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Corporate Flexibility in a Time of Crisis

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Abstract

We use timely surveys of US CFOs to study how flexibility shapes companies' responses to the onset of the COVID-19 crisis and drives longer-term changes in the corporate sector. The three dimensions of corporate flexibility that we study perform distinct functions, yet complement each other. We find that *workplace flexibility*, namely the ability for employees to work remotely, plays a central role in modulating firms' employment and investment planning during the crisis. *Investment flexibility* allows firms to increase or decrease capital spending plans based on their business condition during the crisis, which is shaped by workforce flexibility. Finally, *financial flexibility* contributes to stronger employment and investment plans. We show that the role played by workplace flexibility is new and was absent during the 2008 financial crisis. CFOs expect the workplace transformation of 2020 to have lasting effects for years to come: high workplace flexibility firms foresee continuation of remote work, stronger employment recovery, and shifting away from traditional capital investment, whereas low workplace flexibility firms will rely more on automation to replace labor.

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1 Introduction

In a rapidly changing world, firms need to adapt constantly. Over the last several decades, American businesses have witnessed — and adjusted to — secular changes in foreign competition, technology, and consumer preferences. The year 2020, however, brought unprecedented upheaval and challenges to firms stemming from the COVID-19 pandemic and its impact on human interactions. This unanticipated, global shock created a unique environment to study how companies adapt to crises, how they handle emergencies and plan for the long run.

We conduct a series of CFO surveys to gather companies' internal plans, which we use to study the role of corporate flexibility — the ability of firms to adjust and adapt — in response to the COVID-19 crisis. Our analysis provides unique insights into how flexibility affects firms' key decisions during the crisis as well as their longer-term post-COVID plans. We identify and analyze three important dimensions of corporate flexibility: 1) financial flexibility, which represents the standard observation that financial resources are important for supporting adjustments in firms' activities; 2) workplace flexibility, which captures firms' abilities to accommodate remote work; and 3) investment flexibility, which reflects whether firms can modify the timing of their capital spending in response to changing conditions. Our study shows how each of these dimensions plays a distinct role in shaping corporate planning and how they interact.

We find that workplace flexibility is a first-order determinant of how managers set their employment plans during the pandemic. Moreover, workplace flexibility operates *in tandem* with investment flexibility to determine how firms set their capital spending plans. This shows that during the COVID-19 crisis, operational (i.e., workplace and investment) flexibility is critical to corporate planning, in addition to the more frequently studied role of financial flexibility. Operational flexibility also shapes companies' longer-term plans for *both* hiring and investing: firms with more workplace flexibility expect employment to recover faster, but expect lower capital expenditures going forward as remote work persists; on the other hand, firms with low workplace flexibility expect a slower employment recovery and plan to shift their capital spending towards labor-reducing automation. As we explain below, these plans reflect transformations of the workplace and innovations to both the magnitude and

the nature of investment going forward.

Our first survey wave occurred from mid-February to mid-April, capturing the impact of the COVID-19 outbreak on the revenues and financial well-being of US companies, as well as their plans for hiring and investing. CFOs in our sample cover all sectors of the economy and 47 of 50 states. They represent large, medium, and small firms, public and private; our sample firms largely resemble Compustat firms in terms of employment and other key corporate characteristics. The survey contains a continuous, real-time record of managerial responses to the sudden onset of the COVID-19 crisis. After this initial wave, we continued to survey financial executives in June, September, and December of 2020. These new survey rounds confirm key findings from the first quarter; and importantly, provide further information on CFOs' long-term outlooks for the post-COVID world.

The strategy we use to study various relevant dimensions of corporate flexibility is straightforward. Our financial flexibility measure captures CFOs' (survey-based) assessments, reflecting both the availability of internal funds and access to external financing. For workplace flexibility, we identify the extent to which the employees of a given firm are able to work remotely (cf. Papanikolaou and Schmidt (2020) and Dingel and Neiman (2020)). For investment flexibility, we use survey-based information about firms' ability to adjust the timing of capital expenditures. We also account for a number of other relevant factors, including product demand (based on analyst forecasts), the contact intensity among employees and consumers (cf. Leibovici et al. (2020)), as well as time effects (calendar week) and geographic location effects.

To understand the challenges that firms face in light of the pandemic, we begin by unpacking CFOs' real-time assessments of the financial risk that COVID poses to their businesses. We find that higher workplace flexibility and investment flexibility are associated with lower perceived COVID risk exposure. Financial flexibility has a negative but relatively weak relationship with perceived COVID risk. In addition, firms in more contact intensive industries and those facing lower expected demand perceive higher COVID risk exposure. In other words, the risks posed by the COVID-19 crisis arise from not just customer demand or financing conditions, but also the ability of employees to perform key activities. In this vein, our subsequent analyses account for the fact that COVID-19 poses *multi-dimensional* challenges to firms.

We next investigate how the pandemic affected the real decisions of companies, conditional on their operational and financial flexibility. We start with the key determinants of companies' planning for employment and capital expenditures as the pandemic hit. We find that firms with more financial flexibility expect higher employment and capital expenditure growth in 2020. However, we show that focusing on financial flexibility alone may be insufficient. Importantly, we find that planned employment growth increases significantly with workplace flexibility. At the same time, higher workplace flexibility does not appear to directly boost capital spending plans, which as we discuss later, suggests that remote work is likely to make traditional capital investment less relevant. Interestingly, workplace flexibility affects spending conditionally via an investment channel: companies with a flexible workplace can operate relatively smoothly and exploit higher investment flexibility to *increase* capital spending. In contrast, companies with low workplace flexibility experience unfavorable conditions and use higher investment flexibility to *reduce* — or possibly postpone — capital spending. We confirm that these various dynamics hold over time based on realized outcomes from subsequent surveys. We also provide external validation of our survey results using realized Compustat data, which shows the generality of our findings.

We perform further analyses to characterize the extent to which the above results reflect the unique challenges of the 2020 pandemic. In particular, we compare our findings during the COVID-19 health crisis to the economic forces at play during the Great Financial Crisis of 2008 using CFO survey data from Campello et al. (2010). We first show that financial flexibility appears to exert a similar impact on employment and investment plans in both crises. We then turn to the analysis of workplace flexibility, noting that the physical environment and logistics of the corporate workplace have evolved significantly in recent years.[1] Notably, workplace flexibility played *no role* in firms' decision-making processes during the 2008 financial crisis, while it is *central* in the 2020 health crisis. Likewise, our tests do not indicate that firms exploited their investment flexibility very much during the 2008 crisis — at least not in tandem with their workplace flexibility. Indeed, we use historical Compustat and Bureau

[1] Barrero et al. (2020) show the proportion of employees who primarily worked from home had grown from 0.8% in 1980 to 2.4% in 2010, reaching 4.0% in 2018. Some 42% of working age individuals were working from home in May 2020 (see also Bick et al. (2020) and Brynjolfsson et al. (2020)). See Bloom et al. (2014) and Mas and Pallais (2017) among others for pre-COVID studies of remote work.

of Labor Statistics (BLS) data to show that workplace flexibility has not significantly affected firm employment or investment before 2020. As the current health crisis appears to accelerate the organizational transformation of American businesses, we further demonstrate below that the importance of operational flexibility we uncover in this study is likely to continue even after COVID-19 subsides.

After establishing how firms make employment and investment decisions during the COVID-19 emergency, we examine how they plan to adapt to the "post-COVID" world. We show that operational flexibility with respect to the workplace continues to play a central role. We ask CFOs at which point they expect employment, capital spending, and remote work to return to pre-COVID levels. Among firms negatively affected by the pandemic, 42% expect employment to remain below pre-COVID levels until the end of 2021, and more than 20% think their employment will not return to normal until after 2022, if at all. For capital spending, about 40% of firms expect their willingness to spend on capital investment to remain low until the end of 2021, and 30% expect the return to normal to be delayed until after 2022, if at all. In particular, firms with high workplace flexibility expect employment to recover faster, but this is not the case for the willingness to invest in fixed capital. These firms also expect that remote work will persist for longer or never return to the pre-COVID level.

A key implication of our findings is that firms' responses to the COVID-19 crisis have accelerated changes in the *nature* of investment. Among firms with high workplace flexibility, rather than investing in traditional physical assets like offices and storefronts, companies may invest more in their workforce and intangible assets that facilitate flexible collaboration. Correspondingly, traditional capital expenditures may recover slowly after COVID-19. In this new environment, a slow capital spending recovery does not necessarily reflect financing constraints or weakness of aggregate demand; rather, firms shifting towards remote work and changing investment strategies might be an important driver of sluggish traditional capital spending.

We also investigate long-term workplace changes that relate to using automation to reduce dependence on human labor in production. We find that large firms and firms with lower workplace flexibility are more likely to implement automation to reduce labor. Importantly, this link between workplace flexibility and automation is new, and we do not find any relationship between workplace flexibility and prior automation

adoption trends (Acemoglu and Restrepo, 2020). Indeed, firms that require workers to be physically on-site (low workplace flexibility) may find replacing human labor with automation especially useful for reducing infection risks, in light of the COVID-19 pandemic and potential future health crises. We also investigate which types of workers will be most affected by automation. Overall, low-skill workers are more likely to be displaced by automation. Moreover, low workplace flexibility firms, which are more inclined to automate in the first place, show an even stronger tendency to displace low-skill employees. Interestingly, in addition to displacing low-skill workers, high workplace flexibility firms may also displace high-skill workers via automation. Taken together, the COVID-19 shock appears to accelerate automation adoption, especially in low workplace flexibility industries. While these adjustments can help firms better withstand future health crises or other workplace disruptions, the prospect of a "robot-led recovery" in these industries may pose challenges for workers.

Our paper contributes to research on how crises affect firms and the economy, in our case with a focus on corporate flexibility. A vast literature has looked at the role of access to financing as a key driver of firm outcomes in a number of previous crises. We confirm this basic result; however, our paper also highlights additional critical margins of operational flexibility as firms respond to the COVID-19 crisis. We show that workplace flexibility plays a central role in shaping firms' decisions during the 2020 crisis as well as multiple aspects of their plans for the future. We also show that firms exploit their investment flexibility to operate through difficult times. Indeed, our paper is unique in examining how firms jointly operate across *all three margins*. Our findings indicate that these new dimensions of operational flexibility, as well as the accompanying transformation of the workplace and the nature of investment, will be key themes for research and policy going forward.

Our surveys of CFOs provide valuable information about both firms' strategies for dealing with pandemic in real time and the long-term effects of this crisis. Several contemporaneous papers use stock returns to study the impact of the pandemic on firms.[2] While stock returns summarize investors' perceptions about firms' prospects, they do not directly describe firms' real decisions. Studies of prior crises also com-

[2]Examples include Acharya and Steffen (2020), Alfaro et al. (2020), Ding et al. (2020), Fahlenbrach et al. (2020), Ramelli and Wagner (2020), Davis et al. (2020), Papanikolaou and Schmidt (2020), and Favilukis et al. (2020).

monly use ex post archival data. Realized outcomes are important, and indeed we externally validate our results using archival data available to date, but such data may conflate managers' planning with other ex post forces outside of their response sets. Notably, the long-term effects of COVID-19 will only materialize in archival data after several years, and by then might be difficult to identify given other events happening concurrently. In contrast, our analysis relies on real-time information about internal corporate plans, captured by our *in-crisis, forward-looking* survey instruments. Relatedly, several studies survey small businesses and document their conditions during COVID-19 (Bartik et al., 2020; Alekseev et al., 2020; Bloom et al., 2021). Barrero et al. (2020) ask firms about their hiring and highlight the reallocation consequences of COVID-19.[3] To the best of our knowledge, our paper is the only study using company-level data to integrate multiple key variables for analyzing firms in this crisis, including financial and operational conditions, the planning of real business activities such as employment and capital expenditures, as well as longer-term capital and labor implications. In addition, our sample contains more large firms that play a sizable role in the economy, and in this dimension goes beyond other research that focuses on small businesses.

The challenges brought by the 2020 pandemic, combined with the ever-changing nature of the workplace, pose new questions for economic policy. When financial flexibility is the binding constraint, monetary and fiscal policies may help alleviate problems.[4] When workplace flexibility is the binding constraint, however, traditional policy tools may be less effective. Those tools need to be reimagined and economic interventions may need to target individuals more directly. For example, as workers in industries with low workplace flexibility face fewer employment opportunities, unemployment insurance and skill transitioning programs may become more relevant.

2 Data and Summary Statistics

We describe our data sources in this section and present summary statistics.

[3]Concurrent work by Cajner et al. (2020) shows a decline in employment based on firm-anonymized payroll records. Campello et al. (2020) document a decline on corporate hiring based on job vacancy ads posted by firms in their websites. Gompers et al. (2020a) and Gompers et al. (2020b) survey venture capital and private equity investors, and Giglio et al. (2021) survey retail investors.

[4]Recent work by Chetty et al. (2020), Granja et al. (2020), and Balyuk et al. (2020) studies COVID-19 stimulus programs such as the Paycheck Protection Program (PPP) and finds limited effects.

2.1 CFO Survey Data

Our baseline data source is the Global Business Outlook survey of US CFOs conducted by Duke University in the first quarter of 2020.[5] This survey provides timely information about how firms respond to the sudden arrival of the COVID-19 crisis. We sent out e-mail invitations for this survey starting on February 11, 2020, before the escalation of the spread of the novel coronavirus across the US. This survey round closed on April 10, 2020. Because the timing is centered on March, we refer to it as the "March 2020" survey. We obtained survey responses from 520 CFOs. The overall response rate is 19.5%, which is high compared with typical surveys of executives and investors.[6]

Figure 1 summarizes key characteristics of the respondent firms and demonstrates that the sample includes a wide variety of firm types. Panel A shows that about half of our responses were received before mid-March, when there were still few reported COVID-19 cases in the US. The other half of the responses were received after mid-March, following the national COVID-19 emergency declaration.[7] Panel B shows that sample firms are spread across several industries, including both services and manufacturing. Panel C shows that the sample includes both fairly large firms (revenue over $1 billion) as well as "middle market" firms (revenue between $10 million and $1 billion). We also compare our survey sample to Compustat firms based on financial information of 2019 to provide more context for our analysis. Table 1 shows that the firm size distributions in both samples are similar. Specifically, columns (1) and (5) show the fraction of our sample and Compustat that are within each revenue bracket. Firms in our sample are slightly smaller than Compustat firms, as we include many private firms, but we also have reasonable coverage of large companies (over $1 billion in revenue). Columns (2) to (4) and (6) to (8) show quartiles of employment within each revenue bracket; this comparison reveals that, within each revenue bin, our sample closely matches the distribution of employment among Compustat firms. Taken

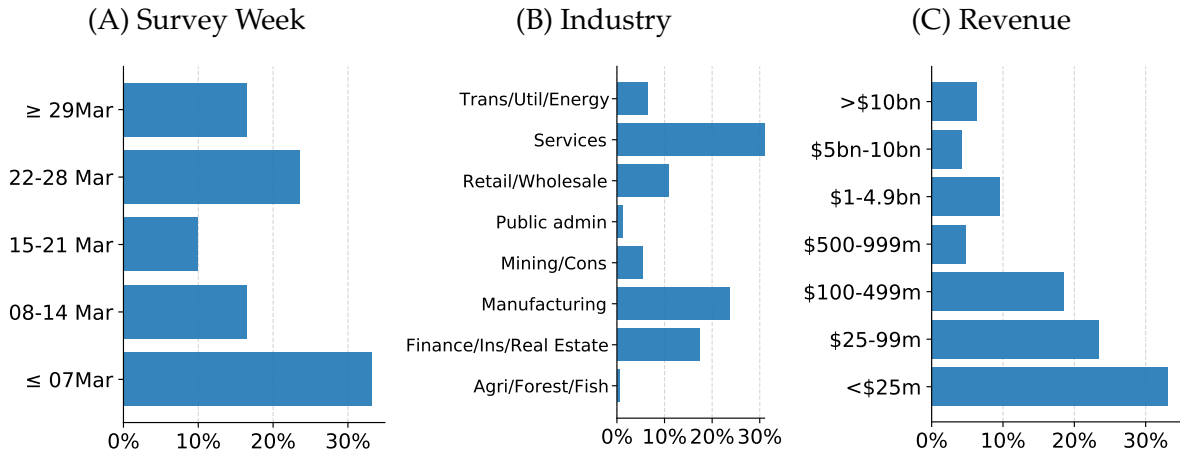
[5]The survey is available at: https://cfosurvey.fuqua.duke.edu/release/.

[6]The response rate for prior Duke CFO surveys is about 9% (Graham and Harvey, 2001; Ben-David et al., 2013). Gompers et al. (2020b) survey private equity investors and obtain a response rate of 23%. Giglio et al. (2021) survey Vanguard investors and obtain a response rate around 4%. Our response rate is likely high because the March 2020 survey was the second phase of a two-part project in which many of the CFOs participated (the first phase was in March 2019). Nearly half of the March 2020 respondents also participated in March 2019.

[7]Appendix Figure A.1 shows that the composition of firms is also similar among responses in different survey weeks.

Figure 1: March Survey Demographics

This figure shows the composition of firms in the March 2020 survey by calendar week (Panel A), industry (Panel B), and firm size by 2019 sales revenue (Panel C). The industries in Panel B are illustrative – the analysis of the paper uses NAICS industry classifications.



together, our sample is well-suited for analyzing the broad cross-section of companies, including larger (Compustat-like) firms that play a central role in the economy and in corporate finance research.

Table 1 about here

The March 2020 survey asked CFOs about their projected growth in revenue, employment (domestic full-time employees), and capital expenditures (spending on structure and equipment) in 2020. We also asked CFOs to assess their firms' exposure to COVID-19: "To what extent is your company's financial well-being exposed to Coronavirus-related risk? (Response options: 0-No financial exposure to Coronavirus risk; 1-Small Coronavirus risk; 2-Medium Coronavirus risk; 3-Large Coronavirus risk; 4-Don't know or not applicable)." We refer to this measure as "COVID risk exposure." We create an indicator variable of high COVID risk exposure, which equals one if the CFO selected medium or large COVID financial risk and zero otherwise.

To measure financial flexibility, we asked CFOs to assess the level of financial flexibility their firms have: "About how much financial flexibility would you say your company has right now? (0-None, 1-A little, 2-3-4-Moderate, 5-A lot)." We classify a firm as having financial flexibility if they answered 2 or greater. As we verify in Table A.1 in the Appendix, this measure of financial flexibility captures both the abundance

of internal funds and the ability to access external financing.

To measure investment flexibility, we use information for the 636 US companies that responded to the Duke Global Business Outlook survey conducted in March 2019 (before the COVID-19 crisis). It is not an easy task to gauge how flexible a firm's investment spending process is, but our survey instrument provides important insight into this issue. In particular, the March 2019 survey collected data on firms' flexibility in investment implementation by asking, "How flexible is the speed at which you complete your largest capital investment project? (0-Very flexible; 1-Flexible; 2-Somewhat flexible; 3-Neutral; 4-Somewhat inflexible; 5-Inflexible; 6-Very inflexible)." We classify a March 2019 firm as having high investment flexibility if the response is 0 or 1. We construct an industry-level measure of investment flexibility by calculating the percentage of firms with high investment flexibility at the four-digit NAICS level. This allows us to apply the 2019 measure of investment flexibility to the entire 2020 sample.[8] We verify that this attribute has an important industry component: the R^2 from four-digit NAICS fixed effects is 0.45.[9] Conceptually, our investment flexibility measure captures flexibility in the *timing* of investment, which is especially relevant for firms' responses to a sudden crisis. This measure is novel compared to prior work on investment adjustment costs, which mostly focus on costs that depend on the magnitude of investment (as summarized by Cooper and Haltiwanger (2006)).

Following the March survey, we conducted additional surveys in June, September, and December 2020. We did so in collaboration with the Federal Reserve Banks of Atlanta and Richmond.[10] These surveys asked CFOs about their projections for both 2020 and 2021. The September survey asked firms when they expect various labor and spending outcomes to return to pre-COVID levels, and the December survey explored automation.

[8] In unreported analysis, rather than using an industry-level measure of investment flexibility, we use the firm-specific flexibility reported in the March 2019 survey to investigate 2020 investment plans, for firms that responded to both the 2019 and 2020 surveys. This analysis confirms the results presented herein for the March 2020 sample.

[9] Industries with the highest investment flexibility include beverage, media, apparel stores, and banking, while industries with the lowest investment flexibility include farming, mining, transportation, health care, and wholesale.

[10] Collectively, nearly 700 firms responded to the June, September, and December surveys, with responses relatively evenly split across the three quarters. The median firm in the three surveys has annual revenue of $20 million and 74 employees. These surveys are publicly available at https://www.richmondfed.org/research/national_economy/cfo_survey/data_and_results.

2.2 Other Data

We also collect data from other sources to enhance our analyses. The external datasets measure firm attributes at the industry level, and we match them with firms in our CFO surveys based on their industries.[11]

For workplace flexibility, we collect data on employees' ability to work remotely by calculating the fraction of employees in each industry who can and do work from home using the American Time Use Survey (ATUS), following Papanikolaou and Schmidt (2020) and Alon et al. (2020). This measure is available for each four-digit NAICS code. We also perform additional tests using the fraction of employees in each industry who can work from home constructed by Dingel and Neiman (2020), which is available for two-digit and three-digit NAICS codes.[12] Both of these measures are constructed using data prior to the COVID-19 crisis, and we cross check these ex ante measures with the ex post prevalence of remote work reported by the BLS every month since May 2020. For each industry corresponding to roughly two-digit NAICS code, the BLS data shows the fraction of employees who worked remotely in the last four weeks due to COVID-19. We find the ex ante measures are around 80% correlated with the BLS measure, which confirms their informativeness. Since the BLS data only start after our March survey and its industry breakdown is less granular, we prioritize the ex ante work from home measures in our main analyses.

We also collect proxies for the contact intensiveness of an industry, as constructed by Leibovici et al. (2020). This contact intensiveness measure is affected by the amount of physical social interactions workers have with both customers and other workers, as well as social interactions among customers. Finally, we collect weekly data on industry-level demand, proxied by the industry-level 2020 revenue growth forecast from Institutional Brokers' Estimate System (IBES) dataset.

[11] For public firms, we know their industry codes directly. For private firms, we use the company name provided by the firm to infer their industry using historical business data from services such as Dun & Bradstreet and Infogroup, and from survey-based responses that relate to industry.

[12] Both Papanikolaou and Schmidt (2020) and Alon et al. (2020) start with data at the worker level from the ATUS and classify each worker based on ability to work from home. They then construct industry-level work from home measures by calculating the percentage of work that can be done at home within each industry. Dingel and Neiman (2020) use O*NET data to classify occupations as being able to be performed at home or not. While using similar sources, these studies' approaches contain important differences. The ATUS measure captures whether workers can work from home (and if they have done so in the past). The O*NET survey captures the nature of work employees perform at the occupation level. The Data Appendix discusses these measures in detail.

2.3 Summary Statistics

Table 2 reports basic sample summary statistics, for the March survey in Panel A and subsequent surveys in Panel B. We discuss projections of revenue, employment, and capital expenditure growth in more detail in Sections 3 to 5. For financial flexibility, about 20% of firms are classified as having low financial flexibility. For workplace flexibility, Table 2 presents statistics for both measures explained above. For the average firm, about 25% of employees in its industry can work from home (and have done so in the past) according to the ATUS data, which we use as our primary measure (four-digit NAICS code level). At the same time, 45% of employees can (in principle) work from home based on the data of Dingel and Neiman (2020), which we use as an additional measure (two-digit NAICS code level). For investment flexibility, on average, about 25% of firms in an industry indicate that they can adjust the speed of capital investment flexibly. Finally, about 15% of firms come from industries that are classified as contact intensive.

Table 2 about here

Figure A.2 in the Appendix presents pairwise variable correlations based on the March survey. A number of variables are correlated with firms' COVID-19 exposure assessments, which we discuss in more detail in Section 3. Workplace flexibility and financial flexibility are not highly correlated. Workplace flexibility and investment flexibility are weakly positively correlated. Workplace flexibility is only somewhat correlated with contact intensiveness.[13]

3 Overview of Real-Time CFO Expectations and COVID Risk Exposures

Chief Financial Officers play an important role in forming the strategies of their firms and overseeing the detailed plans that implement those strategies. CFOs' outlooks

[13]The contact intensive measure does not differentiate whether the contact is primarily among customers (e.g., transportation), between employees and customers (e.g., barbershops), or among employees (e.g., meat packing). As such, contact intensity is different from workplace flexibility. For instance, many low workplace flexibility industries are not the most contact intensive industries (e.g., energy, trucking), whereas some contact intensive industries can have high workplace flexibility (e.g., psychotherapy/counseling services).

and plans provide valuable information for understanding business activities and economic performance (Graham and Harvey, 2001; Ben-David et al., 2013; Gennaioli et al., 2016). In this section, we document CFOs' expectations about their firms' prospects in 2020 and their assessment of COVID risk exposures, which provide background for our subsequent analyses of firms' real decisions.

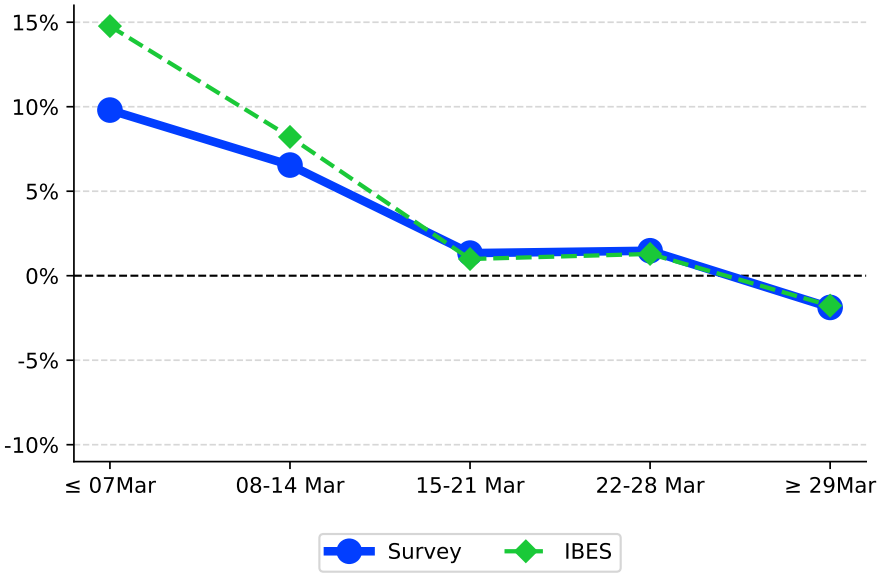
We start with CFOs' expectations of revenue growth during the February/April window. On average, CFOs in the March survey expected 4.6% revenue growth in 2020. Notably, expectations changed substantially from early March through early April, as the severity of the pandemic escalated. The solid line in Figure 2 shows the average expected 2020 revenue growth among CFOs by survey week. The projections were between 5% to 10% in early March, and they collapsed to approximately 0% by late March and early April. The average revenue growth expectation of around 0% stayed steady in the June and September CFO surveys (though respondents change from survey to survey). In the June survey, we directly asked CFOs to assess the revenue impact due to COVID-19. They indicated that COVID-19 would have a 10% negative impact on their firms' 2020 revenue growth, which aligns with the expected 10% revenue growth reduction as of the March survey. As we discuss more in Section 5, in our June and September surveys firms expect revenue growth to rebound to 10% on average in 2021. Overall, COVID-19 is a large shock and the revenue impact for 2020 is substantial, comparable on average to the negative revenue impact firms experienced in 2009.

We also compare the expectations of CFOs in our sample with those of stock market analysts. This comparison allows us to see if market expectations about economic fundamentals are consistent with the views of CFOs. This is an intriguing issue as many have argued that the stock market has been over-optimistic about firms' prospects.[14] The dashed line in Figure 2 shows the average analyst forecast of revenue growth in 2020 for firms in the IBES dataset. We find that the revenue growth expectations of CFOs and stock analysts are very similar. This consistency indicates that firms in our survey are representative of firms in general, while also suggesting that the high prices in the stock market may not necessarily come from investors (as represented

[14]Media reports include: Even Corporate America Thinks the Stock Market is Overvalued, U.S. Stock Market Hits Record 77% Overvalued, and Why the Stock Market is Divorced from the Pain of a Pandemic Economy.

Figure 2: CFO and IBES Forecasts of 2020 Revenue Growth

The solid line shows the average CFO forecast of revenue growth in 2020 by survey week. The data come from the March 2020 CFO survey. The dashed line shows the contemporaneous average analyst forecast of revenue growth in 2020 from IBES among analysts who issue new forecasts each week (we do not include past forecasts that were not updated in a given week).

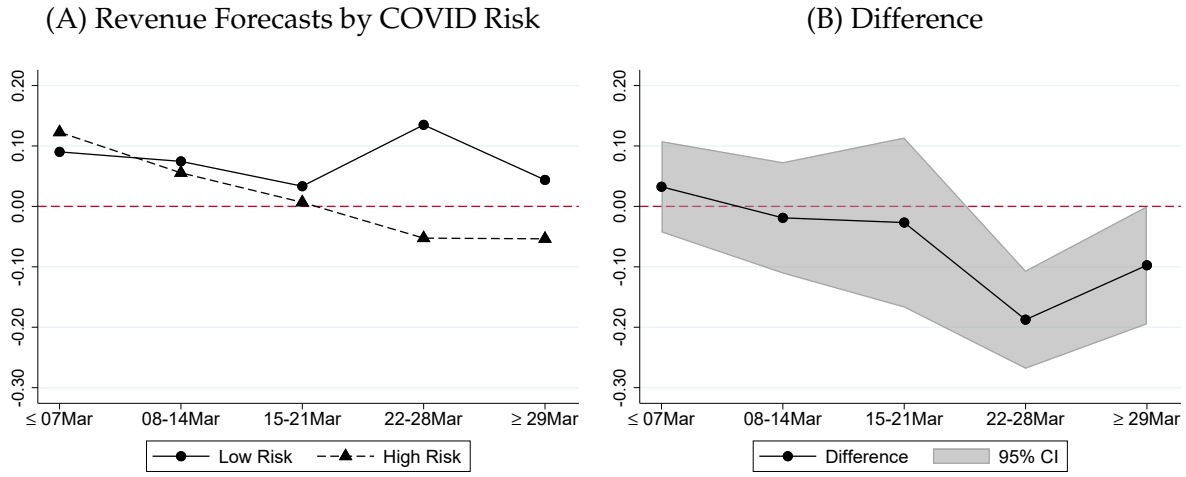


by stock analysts) being far more optimistic about economic prospects than corporate executives. A possible justification for high stock prices is that the financial impact of COVID-19 on firms' revenues is perceived to be transitory (Landier and Thesmar, 2020; Hong et al., 2020; Giglio et al., 2021), and both CFOs and stock analysts expect average revenue growth to return to the pre-COVID level in 2021. However, as we show in Sections 4 and 5, our work points to long-term implications of the current crisis that can affect the very organizational structure of firms, and firms expect these real effects to persist after revenues recover.

We also explore the differential impact of COVID-19 on firms in the cross-section. As discussed in Section 2.1, we asked CFOs to assess the impact of COVID-19 on their firms' well-being. Figure 3 displays CFOs' expectations of revenue growth in 2020, for firms with high and low COVID risk exposure. Before mid-March, revenue growth expectations of firms in these two groups are similar. After mid-March, however, a significant gap emerges, with a difference of about 10 to 15 percentage points. In particular, the revenue growth expectations of low-COVID-risk firms do not change much from early to late March. Firms in the high exposure group, in contrast, anticipate substantially lower revenue growth starting in late March. The expected differences

Figure 3: COVID-19 Exposure and Revenue Forecasts

This figure displays average CFO forecasts of 2020 revenue growth by COVID-19 risk exposure. The data come from the March 2020 CFO survey. COVID risk exposure is high if CFOs stated in the March survey that they faced medium or high coronavirus risk. In Panel A, the solid (dashed) line displays average weekly revenue forecasts for low (high) COVID risk firms. Panel B displays the difference between low and high firms, with 95% confidence intervals.



in revenue growth are significant, as shown in Panel B.

Given the large effect of COVID risk on expected revenue growth, we investigate the drivers of firms' COVID risk exposure in Table 3. We find that lower workplace flexibility and lower investment flexibility are associated with higher perceived COVID risk exposure. Lower financial flexibility is also associated with higher perceived COVID risk exposure, but the statistical relation is weak, suggesting that CFOs do not necessarily consider the COVID-19 shock to be financial in nature. By contrast, firms in more contact intensive industries perceive significantly higher COVID risk exposure. Weaker customer demand is also associated with higher COVID risk exposure, but this result has low statistical significance as specifications often include time dummies (demand plunged for most industries in late March). Finally, the average level of perceived COVID exposure increased after mid-March, as the virus' spread escalated in the US.

Table 3 about here

The results in Table 3 make it clear that firms' exposure to the 2020 pandemic is a multi-dimensional issue. CFOs' responses indicate that the challenges firms confront in the COVID-19 health crisis arise not only from customer demand or financing

availability, but also the ability for companies and their employees to perform key operational activities. In the next section, we analyze companies' real decisions related to employment and investment in the 2020 crisis. We investigate in detail the role of financial flexibility, workplace flexibility, and investment flexibility in modulating these real decisions.

4 Corporate Plans to Hire and Invest through the Pandemic

Employment and capital expenditures are perhaps the most significant margins of corporate decision-making. Through our survey instrument, we are uniquely able to measure CFO's *forward-looking plans* to hire and invest in *real time* amid the pandemic. We do so in this section. Towards the end of the section, we also validate our primary survey findings with subsequent surveys and realized financial statement data.

4.1 Conceptual Framework: The Role of Flexibility in Managing a Crisis

As results in Section 3 point out, the challenges brought about by the COVID-19 crisis are multi-faceted. In turn, we propose a simple conceptual framework to analyze how multiple dimensions of corporate flexibility affect firms' real decisions.

First, standard considerations of financing constraints are potentially relevant for firms' decisions in a variety of crises (even crises that do not originate from the financial sector) because firms rely on financial resources to support their operations and avoid financial distress. Indeed, these issues have been the focus of several studies of firms' outcomes or stock performance during COVID-19 (see, for example, Acharya and Steffen (2020), Fahlenbrach et al. (2020), Ramelli and Wagner (2020), Levine et al. (2020) among others). We refer to this margin as "financial flexibility." In particular, our measure summarizes firms' ability to access *both* internal and external funding, as explained in Section 2.1 (see also Table A.1 in the Appendix).

Second, as many corporate executives highlight, workplace flexibility — the ability for employees to work from home — is a key issue during the COVID-19 crisis. Workplace flexibility became critical as the pandemic unfolded, since it allows for better social distancing practices and helps employees balance caring for family members as needed. Firms whose employees cannot easily work from home may need to adopt

additional health protocols, or limit production capacity, to control infection risk and maintain social distancing at work. Accordingly, low workplace flexibility — the inability to work from home — could negatively affect firms in the pandemic.

Third, faced with the sudden pandemic outbreak, firms needed to consider their ability to adjust the timing of their investment projects. The manner in which companies utilize investment flexibility, however, should depend on the circumstances they face. Firms experiencing favorable conditions can utilize higher flexibility to front-load investment. On the other hand, firms experiencing unfavorable conditions due to the pandemic can utilize higher investment flexibility to avoid or delay capital spending during difficult times. As a result, we expect investment flexibility to interact with the key factors that determine whether firms face favorable or unfavorable conditions. As we demonstrate below, workplace flexibility is an important margin determining whether a firm faces favorable operating conditions in the COVID-19 crisis, and therefore the degree of workplace flexibility modulates how firms use their investment flexibility. Overall, this analysis shows the role of investment flexibility as a margin of adjustment for addressing an urgent crisis; the conditional impact of investment flexibility also helps us affirm which factors are important for shaping whether firms experience favorable or unfavorable conditions.

In addition to analyzing the corporate flexibility dimensions just discussed, we account for consumer demand. We do so using both the IBES demand proxy and the contact intensiveness indicator (the latter because customers' willingness to purchase goods and services can be lower if they need to do so in a contact intensive setting).

4.2 Corporate Flexibility in the 2020 Health Crisis

4.2.1 Basic Results on the Impact of Corporate Flexibility

In Table 4, we investigate the effects of financial flexibility, workplace flexibility, and investment flexibility on firms' employment and capital spending plans in real time as the COVID-19 crisis hit. We use CFOs' projections of employment and capital spending growth in 2020 from the March survey. Panel A presents the results from our main tests using the ATUS work-from-home measure at the four-digit NAICS level; Panel B does the same using the Dingel and Neiman (2020) work-from-home measure.

Table 4 about here

Results in Table 4 show that higher financial flexibility is associated with higher projections of employment and capital expenditure growth in 2020. This is consistent with prior findings about the impact of financial flexibility on corporate plans (see Campello et al. (2010)). All else equal, firms with low financial flexibility expect 7 to 9 percentage point lower growth of employment and capital expenditures in 2020.

Notably, higher workplace flexibility is also associated with significantly higher projections of employment growth during the 2020 pandemic. This result holds for both measures of workplace flexibility. Firms in the top quartile in terms of the fraction of employees who can work from home expect 3 to 4 percentage point higher employment growth than those in the bottom quartile.[15] Interestingly, this effect is domain-specific: higher workplace flexibility does not directly translate into higher projections of capital expenditure growth. This suggests that firms where employees can work from home may be leaning more heavily towards labor instead of traditional capital investment. Correspondingly, we might see lackluster capital spending in these industries following COVID-19 as firms shift away from the traditional way of work and associated capital expenditures, which we explore further in Section 5.

Table 4 also shows that investment flexibility does not have a clear, unconditional impact on real decisions. As we demonstrate shortly, firms use investment flexibility differently depending on whether they face favorable or unfavorable conditions. Finally, we find a positive impact of the industry-level demand proxy, especially for capital expenditure plans. The indicator for contact intensive industries is not significant, however. Our results are robust to the inclusion of time (calendar week) fixed effects and state fixed effects (which absorb state-level variations in pandemic policies such as lock downs).[16] They are also robust to the inclusion of two-digit NAICS fixed effects, which indicates that there are key variations at the finer industry level.

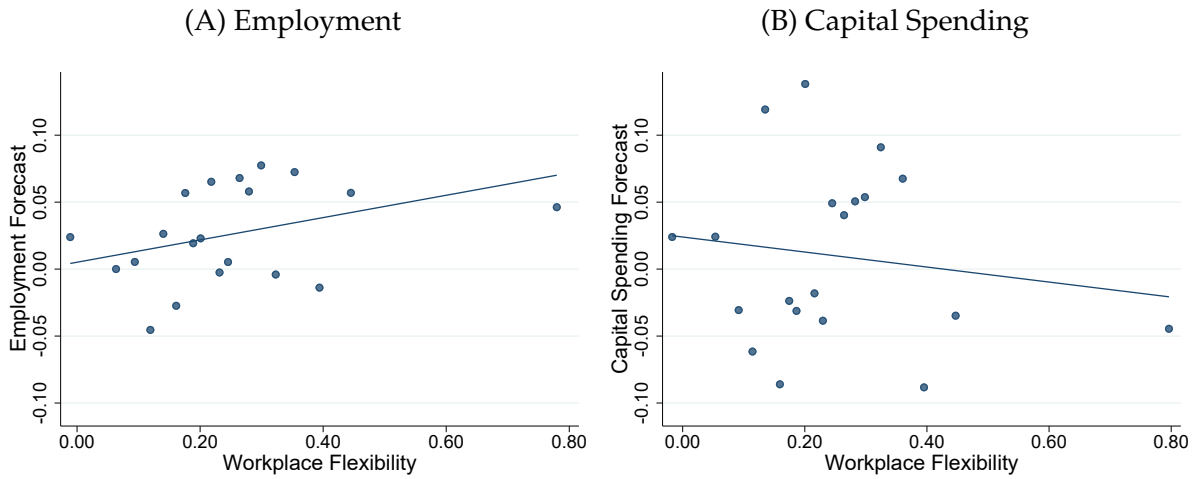
Figure 4 depicts some of the main results from Table 4 via binscatter plots, display-

[15] As shown in Table 2, the interquartile range of workplace flexibility is 0.3 for the ATUS measure and 0.5 for the Dingel and Neiman (2020) measure. The regression coefficients in Table 4 are between 0.08 and 0.1 for both measures. The difference between firms in the top and bottom quartile of workplace flexibility is between $0.3 \times 0.1 = 0.03$ and $0.5 \times 0.08 = 0.04$.

[16] Since our firms are relatively large (like Compustat firms), many are national or multinational. Accordingly, state-specific local policies or lock downs may not be first-order for them. Nonetheless, we still control for state fixed effects based on their headquarters for robustness.

Figure 4: Direct Impact of Workplace Flexibility on Corporate Plans

Panel A displays a binned scatter plot of CFOs' forecasts of their firms' employment growth in 2020 on workplace flexibility, corresponding to column (3) of Table 4, Panel A. Panel B displays the analogous figure for CFO forecasts of their firms' capital spending growth in 2020, corresponding to column (6) of Table 4, Panel A. The data come from the March 2020 CFO survey.



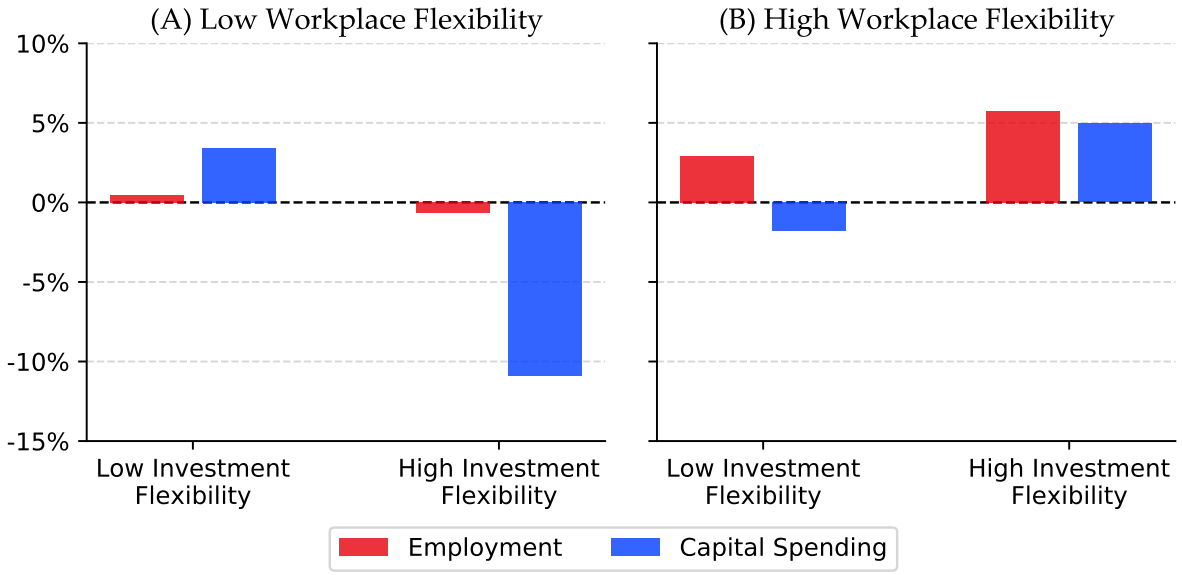
ing planned employment and capital expenditure growth plotted against workplace flexibility. In corroborating analysis, Papanikolaou and Schmidt (2020) use industry-level monthly employment data from the BLS and report that total employment growth was higher from March to April in industries with more workplace flexibility. The evidence in Table 4 and Figure 4, Panel A, shows this important pattern in *ex ante* firm-by-firm plans gathered directly from CFOs, as they reveal firms' real-time decisions for the entire year of 2020 (as well as for years to come, as we show in Section 5). Table 4 and Figure 4, Panel B, further demonstrate how our data allow us to study firms' investment decisions jointly with their employment decisions, which is important for a comprehensive understanding of the effects of workplace flexibility. Papanikolaou and Schmidt (2020) and Favilukis et al. (2020) also find that industries with more workplace flexibility have higher stock returns since COVID-19. We focus on analyzing firms' real decisions about employment and capital spending, which cannot be directly inferred from stock returns.

4.2.2 Conditional Impact of Investment Flexibility

We expand our analysis of corporate flexibility by unpacking the conditional nature of investment flexibility. As discussed in Section 4.1, we expect firms experiencing

Figure 5: Impact of Investment Flexibility Conditional on Workplace Flexibility

Panel A displays average CFO forecast of employment and capital spending growth in 2020, for firms with low workplace flexibility (less than or equal to 0.2). Within the panel, average forecasts are shown for firms with investment flexibility below 0.2 (Low) and above 0.2 (High). Panel B displays the analogous figure for firms with high workplace flexibility (above 0.2). The data come from the March 2020 CFO survey.



favorable *vs.* unfavorable conditions to use their investment flexibility differently. Indeed, we find an interesting interaction between investment flexibility and workplace flexibility, which we first illustrate in Figure 5. Panel A of Figure 5 shows that among firms with low workplace flexibility (which therefore face challenging operational conditions), those with high investment flexibility expect capital expenditures to fall by approximately 10% on average (indicating reductions or deferrals if firms have the investment flexibility to do so), while those with low investment flexibility expect nearly 4% capital expenditure growth in 2020. In contrast, Panel B shows that among firms with high workplace flexibility (which therefore face more favorable operational conditions), those with higher investment flexibility plan to invest more during the pandemic. These patterns demonstrate that investment flexibility shapes firms' abilities to reduce *vs.* accelerate capital expenditures, and that this effect is conditional on workplace flexibility in an economically sensible way.

Table 5 characterizes these patterns more fully via regression analyses. Indeed, when workplace flexibility is low, higher investment flexibility is associated with significantly lower planned capital expenditures. On the other hand, when workplace

flexibility is high (close to one), higher investment flexibility is associated with significantly higher planned capital expenditures. In terms of economic magnitudes, the results in Table 5 columns (4) to (6) indicate that for firms with no workplace flexibility, a one standard deviation increase in investment flexibility (about 0.3) would reduce planned 2020 capital expenditure growth by around 6 percentage points (= –0.2 $\times$ 0.3). For firms with full workplace flexibility, in contrast, a one standard deviation increase in investment flexibility would boost planned 2020 capital expenditure growth by around 13.5 percentage points (= 0.45 $\times$ 0.3). Figure A.3 in the Appendix provides further visualization of the marginal effects of investment flexibility on capital spending plans, for each level of workplace flexibility.

Table 5 about here

The estimates in column (6) suggest that financial flexibility may also interact with investment flexibility, as financial flexibility too can affect whether firms experience adverse or favorable conditions. Correspondingly, we see that firms with low financial flexibility appear to use higher investment flexibility to reduce (possibility delaying) capital expenditures. In comparison, firms do not use higher investment flexibility to cut capital expenditures when they have more financial flexibility, although the interaction term of investment flexibility and financial flexibility is not statistically significant.[17] Overall, the results indicate that having high financial flexibility does not solve all the problems in the COVID-19 crisis. Indeed, low workplace flexibility seems to be the key constraining margin during this crisis.

Finally, results in columns (1) through (3) of Table 5 show that the interaction between investment flexibility and workplace flexibility also has some impact on planned employment growth (albeit statistically less significantly so). To the extent that capital spending and labor are complementary, the results we obtain may outline a mechanism through which investment flexibility spills over onto employment plans.

The results of this section demonstrate that in a health crisis like COVID-19, the traditional concern about financial flexibility is not the only issue that firms face. Importantly, we find evidence that operational flexibility, in the form of workplace flexibility

[17] See the Appendix for the output of regressions containing interactions amongst all pairs of the flexibility measures. Table A.2 shows that the interaction between workplace flexibility and investment flexibility is significantly robust, while other interactions are insignificant.

and investment flexibility, is a key factor in shaping firms' employment and investment decisions, and has not been the focus of earlier work that studies how firms respond to previous crises.

4.3 A Tale of Two Crises: 2020 *vs.* 2008

To provide context for our results, it is important that we characterize and differentiate the impact of a health crisis on firms' decisions from that of other crises, such as those associated with the supply of capital. We do so by presenting a comparison of corporate decision-making in the COVID-19 crisis and that in the 2008 financial crisis. Campello et al. (2010) analyze CFOs' plans for employment and investment at the end of 2008 and document the importance of financial flexibility in shaping corporate decisions in the financial crisis. We use the same 2008 CFO survey data to conduct our corporate flexibility analyses, which allows us to compare the effects of flexibility in 2008 *vs.* 2020.

The CFO projections of employment and capital spending growth in the December 2008 survey are for the year 2009. For financial flexibility, we rely on the survey question from December 2008 that asks firms if their operations are affected by difficulties in accessing the credit market. Firms responding "not affected" are classified as having high financial flexibility, while those responding "somewhat affected" and "very affected" are classified as having low financial flexibility.[18] This question focuses primarily on access to credit markets, while the main financial flexibility question in the March 2020 survey captures the ability of firms to access both internal and external funding, as explained in Section 2. As a result, the financial flexibility variable in the 2020 survey is broader and likely to show stronger results for financial flexibility compared to the variable in the 2008 survey. For workplace flexibility and investment flexibility, we use the same industry-level measures as before.

Panel A of Table 6 presents the same regression specifications as Table 4. Columns (1) and (4) show the results using 2008 data, whereas columns (2) and (5) show the results using the 2020 data. Columns (3) and (6) use the combined sample where we interact workplace flexibility — the distinct central feature of the COVID-19 health

[18] Accordingly, the group labelled "low financial flexibility" ("high financial flexibility") corresponds to the "constrained" ("unconstrained") group in Campello et al. (2010).

crisis — with an indicator for the 2020 survey. We find that during both the COVID-19 pandemic and the financial crisis, financial flexibility plays a similarly important role in shaping firms' employment and investment plans. However, workplace flexibility is uniquely important for employment plans in the 2020 pandemic, while its coefficient in the 2008 data is nearly zero. In an analogous fashion, Panel B of Table 6 follows the regression specifications in Table 5 and demonstrates that firms exploiting their investment flexibility conditional on their workplace flexibility is unique to the 2020 pandemic. Here, too, we find no evidence to suggest that workplace flexibility matters for how firms utilize their investment flexibility in the 2008 financial crisis.

Table 6 about here

Overall, the comparisons in Table 6 highlight that the impact of workplace flexibility is absent in the financial crisis, but central in the health crisis. Just as the Global Financial Crisis gave rise to an important body of work on financial constraints, the COVID-19 health crisis may spur critical new research on the transformation of the corporate workplace.

4.4 External Validation via Subsequent Surveys and Realized Outcomes

Our March survey provides valuable information about how corporate planning evolved in real time as the COVID-19 crisis hit. We subsequently conducted additional surveys and collected Compustat data on realized outcomes to verify the robustness of our findings. Since the subsequent analyses cover a different set of firms, they confirm that our results on the key drivers of corporate decisions in response to COVID-19 hold in general.

Employment Planning for 2020 in Subsequent Surveys. Columns (1) through (4) of Table 7 analyze the drivers of firms' employment plans for 2020 reported in a series of surveys conducted after March 2020.[19] For workplace flexibility, the results are similar to our findings in Table 4 in both sign and in magnitude: firms with high workplace flexibility continue to expect significantly higher employment growth in 2020.

[19] These surveys did not explicitly ask CFOs about capital spending plans or financial flexibility; accordingly, we focus on employment in this analysis.

Table 7 about here

Realized Firm Outcomes based on Subsequent Surveys. In the September survey, we asked CFOs "For your company, how would you assess the level of the following items (employment, capital expenditures, etc.) compared to their levels before the outbreak of COVID-19?" Figure 6 plots the responses, separately for firms with high *vs.* low workplace flexibility. We see that as of September 2020, firms with high workplace flexibility were less likely to have experienced decreases in employment. Interestingly, they are not less likely to have cut capital expenditures. These findings are consistent with results in Table 4 that high workplace flexibility firms in the March survey anticipated higher employment growth, but did not anticipate higher capital expenditure growth in 2020. Correspondingly, the implied physical capital to labor ratio is more likely to have decreased for high workplace flexibility firms, consistent with these firms shifting from capital (in the form of structures and equipment) towards labor.

We also asked firms about their current level of remote work (relative to pre-COVID). Firms with high workplace flexibility are significantly more likely to have increased remote work (orange *vs.* blue in Panel D), which aligns with our definition of workplace flexibility. Table 8 further verifies these results through ordered logit regressions. Note that the presented coefficients are odd-ratios, so a number less than one corresponds to a reduction in a given variable; greater than one indicates an increase.

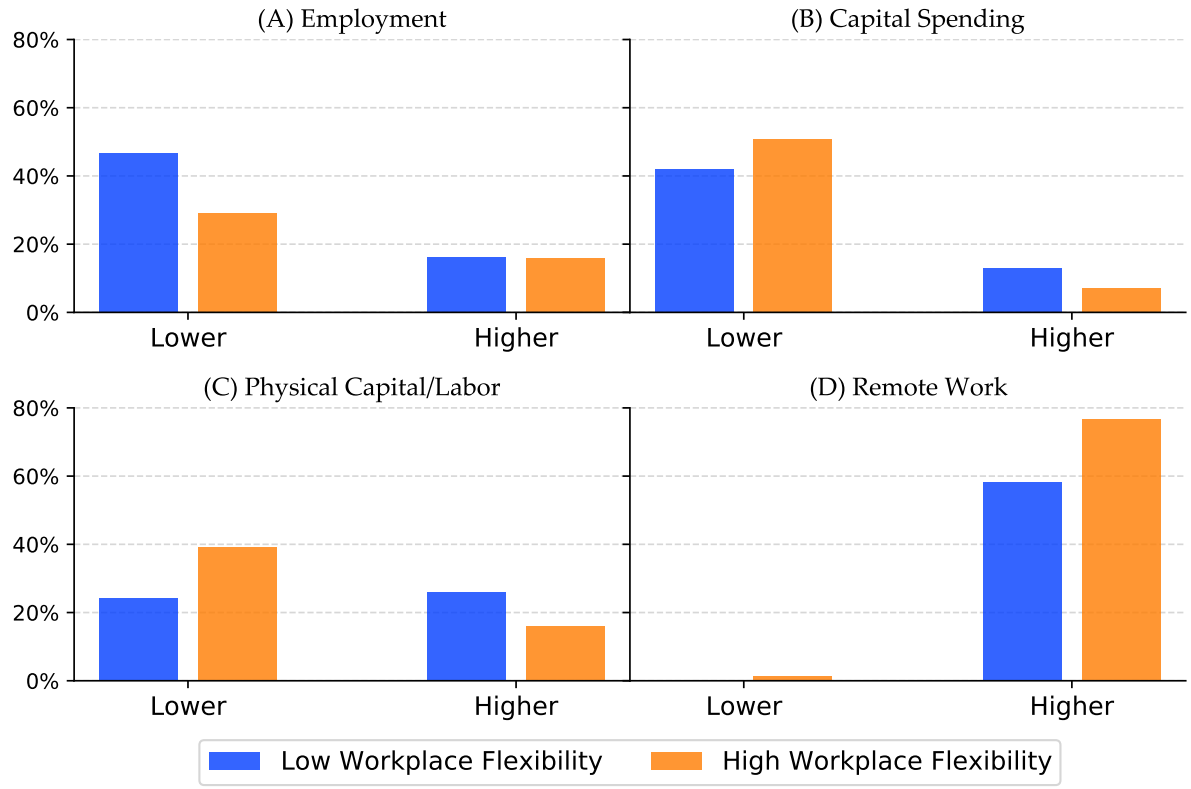
Table 8 about here

External Validation using Realized Outcomes in Compustat and BLS Data. We also perform external validation of our survey-based analysis using realized outcomes among Compustat firms, which report capital expenditures on a quarterly basis.[20] Table 9 presents regressions that study capital expenditure growth since the first quarter of 2020. Similar to what we find in Table 5 based on firms' internal plans reflected in the March survey, realized capital spending growth of Compustat firms confirms a significant interactive effect between workplace flexibility and investment flexibility:

[20] Compustat only reports employment at the end of every fiscal year, rather than on a quarterly basis, so we only consider capital expenditures in this analysis.

Figure 6: Effect of COVID-19 on Firm Outcomes

Each panel displays the percentage of CFOs who stated that the current level for their company was lower (higher) than pre-COVID level. The data come from the September CFO survey. Employment, capital spending and remote work refer directly to whether the level of the variable is lower or higher in September 2020, relative to pre-COVID. For example, the orange bar above "Lower" in Panel A indicates that about 30% of high workplace flexibility firms had reduced employment as of September 2020; the neighboring blue bar indicates that about 45% of low workplace flexibility firms had reduced employment as of September 2020. "Physical Capital/Labor" is coded as "Lower" ("Higher") if the new level of capital spending is lower (higher) than the new level of employment (refer to Table 8 for a detailed definition). Capital spending refers to "willingness to spend" on structures and equipment. Firms that stated there has been no change are omitted from the figure, thus within-group bars do not sum to one. Low (high) workplace flexibility is below (above) the 25th (75th) percentile of workplace flexibility within-sample.



firms use their investment flexibility to increase capital expenditures if conditions are favorable and reduce capital expenditures if conditions are unfavorable. Figure A.4 in the Appendix presents a graphical summary of regressions that perform "placebo checks" using Compustat data from previous years; the figure demonstrates that the interaction between investment flexibility and workplace flexibility in shaping capital expenditures *did not occur* before 2020.[21] Taken together, our finding that workplace flexibility drives how firms use investment flexibility is a salient and unique occur-

[21] The 2008 Compustat result in Figure A.4 in the Appendix also confirms the survey-based comparison of the 2008 and 2020 crises in Table 6.

rence since the onset of the 2020 health crisis.

Table 9 about here

Finally, at the industry level, the BLS provides monthly data on total employment. We also verify in untabulated analysis that cumulative employment growth since the end of 2019 (through October 2020) is significantly positively correlated with workplace flexibility, with a similar magnitude to what we find in Table 4. In Appendix Table A.3, we also show that there was no significant relationship between workplace flexibility and employment before the 2020 pandemic.

5 The Long-Term Impact of the COVID-19 Crisis

Our results above demonstrate the role of operational flexibility in shaping firms' responses to the 2020 health crisis. In this section, we investigate longer-term implications for both corporate and economic policy-making in the aftermath of the 2020 pandemic.

5.1 CFO Outlook for 2021 and Beyond

CFO Outlook for 2021. In the surveys since June 2020, we asked CFOs about their expected growth of revenue and employment in both 2020 and 2021. The statistics in Panel B of Table 2 show that CFOs expect revenue growth to be around zero in 2020, but rebound to around 10% in 2021. They expect employment to be relatively flat for the remainder of 2020, but increase in 2021. Although the median firm expects the cumulative employment growth through 2021 to be zero, there is substantial heterogeneity in observed responses. In particular, columns (5) through (8) in Table 7 show that firms with high workplace flexibility expect significantly higher employment growth through the end of 2021.

Long-Term CFO Outlook of Post-COVID Recovery. For companies' longer-term outlooks, we also asked in the September survey "When, if ever, do you expect the level of revenue, employment, capital expenditures, and share of workforce working remotely to return to where it was before the outbreak of COVID-19?" Because a prior

question in this survey asked whether firms' current levels were above or below pre-COVID levels, we are able to ascertain which direction a given firm would need to move in order to return to pre-pandemic activity.

We first analyze the recovery of revenue, employment, and capital expenditure intensity to pre-COVID levels. We focus on firms that have been negatively affected by COVID-19 or have stayed about the same, which are the vast majority. Table 10 shows the results using ordered logit regressions. The estimated coefficients are odds ratios and a coefficient below (above) one indicates a faster (delayed) return to normal.

Table 10 about here

Interestingly, workplace flexibility does not have a significant impact on CFOs' outlook of revenue recovery. However, firms with high workplace flexibility expect employment to recover faster. In contrast, these firms expect a slow recovery in capital spending.[22] These results indicate that workplace flexibility is associated with greater willingness to hire, though not necessarily greater willingness to spend on structures and equipment.[23] This dynamic is likely driven by the acceleration of the workplace transformation in light of COVID-19: as companies shift to remote work, the primary types of investment will likely move away from traditional capital expenditures, and possibly towards new forms of investment such as intangibles that facilitate flexible collaboration of the workforce.

The ongoing transformation of the US corporate workplace is also evident from CFOs' expectations about the staying power of remote work. As of the September 2020 survey, barely any CFOs reported that their firm was doing less remote work after COVID. About 50% indicated that the level of remote work would go back to the pre-COVID level by the end of 2021, while 40% think remote work will stay high

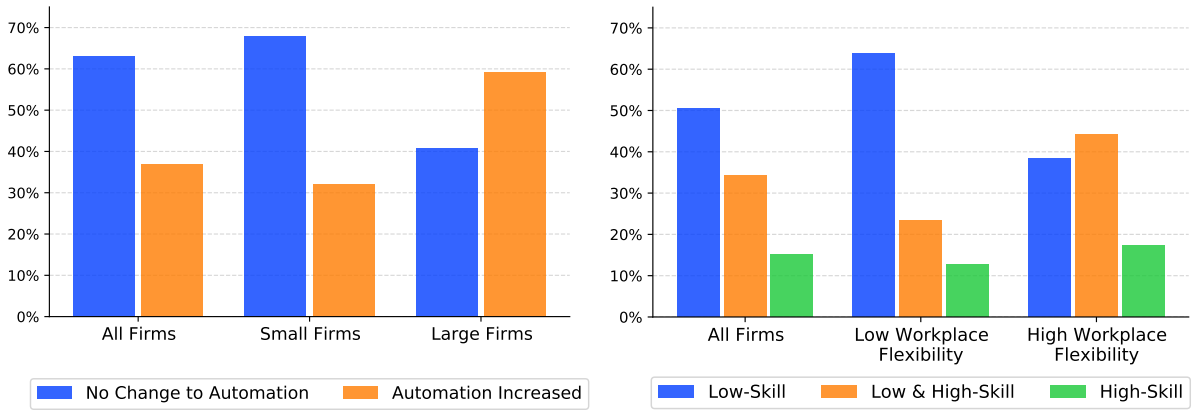
[22] Indeed, as seen in Figure A.5 in the Appendix, among firms for which COVID reduced employment, fewer than 10% think employment is unlikely to return to the pre-COVID level (Panel A), and nearly 20% of firms with high workplace flexibility indicate that their willingness to spend on capital investment is unlikely to ever return to the pre-COVID level (Panel B).

[23] Finance, professional services, and information are among industries least likely to see a decrease in the level of employment relative to pre-COVID. Construction, wholesale, and retail are most likely to expect employment to remain low until at least 2022 (or never return to pre-COVID levels). For capital spending, interestingly, the industries where employment has been least affected (e.g., finance and professional services) are also among the industries most likely to expect the level of capital spending to remain low until at least 2022 (or never return). Similarly, capital spending in industries such as construction and wholesale is less likely to have been affected by COVID-19.

Figure 7: Effect of COVID-19 on Automation

Panel A displays the percentage of firms that have increased their use of automation to reduce labor since the onset of the COVID crisis for all firms, small firms and large firms. Large firms have more than 500 employees. For firms that stated their labor-reducing automation had increased, Panel B displays which portion of the workforce will be most affected: low-skill workers only, both low and high-skill workers, or high-skill workers only. Low (high) workplace flexibility is below (above) the 25th (75th) percentile of workplace flexibility within-sample. The data come from the December 2020 CFO survey.

(A) Introduction of Automation since COVID (B) Effect of Automation on Worker Skill Level



beyond 2021 (see also Bartik et al. (2020)). Furthermore, Table 10 shows that CFOs in industries with higher workplace flexibility are more likely to think that the level of remote work will persist for longer, or is unlikely to ever return to pre-COVID levels.

Automation since the COVID-19 Outbreak. Finally, we study the shift towards automation in response to the pandemic. In the December 2020 survey, we asked CFOs "Has your firm implemented (or does your firm plan to implement) automation to reduce labor since March?" Overall, nearly 40% of the firms responded yes. The push to use automation to replace labor is particularly pronounced among large firms (more than 500 employees), where some 60% responded yes, as shown in Panel A of Figure 7.

Controlling for firm size and other basic firm characteristics, we find that firms with low workplace flexibility have a higher propensity to increase labor-reducing automation, as shown in the logit regressions reported in Table 11 (see columns (1) and (2)). This result is consistent with our findings above that firms with low workplace flexibility expect a slower recovery of employment, which could be driven in part by their higher propensity to adopt labor-reducing automation. Intuitively, for low workplace flexibility firms that historically have required employees to be onsite to perform

their jobs, switching to automation can lower health risks, which is especially relevant in light of the health crisis.

Table 11 about here

It is noteworthy that the coefficient on workplace flexibility in Table 11 remains unchanged after we control for industry-level automation penetration from 2004 to 2014 (see Acemoglu and Restrepo (2020)). Indeed, the correlation between workplace flexibility and prior automation adoption trends is -0.04, which suggests that workplace flexibility does not correlate with inherent technological factors for automation. In other words, the current strong push for automation among low workplace flexibility firms is new; not a continuation of prior automation trends. Taken together, the pandemic experience may have accelerated the shift towards automation, especially among low workplace flexibility firms.[24] While these changes prepare firms to better handle future health crises or other disruptions that would make onsite work difficult, some workers will be displaced. This displacement can have lasting consequences. Thus, it is important to understand which workers are most exposed to labor-reducing automation, which we investigate next.

For firms that increased automation, we also asked, "Which skill positions were affected by the automation you've implemented or plan to implement to reduce your reliance on labor?" On average, low-skill workers are most affected, as shown in Panel B of Figure 7. In particular, firms with low workplace flexibility — which show a stronger propensity to automate in the first place — are especially inclined to replace low-skill workers (a similar result can be gleaned from the logit estimations performed in columns (3) and (4) in Table 11). It is also noteworthy in Panel B that about 60% of firms with high workplace flexibility plan to use automation to replace high-skill workers (e.g., back office jobs), conditional on increasing labor-reducing automation.

5.2 Implications

Our findings suggest several implications regarding economic activities since the COVID-19 crisis.

[24] Education, finance/insurance, manufacturing, and utilities are among industries where a high fraction of firms reported an increase in automation since March 2020, whereas information, construction, retail, and real estate are among industries with a low fraction of firms reporting an increase.

First, our analyses reveal that firms in industries with high workplace flexibility plan higher employment growth both during the ongoing health crisis and in the recovery afterwards, but not necessarily higher capital spending growth. This points to a post-pandemic recovery in which such firms favor labor over standard physical capital investment. We highlight that this phenomenon of weak capital expenditures may not necessarily reflect weakness among firms (e.g., tight financial constraints or insufficient aggregate demand), but rather a shift in the nature of work and the nature of investment. These firms may invest more in software to facilitate flexible workplace arrangements or in human capital and organizational capital, instead of investing in traditional fixed assets. This trend echoes recent research on the increasing importance of intangible investment (e.g., Corrado et al. (2009); Haskel and Westlake (2018), Crouzet and Eberly (2019)), and our findings suggest that COVID-19 may accelerate the rise of intangible investment over traditional physical investment.

Second, firms in industries with low workplace flexibility may be prompted to change their work logistics and the profile of their workforce as well. The inability to work from home often derives from the need to use certain facilities or equipment, or the need to physically deliver goods and services. While a number of production rigidities exist, the higher costs associated with health risks may prompt firms in low workplace flexibility sectors to replace human labor with automation. Research has shown an increasing adoption of automation in the US in the past two decades (see Acemoglu and Restrepo (2020)), and COVID-19 appears to be accelerating this shift given the inconvenience of onsite work. This could, in turn, contribute to a "robot-led recovery" or "jobless recovery" for these sectors in the post-COVID period.

Finally, firms' access to financing has been a central focus of the economic stabilization policies by the Federal Reserve and by Congress (e.g., Primary Market Corporate Credit Facility, Secondary Market Corporate Credit Facility, Main Street Lending Program, and Paycheck Protection Program). While monetary policies and fiscal policies may affect a firm's financial flexibility, and the swift implementation of government assistance programs in the COVID-19 crisis could have helped along this dimension, it is more difficult for government actions to influence workplace flexibility. Accordingly, there may be limits to the effectiveness of traditional economic policies to stimulate employment and investment in this health crisis. For workers in industries with low

workplace flexibility, who may face fewer job opportunities in the near term as well as increasing automation in the long term, unemployment insurance and training to acquire new skills could be important.

6 Concluding Remarks

In early 2020, the US experienced its largest economic dislocation in a decade, if not the largest in the postwar era. The crisis was triggered by an unprecedented emergency of global proportions: the rapid spread of the novel coronavirus (COVID-19). We provide information about corporate decision-making in real time as the COVID-19 crisis hit, as well as firms' planning for both the near term and the long term as the crisis unfolds. Our surveys directly track how firms adjust their operations, instead of making indirect inferences from stock returns. We focus on how companies use three dimensions of corporate flexibility to adapt to the crisis: financial, workplace, and investment flexibility. We show that in light of the COVID-19 crisis, financial flexibility continues to be a significant determinant of firm planning. Workplace flexibility emerges as an additional critical margin that has both direct effects on employment and interactive effects (via investment flexibility) on investment. Investment flexibility also supports firms' emergency response, and companies facing challenging conditions used investment flexibility to cut capital spending during the crisis, while those facing favorable conditions used investment flexibility to increase spending.

Furthermore, our data suggest that operational flexibility — especially with respect to the workplace arrangement — will shape firms' employment and investment decisions in the years to come. Firms may experience long-term changes in the ways they hire and invest, prompted by COVID-19 and the prominence of workplace flexibility. These transformations may require new perspectives for understanding the post-pandemic era. In particular, while previous work has emphasized the importance of financial flexibility, our analysis indicates that operational flexibility will be central for analyzing firms' decisions going forward. In addition, traditional measures of investment such as capital expenditures can be increasingly incomplete in capturing firms' investment activities. Finally, firms may budget more capital expenditures towards automation, which in turn may affect the size and profile of the workforce. The type

of long-term adjustment — whether it be to support remote work or replace workers via automation — is likely to vary by firm, with a given firm's workplace flexibility a central determinant. More research into these important issues is needed.

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Table 1: Comparing March 2020 Survey Firms to Compustat

This table provides a comparison of firms in the March 2020 CFO survey and Compustat, based on financial information for 2019. It displays the distribution of employee counts across different revenue categories for both survey and Compustat firms. Columns (1) displays the percentage of survey firms that fall in each revenue category. For example, 19.8% of survey firms have $5 million or less in sales revenue for the year 2019. Columns (2) to (4) display the 25th, 50th and 75th percentiles of employee counts for survey firms within each revenue category. Columns (5) to (8) display the same for Compustat firms for fiscal year 2019.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Survey				Compustat			
	% of Sample	25%	50%	75%	% of Sample	25%	50%	75%
$\leq$ 5m	19.8	2	9	27	15	3	12	35
5-25m	16.2	31	59	100	7.2	26	56	94
25-100m	26.9	99	198	350	13	91	162	266
100m-1bn	21.3	425	925	1,900	30.4	341	762	1,700
1-5bn	8.1	2,150	5,200	10,000	21.4	2,217	4,900	9,100
$>$ 5bn	7.7	10,000	35,500	82,500	12.9	10,700	23,200	55,000

Table 2: Descriptive Statistics

This table presents summary statistics of the main variables. Panel A shows statistics for the March survey, and Panel B shows statistics for subsequent surveys in 2020 (June, September, and December). The number of observations, means, standard deviations, and quartiles are displayed. In Panel A, forecasts of revenue, employment, and capital expenditures represent growth from the end of 2019 to the end of 2020. In Panel B, both 2020 and 2021 forecasts are relative to 2019. Demand Proxy is based on analyst forecast of industry-level 2020 revenue growth as of the first quarter in Panel A and the corresponding survey quarters in Panel B. Detailed variable definitions are given in the Data Appendix.

Panel A: Summary Statistics (from March 2020 Survey)

	N	Mean	Std dev	25%	50%	75%
Revenue Forecast	501	0.046	0.223	-0.050	0.030	0.100
Employment Forecast	461	0.027	0.175	0	0	0.050
Capital Spending Forecast	453	0.007	0.340	-0.050	0	0.050
COVID Risk	520	0.477				
Workplace Flexibility (ATUS)	451	0.252	0.220	0.064	0.243	0.349
Workplace Flexibility (DN)	454	0.445	0.259	0.225	0.311	0.762
Investment Flexibility	451	0.258	0.297	0	0.200	0.500
Financial Flexibility	520	0.806				
Demand Proxy	454	0.046	0.147	-0.010	0.035	0.102
Contact Intensive	454	0.154				

Panel B: Summary Statistics (from Subsequent Surveys)

	N	Mean	Std dev	25%	50%	75%
Revenue Forecast (for 2020)	626	0.024	0.367	-0.100	0	0.100
Revenue Forecast (for 2021)	621	0.101	0.208	0.010	0.050	0.150
Employment Forecast (for 2020)	640	-0.006	0.176	-0.075	0	0.042
Employment Forecast (for 2021)	641	0.057	0.217	-0.042	0	0.125
Workplace Flexibility (ATUS)	641	0.214	0.157	0.065	0.224	0.334
Workplace Flexibility (DN)	641	0.470	0.261	0.225	0.418	0.762
Investment Flexibility	641	0.261	0.304	0	0.200	0.364
Demand Proxy	641	-0.017	0.206	-0.097	-0.023	0.060
Contact Intensive	641	0.184				

Table 3: Determinants of COVID Risk Exposure

This table examines the determinants of firms' self-assessed exposure to COVID risk. In all specifications, the dependent variable is an indicator variable taking a value of one if firms in the March 2020 survey stated they faced medium or high coronavirus risk. Columns (1) to (3) present results from linear probability models (OLS), and column (4) presents results from a logit specification. Financial Flexibility is an indicator taking a value of one if the firm stated they had more financial flexibility than "None" or "A little." Workplace Flexibility comes from ATUS and is a four-digit NAICS level measure for the percentage of workers that can work from home. Investment Flexibility is a four-digit NAICS level measure for a firm's investment flexibility (with respect to speed of completion). Demand Proxy is the average 2020 revenue growth forecasts from IBES for three-digit NAICS and survey week. Contact Intensive is a four-digit NAICS level indicator taking a value of one if the firm is in a contact-intensive industry (Leibovici et al., 2020). Detailed variable definitions are available in the Data Appendix. The R-squared in column (4) is the pseudo R-squared from the logit regression. Standard errors are clustered at the two-digit NAICS level and displayed in parentheses below the coefficient. ***, **, * denote significance at 1%, 5%, 10%.

	(1)	(2)	(3)	(4)
	Linear Probability Model			Logit
Workplace Flexibility	-0.183**	-0.161*	-0.172*	-0.184***
	(0.071)	(0.088)	(0.089)	(0.065)
Investment Flexibility	-0.082*	-0.110*	-0.099	-0.084**
	(0.044)	(0.058)	(0.060)	(0.038)
Financial Flexibility	-0.017	-0.027	-0.026	-0.019
	(0.069)	(0.061)	(0.057)	(0.059)
Demand Proxy	-0.081	-0.161	-0.181	-0.075
	(0.152)	(0.158)	(0.137)	(0.128)
Contact Intensive	0.204***	0.150*	0.140*	0.198***
	(0.063)	(0.075)	(0.075)	(0.049)
Post March 15	0.353***	0.362***		0.354***
	(0.058)	(0.061)		(0.049)
Observations	451	445	445	451
R-squared	0.167	0.262	0.282	0.128
State FE		Yes	Yes	
Week FE			Yes	

Table 4: Determinants of Employment and Investment Plans

This table examines the determinants of CFOs' projected growth of employment and capital spending in 2020, using data from the March 2020 CFO survey. The dependent variable is the expected annual growth rate of employment (columns (1) to (3)), or capital spending (columns (4) to (6)). In Panel A, Workplace Flexibility comes from ATUS, and is a four-digit NAICS level measure for the percentage of workers that can work from home. In Panel B, Workplace Flexibility (DN) is the work-from-home variable from Dingel and Neiman (2020), measured at the two-digit NAICS level. Financial Flexibility is an indicator taking a value of one if the firm stated they had more financial flexibility than "None" or "A little." Investment Flexibility is a four-digit NAICS level measure for a firm's investment flexibility (with respect to speed of completion). Demand Proxy is three-digit NAICS × survey week average 2020 revenue growth forecasts from IBES. Contact Intensive is a four-digit NAICS level indicator equaling one if the firm is in a contact-intensive industry (Leibovici et al., 2020). Detailed variable definitions are in the Data Appendix. Standard errors are clustered at the two-digit NAICS level and displayed in parentheses below the coefficient. ***, **, * denote significance at 1%, 5%, 10%.

Panel A: Main Specification

	(1)	(2)	(3)	(4)	(5)	(6)
	Employment			Capital Spending		
Workplace Flexibility	0.100***	0.084***	0.081***	0.032	0.017	-0.045
	(0.029)	(0.028)	(0.025)	(0.043)	(0.047)	(0.052)
Investment Flexibility	0.030	0.036*	0.033	-0.030	-0.018	-0.062
	(0.018)	(0.017)	(0.023)	(0.072)	(0.070)	(0.072)
Financial Flexibility	0.068***	0.069***	0.071***	0.077***	0.084***	0.089***
	(0.017)	(0.018)	(0.020)	(0.027)	(0.023)	(0.024)
Demand Proxy		0.141***	0.072		0.467***	0.484*
		(0.040)	(0.074)		(0.162)	(0.239)
Contact Intensive		-0.013	-0.025		0.024	0.146
		(0.014)	(0.040)		(0.050)	(0.110)
Observations	405	405	400	397	397	391
R-squared	0.045	0.060	0.220	0.009	0.051	0.185
Week FE			Yes			Yes
State FE			Yes			Yes
NAICS-2 FE			Yes			Yes

Panel B: Alternative Work-from-Home Measure from Dingel and Neiman (2020)

	(1)	(2)	(3)	(4)	(5)	(6)
	Employment			Capital Spending		
Workplace Flexibility (DN)	0.080***	0.083***	0.103***	-0.006	0.035	0.028
	(0.019)	(0.029)	(0.031)	(0.047)	(0.049)	(0.059)
Investment Flexibility	0.023	0.027	0.038	-0.026	-0.023	-0.003
	(0.024)	(0.023)	(0.025)	(0.078)	(0.076)	(0.082)
Financial Flexibility	0.069***	0.070***	0.072***	0.077***	0.085***	0.095***
	(0.018)	(0.019)	(0.019)	(0.026)	(0.023)	(0.027)
Demand Proxy		0.163***	0.082		0.472***	0.452**
		(0.047)	(0.066)		(0.160)	(0.186)
Contact Intensive		-0.008	-0.000		0.030	0.013
		(0.013)	(0.015)		(0.049)	(0.048)
Observations	405	405	400	397	397	391
R-squared	0.042	0.062	0.189	0.009	0.051	0.152
Week FE			Yes			Yes
State FE			Yes			Yes

Table 5: Conditional Impact of Investment Flexibility on Employment and Investment

This table examines the interactive effects of Workplace and Investment Flexibility on firms' employment and capital spending plans. The dependent variable is the CFOs' projected growth rate for employment (columns (1) to (3)) or capital spending (columns (4) to (6)) in 2020, using data from the March 2020 CFO survey. Workplace Flexibility comes from ATUS and is a four-digit NAICS level measure for the percentage of workers that can work from home. Investment Flexibility is a four-digit NAICS level proxy for a firm's investment flexibility (with respect to speed of completion). Financial Flexibility is an indicator taking a value of one if the firm stated they had more financial flexibility than "None" or "A little." Controls are Demand Proxy and Contact Intensive. Detailed variable definitions are available in the Data Appendix. Standard errors are clustered at the two-digit NAICS level and displayed in parentheses below the coefficient. ***, **, * denote significance at 1%, 5%, 10%.

	(1)	(2)	(3)	(4)	(5)	(6)
	Employment			Capital Spending		
Workplace Flexibility	0.040**	0.056***	0.054***	-0.123	-0.140*	-0.143**
	(0.018)	(0.017)	(0.017)	(0.074)	(0.068)	(0.068)
Investment Flexibility	-0.035	-0.006	-0.100	-0.197**	-0.209**	-0.309***
	(0.022)	(0.029)	(0.058)	(0.075)	(0.084)	(0.093)
Workplace Flex × Investment Flex	0.280**	0.199	0.220	0.736***	0.744**	0.765**
	(0.104)	(0.153)	(0.152)	(0.183)	(0.278)	(0.278)
Financial Flexibility		0.072***	0.042		0.091***	0.059***
		(0.020)	(0.035)		(0.025)	(0.020)
Financial Flex × Investment Flex			0.107**			0.116
			(0.049)			(0.094)
Observations	405	400	400	397	391	391
R-squared	0.031	0.224	0.228	0.020	0.197	0.198
Controls		Yes	Yes		Yes	Yes
Week FE		Yes	Yes		Yes	Yes
State FE		Yes	Yes		Yes	Yes
NAICS-2 FE		Yes	Yes		Yes	Yes

Table 6: Comparison of 2008 Financial Crisis to 2020 COVID Crisis

This table examines how different forms of flexibility affect employment and capital spending plans differently in the 2008 and 2020 crises. In Panel A, we run similar tests to Table 4, Panel A, and compare the determinants of employment and capital spending across surveys. The dependent variable is the CFOs' projected employment growth in columns (1) to (3), and capital spending growth in columns (4) to (6). In column (1), the sample is the December 2008 CFO survey sample, and the employment growth is for the year 2009. In column (2), the sample is the March 2020 sample, and the employment growth is for the year 2020. In column (3), we combine both surveys and interact our flexibility measures with an indicator variable taking a value of one if the firm is in the March 2020 sample. In column (3), the March 2020 dummy is omitted from the regression as it is colinear with the State × Survey fixed effects. Columns (4) to (6) display similar specifications to columns (1) to (3), with the firm's capital spending growth as the dependent variable. In Panel B, we run similar tests to Table 5, comparing the effect of the interaction of workplace and investment flexibility on employment and capital spending across surveys. The columns in Panel B follow the same sequence as Panel A. Controls are our demand proxy (NAICS-4 level IBES analyst forecasts of annual revenue growth from the relevant quarter) and a dummy for contact-intensive industries. Detailed variable definitions are given in the Data Appendix. Standard errors are clustered at the two-digit NAICS level and displayed in parentheses below the coefficient. ***, **, * denote significance at 1%, 5%, 10%.

Panel A: Determinants of Employment and Investment Plans

	(1)	(2)	(3)	(4)	(5)	(6)
	Employment			Capital Spending		
Financial Flexibility	0.041**	0.067***	0.042**	0.088**	0.092***	0.079**
	(0.016)	(0.022)	(0.016)	(0.037)	(0.022)	(0.036)
Workplace Flexibility	-0.027	0.076***	-0.051	0.154	-0.045	0.084
	(0.044)	(0.024)	(0.039)	(0.123)	(0.051)	(0.116)
Investment Flexibility	0.052*	0.032	0.034	0.115*	-0.060	0.073
	(0.030)	(0.022)	(0.024)	(0.059)	(0.070)	(0.054)
March 2020 × Workplace Flex			0.145***			-0.085
			(0.045)			(0.117)
March 2020 × Investment Flex			0.006			-0.149*
			(0.031)			(0.083)
March 2020 × Financial Flex			0.032			0.017
			(0.027)			(0.044)
Observations	335	400	735	322	391	713
R-squared	0.174	0.198	0.216	0.096	0.174	0.147
Sample	Dec '08	Mar '20	Full	Dec '08	Mar '20	Full
Controls	Yes	Yes	Yes	Yes	Yes	Yes
NAICS-2 FE	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes		Yes	Yes	
State × Survey FE			Yes			Yes

Panel B: Conditional Impact of Investment Flexibility during 2008 and 2020

	(1)	(2)	(3)	(4)	(5)	(6)
	Employment			Capital Spending		
Workplace Flexibility	-0.006	0.069***	-0.007	0.146	-0.137**	0.127
	(0.044)	(0.014)	(0.051)	(0.097)	(0.057)	(0.095)
Investment Flexibility	0.053**	-0.011	0.039*	0.101	-0.204**	0.071
	(0.021)	(0.028)	(0.020)	(0.075)	(0.081)	(0.073)
Workplace Flex × Investment Flex	-0.004	0.174	-0.041	-0.091	0.715**	0.039
	(0.177)	(0.154)	(0.145)	(0.188)	(0.260)	(0.239)
Financial Flexibility	0.042**	0.067***	0.056***	0.081**	0.093***	0.086***
	(0.017)	(0.022)	(0.014)	(0.038)	(0.022)	(0.021)
March 2020 × Workplace Flex			0.085			-0.235**
			(0.058)			(0.111)
March 2020 × Investment Flex			-0.029			-0.288***
			(0.036)			(0.103)
March 2020 × Workplace Flex × Investment Flex			0.187			0.646*
			(0.195)			(0.330)
Observations	335	400	735	322	391	713
R-squared	0.167	0.191	0.208	0.138	0.185	0.152
Sample	Dec '08	Mar '20	Full	Dec '08	Mar '20	Full
Controls	Yes	Yes	Yes	Yes	Yes	Yes
NAICS-2 FE	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes		Yes	Yes	
State × Survey FE			Yes			Yes

Table 7: Employment Plans for 2020 and 2021 in Subsequent CFO Surveys

This table examines the determinants of firms' employment and capital spending plans from subsequent CFO surveys (June, September, and December 2020). The dependent variable is the CFOs' projected employment growth from the end of 2019 to the end of 2020 (columns (1) to (4)), or employment growth from the end of 2019 to the end of 2021 (columns (5) to (8)). Detailed variable definitions are in the Data Appendix. Standard errors are clustered at the two-digit NAICS level and displayed in parentheses below the coefficient. ***, **, * denote significance at 1%, 5%, 10%.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Employment for 2020				Employment for 2021			
Workplace Flexibility	0.131**	0.129*	0.153**	0.133*	0.134**	0.161**	0.182***	0.162**
	(0.058)	(0.071)	(0.072)	(0.067)	(0.054)	(0.065)	(0.061)	(0.069)
Investment Flexibility	-0.039	-0.035	-0.058	-0.036	-0.041	-0.044	-0.072*	-0.071*
	(0.046)	(0.045)	(0.037)	(0.043)	(0.045)	(0.040)	(0.034)	(0.036)
Contact Intensive		-0.007	0.006	0.017		0.021	0.036*	0.075*
		(0.018)	(0.018)	(0.037)		(0.015)	(0.017)	(0.041)
Demand Proxy		-0.035	-0.023	-0.034		-0.054	-0.030	-0.007
		(0.060)	(0.048)	(0.035)		(0.049)	(0.043)	(0.039)
Observations	640	640	634	634	641	641	635	635
R-squared	0.017	0.019	0.129	0.181	0.012	0.016	0.127	0.157
State FE			Yes	Yes			Yes	Yes
Qtr FE			Yes	Yes			Yes	Yes
NAICS-2 FE				Yes				Yes

Table 8: Realized Firm Outcomes Relative to Pre-COVID

This table examines how firm outcomes have changed since the onset of COVID. Data are from the September CFO survey. This survey asked CFOs:

For your company, how would you assess the current level of {Employment, Capital Expenditure (Willingness to Spend on Structures and Equipment), Remote Work} compared to their levels before the outbreak of COVID-19? {Significantly lower, Somewhat lower, Little/No change, Somewhat higher, Significantly higher}

We then code responses for Employment, Capital Spending, and Remote Work as 0 if the CFO stated the level was lower, 1 if there was little/no change, and 2 if the level was higher. We back out effects on the the ratio of physical capital and labor using CFO responses about capital spending and labor. If the firm's new level of capital spending was lower (higher) than that of labor, then we say that Physical Capital/Labor has decreased (increased). Similarly, if the new levels of capital spending and labor are the same, then there was no change to Physical Capital/Labor. That is,

$$\text{Physical Capital/Labor} = \begin{cases} 0 \text{ if Capital Spending response} < \text{Employment response} \\ 1 \text{ if Capital Spending response} = \text{Employment response} \\ 2 \text{ if Capital Spending response} > \text{Employment response} \end{cases}$$

Revenue, Employment and Remote Work refer to the level of the variable. Capital Spending refers to "willingness to spend on structures and equipment." The dependent variable is the CFO's response concerning Employment in columns (1) and (2), Capital Spending in columns (3) and (4), and Remote Work in columns (7) and (8). The dependent variable is the Physical Capital/Labor variable in columns (5) and (6). As the dependent variable in each specification has three categories, each column presents results from an ordered logit regression, and coefficients displayed are odds ratios (an odds ratio less (greater) than one indicates a decrease (increase)). Workplace Flexibility, Investment Flexibility and Demand Proxy are standardized to unit variance. Thus, the odds ratios display the proportional change in the odds of observing a higher response from a standard deviation change in the relevant variable (in the case of the binary variable Contact Intensive, the difference between low and high contact-intensive industry firms). Detailed variable definitions are in the Data Appendix. Standard errors are clustered at the two-digit NAICS level and displayed in parentheses below the coefficient. ***, **, * denote significance at 1%, 5%, 10%.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Employment		Capital Spending		Physical Capital/Labor		Remote Work	
Workplace Flexibility	1.317*	1.456**	0.778**	0.841	0.694***	0.688***	1.511***	1.363**
	(0.149)	(0.151)	(0.117)	(0.138)	(0.103)	(0.125)	(0.116)	(0.132)
Investment Flexibility	0.968	0.932	0.984	0.925	0.967	0.972	0.782**	0.828*
	(0.181)	(0.168)	(0.090)	(0.111)	(0.132)	(0.130)	(0.105)	(0.097)
Contact Intensive		1.919*		1.819**		0.933		0.512**
		(0.357)		(0.276)		(0.354)		(0.290)
Demand Proxy		0.986		1.104		1.122		0.969
		(0.190)		(0.169)		(0.097)		(0.076)
Observations	244	244	244	244	244	244	244	244
Pseudo R-squared	0.010	0.017	0.012	0.018	0.024	0.024	0.033	0.042

Table 9: Realized 2020q2 Capital Expenditure Outcomes from Compustat Data

This table examines the conditional effects of Investment Flexibility on capital expenditure realizations for Compustat firms. We start with all observations from Compustat 2020q2 (in calendar time). We require that the firm have positive assets, non-negative debt, non-missing data for lagged leverage and cash/assets, non-missing capital spending data from 2020q1 and 2020q2, and a non-missing four-digit NAICS code. The dependent variable is the log change in capital spending from 2020q1 to 2020q2. Demand Proxy is the average analyst end-of-2020 revenue growth forecast from IBES at the four-digit NAICS level for all analyst forecasts from 2020q2. Log Size is log(1+ firm assets). Lagged Leverage is lagged debt/assets. Lagged Cash/Assets is lagged (cash + cash equivalents)/assets. Standard errors are clustered at the four-digit NAICS level and displayed in parentheses below the coefficient. ***, **, * denote significance at 1%, 5%, 10%.

	(1)	(2)	(3)	(4)
	Log Capital Spending Growth			
Workplace Flexibility	0.107	-0.084	-0.141	0.004
	(0.123)	(0.138)	(0.145)	(0.104)
Investment Flexibility	-0.231	-0.281*	-0.278*	-0.386***
	(0.165)	(0.148)	(0.142)	(0.140)
Workplace Flex × Investment Flex	0.717*	0.714*	0.730**	1.077***
	(0.403)	(0.374)	(0.358)	(0.363)
Demand Proxy		0.798***	0.812***	0.620***
		(0.261)	(0.249)	(0.209)
Contact Intensive		-0.013	-0.025	-0.017
		(0.056)	(0.055)	(0.119)
Log Size			-0.000	0.001
			(0.011)	(0.011)
Lagged Leverage			0.070	0.083
			(0.101)	(0.093)
Lagged Cash/Assets			0.095	0.002
			(0.112)	(0.126)
Observations	2,406	2,406	2,406	2,380
R-squared	0.004	0.013	0.014	0.051
NAICS-2 FE				Yes
State FE				Yes

Table 10: CFO Outlook of Firm Outcomes Returning to Pre-COVID Levels

This table examines how long firms expect the changes brought on by COVID-19 to last. Data are from the September CFO survey. This survey asked CFOs:

When, if ever, do you expect your level of Revenue, Employment, Capital Expenditure (Willingness to Spend on Structures and Equipment), Remote Work to return to where it was before the outbreak of COVID-19?
{0 = No Change, 1 = 2020, 2 = 2021, 3 = 2022, 4 = 2023 or later, 5 = Unlikely to return}

Revenue, Employment and Remote Work refer to the level of the variable. Capital Spending refers to "willingness to spend on structures and equipment." In order to capture how long the negative effects of COVID-19 will last, in columns (1) to (6), we limit the sample to firms that stated their level of the relevant variable (e.g. Revenue in columns (1) and (2)) was the same as or lower than its pre-COVID level. In columns (7) and (8), we limit the sample to firms that stated their level of remote work was the same as or higher than its pre-COVID level. As the dependent variable in each specification has multiple categories, each column presents results from an ordered logit regression, and coefficients displayed are odds ratios (an odds ratio less (greater) than one indicates a decrease (increase)). Workplace Flexibility, Investment Flexibility, and Demand Proxy are standardized to unit variance. Thus, the odds ratios display the proportional change in the odds of observing a higher response from a standard deviation change in the relevant variable (in the case of Contact Intensive, the difference between low and high contact-intensive industry firms). Detailed variable definitions are in the Data Appendix. Standard errors are clustered at the two-digit NAICS level and displayed in parentheses below the coefficient. ***, **, * denote significance at 1%, 5%, 10%.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Revenue		Employment		Capx		Remote Work	
Workplace Flexibility	0.818	0.826	0.702**	0.635**	1.162*	1.108	1.233***	1.193**
	(0.128)	(0.140)	(0.166)	(0.198)	(0.082)	(0.075)	(0.068)	(0.073)
Investment Flexibility	1.460***	1.463***	1.221	1.253*	1.233*	1.295*	0.816**	0.852
	(0.118)	(0.136)	(0.132)	(0.133)	(0.118)	(0.139)	(0.103)	(0.116)
Demand Proxy		0.974		1.082		0.885		0.827***
		(0.094)		(0.224)		(0.148)		(0.068)
Contact Intensive		1.068		0.476**		0.611		0.704*
		(0.336)		(0.316)		(0.337)		(0.189)
Observations	197	197	209	209	210	210	233	233
Pseudo R-squared	0.015	0.015	0.015	0.023	0.007	0.011	0.008	0.012

Table 11: Adoption and Use of Automation in Response to COVID-19

This table examines changes to automation since the onset of COVID-19. Data are from the 2020q4 (November/December) CFO survey. This survey asked CFOs two questions about automation:

Since March, has your business implemented, or do you plan to implement automation or technology to reduce your reliance on labor? {0 = No, 1 = Yes}

Which skill positions were affected by the automation or technology you've implemented or plan to implement to reduce your reliance on labor? {0 = Low-Skill Workers, 1 = Low & High-Skill Workers, 2 = High-Skill Workers}

In columns (1) and (2), the dependent variable is the CFO's response concerning automation implementation, as described in the first question above. In columns (3) and (4), the dependent variable is the CFO's response concerning automation's effect on different types of workers, as described in the second question above. Columns (3) and (4) focus only on firms that answered yes to the first question. In columns (1) and (2), results are from a standard logit regression. For columns (3) and (4), as the dependent variable has multiple categories, each column presents results from an ordered logit regression. Coefficients displayed are odds ratios (an odds ratio less (greater) than one indicates a decrease (increase)). Workplace Flexibility, Investment Flexibility, Demand Proxy and Industry Automation Adoption are standardized to unit variance. Thus, the odds ratios display the proportional change in the odds of observing a higher response from a standard deviation change in the relevant variable (in the case of the binary variable Contact Intensive, the difference between low and high contact-intensive industry firms). Detailed variable definitions are in the Data Appendix. The variable Industry Automation Adoption represents robot adoption between 2004 and 2014 in different industries constructed by Acemoglu and Restrepo (2020). Standard errors are clustered at the two-digit NAICS level and displayed in parentheses below the coefficient. ***, **, * denote significance at 1%, 5%, 10%.

	(1)	(2)	(3)	(4)
	Increase in Automation {0 = No, 1 = Yes}		Effect of Automation on Skill {0 = Low, 1 = Low & High, 2 = High}	
Workplace Flexibility	0.744***	0.763**	1.731**	1.566**
	(0.113)	(0.108)	(0.214)	(0.183)
Investment Flexibility	1.064	1.127	1.020	0.937
	(0.157)	(0.144)	(0.134)	(0.159)
Contact Intensive	0.201***	0.231***	3.235	2.507
	(0.356)	(0.391)	(0.991)	(0.909)
Demand Proxy	1.108	1.183	1.481	1.375
	(0.109)	(0.114)	(0.253)	(0.222)
Log # Employees		1.915***		0.795
		(0.161)		(0.259)
Industry-Level Automation		0.991		0.733***
		(0.017)		(0.047)
Observations	277	277	102	102
Pseudo R-squared	0.050	0.112	0.056	0.091

A Appendix Figures and Tables

Figure A.1: Sample Composition by March 2020 Survey Completion Date

This figure displays the composition of firms in the March 2020 CFO survey split by pre/post March 15, by industry (Panel A) and firm size (Panel B).

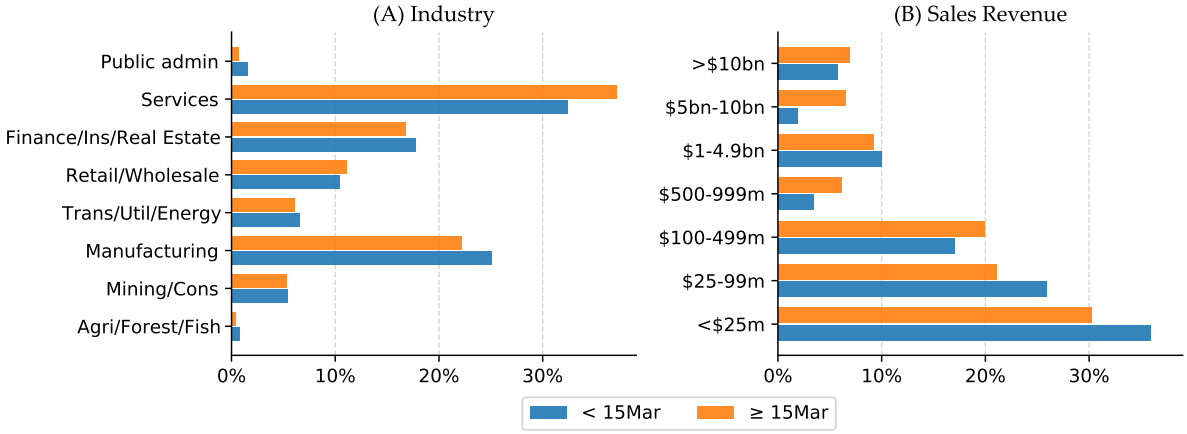


Figure A.2: Cross-Correlations from March 2020 Survey

This figure shows the correlations among the main variables. Dark blue indicates strong positive correlations, and dark red indicates strong negative correlations. Data are from the March 2020 CFO survey.

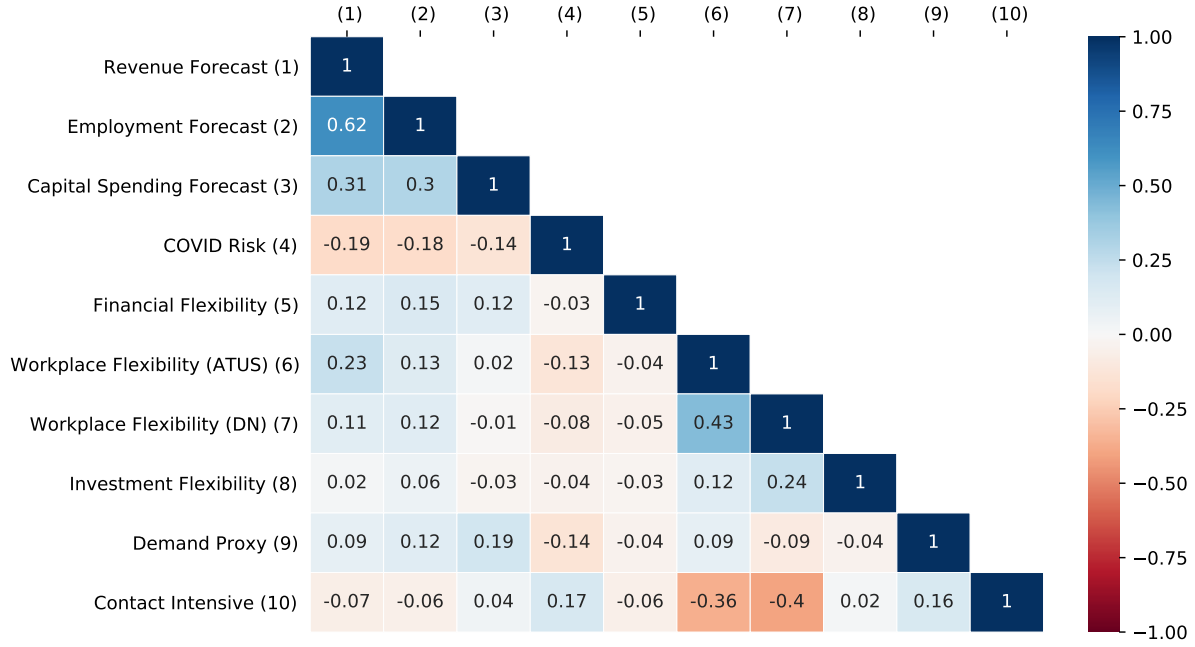


Figure A.3: Effect of Investment Flexibility on Capital Spending Forecasts for Different Levels of Workplace Flexibility

This figure displays the effect of investment flexibility on capital spending forecasts, over the range of workplace flexibility. Estimated using column (5) of Table 5, the estimating equation is

$$\begin{aligned}\text{Capital Spending Forecast}_{it} = \alpha + \beta_1 \text{Investment Flex}_{it} + \beta_2 \text{Workplace Flex}_{it} + \\ \beta_3 (\text{Investment Flex} \times \text{Workplace Flex}) + \lambda \cdot X_{it} + \varepsilon_{it}\end{aligned}$$

Each point on the black line displays the average marginal effect of investment flexibility on capital spending forecasts, for a given value of workplace flexibility,

$$\mathbb{E}\left[\text{Marginel Efect} | \text{Workplace Flex} = w\right] = \beta_1 + \beta_3 w$$

The shaded area displays 95% confidence intervals. The data come from the March 2020 survey and use CFOs' projected capital spending growth in 2020.

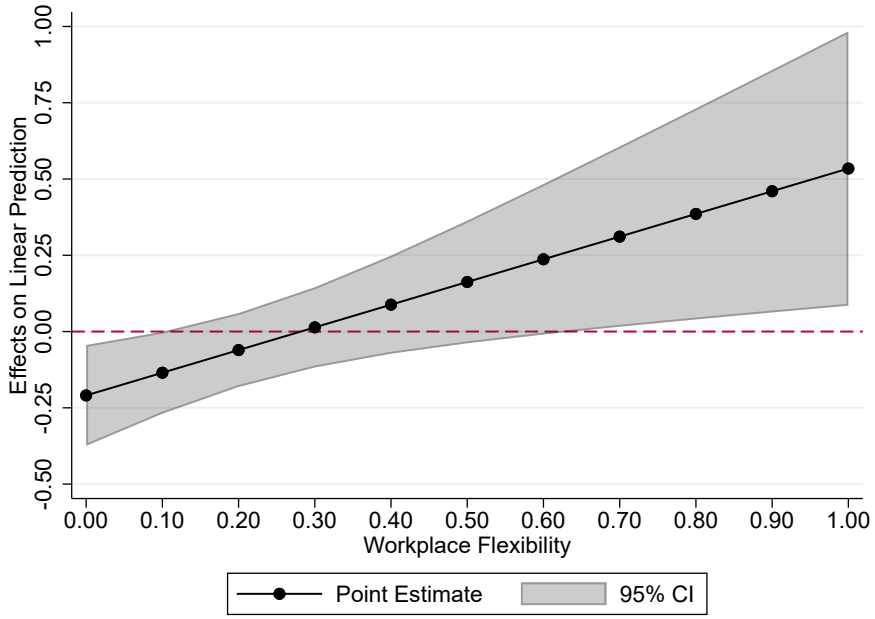


Figure A.4: Capital Spending Growth in Compustat in Prior Years

This figure displays the effect of investment flexibility on realized capital spending growth, conditional on low/high workplace growth throughout time. Specifically, for each year $Y \in \{2005, \ldots, 2019\}$, we set the sample as all eligible Compustat observations from the first two quarters of year Y (we omit the third and fourth quarters from these years to provide a better comparison for the first two quarters of 2020). We then regress log quarterly capital spending growth on the interaction of workplace and investment flexibility, along with controls (lagged leverage, lagged cash/assets, log size) and fixed effects (NAICS-2 and state). We then repeat the same specification for $Q \in \{2020q1, 2020q2\}$. The blue triangles (green dots) display the effect of investment flexibility on realized capital spending growth for a firm with low (high) workplace flexibility. Low (high) workplace flexibility is defined as the Compustat within-sample 10th (90th) percentile value of workplace flexibility (0.039 and 0.54, respectively). The vertical bars display 95% confidence intervals.

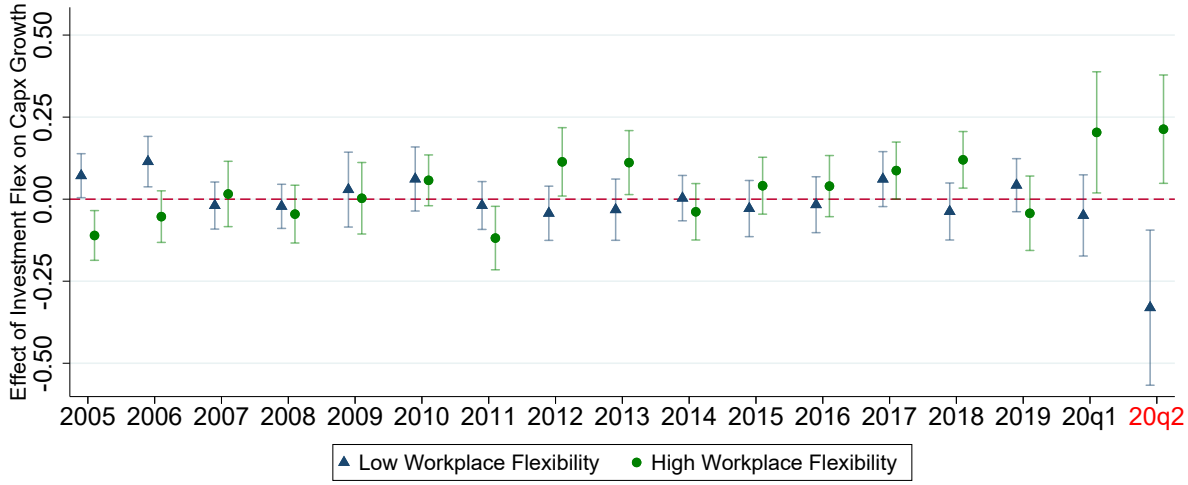


Figure A.5: CFO Outlook of Firm Outcomes Returning to Pre-COVID Levels

Each panel displays the time period at which CFOs expect the relevant variable to return to pre-COVID levels. Revenue, employment and remote work refer to the level of the variable. Capital spending refers to "willingness to spend on structures and equipment." For the revenue, employment and capital spending panels, the sample is limited to firms that stated they saw a decrease in the relevant variable since the onset of COVID-19. For the remote work panel, the sample is limited to firms that stated they saw an increase in remote work since the onset of COVID-19. CFOs reporting no change to the relevant variable are omitted from the calculations. Data are from the September 2020 CFO survey. Panel A is for all firms, and Panel B displays by workplace flexibility. Low (high) workplace flexibility is below (above) the 25th (75th) percentile of workplace flexibility within-sample.

Table A.1: Determinants of Financial Flexibility

This table examines the determinants of firms' self-assessed financial flexibility in the March 2020 survey. In all specifications, the dependent variable is an indicator variable taking a value of one if the firm stated they had more financial flexibility than "None" or "A little." Columns (1) and (2) present results from linear probability models (OLS), column (3) presents results from a logit specification. Cash/Assets is the firm's stated cash to total assets ratio from year-end 2019. Limited Access to External Capital is an indicator taking a value of one if the firm stated that their ability to access external capital limited their ability to pursue attractive investment projects. Detailed variable definitions are available in the Data Appendix. The R-squared in column (3) is the pseudo R-squared from the logit regression. Standard errors are clustered at the two-digit NAICS level and displayed in parentheses below the coefficient. ***, **, * denote significance at 1%, 5%, 10%.

	(1)	(2)	(3)
	Linear Probability Model		Logit
Cash/Assets	0.285***	0.512***	0.348***
	(0.066)	(0.089)	(0.095)
Limited Access to External Capital	-0.169***	-0.163***	-0.167***
	(0.034)	(0.025)	(0.040)
Observations	454	448	454
R-squared	0.060	0.212	0.063
Week FE		Yes	
State FE		Yes	
NAICS-2 FE		Yes	

Table A.2: Conditional Impact of Investment Flexibility: Full Interactions

This table is an extension of Table 5 in the main text, where we include pairwise interactions among all three flexibility measures. Data are from the March 2020 CFO survey. The dependent variable is the projected capital spending growth in 2020 in Panel A, and the projected employment growth in 2020 in Panel B. Detailed variable definitions are in the appendix. Detailed variable definitions are available in the Data Appendix. Standard errors are clustered at the two-digit NAICS level and displayed in parentheses below the coefficient. ***, **, * denote significance at 1%, 5%, 10%.

Panel A: Impact on Capital Spending

	(1)	(2)	(3)	(4)	(5)	(6)
	Capital Spending					
Workplace Flexibility	-0.123	-0.140*	-0.124	-0.143**	-0.222	-0.329**
	(0.074)	(0.068)	(0.074)	(0.068)	(0.162)	(0.154)
Investment Flexibility	-0.197**	-0.209**	-0.373**	-0.309***	-0.363**	-0.291**
	(0.075)	(0.084)	(0.134)	(0.093)	(0.144)	(0.107)
Financial Flexibility		0.091***	0.025	0.059***	-0.001	0.005
		(0.025)	(0.039)	(0.020)	(0.044)	(0.032)
Workplace Flex × Investment Flex	0.736***	0.744**	0.769***	0.765**	0.779***	0.784***
	(0.183)	(0.278)	(0.181)	(0.278)	(0.179)	(0.272)
Financial Flex × Investment Flex			0.210	0.116	0.196	0.089
			(0.147)	(0.094)	(0.158)	(0.110)
Workplace Flex × Financial Flex					0.120	0.229
					(0.117)	(0.133)
Observations	397	391	397	391	397	391
R-squared	0.020	0.197	0.034	0.198	0.035	0.201
Controls		Yes		Yes		Yes
Week FE		Yes		Yes		Yes
State FE		Yes		Yes		Yes
NAICS-2 FE		Yes		Yes		Yes

Panel B: Impact on Employment

	(1)	(2)	(3)	(4)	(5)	(6)
	Employment					
Workplace Flexibility	0.040**	0.056***	0.040**	0.054***	0.001	0.019
	(0.018)	(0.017)	(0.017)	(0.017)	(0.035)	(0.060)
Investment Flexibility	-0.035	-0.006	-0.139***	-0.100	-0.135***	-0.097*
	(0.022)	(0.029)	(0.032)	(0.058)	(0.031)	(0.055)
Financial Flexibility		0.072***	0.037*	0.042	0.027	0.032
		(0.020)	(0.020)	(0.035)	(0.025)	(0.045)
Workplace Flex × Investment Flex	0.280**	0.199	0.310***	0.220	0.316***	0.224
	(0.104)	(0.153)	(0.086)	(0.152)	(0.085)	(0.155)
Financial Flex × Investment Flex			0.122***	0.107**	0.116***	0.103**
			(0.033)	(0.049)	(0.032)	(0.046)
Workplace Flex × Financial Flex					0.047	0.043
					(0.034)	(0.057)
Observations	405	400	405	400	405	400
R-squared	0.031	0.224	0.065	0.228	0.065	0.229
Controls		Yes		Yes		Yes
Week FE		Yes		Yes		Yes
State FE		Yes		Yes		Yes
NAICS-2 FE		Yes		Yes		Yes

Table A.3: Impact of Workplace Flexibility on Employment Growth Realizations 2005-2019

This table examines the effect of Workplace Flexibility on employment growth realizations. Columns (1) to (4) display specifications relating Workplace Flexibility and employment growth for Compustat firms for the fiscal years 2005-2019. We require that the firm have positive assets, non-negative debt, non-missing data for lagged leverage and cash/assets, non-missing employment data from the current and previous year, and a non-missing four-digit NAICS code. Columns (5) and (6) display specifications relating Workplace Flexibility and employment growth at the industry level (four-digit NAICS) using data on employment counts from the Bureau of Labor Statistics (BLS) National Current Employment Statistics Survey. The dependent variable in all specifications is the log change in employment from the previous year. BLS employment growth is measured from December to December. Standard errors are clustered at the four-digit NAICS level and displayed in parentheses below the coefficient. ***, **, * denote significance at 1%, 5%, 10%.

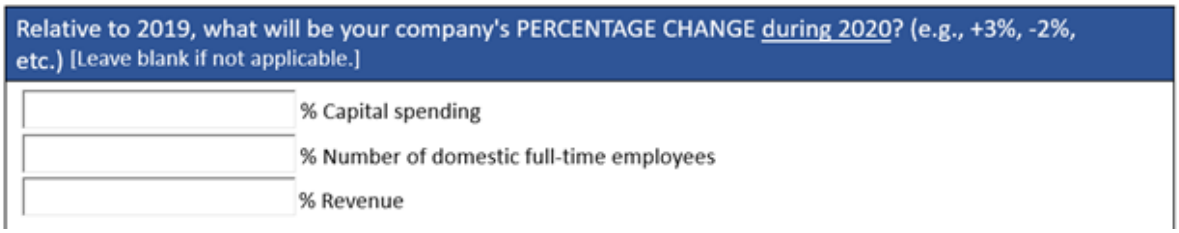
	(1)	(2)	(3)	(4)	(5)	(6)
		Compustat			BLS	
Workplace Flexibility	0.044***	-0.000	-0.000	0.000	0.014	0.019
	(0.008)	(0.015)	(0.015)	(0.015)	(0.010)	(0.012)
Log Size		0.012***	0.013***	0.014***		
		(0.002)	(0.002)	(0.002)		
Lagged Leverage		-0.009**	-0.009**	-0.008**		
		(0.004)	(0.004)	(0.004)		
Lagged Cash/Assets		0.148***	0.142***	0.149***		
		(0.014)	(0.016)	(0.013)		
Observations	69,191	69,191	69,191	69,191	3,360	3,360
R-squared	0.001	0.016	0.026	0.028	0.002	0.314
Year FE			Yes	Yes		Yes
NAICS-2 FE				Yes		Yes
State FE			Yes	Yes		

B Data Appendix

B.1 Duke CFO Survey Variables

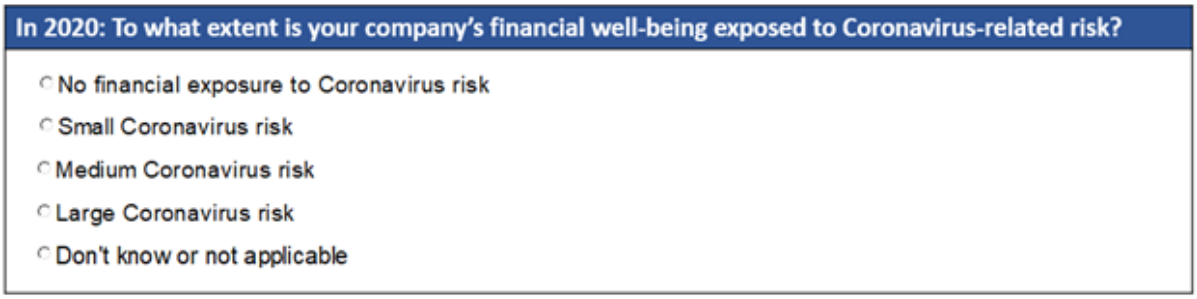
Revenue/Employment/Capital Spending Forecasts

CFO's forecast of the 12-month ahead percentage change in revenue, employment and capital spending, as answered in the question below.



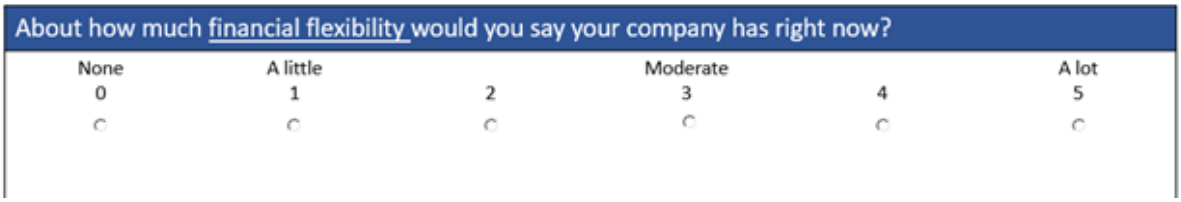
COVID Risk

COVID Risk is an indicator variable taking a value of one if the CFO answered with "Medium Coronavirus Risk" or "Large Coronavirus Risk" to the question below.



Financial Flexibility

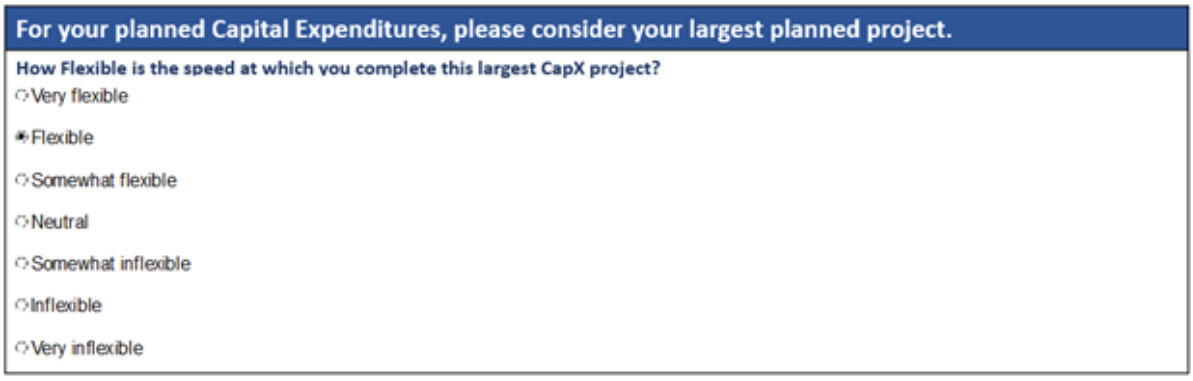
Financial Flexibility is an indicator taking a value of one if the CFO answered 2 or above to the question below.



Investment Flexibility

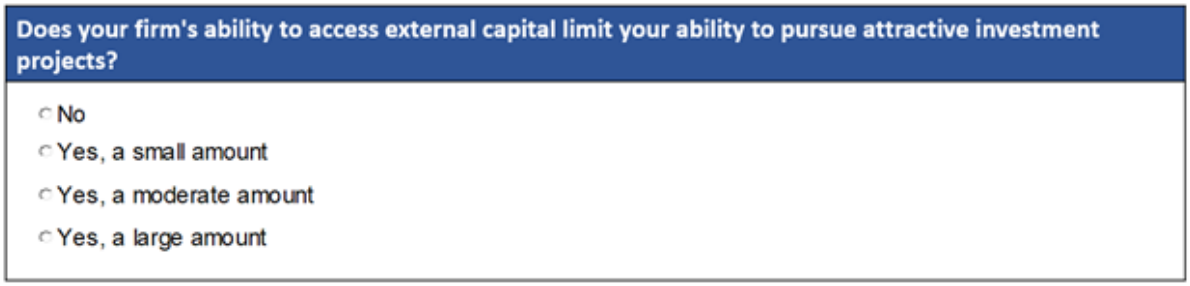
Four-digit NAICS-level proxy for a firm's investment flexibility with respect to speed of project completion. We use data from the March 2019 Duke CFO survey to construct

a four-digit NAICS code measure of Investment Flexibility. Specifically, we define a firm as having flexible investment if they answered "Flexible" or "Very Flexible" to the question below. We then calculate the percentage of firms with investment flexibility at the four-digit NAICS level.



Limited Access to External Capital

Limited Access to External Capital is an indicator variable taking a value of one if the CFO answer with "Yes, a small amount," "Yes, a moderate amount," or "Yes, a large amount" to the question below.



Cash/Assets

Firm's year-end cash to total assets ratio from the March 2020 survey, as answered in the question below.

B.2 External Variables

Workplace Flexibility measure from the American Time Use Survey (ATUS)

Four-digit NAICS-level proxy for a firm's ability to do work from home. We use data from the 2017-2018 American Time Use Survey Leave and Job Flexibilities module (n = 10,040), which asks questions related to workers' ability to perform their job from home. Following Papanikolaou and Schmidt (2020) and Alon et al. (2020), we classify a worker as being able to work from home if they answer yes to these two questions:

- "As part of your (main) job, can you work at home?"
- "Are there days when you work only at home?"

Using the Leave Module weights and Evan Soltas' crosswalk, we aggregate the number of workers that are able to work from home to the four-digit NAICS level.[25]

Workplace Flexibility measure from Dingel and Neiman (2020)

Two or three-digit NAICS-level proxy for a firm's ability to do work from home. This variable is constructed from the O*NET survey and is aggregated from the occupation level to the industry level. Details are available in Dingel and Neiman (2020) and data are available at https://github.com/jdingel/DingelNeiman-workathome.

Demand Proxy

A three-digit NAICS $\times$ survey week level proxy for changes in a firm's demand conditions.[26] Specifically, for all end-of-2020 analyst revenue forecasts that occur in the survey period, we calculate the industry-by-week expected percentage change in revenue from the end of 2019 to the end of 2020.[27]

Contact Intensive

Contact Intensive is an indicator variable taking a value of one if the firm's industry is classified as contact intensive, based on the amount of social interaction expected within the workplace. See Leibovici et al. (2020) for further details.

[25] See, for example, https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/O7JLIC and https://www.atusdata.org/atus-action/faq.
[26] Survey weeks are $\leq$ 7 March, 8-14 March, 15-21 March, 22-28 March, $\geq$ 29 March.
[27] We have also constructed this measure at the two and four-digit NAICS level and results are similar.