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ABSTRACT

Firm-level Expectations and Behavior in Response to the COVID-19 Crisis*

This paper studies the determinants of firms' business outlook and managerial mitigation strategies in the wake of the COVID-19 crisis using a representative panel of German firms. We first demonstrate that the crisis amplifies pre-crisis weaknesses: Firms that appear relatively weak before the crisis are harder hit initially, and, on top of the initial impact, expect more difficulties for their businesses going forward. Consequently, such firms are first to cut employment and investment. Second, our results highlight that expectations regarding the duration of the shutdown—which, at this point of the crisis, exhibit plausibly random variation—are an important determinant of the chosen mitigation strategies: Firms that expect the shutdown to last longer are more likely to lay off workers and to cancel or postpone investment projects.

JEL Classification: D22, D84, E23

Keywords: expectations, firm behavior, COVID-19, shutdown, employment, investment

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1. Introduction

The COVID-19 pandemic that spread globally in early 2020 forced governments to implement drastic measures to mitigate the exponential rise of infections and deaths.[1] These measures resulted in a shutdown of a significant share of economic activity in many countries, without a clear perspective of when the situation would be back to normal. Because the crisis forced firms to take a wide range of important business decisions in a very brief period of time, the pandemic constitutes a laboratory to study the behavior of firms in response to a huge exogenous shock that heavily affected both the supply and the demand side of the economy.

This paper provides first evidence on how firms respond to the shutdown of a significant share of economic activity. Based on April 2020 survey responses of a representative panel of roughly 6,000 German firms, we study the effect of the crisis on firms' business outlook and the strategies firms implemented to deal with the looming economic fallout. Specifically, we address two questions: First, how do a firm's characteristics, its pre-crisis health, and, most notably, its expectations regarding the progression of the crisis affect its general business outlook? And second, how do the same factors explain heterogeneity in the chosen mitigation strategies?

We document that firms that had been in bad shape before the crisis, as measured by their pre-crisis business situation, report to be stronger hit by the COVID-19 crisis by April 2020. What is more, even when controlling for the strength of the initial crisis impact, firms with negative pre-crisis business conditions expect to be more vulnerable to the crisis relative to firms with more positive past conditions. This is, for example, reflected in expectations of higher crisis-induced revenue losses.

In addition, we show that firms' expectation regarding the length of the restrictions on public life are not predictive for the reported initial crisis impact, but constitute an important determinant of their business outlook going forward. After controlling for the initial impact of the crisis, firms that expect the shutdown to last for longer than four months report, for instance, 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.

We document a relatively large heterogeneity in the frequency of different mitigation strategies. For example, while more than half of the firms report to have increased their use of possibilities of working from home or made use of short-time work[2], around 16 % of firms already reduced their workforce by April. 42 % of firms report to postpone investments and 21 % started canceling investment projects.

We show that firms' expectations on the further dynamics of the COVID-19 pandemic are an

[1] See Blavatnik School of Government (2020) for a detailed account of global policy responses to the COVID-19 pandemic.

[2] Short-time work is an employment subsidy paid by the German employment agency (Bundesagentur für Arbeit) to workers who are idle due to a temporary drop in demand below output potential. Firms have to request the subsidy for their employees (see, e.g., Burda and Hunt (2011) for a detailed description of the policy). In March 2020, the German government expanded the program such that firms can reduce hours without bearing any wage costs and social security contributions.

important determinant of the strength of the crisis response. Specifically, firms that expect the shutdown to last for more than four months are about 4 percentage points more likely to implement strong responses with high fixed costs (such as dismissing employees or canceling investment projects) than firms that expect a quick return to normalcy. In contrast, firms seem to implement the relatively inexpensive mitigation strategies, like working from home or short-time work, independent of the expected length of the shutdown.

Pre-crisis firm health—as measured by pre-crisis business conditions—is also an important predictor of the choice of strong mitigation strategies. Yet, here it seems that firms are at least partially forced into the stronger measures, as they are (weakly) less likely to choose the less costly alternatives. There is also suggestive evidence that pre-crisis firm health is associated with liquidity concerns early in the crisis: Weak firms are more likely to use available credit lines, and the effects of pre-crisis firm health on the mitigation strategies partially operate via the association of firm health and crisis-induced (expected) revenue losses.

These results are directly relevant for policy makers: They suggest that the length of the shutdown, and, in extension, the time path for reopening the economy are key statistics for how firms choose to deal with the crisis. Clearly communicating these plans thus helps preventing potentially costly planning mistakes. Moreover, our results suggest that the crisis amplifies or deepens pre-crisis vulnerabilities, suggesting that already weak firms may need more public assistance to survive the crisis. Whether or not this is of public interest may become an important topic for public discourse as the crisis deepens.

Along with work by Bartik et al. (2020), this paper is first to study the managerial decisions that firms implement in response to the COVID-19 crisis, albeit with a different focus. Bartik et al. (2020) seek to provide a broad, mostly descriptive snapshot on the extent to which firms in the U.S. are affected by the crisis and how they plan to deal with the disruptions imposed by the COVID-19 pandemic. Our paper, on the other hand, focuses on highlighting how firms' pre-crisis situation and their expectations about the shutdown duration shape their business outlook and their strategies to counteract the crisis. In addition, our work is related to other recent papers that study the effect of the COVID-19 pandemic on the expectations of firms, but without considering the managerial responses: Using the same survey as this paper, Buchheim et al. (2020) show that the COVID-19 crisis hit firms by surprise. Baker et al. (2020) show that survey-based expectation uncertainty of firms increased substantially in the US and the UK. Bloom et al. (2020) use the same survey from the UK to show that many firms—especially from the tourism and restaurant industry—expect a substantial impact of the pandemic on their sales. Hassan et al. (2020) find that firms' primary concerns during the early phase of the COVID-19 pandemic seemed to be lack of demand, disruption of supply chains and increasing uncertainty.

By linking firms' crisis response to the—plausibly exogenous—expected shutdown duration, our results also add to an emerging strand of literature that investigates how firms' decisions depend on their macroeconomic expectations. This literature is still in its infancy. 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.[3] Recently, Coibion et al. (2020) and Coibion et al. (2018) use experiments involving information treatments to show how differences in inflation expectations of firms (in Italy and New Zealand, respectively) causally affect firms' decisions on prices, employment, and investment. Other papers provide non-experimental, yet also noteworthy, evidence on the link between expectations of firms and their business decisions. Boneva et al. (forthcoming) use an instrumental variables approach to show how price expectation of British firms influence their price setting behavior. Gennaioli et al. (2015) find that expectations of earnings growth of Chief Financial Officers correlate with actual and planned investment of their firms. Similarly, Dovern et al. (2020) show that expectations of GDP growth of German firms correlate with actual and planned investment and employment. Tanaka et al. (forthcoming) provide complementary evidence by showing that GDP expectations of Japanese firms correlate with their employment, investment, productivity, and profitability in subsequent years.

The remainder of this paper is structured as follows. Section 2 describes the survey data, focusing on the questions that we used to elicit how firms were affected by and responded to the COVID-19 pandemic. Section 3, we present evidence on how the COVID-19 pandemic and expectations of its further dynamics have influenced the general business outlook of firms. In Section 4, we present evidence regarding the factors that explain the heterogeneity in firms' mitigation responses. Section 5 concludes.

2. Data

2.1. The ifo Business Survey

Our main data source is the ifo Business Survey (IBS) as described in Sauer and Wohlrabe (2020).[4] The IBS is a monthly survey on current business conditions and expectations among a representative sample of approximately 9,000 German firms in all relevant sectors of the economy. According to a meta-study by Sauer and Wohlrabe (2019), questions are usually answered by senior management such as firm owners, members of the executive board, or department heads. The IBS elicits overall business expectations, current business conditions, and more detailed information on employment, production, demand, and prices as well as firms' perceived uncertainty with respect to future business conditions.

We use the survey responses of April 2020 and the three last months of 2019 (as a pre-pandemic

[3] 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).

[4] The IBS provides input for the ifo Business Climate Index, which is the most recognized leading indicator for the German business cycle, the ifo Employment Barometer, and the ifo Export Expectations, see Sauer and Wohlrabe (2020) for details.

reference point) and focus on the manufacturing, service, and retail/wholesale industries.[5] We harmonize the data following Link (2020) which primarily involves the cleaning and assignment of industry codes of the official German industry classification system.[6] For this paper, we also obtained access to the exact return date of each survey questionnaire in April and information on the location of the firm at the county level. Overall, we can build on a sample of 6,036 firms, which responded in the April wave of the survey (2,161 in manufacturing, 2,138 in services, and 1,737 in retail/wholesale).

2.2. Special Questions Related to the COVID-19 Pandemic

In April, the IBS included additional special questions on the hitherto existing impact of the COVID-19 pandemic on firms, firms' expectations regarding the pandemic and its effect on their business, as well as managerial responses that the firms implemented in response to the pandemic. In particular, the survey contained[7]

- a question on how strongly the COVID-19 crisis had already affected a firm's business conditions on a seven-point scale ranging from -3 ("negative") to +3 ("positive");
- a question on the expected impact of the COVID-19 crisis on firms' revenues in the year 2020 indicated as a percentage increase/decrease;
- a question on whether firms expect to later make up for those forgone revenues (firms could answer "no", "yes, partly", and "yes, completely");
- a question to elicit how long firms expect to be able to survive if the restrictions on public life (that were in place at the time of the survey) were perpetuated for a longer period;
- a question to elicit the expected duration (in months) of the restrictions of public life in Germany;
- and a question to elicit 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", "increased stock holdings", "application for public liquidity facilities", "postponement of investment projects", and "cancelation of investment projects".

[5] The IBS also contains information about firms from the construction sector that we discard because of the peculiarity of this sector.

[6] *"Klassifikation der Wirtschaftszweige 2008"*, abbreviated as WZ 08, which closely follows the European industry classification NACE Rev. 2. The micro data do not allow to discriminate between subsidiaries of the same company in different locations and other firms as each subsidiary of multi-establishment firms that receives a questionnaire is assigned to its own identifier in the data. The term "firm" used in this paper hence refers to both types of entities. Moreover and in contrast to the service and retail/wholesale sectors, the manufacturing survey is run at the product type level. During the time period used, the survey only covers the main product of each firm and the special questions related to the COVID-19 pandemic described below always refer to the firm.

[7] The exact wordings of all COVID-19-related questions that we use (incl. translations into English) are listed in Appendix A.

Table 1: Summary Statistics of IBS Data

	Min	Max	Mean	SD
COVID-19 Impact on Business	-3	3	-1.53	1.45
Expected Shutdown Duration	0	36	3.97	3.43
Expected COVID-19 Revenue Effect	-1	3	-0.21	0.21
Reaction: More Home Office	0	1	0.63	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	0.42	0.49
Reaction: Cancelation 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
Business Uncertainty	0	100	74.68	24.03
Export Share (9/18)	0	1	0.16	0.20
Business Expectations (Q4/19)	-1	1	-0.11	0.64
Business Conditions (Q4/19)	-1	1	0.18	0.69
Employment Expectations (Q4/19)	-1	1	-0.03	0.53
Business Uncertainty (Q4/19)	0	100	57.08	22.38
Expected GDP Growth for 2020 (8/19)	-.04	.1	0.01	0.02

Notes: 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, business conditions, employment expectations and uncertainty 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

In general, the response rate for those special questions was high. More than 97.8 % of firms that responded to the survey in April answered at least four of the six special questions.

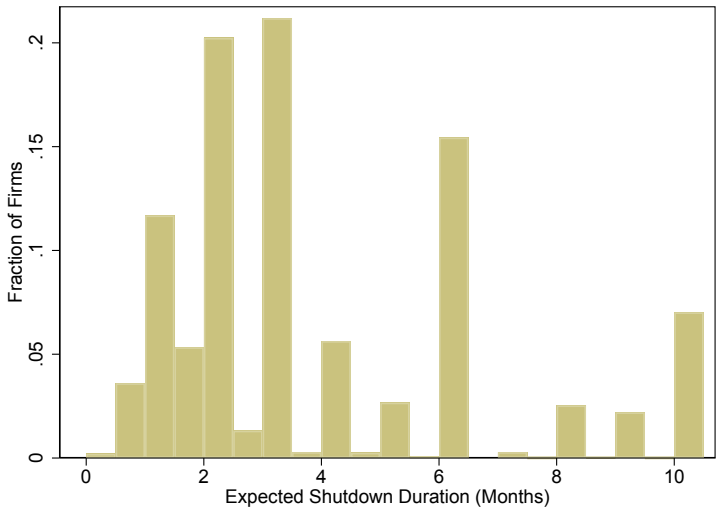
2.3. Descriptive Statistics

Table 1 summarizes basic descriptive statistics for the variables we use. Expected business conditions for the next six months, which are elicited on a trichotomous scale (-1 "more unfavorable", 0 "roughly the same", 1 "more favorable"), averaged at -0.57 in April. This is roughly two thirds of a standard deviation below its average value in the fourth quarter of 2019 and constitutes a historic all-time low. As shown in Buchheim et al. (2020), firms' business outlook only started to deteriorate throughout March, and stabilized on unprecedentedly low levels in April.

Subjective business uncertainty, which is measured on a visual analogue scale ranging between 0 and 100, was also much higher in April than two quarters ago. The average index value of 74.7 is 17.6 points higher than in the fourth quarter of 2019. This increase is huge relative to the historical standard deviation of the cross-sectional average of 2.9 index points between July 2017 (first appearance of this questions in the survey) and December 2019. It complements evidence of a large uncertainty increase due to the COVID-19 pandemic for the US and the UK (Baker et al., 2020).

In terms of how firms are and expect to be affected by the COVID-19 pandemic, we find that the average firm reports a value of -1.53 (on a scale from -3 to $+3$) for how strongly it has been affected by the pandemic when answering the survey. Firms are also very pessimistic regarding the further effects of the crisis on their business. On average, they expect their revenues in 2020 to

Figure 1: 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. The last category contains all responses that indicate an expected shutdown duration of at least 10 months.

be 21 % lower (compared to a hypothetical scenario without the pandemic). Moreover, only half of the firms expect to catch up these foregone sales at least to some degree afterwards. The large expected decline of revenues due to the COVID-19 crisis is similar to data from the Decision Maker Panel, a business survey in the UK, in which 39 % of firms indicated in March that they expect the impact of the COVID-19 crisis on their revenues to exceed 10 % (Bloom et al., 2020).

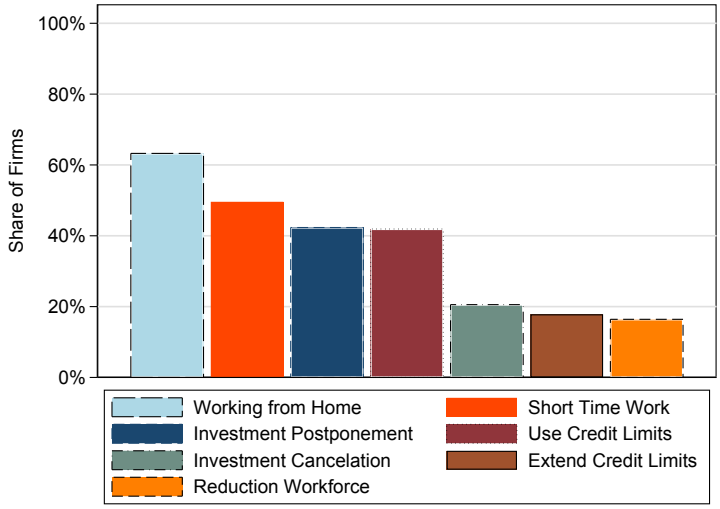
Expectations of the likely duration of the restrictions of public life are very heterogeneous, ranging from 0.5 months to 36 months with a standard deviation of 3.4 (Figure 1). On average, firms expect those restrictions to continue for four months, i.e., until August 2020.

2.4. Mitigation Responses of Firms

The firms in our sample report a wide variety of mitigation responses that they had implemented by the time of the April wave of the IBS. The most frequently mentioned response is to use the possibility for employees to work from home. 63 % of firms mention this as part of their mitigation response (Figure 2). This is very similar to evidence from the UK where 66 % of firms indicate that they currently use remote working (British Chambers of Commerce, 2020) and also to the result of a global survey conducted in March 2020, in which the consulting firm Mercer found that 54 % of firms use this strategy to cope with the COVID-19 crisis (Mercer, 2020). Half of the firms report to use the short-time work scheme. This is consistent with official statistics that suggest that the number of employees, for which applications for short-time work have been filed between late March and April 26, reached a record high of 10 million (Bundesagentur für Arbeit, 2020). In addition, 16 % of firms report that they have already reduced their workforce.

Many firms are reluctant to invest and either postpone investment projects (42 %) and/or cancel

Figure 2: Frequency of Managerial Mitigation Responses



Notes: This figure shows the fraction of firms that stated to have implemented a respective mitigation strategy due to the COVID-19 crisis by the time of the April wave of the IBS. The wording of the questions is presented in Appendix A.

them altogether (21 %). On the funding side, 42 % of firms indicate that they use existing credit lines and almost every fifth firm indicates to have negotiated new credit lines.

2.5. Exogeneity of Expected Shutdown Duration

It is important for the interpretation of our empirical results below that the variation in firms' expectations of the duration of restrictions of public life is exogenous to firm characteristics and their business situation and expectations before the COVID-19 pandemic. Table 2 shows that firms that expect a long shutdown (of more than the median expectation of three months) are not different from those that expect a quicker easing of the restrictions in terms of their characteristics (number of employees and export share) and their pre-crisis situation (reported in the fourth quarter of 2019). Differences are generally small and only significantly different from zero in the case of pre-crisis business expectations, employment expectations, and subjective uncertainty. Interestingly, both groups of firms are not even different in terms of how strongly the pandemic had already affected their businesses by April. Thus, the variation in the expected duration of restrictions to public life seems to be independent of business operations of firms. This suggests that we can interpret any effect of duration expectations on business decisions in a causal way.

3. Results: General Business Outlook

In this section, we describe the heterogeneity of firms' business outlook in the wake of the COVID-19 crisis. We focus on answering two questions. First, do business outlooks of firms in April 2020, the first full month with restrictions on public life in Germany, differ by firm characteristics and

Table 2: Balance Table of Firms' Expected Shutdown Duration

Variable	(1) Duration ≤ 3 months N	Mean/SE	(2) Duration > 3 months N	Mean/SE	T-test Difference (1)-(2)
Business Expectations (Q4/19)	3610	-0.099	2032	-0.126	0.027**
		(0.011)		(0.014)	
Business Conditions (Q4/19)	3612	0.179	2034	0.180	-0.001
		(0.011)		(0.015)	
Employment Expectations (Q4/19)	3610	-0.032	2030	-0.044	0.012**
		(0.009)		(0.012)	
Business Uncertainty (Q4/19)	2474	56.936	1555	58.365	-1.428***
		(0.452)		(0.566)	
Expected GDP Growth for 2020 (8/19)	2556	0.009	1424	0.008	0.001
		(0.000)		(0.000)	
ln(Employees)	3765	3.855	2151	3.722	0.132
		(0.027)		(0.036)	
Export Share	3813	0.173	2186	0.161	0.012
		(0.004)		(0.005)	
COVID-19 Impact on Business	3398	-1.523	1899	-1.580	0.057
		(0.025)		(0.033)	

Notes: This balance table shows characteristics of firms with shutdown duration expectations up to and above the median expected shutdown duration of three months after controlling for fixed effects at the level of two-digit industries. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

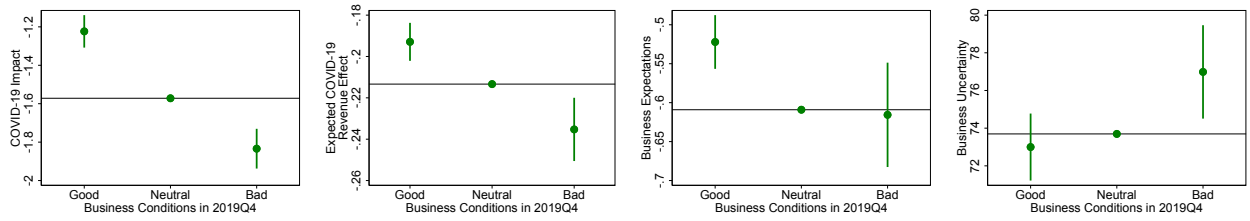
pre-crisis business conditions? Second, to which extent does the expected length of restrictions on public life affect firms' business outlook?

We analyze these questions by regressing different measures for the business outlook on measures of firm characteristics, pre-crisis business conditions, and expectations about the length of the shutdown. Each of these linear regressions includes a full set of industry fixed effects at the two-digit level (for 66 industries), region fixed effects at the county level (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.

Our analysis focuses on four outcomes: the immediate impact of the COVID-19 crisis on firms' current business conditions, and the expected effect of the crisis on revenue in 2020, general business expectations, and perceived business uncertainty. While the first measure covers the initial crisis impact on firms, the other three measures are forward-looking.

We first analyze the effect of firms' pre-crisis business conditions on their business outlook. We hypothesize that firms that have been struggling prior to the COVID-19 crisis are more constrained in their crisis response, and are thus more severely hit throughout the crisis. This should hold vice versa for firms that have been doing well before the COVID-19 pandemic. Also, weaknesses or strengths of firms' business models may spill over into the crisis, affecting also the business outlook for the future. Yet, it is unclear to which extent the initial business impact of the crisis is contingent on the soundness of firms' business model.

Figure 3: The Effect of Pre-Crisis Conditions on Firms' Business Outlook



(a) COVID Impact (b) COVID Revenue Effect (c) Business Expectations (d) Business Uncertainty

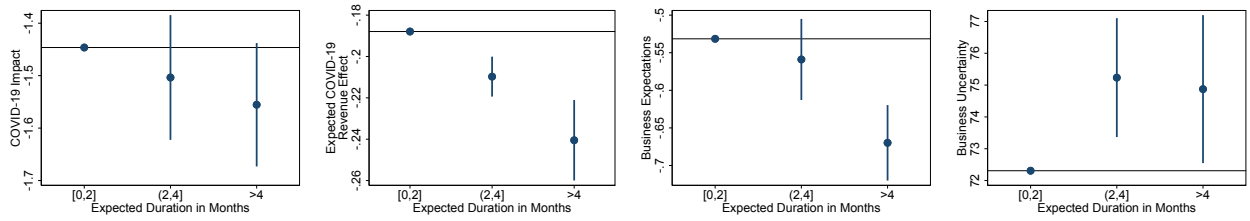
Notes: The figure shows the effect of firms' pre-crisis business conditions in Q4 2019 on (a) the degree businesses are affected by the COVID-19 crisis (elicited on a scale between -3 and 3), (b) firms' expected impact of the crisis on revenues in 2020 (revenue increase/decrease as share of total revenue), (c) firms' expected business conditions during the next six months on a (-1,0,1)-scale, and (d) business uncertainty elicited on a scale between 0 and 100. Estimation control for firms' expected shutdown duration, firms' size and export share, and fixed effects at the levels of dates, counties, and two-digit industries. We also control for the direct impact of COVID-19 in specifications (b) through (d). The predicted values for a firm with neutral pre-crisis business conditions and average firm characteristics serve as baseline. Confidence intervals are depicted at the 95-percent level. The estimates refer to the even columns of Table 3.

Figure 3 summarizes the effects of pre-crisis firm health on the business outlook by displaying the effects of business conditions in Q4 2019 on the different outcome variables. To facilitate the interpretation of magnitudes, we evaluate the partial effects of negative or positive pre-crisis conditions relative to the predicted value of the respective outcome for a hypothetical firm with neutral pre-crisis conditions and average remaining firm characteristics. The estimates in Figure 3 refer to the even columns in Table 3 shown below.

Panel (a) of Figure 3 shows that pre-crisis firm health, as measured by pre-crisis conditions, is a relevant predictor for the initial impact of the COVID-19 crisis on businesses. Specifically, firms with bad conditions before the crisis report to be hit harder relative to firms with neutral conditions, whereas firms with good conditions are, ceteris paribus, less affected. Both effects amount to roughly 1/5th of a standard deviation of the seven-point index of the *COVID-19 Impact* variable.

Given that the immediate business impact of the COVID-19 crisis is a natural predictor for future business developments, all other empirical specifications include this variable as an additional regressor. Nonetheless, pre-crisis business conditions are strongly associated with the expected revenue change due to the COVID-19 crisis. Firms with good pre-crisis conditions expect COVID-19 induced revenue losses to be two percentage points lower, a reduction of the baseline losses by ten percent. Conversely, firms with bad pre-crisis conditions expect revenue losses to rise by a similar magnitude. General business expectations and business uncertainty also vary with pre-crisis firm health, albeit somewhat less strongly. Overall, pre-crisis firm health affects both the initial business impact of the crisis and firms' outlook conditional on the initial impact. This is consistent with—but no hard proof for—the hypothesis that less healthy firms are more constrained in their means to manage the crisis. The next section provides further suggestive evidence for this potential channel when analyzing the effect of pre-crisis health on the choice of COVID-19 crisis mitigation strategies.

Figure 4: The Effect of Expected Shutdown Duration on Firms' Business Outlook



(a) COVID Impact (b) COVID Revenue Effect (c) Business Expectations (d) Business Uncertainty

Notes: The figure shows the effect of firms' expected shutdown on (a) the degree businesses are affected by the COVID-19 crisis (elicited on a scale between -3 and 3), (b) firms' expected impact of the crisis on revenues in 2020 (revenue increase/decrease as share of total revenue), (c) firms' expected business conditions during the next six months on a (-1,0,1)-scale, and (d) business uncertainty elicited on a scale between 0 and 100. Estimations control for pre-crisis business conditions in Q4 2019, firms' size and export share, and fixed effects at the levels of dates, counties, and two-digit industries. We also control for the direct impact of COVID-19 in specifications (b) through (d). 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 the even columns of Table 3.

We subsequently assess how firms' expectations regarding the duration of the shutdown affect their business outlook early in the COVID-19 crisis. The hypothesis is clear in this regard: If the shutdown is expected to last longer, the severe economic consequences of the shutdown are in effect for a longer period. As a consequence, a longer expected shutdown should make firms more pessimistic about their future business outlook – but not about the initial, already realized impact of the crisis.

Figure 4 displays the effect of the expected shutdown duration on the four variables that describe firms' business outlook in the wake of the crisis. As before, we plot the partial effects relative to the respective predicted value of a hypothetical firm that is characterized by average firm characteristics and that expects the shutdown to last for two months at most.

As hypothesized, Panel (a) shows that the expected shutdown duration at best weakly affects the initial impact of the COVID-19 pandemic on businesses: All coefficients are at most borderline statistically significantly different from zero. In contrast, the expected length of the shutdown exhibits a statistically and economically significant effect on all forward-looking variables—the expected effect of the crisis on revenues (Panel (b)), expected business conditions (Panel (c)), and business uncertainty (Panel (d)). Quantitatively, the negative revenue effect predicted by firms that expect 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 mitigation strategies chosen by firms, as the next section shows in more detail.

The even columns of Table 3 report the full set of estimates from the empirical models underlying Figures 3 and 4. In addition, the odd columns show the results when omitting the expected shutdown duration from these specifications. The differences in the coefficient estimates between the respective odd and even columns are negligible, emphasizing the point of Section 2.5: Expectations about the duration of restrictions on public life are by and large orthogonal to observable firm

Table 3: Firm Characteristics, Expectations, and Business Outlook

	COVID-19 Impact		COVID-19 Revenue Effect		Business Expectations		Business Uncertainty	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Expected shutdown duration (baseline: < 2 months):								
2 - 4 months		-0.057		-0.022***		-0.027		2.926***
		(0.061)		(0.005)		(0.027)		(0.953)
> 4 months		-0.109*		-0.053***		-0.138***		2.565**
		(0.060)		(0.010)		(0.026)		(1.186)
Outlook Q4/19 (baseline: neutral):								
BC Q4 19: negative	-0.262***	-0.262***	-0.023***	-0.022***	-0.012	-0.007	3.328**	3.291**
	(0.054)	(0.053)	(0.007)	(0.008)	(0.035)	(0.034)	(1.328)	(1.265)
BC Q4 19: positive	0.348***	0.348***	0.020***	0.020***	0.087***	0.087***	-0.517	-0.697
	(0.042)	(0.043)	(0.005)	(0.005)	(0.018)	(0.018)	(0.906)	(0.907)
COVID-19 impact (baseline: neutral):								
very negative			-0.258***	-0.254***	-0.429***	-0.428***	17.259***	16.908***
			(0.011)	(0.010)	(0.036)	(0.036)	(1.674)	(1.676)
negative			-0.115***	-0.112***	-0.331***	-0.329***	10.033***	9.935***
			(0.008)	(0.008)	(0.036)	(0.037)	(1.528)	(1.498)
positive			0.093***	0.094***	0.276***	0.277***	1.712	1.677
			(0.011)	(0.011)	(0.052)	(0.052)	(1.524)	(1.471)
Firm characteristics:								
ln(Employees)	0.020	0.020	0.015***	0.014***	-0.004	-0.005	0.850***	0.862***
	(0.018)	(0.019)	(0.002)	(0.002)	(0.009)	(0.009)	(0.261)	(0.268)
Export share	-0.419**	-0.392**	-0.028*	-0.025*	0.132**	0.138***	5.486**	5.630**
	(0.174)	(0.174)	(0.014)	(0.014)	(0.051)	(0.050)	(2.525)	(2.434)
Constant	-1.607***	-1.570***	-0.134***	-0.113***	-0.334***	-0.282***	59.521***	58.004***
	(0.074)	(0.096)	(0.009)	(0.012)	(0.040)	(0.040)	(1.632)	(1.700)
N	4897	4821	4732	4691	4860	4786	3436	3394
Adj. R2	0.148	0.147	0.457	0.466	0.137	0.146	0.102	0.105

Notes: The dependent variables are firms' survey responses in April 2020 on the degree their businesses are 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), firms' expected business conditions during the next six months on a (-1,0,1)-scale, and business uncertainty on a scale between 0 and 100. 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. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

characteristics.

Several additional findings are worth pointing out in Table 3. 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, business expectations, and business uncertainty.[8] The results also show to which extent the business outlook in the wake of the COVID-19 crisis depends on firm size and firms' international trade ties. Larger firms report smaller effects of the COVID-19 crisis on their revenues, possibly due to a higher degree of product diversification, which permits them to shift resources to activities that are less severely impeded. Export-oriented firms report a larger effect of the COVID-19 crisis on their business by April and substantially higher business uncertainty relative to firms that export

[8] 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). This enables us to flexibly estimate the association between COVID-19 impact and the remaining outcome variables via fixed effects for each of the categories.

small shares of their production. Apart from its effect on the initial impact of the crisis—and the subsequent effect of the impact on the remaining outcomes—the association between the export share and the remaining outcomes is inconclusive. In fact, given that both the coefficients of *ln(Employees)* and *Export share* are of opposite sign for the specifications with *COVID-19 Revenue Effect* and *Business Expectations* as dependent variables, it is conceivable that both the export share and the number of employees primarily capture firm size in these regressions.

4. Results: Managerial Mitigation Strategies

In the previous section, we have seen that the (expected) impact of the COVID-19 crisis on firms' businesses varies substantially by pre-crisis firm health and firms' expectations about the duration of the shutdown. This section now asks: Do the same factors also influence the choice of strategies that firms implement to manage the crisis?

To tackle this question, we study the effect of pre-crisis firm health and shutdown duration expectations on the firm-level implementation of mitigation strategies in the domains of employment, liquidity management, and investment. We hypothesize that pre-crisis firm health primarily explains variation in the mitigation strategies that relate to a restructuring of business models or that help ease liquidity constraints. The expected shutdown duration, in turn, should primarily explain differences in the prevalence of those managerial response that are costly to reverse: Managers should be more likely to implement less reversible strategies if they anticipate the crisis to last longer.

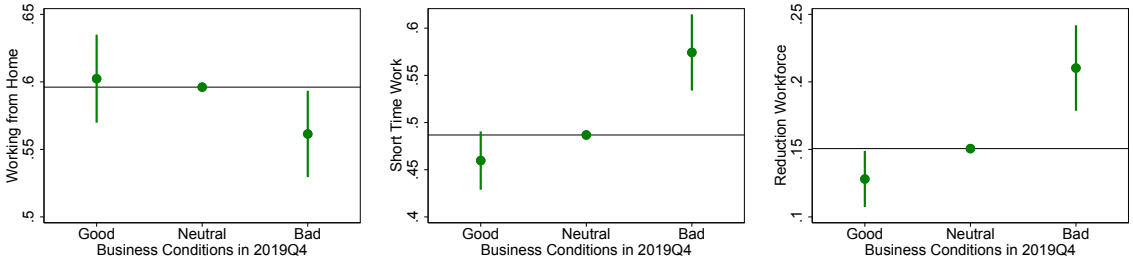
4.1. Employment

We consider the following potential managerial responses to the COVID-19 crisis in terms of employment: working from home, short-time work, and reducing employment. 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.

Figure 5 shows the effect of pre-crisis firm health (measured by business conditions as reported in Q4 2019) on the prevalence of the employment-related mitigation strategies.[9] Firms with bad conditions in Q4 2019 are indeed more likely to implement policies that save wage payments: The prevalence of short-time work increases by about nine percentage points, 1/5 of the predicted

[9] As in the previous section, each empirical model includes industry fixed effects at the two-digit level, location fixed effects at the county level, and fixed effects for the survey date. We also control for the initial impact of the COVID-19 crisis on the firm's business, as well as for the firm's size (via the log of the number of employees), and the firm's export share. See Table 4 below for details.

Figure 5: Effect of Pre-Crisis Conditions on Firms' COVID-19 Mitigation Strategies: Employment



(a) Working from Home (b) Short-Time Work (c) Reduction Workforce

Notes: The figure shows the effect of firms' pre-crisis business conditions in Q4 2019 on the fraction of firms that applied following mitigation strategies: (a) increased work from home, (b) short-time work, and (c) reduction of workforce (e.g., layoffs, desist from extensions). Estimations control for the direct COVID-19 impact, firms' expected shutdown duration, firms' size and export share, and fixed effects at the levels of dates, counties, and two-digit industries. The predicted values for a firm with neutral pre-crisis business conditions and average firm characteristics serve as baseline. Confidence intervals are depicted at the 95-percent level. The estimates refer to the odd columns of Table 4.

prevalence for the average firm. Layoffs increase by six percentage points, more than 1/3 of the prevalence for the average firm. Firms with bad business conditions in Q4 2019 are 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. This may reflect that short-time work and working from home are partial substitutes. Finally, healthy firms with good pre-crisis conditions are less likely to cut employment, either via short-time work or layoffs, but only slightly so.

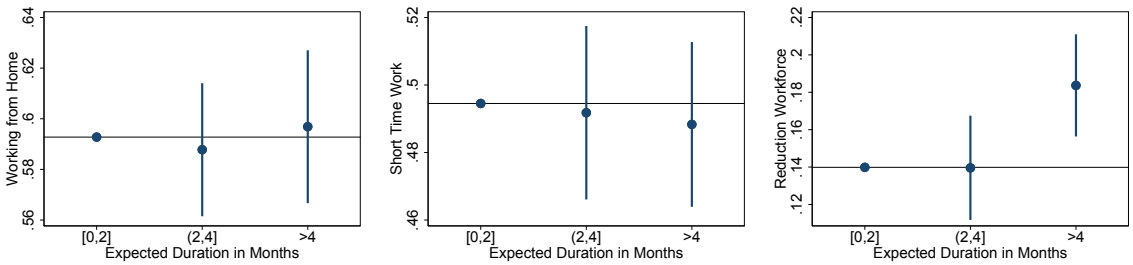
Figure 6 plots the partial effects of the expectations regarding the duration of the shutdown on crisis mitigation strategies. These results differ from the effects of pre-crisis firm health in that the expected shutdown duration only explains firm-level differences in layoffs: In contrast to the other managerial responses, these are difficult to reverse quickly, and should thus predominantly be undertaken by managers that expect the shutdown to last longer.

The odd columns of Table 4 report the full set of estimates of the empirical models underlying the findings in Figures 5 and 6. In addition to the previously discussed findings, the estimates reveal that larger firms are more likely to implement either of the mitigation strategies. This is most likely due to the larger managerial resources of larger firms. As could be expected, firms that have already been hit more heavily by the crisis are more likely to send workers on short-time work or to lay off parts of their workforce. 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.[10]

To learn more about the mechanism behind these managerial decisions, the even columns of Table 4 include three measures for revenue expectations as additional covariates: one indicator for whether expected revenue losses exceed the median of 20 percent, one indicator for whether firms

[10]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.

Figure 6: Effect of Expected Shutdown Duration on Firms' COVID-19 Mitigation Strategies: Employment



(a) Working from Home (b) Short-Time Work (c) Reduction Workforce

Notes: The figure shows the effect of firms' expected shutdown duration on the fraction of firms that applied following mitigation strategies: (a) increased work from home, (b) short-time work, and (c) reduction of workforce (e.g., lay-offs, desist from extensions). Estimations control for the direct COVID-19 impact, firms' pre-crisis business conditions in Q4 2019, 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 the odd columns of Table 4.

expect to partially recover the lost revenue, and the interaction of both indicators. We see that these revenue expectations explain variation in the prevalence of short-time work and layoffs, but not in working from home, similar to the initial COVID-19 impact. We also see that including revenue expectations in the empirical models does not materially change the coefficient estimates of most variables, perhaps with the exception of the *initial COVID-19 impact*. This could be interpreted in the sense that expected revenue losses—and potential ensuing liquidity concerns—are not the primary motivation for the employment responses.

4.2. Investment & Liquidity

In terms of managing investment and liquidity, we consider the following potential managerial responses to the COVID-19 crisis: postponement of investments, cancelation of investment projects, usage of existing credit limits, and the extension of credit limits. 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 have been postponed. At the same time, when canceling projects, firms are likely to retain more of the investment expenditures than when merely postponing them.

Figure 7 shows the partial effects of pre-crisis firm health (measured by business conditions as reported in Q4 2019) on the prevalence of the mitigation strategies in the domains of investment and liquidity management.[11] Overall, pre-crisis firm health is strongly associated with whether firms cancel investments: Firms that report to be in good shape in Q4 2019 are five percentage points less likely to do so than firms with average pre-crisis conditions, 20 percent of which report canceling investments. Firms with bad conditions before the crisis, in turn, are six percentage

[11] All empirical specifications include the same set of controls as the specifications in Figures 5 and 6. See Table 5, the figure notes, and Footnote 9 for details.

Table 4: Mitigation Strategies: Employment

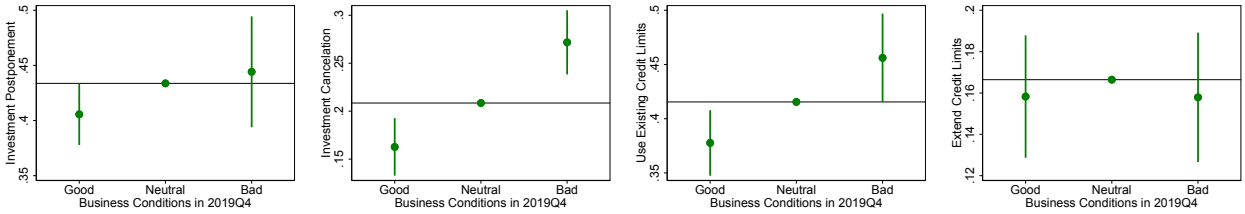
	Working from Home		Short-Time Work		Reduction Workforce	
	(1)	(2)	(3)	(4)	(5)	(6)
Expected shutdown duration (baseline: < 2 months):						
2 - 4 months	-0.005	-0.004	-0.003	-0.014	-0.000	-0.006
	(0.013)	(0.016)	(0.013)	(0.012)	(0.014)	(0.017)
> 4 months	0.004	0.006	-0.006	-0.017	0.044***	0.035**
	(0.015)	(0.016)	(0.012)	(0.014)	(0.014)	(0.015)
Outlook Q4/19 (baseline: neutral):						
BC Q4 19: negative	-0.035**	-0.031*	0.087***	0.073***	0.060***	0.059***
	(0.016)	(0.017)	(0.021)	(0.022)	(0.016)	(0.017)
BC Q4 19: positive	0.006	0.006	-0.027*	-0.016	-0.023**	-0.017
	(0.017)	(0.019)	(0.016)	(0.016)	(0.011)	(0.013)
COVID-19 revenue losses (baseline: < 20%):						
revenue loss ≥ 20%		0.014		0.164***		0.090***
		(0.028)		(0.024)		(0.019)
catch-up lost revenue		0.056*		0.010		-0.035*
		(0.030)		(0.022)		(0.019)
rev. loss ≥ 20%, catch-up		-0.040		-0.002		-0.027
		(0.024)		(0.024)		(0.022)
COVID-19 impact (baseline: neutral):						
very negative	-0.029	-0.015	0.610***	0.506***	0.183***	0.129***
	(0.036)	(0.042)	(0.026)	(0.033)	(0.020)	(0.027)
negative	0.022	0.033	0.295***	0.261***	0.080***	0.062***
	(0.028)	(0.026)	(0.024)	(0.028)	(0.013)	(0.016)
positive	0.020	0.048	-0.066***	0.008	-0.026*	0.013
	(0.038)	(0.045)	(0.019)	(0.046)	(0.013)	(0.020)
Firm characteristics:						
ln(Employees)	0.097***	0.096***	0.035***	0.048***	0.032***	0.043***
	(0.008)	(0.009)	(0.004)	(0.006)	(0.004)	(0.005)
Export share	0.162***	0.165***	-0.024	-0.039	0.001	-0.001
	(0.046)	(0.039)	(0.048)	(0.070)	(0.032)	(0.039)
Constant	0.240***	0.201***	0.037	-0.040	-0.069**	-0.106***
	(0.039)	(0.051)	(0.029)	(0.042)	(0.027)	(0.031)
N	4821	3964	4821	3964	4821	3964
Adj. R2	0.307	0.309	0.341	0.292	0.145	0.145

Notes: The dependent variables are firms' survey responses in April 2020 on the implementation of the following mitigation strategies: increased work from home, short-time work, and reduction of workforce (e.g., lay-offs, desist from extensions). 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. The even columns 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. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

points more likely to cancel investments. This general pattern can also be found for the strategy of postponing investments, albeit at much smaller magnitudes.

In terms of liquidity management, the data suggests that firms with bad pre-crisis conditions need to rely on extra credit to a larger extent than firms that report neutral or good pre-crisis conditions: The relatively weak firms are four percentage points more likely to use existing credit limits compared to firms that were doing decently—an effect of ten percent of the baseline prevalence of this managerial response. Relatively healthy firms, in turn, are four percentage points less likely

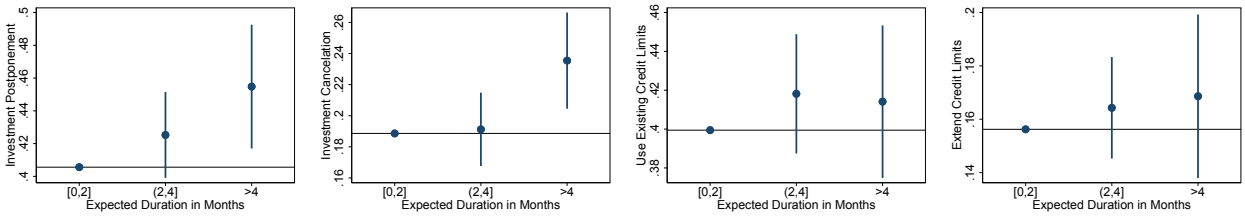
Figure 7: Effect of Pre-Crisis Conditions on Firms' COVID-19 Mitigation Strategies: Investment and Liquidity



(a) Postpone Investment (b) Cancel Investment (c) Use Credit Limits (d) Extend Credit Limits

Notes: The figure shows the effect of firms' pre-crisis business conditions in Q4 2019 on the fraction of firms that applied following mitigation strategies: (a) postponement of investment projects, (b) cancelation of investment projects, (c) usage of existing credit limits, and (d) extension of credit limits. Estimations control for the direct COVID-19 impact, firms' expected shutdown duration, firms' size and export share, and fixed effects at the levels of dates, counties, and two-digit industries. The predicted values for a firm with neutral pre-crisis business conditions and average firm characteristics serve as baseline. Confidence intervals are depicted at the 95-percent level. The estimates refer to the odd columns of Table 5.

Figure 8: Effect of Expected Shutdown Duration on Firms' COVID-19 Mitigation Strategies: Investment and Liquidity



(a) Postpone Investment (b) Cancel Investment (c) Use Credit Limits (d) Extend Credit Limits

Notes: The figure shows the effect of firms' expected shutdown duration on the fraction of firms that applied following mitigation strategies: (a) postponement of investment projects, (b) cancelation of investment projects, (c) usage of existing credit limits, and (d) extension of credit limits. Estimations control for the direct COVID-19 impact, firms' pre-crisis business conditions in Q4 2019, 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 the odd columns of Table 5.

to be in need of extra credit. However, the same pattern 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.

Turning to firms' expectations concerning the duration of the shutdown, Figure 8 shows that these expectations have, in general, statistically significant effects on the decision to postpone or cancel investments. Specifically, if firms expect the shutdown to last four months or longer, they are about five percentage points more likely to postpone or cancel investment projects compared to firms that expect the shutdown to last for two months at most. However, relative to the average prevalence of both mitigation strategies, the effect of duration expectations is much larger for the 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

Table 5: Mitigation Strategies: Investment & Liquidity

	Postpone Investment		Cancel Investment		Use Credit Limits		Extend Credit Limits	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Expected shutdown duration (baseline: < 2 months):								
2 - 4 months	0.020	0.011	0.003	-0.009	0.019	-0.001	0.008	0.005
	(0.013)	(0.016)	(0.012)	(0.014)	(0.016)	(0.016)	(0.010)	(0.013)
> 4 months	0.049**	0.046**	0.047***	0.025	0.015	-0.004	0.012	-0.001
	(0.019)	(0.023)	(0.016)	(0.018)	(0.020)	(0.022)	(0.016)	(0.017)
Outlook Q4/19 (baseline: neutral):								
BC Q4 19: negative	0.010	-0.003	0.063***	0.049**	0.041*	0.026	-0.009	-0.015
	(0.026)	(0.024)	(0.017)	(0.019)	(0.021)	(0.024)	(0.016)	(0.019)
BC Q4 19: positive	-0.028*	-0.022	-0.046***	-0.032	-0.038**	-0.036*	-0.008	-0.003
	(0.014)	(0.017)	(0.015)	(0.021)	(0.015)	(0.019)	(0.015)	(0.017)
COVID-19 revenue losses (baseline: < 20%):								
revenue loss ≥ 20%		0.091**		0.131***		0.068**		0.069***
		(0.036)		(0.022)		(0.032)		(0.021)
catch-up lost revenue		-0.016		-0.076***		-0.008		0.011
		(0.033)		(0.018)		(0.034)		(0.019)
rev. loss ≥ 20%, catch-up		0.013		-0.018		0.012		-0.042**
		(0.044)		(0.023)		(0.043)		(0.017)
COVID-19 impact (baseline: neutral):								
very negative	0.268***	0.155***	0.223***	0.114***	0.162***	0.122***	0.163***	0.170***
	(0.023)	(0.039)	(0.021)	(0.029)	(0.023)	(0.031)	(0.020)	(0.026)
negative	0.174***	0.095**	0.082***	0.030	0.111***	0.091**	0.059***	0.082***
	(0.028)	(0.039)	(0.015)	(0.022)	(0.021)	(0.035)	(0.013)	(0.016)
positive	-0.072***	-0.092*	-0.009	-0.037	-0.015	0.064*	-0.003	0.054
	(0.025)	(0.054)	(0.016)	(0.039)	(0.024)	(0.036)	(0.024)	(0.048)
Firm characteristics:								
ln(Employees)	0.037***	0.046***	0.019***	0.028***	0.019***	0.025***	0.024***	0.031***
	(0.005)	(0.006)	(0.005)	(0.006)	(0.006)	(0.008)	(0.005)	(0.007)
Export share	-0.036	-0.047	-0.030	0.000	0.077	0.049	0.063*	0.044
	(0.065)	(0.069)	(0.040)	(0.050)	(0.063)	(0.066)	(0.034)	(0.044)
Constant	0.122***	0.142**	0.018	0.028	0.229***	0.216***	-0.008	-0.077**
	(0.034)	(0.057)	(0.028)	(0.039)	(0.033)	(0.060)	(0.021)	(0.036)
N	4821	3964	4821	3964	4821	3964	4821	3964
Adj. R2	0.098	0.063	0.096	0.098	0.060	0.052	0.065	0.066

Notes: The dependent variables are firms' survey responses in April 2020 on the implementation of the following mitigation strategies: postponement of investment projects, cancelation of investment projects, usage of existing credit limits, and extension of credit limits. 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 categories "very negative"(−3), "negative" (−2 and −1), and "positive" (+1 to +3); an impact of zero serves as baseline. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

firms).

Figure 8 also shows that firms that expect the shutdown to last longer are somewhat more likely to use and extend their credit lines. Yet, these effects are small and statistically indistinguishable from zero.

The odd columns of Table 4 report the full set of estimates of the empirical models underlying the findings in Figures 7 and 8. As for the employment measures, the estimates reveal that larger and more heavily impacted firms are more likely to implement each of the mitigation strategies, as

expected.

The even columns of Table 4 include measures for revenue expectations as additional covariates to learn more about the mechanisms behind these effects. These revenue expectations help explain the prevalence of the crisis management measures regarding investment and liquidity. This should be expected, because liquidity concerns stemming from the expected loss of revenues should be visible in the direct liquidity management and forward-looking investment strategies.

Also note that including revenue expectations generally reduces the magnitudes of the coefficients of the pre-crisis business conditions and the expected shutdown duration, particularly for the measures of canceling investment and using existing credit lines. This could indicate that liquidity considerations linked to the pre-crisis firm health or the shutdown length explain parts of their effects on the firms' crisis mitigation strategies.

5. Conclusion

This paper assesses the determinants of firms' business outlook and of crisis mitigation strategies in the wake of the COVID-19 crisis using a large representative panel of German firms.

Our findings indicate that pre-crisis firm health is an important predictor of firm responses during the crisis. Firms that were in bad shape prior to the crisis appear to be more severely hit in the first months of the pandemic, and also expect more adverse effects going forward. This higher degree of vulnerability is also reflected in the choice of responses: Firms with poorer pre-crisis health are more likely to choose stronger mitigation strategies, in particular, cutting employment and investment.

We further show that expectations regarding the duration of the shutdown are independent of pre-crisis firm characteristics and largely unrelated to the initial business impact of the crisis. Those duration expectations affect firms' business outlook for the coming months and are also reflected in the choice of mitigation strategies: Firms that expect the shutdown to last four months or longer are 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 temporary reducing wage costs through the short-time work scheme, are implemented independently of the expected duration of the crisis.

These findings also bear high policy relevance. Our findings show that firm responses directly depend on the expected length of restrictions on public life and 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. In addition, our findings suggest that the crisis amplifies preexisting vulnerabilities, indicating that previously weak firms might be in need of stronger public assistance throughout the crisis. Whether or not such support measures are of public interest may become relevant in the public debate throughout the upcoming months.

References

Bachmann, R., T. O. Berg, and E. R. Sims (2015): "Inflation Expectations and Readiness to Spend: Cross-Sectional Evidence," *American Economic Journal: Economic Policy*, 7, 1–35.

Baker, S. R., N. Bloom, S. J. Davis, and S. J. Terry (2020): "COVID-induced Economic Uncertainty," NBER Working Paper 26983, National Bureau of Economic Research.

Bartik, A. W., M. Bertrand, Z. B. Cullen, E. L. Glaeser, M. Luca, and C. T. Stanton (2020): "How Are Small Businesses Adjusting to COVID-19? Early Evidence from a Survey," NBER Working Paper 26989, National Bureau of Economic Research.

Blavatnik School of Government (2020): "Coronavirus Government Response Tracker," https://www.bsg.ox.ac.uk/research/research-projects/coronavirus-government-response-tracker, accessed: 4/29/2020.

Bloom, N., P. Bunn, S. Chen, P. Minzen, and P. Smietanka (2020): "The Economic Impact of Coronavirus on UK Businesses: Early Evidence from the Decision Maker Panel," https://voxeu.org/article/economic-impact-coronavirus-uk-businesses, accessed: 4/28/2020.

Boneva, L., J. Cloyne, M. Weale, and T. Wieladek (forthcoming): "Firms' Price, Cost and Activity Expectations: Evidence from Micro Data," *The Economic Journal*.

British Chambers of Commerce (2020): "BCC Coronavirus Business Impact Tracker: First Results Show Heavy Toll on UK Business Communities as Majority of Firms Face Cash Flow Crisis," https://www.britishchambers.org.uk/news/2020/04/bcc-coronavirus-business-impact-tracker, accessed: 5/2/2020.

Buchheim, L., C. Krolage, and S. Link (2020): "Sudden Stop: Did Firms Expect the COVID-19 Shutdown?" *mimeo*.

Bundesagentur für Arbeit (2020): "Der Arbeitsmarkt im April 2020," https://www.arbeitsagentur.de/presse/2020-27-der-arbeitsmarkt-im-april-2020, accessed: 4/30/2020.

Burda, M. C. and J. Hunt (2011): "What Explains the German Labor Market Miracle in the Great Recession?" NBER Working Paper 17187, National Bureau of Economic Research.

Coibion, O., D. Georgarakos, Y. Gorodnichenko, and M. van Rooij (2019): "How Does Consumption Respond to News about Inflation? Field Evidence from a Randomized Control Trial," NBER Working Paper 26106, National Bureau of Economic Research.

Coibion, O., Y. Gorodnichenko, and S. Kumar (2018): "How do Firms Form Their Expectations? New Survey Evidence," *American Economic Review*, 108, 2671–2713.

Coibion, O., Y. Gorodnichenko, and T. Ropele (2020): "Inflation Expectations and Firm Decisions: New Causal Evidence," *The Quarterly Journal of Economics*, 135, 165–219.

D'Acunto, F., D. Hoang, M. Paloviita, and M. Weber (2019): "IQ, Expectations, and Choice," NBER Working Paper 25496, National Bureau of Economic Research.

D'Acunto, F., D. Hoang, and M. Weber (2016): "The Effect of Unconventional Fiscal Policy on Consumption Expenditure," NBER Working Paper 22563, National Bureau of Economic Research.

Dovern, J., L. S. Müller, and K. Wohlrabe (2020): "How Do Firms Form Expectations of Aggregate Growth? New Evidence from a Large-Scale Business Survey," CESifo Working Paper 8179, CESifo.

Dräger, L. and G. Nghiem (forthcoming): "Are Consumers' Spending Decisions in Line with an Euler Equation?" *Review of Economics and Statistics*.

Gennaioli, N., Y. Ma, and A. Shleifer (2015): "Expectations and Investment," *NBER Macroeconomics Annual*, 30, 379–431.

Hassan, T. A., S. Hollander, L. van Lent, and A. Tahoun (2020): "Firm-Level Exposure to Epidemic Diseases: COVID-19, SARS, and H1N1," NBER Working Paper 26971, National Bureau of Economic Research.

Link, S. (2020): "Harmonization of the ifo Business Survey's Micro Data," *Journal of Economics and Statistics*, 240, 543–555.

Mercer (2020): "Global Spot Survey #2: How Are Companies Responding to the COVID-19 Outbreak?" https://app.keysurvey.com/reportmodule/REPORT2/report/1473410/1182824/0720e383a97d5e5e2fadb54a643789cc?Dir=&Enc_Dir=894531f5&av=IxnIBAm77ac%3D&afterVoting=3aab4e85739b&msig=0489d8874792106961f4fa5944ec949a, accessed: 5/2/2020.

Roth, C. and J. Wohlfart (forthcoming): "How Do Expectations about the Macroeconomy Affect Personal Expectations and Behavior?" *Review of Economics and Statistics*, 1–45.

Sauer, S. and K. Wohlrabe (2019): "Chef oder Praktikant – wer beantwortet eigentlich die Fragebögen in den ifo Konjunkturumfragen?" *ifo Schnelldienst*, 72, 30–32.

——— (2020): "ifo Handbuch der Konjunkturumfragen," Tech. rep., ifo Beiträge zur Wirtschaftsforschung.

Tanaka, M., N. Bloom, J. M. David, and M. Koga (forthcoming): "Firm Performance and Macro Forecast Accuracy," *Journal of Monetary Economics*.

Appendix

A. Special Questions on Covid-19 Exposure and Mitigation Strategies

The wording of the special questions in the April survey of the IBS were as follows:[12]

Question 1:

> Können Sie einen Effekt der Corona-Pandemie auf Ihre derzeitige Geschäftslage feststellen? Ist er negativ oder positiv?
>
> ☐ −3 negativ
> ☐ −2
> ☐ −1
> ☐ 0
> ☐ +1
> ☐ +2
> ☐ +3 positiv
>
> *English translation (by authors)*:
> 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:

> Welche Maßnahmen hat Ihr Unternehmen aufgrund der Corona-Pandemie getroffen?
>
> Operatives Geschäft:
> ☐ verstärkte Nutzung von Homeoffice
> ☐ Kurzarbeit
> ☐ Abbau von Zeitguthaben und Urlaub
> ☐ Beschäftigungsabbau (z.B. Entlassungen, Nicht-Verlängerung)
> ☐ Werksschließungen, Produktionsstopp

[12] We report questions as asked in the survey for firms from the manufacturing sector. Questions in other sectors deviated slightly in terms of the answer choices that were presented. They are available upon request.

☐ verstärkte Lagerhaltung
☐ Wechsel von Zulieferern / Diversifikation in der Beschaffung
Finanzen / Investitionen:
☐ Nutzung bestehender Kreditlinien
☐ Erschließung neuer Kreditlinien
☐ Inanspruchnahme von Liquiditätshilfen
☐ Verschiebung von Investitionsprojekten
☐ Streichung von Investitionsprojekten

English translation (by authors):
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
☐ Cancelation of investment projects

Question 3:

Für wie lange rechnen Sie noch mit Einschränkungen des öffentlichen Lebens in Deutschland aufgrund der Corona-Pandemie? (Tragen Sie ggf. eine Zahl kleiner 1 ein, z.B. “0,5” für 2 Wochen)

_____ Monate

English translation (by authors):
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 5:

Welchen Effekt der Corona-Pandemie auf Ihren Umsatz erwarten Sie im laufenden Jahr?

☐ keinen Effekt
☐ Anstieg um _____ %
☐ Rückgang um _____ %

English translation (by authors):
Which effect of the Corona pandemic on your turnover do you expect in the current year?

☐ No effect
☐ Increase of _____ %
☐ Decline of _____ %

Question 6:

Falls Sie einen Umsatzrückgang erwarten, rechnen Sie damit, diesen später wieder aufholen zu können?

☐ nein
☐ ja, teilweise
☐ ja, gänzlich

English translation (by authors):
If you expect a decline in turnover, do you expect to make up for the forgone turnover afterwards?

☐ No
☐ Yes, partly
☐ Yes, completely

Question 7:

Zur Bekämpfung der Corona-Pandemie werden aktuell zahlreiche Maßnahmen umgesetzt, wie Schließungen von Schulen/Universitäten/Geschäften, Kontaktverbote, Reisebeschränkungen, usw.. Wie lange schätzen Sie, könnte Ihr Unternehmen überleben, wenn diese Maßnahmen noch für längere Zeit aufrechterhalten werden?

☐ weniger als 1 Monat
☐ 1 Monat
☐ 2 Monate

☐ 3 Monate
☐ 4 Monate
☐ 5 Monate
☐ 6 Monate
☐ mehr als 6 Monate

English translation (by authors):
To mitigate the corona pandemic, numerous measures—such as closure of schools/universities/shops, "no-contact rules", travel restrictions, etc.—are currently implemented. How long, do you think, can your firm survive if these measures are kept up for a long period? ☐ less than 1 month
☐ 1 month
☐ 2 months
☐ 3 months
☐ 4 months
☐ 5 months
☐ 6 months
☐ more than 6 months