

Sudden Stop: When Did Firms Anticipate the Potential Consequences of COVID-19?

Lukas Buchheim, Carla Krolage, Sebastian Link

Impressum:

CESifo Working Papers

ISSN 2364-1428 (electronic version)

Publisher and distributor: Munich Society for the Promotion of Economic Research - CESifo GmbH

The international platform of Ludwigs-Maximilians University's Center for Economic Studies and the ifo Institute

Poschingerstr. 5, 81679 Munich, Germany

Telephone +49 (0)89 2180-2740, Telefax +49 (0)89 2180-17845, email office@cesifo.de

Editor: Clemens Fuest

<https://www.cesifo.org/en/wp>

An electronic version of the paper may be downloaded

- from the SSRN website: www.SSRN.com
- from the RePEc website: www.RePEc.org
- from the CESifo website: <https://www.cesifo.org/en/wp>

Sudden Stop: When Did Firms Anticipate the Potential Consequences of COVID-19?

Abstract

COVID-19 hit firms by surprise. In a high frequency, representative panel of German firms, the business outlook declined and business uncertainty increased only when the spread of the COVID-19 pandemic led to domestic policy changes: The announcement of nation-wide school closures on March 13 caused by far the largest change in business perceptions. In contrast, business perceptions hardly reacted to any other potential source of information: Firms did not learn from foreign policy measures, even if they relied on inputs from China or Italy. The local, county-level spread of COVID-19 cases affected expectations and uncertainty, albeit to a much lesser extent than the domestic policy changes.

JEL-Codes: E660, E320, H320, D220, D840.

Keywords: expectations, uncertainty, policy, COVID-19, firms.

Lukas Buchheim
LMU Munich / Germany
lukas.buchheim@econ.lmu.de

Carla Krolage
ifo Institute – Leibniz Institute for Economic Research at the University of Munich/Germany
krolage@ifo.de

Sebastian Link
ifo Institute – Leibniz Institute for Economic Research at the University of Munich/Germany
link@ifo.de

July 3, 2020

We thank the staff of ifo's survey department for the opportunity to add supplementary questions to the ifo Business Survey and the team of the LMU-ifo Economics & Business Data Center for help with the data.

1. Introduction

After an initial outbreak in China in late December 2019, the COVID-19 pandemic started spreading around the world by mid-February 2020. As the pandemic progressively spread from China to further countries, firms in the rest of the world could, in principle, account for the possibility that the pandemic would spill over to other economies, affecting their own production and demand. Did firms anticipate this possibility, enabling them to take precautionary measures, or were firms unexpectedly hit by the crisis when it reached their domestic market? At what point did firms start to realize that they would be affected by the pandemic?

This paper tackles these questions using panel data from a representative and large German business survey. We show that, despite the previous spread in Asia, the COVID-19 crisis hit German firms almost completely by surprise. Based on detailed information on the day of filling the survey, businesses report a worsening outlook and increasing uncertainty only after the beginning of March, when the curfew in Northern Italy was imposed and the first schools were closed in Germany. The largest drop of business expectations and the largest increase in uncertainty follows after March 13, when the German government announced a nation-wide school closure. In combination, these two events led to an unprecedented drop in the business outlook of six standard deviations, and a comparably large increase in business uncertainty.

In contrast to the salient European policy measures, other potential sources of information about the severity of the COVID-19 crisis seem to have at best small effects on expectations and uncertainty. The spread of COVID-19 cases at the firm’s location has some explanatory power, but the overall magnitude is small relative to timing effects. Also, whether or not firms process inputs from China or Italy, the countries most prevalent in the news about the pandemic, appears to matter comparatively little for business expectations or uncertainty.

These results suggest that news about policy events in the home market are the main cause of the heightened uncertainty and sluggish short-run economic development induced by COVID-19 that have been described—but not explained—by [Altig et al. \(2020\)](#) and [Bloom et al. \(2020\)](#) for the US and the UK.¹ By highlighting the crucial role of domestic policy events for firms’ expectations—and the smaller, but significant impact of the local COVID-19 spread—, our work provides new evidence that the experiences of economic agents are a prime source for their expectations. Here, our work is the first to show how local news matter for firms’ expectations, as the effect of experience on expectations has thus far been documented primarily for households (see, e.g., [Ehrmann and Tzamourani, 2012](#); [Malmendier and Nagel, 2016](#); [Cavallo et al., 2017](#); [Kuchler and Zafar, 2019](#)).

In a broader sense, this paper contributes to the survey evidence on firms’ expectations and decision making in the COVID-19 crisis (e.g., [Balleer et al., 2020](#); [Bartik et al., 2020](#); [Buchheim et al., 2020](#); [Hassan et al., 2020](#)). This literature, however, is predominantly concerned with firms’ responses to the crisis along different dimensions. As such, it does not consider the determinants of firms’ expectations before the widespread shutdowns, which is at the heart of this paper.

¹Relatedly, [Giglio et al. \(2020\)](#) and [Fetzer et al. \(forthcoming\)](#) document changes in economic beliefs and anxiety among retail investors and households, respectively.

We proceed as follows. Section 2 describes the firm-level survey data as well as the data on salient events and the local spread of COVID-19 across Germany. Section 3 presents the results, and Section 4 concludes.

2. Data and Empirical Strategy

ifo Business Survey The main data source of this paper is the ifo Business Survey (IBS) as described by [Sauer and Wohlrabe \(2020\)](#).² The IBS is a long-standing monthly panel among a representative sample of German firms across all sectors of the economy, and covers various dimensions of firms’ business activity, including their current and expected business conditions and their uncertainty associated with these expectations. We also obtained access to the exact return date of each survey questionnaire as well as information on the location of the firm at the county level. This data is used to merge the IBS to data on the local spread of COVID-19 as described below. As the survey usually runs during the first three weeks of each month, we lack observations for each month’s final week. We use the responses of firms that filled the survey online between January and April 2020 and harmonize the data following [Link \(2020\)](#). The overall sample encompasses 19,273 firm responses. To get a sense for the monthly responses, consider the April wave: Here, our sample includes 4,867 firms, with 1,694 firms in manufacturing, 363 in construction, 1,132 in retail and wholesale, and 1,678 in the remaining service industries.

Our main variables of interest are firms’ realized business conditions as well as expectations for the next six months, and firms’ perceived uncertainty in predicting their future business development. Firms provide these assessments on a visual analogue scale, ranging from 0 [“bad”/“low uncertainty”] to 100 [“good”/“high uncertainty”].³

In addition to these standard questions, the April wave of the IBS contained a series of additional COVID-19-related questions including a question on the expected impact of the crisis on firms’ revenues in the year 2020 indicated as a percentage increase/decrease.⁴ Moreover, manufacturing firms were asked in April whether they were depending on important input goods from abroad before the pandemic. Firms answering in the affirmative were asked a follow-up question on whether they were depending on shipments from China, Italy, or another severely affected country.

Timing of COVID-19 Containment Measures and Infection Data We assess the relevance of several channels through which the spread of COVID-19 may have affected firms’ perceptions. First, firms’ expectations may be informed by salient news about policy measures both abroad and

²The IBS provides input for the ifo Business Climate Index, which is the most recognized leading indicator for the German business cycle; see [Sauer and Wohlrabe \(2020\)](#) for details. According to a meta-study by [Sauer and Wohlrabe \(2019\)](#), the survey is usually answered by senior management such as firm owners, members of the executive board, or department heads.

³Appendix Table A1 shows summary statistics for the main outcome variables for each survey month. The survey also elicits business conditions and expectations on a three point scale, encoded as “more unfavorable” (−1), “roughly the same” (0) or “more favorable” (1). As our findings are similar when using these variables, we only focus on results for the more detailed scale.

⁴The exact wordings of all COVID-19-related questions that we use are listed in Appendix C.

Table 1: Intervals between Major Policy Events and Number of Firms in IBS

	Start Date	End Date	Obs in IBS
Baseline period	Jan 1	Jan 21	4392
Wuhan lockdown (CHN)	Jan 22	Feb 3	354
Diamond Princess quarantine (JPN)	Feb 4	Feb 15	3879
Hubei hard curfew (CHN)	Feb 16	Feb 21	897
Municipalities lockdown (ITA)	Feb 22	Feb 29	0
Regional curfew (ITA)	Mar 1	Mar 4	1376
Local school closure (GER)	Mar 5	Mar 7	966
Northern Italy curfew (ITA)	Mar 8	Mar 9	757
Nation-wide curfew (ITA)	Mar 10	Mar 12	564
Nation-wide school closure (GER)	Mar 13	Mar 21	1017
Nation-wide curfew (GER)	Mar 22	Apr 14	3829
Lockdown easing announced (GER)	Apr 15	Apr 24	1155

Notes: This table shows different periods of the COVID-19 crisis defined as the interval between major policy events and indicates the number of firms that responded to the IBS in the respective period.

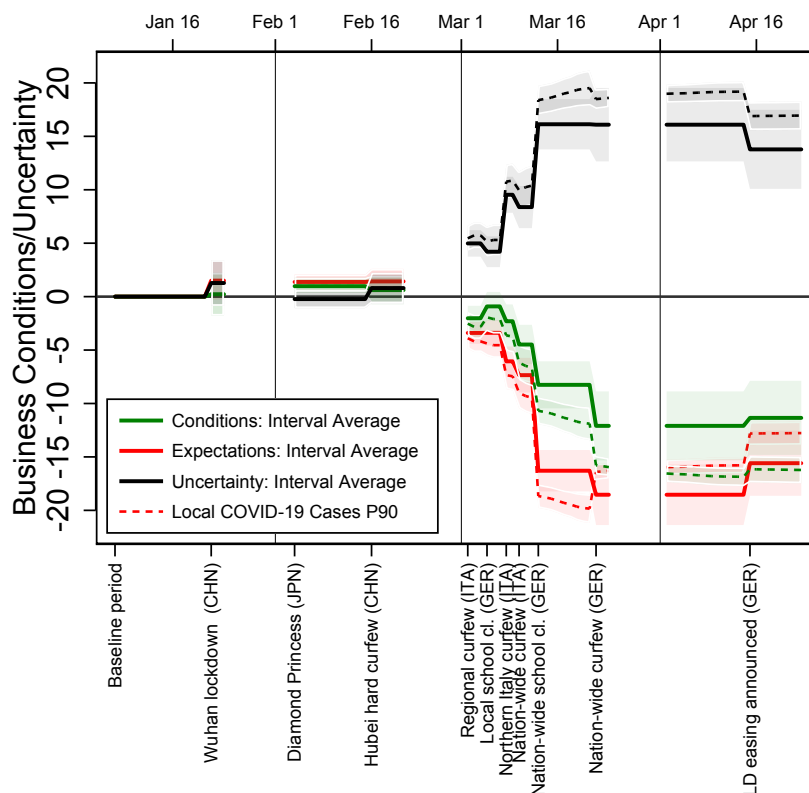
in Germany. For this purpose, we define time indicator variables for all firms replying to the IBS in the period between two salient policy event. These salient policy events are a subset of COVID-19 related policies (shutdown or quarantine measures) that are selected according to the following protocol: (i) Order shutdown events in Asia, Italy, and Germany according to their severity—i.e., the geographical unit affected (local, state/province, or nation-wide shutdown)—and according to distance from Germany. (ii) Select a new event if it is either more severe than the past event or closer to Germany. Table 1 provides an overview of these policy events, the associated time intervals, and the number of firms replying to the IBS in each interval.

Second, firms may perceive the COVID-19 pandemic as more severe if it spread more strongly through their region. The regional exposure varied strongly across Germany as COVID-19 was, at least initially, predominately spread at specific events, such as a carnival celebration in the state of North-Rhine Westphalia, and by tourists returning from skiing vacations. We assess the exposure of firms to the local spread by merging them to the official daily data on the number of infections at the county level provided by the Robert Koch Institute, the German government agency and research institute responsible for disease control and prevention.⁵

Empirical Strategy To assess the determinants of German firms’ perceptions in the first months of the COVID-19 pandemic, we regress the different measures for a firm’s business outlook on the above-described COVID-19 time indicator variables, leaving out the period until January 21 as baseline period. Estimations also account for the number of COVID-19 cases (in logs) in a firm’s county at the time of answering the survey. Given that salient news about the local spread of COVID-19 may have had a different impact on firms’ perceptions at different phases of the pandemic, we interact this variable with monthly indicator variables. In addition, we control for

⁵Infection data are obtained from <https://npgeo-corona-npgeo-de.hub.arcgis.com>

Figure 1: Effect of COVID-19 on Business Conditions, Expectations, and Uncertainty



Notes: The solid lines show the effect of COVID-19-related policy measures on firms' business outlook and uncertainty after controlling for the local spread interacted with month dummies, firm size, and fixed effects at the levels of counties and 70 two-digit industries. The effects are estimated relative to the baseline period before January 22. The dashed lines add the predicted effect of the local COVID-19 cases for a firm at the 90th percentile of cases at a given date. The data gaps correspond to periods that are not covered by the survey. The shaded areas are 90% confidence bounds. The estimates refer to Appendix Table B1.

firm size and include fixed effects at the levels of counties and two-digit industries.

3. Results

Main Findings Figure 1 summarizes the main findings with respect to the effect of the COVID-19 pandemic on business conditions, business expectations, and business uncertainty since January 2020. The full set of estimated coefficients is also shown in Appendix Table B1. The solid lines show the coefficients of the respective time periods, i.e., the overall effect of the pandemic on the respective dependent variable in the intervals between two policy events without adding the direct effect of the local spread of COVID-19. The dashed lines add the effects of the local spread to the timing coefficients, evaluated at 90th percentile of firms with respect to the infection count in their respective county. Confidence intervals are depicted at the 90% level.

The spread of COVID-19 throughout Asia and the severe lockdown measures in China had no discernible effect on the current and expected business conditions of German firms and were

not reflected by any increase in uncertainty until the end of February. Business conditions and expectations only started to depreciate once the infection rates in Europe increased and Italy implemented shutdown measures by the beginning of March. This was accompanied by a significant increase in business uncertainty. Along with the rapid spread of the virus and the implementation of various containment measures in subsequent weeks, firms' business outlook rapidly deteriorated, reaching unprecedentedly low levels by the end of March. The strongest plunge in expectations followed after the German government announced nation-wide school closures on March 13, which likewise led to a substantial increase in uncertainty. The implementation of a nation-wide curfew on March 22 was followed by a further decline in firms' outlook. After April 15, when a first easing of the severity of restrictions was announced, all measures of the business outlook improved only slightly, but stayed close to their historically bad levels.⁶

Firms located in regions with higher infection numbers reported significantly worse business conditions and expectations as well as higher uncertainty during March, as shown by the dashed lines. Compared to the timing effects of salient policy events, however, the magnitude of the local spread of COVID-19 infections is relatively small. In April, business conditions of firms in highly-affected regions remained comparatively worse, while the influence of the local spread on expectations and uncertainty turned insignificant, see Appendix Table B1.

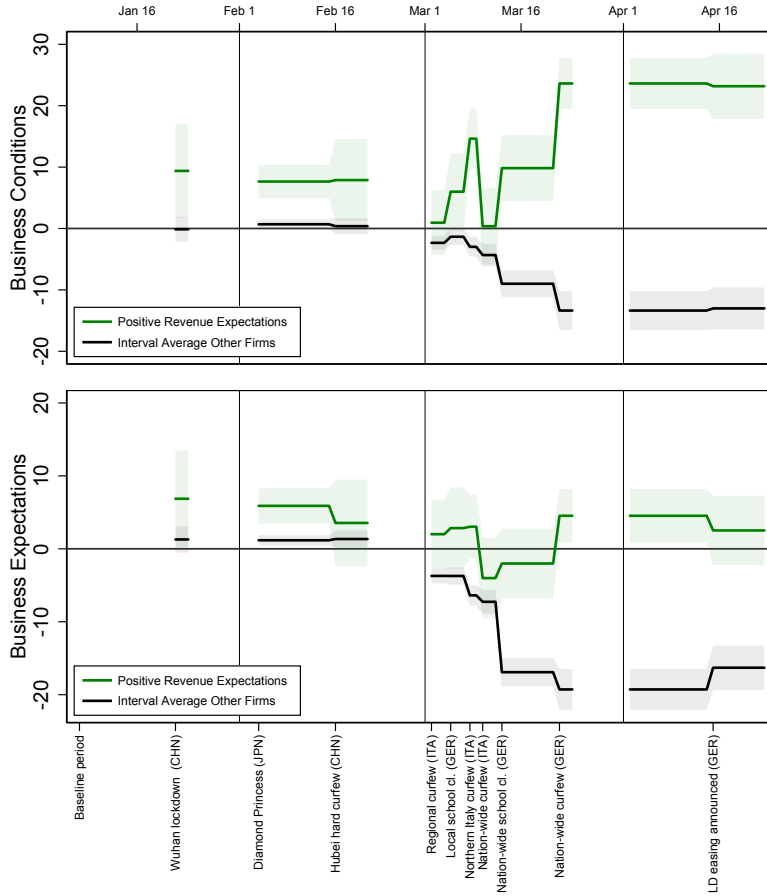
Overall, both realized and expected business conditions showed an unprecedented drop within only a few weeks of time. Relative to the month before, average business conditions and expectations deteriorated by approximately six standard deviations, while uncertainty increased by a similar magnitude.⁷

Heterogeneity between Sectors Overall, firms' perceptions and uncertainty followed a similar time path in the manufacturing, services, and retail industries (see Appendix Figure B1), though at different magnitudes. In all three sectors, expectations and conditions strongly deteriorated during March, with the service sector experiencing the strongest plunge. Since many businesses in the service sector were obliged to cease any in-person client interaction during the lockdown, the larger magnitude of adverse effects does not come as a surprise. Also, business conditions in the service sector began to worsen already in early March, possibly reflecting a growing reluctance of consumers to spend. In contrast, the business expectations and uncertainty of construction firms were largely unaffected until mid-March, but strongly deteriorated after nation-wide school closure

⁶A related question is whether the policy measures affect expectations directly or indirectly—e.g., via stock market developments. In Germany, the two largest drops of the DAX—the most important German stock market index—occurred on March 9 and 12, just before the Italian curfew and the announcement of the German school closures, respectively. For these events, we cannot identify whether firms learn from the policy announcements or the stock market reactions. However, there is suggestive evidence that the policy measures are more important for firms' business perceptions: For one, the cumulative drop in the DAX of more than 15 percentage points between February 17 and March 6 (a Friday), that is of equal size as the cumulative drop between March 9 and 12, is hardly reflected in firms' expectations and uncertainty. Moreover, the announcement of the nation-wide curfew for Germany on March 22 affected firms' business outlook, but had no discernible effect on stock prices.

⁷The standard deviation of monthly means of realized and expected business conditions conditions amounted to 2.5 and 2.9 between 2012 and 2019, respectively. The standard deviation of uncertainty since the introduction of the survey question in 2017 is 2.9.

Figure 2: Effect of COVID-19 on Business Outlook: Positively Affected Firms

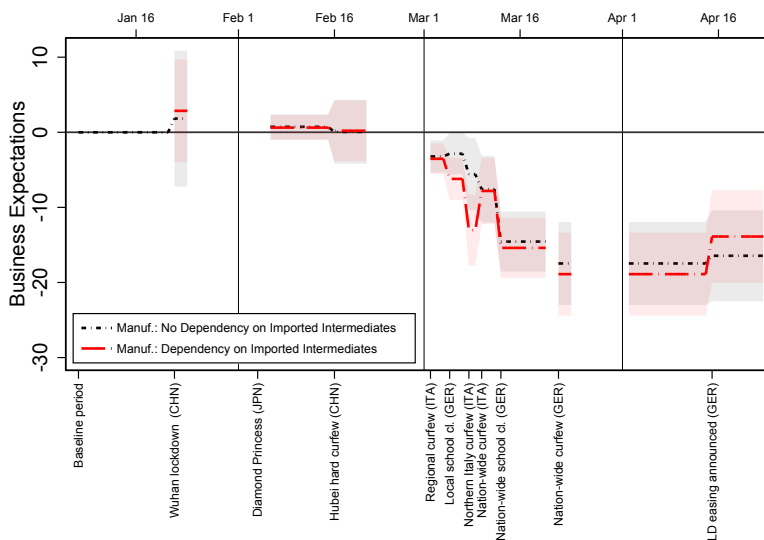


Notes: The solid lines show the effect of COVID-19-related policy measures on firms’ realized and expected business conditions after controlling for the local spread interacted with month dummies, firm size, and fixed effects at the levels of counties and 70 two-digit industries. The effects are estimated relative to the baseline period before January 22 for two groups: firms that report in April 2020 to expect a positive effect of the COVID-19 crisis on their total revenues in 2020 (4.9% of all firms) and all other firms. The data gaps correspond to periods that are not covered by the survey. The shaded areas are 90% confidence bounds. The estimates refer to Appendix Table B1.

was announced on March 13 as well.

Effect on Expectations of Positively Affected Firms While firms’ business outlook plummeted across the vast majority of industries, a small share of firms benefited from the COVID-19 crisis. We categorize firms as advantaged if they expected positive overall revenue effects of the crisis in a special survey question in April. According to this metric, only 4.9% of all firms benefited from the crisis. Unsurprisingly, the vast majority of these firms operate in the food and pharmaceutical industry, are supermarkets, or are active in the information technology or telecommunication services. The differential effects displayed in Figure 2 demonstrate that firms in advantaged sectors reported strongly appreciated business conditions throughout almost all time periods relative to the levels before January 22, whereas conditions for the remaining firms strongly deteriorated. In parallel, business expectations of advantaged firms only appreciated during February and stayed

Figure 3: Effect of COVID-19 on Expectations: Role of Dependency on Imported Intermediates



Notes: The solid lines show the effect of COVID-19-related policy measures on manufacturing firms’ expected business conditions after controlling for the local spread interacted with month dummies, firm size, and fixed effects at the levels of counties and 22 two-digit industries. The effects are estimated relative to the baseline period before January 22. Firms are grouped according to their dependency on important intermediates from abroad prior to the crisis. The data gaps correspond to periods that are not covered by the survey. The shaded areas are 90% confidence bounds. The estimates refer to Appendix Table B2.

relatively flat during March and April, which possibly reflects that firms expect the positive effects on their businesses to be temporary. Business uncertainty also did not increase for firms that benefit from the crisis, except for the period before the nation-wide curfew in Germany (see Appendix Figure B2). Once it became evident that these firms were not restricted during the curfew, uncertainty dropped to pre-crisis levels.

International Trade Links Next, we examine whether expectations differ for firms that are internationally connected. The hypothesis is that the perceptions of import- and export-dependent firms deteriorate earlier, as China—the origin of the pandemic—and Italy—one of the most affected countries early on—are important markets for German firms. To investigate this hypothesis, we assess whether responses of manufacturing firms differ between firms that were relying on imports of intermediate goods before the COVID-19 pandemic and firms that do not.⁸

Figure 3 shows that, contrary to the hypothesis, firms’ expectations are, throughout February, virtually identical for firms that strongly depended on intermediates from abroad and for firms that did not. This is even though the shutdown in China already affected Chinese exports at that time.⁹ What is more, the result also holds for the subset of firms that depend on important intermediates from China specifically (see Appendix Figure B4). Hence, firms failed to anticipate negative effects

⁸in April, the subset of manufacturing firms was asked whether they depended on important intermediaries from abroad in general as well as from China, Italy, or any other country that was strongly affected by the COVID-19 pandemic before the crisis. Empirically, we interact these dummy variables on import dependency with the time intervals.

⁹The same holds for firms’ business conditions. The results are available upon request.

of the pandemic before it had reached Europe, even if they could have learned about them from their suppliers.

In early March, the expectations of import-dependent firms suffered a slightly stronger decline that is only close to significance (t -statistic: 1.57). With increasing restrictions in Italy, expectations of firms depending on Italian intermediates started to drop approximately one week ahead of those of other firms (see Appendix Figure B4). No difference remained from mid-March onwards.

Finally, import-dependent firms faced a slightly, albeit insignificantly, higher level of uncertainty throughout the first months of the pandemic, plausibly reflecting the additional uncertainty generated by trade restrictions implemented in the wake of the pandemic (see Figure B3 in the Appendix).

Overall, the findings suggest that German firms failed to anticipate the crisis until the pandemic reached their domestic market, even if they had the opportunity to learn from their suppliers. In line with this finding, a firm's pre-crisis export share does not hold much explanatory power for the drop in business expectations or the rise in uncertainty, either (see Appendix Figure B5).

4. Conclusion

Based on a large and representative survey of German firms, this paper examines the point in time when firms became aware of the adverse economic implications of the COVID-19 pandemic. We show that firms were unexpectedly hit by the COVID-19 pandemic when it reached Europe, leaving firms with little time to prepare for the lockdown. Despite the prior spread of the pandemic in Asia, business outlooks only began to worsen in March, when Italy imposed its first regional curfew and first schools were closed in Germany. Once the crisis reached their domestic market, firms' business outlook rapidly deteriorated across March, with the strongest plunge occurring after the German government had announced a nation-wide school closure on March 13. Both business conditions and business expectations then stabilized on historically low levels in April.

Other channels through which the COVID-19 pandemic may affect firms' business outlook play a minor role. While the spread of COVID-19 infections in a firms' county exhibits a negative effect on firms' business outlook, the magnitude of effects is by far smaller than that of timing effects. Also, whether firms process intermediate goods from China or Italy, the countries that were most prevalent in the news before the crisis reached the domestic market, has only limited explanatory power for business expectations and uncertainty.

References

- ALTIG, D., S. R. BAKER, J. M. BARRERO, N. BLOOM, P. BUNN, S. CHEN, S. J. DAVIS, J. LEATHER, B. H. MEYER, E. MIHAYLOV, P. MIZEN, N. B. PARKER, T. RENAULT, P. SMIETANKA, AND G. THWAITES (2020): “Economic Uncertainty Before and During the COVID-19 Pandemic,” *NBER Working Paper 27418*.
- BALLEER, A., S. LINK, M. MENKHOFF, AND P. ZORN (2020): “Demand or Supply? Price Adjustment during the Covid-19 Pandemic,” *CEPR Discussion Paper 14907*.
- 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*.
- 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.
- BUCHHEIM, L., C. KROLAGE, J. DOVERN, AND S. LINK (2020): “Firm-level Expectations and Behavior in Response to the COVID-19 Crisis,” *CESifo Working Paper 8304*.
- CAVALLO, A., G. CRUCES, AND R. PEREZ-TRUGLIA (2017): “Inflation Expectations, Learning, and Supermarket Prices: Evidence from Survey Experiments,” *American Economic Journal: Macroeconomics*, 9, 1–35.
- EHRMANN, M. AND P. TZAMOURANI (2012): “Memories of High Inflation,” *European Journal of Political Economy*, 28, 174–191.
- FETZER, T., L. HENSEL, J. HERMLE, AND C. ROTH (forthcoming): “Coronavirus Perceptions and Economic Anxiety,” *Review of Economics and Statistics*.
- GIGLIO, S., M. MAGGIORI, J. STROEBEL, AND S. UTKUS (2020): “Inside the Mind of a Stock Market Crash,” *NBER Working Paper 27272*.
- HASSAN, T. A., S. HOLLANDER, L. VAN LENT, AND A. TAHOUN (2020): “Firm-Level Exposure to Epidemic Diseases: COVID-19, SARS, and H1N1,” .
- KUCHLER, T. AND B. ZAFAR (2019): “Personal Experiences and Expectations about Aggregate Outcomes,” *Journal of Finance*, 74, 2491–2542.
- LINK, S. (2020): “Harmonization of the ifo Business Survey’s Micro Data,” *Journal of Economics and Statistics*, 240, 543–555.
- MALMENDIER, U. AND S. NAGEL (2016): “Learning from Inflation Experiences,” *Quarterly Journal of Economics*, 131, 53–87.

SAUER, S. AND K. WOHLRABE (2019): “CEO or Intern – Who Actually Answers the Questionnaires in the ifo Business Survey?” *CESifo Forum*, 20, 29–31.

——— (2020): “ifo Handbuch der Konjunkturumfragen,” *ifo Beiträge zur Wirtschaftsforschung*.

Appendix

A. Summary Statistics

Table A1: Summary Statistics

	Overall				January		February		March		April	
	Min	Max	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Business Conditions	0	100	47.55	23.94	52.68	21.44	53.74	21.09	47.35	23.00	36.64	25.92
Business Expectations	0	100	44.21	20.50	49.92	16.84	51.44	17.36	40.78	21.00	34.98	21.68
Business Uncertainty	0	100	62.56	25.02	55.64	22.48	55.12	23.10	65.42	25.29	73.70	24.24
ln(COVID-19 Cases in County)	0	8.59	1.89	2.58	0	0	0.06	0.28	1.60	1.65	5.84	1.08
ln(Employees)			3.96	1.76								
Dependency on Imports	0	1	0.57	0.49								
Dependency on Imports from Italy	0	1	0.32	0.47								
Dependency on Imports from China	0	1	0.32	0.47								
Expected COVID-19 Revenue Effect	-1	3	-0.20	0.21								
Observations	19,273				4,746		4,776		4,884		4,867	

Notes: Table shows summary statistics of the IBS waves January through April 2020 that are used in our analyses. The data on the number of COVID-19 cases in each firm's county at the date of the survey response are obtained from the Robert Koch Institute. The *Expected COVID-19 Revenue Effect* and the different dummies on dependency on imports (manufacturing firms, only) are elicited in special IBS questions in April 2020.

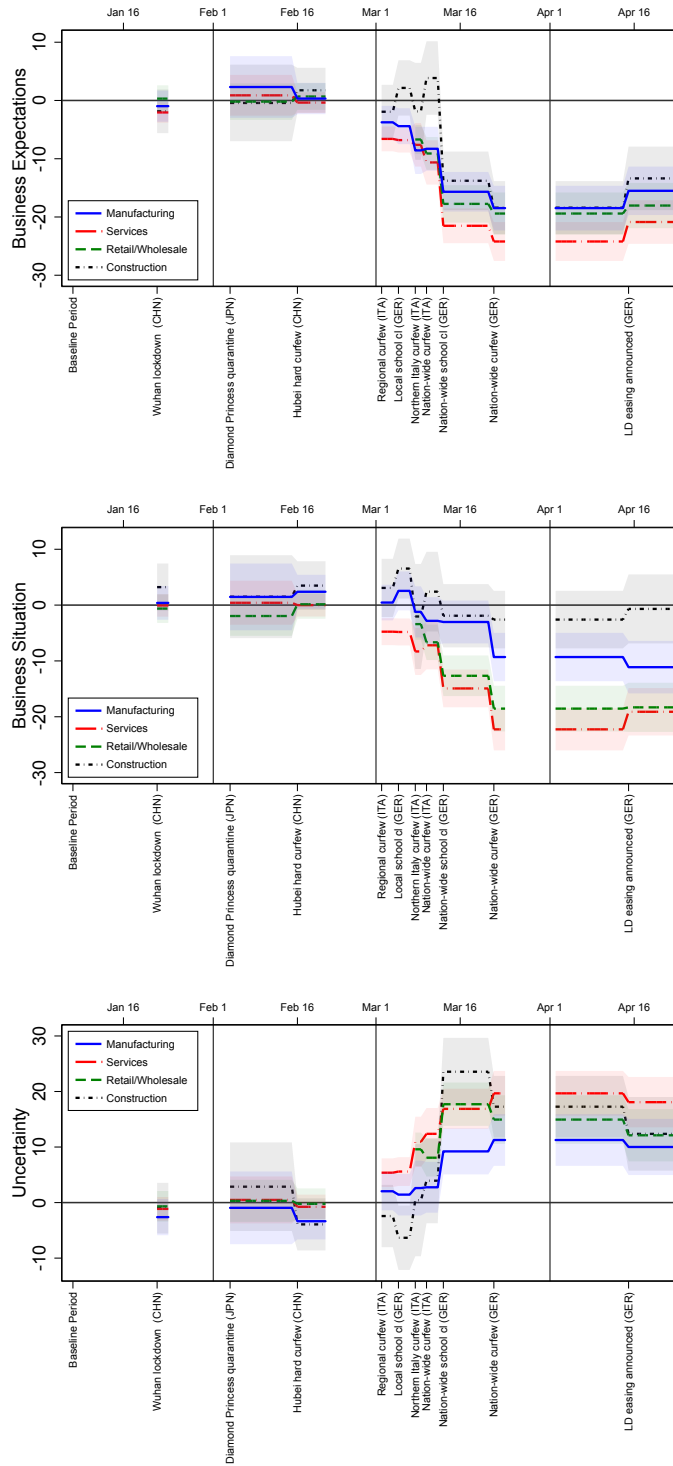
B. Supplementary Tables and Figures

Table B1: Effect of COVID-19 on Business Conditions, Expectations, and Uncertainty

	Business Conditions		Business Expectations		Business Uncertainty	
	(1)	(2)	(3)	(4)	(5)	(6)
Time indicators (baseline period: Jan 1 - Jan 21):						
Wuhan lockdown (CHN)	0.22 (1.22)	0.37 (1.23)	1.50 (1.07)	1.71 (1.08)	1.27 (1.30)	1.21 (1.31)
Diamond Princess quarantine (JPN)	0.98** (0.48)	0.89* (0.48)	1.37*** (0.42)	1.32*** (0.42)	-0.23 (0.51)	-0.19 (0.52)
Hubei hard curfew (CHN)	0.61 (0.81)	0.58 (0.81)	1.42** (0.71)	1.46** (0.72)	0.80 (0.86)	0.81 (0.87)
Regional curfew (ITA)	-2.02*** (0.71)	-2.17*** (0.71)	-3.40*** (0.62)	-3.43*** (0.75)	4.98*** (0.75)	4.97*** (0.76)
Local school closure (GER)	-0.91 (0.82)	-1.04 (0.82)	-3.39*** (0.72)	-3.42*** (0.72)	4.20*** (0.88)	4.22*** (0.88)
Northern Italy curfew (ITA)	-2.30** (0.96)	-2.64*** (0.96)	-6.06*** (0.85)	-6.19*** (0.85)	9.53*** (1.02)	9.64*** (1.03)
Nation-wide curfew (ITA)	-4.48*** (1.12)	-4.47*** (1.12)	-7.35*** (0.99)	-7.44*** (0.99)	8.38*** (1.20)	8.37*** (1.20)
Nation-wide school closure (GER)	-8.25*** (1.34)	-8.46*** (1.34)	-16.29*** (1.18)	-16.47*** (1.18)	16.13*** (1.43)	16.05*** (1.43)
Nation-wide curfew (GER)	-12.09*** (1.96)	-12.32*** (1.96)	-18.54*** (1.73)	-18.65*** (1.72)	16.09*** (2.09)	16.19*** (2.09)
Lockdown easing announcement (GER)	-11.35*** (2.11)	-11.48*** (2.10)	-15.59*** (1.86)	-15.55*** (1.85)	13.78*** (2.25)	13.81*** (2.25)
Interaction terms: time indicators for sectors with positive revenue effects:						
Wuhan lockdown (CHN) \times 1(Pos. aff. ind.)		3.15 (8.69)		-8.49 (7.67)		1.42 (9.30)
Diamond Pr. (JPN) \times 1(Pos. aff. ind.)		14.03*** (4.28)		8.14** (3.78)		-5.65 (4.59)
Hubei curfew (CHN) \times 1(Pos. aff. ind.)		5.08 (6.14)		-1.23 (5.42)		-1.41 (6.57)
Reg. curfew (ITA) \times 1(Pos. aff. ind.)		18.78** (9.40)		2.40 (8.29)		7.91 (10.06)
Local school cl. (GER) \times 1(Pos. aff. ind.)		27.17 (21.29)		-3.18 (18.79)		1.19 (22.79)
Northern ITA curfew \times 1(Pos. aff. ind.)		23.86*** (5.50)		8.50* (4.86)		-5.39 (5.71)
Nation-wide curfew (ITA) \times 1(Pos. aff. ind.)		7.09 (10.55)		13.14 (9.31)		3.13 (11.30)
Nation-wide school cl. (GER) \times 1(Pos. aff. ind.)		20.06*** (6.33)		13.16** (5.59)		9.49 (6.78)
Nation-wide curfew (GER) \times 1(Pos. aff. ind.)		36.46*** (4.42)		12.66*** (3.90)		-9.57** (4.63)
LD easing announcement (GER) \times 1(Pos. aff. ind.)		20.93*** (6.46)		-3.97 (5.46)		-0.49 (6.62)
Local spread of COVID-19:						
$\ln(\text{COVID cases county}) \times 1(t \in 04 \text{ Feb, 21 Feb})$	1.48 (1.31)	1.40 (1.31)	1.75 (1.15)	1.73 (1.15)	-1.50 (1.40)	-1.51 (1.40)
$\ln(\text{COVID cases county}) \times 1(t \in 03 \text{ Mar, 21 Mar})$	-0.74** (0.33)	-0.73** (0.33)	-0.72** (0.29)	-0.71** (0.29)	0.68* (0.35)	0.67* (0.35)
$\ln(\text{COVID cases county}) \times 1(t \in 22 \text{ Mar, 23 Apr})$	-0.74** (0.33)	-0.74** (0.33)	0.43 (0.29)	0.43 (0.29)	0.48 (0.35)	0.47 (0.35)
$\ln(\text{Employees})$	0.81*** (0.11)	0.77*** (0.11)	0.26*** (0.10)	0.24** (0.10)	0.53*** (0.12)	0.53*** (0.12)
Constant	49.39*** (0.54)	49.56*** (0.54)	48.85*** (0.48)	48.90*** (0.48)	53.42*** (0.58)	53.42*** (0.58)
Observations	17,939	17,939	17,960	17,960	17,961	17,961
R^2	0.259	0.263	0.218	0.219	0.231	0.232
County FE	yes	yes	yes	yes	yes	yes
Industry FE (2 digit)	yes	yes	yes	yes	yes	yes
Sample of Firms	Total	Total	Total	Total	Total	Total

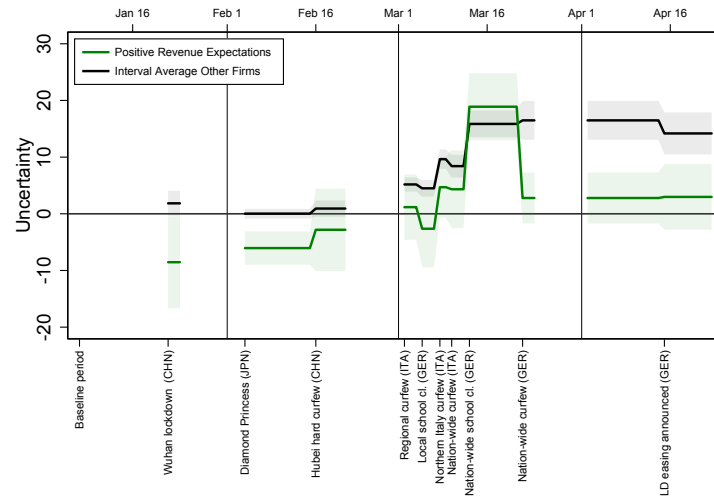
Notes: This table summarizes the effect of COVID-19 on firms' business conditions, business expectations and business uncertainty which are elicited on a visual analogue scale between 0 and 100. The period indicators are defined in Table 1. In Columns (2), (4), and (6) the period indicators are interacted with an indicator that equals one if the firm is operating in an industry that is benefiting from the pandemic (supermarkets and pharmaceutical industry). Data on the county-level counts of COVID-19 cases are received from the Robert Koch Institute and interacted with dummies for different phases of the pandemic. Further controls include the log number of employees and fixed effects at the levels of counties and 70 two-digit industries. Firms are grouped according to their dependency on important intermediates from abroad prior to the crisis. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

Figure B1: Effect of COVID-19 on Business Outlook and Uncertainty in Different Industries



Notes: The solid lines show the effect of COVID-19-related policy measures on firms' business outlook and uncertainty after controlling for the local spread interacted with month dummies, firm size, and fixed effects at the levels of counties and 70 two-digit industries. The effects are estimated relative to the baseline period before January 22 and separately for firms in manufacturing, services, retail/wholesale, and construction industries. The data gaps correspond to periods that are not covered by the survey. The shaded areas are 90% confidence bounds.

Figure B2: Effect of COVID-19 on Uncertainty: Positively Affected Firms



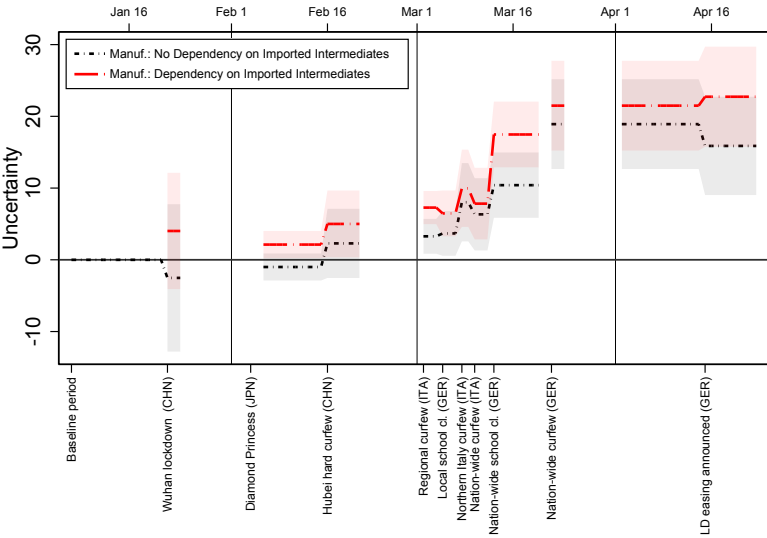
Notes: The solid lines show the effect of COVID-19-related policy measures on firms' business uncertainty after controlling for the local spread interacted with month dummies, firm size, and fixed effects at the levels of counties and 70 two-digit industries. The effects are estimated relative to the baseline period before January 22 for two groups: firms that report in April 2020 to expect a positive effect of the COVID-19 crisis on their total revenues in 2020 (4.9% of all firms) and all other firms. The data gaps correspond to periods that are not covered by the survey. The shaded areas are 90% confidence bounds. The estimates refer to Appendix Table B1.

Table B2: Manufacturing Firms: Results by International Trade Links

	Business Conditions		Business Expectations		Business Uncertainty	
	(1)	(2)	(3)	(4)	(5)	(6)
Time indicators (baseline period: Jan 1 - Jan 21):						
Wuhan lockdown (CHN)	2.51 (3.16)	18.33*** (6.18)	4.35 (2.80)	1.82 (5.50)	0.52 (3.27)	-2.52 (6.24)
Diamond Princess quarantine (JPN)	1.86** (0.73)	2.67** (1.13)	1.30** (0.65)	0.73 (1.01)	-0.98 (0.74)	-1.00 (1.15)
Hubei hard curfew (CHN)	-0.37 (1.80)	0.82 (2.90)	0.52 (1.59)	0.06 (2.58)	2.31 (1.83)	2.29 (2.93)
Regional curfew (ITA)	-0.24 (0.96)	-0.97 (1.46)	-2.84*** (0.85)	-3.22** (1.30)	4.28*** (0.97)	3.27** (1.48)
Local school closure (GER)	1.60 (1.28)	2.70 (1.88)	-3.58*** (1.14)	-2.86* (1.67)	3.22** (1.30)	3.68* (1.90)
Northern Italy curfew (ITA)	-1.45 (2.23)	-0.69 (3.28)	-7.54*** (1.98)	-5.59* (2.92)	5.68** (2.28)	8.02** (3.32)
Nation-wide curfew (ITA)	-3.34 (2.07)	-1.99 (3.03)	-6.27*** (1.84)	-7.58*** (2.70)	5.80*** (2.10)	6.34** (3.06)
Nation-wide school closure (GER)	-3.50 (2.20)	-1.97 (2.73)	-14.03*** (1.96)	-14.55*** (2.43)	10.75*** (2.25)	10.41*** (2.76)
Nation-wide curfew (GER)	-10.54*** (3.57)	-12.49*** (3.77)	-16.12*** (3.17)	-17.47*** (3.36)	16.99*** (3.62)	18.91*** (3.80)
Lockdown easing announcement (GER)	-12.17*** (3.86)	-12.59*** (4.12)	-12.99*** (3.43)	-16.45*** (3.68)	15.52*** (3.92)	15.88*** (4.16)
1(Dependency on imported intermediates)		-0.72 (1.12)		-1.20 (1.00)		2.54** (1.14)
Interaction effects: time indicators for firms depending on imported intermediates:						
Wuhan lockdown (CHN) × 1(Dep. imports)		-25.98*** (7.74)		2.23 (6.89)		4.00 (7.95)
Diamond Pr. (JPN) × 1(Dep. imports)		-0.97 (1.54)		1.10 (1.37)		0.58 (1.56)
Hubei curfew (CHN) × 1(Dep. imports)		-3.74 (3.97)		1.35 (3.53)		0.17 (4.04)
Reg. curfew (ITA) × 1(Dep. imports)		1.50 (1.91)		0.89 (1.70)		1.46 (1.93)
Local school cl. (GER) × 1(Dep. imports)		-1.99 (2.59)		-2.15 (2.31)		0.25 (2.62)
Northern ITA curfew × 1(Dep. imports)		-5.03 (4.48)		-6.24 (3.98)		-0.60 (4.52)
Nation-wide curfew (ITA) × 1(Dep. imports)		-3.75 (3.98)		0.97 (3.55)		-1.05 (4.02)
Nation-wide school cl. (GER) × 1(Dep. imports)		-6.22** (2.68)		0.36 (2.38)		4.52* (2.73)
Nation-wide curfew (GER) × 1(Dep. imports)		0.43 (1.54)		-0.22 (1.37)		0.03 (1.56)
LD easing announcement (GER) × 1(Dep. imports)		-2.75 (2.44)		3.77* (2.18)		4.31* (2.48)
Local spread of COVID-19:						
$\ln(\text{COVID cases county}) \times 1(t \in 04 \text{ Feb, } 21 \text{ Feb})$	4.69* (2.71)	4.89* (2.95)	1.55 (2.40)	2.33 (2.62)	2.86 (2.75)	0.83 (2.98)
$\ln(\text{COVID cases county}) \times 1(t \in 03 \text{ Mar, } 21 \text{ Mar})$	-0.16 (0.59)	0.40 (0.63)	-0.70 (0.52)	-0.46 (0.56)	0.90 (0.60)	0.63 (0.64)
$\ln(\text{COVID cases county}) \times 1(t \in 22 \text{ Mar, } 23 \text{ Apr})$	-0.01 (0.62)	0.31 (0.64)	0.35 (0.55)	0.62 (0.57)	-0.24 (0.63)	-0.62 (0.64)
$\ln(\text{Employees})$	0.17 (0.19)	0.28 (0.21)	0.16 (0.17)	0.23 (0.19)	0.54*** (0.19)	0.42* (0.22)
Constant	46.73*** (1.05)	46.53*** (1.26)	47.48*** (0.93)	47.65*** (1.12)	59.82*** (1.07)	59.36*** (1.28)
Observations	6,457	5,849	6,449	5,841	6,432	5,833
R^2	0.238	0.258	0.256	0.268	0.261	0.279
County FE	yes	yes	yes	yes	yes	yes
Industry FE (2 digit)	yes	yes	yes	yes	yes	yes
Sample of Firms	Manuf.	Manuf.	Manuf.	Manuf.	Manuf.	Manuf.

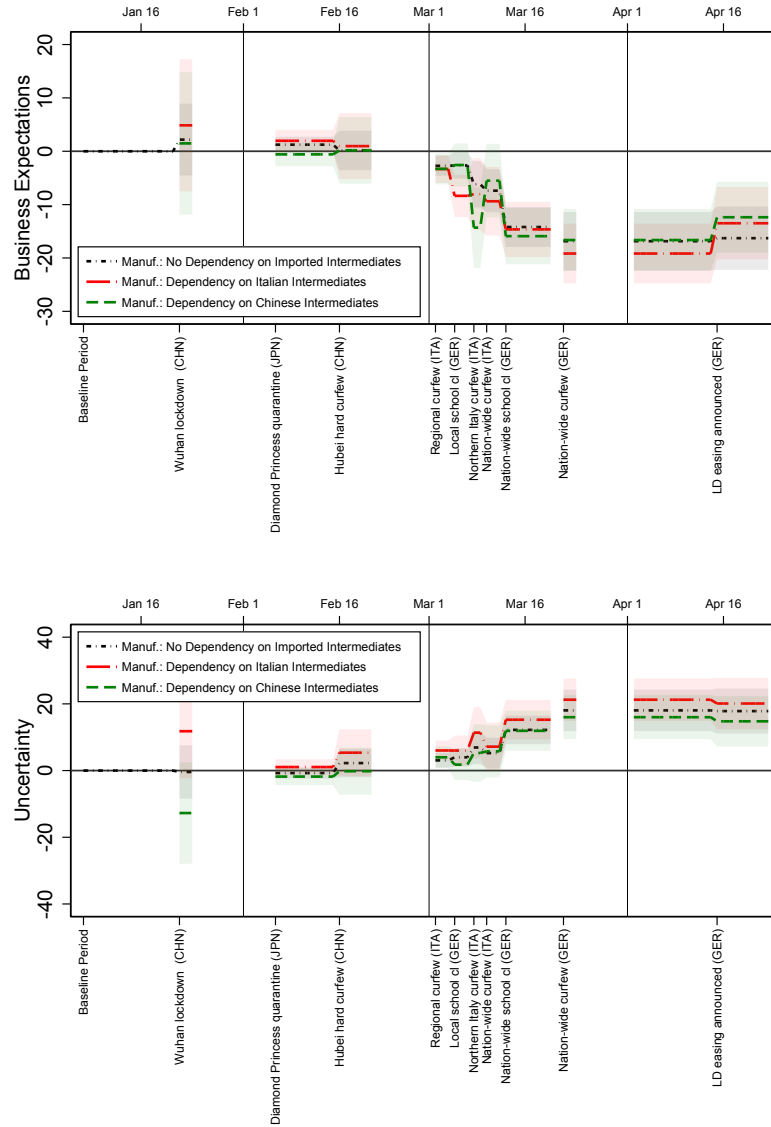
Notes: This table summarizes the effect of COVID-19 on manufacturing firms' business conditions, business expectations, and business uncertainty which are elicited on a visual analogue scale between 0 and 100. The period indicators are defined in Table 1. In Columns (2), (4), and (6) the period indicators are interacted with an indicator that equals one if the a firm reported to have been depending on imports of important intermediaries before the pandemic. Data on the county-level counts of COVID-19 cases are received from the Robert Koch Institute and interacted with dummies for different phases of the pandemic. Further controls include the log number of employees and fixed effects at the levels of counties and 70 two-digit industries. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

Figure B3: COVID-19 Effect on Uncertainty: Role of Dependency on Imported Intermediates



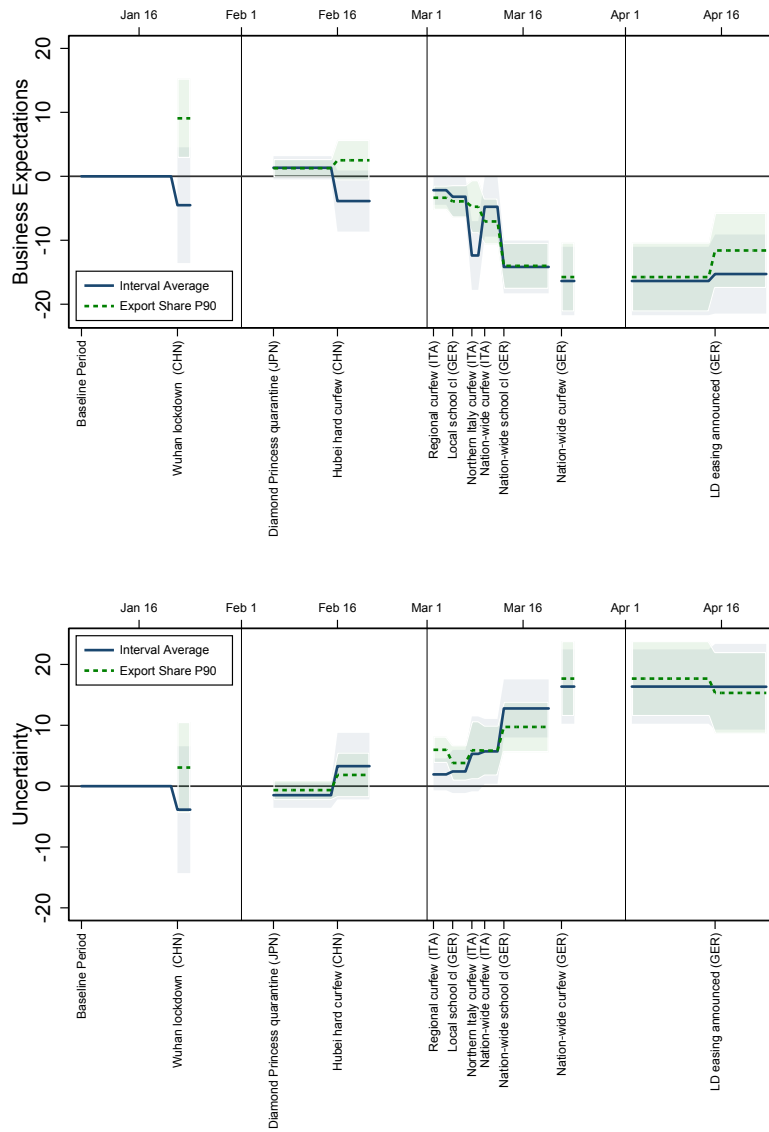
Notes: The solid lines show the effect of COVID-19-related policy measures on manufacturing firms’ business uncertainty after controlling for the local spread interacted with month dummies, firm size, and fixed effects at the levels of counties and 22 two-digit industries. The effects are estimated relative to the baseline period before January 22. Firms are grouped according to their dependency on important intermediates from abroad prior to the crisis. The data gaps correspond to periods that are not covered by the survey. The shaded areas are 90% confidence bounds. The estimates refer to Appendix Table B2.

Figure B4: COVID-19 Effect on Expectations and Uncertainty: Role of Dependency on Intermediates from China or Italy



Notes: The solid lines show the effect of COVID-19-related policy measures on manufacturing firms' expected business conditions and uncertainty after controlling for the local spread interacted with month dummies, firm size, and fixed effects at the levels of counties and 22 two-digit industries. The effects are estimated relative to the baseline period before January 22. Firms are grouped according to their dependency on important intermediates from China or Italy prior to the crisis. The data gaps correspond to periods that are not covered by the survey. The shaded areas are 90% confidence bounds.

Figure B5: Role of Export Share for Business Expectations and Uncertainty



Notes: The solid lines show the effect of COVID-19-related policy measures on manufacturing firms' expected business conditions and uncertainty after controlling for the local spread interacted with month dummies, firm size, and fixed effects at the levels of counties and 22 two-digit industries. The effects are estimated relative to the baseline period before January 22. The dashed lines add the predicted effect of export exposure for a firm at the 90th percentile of export shares. The data gaps correspond to periods that are not covered by the survey. The shaded areas are 90% confidence bounds.

C. Special Questions on COVID-19

The wording of the special questions of the April IBS survey used in this paper was as follows:

Question 1:

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 do you expect on your revenues in the current year?

No effect Increase of ____ % Decline of ____ %

Question 2 [Manufacturing Firms Only]:

a) Waren Sie vor Ausbruch der Corona-Pandemie auf wichtige Warenlieferungen aus dem Ausland angewiesen?

Ja Nein

b) Wenn ja, stammten diese wichtigen Warenlieferungen aus China, Italien oder einem anderem inzwischen vom Corona-Virus besonders stark betroffenen Land?

China Italien Sonstige, und zwar: _____

English translation (by authors):

a) Did you rely on important shipments of goods from abroad before the Corona pandemic?

Yes No

b) If yes, did those important shipments originate from China, Italy, or any other heavily affected country?

China Italy Other countries: _____