Corporate Flexibility in a Time of Crisis

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Abstract

We use timely surveys of US CFOs to study how flexibility shapes companies' responses to the onset of the COVID-19 crisis and drives longer-term changes in the corporate sector. The three dimensions of corporate flexibility that we study perform distinct functions, yet complement each other. We find that *workplace flexibility*, namely the ability for employees to work remotely, plays a central role in modulating firms' employment and investment planning during the crisis. *Investment flexibility* allows firms to increase or decrease capital spending plans based on their conditions during the health crisis, which are shaped by workforce flexibility. Finally, *financial flexibility* contributes to stronger employment and investment plans. The role of workplace flexibility is new during the 2020 health crisis, as we find no such effects during the 2008 financial crisis. CFOs expect the workplace transformation of 2020 to have lasting effects for years to come: the magnitude and form of investment are expected to change as companies continue remote work and rely more on automation to replace labor.

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1. Introduction

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

We use data from a series of CFOs surveys to study the role of corporate flexibility — the ability of firms to adjust and adapt — in response to the COVID-19 crisis. Our analysis provides unique insights into how flexibility affects firms' decisions as they deal with the crisis, as well as firms' longer-term outlooks for the post-COVID world. We identify and analyze three dimensions of corporate flexibility: 1) financial flexibility, which represents the standard observation that financial resources are important for supporting adjustments in firms' activities; 2) workplace flexibility, which represents firms' ability to assign employees to alternative work arrangements (remote work); and 3) investment flexibility, which represents whether firms can modify the timing of capital spending in response to changing conditions. We demonstrate how each of these dimensions plays a role in shaping corporate planning.

We find that workplace flexibility is a first-order determinant of how managers set their employment plans during the pandemic. Moreover, workplace flexibility operates *in tandem* with investment flexibility to determine how firms set their capital spending plans. Our results show that during the COVID-19 crisis, operational — i.e., workplace and investment — flexibility are critical to corporate planning, in addition to the more frequently studied role of financial flexibility. Operational flexibility also shapes

companies' longer-term plans for hiring and investing: firms with more workplace flexibility expect employment to recover faster, but expect lower capital expenditures to continue as remote work mode persists; on the other hand, firms with low workplace flexibility expect a slower employment recovery and plan to shift their capital spending towards labor-altering automation. As we explain below, these changes reflect innovations to *both* the workplace and the nature of investment going forward.

Starting on February 11, 2020, we surveyed CFOs across the US asking them about the impact of COVID-19 on their revenues and financial well-being, as well as their plans for hiring and investing. The survey continued through early April and therefore contains a continuous record of managerial responses to the changing threat posed by COVID-19. During this period, the coronavirus pandemic became a dominant issue in the United States, with a national emergency declaration on March 13. Our data capture real-time information about how companies responded to the sudden onset of the COVID-19 crisis. CFOs in our sample represent small, medium, and large firms, private and public; they cover all sectors of the economy and 47 of the 50 states. After that initial Spring 2020 survey, we continued to survey financial executives in June, September, and December of 2020. These new survey rounds confirm findings from the first quarter; and importantly, provide further information on CFOs' long-term outlook on the post-COVID world.

Our empirical strategy to investigate various relevant dimensions of corporate flexibility is straightforward. For financial flexibility, we measure the CFOs' (survey-based) assessment of their firms' ability to use internal funds or access external financing in the crisis. For workplace flexibility, we identify the extent to which firms have the ability to assign their employees into remote-work mode (cf. Papanikolaou and Schmidt (2020) and Dingel and Neiman (2020)). For investment flexibility, we obtain information from CFOs about their firms' ability to delay or scale back capital expenditures. We also account for

a number of other relevant factors, including product demand (based on IBES forecasts), the intensity of contact between employees and consumers (cf. Leibovici et al. (2020)), as well as time effects (calendar week) and geographic location effects.

We first study the determinants of CFOs' assessment of their companies' COVID business risk exposure. We find that financial flexibility is largely unrelated to that assessment. On the other hand, higher workplace flexibility is associated with significantly lower COVID risk exposure. Higher investment flexibility is also associated with a somewhat lower COVID business risk assessment. In addition, firms in more contact intensive industries and those facing lower expected demand perceive higher COVID risk exposure. The risks posed by COVID-19 affect not just customer demand, but also the ability of employees to perform key activities. In this vein, our findings make clear that managers view the COVID-19 pandemic as a multi-dimensional threat to their firms' businesses.

We then investigate key determinants of corporate planning during the health crisis. Not surprisingly, we find that access to funding shapes firm planning: firms with high financial flexibility expect 7 to 9 percentage point higher employment and capital expenditure growth in 2020 relative to firms with low financial flexibility. Critically, our study shows that a focus on financial flexibility alone may be incomplete. In particular, we show that workplace flexibility is a key determinant of employment changes during the crisis. Moreover, workplace flexibility is not associated with plans to spend on capital expenditures (namely structures and equipment), which as we discuss below, suggests that remote work is likely to make traditional capital investment (e.g., offices) less relevant. Investment flexibility, too, shapes firms' responses to the pandemic. During the crisis, companies with a flexible workplace expect to operate relatively smoothly and therefore exploit higher investment flexibility in order to *increase* spending. In contrast, companies with low workplace flexibility expect unfavorable conditions and use higher investment flexibility to *reduce* — or possibly postpone — planned spending. We confirm

that these various dynamics hold over time based on realized outcomes from subsequent surveys. We also provide external validation of our survey results using realized Compustat data, which demonstrates the generality of our inferences.

We perform further analyses to characterize the extent to which the above results reflect the unique challenges of the COVID-19 health crisis. In particular, we compare our findings during the COVID-19 health crisis to the economic forces at play during the Financial Crisis of 2008, using CFO survey data from Campello et al. (2010). We first show that financial flexibility appears to exert a similar impact on employment and investment plans in both crises. We then turn to the analysis of workplace flexibility, noting that the physical environment and logistics of the modern corporate workplace has been evolving for years.[1] Notably, workplace flexibility played *no role* in firms' decision-making processes during the 2008 financial crisis, while it is *central* in the current 2020 health crisis. The COVID-19 crisis highlights the importance of an emerging new dimension of corporate flexibility — the ability to set up alternative work arrangements. Likewise, our tests do not indicate that firms exploited their investment flexibility very much during the 2008 crisis — at least not in tandem with their ability to re-arrange their work environment. As the current health crisis appears to have accelerated the transformation of the organizational footprint of American businesses, the importance of operational flexibility that we uncover in this study is likely to continue even after COVID-19 subsides in coming years, as we demonstrate below.

After analyzing how firms make decisions about their operations during the COVID-19 emergency, we investigate how firms plan to adapt to the "post-COVID" world. To begin, we ask CFOs about their plans for revenue, employment, and capital expenditures in

[1] Barrero et al. (2020b) show the proportion of employees who primarily worked from home had grown from 0.8% in 1980 to 2.4% in 2010, reaching 4.0% in 2018. Some 42% of working age persons were working from home in May 2020 (see also Bick et al. (2020) and Brynjolfsson et al. (2020)).

both 2020 and 2021. We find that higher workplace flexibility is associated with higher employment at least until the end of 2021. We also ask CFOs at which point they expect employment, capital expenditures, and remote work to return to pre-COVID levels. For firms negatively affected by the pandemic, close to 55% expect employment to return to pre-COVID levels by the end of 2021, while more than 20% think their employment will only return after 2022 (potentially never returning). For capital spending, about 40% of firms expect their willingness to spend on capital investment to return to normal by the end of 2021, while 30% expect the return to normal to be delayed until after 2022 or not at all. In particular, firms with higher workplace flexibility expect employment to return faster. However, these companies do not expect a faster recovery in their willingness to invest in fixed capital.

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

Another long-term change relates to using automation to reduce dependence on human labor in production. We find that large firms and firms with lower workplace flexibility are more likely to implement automation processes to reduce labor or have already done so since March 2020. Indeed, firms that require workers to be physically onsite (i.e., low workplace flexibility) may find replacing human labor with automation especially useful for reducing infection risks in light of the COVID-19 pandemic or should a future health

crisis occur. The acceleration of automation among these firms could account in part for their projections of lower employment growth. We also ask which types of workers will be most affected by automation. Overall, low skill workers are more likely to be displaced by automation. Moreover, low workplace flexibility firms, which are more inclined to automate in the first place, show an even stronger tendency to displace low skill worker; on the other hand, high workplace flexibility firms may also displace high skill workers should they increase automation.

Our paper contributes to research on how crises affect firms and the economy. A vast literature has looked at the role of access to credit and liquidity as a key driver of firm outcomes in a number of previous crises. Because COVID-19 is a health crisis, our paper considers not only the financial dimension of corporate policymaking, but also additional critical margins on operational flexibility. We show that workplace flexibility shapes firms' decisions during COVID-19 and their plans for years to come. We also show that firms exploit their investment flexibility to operate through difficult times. Our paper is unique in examining how firms jointly operate across *all three margins*. Our findings highlight that operational flexibility, as well as the transformation of the workplace and the nature of investment, will be key themes in the years to come for policy and research.

Our surveys of CFOs provide valuable information about both firms' strategies for dealing with the COVID-19 crisis in real time and the long-term effects of this crisis. In parallel to our work, a series of corporate finance papers use stock returns to study the impact of the pandemic on firms.[2] While stock returns summarize investors' perceptions about firms' prospects, they cannot reveal firms' decision-making processes. Another set of papers study the impact of crises on firms using ex post archival data. Ex post realized employment and investment outcomes are important, and indeed we externally validate

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

our results using archival data, but they may conflate managers' planning with other forces such as governmental policies and developments outside of managers' response sets. Importantly, the long-term effects of COVID-19 will only materialize in archival data after several years, and by then might be difficult to pinpoint given many events can happen in the meantime. This stands in contrast to the real-time information conveyed by our *in-crisis*, *forward-looking* survey instruments. Relatedly, Bartik et al. (2020b) survey firms to describe the extent to which their employees perform remote work during COVID-19. Barrero et al. (2020a) ask firms about their hiring and highlight the reallocation consequences of COVID-19.[3] To the best of our knowledge, our paper is the only study using company-level survey data to integrate multiple key variables for analyzing firms in this crisis, including financial and operational conditions, the planning of real business activities such as employment and capital expenditures, as well as longer-term capital and labor implications.

The challenges brought by the 2020 pandemic combined with the ever-changing nature of the workplace pose new questions for economic policies. When financial flexibility is the binding constraint, monetary and fiscal policies may help alleviate this problem. When workplace flexibility is the binding constraint, however, traditional policy tools cannot directly relax such constraints. Policy tools need to be reimagined and economic interventions may need to target individuals more directly. As workers in industries with low workplace flexibility face fewer employment opportunities, unemployment insurance and skill transitioning programs could become more important.

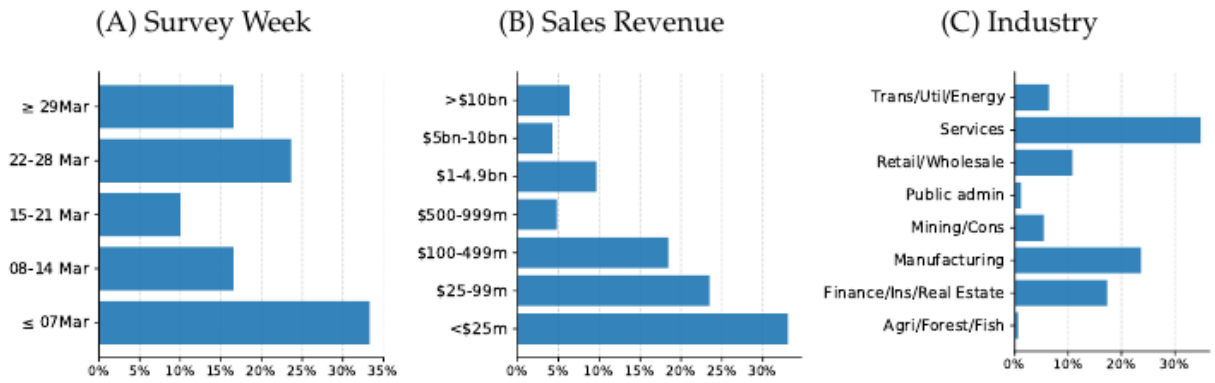
[3] Concurrent work by Cajner et al. (2020) shows a decline in employment based on firm-anonymized payroll records. Campello et al. (2020) document a decline on corporate hiring based on job vacancy ads posted by firms in their websites.

2. Data and Summary Statistics

We detail our various data sources in this section and present the summary statistics.

Figure 1. March Survey Demographics

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



2.1 CFO Survey Data

Our baseline data source is the Global Business Outlook survey of CFOs conducted by Duke University in the first quarter of 2020. 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 the focal survey starting on February 11, 2020, before the escalation of the spread of the novel coronavirus across the US. The survey closed on April 10, 2020. Because this timing is centered on March, we refer to this as the "March 2020" survey. We obtained survey responses from 520 CFOs.

Figure 1 summarizes key characteristics of the respondent firms and demonstrates that the sample includes a wide variety of firm types. Panel A shows that about half of our responses were received before mid-March, when there were still few reported COVID-19 cases in the US. The other half of the responses were received after mid-March,

following the national COVID-19 emergency declaration. Panel B shows that the sample includes both fairly large firms (revenue over $1 billion) as well as "middle market" firms (revenue between $10 million and $1 billion). Finally, Panel C shows that sample firms are spread across several industries, including both services and manufacturing.[4]

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

To measure financial flexibility, we asked CFOs to assess the level of financial flexibility their firms have: "About how much financial flexibility would you say your company has right now? (0-None, 1-A little, 2-3-4-Moderate, 5-A lot)." We classify a firm as having financial flexibility if they answered 2 or greater. As we verify in Table A1 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 523 firms that responded to the US version of the Duke Global Outlook survey conducted in March 2019 (before the COVID-19 crisis). It is not an easy task to gauge the extent to which a firm's investment spending process is "flexible" but our survey instrument provides important insight into this issue. In particular, the March 2019 survey collected data on firms'

[4] Appendix Figure A1 shows that the composition of firms is also similar among responses in different survey weeks.

flexibility in investment implementation. That survey asked: "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.[5] We verify that this attribute has an important industry component: the R^2 from four-digit NAICS fixed effects is 0.45.[6] Conceptually, our investment flexibility measure captures flexibility in the *timing* of investment, which is especially relevant for firms' responses to a sudden crisis. This measure is novel compared to prior work on investment adjustment costs, which mostly focus on costs that depend on the magnitude of investment (as summarized by Cooper and Haltiwanger, 2006).

Following the March survey, we conducted additional surveys in June, September, and December 2020. We did so in collaboration with the Federal Reserve Banks of Atlanta and Richmond.[7] These surveys asked CFOs about their projections for both 2020 and 2021. The September survey asked firms when they expect various labor and spending outcomes to return to pre-COVID levels, and the December survey explored automation.

[5] In unreported analysis, rather than using an industry measure of investment flexibility, we use firm-specific flexibility as declared on the March 2019 survey, to investigate 2020 investment plans (using a sample of firms that responded to both the 2019 and 2020 surveys). This analysis confirms the results presented herein for the March 2020 sample.

[6] 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.

[7] Nearly 700 firms responded to the June, September, and December surveys, with responses relatively evenly split observations across the three quarters. The median firm in these surveys has revenue of $20 million and 74 employees.

2.2 Other Data

We also collect data from other sources to enhance our analyses. The external datasets measure firm attributes at the industry level, and we match them with firms in our CFO survey sample based on their industries.[8]

For workplace flexibility, we collect data on employees' ability to work remotely by calculating the fraction of employees in each industry who can work from home, using the American Time Use Survey (ATUS) following Papanikolaou and Schmidt (2020) and Alon et al. (2020). This measure is available for each four-digit NAICS code. We also perform additional tests using the fraction of employees in each industry who can work from home constructed by Dingel and Neiman (2020), which is available for two-digit and three-digit NAICS codes.[9] Both of these measures are constructed using data prior to the COVID-19 crisis, and we cross check these ex ante measures with the ex post prevalence of remote work reported by the Bureau of Labor Statistics (BLS) since May 2020. For each industry corresponding to roughly two-digit NAICS code, the BLS data shows the fraction of employees who worked remotely in the last four weeks due to COVID-19. We find the ex ante measures are around 80% correlated with the BLS measure, which confirms their informativeness. Since the BLS data only start after our March survey and its industry breakdown is less granular, we prioritize the ex ante work from home measures in our main analyses.

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

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

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

2.3 Summary Statistics

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

[TABLE I ABOUT HERE]

Figure A2 in the Appendix presents pairwise variable correlations based on the March survey. A number of variables are correlated with firms' COVID-19 exposure assessment, which we discuss in more detail in Section 3. Workplace flexibility and financial flexibility are relatively distinct aspects and are not highly correlated. Workplace flexibility and

investment flexibility are weakly positively correlated. Workplace flexibility is only somewhat correlated with contact intensiveness.

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

Chief Financial Officers play an important role in forming the strategies of their firms and overseeing the detailed plans that implement those strategies. CFO expectations can provide valuable information in helping us understand the evolution of business activity and economic performance. In this section, we study CFOs' expectations about their firms' prospects in 2020 and their assessment of COVID risk exposures.

We start with CFOs' expectations of revenue growth in 2020, as reported during the March/April window, when COVID-19 turned into a full-on crisis in the US. The average survey sample expectation is 4.6%. Notably, expectations changed substantially from early March through early April, as the severity of the pandemic escalated. Figure 2 shows that the average expected revenue growth was between 5% to 10% in early March. Those expectations collapsed to approximately 0% by late March and early April. The revenue growth expectation of around 0% stayed steady in the June and September surveys (though we note that the respondents change from survey to survey). In June we directly asked CFOs to assess the revenue impact due to COVID-19. They indicated that COVID-19 will have a 10% negative impact on their firms' 2020 revenue growth. As we discuss more in Section 5, in our June and September surveys firms expect revenue growth to rebound to 10% in 2021.[10]

We also compare the expectations of CFOs in our sample with those of stock market analysts. This comparison allows us to see if market expectations about economic

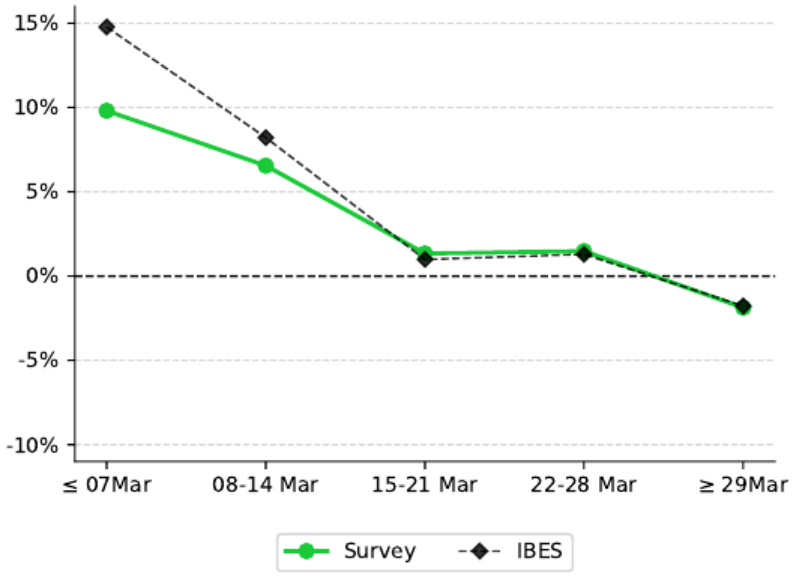
[10] In their March 2020 survey of small businesses, Bartik et al. (2020a) report that nearly all firms expected the COVID-19 crisis to end in 2020. Their evidence points to a clear difference in how managers of large and small firms plan to address the effects of the pandemic on their businesses.

fundamentals are consistent with the views of CFOs. This is an intriguing issue as many have argued that the stock market has been over-optimistic about firms' prospects.[11]

The dashed line in Figure 2 shows the average analyst forecast of revenue growth in 2020 for firms in the IBES dataset. It suggests that the revenue growth expectations of CFOs and stock analysts are very similar. This consistency also indicates that firms in our survey

Figure 2. CFO and IBES Forecasts of 2020 Revenue Growth

The solid line shows the average CFO forecast of revenue growth in 2020 by survey week. The dashed line shows the contemporaneous average analyst forecast of revenue growth in 2020 from IBES.



are representative of the market. Correspondingly, the seemingly high prices in the stock market do not seem to come from investors (as represented by equity analysts) being far more optimistic about economic prospects than are corporate executives. One possible justification for high stock prices could be that the financial impact of COVID-19 on firms' revenues is expected to be relatively transitory (Landier and Thesmar, 2020), and revenue growth is expected to return to the pre-COVID level of 10% in 2021, as our surveys

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

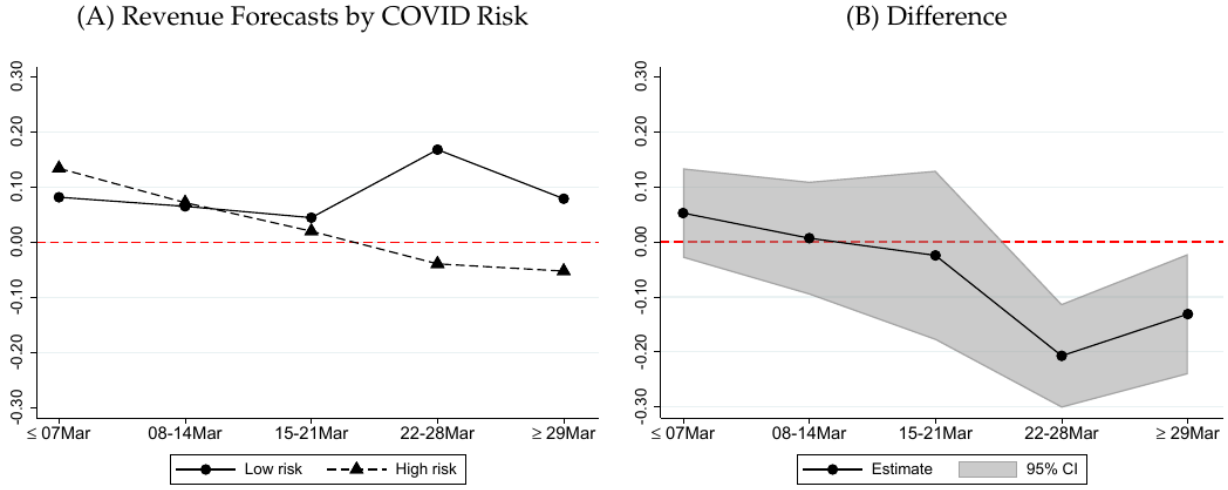
indicate. However, as we show in Sections 4 and 5, our work points to long-term implications of the current crisis that can affect the very organizational structure of firms. Firms expect these real effects to persist after revenues recover.

Figure 3. COVID-19 Exposure and Revenue Forecasts

This figure displays estimated CFO revenue forecasts from column 2 in Table A2. The estimation model is

$$Revenue\ Forecast_{it} = \alpha + \gamma COVID\ Risk_{it} + \sum_{t=2}^{5}(\delta_t Week_t + \beta_t Week_t \times COVID\ Risk_{it}) + \lambda \cdot X_{it} + \epsilon_{it}$$

Controls include our demand proxy and an indicator if the firm is in a contact intensive industry. In Panel A, the solid (dashed) line displays estimated revenue forecasts for low (high) COVID risk firms. Panel B displays the estimated difference between low and high firms, with 95% confidence intervals.



We next explore the differential impact of COVID-19 on firms in the cross-section. As discussed in Section 2, we asked CFOs to assess the impact of COVID-19 on their firms' well-being. Figure 3 shows the revenue growth expectations of firms with high versus low COVID risk exposure. Before mid-March, revenue growth expectations of firms in these two groups are similar. After mid-March, however, a significant gap emerges, with a difference in revenue growth expectations of about 10 to 15 percentage points. In particular, the revenue growth expectations of low-COVID-risk firms do not change much from early to late March. Firms in the high exposure group, in contrast, anticipate

substantially lower revenue growth expectations starting in late March. The expected differences in revenue growth are significant, as shown in Panel B.

Given the large effect of COVID risk on expected revenue, we investigate the drivers of firms' COVID risk exposure. We do this in Table II. Perhaps surprisingly, the results in the table suggest that financial flexibility is fairly dissociated from firms' COVID risk perceptions. By contrast, lower workplace flexibility and lower investment flexibility are associated with higher perceived COVID risk exposure. Firms in more contact intensive industries perceive significantly higher COVID risk exposure. Firms in industries with weaker customer demand also have somewhat higher COVID risk exposure, but results have low statistical significance as specifications often include time dummies (demand plunged for most industries in late March). Finally, the average level of perceived COVID-19 exposure increased after mid-March, as the virus' spread escalated in the US.

[TABLE II ABOUT HERE]

The results in Table II make it clear that firms' exposure to the 2020 pandemic is a multi-dimensional issue. CFOs' responses indicate that the health risks associated with COVID-19 affect not only customer demand, but also employees' ability to perform key activities. In the next section, we analyze companies' real decisions related to employment and investment in the COVID-19 crisis. We investigate in detail the role of financial flexibility, workplace flexibility, and investment flexibility in modulating these real effects.

4. Corporate Plans to Hire and Invest through the Pandemic

Employment and capital expenditures are perhaps the most significant margins of corporate decision-making. Our analysis in Section 4.2 shows how several forms of corporate flexibility affect managers' decisions related to these real policy choices during the onset of the crisis. Through our survey instrument, we are able to measure CFO's

plans to hire and invest. In other words, we are uniquely able to gauge companies' *forward-looking, real-time decisions* on those two dimensions amid a pandemic. At the end of this section, we validate the primary survey findings with subsequent surveys and financial statement data.

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

As results in Section 3 point out, the challenges brought about by the COVID-19 crisis are multi-faceted. This section discusses a framework to consider how different dimensions of corporate flexibility may affect firms' real decisions.

First, standard concerns about financing constraints are likely to be relevant during the COVID-19 crisis — firms rely on financial resources to support their operations, respond to challenges in a crisis, and avoid financial distress. Indeed, these issues have been the focus of several studies (see, for example, Ramelli and Wagner (2020), Fahlenbrach et al. (2020) and Acharya and Steffen (2020)). We refer to this margin as "financial flexibility." In particular, our measure summarizes firms' ability to access *both* internal and external funding as explained in Section 2.1 (see Table AI in the Appendix).

Second, as many corporate executives highlight, workplace flexibility — chiefly, the ability for firm employees to work from home — is a key issue during the COVID-19 crisis. Workplace flexibility became critical as the pandemic unfolded, since it allows for better social distancing practices and helps employees balance caring for family members as needed. Firms whose employees cannot easily work from home may need to adopt more procedures and protocols to control infection risk among employees (which effectively increases the cost of production), or to limit production capacity to maintain social distancing at work. Accordingly, low workplace flexibility — the inability to work from home — could negatively affect firms during the pandemic.

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

In addition to analyzing the corporate flexibility dimensions just discussed, we account for consumer demand. We do so using both the IBES demand proxy and the contact intensiveness indicator (the latter because customers' willingness to purchase goods and services can be lower if they need to do so in a contact intensive environment).[12]

4.2 Corporate Flexibility in the 2020 Health Crisis

We measure the effects of financial flexibility, workplace flexibility, and investment flexibility on firms' plans for employment and capital expenditures in Table III. Panel A

[12] Since the contact intensive measure does not differentiate whether the contact is primarily among customers (e.g., airlines), between employees and customers (e.g., barber shops), or among employees (e.g., meat packing facilities), it could pick up some low workplace flexibility industries. However, many low workplace flexibility industries are not contact intensive (e.g., energy, trucking). As such, contact intensity and workplace flexibility are conceptually different.

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) measure.

[TABLE III ABOUT HERE]

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

Notably, higher workplace flexibility is also associated with significantly higher projections of employment growth during the 2020 pandemic. This result holds for both measures of workplace flexibility. Firms in the top quartile in terms of the fraction of employees who can work from home expect 3 to 4 percentage point higher employment growth than those in the bottom quartile.[13] Interestingly, this effect is domain-specific: higher workplace flexibility does not directly translate into higher projections of capital expenditure growth. This result suggests that firms where employees can work from home may be leaning more heavily towards labor instead of capital going forward, potentially shifting away from traditional capital spending. Differently put, we might see lackluster capital spending in these industries following COVID-19 as firms shift away from the traditional way of work and associated capital expenditures, which we explore further in Section 5.

[13] As shown in Table I, the interquartile range of workplace flexibility is 0.3 for the ATUS measure and 0.5 for the Dingel and Neiman measure. The regression coefficients in Table III 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 0.3×0.1 = 0.03 and 0.5×0.08=0.04.

Figure 4 depicts these results in binscatter plots, displaying projected employment and capital expenditure growth plotted against workplace flexibility. Using industry-level monthly employment data from the BLS, Papanikolaou and Schmidt (2020) also find that total employment growth was higher from March to April in industries with more workplace flexibility. Our evidence using ex ante plans directly from CFOs shows consistent results, and we are able to study firms' real-time decisions for the entire year of 2020 (as well as in the years to come in Section 5). We can also study the real-time decisions on employment jointly with decisions on investment.

Figure 4. Impact of Workplace Flexibility on Employment and Investment Plans

Panel A displays a binned scatter plot of employment forecasts on workplace flexibility, corresponding to column 3 of Table III, Panel A. Panel B displays the analogous figure for capital spending forecasts, corresponding to column 6 of Table III, Panel A.

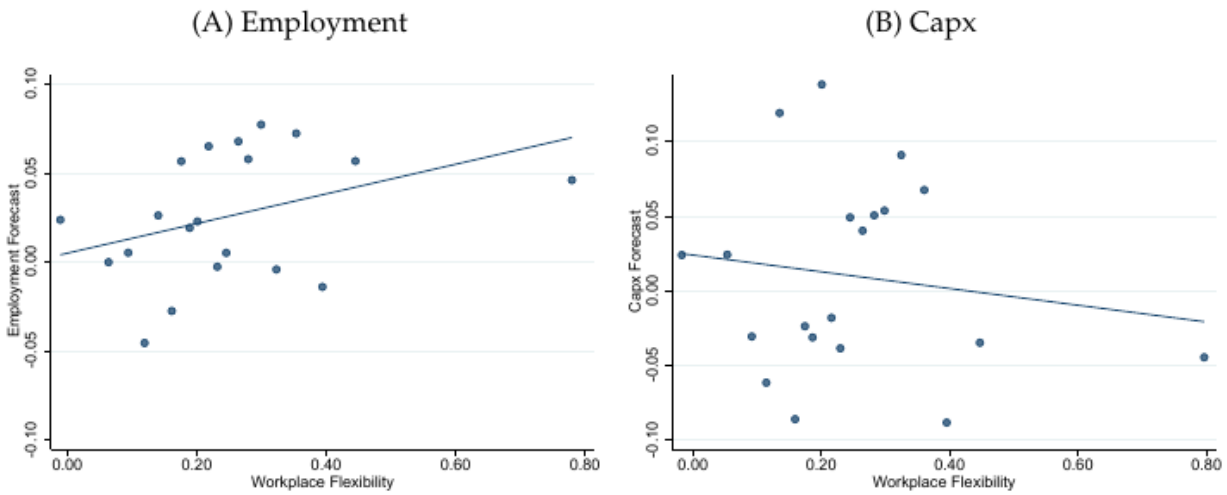


Table III also shows that investment flexibility does not have a clear, unconditional impact on real decisions. As we demonstrate shortly, firms use investment flexibility differently depending on whether they face favorable or unfavorable conditions.

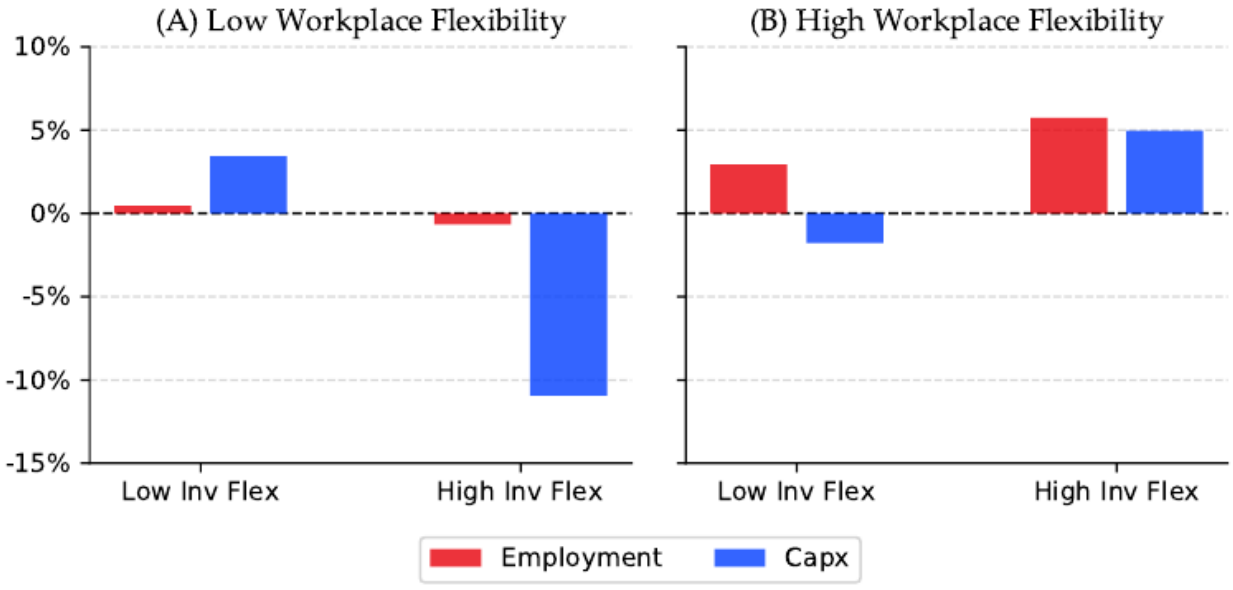
Finally, we find a positive impact of the industry-level demand proxy, especially for capital expenditure plans. The indicator for contact intensive industries is not significant, however. Our results are robust to the inclusion of state fixed effects and time (calendar

week) fixed effects. They are also robust to the inclusion of industry fixed effects, which indicates that there are key variations at the finer industry level.

We proceed further in our analysis of corporate flexibility by unpacking the "conditional nature" of investment flexibility. As explained in Section 4.1, we expect firms experiencing favorable versus unfavorable conditions to use their investment flexibility differently. Indeed, we find an interesting interaction between investment flexibility and workplace flexibility. When workplace flexibility is low, firms may experience operating challenges, so those with higher investment flexibility invest less (possibly delaying investment). We first illustrate these interactive effects in Figure 5.

Figure 5. Impact of Investment Flexibility Conditional on Workplace Flexibility

Panel A displays average employment and capital spending forecasts 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 Inv Flex) and above 0.2 (High Inv Flex). Panel B displays the analogous figure for firms with High Workplace Flexibility (above 0.2).



Panel A of Figure 5 shows that among low workplace flexibility firms, those with high investment flexibility, on average, expect capital expenditure growth to fall by approximately 10% (indicating reductions or deferrals among 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, firms with high workplace flexibility generally face good operational conditions; among these firms, those with higher investment flexibility plan to invest more during the pandemic, as can be seen in Panel B of Figure 5. These patterns show that investment flexibility shapes firms' ability to reduce versus accelerate capital expenditures, and that this effect is conditioned by workplace flexibility in economically sensible ways.

Table IV more fully characterizes these patterns via regression analysis. The results show that when workplace flexibility is low (close to zero), higher investment flexibility is associated with less planned capital expenditures. On the other hand, when workplace flexibility is high (close to one), higher investment flexibility is associated with more planned capital expenditures. In terms of economic magnitudes, the results in Table IV columns (4) to (6) indicate that for firms with no workplace flexibility, a one standard deviation increase in investment flexibility (about 0.3) would reduce planned 2020 capital expenditure growth by around 6 percentage points (= –0.2 × 0.3). For firms with full workplace flexibility, on the other hand, a one standard deviation increase in investment flexibility would boost planned 2020 capital expenditure growth by around 13.5 percentage points (= 0.45 × 0.3).

[TABLE IV ABOUT HERE]

Table IV, column (6), further suggests that financial flexibility could also interact with investment flexibility. In particular, firms with low financial flexibility appear to use higher investment flexibility to reduce (possibility delaying) capital expenditures. The push to cut capital expenditures is less pronounced when firms have more financial flexibility, although the interaction term of investment flexibility and financial flexibility is statistically not very significant. For completeness, we also show the interactions

among all pairs of the flexibility measures in Table AII in the Appendix, which confirms that the interaction between workplace flexibility and investment flexibility is robust while the other interactions are insignificant. Overall, the results indicate that having high financial flexibility does not solve all the problems in the COVID-19 crisis. Indeed, having low workplace flexibility seems to be a key constraining factor during the crisis.

Finally, our results imply that the interaction between investment flexibility and workplace flexibility also impact planned employment growth (albeit statistically less significantly so). To the extent that capital spending and labor are partially complementary, the results we obtain may outline a mechanism through which investment flexibility spills over onto employment plans.

Figure 6: Effect of Investment Flexibility on Capital Spending Forecasts for Different Levels of Workplace Flexibility

Estimated using column 5 of Table IV. The estimating equation is

$$Capx\ Forecast_{it} = \alpha + \beta_1 Investment\ Flex_{it} + \beta_2 Workplace\ Flex_{it} + \beta_3 (Investment\ Flex \times Workplace\ Flex) + \lambda \cdot X_{it} + \epsilon_{it}$$

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,

$$\mathbf{E}[\, Marginal\ Effect \mid Workplace\ Flex = w \,] = \beta_1 + \beta_3 \cdot w$$

The shaded area displays 95% confidence intervals. See Table AIII for the estimated coefficients and standard errors.

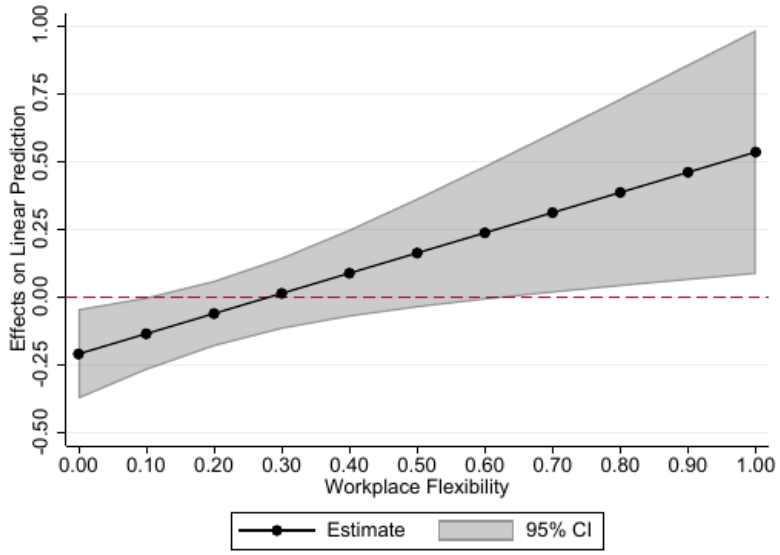


Figure 6 provides visualization of the marginal effects of investment flexibility on planned capital spending growth, based on the results in column (5) of Table IV. The figure displays the response of planned capital spending growth to investment flexibility implied by the regression coefficients, for the full range of workplace flexibility. As explained above, higher investment flexibility is associated with lower planned capital expenditure growth when workplace flexibility is low, but higher planned capital expenditure growth when workplace flexibility is high.

In all, our results show that in a health crisis like COVID-19, the traditional focus of financial flexibility is not the only issue that firms face. Importantly, we find evidence that operational flexibility such as workplace flexibility and investment flexibility are key factors in shaping firms' real employment and investment decisions, even though they have not been the focus in previous work that studies how firms respond to crises.

4.3 A Tale of Two Crises: 2020 vs. 2008

To provide context for our results, it is important that we characterize and differentiate the nature of the impact of a health crisis on firms' decisions from that of other crises, such as those associated with the supply of capital. We do so by presenting a comparison of corporate decision-making in the COVID-19 crisis versus that in the 2008 Global 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 data to conduct our corporate flexibility analyses, which allows us to compare the effects of flexibility in 2008 *vs.* 2020.

For financial flexibility, we rely on the question in the December 2008 survey that asks firms if their operations are affected by difficulties in accessing the credit market. Firms responding "not affected" are classified as having high financial flexibility, while those

responding "somewhat affected" and "very affected" are classified as having low financial flexibility.[14] This question focuses primarily on access to credit markets, while the main financial flexibility question in the March 2020 survey captures the ability of firms to access both internal and external funding as explained in Section 2. As a result, the financial flexibility variable in the 2020 survey is broader and likely to show stronger results for financial flexibility compared to the variable in the 2008 survey. For workplace flexibility, we use the same industry-level measure as before. For investment flexibility, we also use the same industry-level measure discussed in Section 2.

Panel A of Table V parallels the regression specifications in Table III. Columns (1) and (4) show the results using the 2008 data, columns (2) and (5) show the results using the 2020 data; columns (3) and (6) use the combined sample where we interact workplace flexibility — the distinct central feature for the COVID-19 health crisis — with a dummy for the 2020 survey (we omit the inclusion of control variables that are not relevant in the 2008 crisis). We find that during both the COVID-19 pandemic and the Financial Crisis, financial flexibility plays a similarly important role in shaping firms' employment and investment plans. However, workplace flexibility is uniquely important for employment plans in the 2020 pandemic, while its coefficient in the 2008 data is nearly zero.

[TABLE V ABOUT HERE]

In an analogous fashion, Panel B of Table V follows the regression specifications in Table IV to test and verify that firms exploiting their investment flexibility (conditional on their workplace flexibility) is also unique to the 2020 pandemic. Here, too, we find no evidence to suggest that workplace flexibility matters for how firms utilize their investment flexibility in the 2008 financial crisis.

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

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

4.4 External Validation via Subsequent Surveys and Realized Outcomes in 2020

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

Employment Planning for 2020 in Subsequent Surveys. Table VI, columns (1) to (4), analyze firms' employment plans for 2020 reported in subsequent surveys. (These surveys did not directly ask capital expenditures plans or financial flexibility, so we focus on employment in this analysis.) For workplace flexibility, the results are similar to our findings in Table III in both sign and in magnitude: firms with high workplace flexibility continue to expect significantly higher employment growth in 2020.

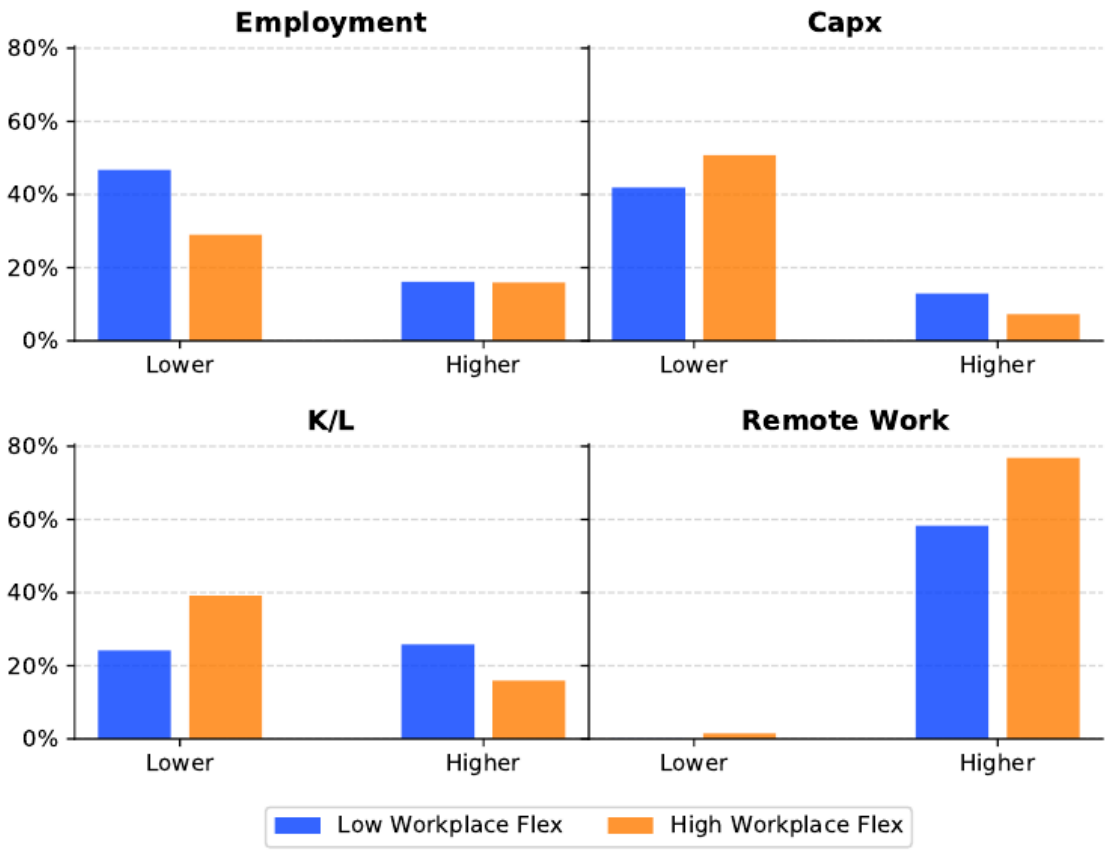
[TABLE VI ABOUT HERE]

Realized Firm Outcomes based on Subsequent Surveys. In the September survey we asked firms "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 7 plots the responses, separately for firms with high *vs.* low workplace flexibility. We see that as of September 2020, firms with high workplace flexibility were less likely to have experienced decreases in employment. Interestingly, they are not less likely to have cut capital expenditures (consistent with results in Table

III that high workplace flexibility firms in the March survey did not anticipate higher capital expenditure growth in 2020)— if anything, they appear to be more likely to reduce capital expenditures. As a result, the implied 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.

Figure 7. Effect of COVID-19 on Firm Outcomes

Each panel displays the percentage of CFOs who stated that the current level for their company was lower (higher) than pre-COVID level. Revenue, Employment and Remote Work refer directly to the level. Capx 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.



We also asked firms about the level of remote work. Firms with high workplace flexibility are significantly more likely to have increased remote work, which aligns with our

definition of workplace flexibility. Table VII further verifies these results through ordered logit regressions.

[TABLE VII ABOUT HERE]

External Validation using Realized Outcomes in Compusat and BLS Data. We also perform external validation using realized outcomes among Compustat firms, which report capital expenditures on a quarterly basis (Compustat firms do not report employment on a quarterly basis, so we only examine capital expenditures in this analysis). Table VIII presents regressions that study capital expenditure growth since the first quarter of 2020. Similar to what we find in Table IV based on firms' planning in the March survey, the realized capital spending growth of Compustat firms confirms the interaction 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 A3 in the Appendix performs "placebo checks" using Compustat data from previous years, and demonstrates that the interaction between investment flexibility and workplace flexibility in shaping capital expenditures *did not occur* before 2020.[15] In particular, the green dots (blue triangles) display the slope coefficients of capital expenditure growth on investment flexibility for high (low) workplace flexibility firms at different points in time. In other words, prior to the pandemic, firms did not exploit their investment flexibility depending on their workplace conditions. Our findings in Tables IV and VIII that workplace flexibility is a key determinant for how firms use investment flexibility to increase or reduce capital expenditures is a salient occurrence uniquely identified at the onset of the 2020 health crisis.

[15] Note also that the 2008 Compustat result in Figure A3 confirms the analysis of Table V.

[TABLE VIII ABOUT HERE]

Finally, at the industry level, the BLS provides monthly data on total employment. We verify that cumulative employment growth since the end of 2019 (through October 2020) is significantly positively correlated with workplace flexibility, with a similar magnitude to what we find in Table III.

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

Our results above are new in identifying the role played by operational flexibility in shaping firms' responses to the 2020 health crisis. We also bring to bear several longer-term implications for both corporate and economic policy-making in the aftermath of the 2020 pandemic. We discuss some of these insights in this section.

5.1. CFO Outlook for 2021 and Beyond

CFO Outlook for 2021. In the surveys since June 2020, we asked firms about their expected growth of revenue and employment in both 2020 and 2021. The summary statistics in Table I, Panel B, show that on average CFOs expect revenue growth to be around zero in 2020, but return to around 10% in 2021. They expect employment to fall in 2020, but increase in 2021. Although the median firm expects the cumulative employment growth through 2021 to be zero, there is significant heterogeneity. In particular, Table VI, columns (5) to (8), show that firms with high workplace flexibility expect significantly higher cumulative employment growth through the end of 2021.

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

asked whether their current levels are above or below pre-COVID levels, we know which direction firms would need to move to return to pre-pandemic activity.

We first analyze the recovery of revenue, employment, and capital expenditure intensity to pre-COVID levels (focusing on firms that have been negatively affected by COVID-19 or have stayed about the same, which are the vast majority). Table IX shows the results using ordered logit regressions. Interestingly, workplace flexibility does not have a significant impact on CFOs' outlook of revenue recovery. However, firms with high workplace flexibility expect employment to recover faster.[16] In contrast, these firms do not expect capital expenditures to recover faster — if anything, they expect capital expenditures to stay below the pre-COVID level for a longer period of time. Indeed, as seen in Figure A4 in the Appendix, among firms that saw worse outcomes relative to the pre-COVID level, fewer than 10% think employment is unlikely to return to the pre-COVID level (Panel A), while nearly 20% of firms with high workplace flexibility indicate that their willingness to spend on capital investment is unlikely to ever return to the pre-COVID level (Panel B). These results suggest that workplace flexibility is associated with greater willingness to hire, though not necessarily greater willingness to spend on structures and equipment. This contrast is likely driven by the acceleration of the workplace transformation in light of COVID-19: as companies switch to remote work, the primary types of investment will likely shift away from traditional capital expenditures, and possibly towards new forms of investment such as intangibles that facilitate flexible collaboration of the workforce.

[TABLE IX ABOUT HERE]

[16] The coefficients of our ordered logits are presented in "odds ratios," so a ratio below one implies that the time to recover is sooner for a firm with high workplace flexibility.

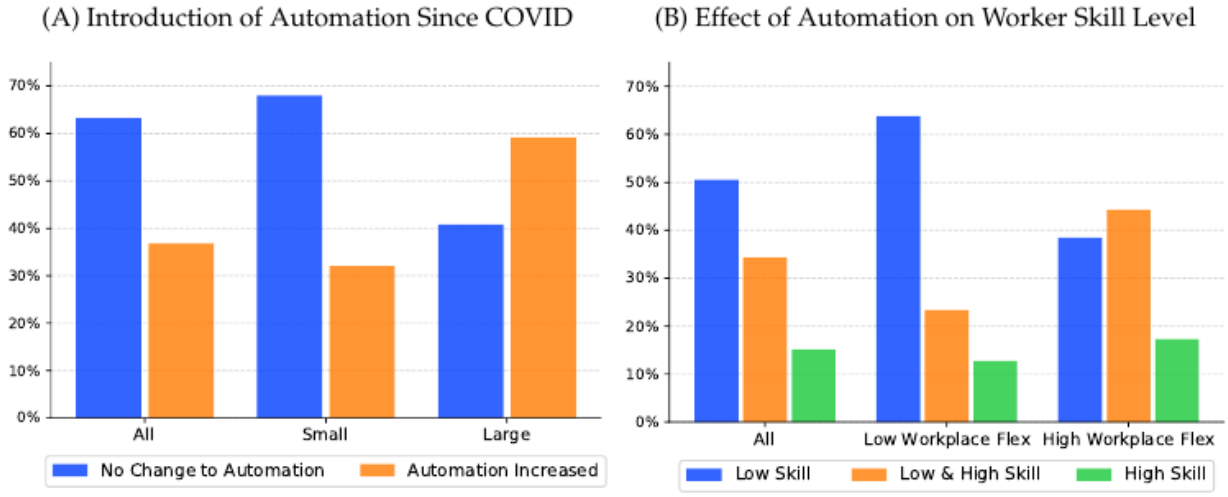
The ongoing transformation of the US corporate workplace is also evident from CFOs' expectations about the staying power of remote work. As of the September 2020 survey, no responding firms reported that remote work was currently below the pre-COVID level. Moreover, about 50% think the level of remote work could go back to the pre-COVID level by the end of 2021, while 40% think remote work will stay high beyond 2021 (see also Bartik et al., 2020b). Furthermore, Table IX shows that companies 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 return to pre-COVID levels.

Automation since the COVID-19 Outbreak. Finally, we investigate the shift towards automation in response to the pandemic. In the December 2020 survey, we asked CFOs "Has your firm (or does your firm plan to) implement automation to reduce labor since March?" Overall, nearly 40% firms responded yes, and the prevalence of increased automation is especially high among large firms (more than 500 employees) where nearly 60% responded yes, as shown in Figure 9, Panel A. Moreover, controlling for firm size and other basic firm characteristics, firms with low workplace flexibility have a higher propensity to increase automation, as shown in columns (1) and (2) of Table X. This result is consistent with our findings above that firms with low workplace flexibility expect a slower recovery of employment, although they do not necessarily expect a slower recovery in revenue. Increased automation could in part account for the slower employment recovery for these firms. 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. In addition, the coefficient on workplace flexibility in column (2) stays the same when we control for industry-level automation penetration from 2004 to 2014 (Acemoglu and Restrepo, 2020), which indicates that the stronger push for automation among low workplace flexibility firms is new, not a continuation of prior automation adoption

trends. Importantly, our results suggest that this displacement of some workers is longer term. The pandemic experience may have accelerated the shift towards automation that was occurring even before COVID-19, especially among low workplace flexibility firms, though of course these changes also prepare firms to better handle future health crises or other workplace displacement that would make onsite work difficult.

Figure 8. Effect of COVID-19 on Automation

Panel A displays the percentage of firms that have increased their level of automation 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 automation had increased, Panel B displays which portion of the workforce will be most affected: low skill workers only, all workers, or high skill workers only. Low (high) Workplace Flexibility is below (above) the 25th (75th) percentile of Workplace Flexibility within-sample.



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 Figure 8, Panel B. In addition, Figure 8, Panel B and Table X, columns (3) and (4) suggest that firms with low workplace flexibility – which show a stronger propensity to automate in the first place – are especially inclined to replace low skill workers. On the other hand, firms with high workplace flexibility are more inclined to replace high skill workers (e.g., back office jobs) conditional on increasing automation.

[TABLE X ABOUT HERE]

5.2. Implications

Our findings suggest several implications for understanding economic activities during and after the COVID-19 crisis.

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

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

could, in turn, contribute to the post-COVID-19 period being a "robot-led recovery" or "jobless recovery" for these sectors.

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

6. Concluding Remarks

In early 2020, the US experienced its largest economic dislocation in a decade, if not the largest in the postwar era. The crisis was triggered by an unprecedented emergency of global proportions: the rapid spread of the novel coronavirus (COVID-19). We provide information about corporate decision-making in real time as the COVID-19 crisis hit as well as firms' planning for both the near term and the long term as the crisis unfolds. Our surveys directly track how firms adjust their operations, instead of making indirect inferences from stock returns. We leverage CFOs' perspectives to investigate the transmission mechanism of COVID-19 to the real economy. We focus on how companies use three dimensions of corporate flexibility to adapt to the crisis: financial, workplace, and investment flexibility. We show that in light of the COVID-19 crisis, financial

flexibility continues to be an important determinant of firm planning; and, workplace flexibility emerges as an additional critical margin that has both direct effects on employment and interactive effects (via investment flexibility) on investment. Importantly, while firms facing poor prospects used investment flexibility to cut investment during the crisis, those facing favorable prospects used investment flexibility to increase planned spending.

Furthermore, our data suggest that operational flexibility – especially with respect to the workplace arrangement – will shape firms' employment and investment decisions in the years to come. Firms may experience long-term changes in the ways they hire and invest, prompted by COVID-19 and the prominence of workplace flexibility. These transformations may require new perspectives for understanding the post-pandemic era. In particular, while previous work has emphasized the importance of financial flexibility, our analysis indicates that operational flexibility will be central for analyzing firms' decisions going forward. In addition, traditional measures of investment such as capital expenditures will be increasingly incomplete for capturing firms' investment activities. Finally, the type and amount of investment, whether it be to support remote workers or replace workers via automation, is likely to vary by firm. Our results suggest that low skill workers will be most adversely affected by automation, though high skill workers will also be affected at workplace flexible firms. More research into this important issue is needed.

Taken together, operational flexibility is central for shaping firms' decisions both during the onset of the COVID-19 crisis and in the years to come post-pandemic. Firms' effort to enhance operational flexibility going forward – leading to the transformation of the workplace, and correspondingly the changing nature of investment – will be key for understanding activities and outcomes at the firm level and for the economy as a whole.

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Table I. Descriptive Statistics

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

Panel A. Summary Statistics (from March 2020 Survey)

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

Panel B. Summary Statistics (from Subsequent Surveys)

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

Table II. 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 Probit specification. Financial Flexibility is an indicator taking a value of one if the firm stated they had more financial flexibility than "None" or "A little." Workplace Flexibility comes from ATUS and is a four-digit NAICS level measure for the percentage of work that can be done from home. Investment Flexibility is a four-digit NAICS level measure for a firm's investment flexibility (with respect to speed of completion). Demand Proxy is three-digit NAICS × survey week average revenue growth rate forecasts from IBES. Contact Intensive is a four-digit NAICS level indicator taking a value of one if the firm is in a contact-intensive industry (Leibovici et al., 2020). Detailed variable definitions are available in the Data Appendix. The R-squared in column 3 is the pseudo R-squared from the Probit 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			Probit
Workplace Flexibility	-0.183**	-0.161*	-0.172*	-0.181***
	(0.071)	(0.088)	(0.089)	(0.063)
Investment Flexibility	-0.082*	-0.110*	-0.099	-0.082**
	(0.044)	(0.058)	(0.060)	(0.039)
Financial Flexibility	-0.017	-0.027	-0.026	-0.019
	(0.069)	(0.061)	(0.057)	(0.059)
Demand Proxy	-0.081	-0.161	-0.181	-0.085
	(0.152)	(0.158)	(0.137)	(0.129)
Contact Intensive	0.204***	0.150*	0.140*	0.197***
	(0.063)	(0.075)	(0.075)	(0.052)
Post March 15	0.353***	0.362***		0.352***
	(0.058)	(0.061)		(0.049)
Observations	451	445	445	451
R-squared	0.167	0.262	0.282	0.128
State FE		Yes	Yes	
Week FE			Yes	

Table III. Determinants of Employment and Investment Plans

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

Panel A. Main Specification

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

Panel B. Alternative Work from Home Measure (Dingel and Neiman, 2020)

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

Table IV. 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 firm's growth rate forecast for employment (columns 1-3) or capital spending (columns 4-6). Workplace Flexibility comes from ATUS and is a four-digit NAICS level measure for the percentage of work that can be done from home. Investment Flexibility is a four-digit NAICS level proxy for a firm's investment flexibility (with respect to speed of completion). Financial Flexibility is an indicator taking a value of one if the firm stated they had more financial flexibility than "None" or "A little." Controls are Demand Proxy and Contact Intensive. Detailed variable definitions are available in the Data Appendix. Standard errors are clustered at the two-digit NAICS level and displayed in parentheses below the coefficient. ***, **, * denote significance at 1%, 5%, 10%.

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

Table V. 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 III, Panel A, comparing the determinants of employment and capital spending across surveys. The dependent variable is the firm's growth rate forecast of employment (columns 1-3), or capital spending (columns 4-6). In column 1, the sample is the December 2008 CFO survey sample. In column 2, the sample is the March 2020 sample. 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 collinear with the State × Survey fixed effects. Columns 4-6 display similar specifications to columns 1-3, with the firm's capital spending forecast as the dependent variable. In Panel B, we run similar tests to Table IV, comparing the effect of the interaction of workplace and investment flexibility on employment and capital spending across surveys. The dependent variable is the firm's growth rate forecast of employment (columns 1-3), or capital spending (columns 4-6). In column 1, the sample is the December 2008 CFO survey sample. In column 2, the sample is the March 2020 sample. In column 3, we combine both surveys and interact workplace and investment flexibility with an indicator variable taking a value of one if the firm is in the March 2020 sample. Columns 4-6 display similar specifications to columns 1-3, with the firm's capital spending forecast as the dependent variable. Detailed variable definitions are given in the Data Appendix. Standard errors are clustered at the two-digit NAICS level and displayed in parentheses below the coefficient. ***, **, * denote significance at 1%, 5%, 10%.

Panel A. Determinants of Employment and Investment Plans

	(1)	(2)	(3)	(4)	(5)	(6)
	Employment forecast			Capx Forecast		
Workplace Flexibility	-0.007	0.092***	-0.027	0.168	0.016	0.146
	(0.041)	(0.022)	(0.036)	(0.106)	(0.057)	(0.101)
Investment Flexibility	0.052	0.024	0.029	0.111*	-0.079	0.065
	(0.030)	(0.023)	(0.025)	(0.053)	(0.076)	(0.050)
Financial Flexibility	0.042**	0.066***	0.043**	0.089**	0.086***	0.080**
	(0.017)	(0.022)	(0.017)	(0.033)	(0.023)	(0.036)
March 2020 × Workplace Flex			0.129***			-0.134
			(0.044)			(0.109)
March 2020 × Investment Flex			0.012			-0.133
			(0.031)			(0.082)
March 2020 × Financial Flex			0.029			0.010
			(0.027)			(0.044)
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
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 forecast			Capx Forecast		
Workplace Flexibility	-0.006	0.069***	-0.007	0.169*	-0.096	0.201**
	(0.044)	(0.014)	(0.051)	(0.093)	(0.063)	(0.093)
Investment Flexibility	0.053**	-0.011	0.039*	0.109	-0.243***	0.076
	(0.021)	(0.028)	(0.020)	(0.073)	(0.083)	(0.078)
Workplace Flex × Investment Flex	-0.004	0.174	-0.041	-0.115	0.826**	-0.022
	(0.177)	(0.154)	(0.145)	(0.190)	(0.302)	(0.226)
Financial Flexibility	0.042**	0.067***	0.056***	0.081**	0.089***	0.084***
	(0.017)	(0.022)	(0.014)	(0.036)	(0.024)	(0.021)
March 2020 × Workplace Flex			0.085			-0.302***
			(0.058)			(0.106)
March 2020 × Investment Flex			-0.029			-0.290**
			(0.036)			(0.107)
March 2020 × Workplace Flex × Investment Flex			0.187			0.725**
			(0.195)			(0.335)
Observations	335	400	735	322	391	713
R-squared	0.167	0.191	0.208	0.136	0.139	0.145
Sample	Dec '08	Mar '20	Full	Dec '08	Mar '20	Full
NAICS-2 FE	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes		Yes	Yes	
State × Survey FE			Yes			Yes

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

This table examines the determinants of firms' employment and capital spending plans from subsequent CFO surveys. Data are from the 2020q2 (June), 2020q3 (September) and 2020q4 (November/December) editions of the survey. The dependent variable is the firm's growth rate forecast of employment from the end of 2019 to the end of 2020 (columns 1-4) or the growth rate forecast of Employment from the end of 2019 to the end of 2021. Detailed variable definitions are in the Data Appendix. Standard errors are clustered at the two-digit NAICS level and displayed in parentheses below the coefficient. ***, **, * denote significance at 1%, 5%, 10%.

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

Table VII. Realized Firm Outcomes Relative to Pre-COVID

This table examines how real variables at the firm have changed since the onset of COVID. Data are from the 2020q3 (September) edition of the 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 expenditure 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 expenditures and labor. If the firm's new level of capital expenditure was lower (higher) than that of labor, then we say that Physical Capital/Labor_decreased (increased). Similarly, if the new levels of capital expenditure and labor are the same, then there was no change to *K/L*. That is

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

Revenue, Employment and Remote Work refer to the level of the variable. Capx refers to "Willingness to spend on structures and equipment." In columns 1-2, the dependent variable is the CFO's response concerning the new level of Employment, as described above (similarly for columns 3-4 and 7-8). The dependent variable in columns 5-6 is the Physical Capital/Labor variable. As the dependent variable in each specification has three categories, each column presents results from an ordered logit regression, and coefficients displayed are odds ratios (an odds ratio less (greater) than one indicates a decrease (increase)). "Workplace Flexibility," "Investment Flexibility" and "Demand Proxy" are standardized to unit variance. Thus, the odds ratios display the proportional change in the odds of observing a higher response from a standard deviation change in the relevant variable (in the case of "Contact Intensive," the difference between low and high contact-intensive industry firms). Detailed variable definitions are in the Data Appendix. Standard errors are clustered at the two-digit NAICS level and t-statistics are displayed in parentheses below the coefficient. ***, **, * denote significance at 1%, 5%, 10%.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Employment		Capx		Physical Capital/Labor		Remote Work	
Workplace Flexibility	1.317*	1.456**	0.778**	0.841	0.694***	0.688***	1.511***	1.363**
	(1.853)	(2.486)	(-2.159)	(-1.263)	(-3.534)	(-2.985)	(3.561)	(2.354)
Investment Flexibility	0.968	0.932	0.984	0.925	0.967	0.972	0.782**	0.828*
	(-0.179)	(-0.417)	(-0.176)	(-0.704)	(-0.256)	(-0.221)	(-2.349)	(-1.953)
Contact Intensive		1.919*		1.819**		0.933		0.512**
		(1.826)		(2.168)		(-0.196)		(-2.308)
Demand Proxy		0.986		1.104		1.122		0.969
		(-0.077)		(0.588)		(1.194)		(-0.412)
Observations	244	244	244	244	244	244	244	244
Pseudo R-squared	0.010	0.017	0.012	0.018	0.020	0.024	0.033	0.042

Table VIII. Realized Capital Expenditure Outcomes from 2020q2 Compustat Data

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

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

Table IX. CFO Outlook of Firm Outcomes Returning to Pre-COVID Levels

This table examines how long firms expect the changes brought on by COVID to last. Data are from the 2020q3 (September) edition of the 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. Capx refers to "Willingness to spend on structures and equipment." In columns 1 and 2, the dependent variable is the CFO's response concerning the new level of revenue, as described above (similarly for columns 3 to 8 for employment, capital expenditure and remote work). In order to capture how long the negative effects of COVID-19 will last, in columns 1 to 6, we limit the sample to firms that stated their level of the relevant variable (e.g. ``Revenue" in columns 1 and 2) was the same as or lower than its pre-COVID level. In columns 7 and 8, we limit the sample to firms that stated their level of remote work was the same as or higher than its pre-COVID level. As the dependent variable in each specification has multiple categories, each column presents results from an ordered logit regression, and coefficients displayed are odds ratios (an odds ratio less (greater) than one indicates a decrease (increase)). "Workplace Flexibility," "Investment Flexibility" and "Demand Proxy" are standardized to unit variance. Thus, the odds ratios display the proportional change in the odds of observing a higher response from a standard deviation change in the relevant variable (in the case of "Contact Intensive," the difference between low and high contact-intensive industry firms). Detailed variable definitions are in the Data Appendix. Standard errors are clustered at the two-digit NAICS level and t-statistics are displayed in parentheses below the coefficient. ***, **, * denote significance at 1%, 5%, 10%.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Revenue		Employment		Capx		Remote Work	
Workplace Flexibility	0.818	0.826	0.702**	0.635**	1.162*	1.108	1.233***	1.193**
	(-1.573)	(-1.364)	(-2.135)	(-2.294)	(1.824)	(1.361)	(3.091)	(2.421)
Investment Flexibility	1.460***	1.463***	1.221	1.253*	1.233*	1.295*	0.816**	0.852
	(3.202)	(2.789)	(1.510)	(1.704)	(1.777)	(1.865)	(-1.980)	(-1.376)
Demand Proxy		0.974		1.082		0.885		0.827***
		(-0.279)		(0.353)		(-0.829)		(-2.774)
Contact Intensive		1.068		0.476**		0.611		0.704*
		(0.196)		(-2.349)		(-1.463)		(-1.858)
Observations	197	197	209	209	210	210	233	233
Pseudo R-squared	0.015	0.015	0.015	0.023	0.007	0.011	0.008	0.012

Table X. Automation Adoption since COVID-19

This table examines changes to automation since the onset of COVID. Data are from the 2020q4 (November/December) edition of the 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 = All Workers, 2 = High Skill Workers}

In columns 1 and 2, the dependent variable is the CFO's response concerning the introduction of automation, 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 affirmatively to the first question. In columns 1 and 2, results are from a standard logit regression. For columns 3 and 4, as the dependent variable has multiple categories, each column presents results from an ordered logit regression. Coefficients displayed are odds ratios (an odds ratio less (greater) than one indicates a decrease (increase)). "Workplace Flexibility," "Investment Flexibility," "Demand Proxy," and "Industry Automation Adoption" are standardized to unit variance. Thus, the odds ratios display the proportional change in the odds of observing a higher response from a standard deviation change in the relevant variable (in the case of "Contact Intensive," the difference between low and high contact-intensive industry firms). Detailed variable definitions are in the Data Appendix. The variable "Industry Automation Adoption" represents robot adoption between 2004 and 2014 in different industries constructed by Acemoglu and Restrepo (2020). Standard errors are clustered at the two-digit NAICS level and t-statistics are displayed in parentheses below the coefficient. ***, **, * denote significance at 1%, 5%, 10%.

	(1)	(2)	(3)	(4)
	Increase in Automation {0 = No, 1 = Yes}		Effect of Automation on Skill {0 = Low, 1 = Low & High, 2 = High}	
Workplace Flexibility	0.744***	0.763**	1.731**	1.566**
	(-2.618)	(-2.517)	(2.563)	(2.449)
Investment Flexibility	1.064	1.127	1.020	0.937
	(0.396)	(0.830)	(0.151)	(-0.406)
Contact Intensive	0.201***	0.231***	3.235	2.507
	(-4.503)	(-3.745)	(1.184)	(1.011)
Demand Proxy	1.108	1.183	1.481	1.375
	(0.946)	(1.474)	(1.551)	(1.435)
Log Employees		1.915***		0.795
		(4.046)		(-0.887)
Industry Automation Adoption		0.991		0.733***
		(-0.529)		(-6.654)
Observations	277	277	102	102
Pseudo R-squared	0.050	0.112	0.056	0.091

Appendix

Figure A1. Sample Composition by March Survey Completion Date

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

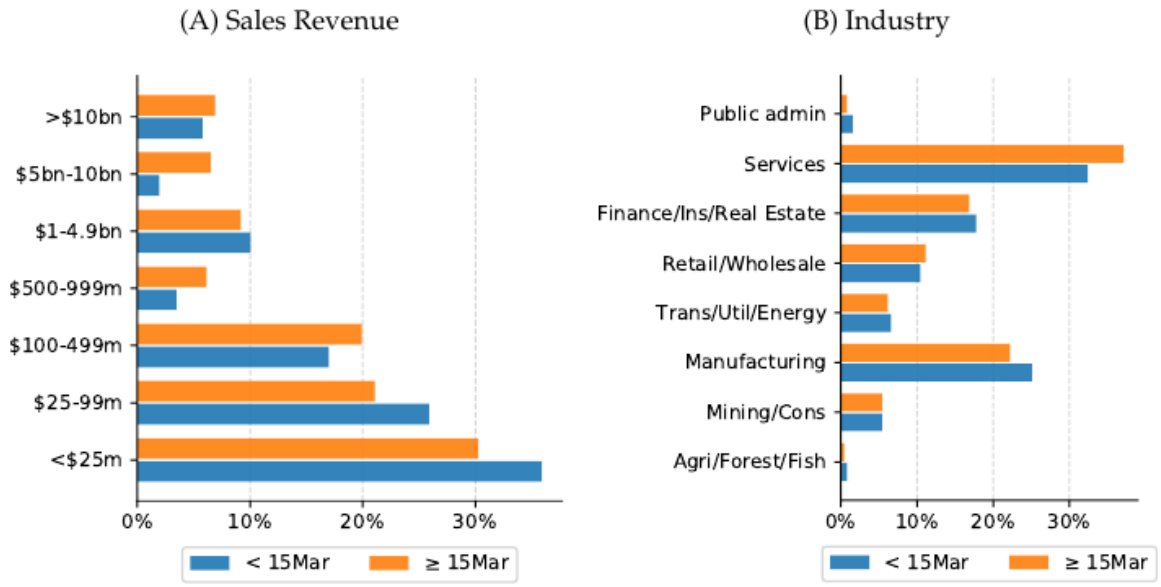


Figure A2. Cross-Correlations from March 2020 Survey

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 main March 2020 CFO Survey sample.

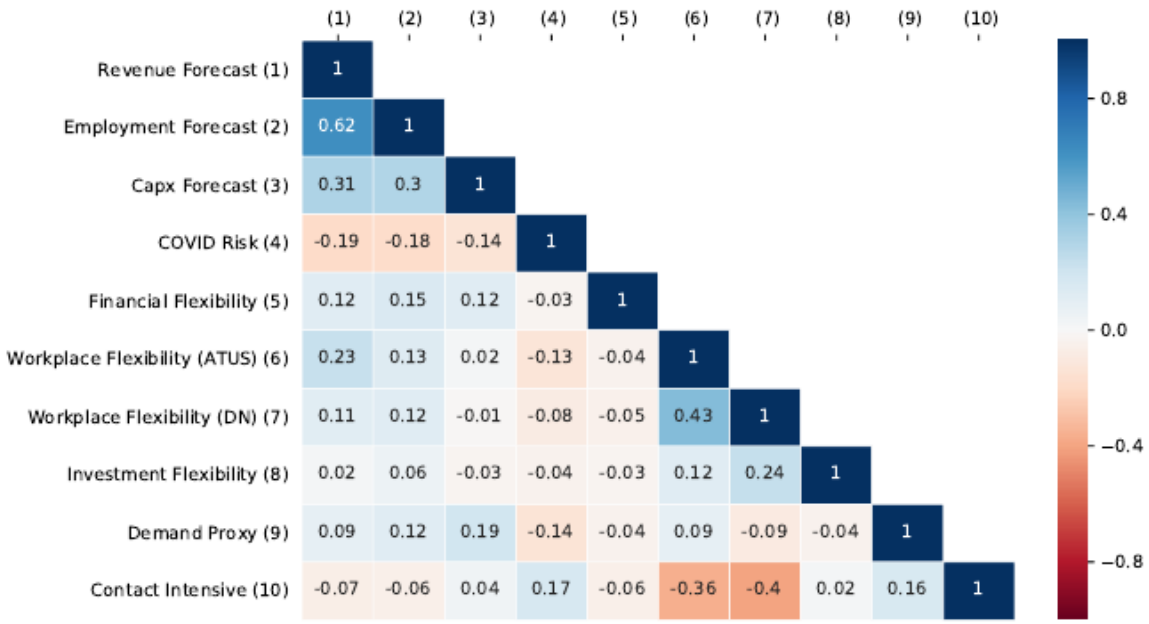


Figure A3. Capital Expenditure Growth in Compustat before 2020

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

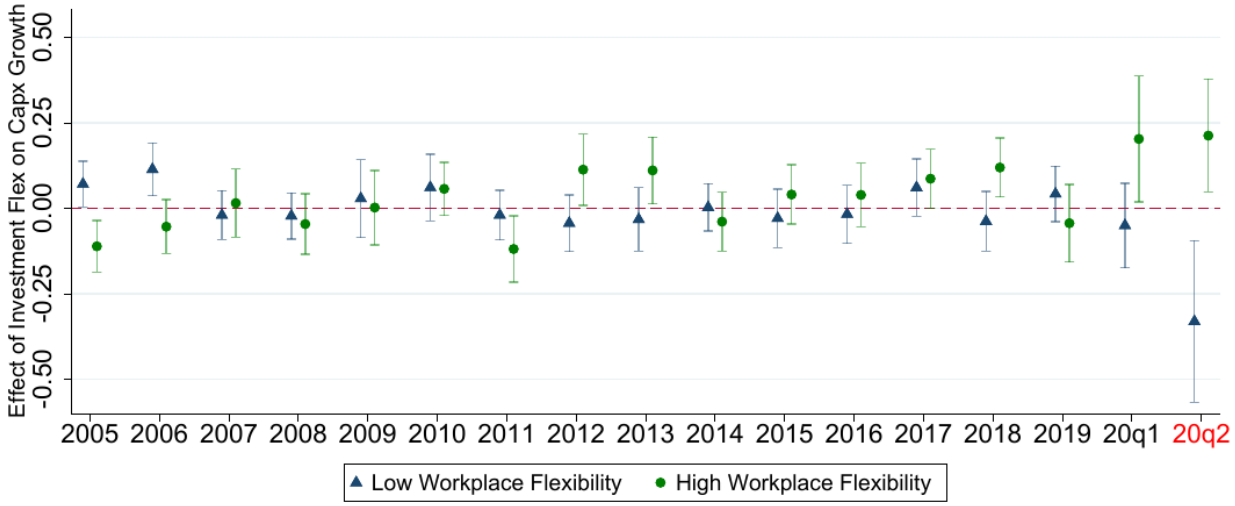
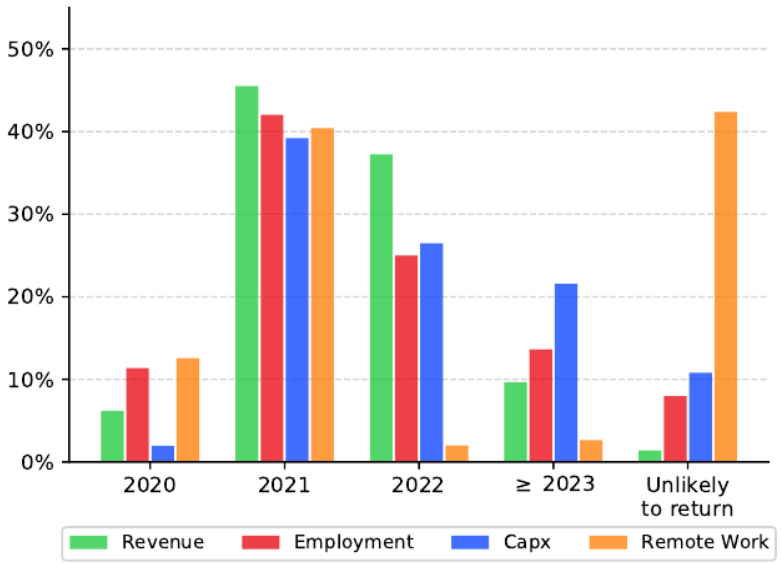


Figure A4. CFO Outlook of Firm Outcomes Returning to Pre-COVID Levels

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. Capx refers to "Willingness to spend on structures and equipment." For the Revenue, Employment and Capx 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 that believe there will be no change to the relevant variable are omitted from the calculations. Data are from the 20q3 (September) edition of the CFO survey. Panel A is for all firms, Panel B displays by Workplace Flexibility. Low (high) Workplace Flexibility is below (above) the 25th (75th) percentile of Workplace Flexibility within-sample.

(A) All Firms



(B) By Workplace Flexibility

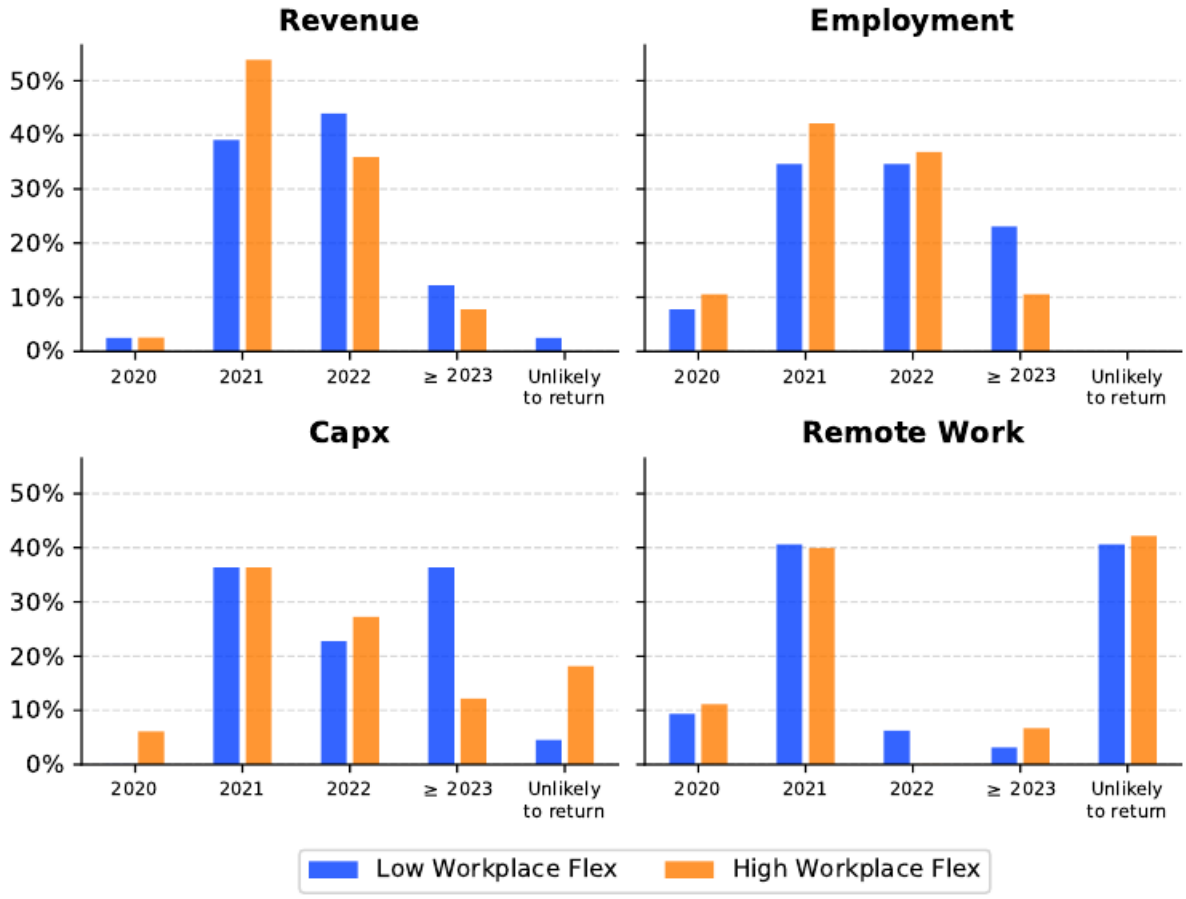


Table AI. Determinants of Financial Flexibility

This table examines the determinants of firms' self-assessed financial flexibility. 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 1-2 present results from Linear Probability Models (OLS), column 3 presents results from a Probit specification. Cash/Assets is the firm's stated cash to total assets ratio from year-end 2019. Limited Access to External Capital is an indicator taking a value of one if the firm stated that their ability to access external capital limited their ability to pursue attractive investment projects. Detailed variable definitions are available in the Data Appendix. The R-squared in column 3 is the pseudo R-squared from the Probit. 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		Probit
Cash/Assets	0.285***	0.512***	0.319***
	(0.066)	(0.089)	(0.089)
Limited Access to External Capital	-0.169***	-0.163***	-0.166***
	(0.034)	(0.025)	(0.039)
Observations	454	448	454
R-squared	0.060	0.212	0.062
Week FE		Yes	
State FE		Yes	
NAICS-2 FE		Yes	

Table AII. Conditional Impact of Investment Flexibility: All Second-Order Flexibility Interactions (Extension of Table IV)

This table is an extension of Table IV in the main text, where we include all second-order flexibility interactions. Data are from the March 2020 CFO survey. In Panel A, the dependent variable is the firm's capital expenditure forecast, in Panel B it is the firm's employment forecast. Detailed variable definitions are in the appendix. Detailed variable definitions are available in the Data Appendix. Standard errors are clustered at the two-digit NAICS level and displayed in parentheses below the coefficient. ***, **, * denote significance at 1%, 5%, 10%.

Panel A. Impact on Capital expenditure

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

Panel B. Impact on Employment

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

Table AIII. Estimated Average Marginal Effects from Figure 6

This table displays the coefficients used to produce Figure 7. The average marginal effects are produced using column 5 of Table IV. The estimating equation is

$$Capx\ Forecast_{it} = \alpha + \beta_1 Investment\ Flex_{it} + \beta_2 Workplace\ Flex_{it} + \beta_3 (Investment\ Flex \times Workplace\ Flex) + \lambda \cdot X_{it} + \epsilon_{it}$$

The average marginal effect, conditional on a value of Workplace Flexibility is

$$\mathbf{E}[\, Marginal\ Effect \mid Workplace\ Flex = w\,] = \beta_1 + \beta_3 \cdot w$$

The estimated coefficients are displayed in the table below. Standard errors, displays in parentheses below the coefficient, are estimated via the Delta method (Williams, 2012). ***, **, * denote significance at 1%, 5%, 10%.

Workplace Flexibility =	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
Average Marginal Effect	-0.21**	-0.14**	-0.06	0.01	0.09	0.16	0.24*	0.31**	0.39**	0.46**	0.53**
	(0.08)	(0.07)	(0.06)	(0.07)	(0.08)	(0.1)	(0.13)	(0.15)	(0.18)	(0.2)	(0.23)

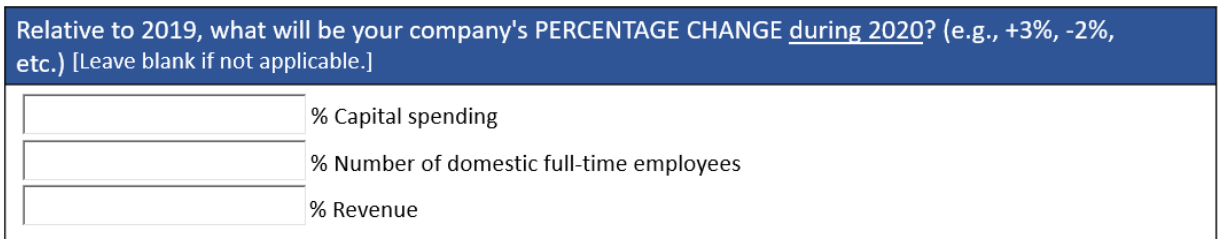
Data Appendix

D.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, see Figure D1.

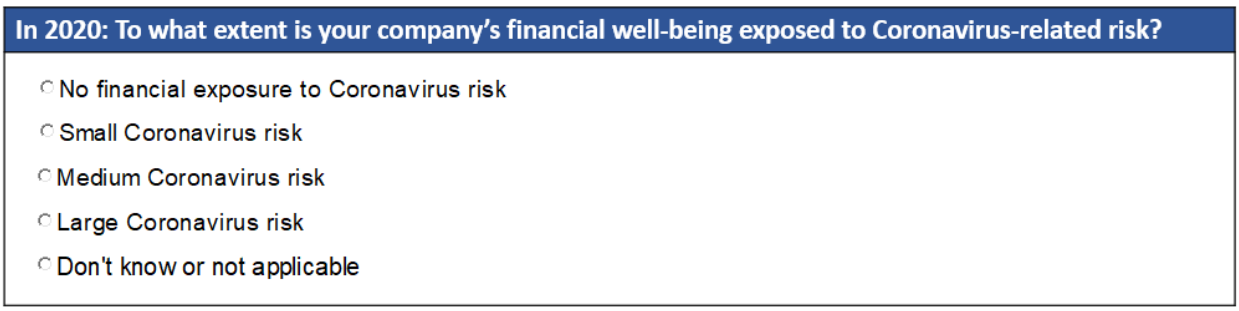
Figure D1: Revenue/Employment/Capital Spending Forecasts



COVID Risk

COVID Risk is an indicator variable taking a value of one if the CFO answered with "Medium Coronavirus Risk" or "Large Coronavirus Risk" to the question in Figure D2.

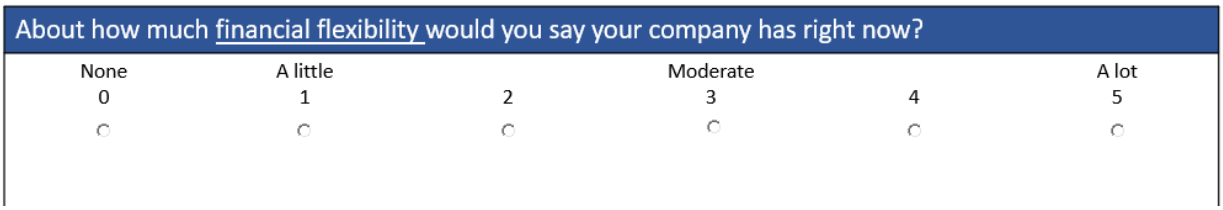
Figure D2: COVID Risk



Financial Flexibility

Financial Flexibility is an indicator taking a value of one if the CFO answered 2 or above to the question in Figure D3.

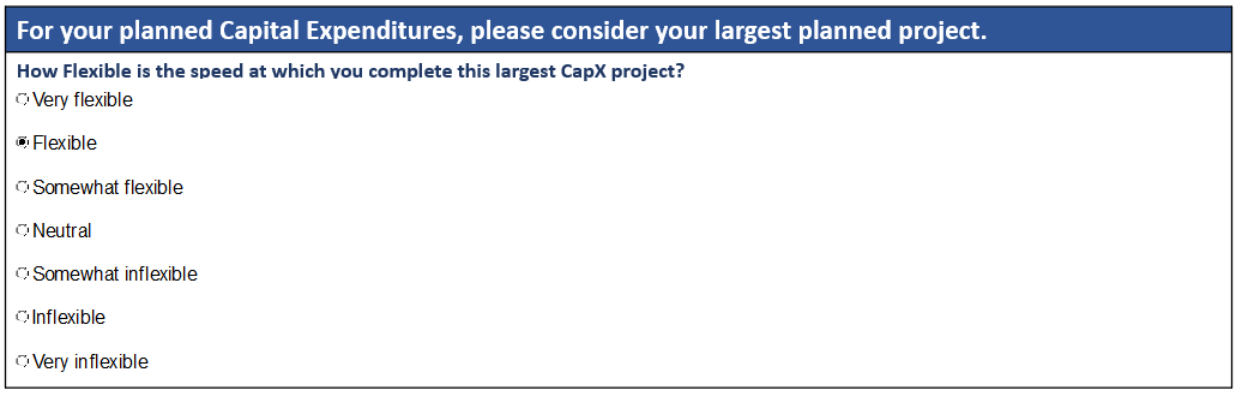
Figure D3: Financial Flexibility



Investment Flexibility

Four-digit NAICS-level proxy for a firm's investment flexibility with respect to speed of project completion. We use data from the March 2019 Duke CFO survey to construct a four-digit NAICS code measure of Investment Flexibility. Specifically, we define a firm as having flexible investment if they answered "Flexible" or "Very Flexible" to the question in Figure D4. We then calculate the percentage of firms with investment flexibility at the four-digit NAICS level.

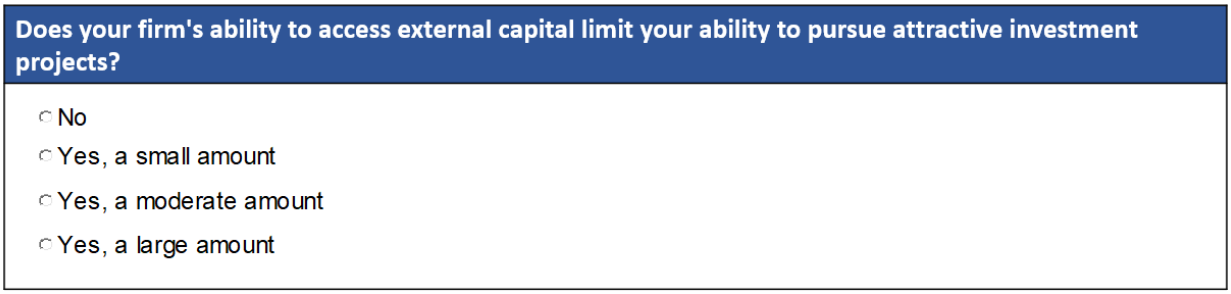
Figure D4: Investment Flexibility



Limited Access to External Capital

Limited Access to External Capital is an indicator variable taking a value of one if the CFO answer with "Yes, a small amount," "Yes, a moderate amount," or "Yes, a large amount" to the question in Figure D5

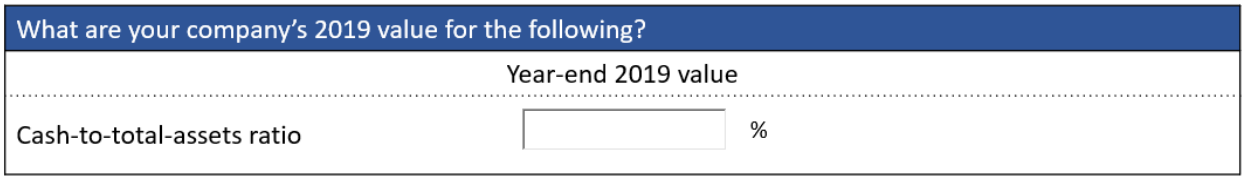
Figure D5: Limited Access to External Capital



Cash/Assets

Firm's year-end cash to total assets ratio from the March 2020 survey. See Figure D6.

Figure D6: Cash/Assets



D.2 External Variables

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

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

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

Using the Leave Module weights and Evan Soltas' crosswalk, we aggregate the number of workers that are able to work from home to the four-digit NAICS level.[17]

Workplace Flexibility measure from Dingel and Neiman (2020)

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

Demand Proxy

A three-digit NAICS × survey week level proxy for changes in a firm's demand conditions.[18] Specifically, for all end-of-2020 analyst revenue forecasts that occur in the

[17] See, for example, https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/O7JLIC and https://www.atusdata.org/atus-action/faq.

[18] Survey weeks are 1-7 March, 8-14 March, 15-21 March, 22-28 March, 29 March-5 April.

survey period, we calculate the industry-by-week expected percentage change in revenue from the end of 2019 to the end of 2020.[19]

Contact Intensive

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

[19] We have also constructed this measure at the two and four-digit NAICS level and results are similar.