# Internet Appendix for

Corporate Flexibility in a Time of Crisis

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A Supplemental Results

Figure IA.1: Cross-Correlations from March 2020 Survey

This figure shows the correlations among the main variables. Dark blue indicates strong positive correlations, and dark red indicates strong negative correlations. Data are from the March 2020 CFO survey. Detailed variable definitions are in Internet Appendix C.
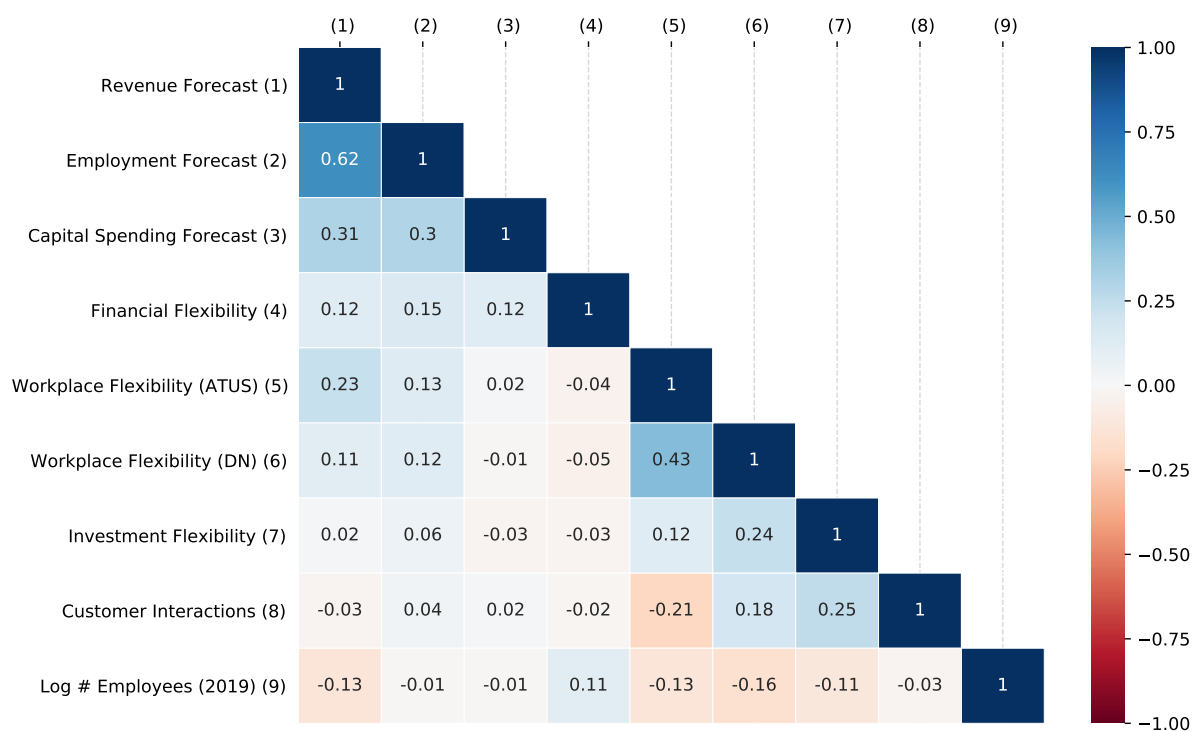
Figure IA.2: Remote Work in ATUS (Pre-COVID) versus BLS Data (July 2020)

This figure shows the correlation between work from home measured in ATUS and in BLS data. Each point is a two-digit NAICS industry.
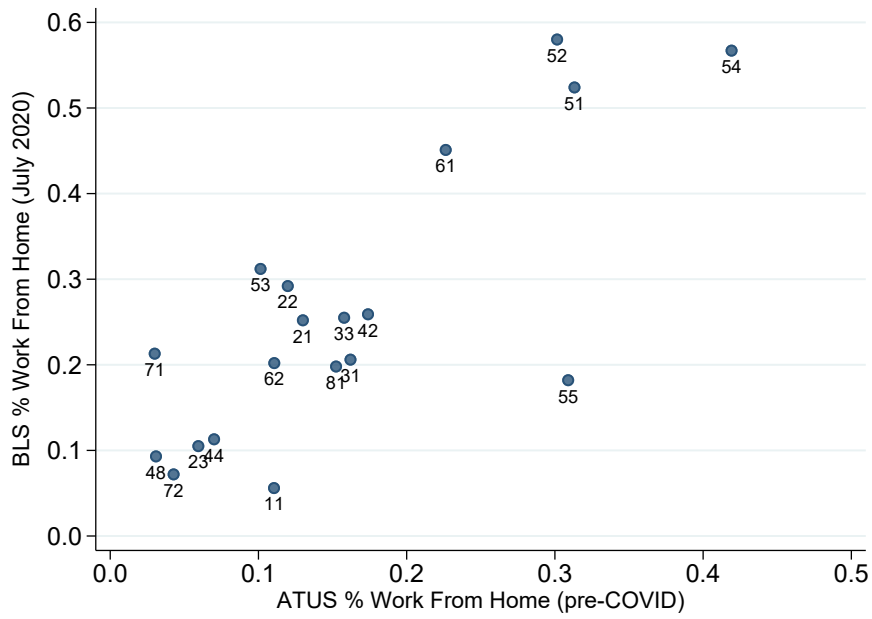
Figure IA.3: Effect of COVID-19 on Company Outcomes

Each panel displays the percentage of CFOs who stated that the current level for their company was lower (higher) than pre-COVID level. The data come from the September 2020 CFO survey. Employment, capital spending and remote work refer directly to whether the level of the variable decreased or increased in September 2020, relative to pre-COVID. For example, the orange bar above "Decrease" in Panel A indicates that about 30% of high workplace flexibility firms had reduced employment as of September 2020; the neighboring blue bar indicates that about 45% of low workplace flexibility firms had reduced employment as of September 2020. "Physical Capital/Labor" is coded as "Decrease" ("Increase") if the new level of capital spending is lower (higher) than the new level of employment (refer to Table IA.6 for a detailed definition). Capital spending refers to "willingness to spend" on structures and equipment. Firms that stated there has been no change are omitted from the figure, thus within-group bars do not sum to one. Low (high) workplace flexibility is below (above) the 25th (75th) percentile of workplace flexibility within-sample.
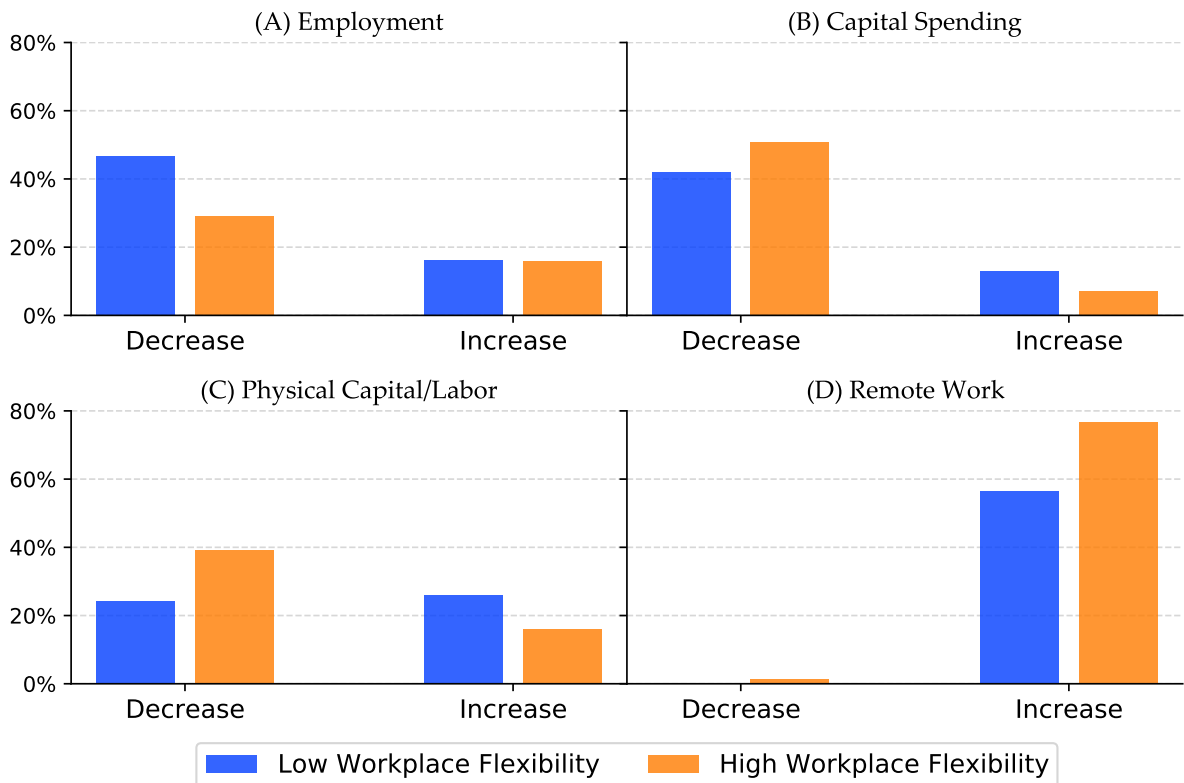
Table IA.1: Descriptive Statistics from Subsequent Surveys

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

	N	Mean	Std dev	25%	Median	75%
CFO Forecast Variables						
Revenue Forecast (for 2020)	626	0.024	0.367	-0.100	0	0.100
Revenue Forecast (for 2021)	621	0.101	0.208	0.010	0.050	0.150
Employment Forecast (for 2020)	640	-0.006	0.176	-0.075	0	0.042
Employment Forecast (for 2021)	641	0.057	0.217	-0.042	0	0.125
Flexibility Variables						
Workplace Flexibility (ATUS)	641	0.214	0.157	0.065	0.224	0.334
Workplace Flexibility (DN)	641	0.470	0.261	0.225	0.418	0.762
Investment Flexibility	641	0.261	0.304	0	0.200	0.364
Control Variables						
Customer Interactions	641	0.466	0.101	0.403	0.487	0.515
Log # Employees (2019)	641	4.774	2.240	3.296	4.605	5.943

Table IA.2: Determinants of COVID Risk Exposure

This table examines the determinants of firms' self-assessed exposure to COVID risk. In all specifications, the dependent variable is an indicator variable taking a value of one if firms in the March 2020 survey stated they faced medium or high coronavirus risk. Columns (1) to (3) present results from linear probability models (OLS), and column (4) presents results from a logit specification. The dependent variable in all specifications is an indicator variable equal to one if the CFO stated their firm faced "medium" or "large" Coronavirus risk and zero otherwise. Financial Flexibility is an indicator taking a value of one if the firm stated they had more financial flexibility than "None" or "A little." Workplace Flexibility comes from ATUS and is a four-digit NAICS level measure for the percentage of workers that can work from home. Investment Flexibility is a four-digit NAICS level measure for a firm's investment flexibility (with respect to speed of completion). Customer Interactions is a four-digit NAICS level variable that proxies for the intensity of interactions with consumers. Log # Employees (2019) is the natural logarithm of the firm's number of employees at the end of 2019. Detailed variable definitions are available in Internet Appendix C. The R-squared in column (4) is the pseudo R-squared from the logit regression. Standard errors are clustered at the two-digit NAICS level and displayed in parentheses below the coefficient. ***, **, * denote significance at 1%, 5%, 10%.

	(1)	(2)	(3)	(4)
	Linear Probability Model			Logit
Financial Flexibility	-0.036	-0.042	-0.039	-0.036
	(0.062)	(0.054)	(0.051)	(0.052)
Workplace Flexibility	-0.227**	-0.182**	-0.181**	-0.245***
	(0.088)	(0.081)	(0.075)	(0.083)
Investment Flexibility	-0.118	-0.145*	-0.139*	-0.114*
	(0.070)	(0.073)	(0.073)	(0.061)
Customer Interactions	0.498***	0.502***	0.549***	0.509***
	(0.082)	(0.103)	(0.090)	(0.073)
Log # Employees (2019)	0.010	0.013	0.013	0.010
	(0.011)	(0.011)	(0.011)	(0.010)
Post March 15	0.358***	0.377***		0.358***
	(0.056)	(0.061)		(0.050)
Observations	451	445	445	451
R-squared	0.166	0.268	0.291	0.127
State FE		Yes	Yes	
Week FE			Yes	

Table IA.3: Conditional Impact of Investment Flexibility: Full Set of Interactions

This table is an extension of Table 3 in the main text, where we include pairwise interactions among all three flexibility measures. Data are from the March 2020 CFO survey. The dependent variable is the projected capital spending growth in 2020 in Panel A, and the projected employment growth in 2020 in Panel B. Controls are Customer Interactions and Log # Employees (at the end of 2019). Detailed variable definitions are available in Internet Appendix C. Standard errors are clustered at the two-digit NAICS level and displayed in parentheses below the coefficient. ***, **, * denote significance at 1%, 5%, 10%.

Panel A: Impact on Capital Spending

	(1)	(2)	(3)	(4)	(5)	(6)
			Capital Spending			
Financial Flexibility	0.082***	0.094***	0.025	0.059**	-0.001	0.004
	(0.027)	(0.028)	(0.039)	(0.023)	(0.044)	(0.037)
Workplace Flexibility	-0.124	-0.146	-0.124	-0.150	-0.222	-0.336
	(0.073)	(0.100)	(0.074)	(0.100)	(0.162)	(0.199)
Investment Flexibility	-0.199**	-0.250***	-0.373**	-0.358***	-0.363**	-0.340***
	(0.074)	(0.077)	(0.134)	(0.087)	(0.144)	(0.101)
Workplace Flex × Investment Flex	0.754***	0.922***	0.769***	0.945***	0.779***	0.961***
	(0.179)	(0.273)	(0.181)	(0.270)	(0.179)	(0.265)
Financial Flex × Investment Flex			0.210	0.126	0.196	0.100
			(0.147)	(0.097)	(0.158)	(0.110)
Workplace Flex × Financial Flex					0.120	0.230
					(0.117)	(0.144)
Observations	397	391	397	391	397	391
R-squared	0.029	0.177	0.034	0.179	0.035	0.182
Controls		Yes		Yes		Yes
Week FE		Yes		Yes		Yes
State FE		Yes		Yes		Yes
NAICS-2 FE		Yes		Yes		Yes

Panel B: Impact on Employment

	(1)	(2)	(3)	(4)	(5)	(6)
			Employment			
Financial Flexibility	0.071***	0.077***	0.037*	0.048	0.027	0.039
	(0.018)	(0.019)	(0.020)	(0.034)	(0.025)	(0.045)
Workplace Flexibility	0.039**	0.046**	0.040**	0.043**	0.001	0.014
	(0.017)	(0.017)	(0.017)	(0.017)	(0.035)	(0.058)
Investment Flexibility	-0.037*	-0.025	-0.139***	-0.114*	-0.135***	-0.111*
	(0.021)	(0.027)	(0.032)	(0.057)	(0.031)	(0.054)
Workplace Flex × Investment Flex	0.302***	0.268	0.310***	0.287	0.316***	0.289
	(0.090)	(0.182)	(0.086)	(0.180)	(0.085)	(0.182)
Financial Flex × Investment Flex			0.122***	0.104*	0.116***	0.100**
			(0.033)	(0.050)	(0.032)	(0.047)
Workplace Flex × Financial Flex					0.047	0.036
					(0.034)	(0.059)
Observations	405	400	405	400	405	400
R-squared	0.058	0.230	0.065	0.234	0.065	0.234
Controls		Yes		Yes		Yes
Week FE		Yes		Yes		Yes
State FE		Yes		Yes		Yes
NAICS-2 FE		Yes		Yes		Yes

Table IA.4: Investment Flexibility and Customer Interactions

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

Panel A: March 2020 CFO Survey

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

Panel B: Compustat Annual 2020

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

Table IA.5: Impact of Workplace Flexibility on Employment Growth Realizations
2005-2019

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

	(1)	(2)	(3)	(4)	(5)	(6)
			Compustat		BLS	
Workplace Flexibility	0.051***	0.001	-0.008	-0.005	0.014	0.019
	(0.010)	(0.014)	(0.017)	(0.013)	(0.010)	(0.012)
Lagged Leverage		-0.015***	-0.018***	-0.018***		
		(0.002)	(0.002)	(0.002)		
Lagged Cash/Assets		0.098***	0.076***	0.083***		
		(0.012)	(0.014)	(0.012)		
Customer Interactions			0.054***	-0.005		
			(0.015)	(0.030)		
Lagged Log # Employees			-0.006***	-0.006***		
			(0.001)	(0.001)		
Observations	69,249	69,249	69,249	69,249	3,360	3,360
R-squared	0.001	0.009	0.022	0.024	0.002	0.314
Year FE			Yes	Yes		Yes
State FE			Yes	Yes		
NAICS-2 FE				Yes		Yes

Table IA.6: Realized Company Outcomes Relative to Pre-COVID

This table examines how firm outcomes have changed since the onset of COVID, using the same data as Figure IA.3. Data are from the September 2020 CFO survey. This survey asked CFOs:

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

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

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

Revenue, Employment and Remote Work refer to the level of the variable. Capital Spending refers to "willingness to spend on structures and equipment." The dependent variable is the CFO's response concerning Employment in columns (1) and (2), Capital Spending in columns (3) and (4), and Remote Work in columns (7) and (8). The dependent variable is the Physical Capital/Labor variable in columns (5) and (6). As the dependent variable in each specification has three categories, each column presents results from an ordered logit regression, and coefficients displayed are odds ratios (an odds ratio less (greater) than one indicates a decrease (increase)). Workplace Flexibility, Investment Flexibility, Customer Interactions and Log # Employees (at the end of 2019) are standardized to unit variance. Thus, the odds ratios display the proportional change in the odds of observing a higher response from a standard deviation change in the relevant variable. Detailed variable definitions are in Internet Appendix C. Standard errors are clustered at the two-digit NAICS level and displayed in parentheses below the coefficient. ***, **, * denote significance at 1%, 5%, 10%.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Employment		Capital Spending		Physical Capital/Labor		Remote Work	
Workplace Flexibility	1.317*	1.221	0.778**	0.760**	0.698***	0.707***	1.511***	2.291***
	(0.149)	(0.142)	(0.117)	(0.129)	(0.109)	(0.105)	(0.116)	(0.260)
Investment Flexibility	0.968	0.960	0.984	0.948	0.980	0.975	0.782**	0.797
	(0.181)	(0.186)	(0.090)	(0.103)	(0.140)	(0.149)	(0.105)	(0.139)
Customer Interactions		0.841**		1.095		1.275**		1.107
		(0.077)		(0.108)		(0.102)		(0.221)
Log # Employees (2019)		0.604***		0.914		1.491***		4.237***
		(0.110)		(0.165)		(0.150)		(0.267)
Observations	244	244	244	244	244	244	244	244
Pseudo R-squared	0.010	0.046	0.012	0.014	0.022	0.048	0.033	0.208

Table IA.7: Proxies for Financial Flexibility and Customer Interactions in Compustat

This table examines the interactive role of proxies for financial flexibility and customer interactions in determining employment and capital spending outcomes for Compustat firms for the year 2020. Columns (1) to (3) examines the effect of customer interactions (demand) on employment growth outcomes, conditional on proxies for firms' financial flexibility. In column (1) we interact our demand variable with the firm's lagged cash/assets (lagged CHE/AT in Compustat). In column (2), we interact demand with the firm's lagged leverage (lagged (DLC + DLTT)/AT in Compustat). In column (3), we include both interactive terms. Columns (4) to (6) display the analogous specifications for capital spending growth outcomes. In all columns, we require that a firm have positive assets, non-negative debt, non-missing data for lagged leverage and cash/assets, non-missing employment or capital spending data from fiscal years 2019 and 2020, and a non-missing four-digit NAICS code. In columns (1) to (3), the dependent variable is the log change in employment from 2019 to 2020. In columns (4) to (6), the dependent variable is the log change in capital spending from 2019 to 2020. Each column includes the variables Workplace Flexibility, Investment Flexibility and Log # Employees (at the end of 2019), and both state and NAICS-2 fixed effects. Standard errors are clustered at the four-digit NAICS level and displayed in parentheses below the coefficient. ***, **, * denote significance at 1%, 5%, 10%.

	(1)	(2)	(3)	(4)	(5)	(6)
	Employment Growth			Capital Spending Growth		
Customer Interactions	-0.297***	-0.139	-0.222*	-0.277	0.057	0.010
	(0.087)	(0.103)	(0.123)	(0.339)	(0.387)	(0.418)
Lagged Cash/Assets	-0.021	0.184***	0.009	0.191	0.414***	0.318
	(0.128)	(0.020)	(0.134)	(0.465)	(0.084)	(0.471)
Lagged Leverage	-0.072**	0.043	0.015	-0.069	0.280	0.263
	(0.032)	(0.106)	(0.110)	(0.056)	(0.303)	(0.302)
Customer Interactions × Lagged Cash/Assets	0.460		0.394	0.498		0.217
	(0.287)		(0.300)	(1.024)		(1.039)
Customer Interactions × Lagged Leverage		-0.252	-0.192		-0.770	-0.732
		(0.214)	(0.222)		(0.645)	(0.645)
Observations	4,689	4,689	4,689	4,212	4,212	4,212
R-squared	0.096	0.096	0.096	0.057	0.057	0.057
Flexibility Variables & Controls	Yes	Yes	Yes	Yes	Yes	Yes
NAICS-2 FE	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes

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B Model Solutions

The firm's maximization problem is:

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

$$s.t. \ w L_1 + K_1 - \Delta = C.$$

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

$$\frac{\partial F}{\partial L_1} = \alpha \phi A B L_1{}^{\alpha-1} - w,$$

$$\frac{\partial F}{\partial L_2} = \alpha A L_2{}^{\alpha-1} - w,$$

$$\frac{\partial F}{\partial \Delta} = -\beta \phi A B (K_1 - \Delta)^{\beta-1} + \beta A (K_2 + \Delta)^{\beta-1} - 2\xi \Delta,$$

$$\frac{\partial F}{\partial K_2} = \beta A (K_2 + \Delta)^{\beta-1} - 1.$$

Financial Constraint Not Binding

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

$$\frac{\partial F}{\partial L_1} = \alpha \phi A B L_1{}^{\alpha-1} - w = 0,$$

$$\frac{\partial F}{\partial \Delta} = -\beta \phi A B (K_1 - \Delta)^{\beta-1} + \beta A (K_2 + \Delta)^{\beta-1} - 2\xi \Delta = 0.$$

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

$$\frac{\partial L_1}{\partial \phi} = \frac{L_1}{\phi(1 - \alpha)} > 0,$$

$$\frac{\partial \Delta}{\partial \phi} = \frac{\beta A B (K_1 - \Delta)^{\beta-1}}{\beta(\beta-1)\phi A B (K_1 - \Delta)^{\beta-2} + \beta(\beta-1) A (K_2 + \Delta)^{\beta-2} - 2\xi} < 0.$$

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

$$\frac{\partial L_1}{\partial \xi} = 0,$$

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

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

$$\frac{\partial L_1}{\partial B} = \frac{L_1}{\phi(1-\alpha)} > 0,$$

$$\frac{\partial \Delta}{\partial B} = \frac{\beta\phi A(K_1 - \Delta)^{\beta-1}}{\beta(\beta-1)\phi AB(K_1 - \Delta)^{\beta-2} + \beta(\beta-1)A(K_2 + \Delta)^{\beta-2} - 2\xi} < 0.$$

Financial Constraint Binding

The partial derivatives of G are:

$$\frac{\partial G}{\partial L_1} = w,$$

$$\frac{\partial G}{\partial L_2} = 0,$$

$$\frac{\partial G}{\partial \Delta} = -1,$$

$$\frac{\partial G}{\partial K_2} = 0.$$

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

$$\frac{\partial Y}{\partial \lambda} = wL_1 + K_1 - \Delta - C = 0,$$

$$\frac{\partial Y}{\partial L_1} = \alpha\phi ABL_1{}^{\alpha-1} - (\lambda + 1)w = 0,$$

$$\frac{\partial Y}{\partial \Delta} = -\beta\phi AB(K_1 - \Delta)^{\beta-1} + \beta A(K_2 + \Delta)^{\beta-1} - 2\xi\Delta + \lambda = 0.$$

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

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

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

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

$$\frac{\partial L_1}{\partial \phi} = \frac{1}{w}\frac{\partial \Delta}{\partial \phi},$$

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

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

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

$$\frac{\partial L_1}{\partial \xi} = \frac{1}{w}\frac{\partial \Delta}{\partial \xi},$$

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

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

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

respect to B and obtain:

$$\frac{\partial L_1}{\partial B} = \frac{1}{w}\frac{\partial \Delta}{\partial B},$$

$$\frac{\partial \Delta}{\partial B} = \frac{\beta\phi A(K_1 - \Delta)^{\beta-1} - \frac{1}{w}\alpha\phi AL_1^{\alpha-1}}{\beta(\beta-1)\phi AB(K_1 - \Delta)^{\beta-2} + \beta(\beta-1)A(K_2 + \Delta)^{\beta-2} - 2\xi + \frac{1}{w^2}\alpha(\alpha-1)\phi ABL_1^{\alpha-2}}.$$

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

C Data Appendix

This appendix provides detail on the construction of all variables used in the paper. Code and data for our measures of workplace flexibility and investment flexibility, customer interactions and fixed cost share are available at https://github.com/jwb4335/corporate_flexibility. More detail on the construction of other variables is available upon request.

C.1 Duke CFO Survey Variables

Revenue/Employment/Capital Spending Forecasts

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

Relative to 2019, what will be your company's PERCENTAGE CHANGE during 2020? (e.g., +3%, -2%, etc.) [Leave blank if not applicable.]
	% Capital spending
	% Number of domestic full-time employees
	% Revenue

Financial Flexibility

An indicator variable taking a value of one if the CFO answered 2 or above to the question below.

About how much financial flexibility would you say your company has right now?					
None	A little		Moderate		A lot
0	1	2	3	4	5
○	○	○	○	○	○

Investment Flexibility

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

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the question below. We then calculate the percentage of firms with investment flexibility at the four-digit NAICS level. Industries with the highest investment flexibility include beverage, media, apparel stores, and banking, while industries with the lowest investment flexibility include farming, mining, transportation, health care, and wholesale.

For your planned Capital Expenditures, please consider your largest planned project.
How Flexible is the speed at which you complete this largest CapX project?
○ Very flexible
◉ Flexible
○ Somewhat flexible
○ Neutral
○ Somewhat inflexible
○ Inflexible
○ Very inflexible

Log # Employees (2019)

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

COVID Risk

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

In 2020: To what extent is your company's financial well-being exposed to Coronavirus-related risk?
○ No financial exposure to Coronavirus risk
○ Small Coronavirus risk
○ Medium Coronavirus risk
○ Large Coronavirus risk
○ Don't know or not applicable

Limited Access to External Capital

An indicator variable taking a value of one if the CFO answer with "Yes, a small amount," "Yes, a moderate amount," or "Yes, a large amount" to the question below.

Does your firm's ability to access external capital limit your ability to pursue attractive investment projects?

○ No
○ Yes, a small amount
○ Yes, a moderate amount
○ Yes, a large amount

Cash/Assets

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

What are your company's 2019 value for the following?

	Year-end 2019 value
Cash-to-total-assets ratio	%

C.2 External Variables

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

Four-digit NAICS level proxy for a firm's ability to do work from home. We use data from the 2017-2018 ATUS Leave and Job Flexibilities module (n = 10,040), which asks questions related to workers' ability to perform their job from home. Following Papanikolaou and Schmidt (2022) and Alon et al. (2020), we classify a worker as being able to work from home if they answer yes to these two questions:

- As part of your (main) job, can you work at home?

- Are there days when you work only at home?

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

Workplace Flexibility measure from Dingel and Neiman (2020)

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

Customer Interactions

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

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

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

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

of downstream industries' Direct Customer Interactions. We combine the direct and indirect channels into an overall measure for the importance of customer interactions:

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

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

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

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

Fixed Cost Share

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

Fraction Part-Time

Four-digit NAICS level variable for the percentage of workers in an industry that are part-time. Following Mas and Pallais (2017), we start from the 2010, 2012, 2014, 2016,

2018 supplements of the General Social Survey. Using the Soltas (2019) crosswalk to map from census to NAICS industry codes, we aggregate to the NAICS-4 level, and take the simple average across years as our final measure. Retail industries have a high fraction of part-time workers (e.g., clothing stores), whereas professional/scientific services have a low fraction of part-time workers (e.g., scientific/R&D services).

Scheduling Autonomy

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

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

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

Unionization

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

Scale Inflexibility

Four-digit NAICS level proxy for a firm's inability to easily adjust the scale of production in response to profitability shocks. Using annual Compustat data from 2000-2019,

We start from the firm-level measure described in Gu et al. (2019) and Gu et al. (2021):

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

where the numerator is the range of the firm's ratio of operating costs to sales over the previous 20 years, and the denominator is the standard deviation over the previous 20 years of the firms sales to assets ratio (we require firms to have at least 10 years of data to be included). We then take the simple average across firms at the NAICS-4 level as our final measure. Firms in oil & gas extraction have a high degree of inflexibility, whereas firms in plastic and paper product manufacturing have low inflexibility.

Human Coordination

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

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