

# Sentiment and Firm Behavior During the COVID-19 Pandemic

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How did sentiment about the policies for containing the COVID-19 pandemic affect firms' business outlook and behavior early in the crisis? In a representative panel of German firms, we demonstrate that the variation in expectations regarding the duration of COVID-19 induced lockdowns plausibly reflects sentiment that is unrelated to fundamentals. This sentiment-driven variation in expectations was an important determinant of firms' crisis response: Firms that perceived the shutdown to last longer were more likely to implement strong measures like layoffs or canceling investments. The implementation of soft measures, e.g., working from home, was unrelated to the expected crisis progression.

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## 1. Introduction

Recent theoretical work highlights sentiment, that is, shifts in expectations unrelated to fundamentals, as an important driver of economic activity (e.g., [Angeletos and La’O, 2013](#); [Benhabib et al., 2015](#)). However, micro-level evidence on the link between sentiment-driven expectations and behavior is scarce—especially for the case of firms.

This paper studies how sentiment-driven expectations affect firms’ business decisions by exploiting the unprecedented nature of the COVID-19 pandemic. Early in the crisis, governments implemented a shutdown of a significant share of economic activity in many countries, without clear perspective of when the situation would be back to normal. Amid this unclear situation, firms had to make decisions on how to adapt to the crisis. We investigate how firms’ sentiment about the duration of the COVID-19 crisis—proxied by their expectations of the duration of COVID-19 induced restrictions on public life—affected their managerial decisions. To this end, we argue that variation in firms’ expectations regarding the duration of the shutdown mostly reflect sentiment.

The expectation data are from the April 2020 wave of the Ifo Business Survey (IBS) that covers roughly 6,000 German firms. There are three reasons for why the variation in shutdown duration plausibly reflects sentiment: First, firms did not anticipate COVID-19 related policies ([Buchheim et al., 2020](#)). Second, the expected shutdown duration is orthogonal to the initial impact of the COVID-19 crisis both at the levels of firms and industries. Third, the panel dimension of the survey allows us to show that the expected shutdown duration is largely uncorrelated with firms’ pre-COVID-19 business conditions, firms’ general optimism or pessimism in the spirit of [Bachmann and Elstner \(2015\)](#), or firm characteristics such as their size or their export exposure. Because the cross-sectional differences in expectations thus seem to reflect sentiment and are, as such, independent of fundamentals by definition, we interpret their effects on business decisions as causal.

We find that firms’ sentiment about the further progression of the crisis explains their choices of forward-looking business strategies to mitigate the consequences of COVID-19. In particular, firms that believed the shutdown to last for more than four months were 23 to 31 percent more likely to implement strong responses with high fixed costs—canceling investment or dismissing employees—than the average firm expecting a quick return to normalcy. In contrast, firms implemented relatively inexpensive measures, like working from home or short-time work, independently of the expected length of the shutdown. Noteworthy, these effects are prevalent after controlling for pre-crisis firm health and the concurrent impact of the COVID-19 crisis on firms’ businesses that are found to be important determinants for firms’ responses to the crisis on their own.

The effects of sentiment on managerial decisions are consistent with their effects on the general business outlook of firms. We show that firms’ shutdown expectations are not predictive for the reported initial crisis impact, but constitute an important determinant of their business outlook going forward. For example, firms that believed the shutdown to last for longer than four months reported a five percentage point higher expected decline in revenues due to the COVID-19 crisis than firms expecting the shutdown to last for less than two months, even after controlling for the initial business impact of the crisis.

Taken together, our results suggest that the perceived length of a shutdown, and, in extension, the time path for reopening the economy are key statistics for how firms chose to deal with the crisis. Clearly communicating these plans—at times of relatively low virus activity, but more importantly during a potential second wave of widespread lockdowns—thus helps preventing potentially costly planning mistakes.

Our paper makes several contributions to the literature. To the best of our knowledge, we are the first to provide micro-level evidence that sentiment informs managerial choices of firms. Our results hence provide support for recent theoretical work arguing that sentiment is key to explaining behavior of economic agents in a way that is in line with observed aggregate fluctuations (e.g., [Angeletos and La’O, 2013](#); [Benhabib et al., 2015](#)). In this respect, our paper is closely related to recent studies examining the link between consumer sentiment and consumption choices at the household level. [Mian et al. \(2018\)](#) highlight that sentiment shocks after elections do not have significant effects on household spending, while [Gillitzer and Prasad \(2018\)](#) and [Makridis \(2019\)](#) provide evidence that changes in individuals’ sentiment affects consumption. The latter finding is also supported by the co-movement of consumer sentiment and GDP in state-level ([Benhabib and Spiegel, 2019](#)) and aggregate (e.g., [Barsky and Sims, 2012](#); [Lagerborg et al., 2020](#)) data.

Our results also add to the emerging strand of literature that investigates the more general link between firms’ (macroeconomic) expectations and their decisions. Difficulties in identifying exogenous variation in firms’ expectations as well as a lack of data containing both expectations and business decisions make it challenging to empirically study this potential key determinant of firms’ hiring and investment.<sup>1</sup> Recently, [Coibion et al. \(2018\)](#) and [Coibion et al. \(2020\)](#) use experiments involving information treatments to show how differences in inflation expectations of firms causally affect firms’ decisions on prices, employment, and investment. [Boneva et al. \(2020\)](#) use an instrumental variables approach to a similar end. In addition to these studies establishing causal effects, [Gennaioli et al. \(2015\)](#), [Tanaka et al. \(2020\)](#), and [Dovern et al. \(2020\)](#) document that managerial expectations correlate with business decisions.

In the context of the COVID-19 pandemic, this paper is first in highlighting how firms’ expectations about the progression of the pandemic shaped their business decisions. Only few other papers describe these decisions during the first wave of the pandemic. [Alekseev et al. \(2020\)](#) and [Bartik et al. \(2020\)](#) provide broad, mostly descriptive snapshots on the extent to which firms in the U.S. are affected by the crisis and how they planned to deal with the ensuing disruptions. In addition, [Alstadsæter et al. \(2020\)](#) summarize some characteristics of Norwegian firms that laid off workers early in the crisis; their main focus, however, is on the socio-economic characteristics of dismissed employees. Our work is also related to [Altig et al. \(2020\)](#), [Baker et al. \(2020\)](#), and [Hassan et al. \(2020\)](#) who study the effect of the COVID-19 pandemic on expectations and subjective uncertainty

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<sup>1</sup>There is a larger—yet also very recent—literature on the effect of expectations of private households on their decisions. Most of this literature relies on the analysis of correlations between expectations and decisions and focuses on the identification of heterogeneity driven by socioeconomic characteristics ([Bachmann et al., 2015](#); [D’Acunto et al., 2019](#); [Dräger and Nghiem, forthcoming](#)). A number of very recent studies identify causal effects from households’ expectations on decisions using information treatments or natural experiments ([D’Acunto et al., 2016](#); [Coibion et al., 2019](#); [Roth and Wohlfart, forthcoming](#)).

of firms, but without considering the managerial responses.

The remainder of this paper is structured as follows. Section 2 describes the survey data and argues that variation in duration expectations is rooted in sentiment rather than (private) information. In Section 3, we present evidence on how the COVID-19 pandemic and sentiment about its further dynamics have influenced the general business outlook of firms and firms’ managerial responses. Section 4 concludes.

## 2. Data: Sentiment-driven Expected Shutdown Duration

### 2.1. The ifo Business Survey

Our main data source is the ifo Business Survey (IBS). The IBS is a long-standing monthly survey among a representative sample of German firms across all sectors of the economy. It covers various dimensions of firms’ business activities, including their current and expected business conditions.<sup>2</sup> While we exploit the panel dimension of these questions to control for pre-trends at the firm level, we restrict the analysis to the IBS wave of April 2020 that included supplementary questions related to the COVID-19 pandemic.<sup>3</sup> In particular, the survey asked i) how long firms expected the restrictions of public life in Germany to last (in months) (henceforth, “expected shutdown duration”), ii) how strongly the COVID-19 crisis had already affected firms’ business conditions (“COVID-19 impact” on a scale from -3 (“negative”) to +3 (“positive”)), iii) the expected percent change in revenues due to the COVID-19 crisis (“COVID-19 revenue effect”), and iv) which measures firms had already taken in response to the pandemic with a list of (non-exclusive) answers that included, inter alia, “more working from home”, “short-time work”, “reduction of employment”, “postponement of investment projects”, and “cancelation of investment projects”.<sup>4</sup>

Overall, our sample comprises 4,846 firms that responded to the IBS in April 2020 and in the last quarter of 2019. 1,763 of these were in manufacturing (IBS-IND, 2020), 1,674 in services (IBS-SERV, 2020), and 1,409 in retail/wholesale (IBS-TRA, 2020).<sup>5</sup> The average firm stated to be strongly adversely affected by the COVID-19 crisis; the mean “COVID-19 impact” was  $-1.53$ . This strong negative effect of the pandemic is also reflected in the expected business conditions, which are regularly elicited on a trichotomous scale ( $-1$  “more unfavorable”,  $0$  “roughly the same”,  $1$  “more favorable”) and averaged at  $-0.57$  in April. Both the drop relative to March and the

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<sup>2</sup>The IBS provides input for the ifo Business Climate Index, the most recognized leading indicator for the German business cycle, see Sauer and Wohlrabe (2020) for details. Sauer and Wohlrabe (2019) document that questions are usually answered by senior managers.

<sup>3</sup>Buchheim et al. (2020) show that firms’ business outlook decreased strongest after the announcement of nation-wide school closures on March 13. Since roughly three out of four respondents of the March wave answered the survey before this date, April 2020 is the first month in which all survey respondents were under the impression of the COVID-19 crisis.

<sup>4</sup>In general, the response rate for the COVID-19-related supplementary questions was high. More than 97.2 % of firms that responded to the survey in April answered at least three of these four special questions. Table A1 in Appendix A summarizes basic descriptive statistics for the variables we use and Appendix B documents the translated wording of all COVID-19-related questions used in this paper.

<sup>5</sup>Data harmonization across sectors follows Link (2020) which primarily involves the cleaning and assignment of industry codes of the official German industry classification system WZ08.

low April level constitute historical records. Firms were also very pessimistic regarding the further effects of the crisis on their business. On average, they expected their revenues in 2020 to drop by 21 % relative to a hypothetical scenario without the pandemic.

Firms in our sample reported whether or not they implemented one or more of a variety of crisis response strategies by April. The most frequent response was to use the possibility for employees to work from home (63.8 %).<sup>6</sup> Half of the firms (49.7 %) reported to use the short-time work scheme which is consistent with official statistics suggesting that the number of employees on short-time work reached a record high of approximately six million in April ([Bundesagentur für Arbeit, 2020](#)). In addition, 16.2 % of firms reported that they had already reduced their workforce. Many firms were reluctant to invest and either postpone investment projects (43.2 %) and/or cancel them altogether (20.5 %). On the funding side, 48.6% of firms reported having taken out additional credit.<sup>7</sup>

## 2.2. Sentiment-driven Expected Shutdown Duration

Firms’ expectations regarding the duration of the COVID-19 related restrictions are highly dispersed. They range from 0.5 months to 36 months with a standard deviation of 3.4, reflecting the high general uncertainty regarding the progression of the crisis.<sup>8</sup>

We argue that the variation in expected shutdown duration is rooted in sentiment rather than information. First, [Buchheim et al. \(2020\)](#) show with data from the January to March waves of the same panel that firms did not anticipate COVID-19 related policies that were implemented in March 2020. Hence, it is unlikely that the variation in the duration expectations reflects private information about the crisis progression.

Second, the shutdown duration expectations do also not reflect the initial impact of the COVID-19 crisis on firms’ businesses. Panel (a) of Figure 1 shows that there is no correlation between the expected duration of the shutdown and the initial impact of the COVID-19 crisis on businesses at the firm level: The conditional means of the expected shutdown duration are equal across the values of COVID-19 impact (integers between -3 and 3), and the conditional distributions are comparable. The same holds at the industry level in Panel (b): Firms in industries that were initially more adversely affected by the crisis did not expect the restrictions on public life to be in place for a longer or shorter period of time than firms in less affected industries. For example, the duration expectations of the heavily hit hospitality industry (restaurants and hotels, travel agencies) are, on average, nearly identical to retail and wholesale firms—of which some were hit badly while others were not—and the telecommunication, pharmaceutical or paper products industries which report to not have been hit by the pandemic at all. Both of these results thus support the interpretation of

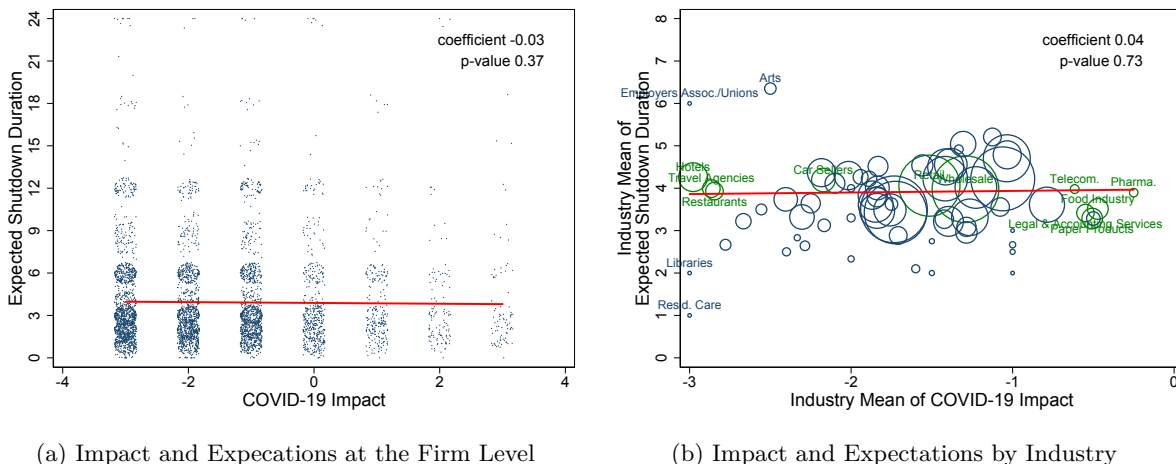
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<sup>6</sup>This is very similar to evidence from the UK (66 % in April, [British Chambers of Commerce, 2020](#)) and also to the result of a global survey (54 % in March, [Mercer, 2020](#)).

<sup>7</sup>We combine firms reports on “usage of existing credit limits” (indicated by 42.3 % of all firms) and “extension of credit limits” (17.6 %) for the sake of brevity. Qualitatively, the results of Section 3.2 are similar if we examined these categories separately.

<sup>8</sup>On average, firms expected those restrictions to continue for four months, i.e., until August 2020. See Figure A1 in Appendix A for the distribution of shutdown duration expectations.

Figure 1: Expected Shutdown Duration and COVID-19 Impact



Notes: Panel (a) plots, after adding small random errors to the discrete values for better visibility, the expected shutdown duration (in months and censored at 24 months for readability) against the COVID-19 impact (measured by integers between -3 “negative impact” and 3 “positive impact”) at the firm level both elicited in the April wave of the IBS. Panel (b) plots the industry-specific mean of firms’ expected shutdown duration against average COVID-19 impact on business activity at the levels of two-digit industries. Industry-averages are weighted by the number of firms per industry indicated by the bubble size.

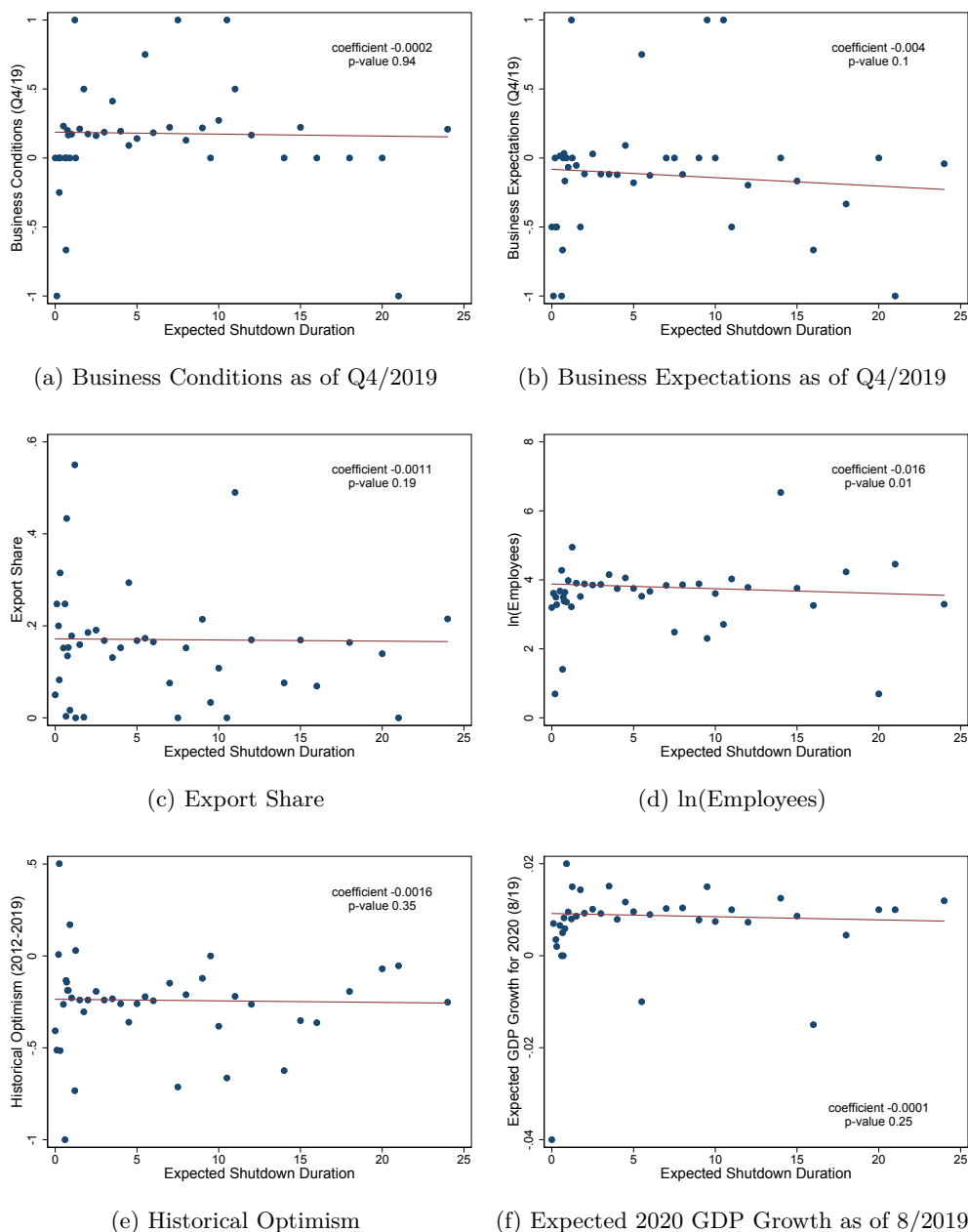
duration expectations as a purely forward-looking measure of sentiment about the crisis progression.

Third and finally, firms’ shutdown duration expectations are largely uncorrelated with observables at the firm-level. Figure 2 illustrates this point by plotting, for 50 percentile bins of the expected shutdown duration, the means of different firm-level observables against the mean of the duration expectations, along with the best linear fit.<sup>9</sup> The first row shows that firms’ pre-crisis business situations in Q4 2019—as measured by the reported business conditions in Panel (a) and the six months ahead business expectations in Panel (b)—are unrelated to whether firms were optimistic or pessimistic regarding the shutdown duration. The second row shows that the same is true for the correlation of duration expectations and long-run firm characteristics: There is no economically meaningful correlation between either firms’ export shares (Panel (c)) or firms’ size (Panel (d)) and their sentiment regarding the shutdown duration, even though the slight negative correlation between log employees and the expected shutdown duration is statistically significant. Finally, the third row shows that the expected shutdown duration is also unrelated to firms’ optimism or pessimism, either measured as whether they consistently over- or underpredict their own business developments in the spirit of [Bachmann and Elstner \(2015\)](#) (Panel (e)),<sup>10</sup> or with respect to their August 2019 expectations regarding GDP growth for 2020 (Panel (f)).

<sup>9</sup>Appendix Table A2 makes the same point by showing that there are no economically meaningful differences in the means of these observables—and the initial COVID-19 impact—for shutdown expectations above and below the median.

<sup>10</sup> We define “Historical Optimism” as each firm’s mean difference between business expectations and subsequently realized business conditions between 2012 and 2019. If this difference is positive for a firm, this firm is overly optimistic regarding its future businesses. In contrast, if this difference is negative, the firm is consistently overly pessimistic regarding its own business developments.

Figure 2: Expected Shutdown Duration and Firm-Level Observables



*Notes:* Each figure groups the observations into 50 percentiles of the expected shutdown duration and plots, for each percentile bin, the mean of a firm-level observable against the mean of the expected shutdown duration. For readability, the expected shutdown duration is censored at 24 months. The first row plots the expected shutdown duration against firms' business outlook in Q4 2019 (reported business conditions in Panel (a) and expected business conditions for the next six months—including the first months of 2020—in Panel (b)). The second row plots the expected shutdown duration against firm characteristics: export share (in terms of revenues) in Panel (c) and firm size (as measured by ln(employees)) in Panel (d). The third row plots the expected shutdown duration against historical optimism (for the definition see Footnote 10) in Panel (e) and the firms' expected GDP growth for 2020 as elicited in August 2019.

Overall, the evidence shows that variation in the expected shutdown duration is not driven by either the initial impact of the COVID-19 crisis on firms' businesses, the firms' pre-crisis business



situation, or firms’ characteristics. Hence, it is plausible that the variation in those expectations reflects firms’ sentiment regarding the crisis progression, especially given the unprecedented nature of the crisis and accompanying policies during the first weeks of the pandemic. Since sentiment is, by definition, unrelated to fundamentals, we can then interpret effects of shutdown duration expectations on business decisions in a causal way.

### 3. Empirical Results

In this section, we analyze the effects that the sentiment-driven expectations regarding the duration of restrictions on public life had on firms’ business outlooks and on their managerial decisions to cope with the COVID-19 crisis. In particular, we focus on answering two questions: First, to which extent is the sentiment regarding the shutdown duration reflected in firms’ general business outlook? Second, did the sentiment regarding the shutdown duration also influence the choice of strategies that firms implemented to manage the crisis?

We analyze these questions by regressing different outcomes on the measure of sentiment—the expected shutdown duration—, controlling for firm characteristics and pre-crisis business conditions. Given that the initial impact of the COVID-19 crisis is a natural predictor for future business developments and the choice of managerial strategies in response to the crisis, the empirical specifications with forward-looking outcomes and the managerial responses include this variable as an additional control variable. Each linear regression includes a full set of industry fixed effects at the two-digit level (for 66 industries), county fixed effects (for 397 counties that are covered by our firm sample), and date-of-response fixed effects (dates between April 2 and 23). This way, we flexibly control for unobserved differences in the sectoral and regional exposure to the crisis, as well as for differences in information and crisis management depending on the exact survey date.

#### 3.1. Effects of Sentiment about Shutdown Duration on Business Outlook

To analyze the effects that expectations of the duration of the COVID-19 restrictions had on the general business situation of firms, we focus on three outcomes: the initial impact of the COVID-19 crisis on firms’ current business conditions, on the expected effect of the crisis on revenues in 2020, and on general business expectations for the next six months.

The hypotheses are clear: If the shutdown is perceived to last longer, the severe economic consequences of the shutdown are perceived to be in place for a longer period. As a consequence, a longer expected shutdown should make firms more pessimistic about their future business outlook—but should be independent of the initial, already realized impact of the crisis.

Table 1 reports the full set of estimates for these empirical models. In line with the above hypotheses and Figure 1, Column (2) shows that the sentiment regarding the shutdown duration correlates at best weakly with the reported initial impact of the COVID-19 pandemic on businesses. In contrast, the sentiment regarding the shutdown duration exhibits a statistically and economically significant effect on both forward-looking variables—the expected effect of the crisis on revenues in



Table 1: Effects of Sentiment about Shutdown Duration on Business Outlook

	COVID-19 Impact		COVID-19 Revenue Effect		Business Expectations	
	(1)	(2)	(3)	(4)	(5)	(6)
Expected shutdown duration (baseline: < 2 months):						
2 - 4 months		-0.051 (0.061)		-0.021*** (0.005)		-0.030 (0.028)
> 4 months		-0.107* (0.059)		-0.052*** (0.010)		-0.136*** (0.025)
COVID-19 impact (baseline: neutral):						
very negative			-0.257*** (0.011)	-0.254*** (0.010)	-0.427*** (0.037)	-0.428*** (0.036)
negative			-0.116*** (0.008)	-0.113*** (0.008)	-0.330*** (0.036)	-0.328*** (0.037)
positive			0.092*** (0.011)	0.093*** (0.011)	0.275*** (0.054)	0.277*** (0.054)
Outlook Q4/19 (baseline: neutral):						
negative	-0.261*** (0.054)	-0.259*** (0.053)	-0.023*** (0.007)	-0.022*** (0.008)	-0.011 (0.034)	-0.007 (0.034)
positive	0.346*** (0.042)	0.345*** (0.043)	0.020*** (0.005)	0.021*** (0.005)	0.087*** (0.018)	0.087*** (0.017)
Firm characteristics:						
ln(Employees)	0.020 (0.018)	0.019 (0.019)	0.015*** (0.002)	0.014*** (0.002)	-0.004 (0.009)	-0.005 (0.009)
Export share	-0.414** (0.174)	-0.386** (0.174)	-0.030** (0.014)	-0.028** (0.014)	0.129** (0.051)	0.136*** (0.051)
Constant	-1.609*** (0.073)	-1.571*** (0.095)	-0.133*** (0.009)	-0.113*** (0.012)	-0.332*** (0.040)	-0.281*** (0.040)
County FE	yes	yes	yes	yes	yes	yes
Industry FE	yes	yes	yes	yes	yes	yes
Date FE	yes	yes	yes	yes	yes	yes
Observations	4914	4835	4750	4706	4878	4801
Adj. R2	0.147	0.147	0.458	0.466	0.138	0.146

Notes: The dependent variables are firms' survey responses in April 2020 on the degree their businesses were affected by the COVID-19 crisis (elicited on a scale between -3 and 3), firms' expected impact of the crisis on revenues in 2020 (revenue increase/decrease as share of total revenue), and firms' expected business conditions during the next six months on a (-1,0,1)-scale. The expected shutdown duration is the measure of sentiment regarding the crisis progression (see Section 2.2 for details). In addition to the controls listed in the table, all empirical models include fixed effects at the levels of dates, counties, and two-digit industries. When the direct *COVID-19 impact* is used as a control variable, we group the seven-point scale into the categories "very negative" (-3), "negative" (-2 and -1), and "positive" (+1 to +3); an impact of zero serves as baseline. Standard errors clustered at the level of two-digit industries in parentheses. Significance levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Column (4) and expected business conditions in Column (6). Quantitatively, the negative revenue effect predicted by firms that expected a long duration of more than four months exceeds that of baseline firms by five percentage points. The substantial magnitude of this differential effect highlights the importance of shutdown expectations, and also bears high relevance for the response strategies chosen by firms, as the next section shows in more detail.

Two additional findings are worth pointing out: As hypothesized, the initial impact of the COVID-19 crisis as of April 2020 proves to be a strong predictor for the expected revenue effect and business expectations.<sup>11</sup> In addition, pre-crisis overall firm health affects both the initial business impact of the crisis and firms’ outlook conditional on the initial impact. The latter finding is consistent with—but no hard proof for—the notion that less healthy firms are more constrained in their means to manage the crisis.

The odd columns of Table 1 show the results when omitting the expected shutdown duration. The differences in the coefficient estimates between the respective odd and even columns are negligible, emphasizing the point of Section 2.2: Shutdown duration expectations are by and large orthogonal to observable firm characteristics, consistent with its interpretation as sentiment regarding the crisis progression.

### 3.2. Effects of Sentiment about Shutdown Duration on Managerial Decisions

Given the effects of sentiment regarding the shutdown duration on the business outlook shown in the previous section, we now tackle the following question: Did the perceived shutdown length also influence the choice of strategies that firms implemented to cope with the crisis?

To answer this question, we estimate the effects of sentiment about the shutdown duration on the prevalence of firms’ choices in the domains of employment, liquidity management, and investment. We hypothesize that the expected shutdown duration should primarily explain differences in the prevalence of those managerial responses that are costly to reverse: Managers should be more likely to implement less reversible strategies if they anticipate the crisis to last longer.

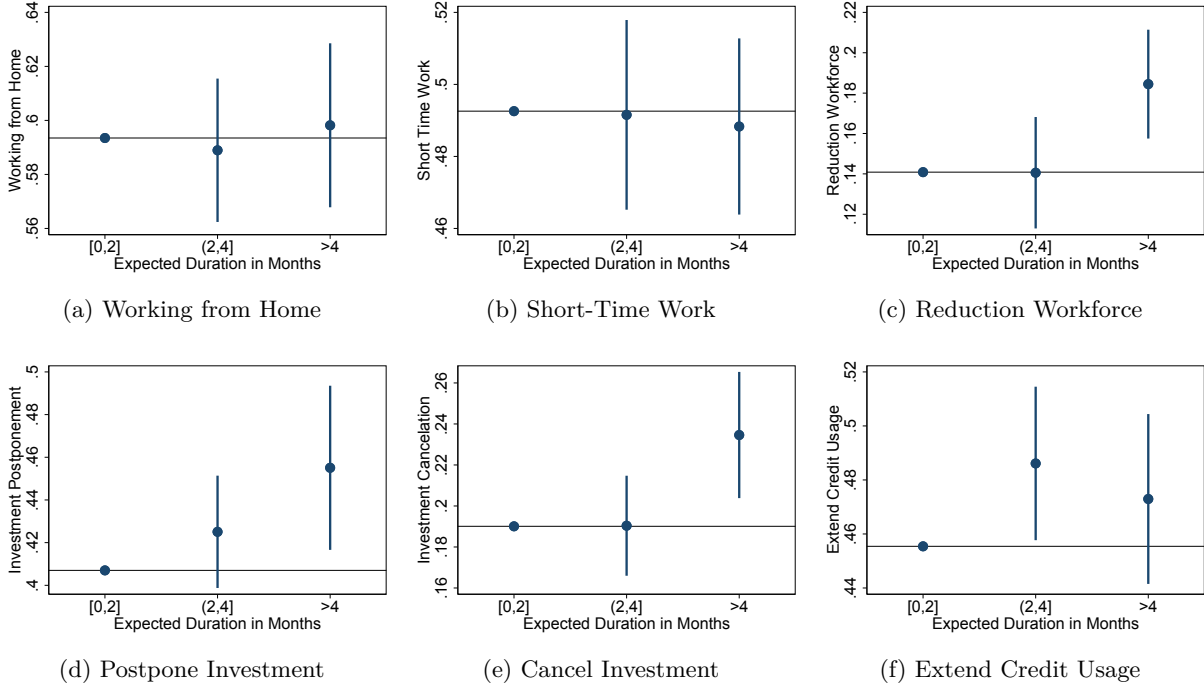
We consider the following potential managerial responses to the COVID-19 crisis in the employment domain: working from home, short-time work, and workforce reductions. These strategies differ in terms of their severity and reversibility. Having employees work from home is easily reversible and does not affect salaries paid and hours worked. Short-time work is a government scheme that permits firms to temporarily reduce working hours with a corresponding reduction in pay, and compensates part of employees’ foregone earnings. This scheme allows firms to retain their workforce at times of lower demand without paying the salary in full. This strategy thus is easy to reverse. Finally, layoffs affect the level of employment more permanently, while saving the entirety of salary costs.

In terms of managing investment and liquidity, we consider the following managerial responses to the COVID-19 crisis: postponement of investments, cancelation of investment projects, and usage of additional credit. As for the employment responses, the investment measures differ in their severity and reversibility: Naturally, it is more costly to reactivate a canceled investment project than to accelerate projects that had only been postponed. At the same time, when canceling projects, firms are likely to retain more of the investment expenditures than when merely postponing them.

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<sup>11</sup>As comparatively few firms indicate that they are positively affected by the crisis, we aggregate the reported COVID-19 impact into four categories when the variable is used as a covariate: very negative impact (−3), negative impact (−2 and −1), no impact (0), and positive impact (+1 to +3).

Figure 3: Effects of Sentiment about Shutdown Duration on Managerial Decisions



*Notes:* The figure shows the effect of firms’ expected shutdown duration—the measure of sentiment regarding the crisis progression (see Section 2.2 for details)—on the fraction of firms that applied the respective crisis response strategies. Estimations control for the direct COVID-19 impact, firms’ pre-crisis business conditions in 2019:Q4, firms’ size and export share, and fixed effects at the levels of dates, counties, and two-digit industries. The predicted values for a firm expecting a shutdown of less than two months and average firm characteristics serve as baseline. Confidence intervals are depicted at the 95-percent level. The estimates refer to Table 2.

Figure 3 plots the partial effect of sentiment about the shutdown duration on crisis response strategies. These effects are shown relative to the predicted prevalence for a firm expecting a shutdown duration of less than two months, with all other control variables fixed at their average values. Table 2 reports the corresponding full set of estimates.

In the employment domain, variation in sentiment regarding the shutdown duration only explains firm-level differences in layoffs: In contrast to work from home or short-time work, these are difficult to reverse quickly, and should thus predominantly be undertaken by managers that expect the shutdown to last longer. In line with this, the prevalence of layoffs increases by more than four percentage points if firms expected the shutdown to last more than four months. In other words, these firms were more than 30 percent more likely to reduce their workforce compared to an otherwise comparable firm anticipating a quick return to normalcy within less than two months.

Sentiment about the shutdown duration has statistically significant effects on the decision to postpone or cancel investments. Specifically, if firms perceived the shutdown to last four months or longer, they were about five percentage points more likely to postpone or cancel investment projects compared to firms that expected the shutdown to last for two months at most. Relative to the average prevalence of both crisis response strategies, the effect of sentiment is much larger for the

Table 2: Effects of Sentiment about Shutdown Duration on Managerial Decisions – Full Regression Results

	Working from Home	Short Time Work	Reduction Workforce	Postpone Investment	Cancel Investment	Extend Credit Usage
	(1)	(2)	(3)	(4)	(5)	(6)
Expected shutdown duration (baseline: < 2 months):						
2 - 4 months	-0.005 (0.014)	-0.001 (0.013)	-0.000 (0.014)	0.018 (0.013)	0.000 (0.012)	0.031** (0.014)
> 4 months	0.005 (0.015)	-0.004 (0.012)	0.044*** (0.014)	0.048** (0.020)	0.045*** (0.016)	0.018 (0.016)
COVID-19 impact (baseline: neutral):						
very negative	-0.027 (0.037)	0.605*** (0.026)	0.183*** (0.020)	0.268*** (0.023)	0.223*** (0.021)	0.205*** (0.021)
negative	0.024 (0.030)	0.293*** (0.024)	0.079*** (0.014)	0.177*** (0.028)	0.084*** (0.016)	0.136*** (0.021)
positive	0.021 (0.038)	-0.070*** (0.019)	-0.027** (0.013)	-0.072*** (0.025)	-0.007 (0.016)	-0.014 (0.028)
Business Conditions Q4/19 (baseline: neutral):						
negative	-0.037** (0.016)	0.087*** (0.021)	0.061*** (0.016)	0.009 (0.026)	0.066*** (0.017)	0.040* (0.023)
positive	0.007 (0.017)	-0.025 (0.016)	-0.021** (0.010)	-0.027* (0.014)	-0.045*** (0.016)	-0.038*** (0.015)
Firm characteristics:						
ln(Employees)	0.097*** (0.008)	0.035*** (0.005)	0.032*** (0.004)	0.037*** (0.005)	0.019*** (0.005)	0.025*** (0.007)
Export share	0.158*** (0.046)	-0.019 (0.049)	0.001 (0.032)	-0.038 (0.064)	-0.025 (0.040)	0.089 (0.059)
Constant	0.239*** (0.039)	0.036 (0.030)	-0.068** (0.028)	0.121*** (0.034)	0.017 (0.027)	0.237*** (0.037)
County FE	yes	yes	yes	yes	yes	yes
Industry FE	yes	yes	yes	yes	yes	yes
Date FE	yes	yes	yes	yes	yes	yes
Observations	4835	4835	4835	4835	4835	4835
Adj. R2	0.308	0.338	0.144	0.098	0.094	0.076

Notes: The dependent variables are firms' survey responses in April 2020 on whether or not they implemented the following strategies in response to the crisis: increased work from home, short-time work, reduction of workforce (e.g., lay-offs, desist from extensions), postponement of investment projects, cancelation of investment projects, extended credit use. The expected shutdown duration is the measure of sentiment regarding the crisis progression (see Section 2.2 for details). In addition to the controls listed in the table, all empirical models include fixed effects at the levels of dates, counties, and two-digit industries. To flexibly control for the direct *COVID-19 impact*, we group its seven-point scale into categories "very negative" (-3), "negative" (-2 and -1), and "positive" (+1 to +3); an impact of zero serves as baseline. Standard errors clustered at the level of two-digit industries in parantheses. Significance levels: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

less reversible strategy of canceling investments (implemented by 19 percent of average firms) than for the more reversible strategy of postponing investments (implemented by almost 45 percent of firms). Firms that anticipated the shutdown to last longer were also more likely to use additional credit. Yet, this effect is only statistically different from zero for firms with an expected shutdown duration between two and four months.

To learn more about the mechanism behind these managerial decisions, Appendix Table A3 includes three factors pertaining to revenue expectations as additional covariates: one indicator for whether expected revenue losses exceed the median of 20 percent, one indicator for whether firms

expected to partially recover the lost revenue, and the interaction of both indicators. These revenue expectations explain variation in the prevalence of all crisis response strategies with the exception of working from home, similar to the effects of the initial COVID-19 impact. This should be expected, because liquidity concerns stemming from the expected loss of revenues should be visible in direct liquidity management, in forward-looking investment strategies, and in liquidity-saving short-time work and layoffs. Also note that including revenue expectations generally reduces the magnitudes of the coefficients of the expected shutdown duration, particularly for the measures of canceling investment and extending credit. This could indicate that liquidity considerations linked to the perceived shutdown duration explain parts of their effects on the firms' crisis response strategies.

Besides the effects of sentiment, three additional findings are worth pointing out: First, firms' pre-crisis health is a strong predictor of firms' response to the COVID-19 crisis. Firms with bad conditions in 2019:Q4 were more likely to implement policies that save wage payments and investment costs. Among firms in bad pre-crisis health, the prevalence of short-time work increases by 1/5 of the predicted prevalence for the average firm, while the likelihood of layoffs and cancellation of investment projects increases by more than 1/3. This general pattern can also be found for the strategy of postponing investments, albeit at much smaller magnitudes. Firms with bad business conditions in 2019:Q4 were also less likely to implement working from home, but this effect is comparatively small given the widespread adoption of this managerial response to the crisis. Moreover, this may reflect that short-time work and working from home are partial substitutes. Lastly, the relatively weak firms were four percentage points more likely to use additional credit compared to firms that were doing decently—an effect of nine percent of the baseline prevalence of this managerial response.<sup>12</sup>

Second, larger firms were more likely to implement either of the measures. This is most likely due to the larger managerial resources of larger firms. In particular, we find that large firms were more likely to reduce employment, *ceteris paribus*. This is in contrast to evidence in [Alstadsæter et al. \(2020\)](#) who find that in Norway small firms were more likely to lay off employees during the initial phase of the COVID-19 crisis.

Third, firms that had already been hit more adversely by the crisis were more likely to send workers on short-time work, to lay off parts of their workforce, to postpone or cancel investment projects, and to extend their use of credit. The absence of an effect of the initial crisis impact on the prevalence of working from home is plausible as the feasibility of this managerial response is heavily linked to workers' tasks<sup>13</sup> and, in addition, such policy was generally regarded as mandatory whenever possible.

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<sup>12</sup>This effect rests on an increase in the usage of existing credit limits and cannot be observed for the prevalence of extending credit lines. Here, firm health has no effect, potentially because firms in good health do not need additional credit, and firms in bad health have more difficulties to obtain new credit lines.

<sup>13</sup>Recall that all empirical specifications include industry fixed effects, so that industry-level difference in the suitability of working from home as well as industry-level differences regarding the initial COVID-19 impact are filtered out.

## 4. Conclusion

This paper studies how sentiment-driven expectations affected firms' business decisions in the wake of the COVID-19 crisis using a large representative panel of German firms. We show that expectations regarding the duration of the shutdown most likely reflect sentiment that is unrelated to fundamentals because these expectations were orthogonal to the initial impact of the crisis on firms' businesses, pre-crisis business conditions, as well as long-term firm characteristics. We then show that the sentiment about the progression of the COVID-19 crisis influenced firms business outlook for the coming months and their choice of strategies for coping with the crisis: Firms that anticipated the shutdown to last four months or longer were more likely to implement costly and permanent measures, in particular layoffs and the cancelation of investment projects. In contrast, easily reversible measures, such as having employees work from home, or temporarily reducing wage costs through the short-time work scheme, were implemented independently of the expected duration of the crisis.

Our findings provide first firm-level evidence on the link between sentiment-driven expectations and behavior. Such link is a crucial mechanism in recent theoretical models that highlight sentiment as an important driver of economic activity (e.g., [Angeletos and La'O, 2013](#); [Benhabib et al., 2015](#)). So far, empirical evidence on the importance of this relationship has been limited to the link between consumer sentiment and consumption choices at the household level (e.g., [Mian et al., 2018](#); [Gillitzer and Prasad, 2018](#); [Makridis, 2019](#)).

Our findings also bear high policy relevance. We show that firm responses directly depend on the perceived length of restrictions on public life, i.e., the time path for reopening the economy. Therefore, clearly communicating the planned schedule of policy measures helps prevent potentially costly planning mistakes and might help to safeguard employment.

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# Appendix

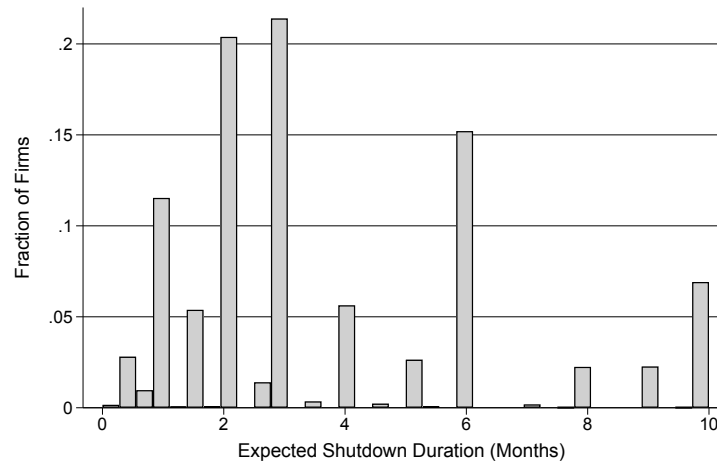
## A. Supplementary Figures and Tables

Table A1: Summary Statistics of IBS Data

	min	max	mean	sd
COVID-19 Impact on Business	-3	3	-1.53	1.44
Expected Shutdown Duration	0	36	3.93	3.43
Expected COVID-19 Revenue Effect	-1	3	-0.21	0.21
Reaction: More Home Office	0	1	0.64	0.48
Reaction: Short Time Work	0	1	0.50	0.50
Reaction: Reduction Workforce	0	1	0.16	0.37
Reaction: Postponement of Investment Projects	0	1	0.43	0.50
Reaction: Cancellation of Investment Projects	0	1	0.21	0.40
Reaction: Use Existing Credit Limits	0	1	0.42	0.49
Reaction: Extend Credit Limits	0	1	0.18	0.38
Business Expectations	-1	1	-0.57	0.66
Employees			369.26	3297.55
Export Share	0	1	0.17	0.22
Business Expectations (Q4/19)	-1	1	-0.11	0.64
Business Conditions (Q4/19)	-1	1	0.18	0.69
Expected GDP Growth for 2020 (8/19)	-.04	.1	0.01	0.02
Observations	4846			

Notes: This table shows summary statistics of the IBS wave in April 2020 that is used in our analyses. The sample is supplemented by averages of regular survey questions on business expectations and business conditions during the fourth quarter of 2019 as well as responses to special survey questions on firms' export share as of September 2018 and expected GDP growth for 2020 elicited in August 2019.

Figure A1: Distribution of Expected Shutdown Duration



Notes: This figure shows the distribution of firms' expectations of the duration of restrictions of public life in response to the COVID-19 pandemic elicited in the April 2020 wave of the IBS. The last category contains all responses that indicate an expected shutdown duration of at least 10 months.

Table A2: Balance Table of Firms' Expected Shutdown Duration

Variable	(1)		(2)		T-test Difference (1)-(2)
	Duration $\leq$ 3 months N	Mean/SE	Duration $>$ 3 months N	Mean/SE	
COVID-19 Impact on Business	3111	-1.509 (0.026)	1735	-1.579 (0.034)	0.070
Business Conditions (Q4/19)	3111	0.182 (0.012)	1735	0.181 (0.017)	0.001
Business Expectations (Q4/19)	3110	-0.094 (0.011)	1733	-0.126 (0.015)	0.032*
Export Share	3111	0.174 (0.004)	1735	0.166 (0.005)	0.008
ln(Employees)	3111	3.876 (0.030)	1735	3.736 (0.041)	0.140***
Expected GDP Growth for 2020 (8/19)	2185	0.009 (0.000)	1188	0.009 (0.000)	0.000
Historical Optimism (2012-2019)	2981	-0.236 (0.008)	1653	-0.244 (0.010)	0.008

Notes: This balance table shows characteristics of firms with shutdown duration expectations up to and above the median expected shutdown duration of three months. Significance levels: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table A3: Effects of Sentiment about Shutdown Duration on Managerial Decisions Controlling for Expected Revenue Losses

	Working from Home	Short Time Work	Reduction Workforce	Postpone Investment	Cancel Investment	Extend Credit Usage
	(1)	(2)	(3)	(4)	(5)	(6)
Expected shutdown duration (baseline: < 2 months):						
2 - 4 months	-0.003 (0.016)	-0.012 (0.012)	-0.006 (0.017)	0.009 (0.016)	-0.012 (0.015)	0.020 (0.016)
> 4 months	0.007 (0.015)	-0.014 (0.014)	0.035** (0.014)	0.044* (0.023)	0.022 (0.018)	-0.003 (0.018)
COVID-19 impact (baseline: neutral):						
very negative	-0.011 (0.042)	0.499*** (0.034)	0.128*** (0.028)	0.154*** (0.040)	0.112*** (0.029)	0.168*** (0.030)
negative	0.036 (0.027)	0.256*** (0.031)	0.061*** (0.018)	0.097** (0.040)	0.031 (0.022)	0.125*** (0.033)
positive	0.047 (0.045)	-0.002 (0.050)	0.011 (0.022)	-0.093* (0.054)	-0.032 (0.040)	0.090** (0.044)
COVID-19 revenue losses (baseline: < 20%):						
revenue loss $\geq$ 20%	0.016 (0.027)	0.166*** (0.025)	0.091*** (0.020)	0.093** (0.035)	0.131*** (0.021)	0.084*** (0.031)
catch-up lost revenue	0.057* (0.030)	0.016 (0.022)	-0.033* (0.019)	-0.015 (0.031)	-0.079*** (0.018)	-0.011 (0.029)
rev. loss $\geq$ 20%, catch-up	-0.042* (0.024)	-0.007 (0.024)	-0.030 (0.023)	0.011 (0.043)	-0.016 (0.024)	-0.006 (0.041)
Business Conditions Q4/19 (baseline: neutral):						
negative	-0.035** (0.016)	0.072*** (0.022)	0.061*** (0.017)	-0.005 (0.024)	0.051*** (0.019)	0.025 (0.027)
positive	0.006 (0.019)	-0.014 (0.016)	-0.015 (0.013)	-0.021 (0.017)	-0.030 (0.021)	-0.035* (0.018)
Firm characteristics:						
ln(Employees)	0.097*** (0.009)	0.048*** (0.006)	0.043*** (0.005)	0.047*** (0.006)	0.028*** (0.006)	0.033*** (0.008)
Export share	0.160*** (0.039)	-0.034 (0.071)	-0.002 (0.040)	-0.052 (0.068)	0.006 (0.051)	0.044 (0.057)
Constant	0.197*** (0.051)	-0.040 (0.045)	-0.105*** (0.033)	0.141** (0.057)	0.028 (0.038)	0.208*** (0.058)
County FE	yes	yes	yes	yes	yes	yes
Industry FE	yes	yes	yes	yes	yes	yes
Date FE	yes	yes	yes	yes	yes	yes
Observations	3982	3982	3982	3982	3982	3982
Adj. R2	0.310	0.289	0.144	0.064	0.097	0.066

Notes: The dependent variables are firms' survey responses in April 2020 on whether or not they implemented the following strategies in response to the crisis: increased work from home, short-time work, reduction of workforce (e.g., lay-offs, desist from extensions), postponement of investment projects, cancellation of investment projects, extended credit use. The expected shutdown duration is the measure of sentiment regarding the crisis progression (see Section 2.2 for details). In addition to the controls listed in the table, all empirical models include fixed effects at the levels of dates, counties, and two-digit industries. To flexibly control for the direct *COVID-19 impact*, we group its seven-point scale into categories "very negative" (-3), "negative" (-2 and -1), and "positive" (+1 to +3); an impact of zero serves as baseline. Compared to 2 we additionally control for the expected crisis-induced change in revenues by including an indicator on whether the revenue loss exceeds 20 percent, an indicator for whether firms expect to catch-up with parts of the revenues lost, and an interaction term of both indicators. Standard errors clustered at the level of two-digit industries in parantheses. Significance levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

## B. Special Questions on Covid-19 Exposure and Crisis Response Strategies

The wording of the special questions in the April survey of the IBS were as follows (translation to English by authors):<sup>14</sup>

Question 1:

Do you realize an effect of the Corona pandemic on your current business situation? Is this effect negative or positive?

- 3 negative
- 2
- 1
- 0
- +1
- +2
- +3 positive

Question 2:

Which measures has your firm taken in response to the Corona pandemic?

Operations:

- Intensified use of working from home
- Short-time work
- Reduction of time accounts and leave days
- Cut of employment (e.g., lay-offs, desist from extensions)
- Plant closure, stop of production
- Increased stock-keeping
- Change of suppliers / diversification of supply chains

Finances / Investment:

- Use of existing credit lines
- Acquisition of new credit lines
- Application for public liquidity facilities
- Postponement of investment projects
- Cancellation of investment projects

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<sup>14</sup>We report questions as asked in the survey for firms from the manufacturing sector. In some cases, questions in other sectors deviated slightly in terms of the answer choices that were presented. They are available upon request.

Question 3:

How long do you think will there be restrictions of public life in Germany due to the Corona pandemic? (If necessary, enter a number smaller than 1. For instance, "0.5" for 2 weeks)

\_\_\_\_\_ Months

Question 4:

Which effect of the Corona pandemic on your revenues do you expect in the current year?

- No effect
- Increase of \_\_\_\_\_ %
- Decline of \_\_\_\_\_ %

Question 5:

If you expect a decline in revenues, do you expect to make up for the forgone revenues afterwards?

- No
- Yes, partly
- Yes, completely