NBER WORKING PAPER SERIES

COVID-19 IS ALSO A REALLOCATION SHOCK

Jose Maria Barrero
Nicholas Bloom
Steven J. Davis

Working Paper 27137
http://www.nber.org/papers/w27137

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
May 2020

We thank the Federal Reserve Bank of Atlanta, the Sloan Foundation, and the University of Chicago Booth School of Business for financial support. The views expressed herein are those of the authors and do not necessarily reflect the views of the National Bureau of Economic Research.

COVID-19 Is Also a Reallocation Shock
Jose Maria Barrero, Nicholas Bloom, and Steven J. Davis
NBER Working Paper No. 27137
May 2020
JEL No. D22,D84,E24,H12,H25,J21,J62,J63,J65

ABSTRACT

Drawing on firm-level expectations at a one-year forecast horizon in the Survey of Business Uncertainty (SBU), we construct novel, forward-looking reallocation measures for jobs and sales. These measures rise sharply after February 2020, reaching rates in April that are 2.4 (3.9) times the pre-COVID average for jobs (sales). We also draw on special questions in the April SBU to quantify the near-term impact of the COVID-19 shock on business staffing. We find 3 new hires for every 10 layoffs caused by the shock and estimate that 42 percent of recent layoffs will result in permanent job loss. Our survey evidence aligns well with anecdotal evidence of large pandemic-induced demand increases at some firms, with contemporaneous evidence on gross business formation, and with a sharp pandemic-induced rise in equity return dispersion across firms. After developing the evidence, we consider implications of our evidence for the economic outlook and for policy responses to the pandemic. Unemployment benefit levels that exceed worker earnings, policies that subsidize employee retention, occupational licensing restrictions, and regulatory barriers to business formation will impede reallocation responses to the COVID-19 shock.

Jose Maria Barrero
Av. Camino a Santa Teresa #930
Col. Heroes de Padierna
CP. 10700.
Alc. Magdalena Contreras
CDMX
Mexico
jose.barrero@itam.mx

Steven J. Davis
Booth School of Business
The University of Chicago
5807 South Woodlawn Avenue
Chicago, IL 60637
and NBER
Steven.Davis@ChicagoBooth.edu

Nicholas Bloom
Stanford University
Department of Economics
579 Serra Mall
Stanford, CA 94305-6072
and NBER
nbloom@stanford.edu

A Survey of Business Uncertainty website is available at
https://www.frbatlanta.org/research/surveys/business-uncertainty

The COVID-19 pandemic and efforts to contain the virus are exacting a staggering economic toll in countries around the world. China's economy shrank 6.8 percent in the first quarter of 2020 on a year-on-year basis, and Eurozone economies shrank at a14.8 percent annualized rate. In the United States, nearly 28 million persons filed new claims for unemployment benefits over the six-week period ending April 25.[1] The U.S. economy shrank at an annualized rate of 4.8 percent in the first quarter of 2020, and many analysts project it will shrink at a rate of 25% or more in the second quarter.[2] Yet, even as much of the economy is shuttered, some firms are expanding in response to pandemic-induced demand shifts. As noted in a recent *Wall Street Journal* article, "The coronavirus pandemic is forcing the fastest reallocation of labor since World War II, with companies and governments mobilizing an army of idled workers into new activities that are urgently needed."[3] In other words, Covid-19 is also a major reallocation shock.

We develop evidence on the extent and character of this reallocation shock for the U.S. economy. We start with anecdotal evidence, drawing on news reports and other sources. Anecdotal evidence is useful for its immediacy, as a source of hypotheses, and for insights into broader forces. Next, we turn to the Survey of Business Uncertainty (SBU) to construct novel, forward-looking measures of expected sales and job reallocation across American firms at a one-year look-ahead horizon. The SBU is a monthly panel survey developed and fielded by the Federal Reserve Bank of Atlanta in cooperation with Chicago Booth and Stanford.

We use firm-level employment forecasts in the SBU to calculate the following quantity: the gross expected job gains at firms that anticipate growing over the next year *plus* the gross expected job losses at firms that anticipate shrinking *minus* the absolute value of the net change obtained by summing over all the forecasts. We activity weight the firm-level forecasts in this calculation and divide by aggregate employment to obtain the expected excess job reallocation rate at a one-year look-ahead horizon. This statistic quantifies the volume of cross-firm job reallocation in excess of the amount needed to accommodate the aggregate net change. It is the

---

[1] The unemployment claims data are available at https://oui.doleta.gov/unemploy/claims_arch.asp.
[2] As of 31 March, Goldman Sachs projects that U.S. GDP will fall 34 percent (annualized) in the second quarter of 2020 (Carew, 2020). Baker, Bloom, Davis and Terry (2020) obtain a similar figure using the estimates implied by an empirical model of disaster effects that Baker, Bloom and Terry (2020) fit to historical data for 38 countries. According to Blue Chip Economic Indicators report of 10 April 2020, the mean forecast for U.S. GDP is a 24.5 percent (annualized) drop in the second quarter of 2020.
[3] The quotation is from Bender and Dalton (2020).

forward-looking analog to the backward-looking measures of excess job reallocation examined in Dunne, Roberts and Samuelson (1989) and Davis and Haltiwanger (1992).[4]

Our measure of the expected excess job reallocation rate rises from 1.5 percent of employment in January 2020 to 5.4 percent in April. The April value is 2.4 times the pre-COVID average and is, by far, the highest value in the short history of the series. We also use firm-level sales forecasts in the SBU to compute the expected excess sales reallocation rate at a one-year forecast horizon. Expected sales reallocation shows a similar time-series pattern, reaching values in March and April that are four times the pre-pandemic average. Thus, our expected excess reallocation rate measures support the view that COVID-19 is a major reallocation shock.

We also quantify the near-term reallocative impact of pandemic-related developments on business staffing. For this purpose, we draw on two special questions fielded in the April 2020 SBU. One question asks (as of mid-April) about the coronavirus impact on own-company staffing since 1 March 2020, and another asks about the anticipated impact over the ensuing four weeks. Cumulating responses over firms and across these two questions, the data say that pandemic-related developments caused near-term layoffs equal to 12.8 percent of March 1 employment and new hires equal to 3.8 percent. In other words, the COVID-19 shock caused 3 new hires in the near term for every 10 layoffs. These sizable new hires amidst a tremendous overall contraction align well with our anecdotal evidence of large pandemic-induced increases in demand at certain firms. Weekly statistics on gross business formation derived from U.S. administrative data also point to creation and gross hiring activity, even in the near-term wake of the pandemic.

Next, we consider time-series evidence on the dispersion in monthly equity returns across U.S.-listed firms. Return dispersion relates less directly to future reallocation activity, but its availability over several decades helps us put the COVID-19 episode in perspective. Whether measured by the interquartile range or the standard deviation of returns in the value-weighted distribution, the dispersion in equity returns jumps sharply in March 2020, reaching levels last

[4] Many later studies consider backward-looking job reallocation measures. See Davis and Haltiwanger (1999) for a review. For applications of analogous backward-looking reallocation measures to other outcomes, see Dell'Ariccia and Garibaldi (2005) and Craig and Haubrich (2013) on bank lending, Eisfeldt and Rampini (2006) on physical capital, Davis et al. (2009) on sales, Broda and Weinstein (2010) on consumer products, Iacovone and Jovorcik (2010) on export products, Herrera, Kolar and Minetti (2011) on business credit, and Afonso and Lagos (2015) on the federal funds market.

seen during the financial crisis of 2008-09 and the dot.com bust of the early 2000s. These three episodes exhibit the highest return dispersion in our sample period, which starts in 1984.

After presenting the evidence, we consider implications for the economic outlook and for policy responses to the pandemic. Even if medical advances or natural forces bring an early resolution to the crisis, many pandemic-induced shifts in consumer demand and business practices will persist. Thus, much of the near-term reallocative impact of the pandemic will also persist, as indicated by our forward-looking reallocation measures. Drawing on our survey evidence and historical evidence of how layoffs relate to recalls, we estimate that 42 percent of recent pandemic-induced layoffs will result in permanent job loss. If the pandemic and partial economic shutdown linger for many months, or if pandemics with serious health consequences and high mortality rates become a recurring phenomenon, there will be profound, long-term consequences for the reallocation of jobs, workers and capital across firms and locations.

Historically, creation responses to major reallocation shocks lag the destruction responses by a year or more. Partly for this reason, we anticipate a drawn-out economic recovery from the COVID-19 shock, even if the pandemic is largely controlled within a few months. Multiple economic forces contribute to a delayed creation response, as we discuss. Policy responses to major shocks and inherited features of the policy landscape can further stretch out the creation response, slowing the recovery. In this regard, we discuss four aspects of U.S. policy that can retard creation responses to the pandemic-induced reallocation shock: Unemployment benefit levels that exceed earnings for many American workers under the Coronavirus Aid, Relief, and Economic Security (CARES) Act, policies that subsidize employee retention irrespective of the employer's longer term outlook, occupational licensing restrictions the impede mobility across occupations and states, and regulations that inhibit business formation and expansion.

I. Anecdotal Evidence

a. Hiring and job reallocation

Recent news stories highlight the millions of layoffs triggered by the pandemic and lockdown. They also recount many examples of large-scale hiring. As of April 18, Walmart hired 150,000 new employees in the span of a month and plans to hire 50,000 more (Nassauer, 2020). Likewise, Amazon hired 100,000 new employees in recent weeks and aims to hire

another 75,000 (Koetsler, 2020). Dollar General plans to hire 50,000 new workers by the end of April.[5] Lowe's, the home improvement chain, aims to hire 30,000 new employees this spring (Tyko, 2020). As of late March, many takeout and delivery-oriented firms are scrambling to hire workers. Instacart, for example, is adding 300,000 shoppers to its payroll, and Domino's is adding roughly 10,000 pizza delivery drivers (Bender and Dalton, 2020). Papa John's plans to hire 20,000 new employees to meet heightened demand for pizza delivery in the wake of the pandemic (Bandolm, 2020). Outschool sought to hire 5,000 new teachers in the last two weeks of March to offer more online classes in light of school closures.[6]

Some companies are forming partnerships that exploit the reallocative nature of the COVID-19 shock to speed hiring. Supermarket chain Kroger created an exchange with Sodexo, Sysco and Marriott International to hire workers laid off from food-service and hospitality firms. CVS Healthcare is seeking to recruit 50,000 new staff by partnering with the Hilton hotel chain, clothing retailer Gap, and Delta Airlines (Weber, 2020). Uber now lists job openings at 7-Eleven, Amazon and McDonald's and a dozen other companies for its unemployed drivers (Lee, 2020).

The near-term reallocative effects of the COVID-19 shock are also evident in consumer spending patterns. The data analytics firm, Earnest Research, tracked credit card and debit card purchases for nearly six million Americans to assess the impact of the COVID-19 shock on consumer spending. For the week ending 1 April 2020, their data show that spending on airlines, hotels, rental cars, taxis, ride sharing and movie theaters is down 75-95 percent relative to spending in 2019 (Leatherby and Gelles, 2020). Spending on fast food, auto parts, and autos is down 35 percent, and spending on apparel is down 70 percent. At the same time, spending on home improvement, video streaming, gaming, food delivery, meal kits, and online grocers has boomed. The bulk of these spending cuts and shifts will reverse when the pandemic recedes and the lockdown ends, but some aspects of the shift are likely to persist.

[5] See https://careers.dollargeneral.com. Accessed on 19 April 2020.
[6] See https://blog.outschool.com/outschool-needs-5-000-teachers-to-start-offering-live-online-classes-outschool-needs-5-000-teachers-to-start-offering-live-online-classes-in-the-next-2-weeks/. Accessed on 19 April 2020.

b. Intra-Industry Reallocation

Perhaps because we often conceptualize the economy in terms of industries and regions, one might guess that pandemic-induced reallocation will mainly involve cross-industry and cross-region shifts. A large body of evidence suggests otherwise. Idiosyncratic, employer-specific factors dominate gross job creation and destruction, while employment shifts between industries and regions account for only a small share of excess job reallocation. For example, when Davis and Haltiwanger (1992) split the U.S. manufacturing sector into about 450 four-digit Standard Industrial Classifications, between-industry employment shifts account for only 13 percent of annual excess job reallocation during the 1970s and 1980s. When they split the manufacturing sector into roughly a thousand groups defined by the cross product of states and two-digit SICs, between-group shifts account for only 14 percent of excess job reallocation. This type of finding has been replicated many times across countries, sectors and time periods.[7] Hence, we expect the bulk of the pandemic-induced reallocation response to occur within industries and regions.

The restaurant industry provides a salient example of intra-industry reallocation in the current crisis. According to a survey conducted by the National Restaurant Association in late March, 3 percent of restaurant owners and operators have permanently closed in response to COVID-19, and another 11 percent anticipate permanently closing within the next 30 days (Taylor, 2020). Applying these figures to the number of U.S. restaurants yields more than 100,000 permanent restaurant closures in the near-term wake of the COVID-19 shock. At the same time, takeout and delivery-oriented chains are experiencing a huge demand boom, as illustrated by the anecdotes for Domino's Pizza and Papa John's. Much of this immediate reallocative impact will likely persist.

Turning to another salient example, an unsettled economy and uncertain outlook favor large incumbents with deep pockets. As Cutter and Thomas (2020) write in the *Wall Street Journal*: "The biggest players in tech are hoovering up talent in the midst of the coronavirus pandemic. As some of Silicon Valley's most-promising startups lay off workers and others

[7] Davis and Haltiwanger (1999, Table 5) review evidence from studies that span thirteen countries. Employment shifts between regions and industries account for less than 10 percent of excess job reallocation in half the studies and 10 to 20 percent in the rest.

freeze hiring, established companies including Apple Inc., Alphabet Inc.'s Google and Amazon.com Inc. are pursuing software engineers, data scientists, product designers and others. Facebook Inc. says usage has spiked during the coronavirus crisis and it is committed to policing platforms ahead of the 2020 presidential election, so it will hire more than 10,000 people this year for critical roles on its product and engineering teams. The current moment may give well-capitalized tech companies a chance to poach skilled workers who until recently were gravitating to smaller upstarts, veteran technology recruiters say." These remarks suggest that the pandemic will induce a reallocation from smaller, younger tech firms to larger, established ones. A similar dynamic may play out in other industries as incumbents with deep pockets and established markets attract workers with newly-heightened concerns about job security.

A third example highlights the role of new-found concerns about face-to-face interactions as a driver of intra-industry reallocation. In a recent article in *Medical Economics,* a publication aimed at healthcare professionals and business managers, Mann (2020) remarks that telemedicine works "for most medication refills … urinary tract infections, colds and rashes, diabetes and hypertension follow-ups, lab results, post-op visits, birth control and fertility, and mental health." Although a pandemic-induced shift to telemedicine may have little long-term impact on the net demand for medical services, some physician practices and medical clinics will respond adroitly to the shift, and many will not. Horn (2020) offers an insightful glimpse into the commercial challenges presented by a partial shift to telemedicine. As his discussion suggests, there is high potential for a large reallocation of customers, revenues and workers across practices and clinics. A similar dynamic will play out in other professional, business, and personal services: Some businesses will respond deftly to newly-intensified customer concerns about face-to-face interactions, and many will not.

There are also well-documented examples of major past structural transformations that took the form of intra-industry reallocation. Foster, Haltiwanger and Krizan (2006) attribute large productivity gains in the U.S. retail sector in the 1990s mainly to a reallocation from small retail outlets to larger, more productive stores operated by national chains. Walmart, Target, Home Depot, Staples, Barnes & Noble and Best Buy played significant roles in this process, expanding at the expense of rivals. Later, the rise of online shopping brought another major reallocation. In this regard, it's worth recalling that Amazon began as an online bookseller,

eventually displacing rival booksellers who shifted online too little or too late. The coronavirus pandemic is accelerating the shift to online shopping, as illustrated by some of our anecdotes.

II. Systematic Evidence

a. Constructing Forward-Looking Reallocation Measures

We construct forward-looking reallocation measures using data from the Survey of Business Uncertainty (SBU), which samples senior executives in American firms at a monthly frequency. The SBU covers all 50 states, every major nonfarm industry, and a range of firm sizes. Core survey questions elicit subjective forecast distributions over own-firm future outcomes at a one-year look-ahead horizon. (More precisely, the look-ahead horizon is twelve months for employment and four quarters for sales.) The survey instrument also gathers data for current and past outcomes. See Altig et al. (2020b) for more information.

Let $\mathrm{E}_t L_{i,t+12}$ denote the expected level of employment in month $t+12$ at firm i implied by its subjective forecast distribution at *t*. Define the corresponding month-*t* expected employment growth rate at a 12-month look-ahead horizon as the arc percentage change,[8]

$$\mathrm{E}_t g_{i,t+12} = \frac{\mathrm{E}_t L_{i,t+12} - L_{it}}{0.5\left(L_{it} + \mathrm{E}_t L_{i,t+12}\right)},$$

where all quantities on the right side derive from survey responses in month t. Denote the firm's activity weight as $z_{it} \equiv 0.5\left(L_{it} + \mathrm{E}_t L_{i,t+12}\right)$ and the corresponding aggregate activity measure as $Z_t = \sum_i z_{it}$. Let $\mathcal{S}_t^+$ and $\mathcal{S}_t^-$ denote the sets of firms at t with positive and negative values, respectively, for $\mathrm{E}_t g_{i,t+12}$.

We compute the expected excess job reallocation rate in month *t* as

$$\mathrm{E}_t X_{t+12}^{\text{jobs}} = \sum_{i \in \mathcal{S}_t^-} \left(\frac{z_{it}}{Z_t}\right) \left| \mathrm{E}_t g_{i,t+12} \right| + \sum_{i \in \mathcal{S}_t^+} \left(\frac{z_{it}}{Z_t}\right) \mathrm{E}_t g_{i,t+12} - \left| \sum_i \left(\frac{z_{it}}{Z_t}\right) \mathrm{E}_t g_{i,t+12} \right|,$$

[8] This growth rate measure is symmetric about zero, bounded between -2 and 2, and equal to log changes up to a second-order Taylor series approximation. Growth rates computed in this manner aggregate exactly when combined with suitable weights, given by the simple mean of initial and (expected) terminal levels. This approach to growth rate measurement and aggregation has become standard in the literature on business-level dynamics. See Davis and Haltiwanger (1999).

where the first term on the right side is the expected gross job destruction rate over the 12-month forecast horizon, the second term is the expected gross job creation rate, and the third term is the absolute value of the expected net employment growth rate.[9] We compute the expected excess sales reallocation rate at a four-quarter forecast horizon in an analogous manner.[10]

Since we use SBU data to construct our forward-looking reallocation measures, we would like some assurance that the underlying firm-level data contain meaningful forecasts. In this regard, Altig et al. (2020b) and Barrero (2020) show that firm-level growth rate expectations in the SBU data are highly predictive of realized growth rates. Using survey questions with the same design as the SBU questions, a revision underway of Bloom et al. (2017) finds that plant-level growth rate expectations in the Census Bureau's Manufacturing and Organizational Practices Survey are also highly predictive of realized outcomes. These studies give us confidence that our forward-looking reallocation measures reflect meaningful forecasts of firm-level growth rates.

That said, there are good reasons to think that our SBU-derived measures understate the expected reallocation rate on average, and that they also understate the rise in expected reallocation activity in the wake of the coronavirus pandemic. First, the SBU under samples younger firms, which have ***much*** higher reallocation rates than mature firms. See Altig et al. (2020b) for further discussion of this point and references to the relevant literature. Second, highly stressed firms are less likely to respond to surveys, which leads to an understatement of expected destruction activity.[11] Third, we cannot sample firms that will enter in the future, which leads to an understatement of expected creation activity. Thus, we regard our estimates of forward-looking reallocation rates as conservative in terms of both average levels and the pandemic-induced response.

---

[9] In practice, we winsorize the z_{it} values at 500 and the $E_t g_{i,t+12}$ values at the 1st and 99th percentiles of the distribution of expected employment growth rates in data pooled over the period from October 2014 to December 2018. These thresholds follow Altig et al. (2020b).

[10] For sales, we winsorize z_{it} at the 90th percentile of its distribution in the pooled sample from September 2016 to April 2020. We winsorize $E_t g_{i,t+12}$ at the 1st and 99th percentiles of the distribution of expected sales growth rates in the pooled sample for the period from October 2014 to December 2018. See Altig et al. (2020b) for an explanation of how we obtain arc percentage changes and implied levels of expected future sales from SBU data on the forecast distribution over future sales growth rates.

[11] In line with this remark, the survey response rates among active SBU panelists are 57% in January 2020 60% in February, 57% in March and 52% in April, where "active" panelists are those who responded to the survey at least once in the previous six months.

b. Expected Excess Reallocation Rates

Table 1 reports average expected growth rates and excess reallocation rates from September 2016 to January 2020, before the Covid-19 pandemic impacted the U.S. economy.[12] The expected excess reallocation rate averages 0.97 percent for sales and 2.23 percent for jobs.

Figure 1 displays the expected excess job reallocation rate from October 2016 to April 2020, alongside the expected employment growth rate for the same 12-month forecast horizon. The expected excess reallocation rate rises from 1.54 percent in January 2020 to 5.39 percent in April, which is 2.4 times the pre-COVID mean reported in Table 1. The upward jump from March to April is the largest move in the short history of the series. Figure 2 shows a broadly similar pattern for the expected sales reallocation rate, which jumps from 0.24 percent in January 2020 to 4.08 percent in March and 3.78 in April. These March and April values are also the highest in the history of the series, and they are about four times the pre-COVID mean. In sum, our forward-looking relocation measures confirm that the COVID-19 pandemic is a large reallocation shock.

Several other countries conduct surveys that could be used to construct forward-looking reallocation measures like the ones shown in Figures 1 and 2. The U.K. Decision Maker Panel, a monthly survey that began in August 2016, includes questions patterned after the ones in the SBU (Bloom et al., 2018). Surveys in Germany, Italy and Japan also collect data on the expectations of firm-level variables. See Guiso and Parigi (1999), Bachmann and Elstner (2015), Bachman et al. (2018), Massenot and Pettinichi (2018), Tanaka et al. (2019) and Chen et al. (2019). Thus, it is feasible to construct forward-looking excess reallocation time series for several countries, which would be quite helpful in evaluating their predictive content and usefulness for policy makers.

c. Expected Growth Rates in the Wake of the Pandemic

Figures 1 and 2 also show the monthly paths of expected employment and sales growth rates for the period covered by the SBU. Expected twelve-month employment growth fell about 2.2 percentage points from January to April 2020, and expected sales growth fell about 7.3 percentage points over the same period. While these statistics point to a sharp deterioration in the U.S. economic outlook in the wake of the COVID-19 shock, they are milder than some projections.

[12] The SBU first went to field in October 2014, but the early monthly samples were small and our formulation of the look-ahead questions did not stabilize until September 2016.

One possibility is that SBU firms expect a very large near-term hit from the pandemic and lockdown in 2020 and a substantial, but partial recovery by April 2021.

To investigate that possibility, we turn to a special question fielded as part of the April 2020 SBU. The question reads as follows: "What is your best guess for the impact of coronavirus developments on your firm's sales revenue in 2020?" The response options are a respondent-supplied percentage amount, up or down, and no effect. The results, summarized in Table 2, say that firms expect the coronavirus pandemic to lower their sales by 18-19 percent in 2020. This is an enormous negative shock, and it is more than twice as large as the fall from January to April 2020 in the average one-year sales forecast. Taken together, the evidence in Table 2 and Figure 2 says that firms in the SBU anticipate a huge negative shock to their sales in 2020 followed by a considerable but highly incomplete bounce back by April 2021.

d. Gross Hiring and Business Formation in the Pandemic's Immediate Wake

The top part of Table 3 presents two questions about the impact of COVID-19 on staffing levels that appeared in the April 2020 SBU. One question asks about impact on own-company staffing levels since 1 March 2020, and the other asks about the anticipated impact over the next four weeks. For each question, the survey instrument allows responses in five categories: number of permanent layoffs, with no expectation of recall; number of temporary layoffs and furloughs; hires of new employees; cuts to the number of contractors and leased workers; and additions to the number of contractors and leased workers. Cumulating the responses to these two questions and aggregating over firms yields a near-term net contraction equal to 11.9 percent of March 1 employment.[13] 92 percent of this net contraction happened between March 1 and the mid-April survey response period, and the rest is anticipated to happen over the ensuing four weeks.

Despite the large negative employment impact of the pandemic and lockdown over the span of two-and-one-half months, the coronavirus shock also caused gross staffing gains: new hires equal to 3.8 percent of March 1 employment, and new contractors and leased workers equal

[13] Bartik et al. (2020) find a 40 percent employment contraction from 31 January to late March/early April in their survey of American firms with fewer than 500 employees. The gap between their employment contraction figure and ours is partly due to their focus on small firms. As they report in their Table 2, smaller firms in their sample contract more sharply in this period. We also find sharper contractions among the smallest firms in the SBU. However, the firm-size differential is too small to fully explain the discrepancy between their estimated employment contraction and ours.

to 0.2 percent. Echoing our remarks in Section II.a, the under sampling of young firms in the SBU and the omission of new firms in our sample frame are sources of downward bias in the estimated rate of gross staffing gains. Thus, we see our estimate as conservative.

The survey data also say the coronavirus shock caused gross staffing reductions equal to 14.9 percent of March 1 employment, mostly due to temporary layoffs and furloughs.[14] Here as well, we see our estimate of the gross staffing reduction impact as conservative for two reasons: the SBU under samples younger firms, and highly stressed firms are less likely to respond to surveys.

We can restate our results about gross staffing gains and losses in terms that are less sensitive to these sources of bias. In particular, Table 3 implies that coronavirus-related development caused about 3 new hires for every 10 layoffs. If we include contactors and leased workers, the ratio is about 2.7 gross staffing gains for every 10 gross staffing reductions.

Weekly Census Bureau statistics on gross business formation also point to gross hiring activity in the near-term wake of the pandemic, although at a much slower pace than pre-COVID. These statistics derive from administrative data on applications for a new Employer Identification Number (EIN) on IRS Form SS-4. Figure 3 reports statistics for "high-propensity" applications, which are the subset of applications for a new EIN that the Census Bureau regards as having a high propensity to hire paid employees. The figure makes two points. First, and not surprisingly, gross business formation rates after mid-March are down 24 to 38 percent relative to the same calendar week in the 2019. Second, and perhaps surprisingly, high-propensity business applications continue at the pace of 20-30 thousand per week. In sum, new business formation is greatly depressed in the wake of the COVID-19 shock, but it is not moribund.

The statistical evidence in Table 3 and Figure 3 align well with the anecdotal evidence in Section I of large pandemic-induced demand increases at certain firms, even as layoffs in the

[14] We can obtain a corresponding estimate of aggregate gross staffing reductions in the private sector as follows: There were 152.5 million employees in the nonfarm private sector as of February 2020, according to the BLS Current Employment Statistics. According to BLS (2017), independent contractors are 6.9 percent of employment in the Current Population Survey. Multiplying the February 2020 CPS employment figure by 6.9 percent yields an estimated 10.9 million contract workers. Finally, 14.9% of 163.4 (=152.5 + 10.9) million yields aggregate gross staffing reductions of 24.4 million. As we explain in the text, we see this estimate as conservative.

U.S. economy exceeded twenty million. At the risk of belaboring the obvious, it's also worth remarking on an important distinction between the evidence in Table 3 and Figure 3, on the one hand, and the evidence in Figures 1 and 2 on the other. Table 3 speaks to the near-term reallocative impact of the COVID-19 shock, and Figure 3 provides evidence that job-creating business formation continues in the face of the pandemic and lockdown. In contrast, Figures 1 and 2 provide evidence that the shock is expected to trigger unusually large rates of job and sales reallocation across firms over the next year. Thus, our evidence speaks to both near-term and medium-term reallocative effects of the COVID-19 shock.

e. Dispersion in Equity Returns Across Firms

Tables 1-3 and Figures 1-3 draw on data sources with short histories. That makes it hard to situate the evidence in a broad historical context. Thus, we turn now to time-series evidence on the dispersion of returns across common equity securities for U.S.-listed firms.[15] Specifically, we compute the interquartile range and the standard deviation of the value-weighted return distribution using closing market prices from the end of one month to the end of the next. We consider return dispersion rather than the excess reallocation of equity value given the predominant role of discount rate variation in aggregate stock market movements (e.g., Shiller, 1981, Campbell and Shiller, 1988, and Cochrane, 2011). If, for example, discount rates on risky securities generally rose in the wake of the COVID-19 shock, an excess reallocation measure would obscure heterogeneity in the shock's impact on expected firm-level cash flows.[16] In contrast, this heterogeneity is reflected in return dispersion measures if the discount rate variation itself is dominated by common factors.

Figure 4 displays the dispersion in monthly equity returns from January 1984 to April 2020. Three episodes stand out: the dot-com market bust in the early 2000s, the financial crisis of 2008-2009, and the market's reaction to the COVID-19 shock in March 2020. The first two episodes involve high return dispersion for more than a year and multiple peaks. It remains to be

[15] We are hardly the first to use the dispersion in stock returns as a proxy for reallocative shocks. See, for example, Loungani, Rush and Tave (1990), Brainard and Cutler (1993) and Davis, Loungani and Mahidhara (1997). Unlike these earlier works, which focus on cross-industry return dispersion, we consider the dispersion in value-weighted returns across firms.

[16] Our supposition here on the rise in discount rates in reaction to the COVID-19 shock finds support in Gormsen and Koijen (2020).

seen whether the same pattern will play out this time. Nevertheless, Figure 4 suggests that the COVID-19 shock triggered unusually large differences across firms in shocks to their expected future cash flows. That is, the stock return data support the view that the COVID-19 shock had large reallocative effects among publicly traded firms. When we consider the two-month interval from 24 February to 21 April, the impact of the COVID-19 shock on the dispersion in returns is greater yet, as shown by the large dots in Figure 4.[17]

A handful of recent studies provide evidence on the sources of heterogeneity in the COVID-19 impact on publicly traded firms. Hassan et al. (2020) characterize and quantify the concerns that senior executives express in corporate earnings conference calls. As the pandemic spread from January to March, executives expressed increasing concern about negative demand shifts, rising uncertainty, supply chain disruptions, capacity curtailments, and employee welfare. The extent and nature of expressed concerns differ across industries and firms. Davis, Hansen and Seminario (2020) and Ramelli and Wagner (2020) trace the heterogeneity in firm-level stock price reactions to COVID-19 developments to specific risk exposure categories such as reliance on global supply chains, exports to China, food and drug regulation, energy regulation, and financial regulation. We see these studies as both confirming the heterogeneous impact of the COVID-19 shock on the fortunes of publicly traded firms, and as providing granular evidence on the sources of the heterogenous impact.

III. Implications for the Economic Outlook

a. Reasons to Anticipate a Slow Recovery

As of 26 April, confirmed cases of COVID-19 are approaching 3 million, with 206 thousand persons known to have died from the disease.[18] The death toll in the United States appears to have peaked at about 2,000 per day, but there remains great uncertainty about the future course of the pandemic and the duration, extent and effectiveness of economic lockdowns and voluntary social distancing efforts. In particular, we do not know whether a gradual re-opening of the

[17] We chose 24 February, because it is the first large daily move in the U.S. stock market that next-day journalistic accounts attribute to the COVID-19 pandemic. See Baker et al. (2020).
[18] See the Johns Hopkins Coronavirus Resource Center at https://coronavirus.jhu.edu/map.html.

economy will lead to a major surge in new cases, prompting authorities to re-impose tight restrictions on commercial activity. Obviously, if the pandemic and partial shutdown linger, the economic recovery will be delayed. Thus, the future course of the pandemic and containment efforts could lead to a delayed or sluggish recovery. If global pandemics with serious health consequences become an oft-recurring phenomenon, they will undercut growth for many years.

Under an optimistic scenario, the pandemic recedes in the coming weeks, COVID-19 treatments improve, an effective vaccine becomes available and widely deployed in 12-18 months, and the economy gradually comes back on line over the next 2-3 months without serious setbacks. Even in this scenario, we see several reasons to anticipate a lengthy recovery. U.S. real GDP may not surpass its 2019 level until the latter half of 2021 or later, and the return path to full employment is likely to take even longer. We turn to the reasons now.

The pandemic and lockdown will curtail current and near-term aggregate demand through several channels. First, labor incomes and profits are severely depressed, and they will remain so for the duration of the lockdown. Second, economic uncertainty is extraordinarily elevated, which further depresses consumption expenditures and investment demand. Since uncertainties about the course of the pandemic and the stringency of the lockdown are likely to abate over the next several weeks and months, firms have especially strong incentives to defer investments that are costly to reverse. Third, temporary disruptions on the supply side of the economy can cause aggregate demand to fall more than one-for-one with the direct impact of the supply shock (Guerrieri et al., 2020). Fourth, as we discuss momentarily, the COVID-19 shock has negative effects on the economy's productive potential in the future. That lowers expected future incomes, which further depresses current spending demands by forward-looking agents.

The overall fall in aggregate demand is massive. While policymakers are aggressively deploying fiscal and monetary tools to counter this fall, it seems unlikely that they will or can achieve a full offset. Thus, we expect demand-side forces to depress employment and output for several months or more.

We now turn to supply-side considerations, with a focus on developments that influence the economy's future productive potential. First, the cash-flow crunch caused by the lockdown, uncertainty about the future course of the pandemic, concerns about slower growth in the near- and medium-term, and uncertainty about the outlook for growth and product demand are all

likely to depress capital investment expenditures for several months or more. Thus, the economy will carry a smaller stock of productive capital into the future as a consequence of the COVID-19 shock. In addition, pandemic-induced demand shifts and continuing concerns about infectious disease will undercut the production value of certain forms of capital such as large-scale entertainment venues, high-density retail facilities, and restaurants with closely-packed patrons.

Second, universities, government labs, and commercial facilities have shuttered non-COVID research projects. Schools have sent students home, and universities are making do with remote classes. Barrero, Bloom and Wright (2017) and Bansal et al. (2019) provide evidence that R&D investments are highly sensitive to uncertainty, because they are irreversible and riskier than investments in physical capital. The same may hold for investments in worker training, strong managerial practices, and other forms of intangible capital. Given the extraordinarily high levels of economic uncertainty in the wake of the COVID-19 shock (Baker, Bloom, Davis and Terry, 2020), investment rates in these intangibles are likely to be at least temporarily depressed. Immigration and trade, facilitators of innovation, have also shriveled. We expect these developments to lower the trajectory of future productivity into 2021 and beyond.

The third reason we anticipate a slow recovery on the supply side leads us back to the pandemic-induced reallocation shock and is the focus of the next section.

b. Creation Lags Destruction in the Response to Reallocation Shocks

Davis and Haltiwanger (2001) study the dynamic effects of oil price shocks in the 1970s and 1980s on job creation and destruction activity in the U.S. manufacturing sector. They find sizable reallocative effects of oil price shocks spread out over several years. A key message is that the destruction side of reallocation precedes the creation side by 1-2 years. Employment and output are depressed in the interim. Reasons for the delayed creation response include the time needed to plan new enterprises and business activities, the time required to navigate regulatory hurdles and permitting processes to start or expand businesses, time-to-build in capital formation, uncertainties that lead to delays in making sunk investments, and search and matching frictions in forming new relationships with suppliers, employees, distributors, and customers.

To appreciate why creation responses can lag months and years behind destruction responses, consider the experience of the American auto industry in the wake of the 1973 oil

price shock.[19] As Bresnahan and Ramey (1993) document, the shock increased the demand for small, fuel-efficient cars and simultaneously reduced the demand for larger cars. Capacity utilization and output fell in the wake of the oil price shock, even though a handful of plants equipped to produce small cars operated at peak capacity.

Several factors made it hard for the industry to respond rapidly to the increased demand for small, fuel-efficient cars. First, much of the physical capital in the U.S. auto industry was dedicated to the production of larger rather than smaller cars. Second, U.S. auto workers had accumulated skills that were specialized in the production of particular models, and these tended to be larger vehicles. Third, many auto workers laid off from large-car plants could not take up employment at small-car plants without a costly relocation. Fourth, the dealership network and salesforce of the U.S. auto industry had evolved under an era of thriving large-car sales, and they were probably better suited to market and service larger cars. Fifth, the knowledge base and the research and design personnel at U.S. auto companies were specialized in engineering larger cars. The development of smaller, more fuel-efficient cars required a reorientation of the knowledge base and the development of new skills by research and design personnel. Over time, U.S. automakers adapted to the shift in demand for vehicle types, but much of the creation response involved the entry and expansion of new facilities in the United States built and operated by Japanese automakers (Mair, Florida and Kenny, 1988).

Let's return to the broader reallocative consequences of the COVID-19 shock. Even with a vaccine in hand, consumer and business spending won't fully revert to pre-pandemic patterns. Concerns about infectious disease will linger. Millions of households are learning how to purchase almost anything online, and many will stick with it. Business people are learning how to travel less. Much of the shift in spending patterns and business practices will persist. National borders have been closed to most, often almost all, travel in countries around the world. Even when the pandemic recedes, stricter border controls, health checks and travel restrictions will likely remain in effect for years. However well advised, these policies will curtail international travel for business, tourism and scientific conferences. In addition, the long expansion that preceded the COVID-19 shock probably delayed the exit and contraction of marginal businesses,

[19] This paragraph and the next borrow from Davis and Haltiwanger (2001).

factories and product lines that were sliding toward obsolescence in any event. By depressing demand now and for at least several months, the COVID-19 shock triggered a recession that is likely to involve cleansing dynamics, as in the model of Caballero and Hammour (1994). These are among the reasons to think that the reallocative effects of the COVID-19 shock will persist long after the pandemic recedes.

c. Potential for Transformative Shifts

Jones et al. (2008) document the emergence of 335 new infectious diseases in human populations from 1940 to 2004, with a rising incidence over time even after efforts to control for reporting bias. Urbanization, long-distance travel, and cross-border commuting create the potential for new disease outbreaks to spread rapidly and become global pandemics. If major pandemics become a recurring phenomenon, we may see population shifts away from densely populated cities. Even if those shifts are largely confined to retirees and the well off, it would involve a massive reallocation of business, jobs, workers and capital. Persistent concerns about disease transmission will also provide strong impetus for new products and new efforts to allay customer concerns about infection risks. Driverless taxis that automatically disinfect interior spaces after each passenger trip is but one possibility among many.

Shiva (2020) argues that countries around the world need large investments to upgrade public health systems and healthcare capacity: hospitals, treatment capabilities, protective gear for front-line healthcare workers, greatly enhanced testing capabilities, vaccine stocks, and stockpiles of masks and equipment to control and monitor infection risks. In the wake of the COVID-19 pandemic and its enormous economic toll, arguments for greater investments in public health systems and healthcare capacity will have broad appeal. Thus, it seems a good bet that many countries, including the United States, will indeed undertake large-scale investments in public health systems, healthcare capacity, and medical research in the next several years.

IV. Messages for Policy

a. Many Lost Jobs Are Gone for Good

Many of the American jobs lost since early March will return in the coming weeks and months as the pandemic and lockdown recede. According to Table 3, temporary layoffs and

furloughs account for 77 percent of gross staffing reductions from March 1 to mid-May. Recall that 27.9 million Americans filed new claims for unemployment benefits in the six weeks ending on April 25. 23 percent of that number is 6.4 million permanently lost jobs. Of course, there remains tremendous uncertainty about the economic outlook. For many firms, cash-flow problems today will become insolvencies in the future, and "temporary" layoffs will become permanent. The longer it takes to bring the economy back on line, the larger the fraction of recent layoffs that will turn out to be permanent.

To get a sense for the fraction of layoffs that will lead to actual recalls, we turn to evidence from Katz and Meyer (1990), who analyze a sample of UI recipients in Missouri and Pennsylvania from 1979 to 1981. They find that 72 percent of UI recipients who initially expected to be recalled were actually recalled. In addition, 13 percent of ex ante "permanent" layoffs were, in fact, recalled. Applying these figures to statistics in the rightmost column of Table 3 implies actual recalls equal to $(0.72)[11.4/14.9] + 0.13[(1.6 + 2.1)/14.9] = 58$ percent of gross staffing reductions. This calculation adjusts for "permanent" layoffs that result in recalls and treats cuts in contractors and leased workers like permanent layoffs. According to this calculation, 42 percent of the gross staffing reductions reflected in Table 3 will result in permanent job losses. Applying the 42 percent figure to the 27.9 million new claims for unemployment benefits in the six weeks ending on April 25 yields 11.6 million permanently lost jobs. This number does not include future job losses caused by the COVID-19 shock.

Our earlier remarks on the potential for customer (and employee) concerns about infectious disease transmission to alter retail formats, restaurant designs, and the delivery of many medical, professional, personal and business services suggest that the reallocative consequences of the COVID-19 pandemic will continue to play out for many months and years to come. The evidence in Figures 1 and 2 also says that firms expect high rates of job and sales reallocation to continue over at least the next twelve months. These remarks and statistical evidence point to additional permanent job losses beyond the initial 11.6 million or so.

Broadly speaking, we anticipate permanent job losses in three buckets: jobs lost due to COVID-induced demand shifts, jobs formerly at marginal firms that don't survive the pandemic and lockdown, and jobs lost due to the intra-industry reallocation triggered by the pandemic and post-pandemic concerns about the transmission of infectious diseases. Sections I and II above

draw on multiple sources of evidence, and a few historical experiences, to explain why we anticipate a sizable number of permanently lost jobs in each bucket.

If we are correct that many of the lost jobs are gone for good, there are important implications for policy. First, policy efforts to preserve all pre-COVID jobs and employment relationships could prove quite costly, if pursued. They are analogous to policies that prop up dying industries and failing firms. These policies are feasible, but the cost is high in terms of resource misallocation and taxpayer burden. Second, there are potentially large benefits of policies and policy reforms that facilitate a speedy reallocation of jobs, workers, and capital to newly productive uses in the wake of the pandemic. Policies that deter or slow factor reallocation are likely to further lengthen the lag of creation behind destruction, slowing the overall recovery from the pandemic, the lockdown, and the pandemic-induced reallocation shock.

In the rest of the paper, we develop these themes in connection with specific policy interventions and legacy features of the U.S. policy landscape. We focus on policies that directly impact the economy's reallocation response to the COVID-19 shock. Policies that facilitate productive reallocation can also ease supply constraints and complement the role of fiscal and monetary policy in stabilizing demand. In turn, aggregate demand stabilization and monetary policy actions that ensure the smooth functioning of the financial system help set the stage for a speedier reallocation of jobs, workers, and capital to their most efficient uses.

b. High Unemployment Benefits Encourage Layoffs, Discourage Work, and Delay Productive Reallocation

President Trump signed the Coronavirus Aid, Relief, and Economic Security (CARES) Act on 27 March 2020. As part of this relief bill, the federal government is supplementing unemployment insurance (UI) benefit levels by $600 per week through the end of July 2020.[20] Each UI recipient receives the extra $600 per week irrespective of previous earnings or their

[20] The Federal Pandemic Unemployment Compensation provision of the CARES Act also expanded UI eligibility to independent contractors, gig workers, self-employed persons and to certain persons who are "unable or unavailable to work because of certain health or economic consequences of the COVID-19 pandemic," extended the duration of unemployment benefits by up to 13 weeks, and relaxed job search requirements. See the U.S. Department of Labor at https://www.dol.gov/coronavirus/unemployment-insurance, accessed on 28 April 2020.

potential earnings on a new job.[21] For many workers, the extra $600 pushes total unemployment benefits to levels that exceed their previous earnings.

According to an analysis of this provision in Williams (2020), "the average replacement rate across states would increase to roughly 116 percent…. The expanded benefits exceed 90 percent of the average weekly wages in all states; they exceed 120 percent of average wages in 21 states and 130 percent in six states." Similarly, the Council of Economic Advisers estimates that 64 percent of workers (and at least 50 percent in every state except DC) would receive more income from unemployment benefits than from working until the end of July when the $600 federal supplement expires. Industries like hospitality and retail have an even greater share of workers for whom unemployment benefits exceed earnings.[22]

The newly generous unemployment benefit levels are not lost on employers. "When Equinox had to start furloughing some employees at its chain of upscale fitness clubs, Executive Chairman Harvey Spevak had a surprising message to stakeholders. 'We believe most will be better off receiving government assistance during our closure'." This passage is from Thomas and Cutter (2020), who also write: "Equinox joins a number of companies, including Macy's ... and [furniture maker] Steelcase ...that are citing the federal government's beefed-up unemployment benefits as they furlough or lay off staff amid the coronavirus pandemic. The stimulus package is changing the calculus for some employers, which can now cut payroll costs without feeling they are abandoning their employees." Thomas and Cutter also report that some workers in "essential businesses," who would receive more income while unemployed are asking to be laid off. These remarks suggest that federal supplemental unemployment benefits have boosted layoffs and unemployment benefit claims in recent weeks.

The extra $600 per week in supplemental benefits is also likely to discourage many unemployed persons from returning to work before August. Even at replacement rates in the historical range of 40-50 percent of prior earnings, unemployment benefits discourage job search by recipients. See, for example, the studies by Katz and Meyer (1990) and Krueger and Mueller

---

[21] See the Department of Workforce Development at https://dwd.wisconsin.gov/uiben/fpuc/ for a description of how the State of Wisconsin is implementing the supplemental UI benefits

[22] This and the previous sentence reflect personal communications with CEA staff.

(2010). Evidence is already emerging that today's much higher replacement rates are discouraging a return to work. Huffman (2020) and Kullgren (2020), for example, offer anecdotal evidence from the restaurant industry. The problem will worsen as the economy reopens and employers seek to recall laid-off employees or hire new ones. Some U.S. Congressional leaders have proposed to extend supplemental unemployment benefits beyond July (Touchberry, 2020), which would further discourage a return to work and slow the economy's response to the reallocative aspects of the COVID-19 shock.

Prang (2020) supplies an interesting example of how the $600 supplemental benefit is affecting a cleaning company that employed 30 workers before the pandemic. The owner received a $250,000 loan under the Paycheck Protection Program. Under the terms of the program, the loan is forgivable if the company reopens within eight weeks and rehires its former employees. The owner thinks it will take longer than eight weeks to reopen, and that it is "unclear if his workers would want to stay at the firm over the next couple of months because many of them stand to make more from the country's expanded unemployment benefits. Mr. Walsh [the owner] estimated he would have to raise the pay of certain employees by up to 40% to compete with collecting unemployment." Many owners and managers will confront similar challenges as they seek to reopen their businesses in the near future.

c. Linking Firm Aid to Employee Retention Deters Productive Reallocation

The CARES Act also created the Paycheck Protection Program (PPP), an emergency lending facility that extends loans to small businesses on favorable terms. Congress allocated $349 billion to the PPP in the CARES Act and added another $321 million about a month later, bringing the total to $670 billon (Boggs, 2020). As Letteiri and Lyons (2020) explain, the PPP has two main goals: "1) help small businesses cover their near-term operating expenses during the worst of the crisis, and 2) provide a strong incentive for employers to retain their employees." Loans are forgivable in an amount up to the borrower's expenditures on payroll, rent, utilities, and mortgage interest in the eight weeks after loan receipt, ***if*** the borrower maintains their pre-crisis level of full-time equivalent employees. Otherwise, the amount forgiven falls in proportion to the headcount reduction. (Payroll expenses must account for at least 75 percent of the forgiven amount.) Thus, the loan becomes a grant if covered operating costs exceed the loan amount and the borrower maintains headcount.

The efficiency rationale for the PPP is straightforward, though seldom articulated: If there is social value to business continuity that exceeds the private value captured by owners, employees, suppliers and customers, then taxpayer subsidies that encourage the operation of temporarily unprofitable businesses might create positive social value. We say "might" here, because these subsidies involve other costs, including the deadweight cost of taxation.

We make no effort to analyze the full range of benefits and costs of the PPP or to assess its implementation. Our more modest aim is to highlight the program's effects on static efficiency and reallocation incentives in the wake of the COVID-19 shock. Given the program's design, an eligible firm has strong financial incentives to tap the PPP to fund eight weeks of current operations, even when its output during that period has negative social value, and its workers and other inputs would be more efficiently deployed elsewhere.

Consider, for example, a restaurant that can generate revenues of $5,000 a week during the crisis at a cost of $8,000 per week for payroll and $2,000 for food and utilities. The short-run profit maximizing decision for the restaurant owner is to shut down during the crisis, saving $5,000 a week. That privately sensible decision also frees up the employees to take another job or collect unemployment benefits and, if not working, to devote more time to valuable activities at home such as caring for children and monitoring their studies while schools are closed.[23] That same owner with a PPP loan of $64,000 will find it profitable to stay open. The forgivable loan covers labor costs during the eight-week period, leaving net profits of $3,000 per week for the restaurant owner. In this example, the taxpayer foots the bill to subsidize business operations that have negative social value. Through the forgivable loan, the PPP incentivizes the owner to employ workers whose time has higher value in other jobs and non-market activities.

The PPP also creates incentives to delay socially valuable reallocation responses to the COVID-19 shock. To see this point, return to the example and suppose the owner anticipates the restaurant will remain unprofitable even after the pandemic recedes and the lockdown ends. This scenario is a likely one for many restaurants, because the fall in demand for dine-in restaurants will persist, as we discussed above. Even in these circumstances, the PPP gives the restaurant

[23] Some laid-off workers may not qualify for unemployment benefits, even under the relaxed criteria provided by the CARES Act. If that is the concern, lawmakers can further relax the eligibility criteria for unemployment benefits.

owner a financial incentive to continue operating for as long as forgivable loans are available to turn an unprofitable business into a privately profitable one. In other words, the PPP creates financial incentives to keep workers engaged in businesses that cannot succeed beyond the duration of government subsidies, and to postpone their redeployment to viable businesses.

Under the current design of the PPP, covered expenses count towards loan forgiveness for only eight weeks after loan receipt. That limits the extent to which the PPP delays the redeployment of workers (and other inputs) to more productive uses in firms with better prospects. However, there are proposals to extend the forgiveness accrual period to 24 weeks or more, and to extend the program through the end of 2020. See Letteiri (2020), for example, and the reportage in Omeokwe (2020).

There are more efficient ways to channel liquidity support to viable, cash-strapped businesses during the crisis. Delinking financial assistance to firms from employee retention would largely eliminate the incentive to inefficiently deploy labor. Assistance in the form of low-interest loans without forgiveness provisions would discourage firms with poor economic outlooks from applying for assistance. That way, taxpayer-backed programs to provide liquidity support for businesses could be allocated to firms with reasonable survival prospects. Modifying the PPP in these two respects would also facilitate a speedier reallocation of factor inputs away from businesses with poor future prospects in the wake of the COVID-19 shock to existing and new businesses with better prospects.

In Sections I and II, we presented evidence that the COVID-19 shock caused large, persistent shifts in demand patterns and business practices. The reallocative aspects of the shock imply that many businesses should not return to pre-COVID employment levels, and they will not do so without employment-retention subsidies of indefinite duration. This point applies well beyond the PPP to other programs and proposals that use taxpayer funds to underwrite employee retention regardless of the employer's demand outlook. For example, the U.S. Treasury struck an agreement with ten major U.S. airlines to provide $25 million in subsidies in exchange for barring layoffs and furloughs before October (Sider, 2020a). The number of people passing through U.S. Transportation Security Administration screening checkpoints on 1 May 2020 is 93 percent lower than 1 May 2019, and airline executives say "it will likely take years to get back to travelling as usual." (Sider, 2020b) In circumstances like these, employee-retention subsidies

will delay the redeployment of workers and other productive inputs to more efficient uses during the crisis and afterwards.

d. Land-Use Restrictions

Certain legacy features of the U.S. policy landscape will also, unless reformed, inhibit the economy's response to the reallocative nature of the COVID-19 shock. To take one example, more stringent land-use regulations and greater organized political opposition to new real estate developments have reduced the elasticity of housing supply in many U.S. cities since the 1960s (Glaeser and Gyourko, 2018). By making it costlier for businesses and workers to move to the most productive cities, Hsieh and Moretti (2019) conclude that housing supply restrictions lowered aggregate U.S. growth by 36 percent from 1964 to 2009. Herkenhoff, Ohanian and Prescott (2018) consider state-level policies that restrict land availability for housing and commercial purposes. Using a state-level growth model, they simulate the effect of moving all U.S. states halfway from their current land-use regulations to that of Texas, the least-restrictive state. Their model implies that such a move would lead to substantial population reallocations across U.S. states and raise aggregate U.S. output by 12 percent. In an empirical study, Ganong and Shoag (2017) link the slowing of cross-state income convergence since the 1980s to rising housing supply regulations.

e. Occupational Licensing Restrictions

Government-mandated restrictions on who can work in what jobs are another important class of policies that impede responses to reallocative shocks. The share of American workers who must hold a license to do their jobs rose from less than 5% in the 1950s to more than 25% by 2008 (Kleiner and Krueger, 2013). About one-third of the growth in occupational licensing since the 1960s reflects changes in the mix of jobs.[24] The other two-thirds reflects a greater prevalence of licensing requirements within occupations. Carpenter et al. (2012) provide an illuminating description of state licensure requirements in 102 low- and moderate-income occupations. They document onerous licensing requirements for barbers, manicurists, tree trimmers, funeral attendants, massage therapists, auctioneers, sign language interpreters, and

[24] U.S. Department of the Treasury Office of Economic Policy (2015), page 20.

hundreds of other jobs.[25] According to the Council of State Governments, "over 1,100 jobs were licensed, certified, or registered in at least one state." (U.S. Department of Treasury Office of Economic Policy, 2015, page 7)

Most occupational licenses are at the state level and cross-state reciprocity is limited. Thus, licensing raises entry barriers in many jobs *and* inhibits worker mobility across states. See Carpenter et al. (2012), the U.S. Treasury Office of Economic Policy (2015), Johnson and Kleiner (2017), Kleiner and Xu (2019) and Hermansen (2019) for evidence that licensing reduces job-to-job mobility among workers, lowers occupational entry rates, reduces interstate mobility rates of workers in affected occupations, and lowers inward worker migration in states with more extensive and stricter licensing regulations.

Occupational licensing restrictions have presented themselves in a particularly pointed manner during the COVID-19 healthcare crisis, as observed in a recent *Wall Street Journal* (2020) editorial:

> Last month [New York Governor] Cuomo allowed medical personnel licensed anywhere in the country to practice in the state without a New York license. The Governor also expanded "scope-of-practice" rules to allow nurse practitioners, physician assistants and nurse anesthetists to perform jobs they've been trained to do without supervision from a higher-trained professional… Washington, Colorado and Massachusetts are relaxing licensing for out-of-state medical professionals. Florida Gov. Ron DeSantis last month signed legislation allowing primary-care nurse practitioners and advanced-practice registered nurses to operate independently. Another new law would let pharmacists test and treat common ailments like the flu and strep throat.

Relaxing restrictions of this sort are thus one route to facilitating both the response to the pandemic *and* the necessary post-pandemic reallocation of resources. The U.S. Department of the Treasury Office of Economic Policy (2015) and Thierer (2020) provide several proposals for reforming occupational licensing practices in the United States.

---

[25] These examples are drawn from Table 1 in Carpenter et al. (2012).

f. Regulatory barriers to business formation and expansion

As we have stressed, the COVID-19 pandemic precipitated a major reallocation shock to the U.S. economy. The strength of the recovery will turn partly on how successfully the economy responds to the reallocative aspects of the shock. In this regard, there are reasons for concern beyond the ones identified above. Available evidence suggests the U.S. economy responds more sluggishly to reallocation shocks now than decades earlier, and that regulatory barriers to business entry and expansion are important reasons for the increased sluggishness.

Decker et al. (2018) present evidence that plant-level employment growth became less responsive to plant-level total factor productivity (TFP) shocks after the 1980s in the U.S. manufacturing sector. Among plants operated by young firms in high-tech manufacturing, the fall in responsiveness began after the 1990s. Plant-level investment rates also became less responsive to TFP shocks after the 1990s. Moreover, the intra-industry dispersion of labor productivity has drifted upwards since at least the mid-1990s. Decker et al. also find that firm-level employment growth became less sensitive to labor productivity shocks in the U.S. nonfarm private sector since the mid-1990s, and that the intra-industry dispersion of labor productivity has risen since the mid-1990s. All of these findings point to greater sluggishness in responding to firm-level and establishment-level shocks.

Gutierrez and Philippon (2019) find that the elasticity of market entry with respect to Tobin's *q* has declined since the late 1990s. They attribute this development mainly to rising entry costs driven by regulations and lobbying. Their evidence points to greater sluggishness at the level of markets in the U.S. economy. It is complementary to the plant-level and firm-level evidence in Decker et al. (2018).

Davis (2017) presents evidence that the U.S. regulatory and tax systems grew enormously in scale, scope and complexity in recent decades. He argues that regulatory burdens and complexity tend to fall more heavily on younger firms, and businesses that expand into new markets. A vast, complex regulatory landscape creates large costs of learning the relevant regulations, developing compliance systems, and establishing relationships with regulators. Young businesses have had less time to develop the knowledge and internal processes required for compliance. Partly for this reason, complex regulatory systems favor incumbents while disadvantaging entrepreneurship and young businesses. Compared to smaller, newer and would-

be competitors, larger and incumbent firms have greater capacity and incentive to lobby for legislative exemptions, administrative waivers, and favorable regulatory treatment. Similar remarks apply to the U.S. business tax code, which is also vast and complex.

We conclude with remarks on one class of regulations that is especially pertinent in light of the COVID-19 shock: Certificate of Need (CON) laws in the healthcare sector. As described by Mitchell (2020), these laws "limit the ability of healthcare professionals to open new facilities, expand existing ones, or offer new services…. [They] cover dozens of technologies and services … and are not intended to evaluate a provider's competency or safety record. Instead, [the CON process] is intended to evaluate the provider's claim that the service is actually needed…. Incumbent providers are invited to challenge the applications of their would-be competitors. Even if a CON is granted, applicants can expect the process to take months or years." In light of this description, the potential for CON laws to deter entry, reduce healthcare capacity, and inhibit the healthcare sector's responsiveness to reallocation shocks is obvious.

The number of U.S. states with CON laws went from zero before 1964 to 23 in 1970 and 49 in 1980 (Mitchell and Koopman, 2016). Since then, many states have repealed CON laws, and they are currently in effect in 35 states and the District of Columbia. The adoption and repeal of CON laws at different times in different states is quite useful for research into their effects. According to Mitchell's (2020) timely summary of research in this area, CON laws are associated with fewer hospitals per capita, fewer hospital beds per capita, fewer ambulatory surgery centers per capita, fewer hospice care facilities, fewer dialysis clinics, fewer hospitals offering MRI, CT and PET scans, and longer driving distances to obtain care.

This evidence supports two conclusions: First, that CON laws contributed to hospital capacity shortfalls during the COVID-19 pandemic. Second, that CON laws will hamper the healthcare sector's response to demand shifts driven by the COVID-19 shock and make it harder and costlier to strengthen healthcare capacity in the United States. Mitchell, Amez-Droz and Parsons (2020) offer several suggestions for phasing-out or otherwise reforming CON laws.

References

Alfonso, Gara and Ricardo Lagos, 2015. "Trade Dynamics in the Market for Federal Funds," *Econometrica,* 83, no. 1, 263-313.

Altig, David, Jose Maria Barrero, Nick Bloom, Steven J. Davis, Brent Meyer, Emil Mihaylov and Nick Parker, 2020a. "American Firms Foresee a Huge Negative Impact of the Coronavirus," Technical Report, Federal Reserve Bank of Atlanta, 23 March.

Altig, David, Jose Maria Barrero, Nick Bloom, Steven J. Davis, Brent Meyer and Nick Parker, 2020b. "Surveying Business Uncertainty" NBER Working Paper 25956. Revised, March 2020. Forthcoming, *Journal of Econometrics.*

Bachmann, Ruediger, Kai Carstensen, Stefan Lautenbacher and Martin Schneider, 2018. "Uncertainty and Change: Survey Evidence of Firms' Subjective Beliefs," working paper.

Bachmann, Ruediger and Stefan Elstner, 2015. "Firm optimism and pessimism," *European Economic Review*, *79* (October), 297-325.

Baker, Scott, Nicholas Bloom, Steven J. Davis, Kyle Kost, Marco Sammon and Tasaneeya Viratyosin, 2020. "The Unprecedented Stock Market Reaction to COVID-19," *COVID Economics: Vetted and Real-Time Papers,* 1, 5 April.

Baker, Scott, Nicholas Bloom, Steven J. Davis and Stephen J. Terry, 2020. "COVID-Induced Economic Uncertainty," NBER Working Paper 26983.

Baldwin, Richard and Beatrice Weder di Mauro, 2020. "Introduction," in Baldwin and Weder di Mauro, editors, *Economics in the Time of COVID-19*, CEPR, London, pp. 1–30.

Bandolm, Lana, 2020. "Papa John's Plans to Hire 20,000 Workers During Coronavirus Outbreak," *Forbes,* 23 March.

Bansal, Ravi, Marian Max Croce, Wenxi Liao, and Samuel Rosen, 2019. "Uncertainty-Induced Reallocations and Growth," NBER Working Paper No. 26248.

Bartik, Alexander W., Maranne Bertrand, Zoe B. Cullen, Edward L. Glaeser, Micahel Luca, and Christopher T. Stanton, 2020. "How Are Small Businesses Adjusting to COVID-19? Early Evidence from a Survey," NBER Working Paper No. 26989.

Bender, Ruth and Matthew Dalton, 2020. "Coronavirus Pandemic Compels Historic Labor Shift: Outbreak Reshapes Job Market as Some Sectors Shut Down, Other See Demand Surge," *Wall Street Journal,* 29 March 2020.

Barrero, Jose Maria, 2020. "The Micro and Macro of Managerial Beliefs," working paper, Instituto Tecnológico Autónomo de México.

Bloom, Nicholas, Philip Bunn, Scarlet Chen, Paul Mizen, Pawel Smietanka, Greg Thwaites and Garry Young, 2018. "Brexit and uncertainty: insights from the Decision Maker Panel," *Fiscal Studies, 39*, no. 4, 555-580.

Bloom, Nicholas, Steven J. Davis, Lucia Foster, Brian Lucking, Scott Ohlmacher and Itay Saporta Ecksten, 2017. "Business-Level Expectations and Uncertainty," working paper.

Boggs, Justin, 2020. "Congress Approves Replenishing the Paycheck Protection Program," *Denver Channel,* 23 April.

Brainard, S. Lael and David M. Cutler, 1993. "Sectoral Shifts and Cyclical Unemployment Reconsidered," *Quarterly Journal of Economics,* 108, no. 1 (February): 219-243.

Bresnahan, Timothy F. and Valery A. Ramey, 1993. "Segment Shifts and Capacity Utilization in the U.S. Automobile Industry," *American Economic Review*, 83, 2, 213-218.

Broda, Christian and David E. Weinstein, 2010. "Product Creation and Destruction: Evidence and Price Implications," *American Economic Review*, 100 (June), 691-723.

Bureau of Labor Statistics, U.S. Department of Labor, 2017. "Contingent and Alternative Employment Arrangements – May 2017," at www.bls.gov/news.release/pdf/conemp.pdf.

Caballero, Ricardo and Mohammed Hammour, 1994. "The Cleansing Effect of Recessions," *American Economic Review*, 84, no. 5 (December), 1350-1368.

Campbell, John Y. and Robert J. Shiller, 1988. "The Dividend-Price Ratio and Expectations of Future Dividends and Discount Factors," *Review of Financial Studies*, 1, 195-228.

Carew, Sinead, 2020. "Goldman Sachs Slashes U.S. GDP Estimate Further," *U.S. News & World Report*, 31 March.

Carpenter, Dick M., Lisa Knepper, Angela C. Erickson, and John K. Ross. 2012. *License to Work: A National Study of Burdens from Occupational Licensing*, Arlington, VA: Institute for Social Justice.

Chen, Cheng, Tatsuro Senga, Chang Sun and Hongyong Zhang, 2019. "Uncertainty, Imperfect Information and Learning in the International Market," working paper.

Cochrane, John, 2011. "Presidential Address: Discount Rates," *Journal of Finance*, 68, no. 4, 1047-1108.

Craig, Ben R. and Joseph G. Haubrich, 2013. "Gross Loan Flows," *Journal of Money, Credit & Banking*, 45, no. 2-3.

Cutter, Chip and Patrick Thomas, 2020. "Looking for a Job? Big Tech Is Still Hiring?" *Wall Street Journal*, 14 April.

Davis, Steven J., 2017. "Regulatory Complexity and Policy Uncertainty: Headwinds or Our Own Making," Becker Friedman Institute Working Paper, April.

Davis, Steven J., Jason Faberman, John Haltiwanger and Ian Rucker, 2010. "Adjusted Estimates of Worker Flows and Job Openings in JOLTS," in *Labor in the New Economy*, edited by K. Abraham, J. Spletzer and M. Harper, University of Chicago Press.

Davis, Steven J. and John Haltiwanger, 1992. "Gross Job Creation, Gross Job Destruction, and Employment Reallocation." *Quarterly Journal of Economics*, August.

Davis, Steven J. and John Haltiwanger, 1999. "Gross Job Flows," *Handbook of Labor Economics*, Volume 3B, Orley Ashenfelter and David Card, editors, Amsterdam: North-Holland.

Davis, Steven J. and John Haltiwanger, 2001. "Sectoral Job Creation and Destruction Responses to Oil Price Changes," *Journal of Monetary Economics*, December.

Davis, Steven J., John C. Haltiwanger, and Scott Schuh, 1996. *Job Creation and Destruction.* Cambridge, MA: MIT Press.

Davis, Steven J., John Haltiwanger, Ron Jarmin, C.J. Krizan, Javier Miranda, Alfred Nucci, and Kristin Sandusky 2009, "Measuring the Dynamics of Young and Small Businesses: Integrating the Employer and Nonemployer Universes". In *Producer Dynamics: New Evidence from Micro Data*, edited by Timothy Dunne, J. Bradford Jensen and Mark J. Roberts, University of Chicago Press.

Davis, Steven J., Stephen Hansen and Cristhian Seminario, 2020. "Firm-Level Risk Exposures and Stock Price Reactions to COVID-19," working paper.

Davis, Steven J., Prakash Loungani and Ramamohan Mahidhara, 1997. "Regional Labor Fluctuations: Oil Shocks, Military Spending, and other Driving Forces," Board of Governors of the Federal Reserve System, International Finance Discussion Papers 578.

Decker, Ryan A., John C. Haltiwanger, Ron S. Jarmin and Javier Miranda, 2018. "Changing Business Dynamism and Productivity: Shocks vs. Responsiveness," NBER Working Paper No. 24236.

Dell'Ariccia, Giovanni and Pietro Garibaldi, 2005. "Gross Credit Flows," *Review of Economic Studies*, 72, 665-685.

Di Mauro, Filipo and Chad Syverson, 2020. "The COVID Crisis and Productivity Growth," *VOX CEPR Policy Portal*, 16 April 2020.

Dunne, Timothy, Mark Roberts, and Larry Samuelson, 1989. "Plant Turnover and Gross Employment Flows in the U. S. Manufacturing Sector," *Journal of Labor Economics*, 7, 48-71.

Eisfeldt, Andrea and Adriano A. Rampini, 2006. "Capital Reallocation and Liquidity," *Journal of Monetary Economics*, 53, 369-399.

Foster, Lucia, John Haltiwanger and C.J. Krizan, 2006. "Maket Selection, Reallocation, and Restructuring in the U.S. Retail Sector in the 1990s," *Review of Economics & Statistics*, 88, 748-758.

Ganong, Peter and Daniel Shoag, 2017. "Why Has Regional Income Convergence in the U.S. Declined?" *Journal of Urban Economics*, 102 (November), 76-90.

Glaeser, Edward and Joseph Gyourko, 2018. "The Economic Implications of Housing Supply, " *Journal of Economc Perspectives*, 32, no. 1 (Winter), 3-30.

Gormsen, Niels J. and Ralph S. Koijen, 2020. "Coronavirus: Impact on Stock Prices and Growht Expectations," working paper, 23 April.

Guerrieri, Veronica, Guido Lorenzoni, Ludwig Straub and Ivan Werning, 2020. "Macroeconomic Implications of COVID-19: Can Negative Supply Shocks Cause Demand Shortages?" NBER Working Paper No. 26918.

Guiso, Luigi and Giuseppe Parigi, 1999. "Investment and demand uncertainty," *Quarterly Journal of Economics*, *114*, no. 1, 185-227.

Hassan, Tarek A., Stephan Hollander, Laurence van Lent and Ahmed Tahoun, 2020. "Firm-Level Exposure to Epidemic Diseases: COVID-19, SARS, and H1N1," NBER Working Paper No. 26971.

Herkenhoff, Kyle F., Lee E. Ohanian, and Edward C. Prescott, 2018. "Tarnishing the Golden and Empire States: Land-Use Restrictions and the U.S. Economic Slowdown," *Journal of Monetary Economics*, 93 (January), 89-109.

Hermansen, Mikkel, 2019. "Occupational Licensing and Job Mobility in the United States," OECD Economics Department Working Paper No. 1585.

Herrera, Anna Maria, Marek Kolar and Raoul Minetti, 2011. "Credit Reallocation," *Journal of Monetary Economics*, 58, 551-563.

Horn, Daniel, 2020. "The Pandemic Could Put Your Doctor out of Business," *Washington Post*, 24 April.

Huffman, Kurt, 2020. "Our Restaurants Can't Reopen Till August," *Wall Street Journal,* 21 August.

Hsieh, Chang-Tai and Enrico Moretti, 2019. "Housing Constraints and Spatial Misallocation," *American Economc Journal: Macroeconomics,* 11, no. 2, 1-39.

Iacovone, Leonardo and Beata S. Jovorcik, 2010. "Multi-Product Exporters: Product Churning, Uncertainty and Export Discoveries," *Economic Journal,* 120, Issue 544 (May), 481-499.

International Monetary Fund, 2020. "Chapter 1: The Great Lockdown," *World Economic Outlook,* April.

Jackson, Nancy Mann, 2020. "Coronavirus Offers Opportunity for Physicians to Try Telemedicine," *Medical Economics,* 18 March.

Johnson, Janna E., and Morris M. Kleiner. 2017. "Is Occupational Licensing a Barrier to Interstate Migration?" NBER Working Paper 24107.

Jones, Karen E., Nikkita G. Patel, Marc A. Levy, Adam Storeygard, Deborah Balk, John L. Gittelman and Peter Daszak, 2008. "Global Trends in Emerging Infectious Diseases," *Nature,* 451, 990-993.

Katz, Lawrence F. and Bruce D. Meyer, 1990. "The Impact of the Potential Duration of Unemployment Benefits on the Duration of Unemployment," *Journal of Public Economics,* 41, no. 1, 45-72.

Kleiner, Morris M., and Alan B. Krueger. 2013. "Analyzing the Extent and Influence of Occupational Licensing on the Labor Market." *Journal of Labor Economics* 31, no. 2: S173–S202.

Kleiner, Morris M. and Ming Xu, 2020. "Occupational Licensing and Labor Market Fluidity," working paper, August.

Koetsler, John, 2020. "Amazon Hired 100,000 People Last Month. Now It's Hiring Another 75,000," *Forbes,* 13 April 2020.

Krueger, Alan B. and Andreas Mueller, 2010. "Job Search and Unemployment Insurance: New Evidence from Time Use Data," *Journal of Public Economics,* 94, nos. 3-4, 546-572.

Kullgren, Ian, 2020. "Restaurants' Bailout Problem: Unemployment Pays More," *Politico,* 20 April 2020.

Kuper, Simon, 2020. "The Pandemic Will Forever Change How We Live," *Financial Times,* 8 April 2020.

Leatherby, Lauren and David Gelles, 2020. "How the Virus Transformed the Way Americans Spend Their Money," *New York Times,* 11 April.

Lee, Dave, 2020. "Uber Starts Listing Other Jobs for its Drivers," *Financial Times,* 6 April.

Letteiri, John, 2020. "The Paycheck Protection Program Needs Fundamental Improvements, Not Just More Funding," Economic Innovation Group, 16 April.

Letteiri, John and Catherine Lyons, 2020. "Understanding the Paycheck Protection Program," Briefs and Blogs, Economic Innovation Group, 26 March.

Loungani, Prakash, Mark Rush and William Tave, 1990. "Stock Market Dispersion and Unemployment," *Journal of Monetary Economics,* 25, no. 3 (June), 367-388.

Mair, Andrew, Richard Florida and Martin Kenney, 1988. "The New Economic Geography of Automobile Production: Japanese Transplants in North America," *Economic Geography*, 64, no. 4 (October), 352-373.

Massenot, Baptiste and Yuri Pettinicchi, 2018. "Can firms see into the future? Survey evidence from Germany," *Journal of Economic Behavior & Organization*, *145*, 66-79.

Mitchell, Matthew D., 2020. "First, Do No Harm: Three Ways that Policymakers Can Make It Easier for Healthcare," Mercatus Special Edition Policy Brief, 24 March.

Mitchell, Matthew D., Alise Amez-Droz, and Anna K. Parsons, 2020. "Phasing Out Certificate-of-Need Laws: A Menu of Options," Mercatus Center Policy Brief, 7 February.

Mitchell, Matthew D. and Christopher Koopman, 2016. "40 Years of Certificate-of-Need Laws Across America," Mercatus Center, 27 September.

Nassauer, Sarah, 2020. "Walmart's Coronavirus Challenge Is Just Staying Open," *Wall Street Journal*, 17 April.

Omeokwe, Amara, 2020. "Lawmakers in Congress Press for Changes in Small-Business Aid Program," *Wall Street Journal*, updated 3 May.

Prang, Allison, 2020. "Small Businesses Need Money – But First They Need the U.S. to Reopen," *Wall Street Journal*, 17 April.

Ramelli, Stefano and Alexander F. Wagner, 2020. "Feverish Stock Price Reactions to COVID-19," Swiss Finance Institute Research Paper No. 20-12, 21 April.

Shiller, Robert J., 1981. "Do Stock Prices Move Too Much to Be Justified by Subsequent Changes in Dividends?" *American Economic Review*, 71, 421-436.

Shiva, Mehdi, 2020. "We Need a Better Head Start for the Next Pandemic," *VOX CEPR Policy Portal*, 26 April 2020.

Sider, Alison, 2020a. "Airlines Have the Cash. Now They Need the Passengers," *Wall Street Journal*, 15 April.

Sider, Alison, 2020b. "U.S. Airlines Brace for Slow Recovery as Coronavirus Losses Mount," *Wall Street Journal*, 2 May.

Tanaka, Mari, Nicholas Bloom, Joel M. David and Maiko Koga, 2019. "Firm Performance and Macro Forecast Accuracy," *Journal of Monetary Economics*, forthcoming.

Taylor, Kate, 2020. "3 Million out of Work, $25 Billion Lost, 8 Figures Reveal How the Coronavirus Pandemic Is Devastating Restaurants across America," *Business Insider*, 31 March 2020.

The Editorial Board, "Doctors Without State Borders: Governors Are Easing Rules on Caregivers, and It's Long Overdue," *Wall Street Journal*, 12 April.

Thierer, Adam and Trace Mitchell, 2020. "Occupational Licensing Reform and the Right to Earn a Living: A Blueprint for Action," Policy Brief, Mercatus Center, April.

Thomas, Patrick and Chip Cutter, 2020. "Companies Cite New Government Benefit in Cutting Workers," *Wall Street Journal*, 7 April.

Touchberry, Ramsey, 2020. "Americans Could Get More Money, Unemployment Benefits in Democrats' Next Stimulus Bill," *Newsweek*, 6 April.

Tyko, Kelly, 2020. "Lowe's Hiring for 30,000 New Positions, Giving Employees $80 Million in Bonuses Because of Coronavirus," *USA Today*, 25 March.

Weber, Lauren, 2020. "50,000 Jobs, 900,000 Resumes: Coronavirus Is Redeploying Workers at Record Pace," *Wall Street Journal*, 15 April.

U.S. Department of the Treasury Office of Economic Policy, 2015. "Occupational Licensing: A Framework for Policy Makers." Report prepared by Council of Economic Advisers, Department of the Treasury, and the Department of Labor.

Williams, Noah, 2020. "Unemployment Benefits Under the Federal COVID-19 Relief Package," Center for Research on the Wisconsin Economy, 27 March 2020.

Table 1: Average Values of Expected Growth Rates and Expected Excess Reallocation Rates from September 2016 to January 2020

Expected Growth Rates		Expected Excess Reallocation Rates	
Sales	Jobs	Sales	Jobs
4.36	1.59	0.97	2.23

Notes: Authors' calculations using data from the Survey of Business Uncertainty. We compute the indicated activity-weighted statistic for each month from September 2016 to January 2020, and we then average over months to obtain the entries reported in the sample.

Table 2: Anticipated Coronavirus Impact on 2020 Sales Revenue, Percentage Amounts

Survey Question: What's your best guess for the impact of coronavirus developments on your firm's sales revenues in 2020? (Response options are a respondent-supplied percentage amount, up or down, and no effect.)

Survey Response Period: April 13-24, 2020

(1) Activity-Weighted Mean (Standard Error)	(2) Reweighted to Match the U.S. Industry Distribution	(3) Number of Survey Respondents
-17.6 (0.9)	-18.9 (0.9)	394

Notes: Authors' calculations using data from the April Survey of Business Uncertainty. Column (1) reports activity-weighted means in the April sample. Column 2 reports means after further weighting the sample observations to match the one-digit industry distribution of private sector gross output. According to the BEA, gross output is, "principally, a measure of an industry's sales or receipts ... [and capture] an industry's sales to consumers and other final users (found in GDP), as well as sales to other industries (intermediate inputs not counted in GDP). They reflect the full value of the supply chain by including the business-to-business spending necessary to produce goods and services and deliver them to final consumers."

Table 3: Gross Staffing Changes in Reaction to the COVID-19 Pandemic

Survey Questions: We would also like to ask how developments related to the coronavirus are affecting staffing levels at your firm

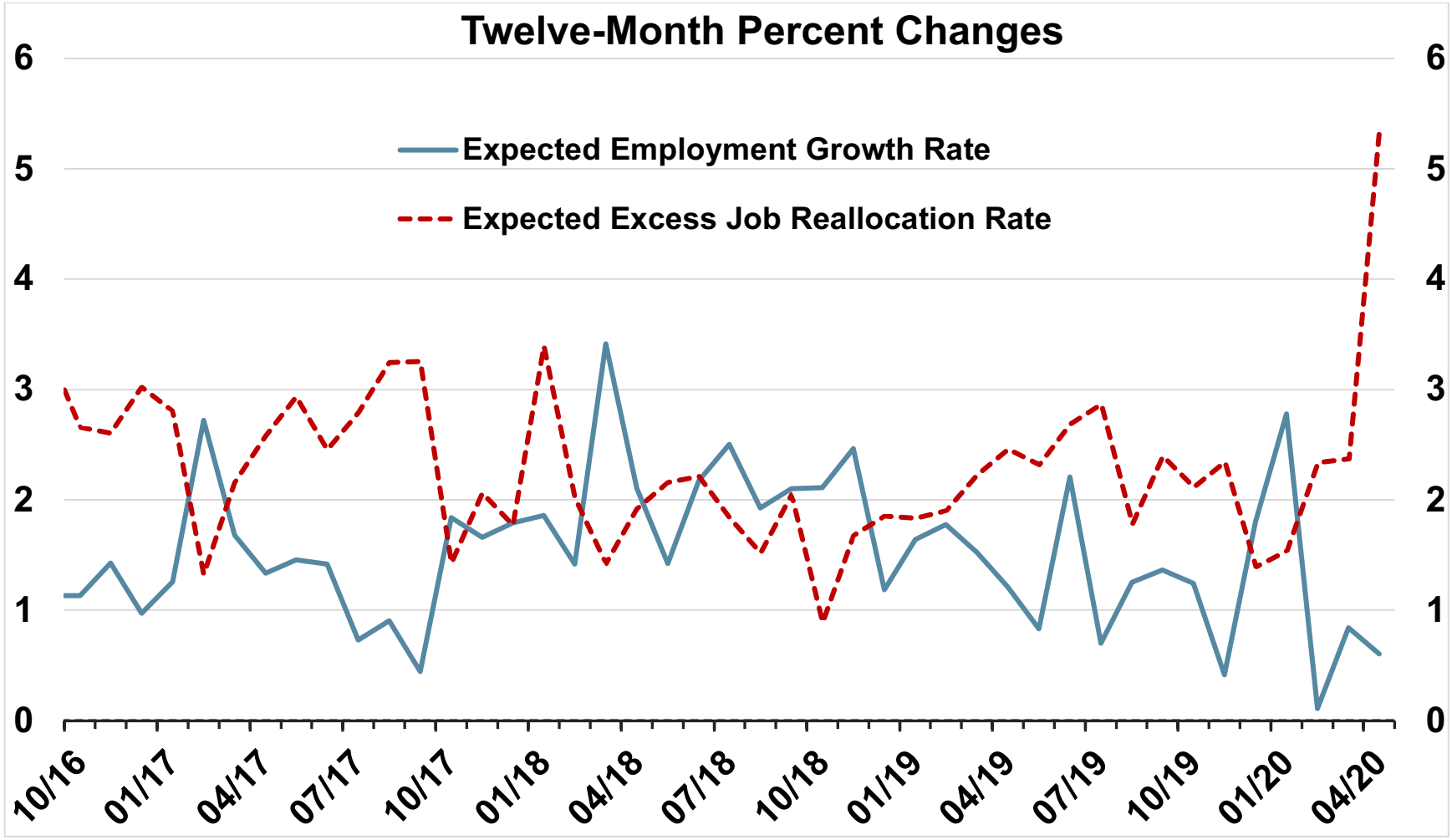
- Since March 1, we made the following staffing changes in response to developments related to the coronavirus. (Response options as indicated below.)
- Over the next four weeks, we expect to make the following staffing changes in response to developments related to the coronavirus. (Response options as indicated below.)

Survey Response Period: April 13-24, 2020

Entries are activity-weighted means, expressed as a percent of employment on March 1	From March 1 to Mid-April	Over Next Four Weeks	Cumulative
Net staffing change	-10.0 (1.18)	-0.9 (2.02)	-10.9
Gross staffing reductions	10.9 (1.16)	4.0 (0.69)	14.9
Permanent layoffs	0.9 (0.18)	0.7 (0.23)	1.6
Temporary layoffs and furloughs	8.5 (0.95)	2.9 (0.49)	11.4
Cuts in contractors and leased workers	1.6 (0.63)	0.5 (0.36)	2.1
Gross staffing increases	0.9 (0.16)	3.1 (1.88)	4.0
Hires of new employees	0.8 (0.16)	3.0 (1.88)	3.8
Additions to contractors and leased workers	0.1 (0.03)	0.1 (0.05)	0.2
Number of survey responses	368	341	

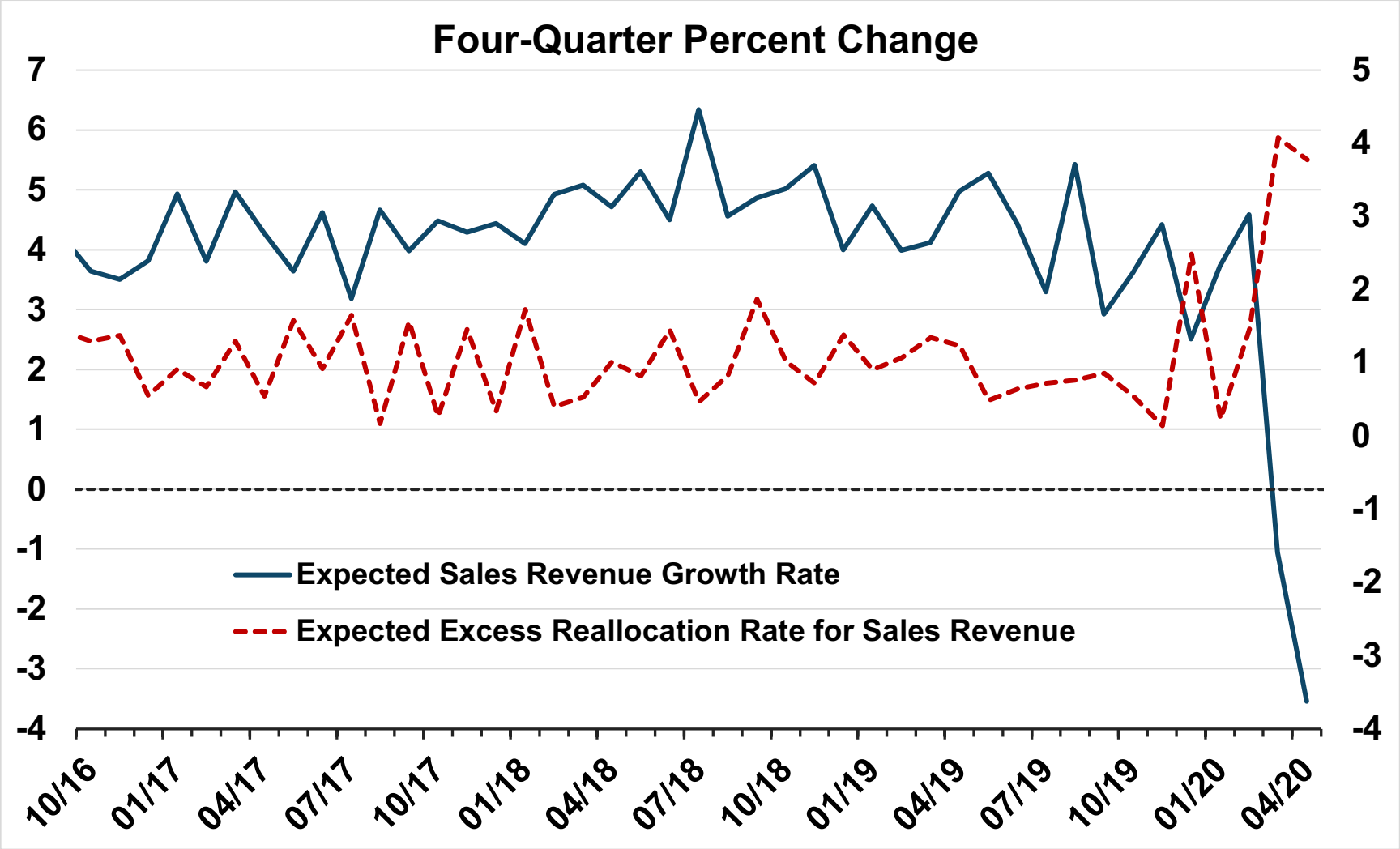
Notes: Authors' calculations using data from the April 2020 Survey of Business Uncertainty. Standard errors in parentheses.

Figure 1: Expected Rates of Employment Growth and Excess Job Reallocation at Twelve-Month Forecast Horizon, October 2016 to April 2020



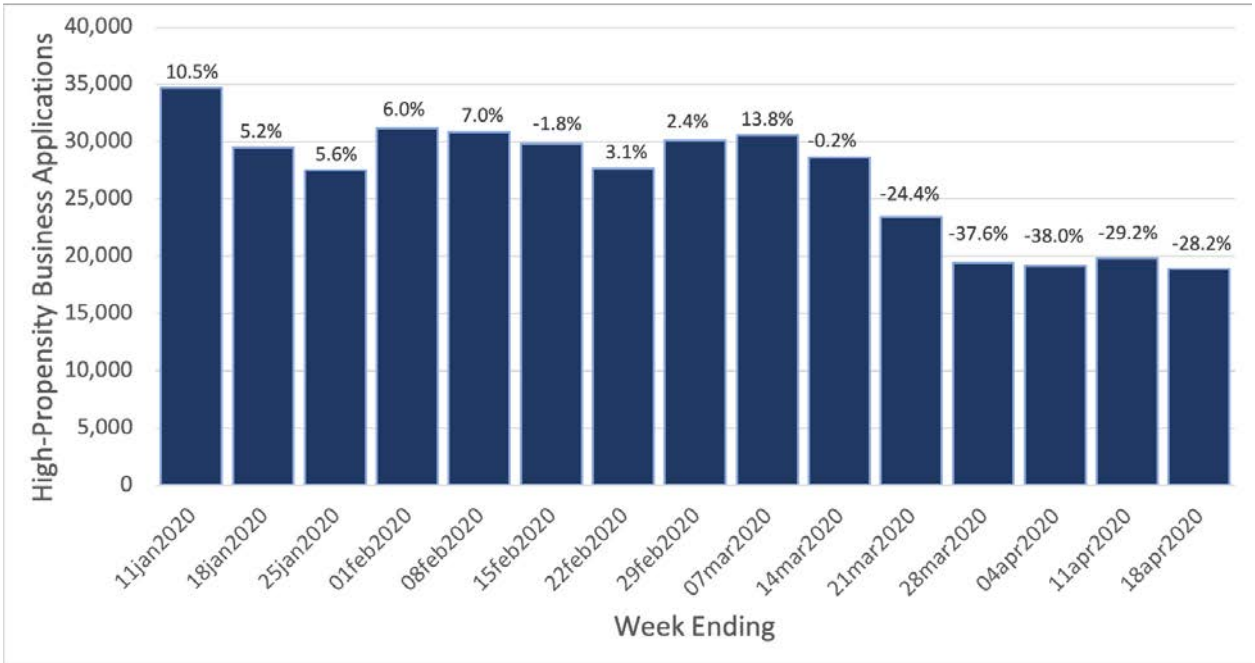
Source: Authors' calculations using data from the Survey of Business Uncertainty.

Figure 2: Expected Rates of Sales Growth and Excess Sales Reallocation at Four-Quarter Forecast Horizon, October 2016 to April 2020



Source: Authors' calculations using data from the Survey of Business Uncertainty.

Figure 3: Weekly Count of High-Propensity Business Applications in 2020 and Percent Change Relative to the Same Week in 2019

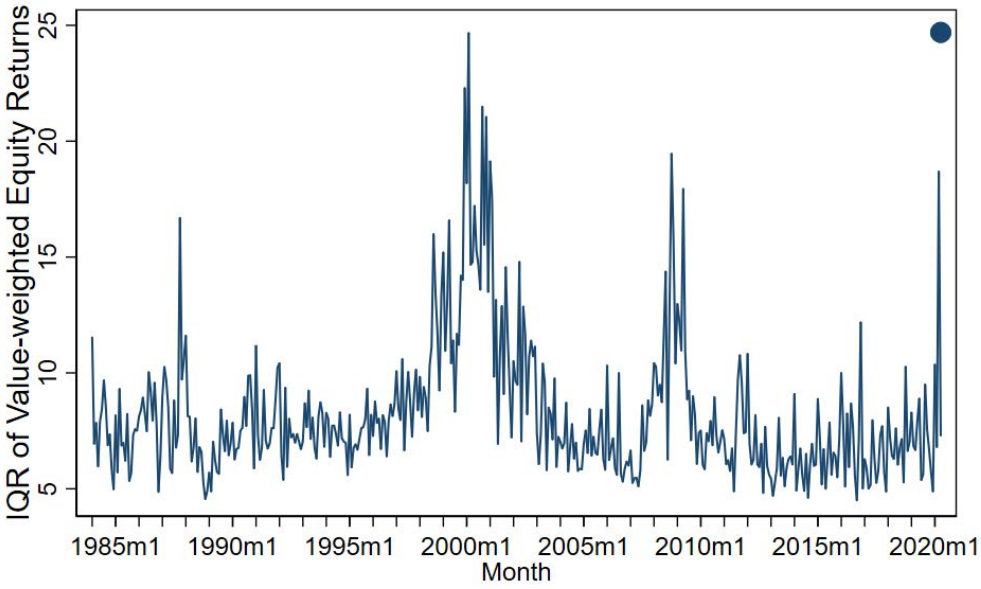


Source: Weekly Business Formation Statistics, U.S. Census Bureau

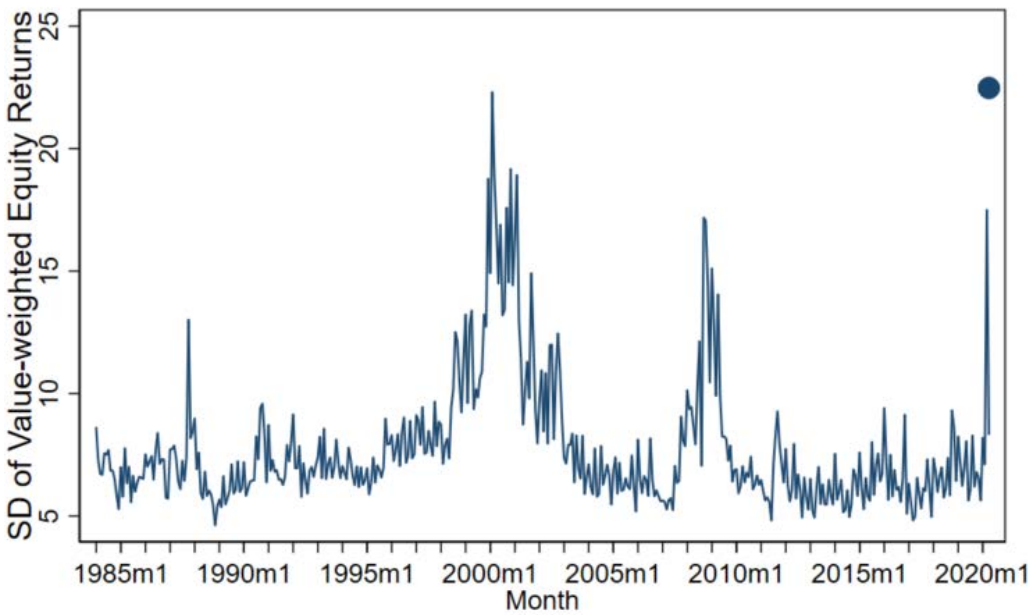
Notes: Bar heights report the count of "High-Propensity Business Applications" in the week ending on the indicated date. These statistics derive from administrative data on applications for a new Employer Identification Number (EIN) on IRS Form SS-4. "High-propensity" applications are those with a high propensity to hire paid employees based on certain characteristics, including (a) they are from a corporate entity; (b) they indicate they are hiring employees, purchasing a business or changing organizational type; (c) they provide a first wages-paid date (planned wages); or (d) they have a NAICS industry code in manufacturing (31-33), retail stores (44), health care (62), or restaurants/food service (72). The values atop each bar are year-on-year percent changes in the number of high-propensity business applications relative to the same week in 2019.

Figure 4: The Dispersion of Firm-Level Stock Returns, January 1984 to April 2020

A. Interquartile Range of the Value-Weighted Equity Return Distribution



B. Standard Deviation of the Value-Weighted Equity Return Distribution



Notes: We consider common equity securities traded on the NYSE, AMEX and NASDAQ with share prices quoted in U.S. Dollars. Data are from Compustat - Capital IQ Daily Security Files and from CRSP, both via the Wharton Research Data Services. We compute returns for month *t* as 100 times the log change of closing prices on the last trading days in months *t-1* and *t* with adjustments for dividends, share repurchases, stock splits and reverse splits. The large dots reflect log changes from 24 February to 21 March 2020.