Corporate Flexibility in a Time of Crisis

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Abstract

We use the COVID shock to study the direct and interactive effects of several forms of corporate flexibility on short- and long-term business plans. We find that i) *workplace flexibility*, namely the ability for employees to work remotely, plays a central role in determining firms' employment plans during the health crisis; ii) *investment flexibility* allows firms to modulate capital spending based on their business prospects in the crisis, with effects shaped by workplace flexibility; and iii) *financial flexibility* contributes to stronger employment and investment, especially when fixed costs are high. The role of workplace flexibility is new to the COVID-19 crisis and is expected to have long-lasting effects on corporate employment and investment.

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1 Introduction

Firms constantly respond to challenging circumstances, often triggered by unexpected shocks. A large body of research shows how financial flexibility allows firms to adapt to adversity. For example, Chodorow-Reich (2014) shows that less financially constrained businesses maintained stronger employment during the 2008-9 Global Financial Crisis. More recently, Acharya and Steffen (2020) show that companies raised cash to prevent distress following the outbreak of COVID-19. While the importance of financial flexibility has been well documented, the unprecedented challenges brought on by the 2020 health crisis highlight the importance of additional dimensions of corporate flexibility, such as the ability to perform work remotely (e.g., Barrero et al., 2021; Papanikolaou and Schmidt, 2021), in helping firms manage difficult circumstances.

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. While existing papers investigate a number of important aspects of the impact of COVID-19, our contribution is unique in providing a comprehensive investigation of firms' real-side decisions, including employment and capital expenditures. Our series of surveys allow us to analyze companies' planning in real time as the COVID crisis hit as well as their long-term outlook for the post-COVID recovery. We confirm the key findings with archival data. We examine *multiple dimensions* of flexibility and highlight the importance of three margins: 1) financial flexibility, which captures the well-studied observation that financial resources are important for supporting adjustments in firms' activities; 2) workplace flexibility, which refers to firms' abilities to accommodate remote work in order to maintain social distancing; and 3) investment flexibility, which reflects whether firms can modify the timing of their capital spending in response to changing conditions. In this paper, we show i) how each of these dimensions plays a role in shaping corporate planning in the COVID-19 crisis and ii) how they interact.

Our primary data come from a survey conducted from mid-February to mid-April 2020, capturing in real time the responses of US companies to the sudden COVID-19 outbreak; in particular, their plans for hiring and investing. Companies in our sample represent all sectors and 47 of the 50 states. They include large, medium, and small

firms, as well as public and private entities. We continued to survey CFOs in June, September, and December of 2020. These additional survey waves confirm the trajectory of business plans for 2020; and importantly, provide information on companies' long-term planning for the post-COVID world.

The strategy we use to study various dimensions of corporate flexibility is straightforward. Our financial flexibility measure captures CFOs' (survey-based) assessments, and reflects both the availability of internal funds and access to external financing. For workplace flexibility, we identify the extent to which employees are able to work remotely (cf. Papanikolaou and Schmidt, 2021; Dingel and Neiman, 2020). For investment flexibility, we use survey-based information on firms' abilities to adjust the timing of their capital expenditures; that is, whether to delay or accelerate spending. Using O*NET and BEA data, we also create a proxy to control for businesses' exposure to reduced demand based on social interactions consumers face in the purchase process (i.e., both direct exposure and indirect exposure through downstream industries).

To organize our analysis, we start with a simple model framework that illustrates how different aspects of corporate flexibility affect firms' real decisions. More financial flexibility, such as having more cash available, relaxes firms' funding constraints and supports more employment and investment. Workplace flexibility helps firms stay productive during the COVID emergency, reducing health risks from traditional in-person work and boosting employment. Investment flexibility allows firms that are experiencing adverse conditions and production difficulties to defer capital expenditures during COVID (or accelerate investment if conditions are favorable). As we detail below, our model focuses on how multiple dimensions of corporate planning are affected following the onset of the pandemic, complementing recent work by Acharya et al. (2021) on firms' precautionary tradeoff between maintaining financial efficiency and operational resiliency.

Our first set of empirical tests looks at firms' real decisions as the pandemic hit, conditional on their financial, workplace, and investment flexibility. We document key determinants of companies' planning for employment and capital spending during the COVID outbreak. To begin, we find that firms with more financial flexibility planned for higher employment and capital expenditure growth in 2020, a result that resonates with the positive impact of financial flexibility on stock returns reported by

existing studies (e.g., Fahlenbrach et al., 2021; Ramelli and Wagner, 2020). Notably, we find that the impact of financial flexibility on employment is significantly stronger for firms with more fixed costs. This evidence aligns with economic intuition: if a company's costs are entirely fixed, then revenues decline in a crisis but costs do not. In this case, having access to cash can be especially important for covering fixed costs. In contrast, if a company's costs are entirely variable, then costs will also decrease as production activities and revenues fall in a crisis, alleviating the need for extra cash.

In addition to studying financial flexibility, a novel aspect of our paper is simultaneously exploring the roles played by two additional forms of flexibility, as well as interactions between all three forms of flexibility, as companies managed the COVID crisis. We find that higher workplace flexibility is associated with significantly higher planned employment growth. This positive effect of workplace flexibility echoes findings in the literature (see, e.g., Papanikolaou and Schmidt, 2021; Favilukis et al., 2020). 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. We also explore the role of investment flexibility and its interaction with workplace flexibility. We find that workplace flexibility affects how firms use investment flexibility: companies with a flexible workplace can operate relatively smoothly during the crisis 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 results hold over time based on realized outcomes from subsequent surveys. We also provide external validation for our survey results using realized Compustat data. Finally, we consider additional types of flexibility related to workplace arrangements (e.g., part-time workers, scheduling autonomy, unionization) and adjustment costs (Gu et al., 2019, 2021), but do not find significant effects associated with these margins in the COVID crisis.

We perform further analyses to characterize the extent to which the above results reflect the unique challenges of the 2020 pandemic. Among other tests, we compare our findings during the COVID-19 crisis to the economic forces at play during the Global Financial Crisis using CFO survey data from Campello et al. (2010). We first show that financial flexibility appears to exert similar impact on employment and in-

vestment plans in both crises. We then turn to the analysis of workplace flexibility, noting that the physical environment and logistics of the workplace have evolved significantly in recent years.[1] Our results show that workplace flexibility played *no role* in firms' decisions during the 2008 financial crisis, while it is *central* in the 2020 health crisis. Likewise, our tests do not indicate that firms significantly exploited their investment flexibility during the 2008 crisis — at least not in tandem with their workplace flexibility. As external validation for these results, we use historical Compustat and BLS data to show that workplace flexibility did not significantly affect firm employment or investment in the 15 years before 2020. Our extensive checks confirm that our central findings are new to the COVID-19 crisis.

A final set of tests investigate companies' planning for the post-COVID world. We find that firms' responses to the pandemic may have accelerated changes in the *nature* of investment. Notably, firms with high workplace flexibility expect employment to recover more quickly and capital spending more slowly; these firms also expect remote work to persist for longer. Our evidence suggests that this segment of the economy may steer away from investing in traditional physical assets, instead investing in the workforce and intangible assets that facilitate flexible collaboration. We also find that large firms and firms with lower workplace flexibility are inclined to implement automation to reduce their dependence on labor. This link between workplace flexibility and automation is new and can contribute to a persistent impact of workplace flexibility on employment decisions. Accordingly, we investigate which types of workers are most affected by automation and find that low-skill workers are more likely to be displaced. In particular, low workplace flexibility firms show a stronger tendency to displace low-skill workers. While these steps may help firms better withstand future health crises or other workplace disruptions, the prospect of increased automation that we document may pose new, long-term challenges for many workers in the economy.

Literature Review. Our paper builds on several strands of research. First, an influential literature has emphasized the role of financial flexibility in general (e.g., Fazzari et al., 1988; Whited and Wu, 2006) and its effects during the COVID-19 crisis in partic-

[1] Barrero et al. (2021) point out the proportion of employees who primarily worked from home had grown from 0.8% in 1980 to 2.4% in 2010, reaching 4% in 2018. Around 40% of working age individuals were working from home in May 2020 (see also Bick et al., 2021; Brynjolfsson et al., 2020). See Bloom et al. (2014) and Mas and Pallais (2017) for pre-COVID studies on remote work.

ular. Among other dimensions, these papers examine how firms build cash holdings as a form of boosting financial flexibility during COVID (Acharya and Steffen, 2020), as well as how financially flexible firms experience better stock returns (Fahlenbrach et al., 2021; Ramelli and Wagner, 2020; Ding et al., 2021). We add to this literature by documenting the role of financial flexibility on firms' *real-side* planning for employment and investment. We further show that the impact of financial flexibility is contingent on the firm's cost structure: the effects of financial constraints are particularly strong among firms with high fixed costs.

Second, our work relates to recent research on work from home. Several papers document the work-from-home waves that occurred in 2020 and suggest that work from home will persist in the future (Bick et al., 2021; Barrero et al., 2021). Favilukis et al. (2020) and Papanikolaou and Schmidt (2021) find stronger stock performance among firms in industries with higher work-from-home capability, and Pagano et al. (2021) find higher stock returns for industries with better social distancing in general. Our contribution in this dimension is to utilize detailed firm-level data on real decisions about employment and investment, analyze the interactive role of workplace flexibility in connection with other forms of flexibility, and shed light on firms' decisions both during the COVID-19 outbreak and over the long-term. Our results show that workplace flexibility was not only a first-order determinant of employment decisions during the health crisis, but it may play a key role for the long-term transformation of both the nature of investment (firms with high workplace flexibility shift away from traditional capital expenditures) and the nature of the workforce (firms with low workplace flexibility adopt automation to replace labor).

Several existing papers survey firms about the effects of COVID-19. The majority of those surveys focus on small businesses (Bartik et al., 2020; Alekseev et al., 2020; Bloom et al., 2021); Barrero et al. (2020) cover a range of firm sizes, but focus on the reallocation angle of the COVID shock. Focusing on public companies, Hassan et al. (2021) perform textual analyses of conference calls and document that executives discuss disruptions of production and operations more during the COVID-19 pandemic than in previous disease outbreaks. Our data are inclusive of larger corporations that play a measurable role in their industries and the larger economy. We use our survey data to perform a comprehensive analysis of firms' *ex ante* real decisions during the

COVID crisis, shedding light on key outcomes regarding hiring, capital investment, workplace arrangements, and automation. We also confirm our key findings using *ex post* realizations of firms' employment and capital spending based on Compustat data. Finally, there is an important literature analyzing firms' stock returns at the onset of the COVID-19 crisis, including several studies discussed above. We provide a detailed comparison of our results relative to those in the stock returns literature in Section 4.3.[2]

Taken together, our work adds to the literature for the new insights it brings into how corporate flexibility facilitates the real decisions firms make in responding and adapting to crises. In particular, our analysis advances knowledge into how firms jointly operate across *multiple margins* (financial, workplace, and investment flexibility), as well as their interactions, during the COVID crisis. Our study complements recent work by Acharya et al. (2021) on the interface between firms' financial and operational margins.

2 Data and Summary Statistics

We describe our data sources and present summary statistics in this section. We describe the main variables covered by our CFO surveys in Section 2.1 and variables from other sources in Section 2.2. Appendix C provides information on the construction of each variable used in the paper.

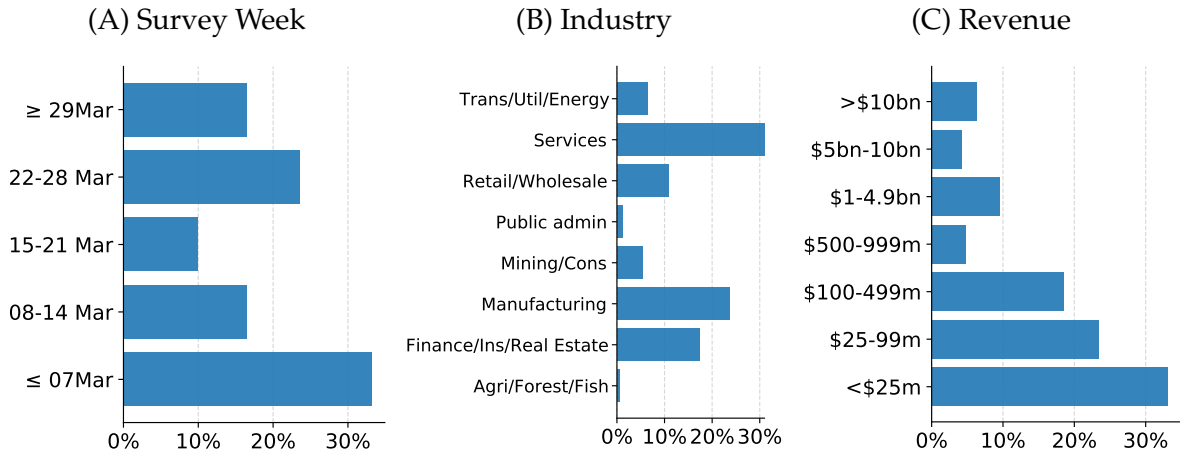
2.1 CFO Survey Data

Our baseline data source is the Global Business Outlook survey of US CFOs conducted by Duke University in the first quarter of 2020. The survey questionnaire is available at https://cfosurvey.fuqua.duke.edu/release/. 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

[2]Another set of studies focus on the impact of government policies. For instance, Chetty et al. (2020), Granja et al. (2020), and Balyuk et al. (2021), among others, examine the effects of the Paycheck Protection Program (PPP).

Figure 1: March 2020 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.



19.5%, which is high compared with typical surveys of executives and investors.[3]

Figure 1 summarizes key characteristics of the respondent firms and shows that the sample includes a wide variety of company 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. Figure A.1 in the Appendix shows that the composition of firms is also similar among responses in different survey weeks. Panel B of Figure 1 shows that sample firms are spread across several industries, including services and manufacturing. Panel C shows that the sample includes large firms (revenue over $1 billion), as well as "middle market" (revenue between $100 million and $1 billion) and small firms.

To provide more context for our analysis, we also compare our sample to Compustat firms based on 2019 financial information. Table 1 shows the firm size distributions in both samples. Specifically, columns (1) and (5) show the fraction of our sample and Compustat that are within each revenue bracket. Our sample contains proportionally more small firms than Compustat, given that we include many private firms, but our sample also includes a reasonable number of medium-sized and large companies.

[3]The response rate for prior Duke CFO surveys was about 9% (Graham and Harvey, 2001; Ben-David et al., 2013). Gompers et al. (2020) 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%.

Columns (2) to (4) and (6) to (8) show quartiles of employment within each revenue bracket. The comparison shows that, within each revenue bin, our sample largely captures the distribution of employment of Compustat firms. Taken together, our sample appears well-suited for studying the broad cross-section of companies.

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 structures and equipment) in 2020. In addition, 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.3 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. We verify that this attribute has an important industry component: the R^2 from four-digit NAICS fixed effects is 0.45. 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 have focused on costs that depend on the magnitude of

investment (as summarized by Cooper and Haltiwanger, 2006).

Following the March 2020 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.[4] 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.

2.2 Other Data

We collect data from several other sources to enhance our analysis. The external datasets measure firm attributes at the industry level, and we match them with firms in our CFO surveys based on their industries.[5]

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) (Papanikolaou and Schmidt, 2021; Hensvik et al., 2020; 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 uses O*NET data and is available for two- and three-digit NAICS codes.[6] Traditionally, workplace flexibility has been examined in labor economics from the employee's perspective (e.g., remote work is a potential way to balance work and family). Since the COVID-19 outbreak, workplace flexibility also became central from the firm's perspective as remote work helps companies adapt to health risks and social distancing.

The workplace flexibility measures from ATUS and O*NET are both constructed using data prior to the COVID-19 crisis, and we cross check these *ex ante* measures

[4]Collectively, nearly 650 firms responded to the June, September, and December surveys, with responses relatively evenly split across the three quarters. These surveys are publicly available at https://www.richmondfed.org/research/national_economy/cfo_survey/data_and_results. Our analysis of these data and conclusions do not necessarily reflect the views of the Federal Reserve Bank.

[5]We know the industry codes of public firms directly. For private firms, we use the company name provided by the CFO to infer the firm's industry using historical business data from services such as Infogroup, and from survey-based responses that list the names of other firms in their industries.

[6]The ATUS and O*NET (Dingel and Neiman, 2020) work-from-home measures use similar sources but their construction procedures contain important differences. The ATUS measure captures whether workers can work from home (and have done so in the past). The O*NET measure captures the nature of the work that employees perform at the occupation level. Appendix C discusses these measures in detail.

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 codes, the BLS data show 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. Figure A.3 in the Appendix presents a scatter plot demonstrating the high correlation between the pre-COVID ATUS measure (x-axis) and the July 2020 BLS measure (y-axis). While the overall prevalence of work from home increased substantially after the COVID outbreak, the cross-sectional relation across industries stayed constant.

We also collect data to control for the impact of the COVID-19 crisis on *customer demand*. In a pandemic, customers reduce activities that require social contact. To control for this factor, we follow the literature (e.g., Koren and Pető, 2020; Pagano et al., 2021) and measure the degree of "in person" transactions in an industry by looking at how much employees interact with customers to provide goods and services. We use the O*NET Work Activities survey, which asks workers how important "performing for people or dealing directly with the public" is to their job. We aggregate this to the industry level (four-digit NAICS) and term it "Direct Customer Interactions."

We note that the above measure only appropriately proxies the effects of the COVID-19 demand reduction for firms that are directly consumer-facing. It ignores the fact that this reduction in customer demand may travel along the supply chain. For instance, although Boeing does not score high on direct customer interactions, Boeing's demand was negatively affected by the health crisis because its main downstream industry (airlines) has high direct customer interactions. Hence, we also construct an "Indirect Customer Interactions" measure by taking the weighted average of "Direct Customer Interactions" among a given firm's *downstream industries*, where the weights are computed using the fraction of sales to different downstream industries according to the Input-Output Table of the BEA. Industries such as retail and travel rank high for direct customer interactions and low for indirect customer interactions, whereas manufacturing industries that supply to them rank high for indirect customer interaction and low for direct customer interactions. Fahlenbrach et al. (2021) analyze how customer interactions filter through the supply chain and affect stock returns, and our indirect measure is similar in construction. The "Customer Interactions" variable we use

in our empirical analysis is a weighted average of the direct and indirect measures.[7]

2.3 Summary Statistics

Table 2 reports summary statistics for the March 2020 survey and Table A.1 does the same for the three subsequent surveys from June, September and December of 2020.

Measures of Flexibility. For financial flexibility, about 20% of firms are classified as having low financial flexibility. Concerning workplace flexibility, 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 26% of firms in an industry indicate that they can adjust the speed of capital investment flexibly.

Figure A.2 in the Appendix shows pairwise variable correlations from the March 2020 survey. Workplace flexibility and financial flexibility are not highly correlated; workplace flexibility and investment flexibility are weakly positively correlated.

Table 2 about here

CFO Outlook. Table 2 shows that, in the March 2020 survey, CFOs expect 4.6% annual revenue growth. They also expect a modest average level of employment growth and capital expenditure growth for the year. As we show using Figure A.4, CFOs' revenue expectations changed substantially from early March through early April, as the severity of the pandemic escalated. The projections were between 5% to 10% in early March, but collapsed to approximately 0% by late March and early April, staying steady in subsequent surveys (though respondents change from survey to survey).[8] Figure A.4 also shows a high degree of alignment between the CFO forecasts in our data and equity analyst forecasts reported in IBES (studied by several recent papers, e.g., Landier

[7] In particular, $\text{Customer Interactions}_i = C_i\,(\text{Direct}_i) + (1 - C_i)\,(\text{Indirect}_i)$, where C_i is the industry's share of output that belongs to "Personal Consumption Expenditures" in the BEA's Input-Ouput Table (i.e., directly selling to consumers) and $1 - C_i$ is the share of sales that belong to intermediate goods.

[8] In the June 2020 survey, CFOs indicated that COVID-19 would directly 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.

and Thesmar, 2020; Hong et al., 2021). This consistency indicates that firms in our survey are representative of firms in general. Overall, COVID-19 is a large shock and the revenue impact for 2020 is substantial, comparable in magnitude to the negative revenue impact firms experienced in 2009. Table A.1 shows that CFOs, on average, expect revenue growth through 2021 to return to close to 10%. Although CFOs expect a relatively speedy revenue recovery, as we show in Sections 4 and 5, this crisis affects the very organizational structure of firms and CFOs expect these long-term effects to persist after revenues recover.

Firm Heterogeneity. Since the onset of COVID-19, it has become apparent that the severity of the shock was different across firms. The March 2020 survey asked CFOs about their firms' exposure to risk from COVID-19. Table A.2 examines the determinants of this self-assessed risk exposure. 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 COVID risk exposure, but the statistical relation is weak, suggesting that CFOs do not necessarily consider the 2020 crisis to be financial in nature. Higher customer interactions (direct or indirect) are also associated with higher COVID risk in the view of CFOs. While subjective, this COVID-related risk assessment gives insight into CFOs' perceptions of the multifaceted challenges brought by COVID-19. In particular, the alleviating role of corporate flexibility provides a basis for our exploration into its effects on real decisions.

3 Conceptual Framework: The Role of Flexibility during the COVID-19 Outbreak

As discussed above, the challenges brought about by the COVID-19 crisis are multifaceted. Hence, we propose a basic conceptual framework to study how multiple dimensions of corporate flexibility affect firms' real decisions during a crisis. This simple framework helps us organize our subsequent empirical work. We discuss in turn its building blocks.

First, it is well understood that financing constraints can be relevant for firms' decisions in a variety of crises (even crises that do not originate from the financial sector), as firms rely on financial resources to support their operations and avoid financial

distress. Indeed, these issues have been the focus of several papers on firms' financial policies or stock performance during COVID-19 (see Acharya and Steffen, 2020; Fahlenbrach et al., 2021; Ramelli and Wagner, 2020). We refer to this margin as "financial flexibility." Our empirical measure summarizes firms' ability to access *both* internal and external funding, as explained in Section 2.1 (see also Table A.3).

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. This theme is also reflected in recent academic studies that measure and analyze the prevalence of work from home (Dingel and Neiman, 2020; Barrero et al., 2021; Papanikolaou and Schmidt, 2021; Alon et al., 2020; Hensvik et al., 2020). Workplace flexibility became critical as the pandemic unfolded, as it allowed for better social distancing practices and helped employees balance caring for family members as needed. Firms whose employees cannot easily work from home may need to adopt additional health protocols (even 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 and their productivity in the pandemic. Our work integrates this margin together with other levers that are relevant to companies.

Third, faced with the sudden pandemic outbreak, firms needed to consider their ability to adjust the timing of their investment projects. Naturally, the manner in which companies utilize investment flexibility should depend on the circumstances they face. In particular, firms experiencing favorable conditions can utilize greater flexibility to front-load investment. In contrast, firms experiencing unfavorable conditions due to the pandemic can utilize greater investment flexibility to delay capital spending during difficult times. As a result, we expect investment flexibility to interact with factors that determine whether firms face favorable or unfavorable conditions. As we demonstrate below, workplace flexibility is an important margin in determining whether a firm faces favorable operating conditions in the COVID crisis, and the degree of workplace flexibility modulates how firms use their investment flexibility. This analysis reveals the role of investment flexibility as a margin of adjustment for addressing a crisis; the conditional impact of investment flexibility also helps us identify which factors are important for shaping whether firms experience favorable or unfavorable conditions.

A Simple Model. We integrate the above observations into a simple two-period model. We do so by following an influential body of work that highlights that the core shock induced by COVID-19 is a supply shock (Guerrieri et al., 2021; Eichenbaum et al., 2021; Fornaro and Wolf, 2020; Acemoglu et al., 2020; Baqaee and Farhi, 2020, 2021; Favilukis et al., 2020), where the magnitude of this shock is modulated by the degree of workplace flexibility. Guerrieri et al. (2021), for example, model the COVID-induced supply shock as "a fraction $\phi > 0$ of agents become unable to produce," so production changes from $Y_t = N_t$ to $Y_t = (1-\phi)N_t$.[9] Favilukis et al. (2020) provide a model that examines several possible shocks associated with COVID. Those authors show that to match the empirical evidence it is important to model COVID as a productivity shock that hits a firm harder if the firm is less able to implement remote work. Correspondingly, we also model COVID as a productivity shock, where its impact is modulated by the degree of workplace flexibility. To the extent a supply shock induced by COVID may also translate into an aggregate demand shock (Guerrieri et al., 2021), we further allow for a demand shifter in the firm's production function similar to Favilukis et al. (2020).

Period 1 in our model corresponds to the COVID outbreak, when firms respond to a sudden and unanticipated health crisis. In this period, firms are hit by a supply shock that forces them to operate at a fraction ϕ of normal productivity A (e.g., workers cannot come to production facilities, so the supply of labor and the use of capital both decline). Our model also allows firms to experience a shift in demand, indexed by B (this maps into the customer interaction control variable we include in our empirical analyses below). In response to these shocks, the firm plans for employment, and adjusts its previous investment plans for this period (pre-determined value K_1) by deferring Δ units of investment to Period 2. Period 2 corresponds to production after the COVID crisis.

The firm optimizes by choosing its labor (governed by L_1 and L_2) and capital (governed by Δ and K_2). For simplicity, capital depreciates fully across periods and the discount rate is normalized to one. The wage rate of workers is denoted by w. The

[9] One can interpret the shock as either only $(1-\phi)$ fraction of agents can work at a given point of time, or all agents can work at $(1-\phi)$ fraction of the pre-COVID capacity. Either interpretation is sufficient for the purposes of our analysis.

firm solves the following maximization problem:

$$\begin{aligned}\max_{L_1,\Delta,L_2,K_2} \quad & B[\phi A L_1^{\alpha} + \phi A (K_1 - \Delta)^{\beta}] + A L_2^{\alpha} + A (K_2 + \Delta)^{\beta} \\ & - (wL_1 + wL_2) - (K_1 + K_2 + \xi \Delta^2) \\ \text{s.t.} \quad & wL_1 + K_1 - \Delta \leq C.\end{aligned}$$

In this setup, financial flexibility during the COVID crisis is represented by a financial constraint that requires spending on labor and capital to be less than available cash C (this can include both internal cash and external financing such as funding through credit lines). As discussed earlier, workplace flexibility modulates the magnitude of the supply shock ϕ during the pandemic. A firm with higher workplace flexibility and a greater ability to accommodate remote work can be relatively more productive in the health crisis (as reflected in higher ϕ). Finally, investment flexibility is captured by firms' ability to modify original plans for investment in period 1 (K_1): the firm can change the amount of investment by Δ and make up for it later in period 2, which comes with a cost $\xi \Delta^2$. This feature of our model is in line with evidence that firms establish their investment schedules ahead of time, but can modify them at some cost in light of changing circumstances (Lamont, 2000; Charoenwong et al., 2021). Firms with higher investment flexibility have a lower ξ. We provide the derivations of model solutions and derivations of comparative statics in Appendix B.

This model framework yields several predictions informing our empirical analyses. First, when the financial constraint is binding, both labor (L_1) and investment ($K_1 - \Delta$) in period 1 will increase with C (more cash available to support expenditures in period 1). This prediction verifies the importance of financial flexibility. Second, higher workplace flexibility (and therefore higher ϕ) is associated with higher employment in the pandemic (L_1).[10] Third, if the firm decides to defer investment given adverse conditions during COVID (i.e., $\Delta > 0$), then more investment flexibility will lead to more deferral (i.e., Δ is higher when ξ is smaller). If the firm decides to front-load investment (i.e., $\Delta < 0$) because it experiences relatively favorable conditions,

[10] One exception is that higher workplace flexibility may not boost employment when financial constraints are binding and firms choose to front-load investment (i.e., $\Delta < 0$). In this case, due to the binding financial constraints, labor competes with capital for financial resources. When ϕ is high, if sufficiently more resources are given to investment, employment could decline.

then more investment flexibility will lead to more front-loading (i.e., Δ is more negative when ξ is smaller). Finally, for the demand shifter B, higher demand would generally boost employment and investment. The demand shifter can also interact with investment flexibility: firms with stronger (weaker) demand face favorable (adverse) conditions, and will use greater investment flexibility to front-load (defer) investment.

We note that as the COVID-19 outbreak is an unanticipated, unprecedented emergency, the workplace flexibility and investment flexibility measures we focus on reflect the nature of business operations in different industries, which affect companies' decisions following the onset of the crisis. In addition to the influence of external industry attributes, individual companies may also develop operational strategies and precautions in advance of crises. Recent work by Acharya et al. (2021) analyzes this dimension and investigates how financial hedging and operational hedging interact.

Other Forms of Flexibility. Our main analyses focus on three forms of flexibility that are central in the COVID-19 crisis. We also explore several other forms of flexibility and provide additional tests in Section 4.1.3. First, firms with higher fixed costs cannot easily reduce their operating costs when negative shocks hit. Although fixed costs do not directly affect marginal returns from employment and investment, they can make financial resources (e.g., cash) especially valuable. In particular, when revenues fall during the COVID-19 outbreak, high fixed costs can drain firms' cash holdings and make the financial constraint more binding. Second, firms may differ in other dimensions of the workplace arrangement, such as the use of part-time *vs.* full-time workers and the ability to schedule work hours flexibly. Third, there can be other forms of adjustment costs of labor or capital, such as unionization and traditional capital adjustment costs. Our empirical work will consider these as well as other forms of flexibility.

4 Corporate Plans to Hire and Invest during the COVID-19 Crisis

Employment and capital expenditures are among the most important elements of corporate decision-making. Through our survey instrument, we are uniquely able to study 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 compare our COVID-19

findings to actions taken by firms during the 2008 Financial Crisis. We also validate our survey findings with subsequent surveys and realized archival data.

4.1 Corporate Flexibility in the 2020 Health Crisis

4.1.1 Basic Results on the Impact of Corporate Flexibility

In Table 3, we follow the framework introduced in the previous section and test 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 the US. We do so using CFOs' projections of employment and capital spending growth in 2020 from the March 2020 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.

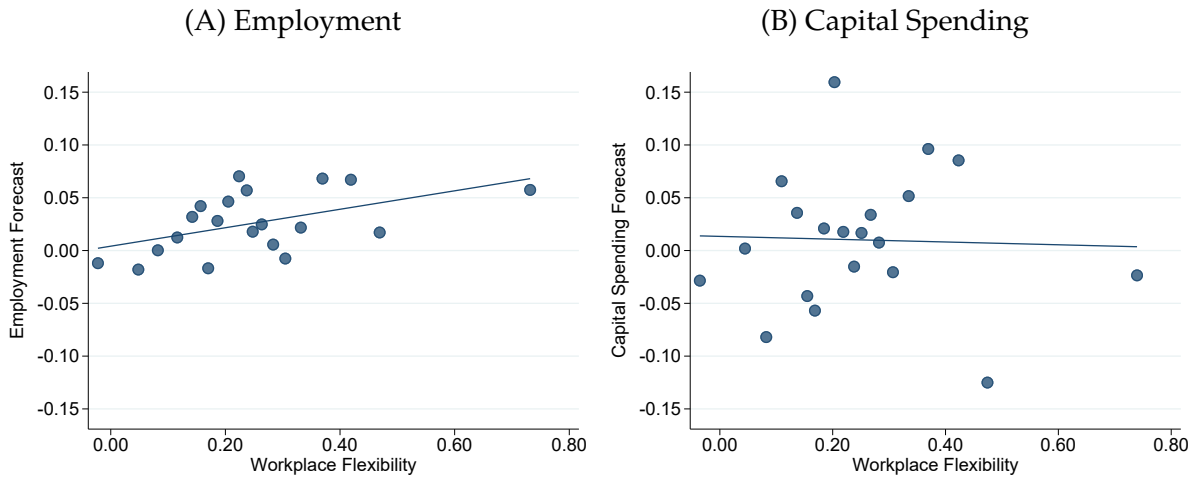
Table 3 about here

Results in Table 3 show that higher financial flexibility is associated with higher planned employment and capital expenditure growth in 2020. This is consistent with predictions discussed above and prior findings on the impact of financial flexibility on corporate plans. All else equal, firms with low financial flexibility expect 7–9 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 pandemic, consistent with our predictions. This result holds for both measures of workplace flexibility. Firms at the 75th percentile of the fraction of employees who can work from home expect 3–4 percentage point higher employment growth than those at the 25th percentile.[11] In untabulated tests, we find that this effect remains significant among the subset of firms with high financial flexibility, in line with predictions. Interestingly, higher workplace flexibility does not directly translate into higher projections of capital expenditure growth. As we discuss later, this evidence suggests that firms at which employees can work from home

[11] 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 3 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 $0.5 \times 0.08 = 0.04$.

Figure 2: 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 3, 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 3, Panel A. The data come from the March 2020 CFO survey.



may be shifting towards new forms of investment and away from traditional capital expenditures.

Table 3 also shows that investment flexibility does not have a clear, unconditional impact on real decisions, in line with our predictions. As discussed above, how firms use investment flexibility should depend on whether they face favorable or unfavorable conditions, and we document this interactive result in the data shortly.

Overall, our results are robust to including controls of customer demand and firm size (log employees at the end of 2019), though neither of these variables is significant.[12] They are also robust to the inclusion of time (calendar week) fixed effects and state fixed effects (which absorb state-level variations in pandemic policies such as stay-at-home orders). Finally, they are robust to the inclusion of two-digit NAICS fixed effects, indicating that there is meaningful variation at the finer industry level.

Figure 2 depicts two of the insights from Table 3 via binscatter plots, displaying planned employment and capital expenditure growth plotted against workplace flexi-

[12]Table 3 is based on the March 2020 survey data. In untabulated analysis, when we use all four quarters of our survey data, the customer interaction variable becomes significantly negatively related to employment, as expected. Thus, this negative relation between customer interaction and employment is driven by data from the second half of 2020. This conclusion is consistent with analysis of full-year Compustat data in Table 8, where again there is a negative association between customer interaction and employment. Detailed analysis available upon request.

bility. In a related paper, Papanikolaou and Schmidt (2021) 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 3 and Figure 2, 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 full-year 2020. As shown in the table and figure, our data also allow us to study firms' investment decisions jointly with their employment decisions, which is important for a broader understanding of the effects of various levers of corporate flexibility.

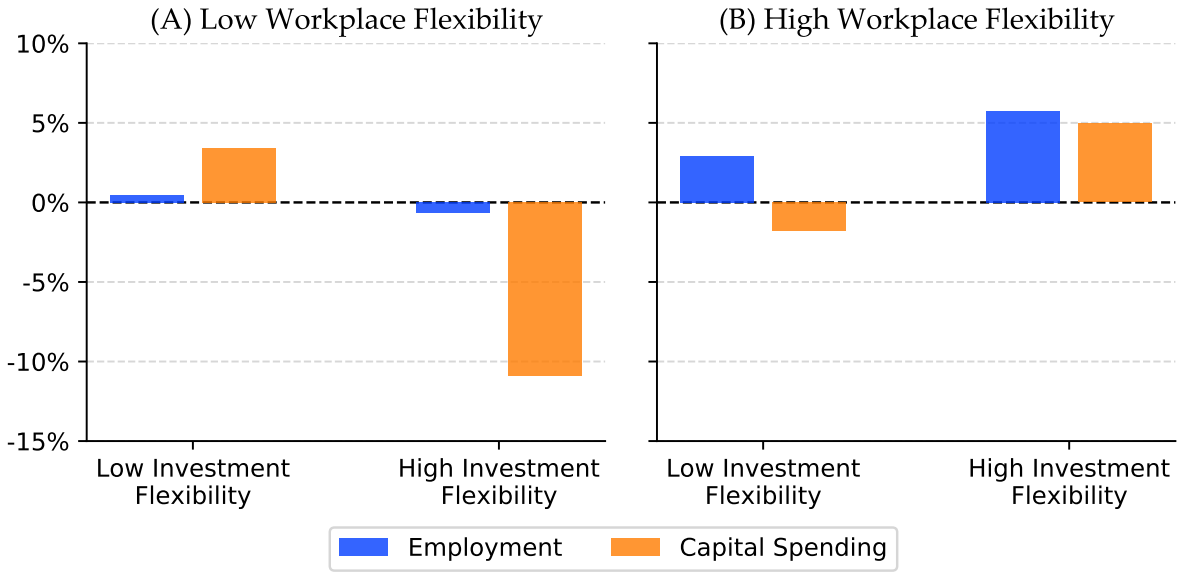
4.1.2 The Conditional Impact of Investment Flexibility

We expand our analysis of corporate flexibility by unpacking the conditional nature of investment flexibility. As discussed in Section 3, we expect firms experiencing favorable *vs.* unfavorable conditions to use their investment flexibility differently. In terms of what determines favorable conditions, we find that workplace flexibility plays a key role, which we first illustrate in Figure 3. Panel A of Figure 3 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 for firms that 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 operating 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 4 characterizes these data patterns more fully via regression analyses. When workplace flexibility is low, higher investment flexibility is associated with significantly lower planned capital expenditures. In contrast, when workplace flexibility is high (close to one), higher investment flexibility is associated with significantly higher planned capital expenditures. Showing this *conditional effect* of investment flexibility is unique to our paper. In terms of economic magnitudes, the results in Table 4 column (4) imply that for firms with no workplace flexibility, a one standard de-

Figure 3: 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.



viation increase in investment flexibility (0.297) would reduce planned 2020 capital expenditure growth by around 5.9 percentage points ($\approx$ –0.199 $\times$ 0.297). For firms with full workplace flexibility, in contrast, a one standard deviation increase in investment flexibility would boost 2020 capital expenditure growth by 16.5 percentage points ($\approx$ 0.555 $\times$ 0.297). The magnitudes are somewhat larger in column (5). Figure A.5 in the Appendix provides visualization of the marginal effects of investment flexibility on capital spending plans across different levels of workplace flexibility. Results in columns (1) and (2) of the table further show that the interaction between investment flexibility and workplace flexibility also has some impact on planned employment growth (albeit statistically less significantly so). Since investment flexibility relates to firms' ability to adjust investment spending (it is not directly related to employment), labor and capital need to be complementary for this interaction to affect employment (e.g., low workplace flexibility makes firms use high investment flexibility for reducing employment). Otherwise, this interaction would primarily affect capital spending instead of employment.[13]

[13]We note that in Table 4, given the interaction with investment flexibility, the non-interacted coefficients on workplace flexibility in all columns and the non-interacted coefficient on financial flexibility in

Table 4 about here

Finally, other variables that affect whether firms experience adverse or favorable conditions may also interact with investment flexibility in shaping capital spending decisions. One such variable is financial flexibility. The estimates in column (6) suggest that firms with low financial flexibility (possibly experiencing more adverse conditions) appear to use higher investment flexibility to reduce or delay capital expenditures. In comparison, firms with more financial flexibility (possibly experiencing more favorable conditions) do not use higher investment flexibility to cut capital expenditures, though the interaction term of investment flexibility and financial flexibility is not statistically significant. Column (3) shows similar tendencies when the outcome is employment.[14] Another variable that can affect a firms' prospects is customer demand, and in Table A.5 we examine its interactive effects with investment flexibility. This analysis shows that firms with higher customer interaction (hence lower demand and worse conditions during the pandemic) appear more inclined to use higher investment flexibility to reduce or delay capital spending in 2020. The relation has the expected sign but is statistically insignificant in the survey data (Panel A of Table A.5); however, this result is stronger and statistically more significant in Compustat data (Panel B). Overall, how firms use investment flexibility suggests that low workplace flexibility seems to be a key constraining margin during this crisis: workplace flexibility is the strongest determinant of how firms use their investment flexibility to adjust capital spending in 2020.

In our main tests, we use an industry-level measure of investment flexibility, constructed using firm-level data from the March 2019 CFO survey. In order to corroborate our findings in Table 4 and provide basis for aggregating investment flexibility to the industry level, we also examine the subsample of firms that responded to both the March 2019 and March 2020 CFO surveys. This allows us to use firm-specific (rather than industry-average) investment flexibility for each firm in this analysis. Table A.6 displays the results: the conditional impact of investment flexibility on investment is

columns (3) and (6) reflect the impact of these variables when investment flexibility is set to zero. The interaction terms show that the impact of both workplace and financial flexibility tend to be higher when investment flexibility is positive rather than zero.

[14] Table A.4 displays specifications containing interactions amongst all pairs of the flexibility measures, showing that the interaction between workplace flexibility and investment flexibility is significantly robust, while other interactions are insignificant.

present even when we use the firm-level measure and the smaller subsample (47% of the main March 2020 sample).

The findings in this section demonstrate how multiple margins of corporate flexibility affect firms' real decisions during the COVID-19 crisis. The classic margin of financial flexibility plays an important role. Furthermore, we find evidence that workplace and investment flexibility are key factors in shaping firms' hiring and investment decisions for both constrained and unconstrained firms, in line with the predictions of the simple model presented in Section 3. As we show below in Section 4.2, these results were not observed prior to the COVID-19 crisis.

4.1.3 Other Measures of Flexibility

In addition to our three focal measures of flexibility, we collect data on four other measures that are broadly related to the concept of flexibility. We analyze these measures in this section.

First, we study the role of fixed costs: firms with more fixed costs could also be viewed as being less flexible in changing their expenditures in a crisis. During the COVID-19 outbreak, as revenues decline, firms with high fixed costs may face significant financial pressures. Correspondingly, financial flexibility (such as more cash holdings) can be especially important in helping firms with high fixed costs cover their costs and stay afloat. In contrast, high fixed cost companies with limited financial resources may be forced to lay off workers especially aggressively in order to save cash and cover the fixed costs. Hence, financial flexibility is particularly important when a firm's cost structure is predominantly fixed. In comparison, companies with low fixed costs can reduce production, and both revenues and costs will decrease, so having financial flexibility is less critical for low fixed cost firms.

To measure the prevalence of fixed *vs*. variable costs, we follow prior work (Anderson et al., 2003; Chen et al., 2019) and regress log change in operating costs on log change in sales. The regression coefficient indicates the fraction of variable costs in total costs: if costs are 100% variable, the coefficient would be 1; if costs are 100% fixed, the coefficient would be 0. We use Compustat data to perform this regression for each industry, and apply the estimated variable cost share to firms in our CFO

surveys according to their industries. Table 5 uses data from the March 2020 CFO survey and shows that planned employment growth during COVID is especially sensitive to financial flexibility among firms with a higher share of costs that are fixed (a lower share of variable costs).[15] In Table A.7, we use Compustat annual employment growth data for 2020 to explore the interaction of fixed costs with financial flexibility. The Compustat-based analysis uses the same industry-level measure of fixed cost share and uses cash holdings and leverage to proxy for financial flexibility; this analysis finds significant evidence that financial flexibility is most beneficial when cost structure is predominantly fixed.

Table 5 about here

Second, we study other dimensions of the workplace environment, including the use of part-time workers and scheduling flexibility. One hypothesis is that if a company can respond more easily by reducing part-time workers or providing more flexible work schedules, it might be better positioned to support more full-time employment. We measure the prevalence of part-time workers and the degree of scheduling flexibility in each industry using the General Social Survey and ATUS, respectively (Mas and Pallais, 2020). We show the relation between these two variables and the growth of full-time employment in 2020 in Table 6 columns (1) to (4). We do not observe a significant relation in the data, which suggests that these margins do not appear to be the most critical in the COVID crisis.

Third, we study the effects of labor adjustment costs related to unionization. Our measure of unionization is detailed in Hirsch and Macpherson (2003); it equals the percentage of employees that are union members at the four-digit NAICS level. When unionization is high, firms cannot lay off employees very easily. We study the impact of unionization in Table 6 columns (5) and (6). Worker unionization rates do not appear to influence our findings.

Finally, several papers also construct a summary measure of firms' flexibility in changing the scale of operations by examining the variability of operating costs rel-

[15] The interactive fixed cost result becomes weaker in column (4) with the inclusion of state fixed effects due to the influence of a small state (District of Columbia, which has four observations) with an industry make-up dominated by investment funds, which have a hard to measure cost structure. Additional details available from the authors upon request.

ative to sales (Gu et al., 2019, 2021). This measure is one way to capture adjustment costs in general. We also study this measure in Table 6 columns (7) and (8) and do not find a direct relation with firms' employment or investment outcomes in 2020.[16]

Table 6 about here

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

To provide context for our analysis, in this section 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 comparing corporate decision-making in the COVID-19 crisis to 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 credit markets. 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.[17] 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 may 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 7 presents the same regression specifications as Table 3. Columns (1) and (4) show the results using 2008 data, whereas columns (2) and (5) show the

[16] In untabulated analysis, we repeat Table 6 columns (7) and (8) using Compustat data and do not find significant results either, nor do we find significant interactive effects between this measure and workplace or financial flexibility.

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

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 crisis — and the other flexibility measures with an indicator for the 2020 survey. We find that during *both* the COVID-19 pandemic and the 2008 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 crisis, while its coefficient in the 2008 data is nearly zero. In analogous fashion, Panel B of Table 7 follows the regression specifications in Table 4 and shows that firms exploiting their investment flexibility conditional on their workplace flexibility is unique to the 2020 pandemic. Here, too, we find no interactive evidence to suggest that workplace flexibility matters for how firms utilize their investment flexibility in the 2008 crisis.

Table 7 about here

Overall, the comparisons in Table 7 highlight that the impact of workplace flexibility is absent in the financial crisis, but has become central since 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.

4.3 External Validation via Realized Outcomes

Our March 2020 survey provides valuable information about corporate planning in real time as the COVID-19 crisis hit. We subsequently collected more data on companies' realized outcomes from both additional surveys and Compustat to verify the robustness of our findings. Since the subsequent analyses cover a different set of firms, they help confirm that our results on the key drivers of corporate decisions in response to COVID-19 hold in general.

Realized Outcomes based on Subsequent Surveys. In the September 2020 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 A.6 plots the responses, separately for firms with high *vs.* low workplace flexibility. One can see that as of September 2020, firms with high workplace flexibility were less likely to have experienced reductions in employment.

Interestingly, they are not less likely to have cut capital expenditures. These findings are consistent with results in Table 3 that high workplace flexibility firms in the March survey anticipated higher employment growth, but did not anticipate higher capital spending 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. Finally, we also asked firms about their current level of remote work (relative to pre-COVID times). Firms with high workplace flexibility are significantly more likely to have increased remote work (orange *vs.* blue in Panel D of the figure), which aligns with our definition of workplace flexibility. Table A.9 verifies these results through ordered logit regressions (coefficients presented in odds ratios).

Realized Outcomes based on Compustat and BLS Data. We also perform external validation of our survey-based analysis using realized outcomes among Compustat firms. Table 8 presents regressions that study annual employment growth and capital expenditure growth in 2020. These annual outcomes map closely to the questions in our CFO surveys (which asked firms about their employment and capital spending plans for the year 2020). We continue to use measures of workplace flexibility and investment flexibility by industry (i.e., these industry-level measures are the same as what we used in previous regressions with survey data). For financial flexibility, nonetheless, we have to rely on proxies in Compustat data. Following other work (Fahlenbrach et al., 2021; Ramelli and Wagner, 2020), we use cash holdings and leverage to proxy for financial flexibility, though we acknowledge that these proxies may only partially measure the concept of financial flexibility. Therefore, in this analysis we interpret cash and leverage as control variables for financial flexibility, more so than as precise measures of financial flexibility.[18]

Columns (1) to (3) of Table 8 validate the results in columns (1) to (3) of Table 3 — workplace flexibility was an important determinant of employment realizations in 2020. Columns (4) to (6) of Table 8 validate our results on the conditional impact of investment flexibility. Similar to what we find in Table 4 based on firms' internal

[18]For instance, Table A.3 shows that CFOs' assessment of financial flexibility are significantly related to both cash/assets and a survey question about access to external capital (the latter of which leverage may be a component). However, the R^2 from these two variables is small, as shown in column (1) without fixed effects, so a specification based on cash and leverage leaves unexplained a fair amount of the variation in financial flexibility.

plans reflected in the March 2020 survey, realized capital spending growth of Compustat firms confirms a significant interactive effect between workplace flexibility and investment flexibility: firms use their investment flexibility to increase capital expenditures if conditions are favorable and reduce capital expenditures if conditions are unfavorable. Figure A.7 in the Appendix presents a graphical summary of regressions that perform "placebo checks" using Compustat data from previous years. Panel A shows that workplace flexibility did not play a positive role in employment growth prior to 2020. Further, Panel B confirms that neither did the interaction between investment flexibility and workplace flexibility in shaping capital expenditures seem to occur before 2020.[19]

Table 8 about here

At the industry level, the BLS provides data on employment. In untabulated analyses, we verify that cumulative employment growth since the end of 2019 (through December 2020) is significantly positively correlated with workplace flexibility, with a similar magnitude to what we find in Table 3. In the rightmost columns of Table A.8, we show that there was no significant relationship between workplace flexibility and employment before 2020.

Corporate Flexibility and Stock Returns. Finally, an influential literature has examined the drivers of stock returns at the onset of the COVID-19 crisis. Our analysis complements this research in that we investigate corporate actions during this period. We examine the determinants of firms' real decisions — both *ex ante* plans via CFO survey data and *ex post* realizations via Compustat and other data — and our findings are generally consistent with results from the stock return literature.

Four main sets of results in the stock return literature relate to our work. First, a number of studies document that firms with more cash and lower leverage (higher financial flexibility) experienced higher stock returns when COVID-19 struck (Fahlenbrach et al., 2021; Ramelli and Wagner, 2020; Ding et al., 2021). Using CFOs' assessments of financial flexibility, we find that such firms had higher planned employment growth and capital expenditures growth. Our analysis of Compustat data further con-

[19]The 2008 Compustat result in Figure A.7 in the Appendix also confirms the survey-based comparison of the 2008 and 2020 crises in Table 7.

firms that firms with more cash at the end of 2019 had higher realized employment growth in 2020. Second, firms in industries with more ability to work from home (higher workplace flexibility) also had higher stock returns after COVID-19 hit (Papanikolaou and Schmidt, 2021; Favilukis et al., 2020; Pagano et al., 2021). We find that such firms had significantly higher employment growth in 2020 in both our CFO survey and Compustat datasets. Third, firms in industries facing higher customer interactions (thus potentially lower customer demand) witnessed lower stock returns (Fahlenbrach et al., 2021; Pagano et al., 2021). We find that high customer interaction firms had lower realized employment and capital spending growth in Compustat data, though the latter is not significant. Using CFO survey data, in untabulated analysis, we also find a significant negative relation between customer interactions and planned employment growth in surveys conducted in the second half of 2020, though the relation is insignificant in the March 2020 survey data. Finally, results in Fahlenbrach et al. (2021) suggest that customer interaction and financial flexibility may also interact: in particular, cash appears more important for stock returns when customer interaction is high.[20] In Table A.10, we test this interaction in employment and capital spending outcomes using Compustat data, and find a similar result in terms of coefficient signs, although insignificant. In unreported results, we find a similar interaction (in terms of signs of coefficients) between financial flexibility and customer interactions in determining employment plans in the March 2020 CFO survey sample, though again insignificant.

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

Our results thus far describe the role of corporate flexibility in shaping firms' more immediate responses to the COVID-19 outbreak. In this section, we discuss longer-term implications of the 2020 pandemic.

Long-Term CFO Outlook of Employment and Investment. To understand managers' long-term expectations and the extent to which the COVID-19 crisis can have a lasting impact, we asked in the September 2020 survey "When, if ever, do you expect the level of revenue, employment, capital expenditures, and share of workforce working

[20] Fahlenbrach et al. (2021) report an insignificant interaction between leverage and customer interaction.

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 analyze the recovery of revenue, employment, and capital expenditure intensity to pre-COVID levels. For more relevant insights, we focus on firms that have been negatively affected by COVID-19 (or at least have stayed about the same), which comprise the vast majority of respondents. Table 9 shows the results using ordered logit regressions. The estimated coefficients are presented in odds ratios and a coefficient below (above) one indicates a faster (delayed) return to normal.

Table 9 about here

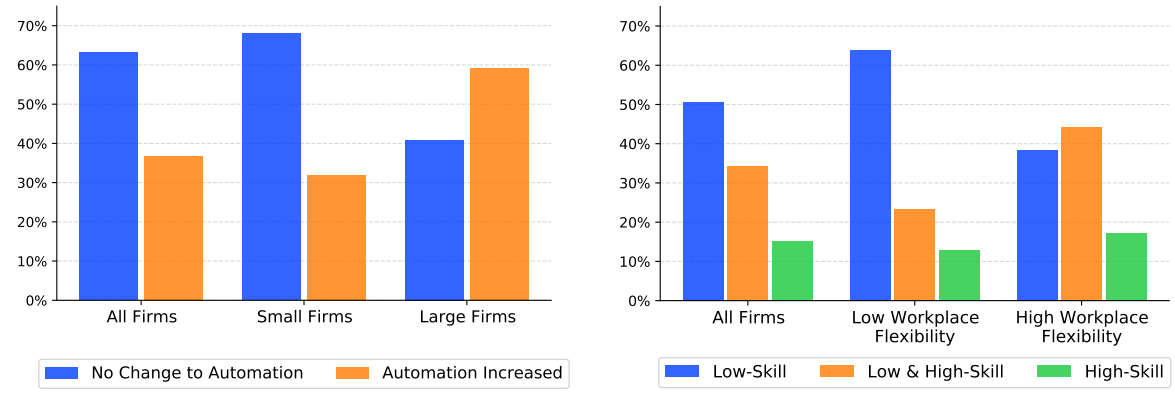
We find that firms with high workplace flexibility expect employment to recover faster (relative to low workplace flexibility firms). In contrast, these firms expect a slow recovery in capital spending. This dynamic could be driven by the acceleration of the workplace transformation in light of COVID-19: 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 (Corrado et al., 2009; Eisfeldt and Papanikolaou, 2013; Haskel and Westlake, 2018; Crouzet and Eberly, 2019). Accordingly, slower growth of capital spending going forward 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.

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 had decreased their amount of remote work since the COVID crisis began. As shown in Figure A.8, about 50% indicated that the level of remote work would go back to the pre-COVID level by the end of 2021, while 40% thought the level of remote work was unlikely to ever return (see also Bartik et al., 2020; Barrero et al., 2021; Eberly et al., 2021). Table 9 further 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.

Figure 4: 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



Automation since the COVID-19 Outbreak. Finally, we study the shift towards automation in response to the pandemic, which may be an important aspect of the lasting impact of COVID-19. A growing literature highlights labor could be displaced by technology as times change (Acemoglu and Restrepo, 2020; Kogan et al., 2021). 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 4.

When we analyze automation via regressions, we control for firm size and customer demand. We also include as a control a proxy for the level of human coordination required in the production in each industry (e.g., teamwork, interpersonal communications); these features are difficult to replicate with an automated workforce (indeed, higher human coordination is associated with a lower automation propensity). 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 10 (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 10 about here

It is noteworthy that the coefficient on workplace flexibility in Table 10 remains unchanged in column (2) after we control for industry-level automation penetration from 2004 to 2014 (see Acemoglu and Restrepo, 2020). Indeed, workplace flexibility not being correlated with *prior* automation adoption trends suggests that workplace flexibility does not proxy for inherent technological drivers of automation. In other words, the current push for automation among low workplace flexibility firms is new; not a continuation of prior automation trends. The pandemic experience may have accelerated the shift towards automation, especially among low workplace flexibility firms. 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 could have lasting consequences. It is thus 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 4. In particular, firms with low workplace flexibility — which show a stronger propensity to automate in the first place — are more inclined to replace low-skill workers (a similar result can be gleaned from the ordered logit estimations in columns (3) and (4) in Table 10). 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.

Taken together, these findings suggest that firms in industries with low workplace flexibility may be prompted to change their production processes and workforce profiles. With higher costs due to health risks, firms in low workplace flexibility sectors may replace human labor with automation. This could possibly contribute to a "robot-led recovery" in these sectors in the long run.

6 Concluding Remarks

In early 2020, the US experienced its largest economic dislocation in a decade. The crisis was triggered by an unprecedented emergency of global proportions: the rapid spread of the novel coronavirus. 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. We do so via a series of CFO surveys that directly track how firms planned to adjust their operations. We focus, in particular, 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 company planning, especially among firms with high fixed costs. 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 responses; 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.

Critically, our analysis suggests that workplace flexibility 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 require new perspectives for understanding the post-pandemic era. In particular, while we expect financial flexibility to continue to be important, our study shows that workplace and investment flexibility can be central for analyzing firms' decisions going forward. In addition, traditional measures of investment such as capital expenditures are likely to become increasingly incomplete in capturing firms' investment activities. Finally, firms may budget more capital expenditures towards automation, which may affect the size and profile of the workforce. The type of long-term adjustment — whether 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. While our work provides new, early insight into these important issues, more research 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. Column (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%	Median	75%	% of Sample	25%	Median	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 for the March 2020 Survey. The number of observations, means, standard deviations, and quartiles are displayed. Detailed variable definitions are given in Appendix C.

	N	Mean	Std dev	25%	Median	75%
CFO Forecast Variables						
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
Flexibility Variables						
Financial Flexibility	520	0.806				
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
Control Variables						
Customer Interactions	451	0.445	0.104	0.369	0.465	0.498
Log # Employees (2019)	520	5.451	2.601	3.807	5.212	6.921

Table 3: 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 (from the end of 2019 to the end of 2020) 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). Customer Interactions is a four-digit NAICS level variable that proxies for the intensity of interactions with consumers, which can affect customer demand during the pandemic. Log # Employees (2019) is the natural logarithm of the firm's number of employees at the end of 2019. Detailed variable definitions are in Appendix C. 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		
Financial Flexibility	0.068***	0.071***	0.074***	0.077***	0.081***	0.089***
	(0.017)	(0.018)	(0.019)	(0.027)	(0.026)	(0.027)
Workplace Flexibility	0.100***	0.111***	0.085***	0.032	0.039	-0.007
	(0.029)	(0.030)	(0.024)	(0.043)	(0.041)	(0.064)
Investment Flexibility	0.030	0.017	0.026	-0.030	-0.044	-0.074
	(0.018)	(0.020)	(0.023)	(0.072)	(0.071)	(0.075)
Customer Interactions		0.091**	0.013		0.091	0.055
		(0.041)	(0.080)		(0.117)	(0.265)
Log # Employees (2019)		-0.002	-0.006		-0.004	-0.008
		(0.004)	(0.005)		(0.006)	(0.008)
Observations	405	405	400	397	397	391
R-squared	0.045	0.050	0.224	0.009	0.011	0.159
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		
Financial Flexibility	0.069***	0.071***	0.075***	0.077***	0.081***	0.091**
	(0.018)	(0.019)	(0.018)	(0.026)	(0.026)	(0.032)
Workplace Flexibility (DN)	0.080***	0.076***	0.093***	-0.006	-0.015	0.001
	(0.019)	(0.022)	(0.030)	(0.047)	(0.051)	(0.060)
Investment Flexibility	0.023	0.018	0.026	-0.026	-0.037	-0.022
	(0.024)	(0.025)	(0.022)	(0.078)	(0.076)	(0.082)
Customer Interactions		0.026	0.055		0.077	0.013
		(0.045)	(0.046)		(0.125)	(0.135)
Log # Employees (2019)		-0.002	-0.006		-0.005	-0.010
		(0.004)	(0.005)		(0.006)	(0.007)
Observations	405	405	400	397	397	391
R-squared	0.042	0.044	0.193	0.009	0.010	0.130
Week FE			Yes			Yes
State FE			Yes			Yes

Table 4: 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 Customer Interactions and Log # Employees (at the end of 2019). Detailed variable definitions are available in Appendix C. 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		
Financial Flexibility	0.071***	0.077***	0.048	0.082***	0.094***	0.059**
	(0.018)	(0.019)	(0.034)	(0.027)	(0.028)	(0.023)
Workplace Flexibility	0.039**	0.046**	0.043**	-0.124	-0.146	-0.150
	(0.017)	(0.017)	(0.017)	(0.073)	(0.100)	(0.100)
Investment Flexibility	-0.037*	-0.025	-0.114*	-0.199**	-0.250***	-0.358***
	(0.021)	(0.027)	(0.057)	(0.074)	(0.077)	(0.087)
Workplace Flex × Investment Flex	0.302***	0.268	0.287	0.754***	0.922***	0.945***
	(0.090)	(0.182)	(0.180)	(0.179)	(0.273)	(0.270)
Financial Flex × Investment Flex			0.104*			0.126
			(0.050)			(0.097)
Observations	405	400	400	397	391	391
R-squared	0.058	0.230	0.234	0.029	0.177	0.179
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 5: Impact of Fixed Costs

This table examines the interactive effects of fixed costs and financial flexibility on firms' employment plans. The dependent variable is the expected annual growth rate of employment in 2020, using data from the March 2020 CFO survey. Fixed Cost Share is a four-digit NAICS level variable that proxies for the proportion of a firm's operating costs that are fixed (as opposed to variable). It is measured based on the sensitivity of log changes in operating costs with respect to log changes in sales. 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). Controls are Customer Interactions and Log # Employees (at the end of 2019). Detailed variable definitions are in Appendix C. 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)
	Employment			
Financial Flexibility	0.030	0.026	0.031	0.065*
	(0.024)	(0.024)	(0.025)	(0.031)
Fixed Cost Share	-0.112**	-0.122**	-0.114*	-0.055
	(0.043)	(0.045)	(0.054)	(0.057)
Fixed Cost Share × Financial Flex	0.124**	0.136**	0.125**	0.053
	(0.053)	(0.055)	(0.056)	(0.070)
Workplace Flexibility	0.104***	0.118***	0.108***	0.095***
	(0.031)	(0.034)	(0.032)	(0.031)
Investment Flexibility	0.031	0.019	0.020	0.026
	(0.018)	(0.020)	(0.025)	(0.022)
Observations	398	398	398	393
R-squared	0.063	0.069	0.133	0.252
Controls		Yes	Yes	Yes
NAICS-2 FE			Yes	Yes
Week FE			Yes	Yes
State FE				Yes

Table 6: Other Measures of Flexibility

This table examines the role of other measures of flexibility in determining firms' employment plans. The dependent variable is the expected annual growth rate of employment in 2020, using data from the March 2020 CFO survey. Financial, Workplace and Investment Flexibility are as defined in previous tables. Fraction Part-Time is constructed from the 2010-2018 General Social Survey files and is the average fraction of part-time to all (part-time + full-time) employees in each four-digit NAICS industry (Mas and Pallais, 2020; Abraham et al., 2018). Scheduling Autonomy is constructed from the 2017-2018 ATUS and is a four-digit NAICS level variable that represents the degree of autonomy workers have in setting their own work schedules (Mas and Pallais, 2017). Unionization is constructed from 2019 BLS data and is the fraction of employees that are members of a union in each four digit NAICS industry (Hirsch and Macpherson, 2003). Scale Inflexibility is the empirical measure of operational inflexibility in Gu et al. (2019) and Gu et al. (2021), which captures the inability for firms to easily adjust the scale of their operations in response to profitability shocks. We take the firm-level measure for the year 2019 and aggregate to the four-digit NAICS level. Controls are Customer Interactions and Log # Employees (at the end of 2019). Detailed variable definitions are in Appendix C. 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							
Financial Flexibility	0.069***	0.074***	0.068***	0.074***	0.068***	0.075***	0.068***	0.074***
	(0.018)	(0.019)	(0.017)	(0.019)	(0.017)	(0.019)	(0.017)	(0.020)
Workplace Flexibility	0.102***	0.085***	0.110**	0.092*	0.102***	0.083***	0.100***	0.085***
	(0.025)	(0.023)	(0.045)	(0.049)	(0.031)	(0.025)	(0.029)	(0.024)
Investment Flexibility	0.028	0.029	0.031	0.027	0.031	0.030	0.030	0.027
	(0.021)	(0.023)	(0.019)	(0.023)	(0.019)	(0.023)	(0.019)	(0.024)
Fraction Part-Time	0.019	-0.110						
	(0.098)	(0.135)						
Scheduling Autonomy			-0.016	-0.011				
			(0.035)	(0.053)				
Unionization					0.031	0.128		
					(0.092)	(0.272)		
Scale Inflexibility							0.026	0.033
							(0.394)	(0.339)
Observations	405	400	405	400	405	400	405	400
R-squared	0.045	0.224	0.045	0.224	0.045	0.224	0.045	0.224
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 7: 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 3, 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 projected capital spending growth as the dependent variable. In Panel B, we run similar tests to Table 4, 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 Customer Interactions (employment counts are not available for the December 2008 survey, thus we exclude the control Log # Employees from this table). Detailed variable definitions are given in Appendix C. 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**	0.066***	0.043**	0.088**	0.087***	0.081**
	(0.017)	(0.022)	(0.017)	(0.032)	(0.024)	(0.036)
Workplace Flexibility	-0.009	0.093***	-0.027	0.167	0.016	0.154
	(0.047)	(0.022)	(0.039)	(0.105)	(0.057)	(0.111)
Investment Flexibility	0.052	0.023	0.029	0.113**	-0.080	0.066
	(0.030)	(0.022)	(0.025)	(0.053)	(0.076)	(0.050)
March 2020 × Financial Flex			0.029			0.010
			(0.027)			(0.044)
March 2020 × Workplace Flex			0.129***			-0.143
			(0.046)			(0.116)
March 2020 × Investment Flex			0.011			-0.129
			(0.031)			(0.082)
Observations	335	400	735	322	391	713
R-squared	0.167	0.188	0.208	0.095	0.124	0.139
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		
Financial Flexibility	0.041**	0.067***	0.056***	0.081**	0.088***	0.085***
	(0.017)	(0.022)	(0.014)	(0.036)	(0.024)	(0.021)
Workplace Flexibility	-0.008	0.069***	-0.007	0.201	-0.096	0.213**
	(0.051)	(0.014)	(0.053)	(0.123)	(0.067)	(0.098)
Investment Flexibility	0.053**	-0.011	0.039*	0.112	-0.242**	0.078
	(0.021)	(0.028)	(0.021)	(0.074)	(0.085)	(0.079)
Workplace Flex × Investment Flex	-0.004	0.174	-0.041	-0.118	0.827**	-0.022
	(0.179)	(0.152)	(0.145)	(0.196)	(0.297)	(0.228)
March 2020 × Workplace Flex			0.085			-0.317***
			(0.060)			(0.116)
March 2020 × Investment Flex			-0.029			-0.287**
			(0.036)			(0.107)
March 2020 × Workplace Flex × Investment Flex			0.187			0.739**
			(0.196)			(0.338)
Observations	335	400	735	322	391	713
R-squared	0.167	0.191	0.208	0.137	0.139	0.145
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 8: Realized Outcomes in Compustat Data

This table examines the effects of workplace and investment flexibility on employment and capital expenditure growth realizations for Compustat firms. Columns (1) to (3) examine the direct effects of workplace and investment flexibility on employment growth realizations using annual Compustat data and columns (4) to (6) examine the conditional effects of investment flexibility on capital expenditure growth realizations for Compustat firms. In columns (1) to (3), the dependent variable is the log change in employment from 2019 to 2020, in columns (4) to (6) the dependent variable is the log change in capital spending from 2019 to 2020. Workplace Flexibility and Investment Flexibility are the same measures used in Tables 3 and 4. 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). Lagged Leverage is the firm's 2019 ratio of debt to assets ((DLC + DLTT)/AT), and Lagged Cash/Assets is the firm's 2019 ratio of cash and cash equivalents to assets (CHE/AT). Customer Interactions is a four-digit NAICS level variable that proxies for the intensity of interactions with consumers. Log # Employees is the natural logarithm of the firm's number of employees in the previous fiscal year (2019). To create our sample, we start with all observations for the 2020 fiscal year. We require that a firm have positive assets, non-negative debt, non-missing data for lagged leverage and cash/assets, and a non-missing four-digit NAICS code. 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)
	Employment Growth			Capital Spending Growth		
Workplace Flexibility	0.155***	0.069**	0.070**	0.121	-0.087	-0.077
	(0.036)	(0.031)	(0.031)	(0.129)	(0.130)	(0.126)
Investment Flexibility	-0.042	-0.049**	-0.030	-0.319***	-0.371***	-0.360***
	(0.026)	(0.024)	(0.021)	(0.099)	(0.095)	(0.093)
Workplace Flex × Investment Flex				0.767***	0.914***	0.897***
				(0.293)	(0.286)	(0.276)
Lagged Leverage		-0.020	-0.026		-0.036	-0.037
		(0.021)	(0.020)		(0.058)	(0.059)
Lagged Cash/Assets		0.217***	0.193***		0.431***	0.430***
		(0.018)	(0.020)		(0.076)	(0.088)
Customer Interactions			-0.219***			-0.123
			(0.075)			(0.317)
Log # Employees (2019)			-0.008***			-0.001
			(0.002)			(0.009)
Observations	4,689	4,689	4,689	4,212	4,212	4,212
R-squared	0.060	0.088	0.093	0.049	0.058	0.059
State FE	Yes	Yes	Yes	Yes	Yes	Yes
NAICS-2 FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 9: 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, Customer Interactions and Log # Employees (at the end of 2019) 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. Detailed variable definitions are in Appendix C. 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		Capital Spending		Remote Work	
Workplace Flexibility	0.818	0.842	0.702**	0.772*	1.162*	1.215*	1.233***	1.517***
	(0.128)	(0.122)	(0.166)	(0.132)	(0.082)	(0.100)	(0.068)	(0.119)
Investment Flexibility	1.460***	1.389***	1.221	1.324**	1.233*	1.308**	0.816**	0.873
	(0.118)	(0.124)	(0.132)	(0.116)	(0.118)	(0.115)	(0.103)	(0.130)
Customer Interaction		1.236*		1.101		0.891		1.008
		(0.127)		(0.079)		(0.103)		(0.164)
Log # Employees (2019)		1.261**		2.350***		1.300		3.465***
		(0.113)		(0.154)		(0.178)		(0.154)
Observations	197	197	209	209	210	210	233	233
Pseudo R-squared	0.015	0.025	0.015	0.082	0.007	0.015	0.008	0.124

Table 10: 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, Customer Interactions, Log # Employees (at the end of 2019) 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 Human Coordination, the difference between firms in industries that require low and high levels of human coordination). The variable Human Coordination is a four-digit NAICS level binary variable that takes a value of one for firms in industries that require a high degree of human coordination in the workplace. The variable Industry Automation Adoption represents robot adoption between 2004 and 2014 in different industries constructed by Acemoglu and Restrepo (2020). Detailed variable definitions are in Appendix C. 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	0.758**	0.760**	1.690**	1.605**
	(0.127)	(0.127)	(0.208)	(0.214)
Investment Flexibility	1.134	1.138	0.951	0.915
	(0.155)	(0.155)	(0.220)	(0.220)
Customer Interactions	1.117	1.136	1.352	1.191
	(0.165)	(0.175)	(0.289)	(0.313)
Log # Employees (2019)	1.953***	1.953***	0.667*	0.686*
	(0.145)	(0.145)	(0.213)	(0.218)
Human Coordination	0.294***	0.292***	3.386**	2.841*
	(0.354)	(0.360)	(0.587)	(0.596)
Industry Automation Adoption		1.062		0.445**
		(0.102)		(0.320)
Observations	277	277	102	102
Pseudo R-squared	0.104	0.105	0.073	0.092

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).

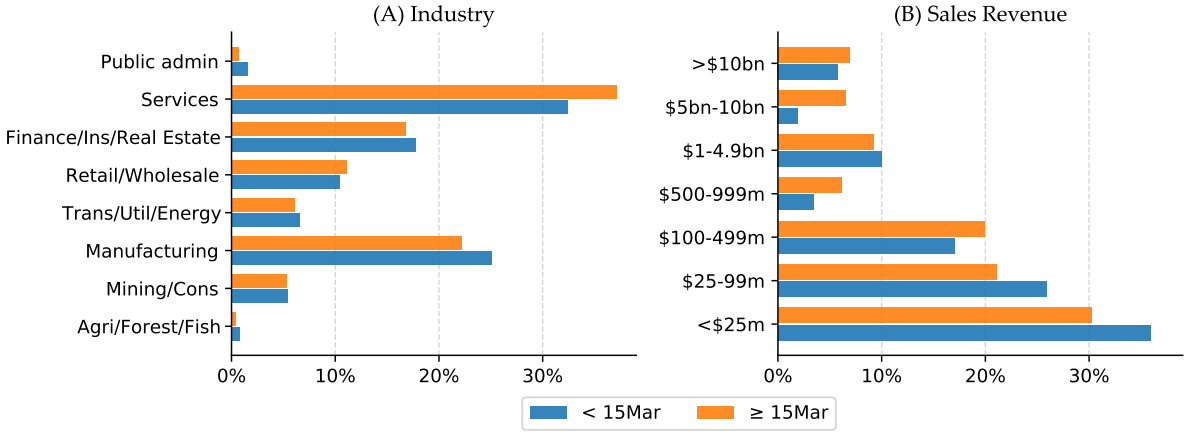


Figure A.2: Cross-Correlations from March 2020 Survey

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. Detailed variable definitions are in Appendix C.

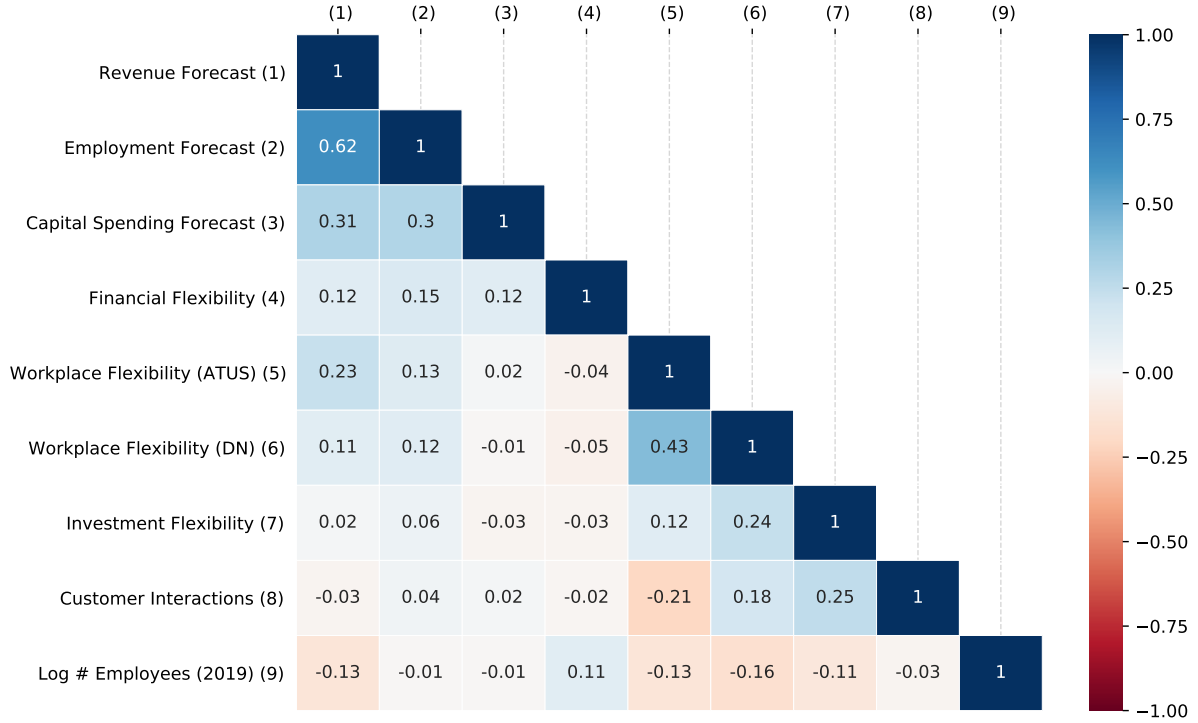


Figure A.3: Remote Work in ATUS (Pre-COVID) versus BLS Data (July 2020)

This figure shows the correlation between work from home measured in ATUS and in BLS data. Each point is a two-digit NAICS industry.

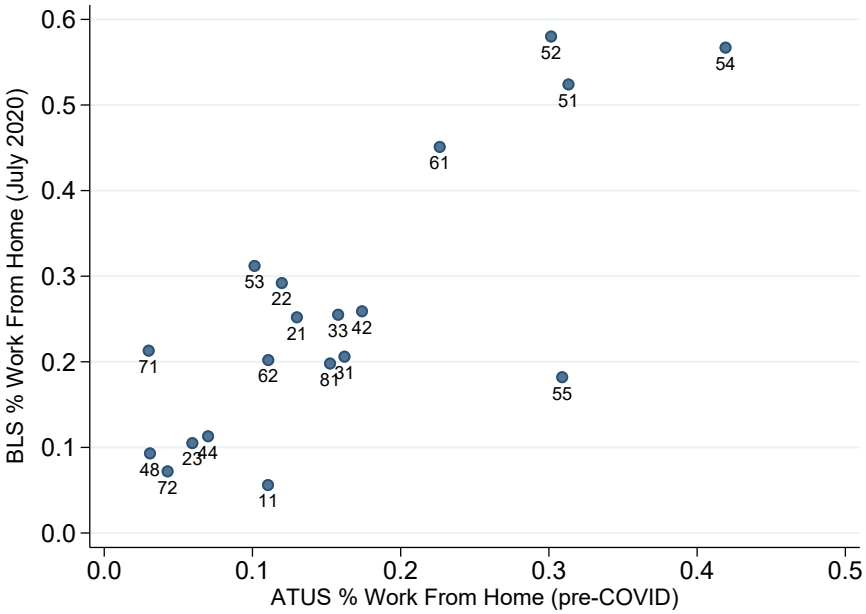


Figure A.4: CFO and IBES Forecasts of 2020 Revenue Growth

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).

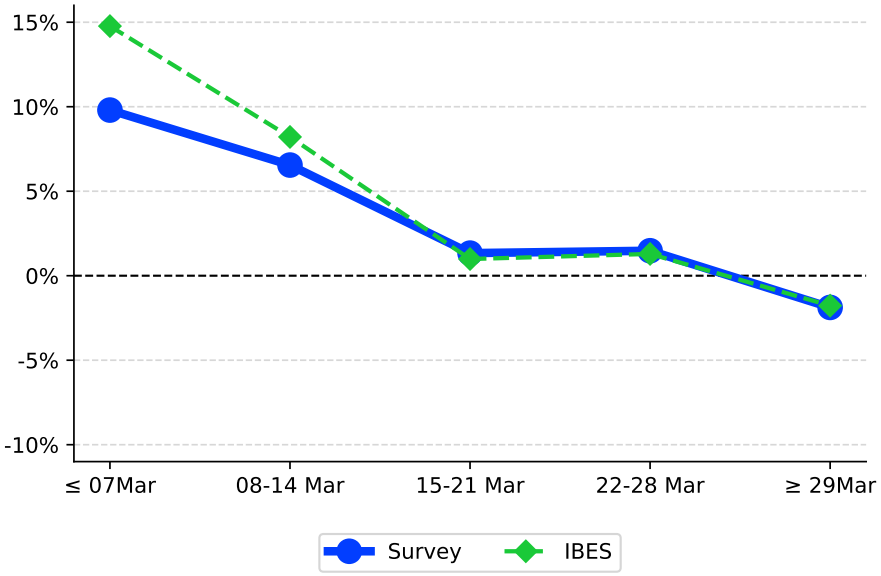


Figure A.5: Effect of Investment Flexibility on Capital Spending Forecasts for Different Levels of Workplace Flexibility

This figure displays the effect of investment flexibility on capital spending forecasts, over the range of workplace flexibility. Estimated using column (5) of Table 4, 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,

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

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

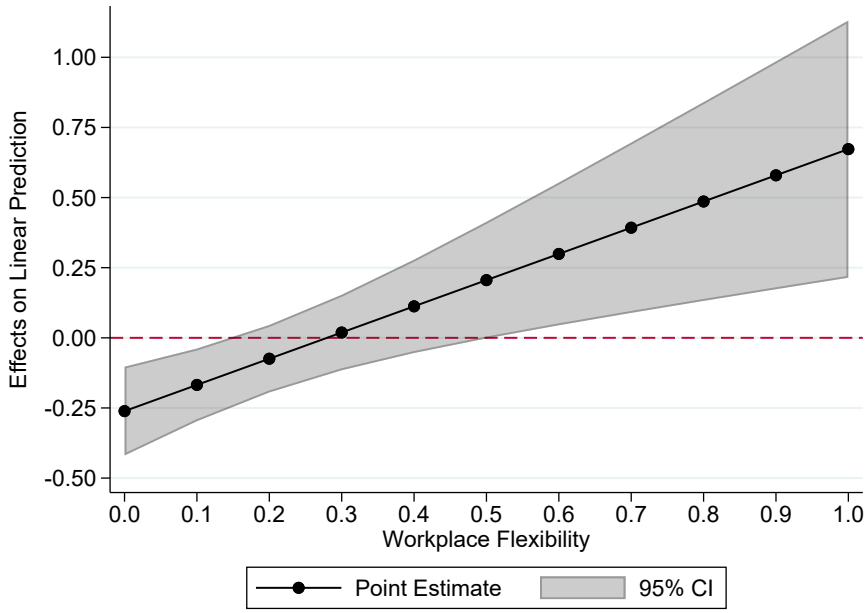


Figure A.6: Effect of COVID-19 on Company Outcomes

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 2020 CFO survey. Employment, capital spending and remote work refer directly to whether the level of the variable decreased or increased in September 2020, relative to pre-COVID. For example, the orange bar above "Decrease" 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 "Decrease" ("Increase") if the new level of capital spending is lower (higher) than the new level of employment (refer to Table A.9 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.

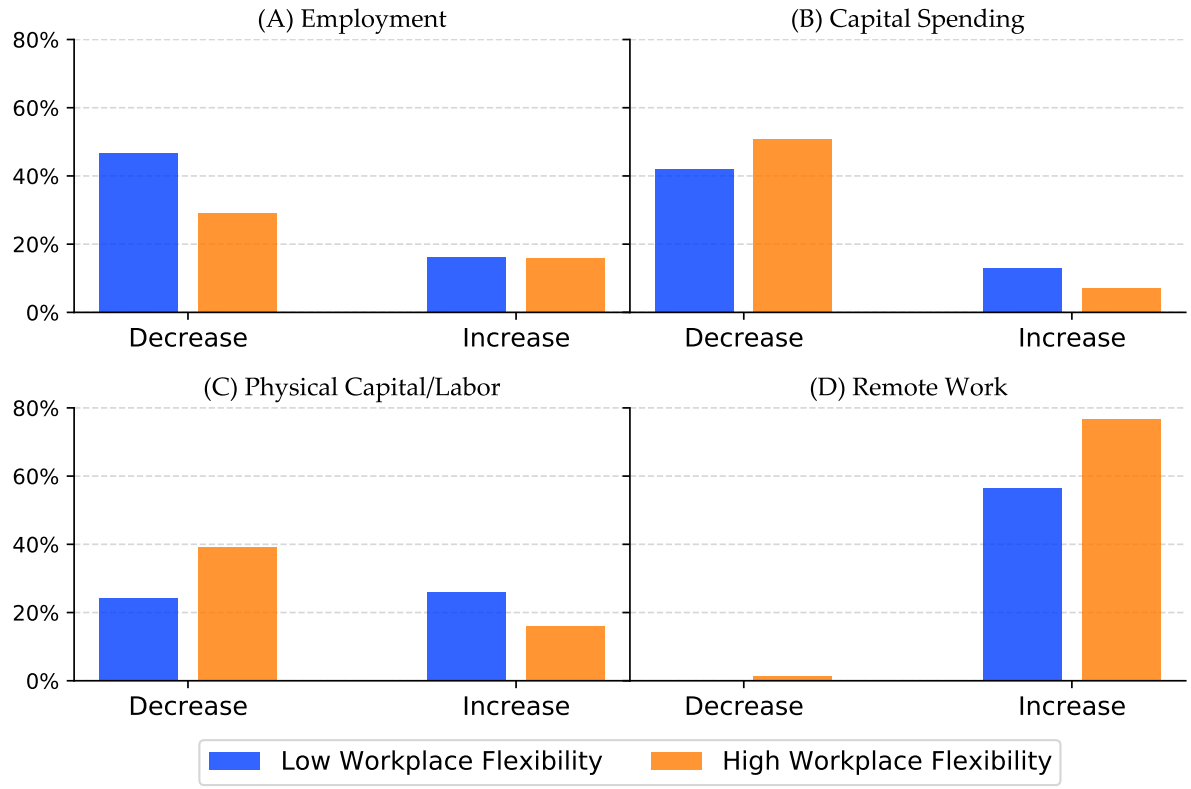
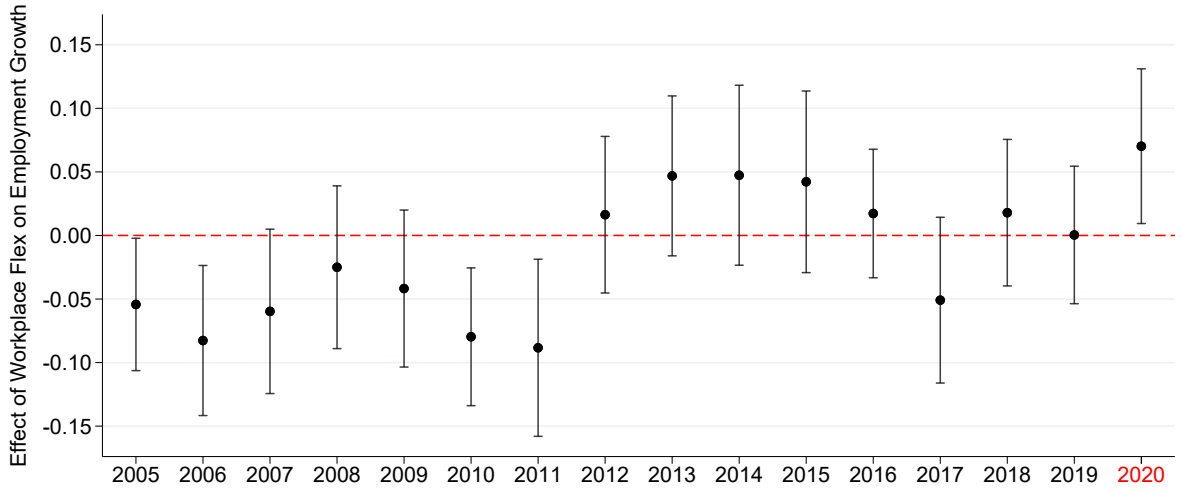


Figure A.7: Employment and Capital Spending Growth in Compustat in Prior Years

This figure displays the effect of workplace flexibility and investment flexibility on realized employment and capital spending growth throughout time. In Panel A, we plot the coefficient on Workplace Flexibility from annual cross-sectional specifications where annual realized employment growth is regressed on Workplace Flexibility, Investment Flexibility, along with controls (lagged leverage, lagged cash/assets, lagged log # employees) and fixed effects (NAICS-2 and state). The exact specification mirrors that in Table 8, column (3). In Panel B, we set the sample as all eligible Compustat observations for each year. We then regress log quarterly capital spending growth on the interaction of workplace and investment flexibility, along with controls and fixed effects (which are the same as described in Panel A above). The exact specification mirrors that in Table 8, column (6). 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 10th (90th) percentile value of workplace flexibility at the four-digit NAICS level (0.036 and 0.653, respectively). In both panels, the vertical bars display 95% confidence intervals.

(A) Employment Growth



(B) Capital Spending Growth

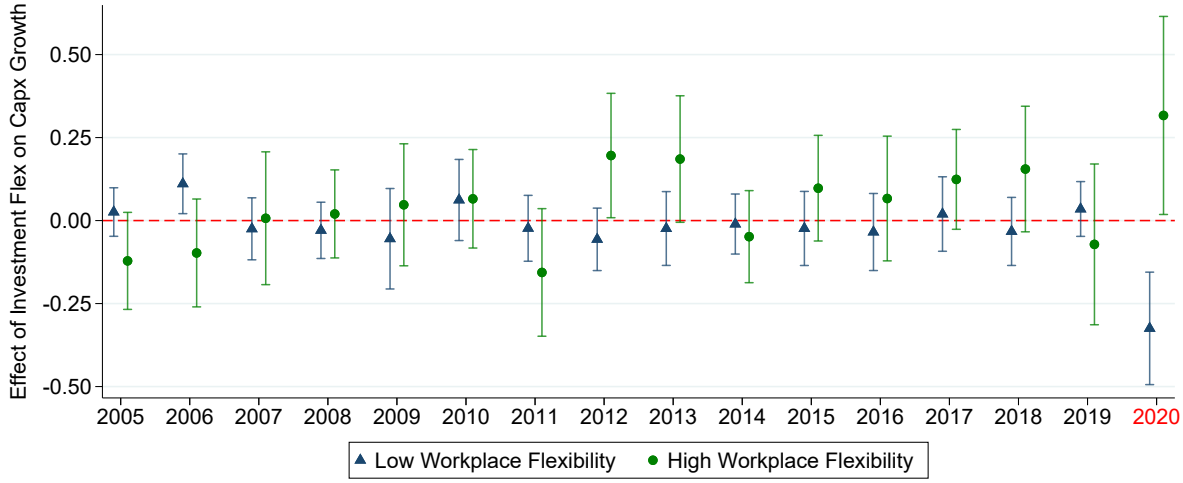
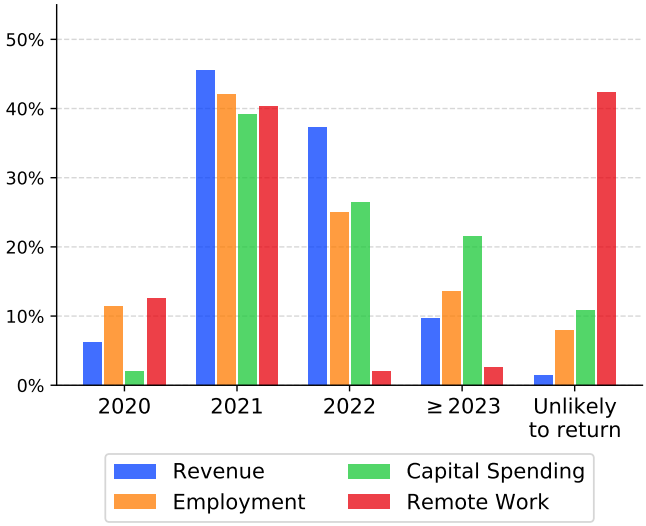


Figure A.8: CFO Outlook of Firm Outcomes Returning to Pre-COVID Levels

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 that stated they saw a decrease in revenue, employment, or capital spending, or an increase in remote work. Panel B displays by workplace flexibility. Low (high) workplace flexibility is below (above) the 25th (75th) percentile of workplace flexibility within-sample.

(A)



(B) Conditional on Workplace Flexibility

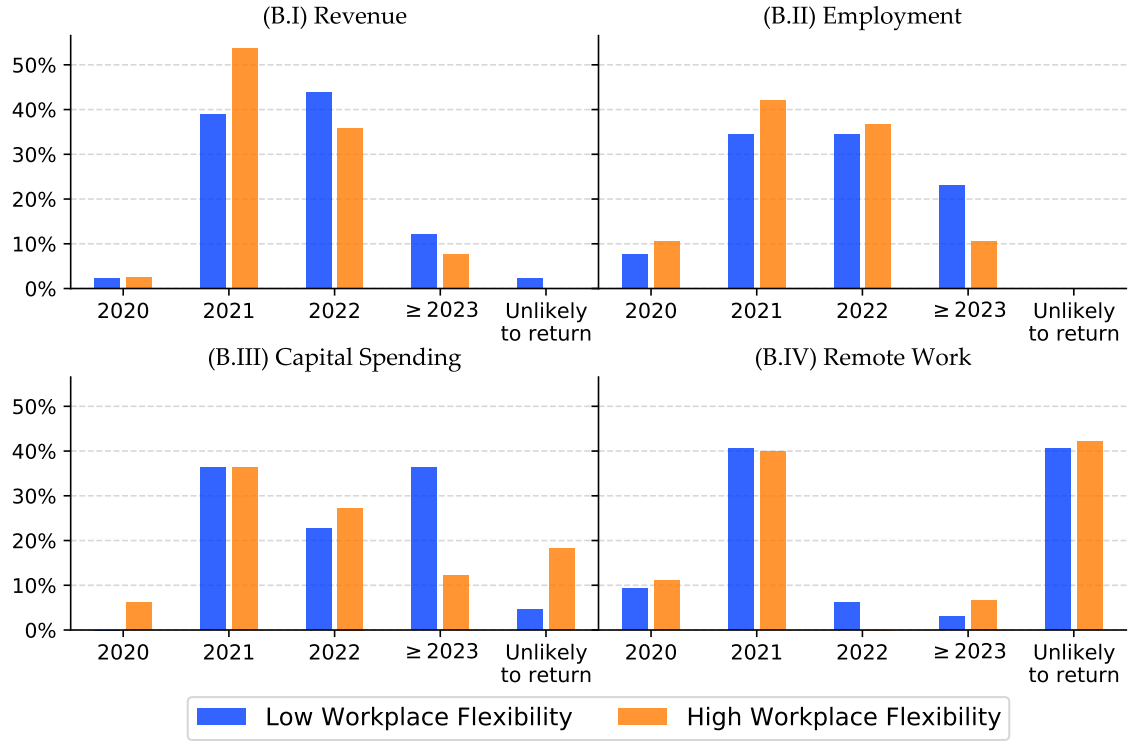


Table A.1: Descriptive Statistics from Subsequent Surveys

This table presents summary statistics of the main variables from the CFO surveys in June, September and December 2020. The number of observations, means, standard deviations and quartiles are displayed. CFO forecasts of revenue and employment represent growth from the end of 2019 to the end of 2020 and 2021. Detailed variable definitions are given in Appendix C.

	N	Mean	Std dev	25%	Median	75%
CFO Forecast Variables						
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
Flexibility Variables						
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
Control Variables						
Customer Interactions	641	0.466	0.101	0.403	0.487	0.515
Log # Employees (2019)	641	4.774	2.240	3.296	4.605	5.943

Table A.2: 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. The dependent variable in all specifications is an indicator variable equal to one if the CFO stated their firm faced "medium" or "large" Coronavirus risk and zero otherwise. 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). Customer Interactions is a four-digit NAICS level variable that proxies for the intensity of interactions with consumers. Log # Employees (2019) is the natural logarithm of the firm's number of employees at the end of 2019. Detailed variable definitions are available in Appendix C. 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
Financial Flexibility	-0.036	-0.042	-0.039	-0.036
	(0.062)	(0.054)	(0.051)	(0.052)
Workplace Flexibility	-0.227**	-0.182**	-0.181**	-0.245***
	(0.088)	(0.081)	(0.075)	(0.083)
Investment Flexibility	-0.118	-0.145*	-0.139*	-0.114*
	(0.070)	(0.073)	(0.073)	(0.061)
Customer Interactions	0.498***	0.502***	0.549***	0.509***
	(0.082)	(0.103)	(0.090)	(0.073)
Log # Employees (2019)	0.010	0.013	0.013	0.010
	(0.011)	(0.011)	(0.011)	(0.010)
Post March 15	0.358***	0.377***		0.358***
	(0.056)	(0.061)		(0.050)
Observations	451	445	445	451
R-squared	0.166	0.268	0.291	0.127
State FE		Yes	Yes	
Week FE			Yes	

Table A.3: 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 Appendix C. 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.4: Conditional Impact of Investment Flexibility: Full Set of Interactions

This table is an extension of Table 4 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. Controls are Customer Interactions and Log # Employees (at the end of 2019). Detailed variable definitions are available in Appendix C. 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					
Financial Flexibility	0.082***	0.094***	0.025	0.059**	-0.001	0.004
	(0.027)	(0.028)	(0.039)	(0.023)	(0.044)	(0.037)
Workplace Flexibility	-0.124	-0.146	-0.124	-0.150	-0.222	-0.336
	(0.073)	(0.100)	(0.074)	(0.100)	(0.162)	(0.199)
Investment Flexibility	-0.199**	-0.250***	-0.373**	-0.358***	-0.363**	-0.340***
	(0.074)	(0.077)	(0.134)	(0.087)	(0.144)	(0.101)
Workplace Flex × Investment Flex	0.754***	0.922***	0.769***	0.945***	0.779***	0.961***
	(0.179)	(0.273)	(0.181)	(0.270)	(0.179)	(0.265)
Financial Flex × Investment Flex			0.210	0.126	0.196	0.100
			(0.147)	(0.097)	(0.158)	(0.110)
Workplace Flex × Financial Flex					0.120	0.230
					(0.117)	(0.144)
Observations	397	391	397	391	397	391
R-squared	0.029	0.177	0.034	0.179	0.035	0.182
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					
Financial Flexibility	0.071***	0.077***	0.037*	0.048	0.027	0.039
	(0.018)	(0.019)	(0.020)	(0.034)	(0.025)	(0.045)
Workplace Flexibility	0.039**	0.046**	0.040**	0.043**	0.001	0.014
	(0.017)	(0.017)	(0.017)	(0.017)	(0.035)	(0.058)
Investment Flexibility	-0.037*	-0.025	-0.139***	-0.114*	-0.135***	-0.111*
	(0.021)	(0.027)	(0.032)	(0.057)	(0.031)	(0.054)
Workplace Flex × Investment Flex	0.302***	0.268	0.310***	0.287	0.316***	0.289
	(0.090)	(0.182)	(0.086)	(0.180)	(0.085)	(0.182)
Financial Flex × Investment Flex			0.122***	0.104*	0.116***	0.100**
			(0.033)	(0.050)	(0.032)	(0.047)
Workplace Flex × Financial Flex					0.047	0.036
					(0.034)	(0.059)
Observations	405	400	405	400	405	400
R-squared	0.058	0.230	0.065	0.234	0.065	0.234
Controls		Yes		Yes		Yes
Week FE		Yes		Yes		Yes
State FE		Yes		Yes		Yes
NAICS-2 FE		Yes		Yes		Yes

Table A.5: Investment Flexibility and Customer Interactions

This table examines the interactive role of investment flexibility and customer interactions in determining capital spending plans and outcomes. Panel A considers capital spending plans for firms in the March 2020 CFO Survey and Panel B considers annual capital spending growth outcomes for the fiscal year 2020 for Compustat firms. In Panel A, the dependent variable is the firm's expected growth in capital spending from the end of 2019 to the end of 2020. Controls are Financial Flexibility and Log # Employees (at the end of 2019). Workplace Flexibility, Customer Interactions and Investment Flexibility are as defined in previous tables. In Panel B, the dependent variable is the log change in capital spending from 2019 to 2020. Controls are Lagged Cash/Assets, Lagged Leverage and Log # Employees (at the end of 2019). For Panel B, we require that a firm have positive assets, non-negative debt, non-missing data for lagged leverage and cash/assets, non-missing employment data from fiscal years 2019 and 2020, and a non-missing four-digit NAICS code. Standard errors are clustered at the four-digit NAICS level and displayed in parentheses below the coefficient. ***, **, * denote significance at 1%, 5%, 10%.

Panel A: March 2020 CFO Survey

	(1)	(2)	(3)	(4)
	Capital Spending			
Workplace Flexibility	0.044	0.064	0.025	-0.114
	(0.046)	(0.068)	(0.065)	(0.091)
Customer Interactions	0.132	0.327	0.261	0.109
	(0.128)	(0.252)	(0.273)	(0.256)
Investment Flexibility	0.052	0.207	0.299	0.063
	(0.393)	(0.333)	(0.346)	(0.292)
Customer Interactions × Investment Flex	-0.206	-0.647	-0.820	-0.669
	(0.876)	(0.768)	(0.781)	(0.659)
Workplace Flex × Investment Flex				0.880***
				(0.265)
Observations	397	397	391	391
R-squared	0.011	0.083	0.164	0.181
Controls	Yes	Yes	Yes	Yes
NAICS-2 FE		Yes	Yes	Yes
Week FE		Yes	Yes	Yes
State FE			Yes	Yes

Panel B: Compustat Annual 2020

	(1)	(2)	(3)	(4)
	Capital Spending Growth			
Customer Interactions	0.491	0.066	0.002	0.025
	(0.373)	(0.345)	(0.343)	(0.348)
Investment Flexibility	0.456	0.268	0.260	-0.047
	(0.366)	(0.179)	(0.190)	(0.200)
Workplace Flexibility	0.118	0.124	0.113	-0.071
	(0.113)	(0.101)	(0.102)	(0.126)
Customer Interactions × Investment Flex	-1.041	-0.782**	-0.774**	-0.605*
	(0.678)	(0.350)	(0.374)	(0.342)
Workplace Flex × Investment Flex				0.829***
				(0.267)
Observations	4,215	4,215	4,212	4,212
R-squared	0.021	0.044	0.058	0.059
Controls	Yes	Yes	Yes	Yes
NAICS-2 FE		Yes	Yes	Yes
State FE			Yes	Yes

Table A.6: Firm-Specific Measure of Investment Flexibility Using March 2019 Subsample

This table examines the interactive effects of workplace and investment flexibility on firms' employment and capital spending plans for firms with a direct measure of investment flexibility, in support of Table 4. The sample is firms that appeared in both the March 2019 (and supplied a direct measure of their firm's Investment Flexibility) and March 2020 CFO Surveys. The dependent variable is the CFOs' projected growth rate for employment (columns (1) to (3)) or capital spending (columns (4) to (6)) for 2020, as given in the March 2020 survey. Investment Flexibility is a dummy variable taking a value of one if the CFO stated they "Flexible" or "Very Flexible" speed with respect to their (largest) investment projects, i.e. the base variable we use to construct our industry-level measure of Investment Flexibility used in our main tests. Financial and Workplace Flexibility are as defined in Table 4. Controls are Customer Interactions at Log # Employees (at the end of 2019). Detailed variable definitions are available in the Appendix C. 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		
Financial Flexibility	0.073**	0.070*	0.092*	0.039	0.349*	0.258
	(0.028)	(0.039)	(0.043)	(0.055)	(0.175)	(0.199)
Workplace Flexibility	0.111**	0.078**	0.085**	-0.250**	-0.293	-0.318
	(0.042)	(0.035)	(0.034)	(0.105)	(0.186)	(0.189)
Investment Flexibility	-0.032	-0.007	0.078	-0.166	-0.307***	-0.736**
	(0.030)	(0.026)	(0.045)	(0.117)	(0.084)	(0.273)
Workplace Flex × Investment Flex	0.015	-0.017	-0.033	0.613**	0.950**	0.999**
	(0.043)	(0.044)	(0.042)	(0.270)	(0.326)	(0.344)
Financial Flex × Investment Flex			-0.088			0.443
			(0.059)			(0.278)
Observations	145	132	132	140	128	128
R-squared	0.083	0.488	0.494	0.026	0.484	0.499
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 A.7: Realized Outcomes in Compustat Data: Impact of Fixed Costs

This table provides external validation from Compustat for our results concerning the interaction of financial flexibility and a firm's fixed cost share found in Table 5. We use Compustat data from fiscal year 2020. We require that a firm have positive assets, non-negative debt, non-missing data for lagged leverage and cash/assets, lagged leverage between zero and one, non-missing employment data from fiscal years 2019 and 2020, and a non-missing four-digit NAICS code. We consider two proxies for a firm's financial flexibility. In columns (1) to (3), Financial Flexibility Proxy is the simple average of the firm's lagged cash/assets (CHE/AT) and one minus the firm's lagged leverage (1-(DLC+DLTT)/AT). In Columns (4) to (6), we use evidence on the determinants of financial flexibility found in Table A.3 to develop a fitted measure of financial flexibility. Specifically, Financial Flexibility Proxy (Fitted) uses the coefficients on Cash/Assets and the indicator variable Limited Access to External Capital in Table A.3, column (1), along with each Compustat firm's lagged cash/assets and an indicator taking a value of one if the firm's lagged leverage is below median (i.e., above median leverage proxies for limited access to external capital). Controls are Customer Interactions, as defined in Appendix C, and Lagged Log # Employees, the natural logarithm of the firm's number of employees from the previous fiscal year (2019). 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)
	Employment Growth					
Fixed Cost Share	-0.204***	-0.145**	-0.145**	-0.722***	-0.613***	-0.608***
	(0.066)	(0.066)	(0.061)	(0.147)	(0.187)	(0.183)
Financial Flexibility Proxy	0.067	0.048	0.034			
	(0.063)	(0.073)	(0.071)			
Fixed Cost Share × Fin Flex Proxy	0.394***	0.390***	0.382***			
	(0.093)	(0.111)	(0.111)			
Financial Flexibility Proxy (Fitted)				-0.052	-0.058	-0.086
				(0.089)	(0.112)	(0.107)
Fixed Cost Share × Fin Flex Proxy (Fitted)				0.756***	0.694***	0.681***
				(0.141)	(0.198)	(0.200)
Observations	4,574	4,572	4,572	4,574	4,572	4,572
R-squared	0.064	0.097	0.101	0.055	0.089	0.093
State FE		Yes	Yes		Yes	Yes
NAICS-2 FE		Yes	Yes		Yes	Yes
Controls			Yes			Yes

Table A.8: 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. Controls in columns (1) to (4) are Customer Interactions, as defined in Appendix C, and Lagged Log # Employees, the natural logarithm of the firm's number of employees from the previous fiscal year. 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	0.051***	0.001	-0.008	-0.005	0.014	0.019
	(0.010)	(0.014)	(0.017)	(0.013)	(0.010)	(0.012)
Lagged Leverage		-0.015***	-0.018***	-0.018***		
		(0.002)	(0.002)	(0.002)		
Lagged Cash/Assets		0.098***	0.076***	0.083***		
		(0.012)	(0.014)	(0.012)		
Customer Interactions			0.054***	-0.005		
			(0.015)	(0.030)		
Lagged Log # Employees			-0.006***	-0.006***		
			(0.001)	(0.001)		
Observations	69,249	69,249	69,249	69,249	3,360	3,360
R-squared	0.001	0.009	0.022	0.024	0.002	0.314
Year FE			Yes	Yes		Yes
State FE			Yes	Yes		
NAICS-2 FE				Yes		Yes

Table A.9: Realized Company Outcomes Relative to Pre-COVID

This table examines how firm outcomes have changed since the onset of COVID. Data are from the September 2020 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, Customer Interactions and Log # Employees (at the end of 2019) 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. Detailed variable definitions are in Appendix C. 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*	1.221	0.778**	0.760**	0.698***	0.707***	1.511***	2.291***
	(0.149)	(0.142)	(0.117)	(0.129)	(0.109)	(0.105)	(0.116)	(0.260)
Investment Flexibility	0.968	0.960	0.984	0.948	0.980	0.975	0.782**	0.797
	(0.181)	(0.186)	(0.090)	(0.103)	(0.140)	(0.149)	(0.105)	(0.139)
Customer Interactions		0.841**		1.095		1.275**		1.107
		(0.077)		(0.108)		(0.102)		(0.221)
Log # Employees (2019)		0.604***		0.914		1.491***		4.237***
		(0.110)		(0.165)		(0.150)		(0.267)
Observations	244	244	244	244	244	244	244	244
Pseudo R-squared	0.010	0.046	0.012	0.014	0.022	0.048	0.033	0.208

Table A.10: Proxies for Financial Flexibility and Customer Interactions in Compustat

This table examines the interactive role of proxies for financial flexibility and customer interactions in determining employment and capital spending outcomes for Compustat firms for the year 2020. Columns (1) to (3) examines the effect of customer interactions (demand) on employment growth outcomes, conditional on proxies for firms' financial flexibility. In column (1) we interact our demand variable with the firm's lagged cash/assets (lagged CHE/AT in Compustat). In column (2), we interact demand with the firm's lagged leverage (lagged (DLC + DLTT)/AT in Compustat). In column (3), we include both interactive terms. Columns (4) to (6) display the analogous specifications for capital spending growth outcomes. In all columns, we require that a firm have positive assets, non-negative debt, non-missing data for lagged leverage and cash/assets, non-missing employment or capital spending data from fiscal years 2019 and 2020, and a non-missing four-digit NAICS code. In columns (1) to (3), the dependent variable is the log change in employment from 2019 to 2020. In columns (4) to (6), the dependent variable is the log change in capital spending from 2019 to 2020. Each column includes the variables Workplace Flexibility, Investment Flexibility and Log # Employees (at the end of 2019), and both state and NAICS-2 fixed effects. 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)
	Employment Growth			Capital Spending Growth		
Customer Interactions	-0.297***	-0.139	-0.222*	-0.277	0.057	0.010
	(0.087)	(0.103)	(0.123)	(0.339)	(0.387)	(0.418)
Lagged Cash/Assets	-0.021	0.184***	0.009	0.191	0.414***	0.318
	(0.128)	(0.020)	(0.134)	(0.465)	(0.084)	(0.471)
Lagged Leverage	-0.072**	0.043	0.015	-0.069	0.280	0.263
	(0.032)	(0.106)	(0.110)	(0.056)	(0.303)	(0.302)
Customer Interactions × Lagged Cash/Assets	0.460		0.394	0.498		0.217
	(0.287)		(0.300)	(1.024)		(1.039)
Customer Interactions × Lagged Leverage		-0.252	-0.192		-0.770	-0.732
		(0.214)	(0.222)		(0.645)	(0.645)
Observations	4,689	4,689	4,689	4,212	4,212	4,212
R-squared	0.096	0.096	0.096	0.057	0.057	0.057
Flexibility Variables & Controls	Yes	Yes	Yes	Yes	Yes	Yes
NAICS-2 FE	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes

B Model Solutions

The firm's maximization problem is:

$$\max_{L_1,\Delta,L_2,K_2} B[\phi A L_1^{\alpha} + \phi A(K_1-\Delta)^{\beta}] + AL_2^{\alpha} + A(K_2+\Delta)^{\beta} - wL_1 - wL_2 - \xi\Delta^2 - K_1 - K_2,$$

$$s.t.\ \ wL_1 + K_1 - \Delta = C.$$

Let $F(L_1, \Delta, L_2, K_2)$ denote the objective function and define $G = wL_1 + K_1 - \Delta - C$. The partial derivatives of F are:

$$\begin{aligned}
\frac{\partial F}{\partial L_1} &= \alpha\phi AB{L_1}^{\alpha-1} - w, \\
\frac{\partial F}{\partial L_2} &= \alpha A{L_2}^{\alpha-1} - w, \\
\frac{\partial F}{\partial \Delta} &= -\beta\phi AB(K_1-\Delta)^{\beta-1} + \beta A(K_2+\Delta)^{\beta-1} - 2\xi\Delta, \\
\frac{\partial F}{\partial K_2} &= \beta A(K_2+\Delta)^{\beta-1} - 1.
\end{aligned}$$

Financial Constraint Not Binding

Setting all partial derivatives of F to 0 gives the unconstrained first-order conditions (FOCs):

$$\begin{aligned}
\frac{\partial F}{\partial L_1} &= \alpha\phi AB{L_1}^{\alpha-1} - w = 0, \\
\frac{\partial F}{\partial \Delta} &= -\beta\phi AB(K_1-\Delta)^{\beta-1} + \beta A(K_2+\Delta)^{\beta-1} - 2\xi\Delta = 0.
\end{aligned}$$

Impact of Workplace Flexibility. We take derivatives with respect to ϕ on both sides of the FOCs and obtain:

$$\begin{aligned}
\frac{\partial L_1}{\partial \phi} &= \frac{L_1}{\phi(1-\alpha)} > 0, \\
\frac{\partial \Delta}{\partial \phi} &= \frac{\beta AB(K_1-\Delta)^{\beta-1}}{\beta(\beta-1)\phi AB(K_1-\Delta)^{\beta-2} + \beta(\beta-1)A(K_2+\Delta)^{\beta-2} - 2\xi} < 0.
\end{aligned}$$

Impact of Investment Flexibility. We take derivatives with respect to ξ on both sides of the FOCs and obtain:

$$\begin{aligned}
&\frac{\partial L_1}{\partial \xi} = 0, \\
&\frac{\partial \Delta}{\partial \xi} = \frac{2\Delta}{\beta(\beta-1)\phi AB(K_1-\Delta)^{\beta-2} + \beta(\beta-1)A(K_2+\Delta)^{\beta-2} - 2\xi} \lessgtr 0 \; if \; \Delta \gtrless 0.
\end{aligned}$$

Impact of Demand Shifter. We take derivatives with respect to B on both sides of the FOCs and obtain:

$$\begin{aligned}
&\frac{\partial L_1}{\partial B} = \frac{L_1}{\phi(1-\alpha)} > 0, \\
&\frac{\partial \Delta}{\partial B} = \frac{\beta\phi A(K_1-\Delta)^{\beta-1}}{\beta(\beta-1)\phi AB(K_1-\Delta)^{\beta-2} + \beta(\beta-1)A(K_2+\Delta)^{\beta-2} - 2\xi} < 0.
\end{aligned}$$

Financial Constraint Binding

The partial derivatives of G are:

$$\begin{aligned}
\frac{\partial G}{\partial L_1} &= w, \\
\frac{\partial G}{\partial L_2} &= 0, \\
\frac{\partial G}{\partial \Delta} &= -1, \\
\frac{\partial G}{\partial K_2} &= 0.
\end{aligned}$$

Let $Y = F - \lambda G$ denote the Lagrange function. The FOCs are:

$$\begin{aligned}
\frac{\partial Y}{\partial \lambda} &= wL_1 + K_1 - \Delta - C = 0, \\
\frac{\partial Y}{\partial L_1} &= \alpha\phi AB{L_1}^{\alpha-1} - (\lambda+1)w = 0, \\
\frac{\partial Y}{\partial \Delta} &= -\beta\phi AB(K_1-\Delta)^{\beta-1} + \beta A(K_2+\Delta)^{\beta-1} - 2\xi\Delta + \lambda = 0.
\end{aligned}$$

Impact of Financial Flexibility. We can take derivatives on both sides of the FOCs with respect to C and obtain:

$$\frac{\partial L_1}{\partial C} = \frac{\beta(\beta-1)\phi AB(K_1-\Delta)^{\beta-2} + \beta(\beta-1)A(K_2+\Delta)^{\beta-2} - 2\xi}{\beta(\beta-1)\phi AB(K_1-\Delta)^{\beta-2}w + \beta(\beta-1)A(K_2+\Delta)^{\beta-2}w - 2\xi w + \frac{1}{w}\alpha(\alpha-1)\phi ABL_1^{\alpha-2}} > 0,$$
$$\frac{\partial \Delta}{\partial C} = \frac{\frac{1}{w^2}\alpha(1-\alpha)\phi ABL_1^{\alpha-2}}{\beta(\beta-1)\phi AB(K_1-\Delta)^{\beta-2} + \beta(\beta-1)A(K_2+\Delta)^{\beta-2} - 2\xi + \frac{1}{w^2}\alpha(\alpha-1)\phi ABL_1^{\alpha-2}} < 0.$$

Impact of Workplace Flexibility. We take derivatives on both sides of the FOCs with respect to ϕ and obtain:

$$\frac{\partial L_1}{\partial \phi} = \frac{1}{w}\frac{\partial \Delta}{\partial \phi},$$
$$\frac{\partial \Delta}{\partial \phi} = \frac{\beta AB(K_1-\Delta)^{\beta-1} - \frac{1}{w}\alpha ABL_1^{\alpha-1}}{\beta(\beta-1)\phi AB(K_1-\Delta)^{\beta-2} + \beta(\beta-1)A(K_2+\Delta)^{\beta-2} - 2\xi + \frac{1}{w^2}\alpha(\alpha-1)\phi ABL_1^{\alpha-2}}.$$

The denominator of $\frac{\partial \Delta}{\partial \phi}$ is always negative (as long as $K_1 - \Delta \geq 0$). The sign of the numerator can be either positive or negative. The intuition is that when the financial constraints are binding, labor competes with capital for financial resources. When ϕ is higher, if sufficiently more resources are given to investment, employment could decline, and vice versa.

Impact of Investment Flexibility. We take derivatives on both sides of the FOCs with respect to ξ and obtain:

$$\frac{\partial L_1}{\partial \xi} = \frac{1}{w}\frac{\partial \Delta}{\partial \xi},$$
$$\frac{\partial \Delta}{\partial \xi} = \frac{2\Delta}{\beta(\beta-1)\phi AB(K_1-\Delta)^{\beta-2} + \beta(\beta-1)A(K_2+\Delta)^{\beta-2} - 2\xi + \frac{1}{w^2}A\alpha(\alpha-1)\phi ABL_1^{\alpha-2}}.$$

The signs of $\frac{\partial \Delta}{\partial \xi}$ and $\frac{\partial L_1}{\partial \xi}$ are also the same, and they depend on Δ. Since the denominator of $\frac{\partial \Delta}{\partial \xi}$ is always negative, we have $\frac{\partial \Delta}{\partial \xi} < 0$ if $\Delta > 0$ and $\frac{\partial \Delta}{\partial \xi} > 0$ if $\Delta < 0$.

Impact of the Demand Shifter. We take derivatives on both sides of the FOCs with

respect to B and obtain:

$$\frac{\partial L_1}{\partial B} = \frac{1}{w}\frac{\partial \Delta}{\partial B},$$
$$\frac{\partial \Delta}{\partial B} = \frac{\beta\phi A(K_1-\Delta)^{\beta-1} - \frac{1}{w}\alpha\phi A L_1^{\alpha-1}}{\beta(\beta-1)\phi AB(K_1-\Delta)^{\beta-2} + \beta(\beta-1)A(K_2+\Delta)^{\beta-2} - 2\xi + \frac{1}{w^2}\alpha(\alpha-1)\phi AB L_1^{\alpha-2}}.$$

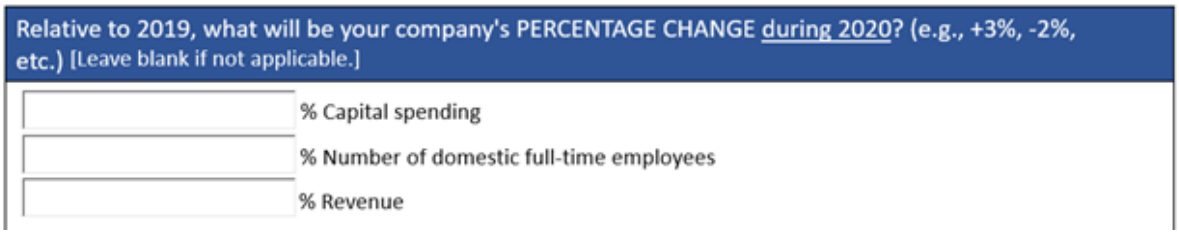
Similar to the case of workplace flexibility, the comparative statics with respect to the demand shifter can be ambiguous when financial constraints are binding. As demand increases, labor and capital compete for financial resources. One of them will increase and the other will decrease; which one will increase depends on the relative marginal returns of capital and labor.

C Data Appendix

C.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.

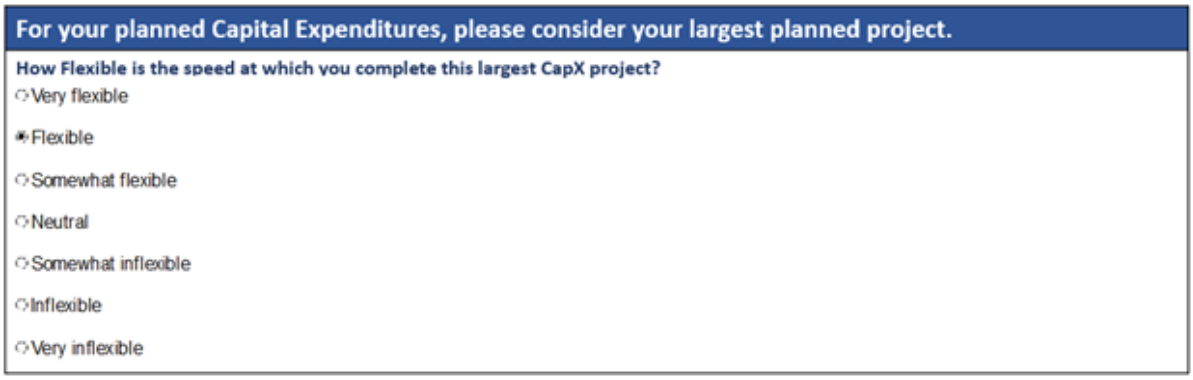


Financial Flexibility

An indicator variable 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 ilexibility. 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. 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.

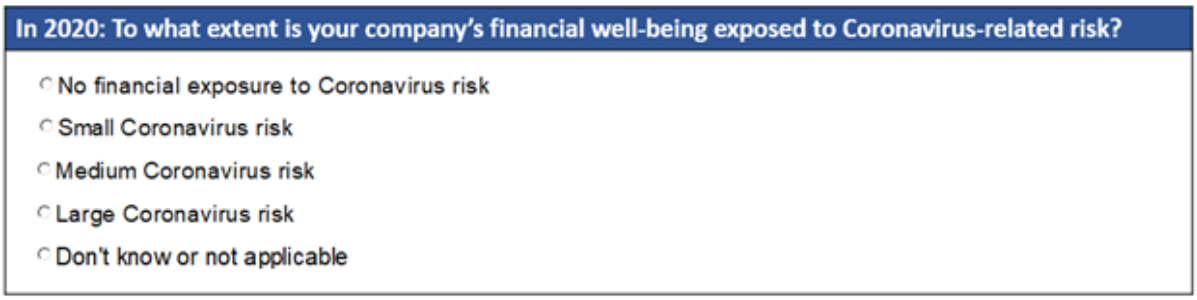


Log # Employees (2019)

The natural logarithm of the firm's number of full-time employees at the end of 2019.

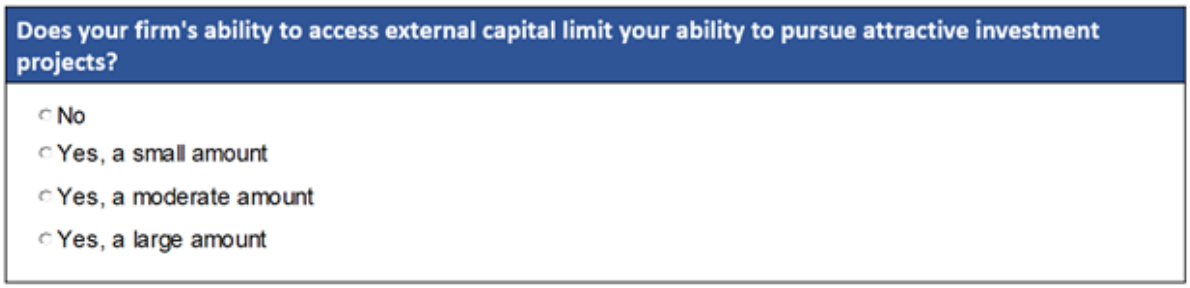
COVID Risk

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



Limited Access to External Capital

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.

C.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 ATUS 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 (2021) 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 Soltas (2019) crosswalk, we aggregate the number of workers that are able to work from home to the four-digit NAICS level. Low workplace flexibility industries include manufacturing and retail; high workplace flexibility industries include professional/scientific services industries.

Workplace Flexibility measure from Dingel and Neiman (2020)

Two-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.

Customer Interactions

Four-digit NAICS level proxy for the degree of social interactions with customers when they purchase goods and services. We start with the O*NET Work Activities survey which asks workers:

- For your job, how important is performing for people or dealing directly with the public?
  {1 = Not Important, 2, 3, 4, 5 = Very Important}

This is an occupation-level variable that tracks the importance of *direct* customer interactions in the transactions of goods and services in each industry, similar to those used in Koren and Pető (2020) and Pagano et al. (2021). We convert our measure to a $[0, 1]$ scale. Using the same method as in Dingel and Neiman (2020), we aggregate this variable to the 4-digit NAICS level, using the proportion of occupation-level workers in each industry as weights. We term this variable "Direct Customer Interactions." This measure does not capture customer interactions and the associated impact on customer demand during the COVID-19 health crisis for non-consumer facing industries. For example, airlines have a high Direct Customer Interaction measure, but aircraft manufacturers do not.

We combine our direct measure with the 2012 BEA Input-Output table (the most recent one) to construct a measure for the importance of downstream linkages to industries with a high degree of direct customer interactions. For each industry, we construct downstream output weights to other industries: when industry i is the supplier and industry j is a downstream industry, the weight on industry j is industry i's output supplied to industry j divided by i's total intermediate output. Using these weights, we construct our measure "Indirect Customer Interactions" as the weighted average of downstream industries' Direct Customer Interactions. We combine the direct and indirect channels into an overall measure for the importance of customer interactions:

$$\text{Customer Interactions}_i = C_i \left(\text{Direct}_i\right) + \left(1 - C_i\right) \left(\text{Indirect}_i\right).$$

The ratios C_i and $1 - C_i$ capture the fraction of an industry's output sold to consumers

and to other industries respectively:

$$C_i = \left(\frac{\text{Personal Consumption Expenditures}}{\text{Total Intermediate Output} + \text{Personal Consumption Expenditures}} \right)_i,$$

where "Personal Consumption Expenditures" is series F010000 and "Total Intermediate Output" is series T001 in the 2012 Input-Output tables. Airlines are in the top decile of the importance of direct customer interactions (high importance), whereas aircraft manufacturing is in the bottom decile (low importance). Conversely, airlines are slightly above median for the importance of indirect customer interactions, and aircraft manufacturing ranks in the top decile (i.e., aircraft manufacturing sells heavily to customer-facing industries).

Fixed Cost Share

Four-digit NAICS level proxy for the proportion of a firm's operating costs are fixed, as opposed to variable. Using quarterly Compustat data from 1985-2018, and following Anderson et al. (2003) and Chen et al. (2019), we regress log changes in operating costs on log changes in sales at the industry level. The slope coefficient from this regression indicates the fraction of variable costs in total costs (variable cost share). We take our measure of fixed cost share as 1 − variable cost share. Industries with low fixed cost share include those in retail/wholesale, whereas those with high fixed cost shares include mining (for example, oil & gas extraction) and pharmaceutical/medical manufacturing.

Fraction Part-Time

Four-digit NAICS level variable for the percentage of workers in an industry that are part-time. Following Mas and Pallais (2017), we start from the 2010, 2012, 2014, 2016, 2018 supplements of the General Social Survey. Using the Soltas (2019) crosswalk to map from census to NAICS industry codes, we aggregate to the NAICS-4 level, and take the simple average across years as our final measure. Retail industries have a high fraction of part-time workers (e.g., clothing stores), whereas professional/scientific services have a low fraction of part-time workers (e.g., scientific/R&D services).

Scheduling Autonomy

Four-digit NAICS level proxy for a worker's autonomy in setting their work schedule. Following Mas and Pallais (2017), we use data from the ATUS Leave and Job Flexibilities Module and classify a worker as having scheduling autonomy if they answer yes to the following:

- Do you have flexible work hours that allow you to vary or make changes in the times you begin and end work?

Using the Soltas (2019) crosswalk, we aggregate the number of workers with scheduling autonomy to the four-digit NAICS level. Professional/scientific services have high levels of scheduling autonomy (e.g., architectural/engineering services); whereas manufacturing industries tend to have low levels of scheduling autonomy (e.g., dairy production, among other food production industries).

Unionization

Four-digit NAICS level variable for the percentage of workers in an industry that are union members. Following Hirsch and Macpherson (2003), we start from the 2019 Current Population Survey (CPS) files. Using the Soltas (2019) crosswalk to map from census to NAICS industry codes, we aggregate to the NAICS-4 level. Air transportation industries have high unionization rates, whereas retail (e.g., clothing stores) have low unionization rates.

Scale Inflexibility

Four-digit NAICS level proxy for a firm's inability to easily adjust the scale of production in response to profitability shocks. Using annual Compustat data from 2000-2019, We start from the firm-level measure described in Gu et al. (2019) and Gu et al. (2021):

$$INFLEX_{i,t} = \frac{\max_{i,t_0,t}\left\{\frac{OPC}{Sales}\right\} - \min_{i,t_0,t}\left\{\frac{OPC}{Sales}\right\}}{\text{stddev}_{i,t_0,t}\left(\Delta \log\left(\frac{Sales}{Assets}\right)\right)},$$

where the numerator is the range of the firm's ratio of operating costs to sales over the previous 20 years, and the denominator is the standard deviation over the previous 20

years of the firms sales to assets ratio (we require firms to have at least 10 years of data to be included). We then take the simple average across firms at the NAICS-4 level as our final measure. Firms in oil & gas extraction have a high degree of inflexibility, whereas firms in plastic and paper product manufacturing have low inflexibility.

Human Coordination

Four-digit NAICS level variable that captures the importance of human interactions in a firm's operations. We use five questions from the O*NET Work Activities and Work Context surveys that asks workers how important the following are to their job: (i) Face-to-face discussions, (ii) Work with group our team, (iii) Contact with others, (iv) Developing and building teams and (v) Communicating with superrvisors, peers or subordinates. These questions do not differentiate between remote and in-person activities, so we focus on occupations with above-median importance of physical proximity (dropping below-median occupations).We then aggregate to the four-digit NAICS level using similar methods as in Dingel and Neiman (2020). We define high human coordination industries as those with human coordination importance in the top quartile. Two industries with high Human Coordination are Restaurants and Scheduled air transportation.