical, administrative, and operative jobs as routine, whereas professional, managerial, and service jobs are nonroutine. They demonstrate that the jobs lost in the more recent recessions were concentrated in routine jobs.

In the long run, demographic shifts affect the patterns and trends observed in measures of inequality. For example, migration between countries affects the mix of human capital in a given country. A population’s age composition plays a role since there is a life cycle to

⁷ Saez and Zucman also discusses how statistical agencies can measure inequality. They compliment BEA for their efforts along these lines but prefer their own concept of national income to the BEA’s work which emphasizes disposable income, which is aligned with consumption.

earnings, which tend to peak in mid- or late career. Shifts in family size and structure affect family-level measures of inequality. This paper concentrates on economic forces associated with the COVID-19 pandemic; it does not address the role of demographic shifts.

Why has inequality increased? Technological change and increasing globalization appear to have been the major forces increasing inequality, especially in manufacturing. Much empirical evidence suggests that technology primarily reduced demand for so-called routine jobs.⁸ Recent work shows that the rise of highly successful “superstar” firms with market power has added to inequality.

Technology and trade

Technological changes have driven reductions in clerical and administrative positions across most industries in the advanced countries. Oberfield and Raval (2021) emphasize that technical change has been important in manufacturing, where the labor share has declined substantially.

Autor (2019) and Autor, Katz, and Kearney (2008) consider the polarization of jobs, in which employment in high and low income occupations increases, but middle-income jobs disappear. According to Autor (2019) the erosion of middle-income jobs has “shunted non-college workers from middle-skill career occupations that reward specialized and differentiated skills into traditionally low-education occupations that demand primarily generic skills.” Such trends affected non-college workers “in middle-skill, blue-collar production and white-collar office, administrative, and clerical jobs.” In another study, Autor (2010) concluded that “The key contributors to the polarization of jobs are the automatization of routine tasks and, to a smaller extent, the international integration of labor markets through trade and, more recently, offshoring.” Bloom, Draca, and Van Reenen (2016) illustrate how international trade effects can bring about technical change.

Efforts to automate production tend to displace routine jobs more than other low-skilled work, but not to reduce employment overall. According to a 2020 World Economic Forum forecast based on an international survey of employers, increased automation would displace 85 million jobs by 2025, but create even more (WEF, 2020). Acemoglu and Restrepo (2021) suggest that automation displaces more jobs than market power does. The authors study job losses in different education and demographic groups. They concentrate on the loss of routine jobs in industries where the labor share is declining. Their measure of automation explains job losses quite well, but employer profit margins or concentration explain job losses much less successfully. They report that international outsourcing has a slight effect on job losses, but has less of an impact than automation. A later section examines how potential increases in automation due to the pandemic may affect inequality.

⁸ Early analyses suggested that improved technology reduced demand for less-educated and less-skilled workers in general (e.g. Juhn, Murphy and Pierce (1993)). Subsequent work showed that technology particularly affected routine jobs. Other analyses emphasize that institutional factors such as the decline of collective bargaining and the minimum wage have been especially important in the U.S.

Market Power

Industry concentration has increased in the U.S in recent decades. There is evidence that some “superstar” firms are more productive than their competitors, expand rapidly, and establish market power in their product markets.⁹ De Loecker et al. (2020) show how these very effective firms establish such market power, restrict output relative to perfect competitors, and consequently reduce labor demand and the share paid to labor.¹⁰

In contrast, some economists have argued that highly successful firms have typically not increased their markups much (Basu, 2019), or that the labor share in manufacturing fundamentally declined because of labor-saving technology. However, Ganapati (2021) finds strong evidence supporting De Loecker et al.’s central contention that oligopoly displaced labor within a broad national data set that covers most of the U.S. economy over forty years.

Local data also show the importance of market power. Concentration of industries in commuting areas is associated with greater local income inequality (Rinz, 2018). Employers with larger local employment share passed a smaller share of productivity gains on to workers (Berger, Herkenhoff, and Mongey, 2022).

Capital income disproportionately benefits high income individuals, increasing inequality. Labor’s share of overall industry revenue has been declining for some time by some measures (Giandrea and Sprague, 2017). However, the effect is not robust to variations in measurement. Koh, Santaella-Llopis, and Zheng (2020) find that the declining labor share is attributable to R&D and software being treated as investment, which assigns more income to capital. Eisefeldt, Falato, and Xiaolan (2021) find that the trend toward lower labor share also disappears if equity-based compensation, such as stock options, is taken into account. Labor’s share is a difficult framework in which to discuss income inequality, and this paper will focus on more direct measures.

Savings rates and the macroeconomy

Some recent evidence shows that inequality may have a substantial effect on the macroeconomy. Higher income people save proportionately more and consume less. Mian, Straub, and Sufi (2021a) link the shift in income towards high income groups with greater savings by the rich (“a saving glut”) and consequently a shortfall of consumer demand and secular stagnation. An expansionary monetary policy can lead to greater indebtedness, which inhibits growth in the future. They suggest that it may be more effective to

⁹ Key articles in this new literature include De Loecker, Eeckhout, and Unger (2020), Autor et al (2020), De Loecker, Eeckhout, and Mongey (2021), and Bessen et al (2020).

¹⁰ Superstar firms often greatly increase their share of the market and output. However, because they are oligopolists they do not increase their output as much as perfect competitors would. Instead, they frequently increase their profit margins which leaves smaller sums to be paid to workers and reduces overall wages and labor force participation (De Loecker, Eeckhout, and Unger (2020, page 611).

redistribute income to lower income groups who will spend more. There is growing empirical support for such views. Mian, Straub, and Sufi (2021b) show that top 1 percent Americans have increased savings greatly in recent years, and that poorer Americans have correspondingly fallen deeper into debt. Mian, Sufi, and Verner (2017) demonstrate, within a sample of 30 countries, that greater household debt inhibits future GDP growth. Zidar (2019) shows that, within data for individual states in the U.S., tax cuts for lower income people increase future employment growth, but tax cuts for the highest-earning 10 percent of the population do not correspondingly help subsequent employment growth.¹¹ This emerging literature suggests that more equal income distribution, and the associated lower indebtedness of average people, increases economic growth. That contrasts sharply with traditional theories which emphasize that greater savings lead to greater growth.¹²

3. Short run effects of the pandemic period

This section discusses how a broad range of effects of the pandemic, including lockdowns and social distancing, affected inequality.

Income, Spending, and Poverty

Measures of household income and poverty for 2020 help illustrate the short-term effect on inequality of the pandemic and attendant policy responses. Overall, while the pandemic itself eroded incomes and widened inequality, policy responses more than offset these effects, rendering 2020 incomes more equal than those of 2019.¹³

Shrider et al. (2021) examine pre- and post-tax household incomes for 2020 and earlier years. According to Census Bureau data, median real, household pre-tax or “money” income fell 2.9 percent between 2019 and 2020. The associated official poverty rate increased by 1.0 percentage point to 11.4 percent. The Gini index of inequality in money income was not statistically significantly different from its 2019 level, whether or not adjusted for household composition.¹⁴

These measures include income from some pandemic response policies, such as expanded and enriched unemployment benefits and paychecks supported by the Payroll Protection Plan. Consequently, it is likely that absent such policies, incomes would have fallen and poverty increased by larger amounts, and the Gini index would have increased. Examining unemployment insurance benefits in particular, at various points in the pandemic a variety of programs expanded their scope and increased their generosity

¹¹ Zidar states, “The effects seem to come from labor supply responses as well as increased consumption and investment.” (p. 1465)

¹² The classical mechanism that increased saving lowers interest rates and stimulates investment may have a more substantial effect over long time periods, but the studies cited here suggest that inequality matters more in the short run.

¹³ Most of the research currently available deals with 2020 and does not extend to 2021.

¹⁴ For comparisons of living standards across households, see the methodological discussion in the appendix.

(Ruffini and Wozniak, 2021). Among other measures, the CARES Act provided an additional \$600 a week to UI recipients in the spring and summer of 2020. (The UI system had various other modifications in the remainder of 2020 and 2021.) In practice the expansion of benefits in the CARES Act gave 80 percent of displaced workers more in benefits than they would have earned from work, as the median displaced worker earned \$519 per week. The combination of the inequality in job loss and the lump-sum \$600 benefit implied that the effect of the CARES Act on the income distribution of workers was extremely progressive (Cortes and Forsythe, 2020).

Most research finds that these increased benefits had little negative effect on total hiring. (See Altonji et al 2020, Marinescu, Skandalis, and Zhao 2021, Dube 2021, Finamor and Scott 2021, and Bartik et al 2020; Petroskey-Nadeau and Valletta 2021 find moderate disincentive effects.). The added benefits were intended to support consumer spending; using credit- and debit-card data from Illinois, Casado et al. (2020) find the programs did increase expenditures.

The timing of the CARES Act payments influenced the time path of monthly poverty. Parolin et al. (2020), using CPS data, estimate that CARES Act transfers reduced the poverty rate by around 5.6 percentage points in April 2020, while in December 2020 with a lower level of CARES Act transfers, the monthly poverty rate was 16.1 percent, 0.6 percent higher than in January 2020. Using a slightly different method that uses the monthly categorical family income variable in CPS, Han et al. (2020) come to similar conclusions.

The pandemic's disparate impact is similarly evident in measures of earnings. The number of individuals working full-time, year-round decreased from 2019 to 2020, while their average earnings increased (Shrider et al., 2021). This is evidence that lower earners were more likely to be out of work. Dalton et al. (2021) also find low-wage workers were more likely to become part-time for economic reasons. The pattern was similar but more pronounced with respect to individuals working full-time, year-round.

The measures of income and poverty discussed above do not consider some other new and existing policies that helped alleviate the pandemic downturn, such as advance child tax credits, economic impact payments, and in-kind benefits. For example, total Supplemental Nutrition Assistance Program (SNAP) benefits increased from \$56 billion in fiscal year 2019 to \$74 billion in fiscal year 2020.¹⁵ More inclusive measures of income suggest that inequality actually decreased during the pandemic. Using a post-tax measure that includes tax credits and economic impact payments, Shrider et al. (2021) report that median, real household income grew by 4.0 percent, while the Gini index of inequality in money income fell by 3.1 percent to 0.428, and the Gini index in equivalence-adjusted money income fell by 4.2 percent to 0.399. The supplemental poverty rate, which, in contrast to official poverty rates, takes greater government assistance and essential

¹⁵ U.S. Department of Agriculture, Food and Nutrition Service <<https://www.fns.usda.gov/pd/supplemental-nutrition-assistance-program-snap>>

expenses into account, declined 2.6 percentage points, to 9.1 percent (Fox and Burns, 2021; Shrider et al., 2021).

Consistent with the research on income, research on consumer spending and saving shows that spending fell more for higher income groups in this period and that the financial position of households lower in the income distribution did not deteriorate on average. Chetty et al. (2020), using credit- and debit-card data, find that households in Zip codes in the top income quartile spent 13 percent less as of mid-July than in January 2020, whereas households in bottom-quartile Zip codes spent only 4 percent less. Using Chase checking account and credit- and debit-card data, Cox et al. (2020) find that the pandemic led to a large and immediate decline in spending during the initial stages of the pandemic in March for all quartiles of the pre-pandemic income distribution. Beginning in mid April, spending recovered much more rapidly for low-income households than for high-income households so that large differences in the change in spending from the beginning of the pandemic arise by the end of May. (Relatedly, Cox et al. 2020 find that liquid assets increase similarly across all income classes in this period.) Similarly, Horvath, Kay and Wix (2021) find that credit card spending recovered most strongly for borrowers with the lowest credit rating. By the end of August 2020, transaction volumes were up 14 percent for the least creditworthy borrowers relative to 2019. Credit-card delinquencies did not increase for any credit score group or Census tract income quintile from March to June 2020 (Consumer Financial Protection Bureau (2020)).

All three rounds of stimulus checks, roughly in April 2020, December 2020, and March 2021, were predominantly saved (either directly or used to pay down debt) rather than spent, and this was true for all income classes (Armantier et al. 2021, using household survey data from the Federal Reserve Bank of New York's Survey of Consumer Expectations). Lower-income households spent somewhat more and paid down debt more relative to higher-income households. Parker et al. (2021) and Coibion et al. (2020) reported similar results for the first round of stimulus, using Consumer Expenditure Interview Survey and Nielsen survey data respectively.

Because the data for most of the foregoing studies on consumer spending and savings come from banks and credit-card providers, they exclude the poorest of the poor. Bitler, Hoynes, and Schanzenbach (2020) note that in spite of the overall progressivity of the policy response, some measures of distress were elevated. For example, comparing estimates from the pre-Covid National Health Interview Survey with the Covid Impact Survey, food insecurity rates had increased almost three times over the pre-COVID rates as of June 2020 with almost a quarter of families reporting their food "just didn't last" and they did not have money to buy more. Bitler et al. suggest three reasons for the discrepancy: (1) Many relief payments to low-income families were delayed, and reached needy families weeks or months after their income losses. They point to the number of weeks before Pandemic Unemployment Assistance (PUA) and Federal Pandemic Unemployment Compensation (FPUC) benefits were awarded in several states and note that pandemic Electronic Benefit Transfer (EBT) benefits (in place of school meals) were

also disbursed slowly. (2) Only the expansions in the generosity of the UI system were large enough to offset income losses during the pandemic. (3) There are many unemployed workers who were not covered by UI, even after its expansions. The authors also show evidence that many furloughed people with less education did not apply for UI benefits, and note that households including any adult without a Social Security number were ineligible for the Economic Impact Payments.

Effect of the pandemic on specific demographic groups

Women

Overall, women's employment and labor force participation declined similarly to men's during 2020. Milovanska-Farrington (2021) finds that, accounting for other demographic characteristics, women's employment decreased less early in the pandemic. Controlling for industry and occupation, Lee, Park and Shin (2021) find that women's employment declined more early in the pandemic, but these differences dissipated by the end of 2020. In the prime age group (25 to 54) women fared relatively worse. Women's labor force participation declined in this age group, reversing a five-year upward trend (Abel and Deitz, 2021). Black and Hispanic prime age women suffered a more severe decline in labor force participation and recovered more slowly than other women.

Women's disadvantage among prime age workers occurred largely because mothers suffered a greater decline in employment than fathers or non-parents during the pandemic recession (Alon et al., 2021). Most of the employment decline among women occurred among mothers who are not college graduates. Fabrizio, Gomes, and Tavares (2021) find that, during the first nine months of the crisis, being a woman with at least one child under 12 years old reduced the probability of employment by 3 percentage points relative to a man with similar characteristics; there was only a 1 percentage point relative drop for women who did not have children under 12. The mandatory closure of schools and child-care centers was a contributing factor early in the pandemic. Russell and Sun (2020) find that the negative effect of closures continued after they had ended.

Alon et al. (2021) also find that women fared worse than men in occupations unsuitable for work from home. The feasibility of working from home is a major factor in explaining how different occupations adjusted to the pandemic.¹⁶ Albanesi and Kim (2021) classify occupations by their ability to work from home and physical proximity to coworkers and customers. Close-proximity occupations not suitable for remote work saw particularly large declines in employment. Since women comprised 73 percent of workers in such occupations, they suffered a disproportionate share of employment decline in the pandemic. Focusing specifically on mothers, Lofton et al. (2021) report that mothers working in occupations with flexible work schedules lost relatively few jobs during the

¹⁶ Dingel and Neiman (2020) provide a widely used classification, based on O*NET data, of occupations which are suitable for work from home.

pandemic. Perhaps surprisingly, in occupations which already had high rates of work from home, mothers lost jobs at rates similar to other occupations.

Furman, Kearney, and Powell (2021) point out that mothers of young children (under 13 years) make up too small a share of the labor force to have a great impact on overall labor force participation and employment. They calculate that mothers of young children account for only 12 percent of the total U.S. workforce, and were only slightly more likely to leave the labor force than women without children.

Greater family responsibilities may also cause working women's productivity to decline relative to men. Du (2020) finds that female stock analysts' forecasts were less accurate after Covid-induced school closures. Deryugina, Shurchkov, and Stearns (2021) field an international survey and find that female academics, particularly those who have children, report a disproportionate reduction in time dedicated to research relative to what comparable men and women without children experience.

Minorities

In general, minorities had greater economic losses from the pandemic, though, as with women, much of this differential dissipated by the end of 2020. In the early pandemic period (through June 2020), Milovanska-Farrington (2021) found that the decline in Black employment was 0.6 percentage points greater than the decline for Whites, and that the increase in the share employed but not at work was 0.9 percentage points higher. Corresponding numbers for Hispanics were 2.4 and 0.9 percentage points. (These numbers adjust for other demographic characteristics such as age and education.) Hershbein and Holzer (2021) find that Blacks and Hispanics lost more employment than Whites, though the difference for Blacks became small by December 2020.¹⁷ Lee, Park and Shin (2021), using a different set of controls, find, in slight contrast, a 1.6 percentage point greater increase in the unemployment rate for Blacks than for Whites by November 2020, but no appreciable difference for Hispanics. As of January 2021, Blacks were less likely than Whites to telework and were 30 percent more likely to report that their income had declined during the previous year (Rothwell and Smith, 2021).

Reduced labor force participation contributed to the greater reduction in Black employment, as labor force participation was 0.5 percent greater for Whites in the first quarter of 2020 but 1.6 percent greater in the second quarter.. The Black-White gap in participation shrank in 2021 to levels comparable to those before the pandemic.

¹⁷ Hirshbein and Holzer's employment measure does not include workers who are part-time for economic reasons and or away from work for unspecified reasons. Adjusting for education and the quartile of the occupational wage has only a small effect (though the work-from-home suitability of the occupation is not controlled for).

Minority-owned businesses were particularly hard hit by the pandemic, with the number of Black and Hispanic business owners measured by the CPS declining 41 and 32 percent respectively between February and April 2020 compared to 22 percent for the country as a whole (Fairlie, 2020). The distribution of minority-owned businesses by industry accounted for most of the differential. Mills and Battisto (2020) found in addition that Black-owned businesses were concentrated in areas particularly hard-hit by Covid, that the Paycheck Protection Program typically provided 15-20 percent of businesses loans in areas where Black-owned businesses were concentrated, and that Black-owned businesses had less access to credit prior to the pandemic. Some research has examined the effect of Federal programs such as PPP on minority-owned businesses, with mixed results. Atkins, Cook and Seaman (2021) find that Black-owned businesses received loans that were approximately 50 percent lower than observationally similar white-owned businesses. In contrast, Calem and Freedman (2021) find that neighborhoods with a high percentage of racial and ethnic minorities received significantly more Paycheck Protection Program dollars per small business than other areas.

Education level

The economic impact of the pandemic also varied greatly by education level. The pandemic recession hit less-educated harder than prior recessions had. Recovery was also slower, since hard-hit sectors, such as leisure/hospitality and personal services, employ less-educated labor more intensively (Groshen and Holzer 2021; Hershbein and Holzer 2021). High school graduates experienced the largest initial decline in employment rates while those with post-graduate education experienced the least. These patterns of relative employment also held true in December 2020, but employment losses were much smaller by then. Lee, Park and Shin (2021) show that the late 2020 differential across education groups is much smaller than earlier in the year. Even after controlling for major occupation, major industry, and demographic variables, employment losses in April 2020 varied by several percentage points across education levels. The differential essentially vanished by November. Ability to work from home is an important mediating variable. Those with high school or less were 71 percent less likely to say they or someone in their household is working from home than graduate degree holders, and CPS data confirm that work from home rates increase substantially with education level (Rothwell and Smith 2021, Dey et al. 2021). The rate of work lost due to the pandemic varied widely with each occupation's suitability for telework and with education. Since occupations suited to telework are highly correlated with education, highly-educated workers had a substantial advantage in weathering the pandemic (Dey et al., 2021).

Occupation

The effect of the pandemic on workers substantially depended on how readily jobs in particular industries or occupations could switch to work-at-home arrangements. In an early paper Malkov (2020) shows that teleworkable occupations require higher education and experience levels as well as greater cognitive, social, character, and computer skills

relative to occupations not suitable for telework. This may reduce opportunities for workers who lose jobs in occupations that do not require these skills.

Occupations more suitable for working from home tend to have higher earnings. Hershbein and Holzer (2021) showed that occupations in the higher quartiles for occupational mean wages had lower declines in employment.

The growth of working from home implies a relocation of economic activity that reduces the demand for urban service workers. Althoff et al. (2021) show that “when high-skill workers begin to work from home or leave the city altogether, they withdraw spending from local consumer service industries that rely heavily on their demand. As a result, low-skill service workers in big cities bore most of the recent pandemic’s economic impact.” As partial corroboration, within large U.S. cities, Ramani and Bloom (2021) find households, businesses, and real estate demand have moved from dense central business districts (CBDs) towards lower density suburban zip-codes.

Industry and establishment characteristics

Using CES data, Dalton, Handwerker and Loewenstein (2020a,b) found that small firms (less than 500 employees) suffered the greatest employment loss early in the pandemic but recovered considerably by the end of 2020. Using Homebase payroll data, Dam, Heise, Melcangi and Shirmer (2021) found that 35 percent of small businesses in retail, leisure, and hospitality were still closed by May 2021, reducing employment by 25 percent compared to February 2020. They estimated that the original employers would eventually rehire only about 4 percent of these displaced workers.

Effects in other industries were temporary. After an unanticipated drop in employment in food manufacturing and animal processing industries in April 2020, employment returned to trend levels within two to three months (Ramsey, Goodwin and Haley 2021). Leisure and hospitality industries had large declines in jobs openings per unemployed worker, but manufacturing industries had only modest changes in this ratio from the end of 2019 to April 2021 (Aaronson, Lewers and Sullivan 2021).

Changes in employment in some sectors were driven by large, pandemic-related shifts in demand, sometimes in combination with policies that forced some businesses to temporarily close or alter operations. For example, Chetty et al. (2020) examine the decline in U.S. consumer credit and debit card spending in the months just after the pandemic began. They find that roughly two-thirds of the reduction as of mid April 2020 came from reduced spending on goods or services that require in-person contact, such as hotels, transportation, and food services—categories that made up just one-third of such spending in January. By mid July, spending increased above pre-pandemic levels for tangible goods, and therefore raised labor demand in the industries that manufactured, warehoused, and shipped such goods. Demand for in-person services remained depressed.

Differences in employment outcomes are not entirely due to industry, however. BLS researchers Dalton et al. (2021) found that low-wage workers and low-wage establishments both suffered disproportionate employment declines, by November 2020, even after accounting for industry.

International Comparisons

The trend toward wider inequality largely has been global, though its details and magnitude have varied from country to country. The pandemic's infection and mortality rates too have varied widely by country. Early in the pandemic, rates of infection were greater in many of the rich countries than in poorer ones. Rapid government intervention narrowed inequality in many developed countries. Later in the pandemic, richer countries recovered economically, while poorer nations suffered more.

As of July 25, 2021, the U.S. death toll relative to its population was more than two and one-half times that of Canada, and had surpassed that of Spain, a country that was hit much harder than the U.S. early in the pandemic.¹⁸ All else equal, the pandemic's impact on inequality would be larger in harder-hit countries. However, all else is not equal. The pandemic's effects on inequality are likely to be larger in countries whose economies are more vulnerable to pandemic disruptions, such as those that rely heavily on tourism. They are likely to be smaller in countries whose responses to pandemic-related economic challenges are more effective and/or more targeted toward disadvantaged groups.

Stantcheva (2022) reviews a number of cross-national and nation-specific studies to illuminate the pandemic's effects on income inequality. She finds that as GDP fell, many countries implemented policies that supported or even increased families' incomes. Income inequality mostly narrowed as a consequence. However, she notes that absent such policies, the pandemic would have widened inequality, as less advantaged groups generally suffered more job displacement and had less opportunities to shift to remote work. Women generally suffered more work disruption than men, because they were more concentrated in adversely affected jobs, and because they took on more child care responsibilities when schools and daycare facilities closed. Moreover, the pandemic might widen inequality in the longer run, because its regressive direct effects (such as job loss) are potentially scarring. The pandemic in the longer run might additionally disadvantage women relative to men, and rural areas relative to cities. Less advantaged schoolchildren generally suffered larger disruptions to learning, and might suffer longer run economic losses as a consequence. The author discusses policies that might lessen these disparate effects.

Furceri et al. (2021a,b) report that five major pandemics in the past twenty years preceding the COVID-19 pandemic were followed by increases in income inequality. The authors examine country-level measures of inequality across many developed and

¹⁸ IZA Institute of Labor Economics, Crisis Response Monitoring.

developing countries. They find that inequality increased more where national governments pursued fiscal austerity, and less where governments provided more fiscal supports. They predict that the current pandemic, owing to its large magnitude, might widen inequality more than past pandemics, recessions, and financial crises did.

Deaton (2021) assembles aggregate, descriptive data across economically developed and developing countries, through December 2020. Richer countries tended to suffer more pandemic deaths, and to lose more income. Inequality between countries had been narrowing since about 2000, especially when countries are weighted by population. During the pandemic, the decrease in unweighted cross-country inequality continued and may have accelerated, while the decrease in population-weighted cross-country inequality seems to have plateaued or slightly reversed. The population-weighted results are driven very heavily by the experiences of China and India.

Yonzan et al. (2021) estimate the amount by which 2020 and 2021 incomes were lower than pre-pandemic projections for each percentile of the global population. Their estimates assume constant within-country income distributions, but allow for some countries' incomes to grow faster than others, with consequences for the global income distribution. In both years income losses were largest between about the 10th and 30th percentiles, falling about 7 percent below projections. The losses were smaller at both lower and higher income levels. Income recovery so far has been skewed in favor of better-off individuals. Below the 10th percentile, 2021 losses were bigger than 2020 losses; above the 40th, 2021 losses were smaller than 2020. The top decile enjoyed the strongest recovery. Their incomes in 2021 were between 2 percent and 3 percent below projections compared with about 5 percent below in 2020. The authors note that their 2020 finding mostly agrees with Deaton's—global inequality generally did not increase, especially if India and China are excluded. But their additional finding for 2021 points to some subsequent widening of global inequality, coming after about 25 years of cumulative narrowing.

Sánchez-Páramo et al. (2021) echo some of these findings, and add that the pandemic appears to have interrupted favorable trends in global extreme poverty rates. Accounting only for aggregate, country-level differences in the the pandemic's impacts, they report that after falling from 10.1 percent in 2015 to 8.5 percent in 2019, the extreme poverty rate spiked to 9.4 percent in 2020. It stood at 9.1 percent in 2021, well above the 7.8 percent rate that had been projected before the pandemic.

Ferreira et al. (2021) look at short-term severe welfare losses, namely pandemic deaths and entry into poverty, to illuminate the incidence of welfare losses worldwide. They find that, while poorer countries generally suffered larger increases in poverty, many richer countries suffered higher death rates, suggesting that their overall welfare losses (from both deaths and increased poverty) have been larger than many poor countries'.

Darvas (2021) examines the pandemic's potential effects on inequality within and across 49 advanced and emerging countries. The pandemic downturn generally hit lower-paid workers harder, so harder-hit countries likely had larger increases in within-country

inequality. The pandemic probably reduced global and between-country inequality, because per capita GDPs declined more in advanced countries than in other countries. Employment protection policies mitigated job loss, especially in Europe, but within-country inequality still tended to increase. He suggests that the pandemic's unique features, including adverse health impacts and telework-related advantages for more prosperous groups, likely made the pandemic's contribution to inequality larger than some earlier recessions'.

The pandemic's effects on inequality varied partly because different countries pursued different job retention and unemployment policies. The OECD (2020) compared jobless benefits and job retention programs within 34 member countries. By May 2020, job retention programs supported approximately 50 million jobs, about ten times as many as during the 2007-2009 global recession. Many countries subsidized job retention through established or new "short-time work" programs, under which government payments replaced earnings lost when hours were reduced. Such programs, widely used in Europe, exist in about half of U.S. states, but are not often used in the U.S. In May 2020, short-time work programs supported 19 percent of German and 33 percent of French workers, but virtually no U.S. workers. Some countries subsidized job retention through wage subsidy programs, which share with employers the cost for hours worked, rather than filling in for hours not worked. Overall, wage replacement rates under job retention programs tended to be higher than jobless benefits, and tended to be higher for lower-wage workers. However, the U.S. temporarily enhanced jobless benefits, providing very high replacement rates for many lower-paid workers. The OECD modeled short-time work and wage subsidy programs' effects on jobs where firms face liquidity constraints. It generally found that relative to short-time work programs, wage subsidy programs expose supported workers to more income loss, but preserve more jobs.

In another study, Tetlow et al. (2020) examine how 5 national governments responded to pandemic unemployment. Early in the pandemic, Australia and the U.K. were more successful than Canada, Ireland, and the U.S. at sustaining links between employers and employees. Countries providing richer unemployment benefits had more unemployment than those emphasizing wage subsidies. The authors seem to interpret this as evidence that the policy difference is causing the difference in joblessness, but it seems possible that causation, if any, runs in the opposite direction, in at least some countries.

While the pandemic has affected global inequality, the converse is also true: inequality has affected the trajectory of the pandemic and the incidence of its effects. Wildman (2021) finds that more unequal OECD countries (with higher Gini coefficients) suffered more infections and deaths early in the pandemic. He suggests three possible mechanisms: inequality itself tends to worsen health outcomes broadly; less equal countries have larger populations facing economic stress and associated health problems; and less equal countries have less social capital and weaker public services, which impairs their social and political responses to pandemics. Sepulveda and Booker (2021) likewise find that more unequal OECD countries had higher death rates, especially among younger age groups.

They reference three possible mechanisms that might attach to economic disadvantage: more exposure, more susceptibility/comorbidity, and less access to health care. Davies (2021) looks more broadly across 141 economically developed and developing countries. He also finds that more unequal countries had higher early death rates. Death rates' elasticity in relation to the Gini coefficient was 0.9 at the mean, implying that 11 percent fewer deaths would have occurred if inequality in the more unequal half of countries had been the same as in the median country and the relationship between inequality and mortality was otherwise unchanged.

4. Long run effects of the pandemic period on work and education

How will the COVID-19 pandemic affect inequality in the U.S. over the longer term? We discuss several effects in this section. Some of the increase in telework seems likely to persist in the long term, and to benefit higher income groups more. As discussed in section 2, past economic downturns have widened inequality by disproportionately scarring disadvantaged groups. This effect might be particularly large following the pandemic downturn, which generally hit disadvantaged groups harder than other downturns. However, scarring effects would be smaller if recovery is faster, or if policies reduce harm from the pandemic. Greater automation or concentration of production may increase inequality. Pandemic-inspired shifts in consumer demand, if they persist, might shift labor demand toward higher skilled workers and thereby widen inequality. School disruptions are likely to widen future inequality within the affected cohort of students.

Telework

The Covid pandemic dramatically increased the extent of telework, in many instances permanently. As a result of the pandemic, 34.5 percent of establishments increased telework for some or all of their employees, according to BLS's 2021 Business Response Survey. Among establishments that increased telework during the pandemic, 60.2 percent expect to keep the increases permanent when the pandemic is over. Telework may directly benefit affected employers and employees, for example by increasing productivity and/or reducing costs of office space and commuting. In addition, telework can change where workers live, what they consume, and where they buy, and such changes may have distributional consequences.

U.S. workers surveyed by Barrero et al. (2020) report that their employers plan that 22 percent of future work will be at home, about half of what the surveyed workers prefer. The authors examine five factors that they predict will help sustain telework: (1) the stigma of working at home has been reduced; (2) inertia against telework was overcome; (3) workers and firms both invested heavily in fixed costs facilitating telework;¹⁹ (4) some

¹⁹ Bloom et al. (2021) find that in 2020 the mix of U.S. patent applications shifted to include more that were related to technologies that support telework.

residual fear of closeness to others may remain; and (5) the pandemic spurred supportive technological advances. The authors believe that increased telework carries benefits that will accrue disproportionately to better-off workers. Interacting workers' stated willingness to pay for teleworking opportunities with their expected access to such opportunities, they estimate that benefits will be larger for those with more education and better pay, larger for men than women, and smaller for older workers. The authors additionally foresee large time savings from reduced commuting, and substantial increases in productivity.

Davis et al. (2021) likewise find that sustained increases in telework will be large and most beneficial to higher-paid U.S. workers. These authors postulate that the pandemic accelerated adoption of technologies that permanently raise many high-skill workers' productivity when working from home. They specify a model where high-skill workers freely allocate their time to working from home or in the office. The model predicts that in the long run, high-skill workers will work from home much more than before the pandemic, and that this will widen inequality. Incomes of both low- and high-skill workers will rise, but the latter will rise more, so the ratio of high- to low-skill wage income will grow from 1.80 pre-pandemic to 1.93 or 1.94 post-pandemic. The authors note that their findings are consistent with other literature that finds that technological advancements in production disproportionately benefit high-skilled workers.

Bonacini et al. (2021) reach similar conclusions with respect to Italy: a longer-term increase in telework opportunities would favor male, older, more highly educated, and better paid Italian workers. Overall average pay would increase, but inequality would widen. Bachelet et al. (2021) examine how increased telework could affect German workers, focusing on financial and time savings from reduced commuting, rather than on pay. Time savings is largest. Some savings accrue to workers at all income levels, but higher income workers save more, so inequality increases.

Pabilonia and Vernon (2022) examine telework's effects on wages and time use among full-time, white-collar U.S. workers shortly before the pandemic, using household data from the American Time Use Survey. They find that fathers who telework earn more than those who work in offices, but teleworking mothers in telework-intensive industries and occupations earn less than their office-based counterparts. The authors interpret their findings to suggest that increasing telework will not reduce the gender wage gap and might even increase the motherhood wage gap—although it might nonetheless increase mothers' well-being and participation. Lyttelton et al. (2020) examine telework's potentially disparate impacts on men and women. Comparing working mothers and fathers pre-pandemic, they find that telecommuting widens gender gaps in housework, but may narrow gaps with respect to child care. Telework additionally could have direct implications for gender disparities in the impact of any future pandemics or other unforeseen events that negatively impact jobs requiring high levels of social contact. It is less clear, however, whether or how gender disparities would translate into changes in income inequality.

Rahman (2020) argues that increasing automation can amplify pandemics' tendency to hurt lower-paid workers more than others. He offers evidence that in regions with increasing automation, new employment has tended to shift toward less teleworkable occupations, which consequently increases pandemic job loss. Automation can "polarize" a labor market toward higher- and lower-skilled jobs, some of which are high-contact service jobs, and fewer in the middle. Regions with less telework opportunities tend to employ more lower-skilled immigrant populations and to have had higher covid-related unemployment. This frame suggests some areas will shift toward telework and others toward automation in the long run, possibly with an effect on inequality, but Rahman does not make a prediction.

Increased telework might benefit one particular category of potentially disadvantaged workers: those with disabilities. Kanter (2021) argues that telework could become a reasonable accommodation under the Americans with Disabilities Act. According to Schur et al. (2020), from 2009 to 2018, 5.7 percent of disabled workers worked primarily from home, compared with 4.6 percent of those without disabilities. The share was higher among disabled workers with mobility impairment (6.7 percent), those with "difficulty outside home" (7.2 percent), and those with more education. The authors find, however, that the prospects for increased telework to benefit disabled workers are mixed: relative to workers without disabilities, disabled workers generally face a larger work-from-home pay penalty, and are less likely to work in occupations that are friendly to telework.

Telework is likely to be more feasible and productive for workers with high-speed internet connectivity. What if such connectivity became available to all? Barrero et al. (2021) model this possibility. They note that lower-paid workers have less access to high-speed internet today, so universal access might reduce inequality. On the other hand, higher-paid workers are more likely to telework, so universal access might increase inequality. The authors find that universal access would benefit all groups, and have little net impact on earnings inequality. They additionally note that high-speed internet access might improve subjective well-being and/or economic and social resiliency, but they do not attempt to quantify these effects.

Taken together, this research seems to suggest that increased telework could benefit all groups, but better-off workers are likely to benefit more. They will be more likely to telework, and consequently more likely to secure attendant gains in productivity and savings in commuting costs.

While telework itself seems likely to increase inequality, consequent geographic shifts' longer-term effects on inequality are less clear. Increased telework among higher-paid workers generally seems likely to shift consumption of housing and other goods away from major city centers and proximate suburbs, and toward outer suburbs and smaller cities and towns. As noted earlier, in the short run this recently hurt lower-paid workers whose jobs depended on higher-paid workers' demand for goods and services in expensive cities and suburbs. But in the longer run these same lower-paid workers could benefit from lower

housing prices and/or migrate to new locations and pursue job opportunities that meet post-pandemic demand patterns shaped by increased telework.

Brueckner et al. (2021) model housing expenses (specifically, rents and the market prices of housing units being offered for sale) as a function of local potential for telework. Their model predicts that growth of telework will decrease rents and home prices in more productive cities, and increase them in high quality of life cities, and thus “flatten” price gradients for distance to the central business district. The authors test these predictions using price/rent changes between 2019 and 2020 (from Zillow) and interactions with the suitability of local industries to telework (derived from occupational composition). Quality-of-life and productivity variables are drawn from previous literature. The data show that during the pandemic rents/prices in more productive cities declined more where telework potential was greater, and that rent/price distance gradients similarly declined. The authors did not find evidence that work-from-home potential influences the effect of quality-of-life on housing values.

Delventhal and Parkhomenko (2020) construct a general equilibrium model of U.S. employment and residence choice in which some workers work from home some or all of the time. Increasing the share of telecommuters produces reallocation both within and across metropolitan areas. Residents mostly shift from central locations to the urban periphery or suburban areas, while jobs go up both in very small and very big cities (based on the employers’ locations, not the teleworkers’ residences). If productivity levels can be maintained without face-to-face interactions, then the model predicts a net increase in welfare for both teleworkers and those who continue to commute.

Delventhal et al. (2020) model increased telework in Los Angeles in particular. Jobs move to the center of the city, as residents move to the suburbs and telework more, allowing space for more jobs downtown. Commuting times fall and traffic congestion eases, which permits commuters to travel longer distances. Average real estate prices fall, with declines in core locations and increases in the periphery. New teleworkers enjoy large welfare gains by saving commute time and moving to more affordable neighborhoods. Commuters enjoy modest welfare gains due to lower commute times, improved access to jobs, and the fall in average real estate prices.

Automation

Employers may automate work tasks to keep workers and customers safe from infection. In a 2020 international survey, 50 percent of employers reported that their experience with covid would cause them to accelerate their long-run efforts to automate work processes (World Economic Forum, 2020, Figure 5). Recent production technologies have reduced the labor share of value added and eliminated routine middle-income jobs, as discussed in Section 2. If the pandemic has accelerated automation, especially for high-contact jobs, this accordingly may increase inequality in the future.

Evidence of a change in the preexisting trend is still mostly anecdotal. Telework and video conferencing increased sharply, but they support worker activities, whereas “automation” ordinarily refers to tasks that workers no longer have to do. There are examples of covid-induced automation, notably the increased use of voice recognition in order-taking equipment at restaurants, and robots selecting and moving objects in warehouses (Casselman, 2021; Cho Lee, and Winters, 2020; and Sedik and Joo, 2021). Firms that have already paid the fixed costs of adopting a new technology will find it easier to continue on that path. A larger market size could also accelerate the adoption of automation. In contrast, small and medium size manufacturers often do not automate because their customer demands may change rapidly and they cannot commit sustained managerial and financial resources to change the production process (Aeppel, 2021).

Albanesi and Kim (2021) find that about one-half of the high-contact occupations that experienced the biggest pandemic declines are highly susceptible to automation. The authors note that replacing high-contact employees with technologies can mitigate the cost of adapting workplaces to reduce infection risks. Chernoff and Warman (2020) find that the occupations most at risk for automation and infection are mostly service occupations, such as customer service representatives, medical assistants, and pharmacy technicians, which disproportionately employ women, particularly Black women and women with some college education. These patterns are similar even when medical occupations are left out.

Concentration

Section 2 of this paper noted that increasing concentration of production among a few so-called “superstar” employers has been widening inequality in income related to employment. If the pandemic intensifies or accelerates such concentration, this could widen future disparities. It seems likely that the pandemic has advantaged at least some superstar firms, for example by shifting more retail consumption toward on-line ecommerce. It further seems likely that many small, independent firms will be less equipped to weather the pandemic’s storms intact than their larger competitors. For example, independent restaurants may be more vulnerable to failure than those that are part of large, branded chains. At the same time, however, it is possible that the pandemic will prove to have advantaged some competitors of superstar firms, such as niche providers of telework-supportive technologies that compete with offerings from the largest technology companies. Consequently, at this juncture, it remains unclear whether or to what degree the pandemic will prove to have increased concentration among superstar firms and attendant inequality.

Dalton et al. (2020a,b) find that large, multi-establishment employers recently have recovered jobs more quickly than single-establishment or small employers. They additionally find that the smallest employers had the most job loss from closures. This evidence is consistent with more concentration, but not necessarily among the largest superstar firms.

Changes in the mix of jobs

The pandemic may affect inequality by changing the mix of jobs in the U.S. economy. Ice et al. (2021) investigate how the pandemic could potentially affect BLS Employment Projections of employment in different industries and occupations. Their input-output framework translates changes in demand into measures of output, employment, and occupations in each industry. They distinguish between “moderate” adjustments in which increased telework is the primary change and “strong” adjustments in which individuals also reduce spending on dining, travel, accommodations, sporting events, and theatres. In a pandemic scenario, demand for the computer and scientific personnel involved in telework increases considerably, whereas demands for food preparation and dining, travel, and accommodations all decline considerably. In addition, demand for construction workers falls because of a slowdown in nonresidential construction. Based on those changes by industry, overall labor demand shifts towards greater reliance on cognitive requirements and post-secondary education and less emphasis on physical skills (Shutters 2021).

Scarring

Section 2 of this paper reviewed evidence that recessions historically tend to widen inequality related to employment. Lower-paid workers generally are more likely to leave the labor force or reduce hours, sometimes for long periods. These disruptions to employment can leave scars that manifest as lower future earnings. Section 3 reviewed evidence that the pandemic disproportionately harmed already disadvantaged workers. This disparity in harm was in some ways more acute than in prior recessions, insofar as low-paid service workers and women—two overlapping groups that tended to suffer less than others in some earlier recessions—tended to be harder hit than others during the pandemic. Will this disparity in short-term injury translate into a longer-term disparity in scarring?

Stevenson (2020) voices concern over the possibility that the early pandemic’s disparate short-term impacts could translate into disparate scarring, disadvantaging women in particular. Von Wachter (2020) estimates Covid’s potential scarring effects for vulnerable job losers and new entrants. He foresees substantial, enduring losses, that could be proportionately larger for less educated workers. However, this research appears to have anticipated a slower economic recovery than came to pass, so losses are likely to be smaller than it predicts. Barret et al. (2021) note that historically, overall scarring has been worse following recessions involving more financial instability. Accordingly, they predict less scarring from the current pandemic, but predict that scarring will be worse in developing economies with weaker policy responses. This could widen inequality across, if not within, countries.

Research to date is limited, and it is too early to draw firm conclusions about the potential for scarring from the Covid pandemic, or attendant implications for inequality. Nonetheless, we can ask, what forces will contribute to the outcome?

Scarring could be limited, for two reasons. First, as described in section 2 of this paper, pandemic-related economic supports protected disadvantaged groups from many serious short-term difficulties. Second, job recovery from the pandemic so far has been somewhat more rapid than after earlier recessions. The pandemic unemployment rate peaked at 14.8 percent; 2 years later it had fallen to 3.9 percent. In the preceding 2007-09 recession, unemployment peaked at 10 percent, then took more than 8 years to fall to 3.9 percent. Other measures of labor utilization tell a similar story.²⁰

On the other hand, at least some of those displaced by the pandemic are likely to suffer lengthy employment disruptions and attendant scarring. Notably, labor force participation declined broadly and sharply early in the pandemic, and exits from the labor market may have scarring effects. Participation fell by more than 3 percentage points from February 2020 to April 2020. It recovered nearly one-half of this loss by August 2020, but as of December 2021 had changed little since then. (The decline following the recession of 2007 to 2009 was of similar magnitude – about 3 percentage points – but it took about five years to drop this far, and it had not recovered much when the pandemic hit.) Because disadvantaged groups generally suffered more and larger pandemic employment disruptions, this seems likely to widen longer-term inequality. This may be especially true for some women, who were simultaneously impacted with respect to both labor demand (being more concentrated in adversely affected jobs) and their own labor supply (shouldering child care responsibilities when schools and day care centers were closed).

School interruption

Inequality in education predates the recent pandemic disruptions. There is ample evidence that inequality in education begins before children enter school. Many children begin kindergarten or first grade already behind their classmates, and they often fall farther behind (Elango et al., 2016). The pandemic will likely exacerbate such inequality because interruptions in on-site schooling tend to affect low-achieving students from low income, less-educated homes more than their peers. These students also tend to have less access to social networks, learning resources, and high-speed internet. These likely channels through which school interruptions will increase inequality.

As a result of the COVID-19 pandemic, schools across United States and the developed world rapidly transitioned to virtual learning. Some research suggests that affected students in grades 1-12 might expect 3 percent lower lifetime income, with losses falling

²⁰ During the pandemic, employment plummeted by 14.7 percent from its February 2020 peak to its April 2020 trough, but as of December 2021, 20 months after the trough, it had recovered to just 2.3 percent below the peak. In contrast, following the recession of 2007-2009, which produced shallower employment trough that was 6.3 percent below the preceding peak, it took 35 months for employment to rebound from there to within 2.3 percent of the peak. Consider also long spells of unemployment, which can be especially scarring. In the pandemic recession, the share of the labor force that had been unemployed 27 weeks or longer peaked at 2.6 percent in February 2021; 9 months later in November 2021 it stood at 1.4 percent. In the preceding recession, that measure had peaked higher at 4.4 percent, then took more than 5 years to fall to the 1.4 percent level.

disproportionately on low-achieving students from disadvantaged households. The aggregate effect could be a 1.5 percent reduction in annual global GDP for the remainder of the century (Hanushek and Woessmann, 2020).

The interruption of on-site schooling has affecting learning. Donnelly and Patrinos (2021) evaluate evidence from eight papers covering seven different developed countries. Seven papers show significant learning loss across a wide range of subjects and grade levels. The papers covering the U.S. in particular show a decline of 5-10 percentile points in math scores for students grade 3-8 but no statistically significant decline in reading. Four of the eight papers included also show significant inequality of learning loss, with underachieving students from low-income homes suffering worse loss in learning than their peers.

There is evidence that even under ideal remote learning conditions student outcomes suffered. The Netherlands offers a “best-case” scenario because it had a short lockdown, equitable school funding, and world-leading rates of internet access. Despite these favorable conditions, Engzell et al. (2020) find about a 3 percentile point or 0.08 standard deviation decline from students’ test scores before the pandemic-related school closures. This is equivalent to one-fifth of a school year, the same period that schools remained closed. Learning losses were up to 60 percent greater among students from less-educated homes.

Most developed countries face much worse educational impacts. In a study of primary school students from 22 European countries, Blaskó et al. (2021) estimate that most European countries can expect greater learning loss than the 3 percentile points mentioned in the previous paragraph. They also estimate that most European countries will face a larger difference in learning loss between children of the most and the least educated parents than Engzell et al. found in the Netherlands. Countries with less equipped students and schools tended to have longer school closures, exacerbating learning losses.

Agostinelli et al. (2020) reach a similar conclusion using a structural model of skill acquisition that draws from previous findings in the literature on interruptions to education. They estimate a combined skill loss of 0.4 standard deviations for children from a census block at the 20th percentile of the income distribution and almost no loss for children from wealthier neighborhoods. Assuming the crisis lasted for one school year (March 2020–March 2021), only half of this gap will close by the end of high school.

Parental engagement and capacity to connect students to learning resources may greatly affect learning outcomes in a virtual environment. Using real-time web search data, Bacher-Hicks et al. (2021) compared how parents sought out new learning resources when schools could not meet in person. They found that search intensity rose twice as much in areas with above median socioeconomic status (measured by household income, parental education, and computer and internet access) as it did in areas with below median socioeconomic status. Search intensity for school-centered resources increased by 15 percent for each additional \$10,000 in mean household income and by roughly 5 percent for each

percentage point increase in the fraction of households with broadband internet and a computer. Areas with more rural schools and Black students saw smaller increases in search intensity. They further show that this disparity in search behavior correlated with changes in students' actual math scores.

Analogous reductions in learning time were found for low achieving students in addition to students from poorer backgrounds. Grewenig et al. (2020) collected detailed time-use information on German students before and during the pandemic-related school closures. They find that students on average reduced their daily learning time of 7.4 hours by about half, after controlling for income. The reduction was somewhat larger for low-achievers (4.1 hours) than for high-achievers (3.7 hours). Low achievers tended to replace learning time with activities such as TV or computer games rather than with activities more conducive to learning and mental development. Using data from the UK Time Use Survey, Andrew et al. (2020) make similar findings. They show a difference of nearly 1.5 hours a day between a child at the bottom and at a top of the income distribution. This means that a child in the 10th percentile of the family income distribution spends about 35 minutes less learning per day than her peer in the median income family, and 1 hour 10 minutes less than her peer in the 90th percentile.

This negative effect on low achieving students seems present in higher education as well. Recent papers show results consistent with past research: online courses result in worse student performance and lower course completion rates than in-person courses, particularly for lower-achieving students.²¹ One potentially positive effect is that successful students generally complete their degrees more quickly if they take online courses instead of in-person classes.

Will there be scarring effects, or can students recover from the learning loss? A recent cross-national study by Azevedo et al. (2020) estimates that the learning loss from the COVID-19 pandemic will have scarring effects on the current cohort of students. Their intermediate scenario model predicts an average permanent loss of 0.6 year of basic schooling, lowering the lifetime average from 7.9 years to 7.3 years. Each affected primary and secondary school student could lose \$872 in yearly earnings, or \$16,000 over the student's work life at present value. This equates to approximately a \$10 trillion aggregate loss of lifecycle earnings, reflecting the cohort's lower levels of learning, lost months in school closures, or potential for dropping out of school. The authors expect these losses to be worse among vulnerable groups.

Lessons from the 1918 flu pandemic

Did the 1918 influenza pandemic affect economic inequality? Such effects might foreshadow COVID-19's implications for future inequality.

²¹ <https://www.brookings.edu/blog/brown-center-chalkboard/2021/08/13/how-does-virtual-learning-impact-students-in-higher-education>

Beach et al. (2020) surveyed literature on the 1918 flu pandemic's economic effects. The authors review evidence that children born at that time suffered economically in adulthood. Possible explanations include in-utero scarring and/or parents reallocating resources toward older siblings. They find no evidence that school interruptions stunted human capital accumulation, but caution against applying that inference to today's educational landscape. The authors indicate that there is little evidence available on the 1918 flu's longer term distributional effects. They note that higher mortality among the poor might result in a more equal surviving population.

Almond (2006) offers evidence that in-utero exposure to the 1918 flu negatively affected long term economic outcomes in the U.S. In-utero infection reduces subsequent adult incomes by 6 percent and increases the poverty rate by 1.5 percentage points. It is not clear which groups had more in-utero exposure, but the author notes that present-day racial disparities in health in early life have distributional consequences.

Ager et al. (2020) linked children whose school had closed in the 1918 flu to their adult outcomes in the 1940 census, and found no significant effect of flu-related U.S. school closures on adult educational attainment, wage income, non-wage income, or hours worked in 1940. The authors noted differences between the flu and the recent pandemic: the 1918 flu sickened and killed more children, but brought about fewer and shorter school closures, and schooling had less importance for economic prosperity at that time.

One study finds that the 1918 flu increased inequality in Italy in the medium term. Galletta and Giommoni (2020) find that after five years, income inequality was higher in harder-hit Italian cities. A one-standard-deviation increase in 1918 pandemic exposure caused a 2.0 percent to 3.4 percent increase in the 1924 Gini index. The authors note that the effect is mostly driven by reduced income at the bottom of the distribution, and that the worst-hit cities still have more unequal incomes in 2018.

Basco et al. (2020) examine the effect of the 1918 flu pandemic on income inequality in Spain. They conclude that this event widened inequality in the short term by depressing real wages but not capital income. (Del Angel et al. [2021], however, find that the 1918 Flu lowered U.S. stock prices.) This effect was short-lived, except for more persistent wage losses among tailors and shoemakers. The authors attribute the effect to a demand shock rather than to a supply shock from the large, concurrent spike in excess deaths. The research uncovers no evidence of substantial longer-term effects on inequality. However, this research identified effects across geographic locations with different excess death rates, and would not have captured effects on inequality that were geographically uniform.

Uncertainties and changing context

A variety of behavioral and policy responses to the pandemic have not yet fully played out. Although the economic literature has not yet considered these issues in detail, developments in these areas could affect how the pandemic alters the path of inequality.

The forces summarized above, such as improvements in technology and the increase in superstar firms, tend to reduce the bargaining power of lower-wage workers. However, trends in vacancies and quits in the fall of 2021 suggest that such workers have greater bargaining power.²² Large numbers of workers quit their jobs.²³ There are signs that many workers are changing their attitudes towards what they expect from their jobs.

Inflation has increased since 2020, which is likely to affect inequality in real incomes and consumption. Pandemic support payments declined or ended even as more infectious variants of the virus became prevalent at the end of 2021. The full effect of these developments remains to be seen.

5. Conclusions

Income inequality has been increasing in the United States since 1980. The economic literature emphasizes that: (1) technological advances and globalization have benefited higher-income groups the most; (2) highly profitable large firms have expanded and wield increasing market power, and this has further concentrated incomes; and (3) recessions often reduce future earnings for lower-paid workers, widening inequality.

Against this backdrop, in early 2020, the COVID-19 pandemic's onset delivered a sudden and large negative economic shock, and prompted strong policy responses. In the short run, the pandemic shock threatened to widen income (and wage) inequality substantially, as lower income and more disadvantaged groups generally faced more job displacement. These groups were more likely to hold jobs that require on-site work and social contact, in sectors such as retail and leisure and hospitality that were forced to shut down or faced with large reductions in demand. Higher-income professionals, in contrast, often were able to shift to telework, preserving their incomes while reducing expenses. School and day care closures disrupted the work of many parents, particularly mothers. Short-term policy responses, however, offset much of the shock to lower incomes, so that by some measures inequality actually declined. By now, the labor market has largely recovered, and major economic policy responses have lapsed. Yet some disruption to both labor demand and supply persists, and additional waves of infection continue. So the effect of the pandemic on inequality is still evolving.

We conclude that the pandemic is likely to widen income inequality over the long run. It appears to have brought about durable changes in labor markets, consumer demand, and production that are likely to benefit higher income groups most, or to erode opportunities for some less advantaged groups. Most importantly, telework has increased permanently. High-contact jobs and services may continue to face reduced demand and increased

²² The increase in quits has been referred as the "Great Resignation." Thompson (2021) provides a useful discussion.

²³ The Job Openings and Labor Turnover Survey (JOLTS) reported that in 2021 the quit rate rose above pre-pandemic levels. ([Job Openings and Labor Turnover Survey News Release, Nov 2021, Table 10. https://www.bls.gov/news.release/archives/jolts_01042022.htm](https://www.bls.gov/news.release/archives/jolts_01042022.htm))

automation. Pandemic-related job displacements, having been concentrated among less advantaged groups, may have scarring effects that widen inequality after offsetting economic policies lapse. School disruptions have been worse for lower-income students and are likely to have lingering negative effects, which are likely to widen future inequality within more recent birth cohorts.

The history after the 1918 flu shows that the effect of a pandemic on inequality—not just inequality in income and wages, but also in education, health, and wealth—depends on the pandemic’s nature, the economic context, and the associated behavioral and policy responses. As such, that history probably does not accurately foreshadow the current pandemic’s effects.

Appendix: Measures of inequality

Quantitative measures of inequality can cover different aspects of the resources of individuals in a population, such as their incomes, earnings, consumption expenditures, or wealth. Each of these provides economic information that is useful for some purpose. In this paper we focused on measures of income inequality.

There are also many mathematical measures of inequality. These are sometimes referred to as measures of *dispersion*, that is, the differences across a population. Some used for income inequality are the difference of the 90th percentile figure to the 10th, or the 75th to the 25th. The latter is sometimes called the *interquartile range*. The *Gini index*, sometimes called the Gini coefficient, is a measure of inequality which has values from 0 to 1. By construction it is 0 if all incomes in the population are the same, and 1 if all income went to one individual. Another measure is the *coefficient of variation*, which is the standard deviation of the sample data divided by its mean. It is less common to use standard deviation directly, because it changes as the figures scale up, e.g. with wage or price inflation, and therefore will often be imperfectly comparable from year to year.

The interest in inequality is sometimes not focused on the distribution of high incomes but on the levels associated with those who have the least. For this purpose, there are often *threshold* concepts, such as a poverty level. Here, the reported measure is not a statistical attribute summarizing the whole population, but rather a proportion or count of those below the threshold. These measures are sometimes treated as measures of inequality too.

To compare living standards across households, as opposed to individuals, incomes need to be adjusted for household size and composition. A household with more people can benefit from economies of scale. In addition, children need and contribute different things from adults. These adjustments are standardized by *equivalence scales*. The Supplemental Poverty Measure and Fox and Burns (2021) make such adjustments.

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