Expectation Management of Policy Leaders: Evidence from COVID-19

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Expectation management of policy leaders: Evidence from COVID-19*

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Abstract

This paper studies how the communication of political leaders affects the expectation formation of the public. Specifically, we examine the expectation management of the German government regarding COVID-19-related regulatory measures during the early phase of the pandemic. We elicit beliefs about the duration of these restrictions via a high-frequency survey of individuals, accompanied by an additional survey of firms. To quantify the success of policy communication, we use a regression discontinuity design and study how beliefs about the duration of the regulatory measures changed in response to three nationally televised press conferences by Chancellor Angela Merkel and the Prime Ministers of the German federal states. We find that the announcements of Angela Merkel and her colleagues significantly prolonged the expected duration of restrictions, with effects being strongest for individuals with higher ex-ante optimism.

Key words: Expectations, Belief updating, COVID-19, Shutdown

JEL classification: D12, D84, H12

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1 Introduction

The observation that expectation management is an important component of economic policy has been acknowledged most prominently in the field of monetary policy (e.g. Rivot 2017) but applies to many markets. It is clear that improving forecasts of demand and supply is important for reducing the uncertainty of economic agents. Correspondingly, analyses of market expectations appear increasingly often and in many guises. A common finding is that the management of expectations is especially important after exogenous shocks or structural breaks in the economy, because agents' uncertainty about their own forecasts of market fundamentals is at its greatest and the heterogeneity of expectations across agents is correspondingly large.[1] This paper studies how policy communication affects expectations of individuals. Specifically, we quantify the effects of statements about COVID-19-related regulatory measures made by chancellor Angela Merkel and the prime ministers of the German federal states during the early phase of the pandemic. Our analysis contributes to an emerging literature that studies whether heterogeneous population expectations can be influenced by policymakers.[2]

The outbreak of the COVID-19 pandemic in early 2020 was a major structural break, taking the world by surprise and creating a world-wide guessing game about the outbreak's scale and the pandemic's endurance. We focus on the latter uncertainty, about the pandemic's duration and the related restrictions, which is of first order for expectation management and one of major economic importance. Expectations about the pandemic's duration were highly unrealistic in its early phases: even after the first larger-scale infections in metropolitan centers of different countries, few economic decision-makers anticipated a long-lasting impact. For instance, Bartik et al. (2020) surveyed American businesses between late March and early April 2020, finding that respondents predominantly predicted the crisis to have ended by June 2020. What *did* become clear very quickly is that the crisis, while it lasts, would result in massive changes to economic activity and to private lives. A combination of voluntary measures and imposed restrictions rapidly reduced supply and demand in many markets and affected various other aspects of everyday life. The large scope of such changes further underlined the importance of learning about the length of the crisis. "How much longer?" was a question that soon reverberated throughout the world's public media.

In this situation, many political leaders attempted not only to promise a solid policy response with wide-ranging public health measures and economic rescue packages, but also to educate the public about the length of the pandemic. Announcements of policy makers and scientists about the length of the crisis received wide coverage in news and social media – but so did many

[1] See, e.g., the laboratory study by Becker et al. (2009) and the macroeconomic analysis of survey data in Baele et al. (2015).

[2] Several papers, including Coibion et al. (2019), investigate how central bank communication affects inflation expectations. In the context of COVID-19, Coibion et al. (2020*a*) use information treatments in a survey experiment in the US to study the effects of policy maker announcements. Our paper differs in that we use real-world press conferences in Germany as a natural experiment.

other public discussions about the pandemic. The empirical question arises to what extent the announcements of policy makers were effective. In a cacophony of media publications and expert views, are policy makers able to move the beliefs of the public? An affirmative answer would be an important prerequisite of successful crisis management. The large majority of the policy response is made up of the regulation of human behaviors – including social distancing, private consumption,and investment decisions – and as such, the ability of political leaders to reach their population's minds is crucial to its effectiveness.

There are potential reasons for and against suspecting a strong policy communication in this context. On the positive side, one may argue that the regulation of social distancing, despite its novelty, is relatively straightforward to describe at least in its basic and undifferentiated form: public events are forbidden or not, schools are closed or not. Consistent with this hypothesis, Goldberg et al. (2020) report evidence that mask wearing increased strongly after a corresponding recommendation by the U.S. Center for Disease Control. Moreover, the main regulatory decisions lie in the hands of a few well-identified policy makers and they are the same individuals who also make the public announcements. Thus, it may be natural to suspect that these announcements are being widely listened to and understood. A further factor may be that the pandemic's salience and importance makes it plausible that even small modulations in the tone of communication can have significant effects.[3] On the negative side, the questions at hand lay in an unchartered territory and politicians are not usually viewed as public health professionals. Even for an experienced politician, the situation was new and highly uncertain. It was therefore not natural for the observer to believe that the policy makers knew what they were doing. Perceived competency is known to be one of the main predictors of a politician's election success – in a novel context, it is not clear that the public views incumbent politicians as particularly competent.[4]

In terms of their quantitative importance, these and related arguments may apply more or less strongly to different subgroups of the public. For instance, Lenz & Lawson (2011) document that the less politically educated react more strongly to politicians' physical appearance in their voting behavior, suggesting that differently educated subgroups of an audience may also react differently to policy announcements about novel and crisis-related policies. More generally, heterogeneity in perspectives of the listeners may have important consequences for the success

[3] As an illustration of a related phenomenon, Fetzer et al. (2020) demonstrate that alternative framings of the infectiousness of COVID-19 have sizable effects on the anxiety of respondents of a survey in early March, 2020.

[4] A large literature in political science analyzes the impact of the communication by political leaders on citizens' behavior. For example, Druckman & Holmes (2004) show that what the president says matters for what the public thinks of him, while Tedin et al. (2011) use an experimental design to show that the US President's communication via speeches can influence political opinions. In the context of the COVID-19 pandemic, Hatcher (2020) argues that President Trump's communication during the pandemic violated principles of public health, such as practicing transparency and deferring to medical experts, and was hence dangerous and misleading. In the same context, Newton (2020) analyzes the effect on public compliance with social distancing and lockdown rules of the British government's information provision and the public's use of the news media. Their findings suggest that the news media reporting had an important impact on the public's behavior.

of policy announcements. A possible reason for heterogeneous reactions is that the politicians' communications to the public were extraordinarily intrusive for some groups: the politicians told the population, live on TV, whether or not their basic rights are restricted for the foreseeable future. Depending on how strongly the listeners' lives were affected and depending on whether listeners are offended by the restrictions – which may correlate with observable variables like gender or political affiliation – they may show negative reactions including disbelief (Terkourafi (2008), Bénabou & Tirole (2016)).

To quantify the effect of expectation management on belief updating, we study the variation in expectations about the duration of restrictions before and after press conferences of German policy makers in the first months of the Corona pandemic's outbreak. Specifically, on three occasions during the spring of 2020, leading German politicians, among them Chancellor Angela Merkel, appeared in widely broadcasted press conferences and made announcements about the state of the pandemic as well as the German regulatory responses. We conduct a large online survey to elicit the beliefs of individuals about the duration of three well-defined restrictions: (1) when will the majority of school children be back in school; (2) when will the premier football league (*Bundesliga*) return to normal operations with stadium visitors; and (3) when will all current restrictions related to the Corona crisis be fully lifted? The online survey has a fine time structure: the internet panel that we use collects responses on a daily basis within a pre-defined time period. Thus, in the empirical analysis, we can account for time trends in belief formation using a regression discontinuity design.

The empirical analysis in the paper consists of three parts. In the first part, we provide graphical evidence about the evolution of individuals' expectations over time and, specifically, around the three press conferences. This descriptive exercise provides first suggestive evidence that the press conferences changed individuals' expectations. In addition, the graphical analysis reveals a clear time trend in expectations. Interestingly, we find a similar time pattern for the expectations of managers of German firms for whom we elicit expectations in a different survey at two points in time. In the second part of the empirical analysis, we control for the overall time trend and isolate the effect of policy communication on expectations. We exploit the variation in expectations shortly before and after each of the three press conferences, using a standard regression discontinuity design. In the main specification, we use a time window of one week before and after each press conference and restrict the time trend to be linear. In additional specification checks, we further show that results are robust to changes in the distance to the cut-off dates, the specification of the time trend and the definition of the outcome variable. Moreover, we conduct placebo tests and estimate our model for all available dates in the survey period. Our results show that policy communication significantly prolonged the expected duration of the restrictions. In particular, we find that the first press conference of Angela Merkel and her colleagues had a sizable impact. In this press conference, Merkel conveyed a strong sense of caution. The expected time until all restrictions would be fully lifted moved by about

one month on this day, from mid-October 2020 to mid-November 2020. Likewise, the expected date of school openings moved by about three weeks. In contrast, we do not find significant effects of the second press conference on any measure of restrictions. This is not surprising, as the policy communication in the second press conference was rather vague about the duration of the restrictions. The third press conference, once more, significantly prolonged the expected duration of the general restrictions. The effect on the expected duration of school closures is also positive but only significant at the 10% level. Next, we investigate belief uncertainty and analyze the second moments of individuals' beliefs before and after the press conferences. We find that while the policy announcements did not significantly affect individuals' mean beliefs about the duration of sport restrictions, there is some evidence that they reduced the dispersion in these beliefs. Studying the heterogeneity in responses to the policy communication, we find a surprising pattern of consistency – the effects do not vary much with observed respondent characteristics. We do find some differences in response behavior by gender, but no consistent differences with respect to education, age, region, regional exposure to COVID-19 or political preferences. However, in additional quantile regressions, we show that policy communication is most effective for individuals with more optimistic expectations (i.e., individuals who expect a shorter duration of restrictions) as their part of the response distribution is shifted more strongly. In the third and final part of the empirical analysis, we explore some behavioral effects of the policy announcements. Using data on planned consumption expenditure and aggregate mobility indicators, our analyses suggest that behavioral effects of the three press conferences were rather limited, which is consistent with results from previous literature. For example, Coibion et al. (2020*b*) do not find any effect of the expected duration of the COVID-19 pandemic on individuals' marginal propensity to consume out of stimulus checks in the United States.

The remainder of this paper is organized as follows. In section 2, we briefly describe the evolution of the pandemic in Germany in 2020 and explain the content of the three press conferences where policy measures were communicated to the general public. Section 3 presents the data and provides graphical evidence on the evolution of expectations over time. In section 4, we discuss the econometric approach. Section 5 contains the results on expectations, section 6 reports additional results on behavioral effects. Section 7 concludes.

2 Background

In this section, we describe the development of COVID-19 in Germany during the first months of the pandemic and describe the key policy measures implemented in March 2020. We focus on the effectiveness of policy communication at the beginning of the pandemic, studying three main press conferences by Chancellor Angela Merkel between April and May 2020. In these press conferences, Angela Merkel announced to what extent existing restrictions would be continued or modified. We describe the content of these press conferences below. To understand how the effectiveness of policy communication may depend on the political context and the popularity of the political leaders, we also provide some background regarding voter support for the German government before and during the pandemic.

2.1 Timeline of COVID-19 and policy responses in Germany

Figure 1 describes the dynamic development of COVID-19 infections, which started to strongly increase in mid March. At this time, the German government introduced a variety of restrictions that effectively shut down large parts of both economic and private lives. These restrictions included the prohibition of large events, travel restrictions, as well as the closure of stores, schools, and recreational facilities. Citizens were told to stay at home, they could meet only one person from another household, and a minimum distance of 1.5 meters had to be kept whenever contact could not be avoided. These strict contact restrictions were renewed and extended at the end of March, without a fixed expiry date.

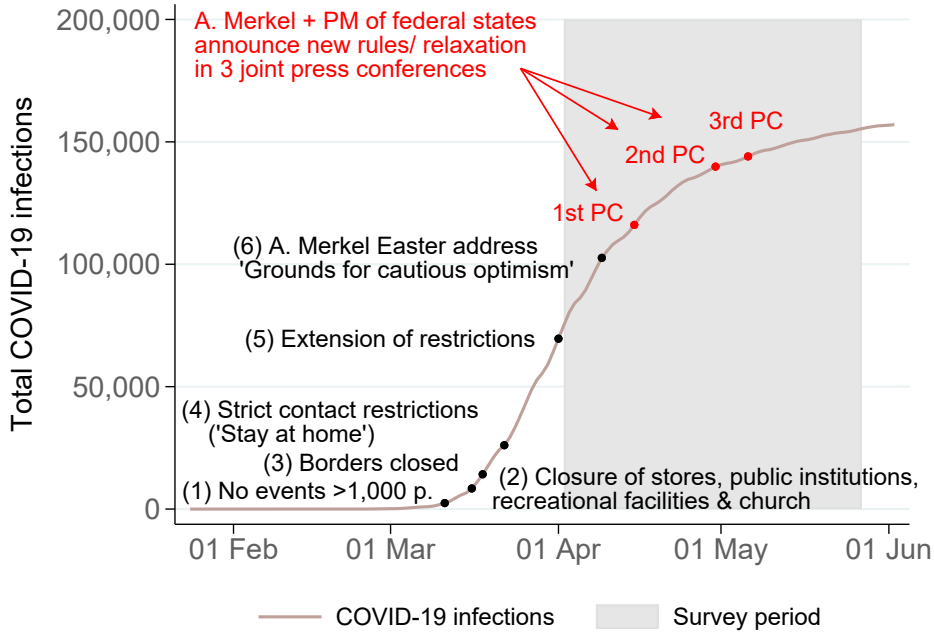


Figure 1: COVID-19 cases and policy measures in Germany in 2020

Notes: Plot shows the evolution of total COVID-19 infections and regulatory measures implemented by the German government in the first months of the pandemic. Data source: RKI COVID19.

The period between March and May, 2020, was characterized by large uncertainty about the spread of infections, the duration of the pandemic, and the appropriate policy response. Individuals received daily information from the media, numerous policy makers, and medical experts. Similar to the evolving scientific knowledge about the COVID-19 pandemic, this information was noisy and often contradicting.

Three main policy communication events stand out: the press conferences by chancellor Angela Merkel between April and May[5]. In these press conferences, Angela Merkel announced changes to the restrictions that the federal government and state governments had agreed on. These press conferences had extremely broad media coverage, with the vast majority of Germans following the events live or accessing summaries of the press conferences. For example, on April 15, the day of the first press conference studied in this paper, more than 23 million Germans watched a summary of Angela Merkel's speech in an evening news show, corresponding to about 30 percent of the German population. This initial media coverage was then multiplied by online and printed press and through social media outlets. Hence, it is credible to assume that most Germans were aware of the content of the press conferences (see Appendix II.1 for more details on media coverage).

We summarize the content of the press conferences below. In the empirical analysis, we then evaluate how these public announcements affected individuals' expectations about the duration of the restrictions.

2.2 Press conferences of Angela Merkel

First press conference (April 15, 2020)[6]

In the first press conference, chancellor Angela Merkel announces that contact restrictions are extended until May 3, meaning that residents can meet at most one person from another household at a time and that minimum distance regulations remain unchanged. Merkel also announces that small steps are being taken to increase the freedom of movement for citizens. Shops up to 800 square meters are allowed to open if they comply with certain hygiene measures. Schools are allowed to open gradually, events with large attendance remain prohibited until August 31. The policy makers also ask the population to refrain from private travels and visits. Overall, rules remain strict and the extent of relaxation measures falls behind expert recommendations issued prior to the press conference.[7]

Second press conference (April 30, 2020)[8]

[5]Owing to the federal structure in Germany, the presidents of two states, Bavaria and Hamburg in the present case, accompanied Merkel.

[6]`https://www.bundeskanzlerin.de/bkin-de/aktuelles/fahrplan-corona-pandemie-1744276`

[7]A widely covered report by Leopoldina, the national scientific academy, dated April 13, 2020, had suggested room for a larger lifting of restrictions.

[8]`https://www.bundeskanzlerin.de/bkin-de/aktuelles/bund-laender-beschluesse-1749900`

In the second press conference, Angela Merkel announces only minor changes to existing rules. Contact restrictions remain in place. Church services are permitted again, while playgrounds and cultural facilities may reopen if hygienic conditions are met. Economic aid, mostly from federal sources, will be provided to alleviate the negative effects of the crisis. A further evaluation of current policies, and whether further opening measures can take place, is announced for May 6.

Third press conference (May 6, 2020)[9]

Contact restrictions are modified in that members of two households are allowed to meet. Conceding to pressure from individual state governments, Angela Merkel announces that schools and shops of all sizes are allowed to open under strict conditions. Recreational sport is permitted outside. Further, a de-centralized 'emergency mechanism' is imposed according to the regional development of COVID-19 infections: if the cumulative number of new infections per 100,000 inhabitants exceeds a threshold of 50 over a seven-day period in a region, new restrictions will be imposed in that region.

2.3 Macroeconomic and political context

The effect of public communication may depend significantly on the context, as well as on the popularity of the political leaders. While Germany was often referred to as "the sick man of Europe" because of low growth and high unemployment before 2005 (Dustmann et al. 2014), this changed in the mid-2000s after a series of labor market and tax reforms. These reforms came into effect when Angela Merkel became German Chancellor in 2005, although they had been initiated by the previous government. These reforms are seen as one reason why neither the Great Recession nor the euro crisis affected the German labor market severely. In contrast to the United States and most other EU countries, Germany experienced almost no increase in unemployment in 2008 and 2009, despite a sharp decline in GDP. Since 2010, the German economy had been growing for 10 consecutive years – the longest period in modern German history. Moreover, labor force participation rates of both women and men increased steadily after 2004 and the unemployment rate fell to 5 percent in 2019.

This stable economic development has led to relatively high popularity of Chancellor Merkel, with approval rates of around 70 percent at the beginning of 2020. Furthermore, Archer & Ron-Levey (2020) report that before the COVID-19 pandemic, 83 percent of the German population said they had a lot or some trust in the government's medical and health advice, and only 13 percent said they had not much trust or none.[10] By and large, the coalition government of Angela Merkel's center-right CDU/CSU and the center-left social democratic SPD had been

[9] `https://www.bundeskanzlerin.de/bkin-de/aktuelles/merkel-bund-laender-gespraeche-1751090`

[10] This trust in the government in this Gallup poll was highest in Germany and lowest in Italy, with 63 percent and 36 percent, respectively.

working smoothly in the years preceding the pandemic. The next federal election was scheduled for the fall of 2021, hence, 2020 was not an election year and candidates of all parties were not to be elected before spring 2021. After the outbreak of the COVID-19 pandemic, Angela Merkel's approval rates - as well as voter support of the federal government - increased to new all time highs (see Figure A.6 in the Appendix). However, Angela Merkel had already announced in October 2018 that she would not seek reelection.

3 Data and graphical evidence

This section describes the data that we collected to study expectations about the duration of the pandemic and shows summary statistics for our sample. We also provide graphical evidence on the evolution of expectations over time around the three press conferences of Angela Merkel. The next section then outlines our empirical approach and quantifies the effect of policy communication on beliefs.

3.1 High frequent elicitation of expectations

We elicit expectations about the duration of COVID-19-related restrictions based on daily online surveys conducted by *Civey*. *Civey* is a market research and polling institute that provides Germany's largest open access online panel with over one million active users. *Civey* collaborates with different online news portals and forums to place short survey modules that can be answered in a multiple-choice set-up (see Figure A.1 in the Appendix for an example). After participating in a survey, respondents can immediately observe the overall evaluation of all other respondents, which creates an incentive to submit a response (see Figure A.2 in the Appendix for an example). To obtain results for a balanced sample of the population, surveys are embedded in over 25,000 webpages targeting different audiences. When displaying live results, *Civey* applies an automated weighting procedure based on self-reported gender, year of birth, postal-code and political party preference. To limit the extent of self-selection into a particular survey, *Civey* invites survey participants to answer multiple surveys in a row, which are displayed in randomized order – *Civey* then disregards the answer to the first survey that individuals initially clicked on.

We contracted with *Civey* in March 2020 to survey citizens' expectations about COVID-19-related restrictions on a daily basis, for a period of two months. Between April 2 and May 27, we obtained a total of 123,840 observations.[11] The number of observations varies considerably between the different days and between the different questions, which is partly explained by the display algorithm that makes particular surveys more or less salient on a given day (see Table A.1 in the Appendix for sample statistics).

[11] Respondents may answer multiple surveys and they may repeat the same survey at different points in time. We account for potential correlation in the error terms by clustering standard errors at the individual level.

We collected answers to the following expectation questions:

1. When will the current restrictions related to the Corona crisis be fully lifted? (Q1)
2. When will the majority of school children be back in school? (Q2)
3. When will the national football league return to normal operations with stadium visitors? (Q3)

Individuals provide answers by stating the number of months they expect it will take until the restrictions are lifted (choosing out of several categorical response options, see Appendix I.2 for details). To take out the mechanical effect of survey time on the choice of categorical response options, we also translate this information into the expected calendar date (see Appendix I.4). In our main analyses, we exclude individuals who responded that the restrictions would never end or that they did not know when they would end, but we use responses to these extreme answer categories to explore uncertainty in beliefs around the press conferences. We further restrict our analyses to individuals with complete information on socio-demographic and geographic covariates.

Owing to its open access nature, the panel is not a representative sample but a convenience sample. In Table 1 we show weighted summary statistics for our estimation sample. *Civey* provides survey weights separately for each question. In Columns I-III we present the summary statistics based on the weights calculated for three main outcome variables mentioned above. In Column IV we show official statistics for comparison.[12] The weighted summary statistics for gender, age, region and political preferences are comparable to the German population. However, the distribution of educational outcomes is very different in the *Civey* sample. Specifically, more individuals have a university degree than in the official data and only very few individuals have no degree. Thus, a clean analysis of heterogeneous effects by education is not possible. In the main specification of our regression analyses we control for individual characteristics. In addition, we conduct sensitivity analyses and report estimates that use the sample weights provided by *Civey* in the Appendix.

[12] In Table A.2 in the Appendix we provide evidence about the unweighted summary statistics which show that *Civey* undersamples women and younger age cohorts and oversamples the college-educated as well as individuals with right-wing political party preference.

Table 1: Sample characteristics of *Civey* respondents

	Civey Online Panel			Official
	(Q1)	(Q2)	(Q3)	
Female	48.1	49.8	47.2	50.7
Age categories				
18-39 yrs.	7.3	6.6	6.4	16.3
30-39 yrs.	11.3	12.2	12.0	15.5
40-49 yrs.	16.3	17.7	17.0	14.7
50-64 yrs.	30.3	31.5	32.0	27.5
65+ yrs.	34.9	32.0	32.7	26.0
Region				
North/West	33.8	32.5	33.7	37.7
South	41.7	42.6	42.3	42.8
East	24.4	24.9	24.0	19.5
Political party preference				
Union/FDP	43.6	44.1	45.7	45.0
Red/Red/Green (RRG)	43.3	39.9	40.3	39.0
AfD	9.4	11.6	10.5	9.0
Other	3.8	4.4	3.6	7.0
Education				
University degree	50.0	51.4	51.7	19.6
Vocational degree	47.5	46.0	45.5	59.2
No degree	2.4	2.6	2.8	20.8

Note: Cells contain shares in percent. Official statistics on gender, education, age and region from Federal Statistical Office (Destatis), based on 2019 microcensus and 2019 forward projection of 2011 census. Official statistics on political party preference based on Forsa Sonntagsfrage of May 30th, 2020. *Civey* samples differ by question: Q1= All restrictions, Q2=School closures, Q3= Bundesliga. *Civey* means adjusted for population weights.

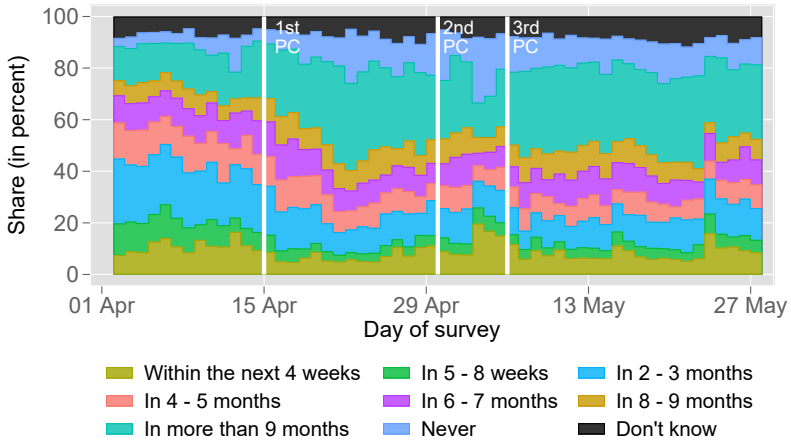
3.2 Expectations of individuals over time

In this section, we show how respondents' expectations about the duration of the different restrictions in Germany evolved between April and May 2020. Figure 2 presents the evolution of categorical answers over time. The vertical lines mark the dates of the three press conferences. The figure provides first suggestive evidence that the press conferences affected the expectations of individuals. Specifically, the share of individuals expecting that restrictions will be lifted only in more than nine months increases after the first press conference on April 15th. On the same day, the share of individuals expecting restrictions to be lifted in the next 2-3 months decreases. The picture looks similar when focusing on the restrictions related to schooling. After the first press conference, the share of individuals expecting an opening in the next 4 weeks is reduced while the share expecting a longer restriction (2-3 months or 4-5 months) increases. The pattern at the later press conferences and for the restrictions of football events is less pronounced.

As described above, we translate individuals' categorical responses into continuous variables which measure the expected duration until restrictions are lifted in days. This allows us to analyze how the mean and the median expected duration evolved over time and in relation to the press conferences. Despite some noise in the daily expectations data with positive and negative outliers, both the mean and the median beliefs show clear shifts around the press conferences in expectations about all restrictions and restrictions related to school closures (Figures A.3-A.4 in the Appendix). Consistent with the pattern of the categorical answers, the median of the expected duration for all restrictions and restrictions related to schooling increases after the first press conference, corroborating the suggestive evidence that policy communication can affect expectation formation. In addition, by taking out the mechanical effect of survey time on the choice of categorical response categories, graphical evidence based on the expected calendar date reveals that individuals' expectations show a sizable time trend over the survey period. For example, individuals surveyed at the beginning of April 2020, on average, expected all restrictions to be fully lifted by November 2020. In contrast, individuals surveyed at the end of May expected an end of all restrictions only in the beginning of 2021. A similar time pattern can be observed for specific restrictions for schools and major sports events (football); however, the expected end date of these restrictions is earlier than for overall restrictions.

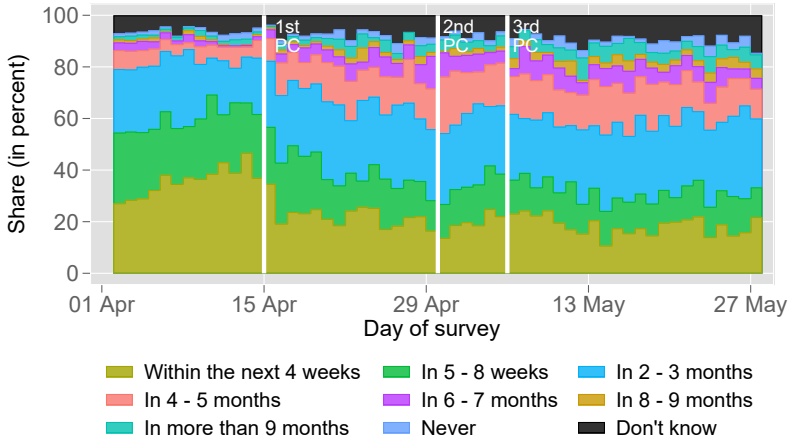
The observed time trend in expectations can be explained by various factors. For example, it might be related to the arrival of new scientific information about the pandemic, new media information, or the experience of other countries with longer exposure to Corona. In Appendix V we present additional information about expectations of managers collected in the ifo Manager Survey in two waves in April and May 2020, respectively. We compare the expectations of managers and individuals over the same time periods and find a surprising similarity in the time trends (Figure A.10). In the following econometric analysis, we control for the overall time

(a) **All restrictions fully lifted**



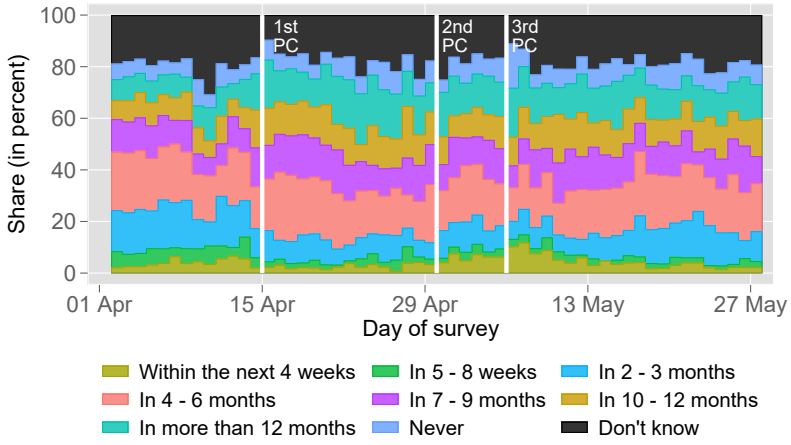
N=97,404

(b) **Children back in school**



N=24,929

(c) **Bundesliga with stadium attendees**



N=25,244

Figure 2: Expected duration of restrictions over time

Notes: Plots show how expectations evolved over time. Solid vertical lines indicate the three press conferences (PC). Data source: Civey Online Panel 2020.

trend to isolate the effect of policy communication at the time of the press conferences. In addition, we study heterogeneity by testing whether and how the effect of policy communication differs by observable characteristics and varies along the distribution of expectations.

4 Model and identification

4.1 Empirical model

To identify and quantify the effect of policy communication on expectations, we use the variation in expectations before and after the day of a press conference. We restrict the time window and focus only on changes in expectations one week before and one week after a press conference. In addition, we control for the general time trend during that period using a standard regression discontinuity design[13]:

$$y_i = \alpha + \beta D_i + \gamma_0 f(M_i - c) + \gamma_1 D_i f(M_i - c) + x_i\delta + \varepsilon_{it}, \tag{1}$$

where y_i is a measure of the expected end date of the restriction, β is the coefficient of interest which captures the effect of the press conference, while γ_0 and γ_1 account for the time trend before and after the press conference. The date of the survey, measured in days, is described by M_i and c is the cut-off date. In the main specification, we use a context-based definition of the distance to the press conferences. Specifically, we use a 7-day distance wherever possible but restrict the length if the 7 day default generates overlap with other events.[14] Since we only include observations in a narrow time window before and after the press conferences, we restrict the time trend in the main specification to be linear. In addition we control for the effect of further explanatory variables summarized by x_i.[15] In the empirical analysis we extend the main specification and show that results are robust to changes in the distance to the cut-off date, specification of the time trend and the definition of the outcome variable.

Finally, in Table A.3 in Appendix III.1 we provide evidence that manipulation around the cut-off dates does not pose a threat to identification in our setting. Importantly, the characteristics of the respondents are very similar in the days before and after the three press conferences. Differences in the observed variables (gender, education, age, children, political party preference, postal-code) before and after each press conference are either not statistically significant or, if the difference is significant, very small in magnitude.

[13]Since the running variable is time, measured in calendar days, the model can be conceptualized as a time series model with a potential time break at the press conference as well. An alternative approach would be to specify an event-study model but because of our data structure with substantial variation in daily sample sizes, we opted for the time-series approach.

[14]We use 6 days before and 5 days after the first press conference, 7 days before and 5 days after the second press conference and 6 days before and 7 days after the third press conference.

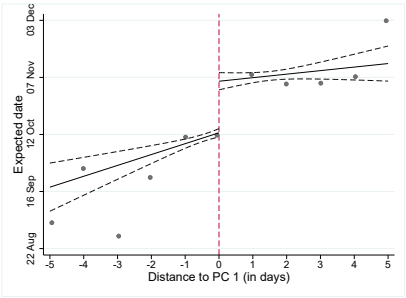
[15]We adjust coefficients to account for level differences in expectations based on demographic characteristics, geographic variation, and differential exposure to COVID-19. Specifically, x_i contains gender (male/female), education (university/other), age (below/above age 50), children in the household (yes/no), region (northwest/southwest/east), population density (high/low), purchasing power (high/low), political party preference (Union/FDP, Red/Red/Green, AfD, Other), and the county-level quantile of the COVID-19 new infection rate.

5 Effects of policy communication on expectations

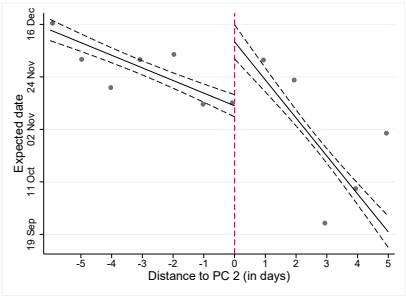
5.1 Graphical evidence

Before we turn to the results of the econometric analysis we present further graphical evidence about the changes in expectations around the three press conferences. Figures 3a - 3i show linear trends with confidence intervals before and after the press conferences. For the expectations about the duration of all restrictions, the graphical evidence points at discontinuities at the first and the third press conference. The same is true for expectations about school closures before and after the first press conference. The evidence is less clear for the other press conferences and for the expectations about the restrictions about football events.

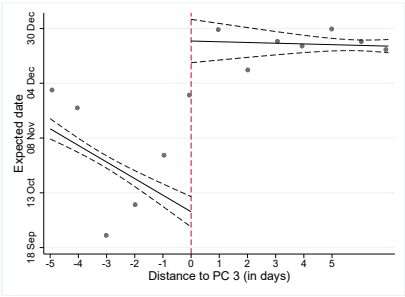
(a) **First press conference** *All restrictions*



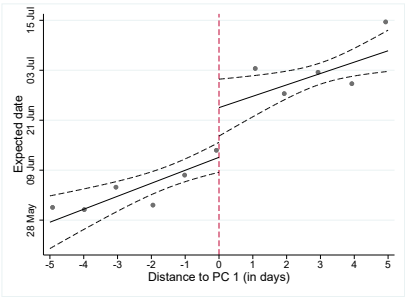
(b) **Second press conference** *All restrictions*



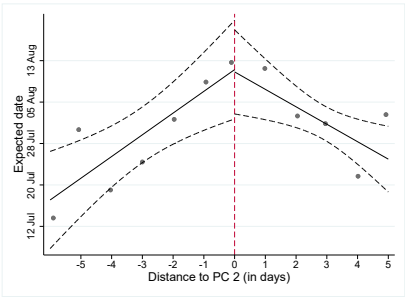
(c) **Third press conference** *All restrictions*



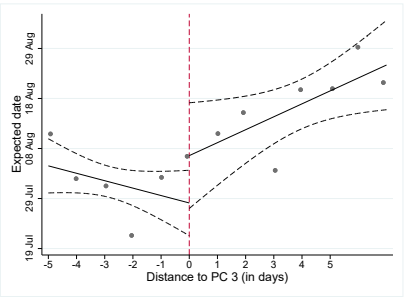
(d) **First press conference** *School closures*



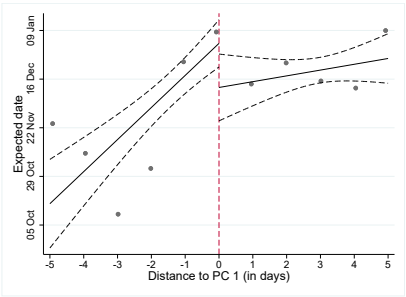
(e) **Second press conference** *School closures*



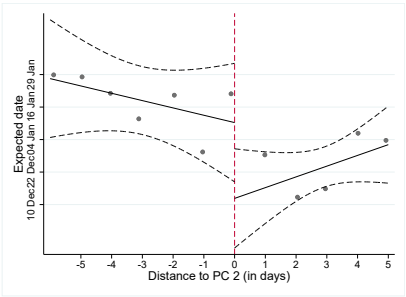
(f) **Third press conference** *School closures*



(g) **First press conference** *Bundesliga*



(h) **Second press conference** *Bundesliga*



(i) **Third press conference** *Bundesliga*

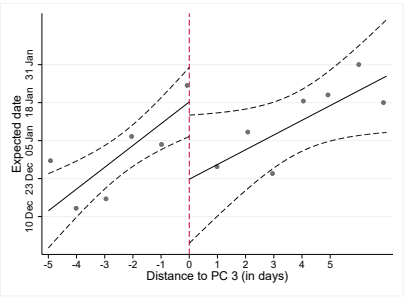


Figure 3: Conditional means with linear fit

Notes: Each observation represents the daily average expected date until restrictions are lifted. The dashed vertical lines denote the press-conference cut-offs. The solid trend lines are based on regressions using unbinned data, with dashed lines indicating 95-% confidence intervals.

5.2 Mean effects

In Table 2 we present our estimates of the impact of policy communication on the expected duration of restrictions. In addition to the main specification, which controls for observable characteristics and the time trend, we show bivariate results without any further observable control variables, as well as multivariate results without the time trend. As documented in the graphical analysis, the time trend has a sizable effect on expectations. Therefore, we focus on the main specification controlling for the time trend when discussing the effects of policy communication.

Table 2: Estimation results: Expectation updating in response to new COVID-19 announcements

	1st Press Conference			2nd Press Conference			3rd Press Conference		
	BV	MV	MV Trend	BV	MV	MV Trend	BV	MV	MV Trend
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
All restrictions	30***	31***	25***	-14***	-13***	10	38***	34***	50***
MDV (pre-event)	14 Oct	14 Oct	14 Oct	28 Nov	28 Nov	28 Nov	16 Nov	16 Nov	16 Nov
S.D. (pre-event)	124	124	124	131	131	131	132	132	132
N	15,560	15,560	15,560	8,675	8,675	8,675	12,708	12,708	12,708
School closures	26***	27***	13**	2	3	0	15***	15***	11
MDV (pre-event)	05 Jun	05 Jun	05 Jun	29 Jul	29 Jul	29 Jul	01 Aug	01 Aug	01 Aug
S.D. (pre-event)	54	54	54	80	80	80	80	80	80
N	4,215	4,215	4,215	2,913	2,913	2,913	3,450	3,450	3,450
Bundesliga	8	12*	-20	-27***	-27***	-28	15*	14*	-28
MDV (pre-event)	13 Dec	13 Dec	13 Dec	19 Jan	19 Jan	19 Jan	27 Dec	27 Dec	27 Dec
S.D. (pre-event)	171	171	171	175	175	175	175	175	175
N	3,560	3,560	3,560	2,448	2,448	2,448	3,017	3,017	3,017

Note: Civey Online Panel, April 2-May 27, 2020. Table shows the change in the expected duration in days associated with each of the three public announcements. Cells contain the coefficient estimates from a binary indicator that takes on 0 if the outcome was measured before the event, it takes on 1 if it was measured after the event. MDV= mean dependent variable measured before the event. S.D. = baseline standard deviation in days. BV= bivariate OLS. MV= multivariate OLS adjusted for gender (male/female), education (university/other), age (below/above 50), children in household (yes/no), region (northwest/south/east), population density (high/low), purchasing power (high/low), political party preference (Union/FDP, Red/Red/Green, AfD, Other) and county-level quartile of COVID-19 new infection rate. MV Trend = multivariate OLS with a linear trend centered at zero at the event interacted with the before/after indicator. Estimation with standard errors clustered at the person-level in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Overall, the results provide evidence that policy communication can have a significant effect on expectations. The first press conference in which Merkel conveyed a strong sense of caution significantly shifted citizens' expectations about the duration of the pandemic. The expected time until all restrictions are fully lifted moved by almost one month (25 days) after the first press conference. In other words, the press conference shifted beliefs about the end of restrictions from mid-October 2020 to mid-November 2020. This shift amounts to one fifth of the baseline standard deviation and is equivalent to the baseline linear time trend increase over a period of 4 days. We find a similar but smaller effect on the expected duration of school restrictions, which increase by about two weeks (13 days, one quarter of the baseline standard deviation, equivalent to a 4 day baseline linear trend increase). Expectations about the duration of sport events are not significantly affected. For the second press conference, we do not find significant effects on

any measure of restrictions after controlling for the time trend. This is not surprising as Angela Merkel announced only minor changes to existing rules during the second press conference and policy communication was rather vague. In contrast, the third press conference had a sizable and significant effect on expectations about general restrictions. According to the estimate, expectations shifted by over a month (50 days, one third of baseline standard deviation). The effect on expected school restrictions is positive (11 days, one seventh of baseline S.D.) but only significant at the 10% level. Again, we find no effects of policy communication on the expected lifting of restrictions regarding sport events.

5.3 Specification checks

In the following we provide the specification checks mentioned above and show results from placebo tests which support the central findings of our analysis. Appendix III contains additional robustness checks, such as reweighted estimates and sensitivity to inattentive respondents.

5.3.1 Distance to cut-off

To analyze the sensitivity of our results to the chosen distances around the cut-off dates, we alternatively specify our main model for a fixed 5-day, 6-day, and 7-day pre/post distance around the respective events (Table 3). The results for all restrictions and school closures are robust to the variation in the time window. The point estimates for the sports events are also comparable across different specifications; their significance levels vary, however, which corroborates our conclusion that the communication of Angela Merkel did not have a clear effect on individuals' expectations regarding sports events.

5.3.2 Functional form of the time trend

In Table 4 we present results of our multivariate specification with quadratic time trends and compare estimates with the specification based on the linear trend assumption. The results are mostly stable in terms of sign and statistical significance and the main picture is the same. Both specifications suggest that the first press conference shifted the expectations about all restrictions and about school closures while the third press conferences only had an effect on all restrictions.

5.3.3 Specification of the dependent variable

In Table 5 we directly estimate the effect on the categorical variables instead of using the constructed variable of expected duration. In more detail, in Panel A we estimate the effect of the press conferences on the probability of choosing the lowest category, in Panel B we focus on the probability of the highest category and in Panel C we use an ordered Probit to estimate how the shares in all categories are shifted. Again, we find significant effects of the first and

Table 3: Estimation results: Sensitivity to the chosen distance to cut-off

	1st Press Conference				2nd Press Conference				3rd Press Conference			
	c	5d	6d	7d	c	5d	6d	7d	c	5d	6d	7d
All restrictions	25***	25***	20***	18***	10	9	2	-6	50***	38***	49***	49***
	(3)	(3)	(3)	(3)	(5)	(6)	(5)	(5)	(7)	(9)	(7)	(7)
N	15,560	15,468	15,979	16,501	8,675	7,357	8,351	9,354	12,708	5,735	9,868	13,534
MDV (pre-event)	14 Oct	14 Oct	14 Oct	13 Oct	28 Nov	23 Nov	25 Nov	28 Nov	16 Nov	10 Nov	16 Nov	16 Nov
School closures	13**	12**	11**	11**	0	-2	-3	-7	11	8	9	11
	(4)	(4)	(4)	(4)	(7)	(7)	(7)	(6)	(7)	(8)	(7)	(7)
N	4,215	4,100	4,401	4,700	2,913	2,652	3,013	3,327	3,450	2,775	3,289	3,589
MDV (pre-event)	05 Jun	06 Jun	05 Jun	06 Jun	29 Jul	01 Aug	01 Aug	29 Jul	01 Aug	30 Jul	01 Aug	02 Aug
Bundesliga	-20	-24*	-25*	-27**	-28	-32	-33*	-26	-28	-37*	-34*	-23
	(11)	(11)	(10)	(10)	(15)	(17)	(15)	(14)	(14)	(17)	(15)	(14)
N	3,560	3,481	3,736	3,977	2,448	2,233	2,625	2,894	3,017	2,457	2,884	3,131
MDV (pre-event)	13 Dec	13 Dec	13 Dec	09 Dec	19 Jan	14 Jan	16 Jan	19 Jan	27 Dec	27 Dec	27 Dec	28 Dec

Note: Civey Online Panel, April 2-May 27, 2020. Table shows the change in the expected duration in days associated with each of the three public announcements, comparing different distances to the respective event: main specification (c=context-based, 5-7 days avoiding overlap with other events), as well as 5 days, 6 days or 7 days respectively. Cells contain the coefficient estimates from a binary indicator that takes on 0 if the outcome was measured before the event, it takes on 1 if it was measured after the event. MDV= mean dependent variable measured before the event. Results from multivariate OLS with a linear trend centered at zero at the event interacted with the before/after indicator, adjusted for gender (male/female), education (university/other), age (below/above 50), children in household (yes/no), region (northwest/south/east), population density (high/low), purchasing power (high/low), political party preference (Union/FDP, Red/Red/Green, AfD, Other) and county-level quartile of COVID-19 new infection rate. Estimation with standard errors clustered at the person-level in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: Estimation results: Sensitivity to the functional form of the time trend

	1st Press Conference		2nd Press Conference		3rd Press Conference	
	Linear Trend (1)	Quadratic Trend (2)	Linear Trend (3)	Quadratic Trend (4)	Linear Trend (5)	Quadratic Trend (6)
All restrictions	25***	38***	10	34***	50***	25*
	(3)	(7)	(5)	(9)	(7)	(12)
N	15,560	15,560	8,675	8,675	12,708	12,708
MDV (pre-event)	14 Oct	14 Oct	28 Nov	28 Nov	16 Nov	16 Nov
School closures	13**	30***	0	17	11	2
	(4)	(8)	(7)	(12)	(7)	(11)
N	4,215	4,215	2,913	2,913	3,450	3,450
MDV (pre-event)	05 Jun	05 Jun	29 Jul	29 Jul	01 Aug	01 Aug
Bundesliga	-20	-3	-28	-2	-28	-50*
	(11)	(21)	(15)	(26)	(14)	(24)
N	3,560	3,560	2,448	2,448	3,017	3,017
MDV (pre-event)	13 Dec	13 Dec	19 Jan	19 Jan	27 Dec	27 Dec

Note: Civey Online Panel, April 2-May 27, 2020. Table shows the change in the expected duration of the pandemic in days associated with each of the three public announcements. Cells contain the coefficient estimate from a binary indicator that takes on 0 if the outcome was measured before the event, it takes on 1 if it was measured after the event. Multivariate OLS with linear trend or with quadratic trend centered at zero at the event interacted with the before/after indicator, adjusted for gender (male/female), education (university/other), age (below/above 50), children in household (yes/no), region (northwest/south/east), population density (high/low), purchasing power (high/low), political party preference (Union/FDP, Red/Red/Green, AfD, Other) and county-level quartile of COVID-19 new infection rate. Estimation with standard errors clustered at the person-level in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

the third press conference. For example, consistent with Figures A.9a and A.9b, we find that after the first press conference the probability of choosing the lowest category is reduced for all restrictions and school restrictions. Moreover, after the third press conference the probability of the lowest category for all restrictions decreases while the probability for the highest category increases.

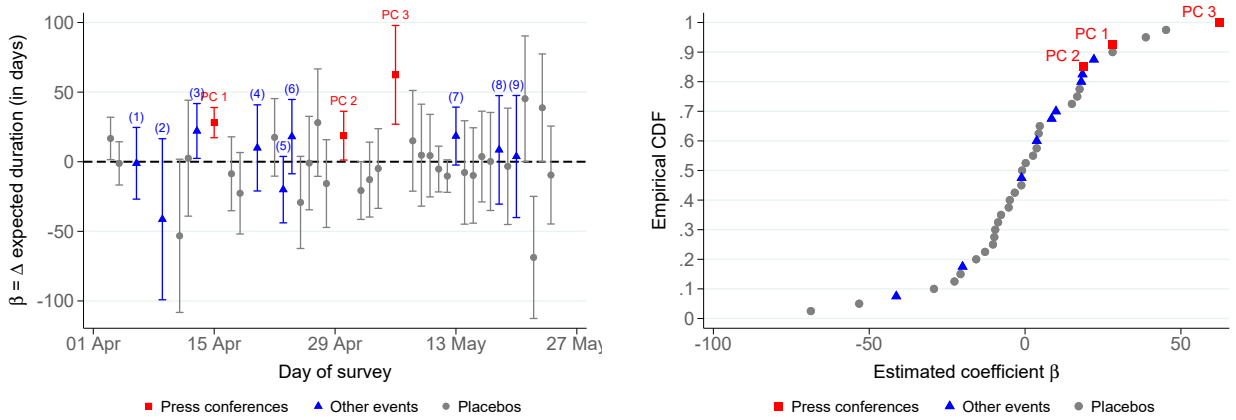
Table 5: Estimation results: LPM of boundary responses and ordered probit

	1st Press Conference			2nd Press Conference			3rd Press Conference		
	All	School	BL	All	School	BL	All	School	BL
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
A. Lowest category	-0.04***	-0.16***	0.01	-0.03**	0.03	0.03	-0.10***	0.00	0.05
	(0.01)	(0.03)	(0.01)	(0.01)	(0.03)	(0.02)	(0.02)	(0.03)	(0.03)
MDV (pre-event)	0.09	0.42	0.04	0.09	0.21	0.04	0.13	0.23	0.09
B. Highest category	0.05***	0.01	-0.05*	0.01	0.01	-0.02	0.13***	-0.00	-0.05
	(0.01)	(0.01)	(0.03)	(0.02)	(0.02)	(0.04)	(0.03)	(0.02)	(0.03)
MDV (pre-event)	0.24	0.01	0.19	0.37	0.04	0.22	0.31	0.04	0.19
C. Ordered probit	0.23***	0.29***	-0.08	0.10*	-0.04	-0.20*	0.44***	0.13	-0.18*
	(0.03)	(0.07)	(0.07)	(0.04)	(0.09)	(0.09)	(0.06)	(0.08)	(0.09)
N	15,560	4,215	3,560	8,675	2,913	2,448	12,708	3,450	3,017

Note: Civey Online Panel, April 2-May 27, 2020. Panels A and B show results from linear probability models with the dependent variables indicating if individuals chose the lower bound category (Panel A, "Within the next 4 weeks") or the upper bound category (Panel B, "More than 9 months" for all restrictions and school closures, "More than 12 months" for football Bundesliga). Panel C shows results from ordered probit regressions of the categorical response variables excluding undecided and extreme responses ("Don't know"/"Never"). Cells contain the coefficient estimates from a binary indicator that takes on 0 if the outcome was measured before the event, it takes on 1 if it was measured after the event. Estimation results from multivariate regressions with a linear trend centered at zero at the event interacted with the before/after indicator. Estimation with standard errors clustered at the person-level in parentheses. MDV= mean dependent variable measured before the event. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

5.3.4 Placebo checks

To provide empirical support for our econometric strategy, we conduct a series of placebo analyses and estimate our main specification for all available dates in the survey period. We use a two-day distance before and after each true press conference date and each placebo date, excluding only those days for which the two-day distance generates overlap with true treatments or for which there are fewer than four data points available, that is in the beginning and in the end of the survey period.[16] This results in 37 placebo estimates and three treatment estimates for each of the three outcomes (all restrictions, school closures and *Bundesliga*). We distinguish two types of placebo estimates: (i) 'true' placebo days at which no event took place and (ii) days at which events other than the three main press conferences took place. These other events include speeches and meetings of Angela Merkel and the prime ministers that were also related to COVID-19 but which, in contrast to the three events followed by the main press conferences studied, did not change official COVID-19 regulation.



(a) Placebo and treatment estimates
Coefficient estimates β with 95% C.I.

(b) Empirical CDF
Distribution of placebo and treatment estimates

Figure 4: Placebo checks and comparison to other events: All restrictions

Notes: Plots show coefficient estimates of the pre/post indicator from multivariate regression with an interacted linear trend. Red squares denote the three press conference treatments (PC), blue triangles show other events: (1,4) Corona Cabinet, (2) Easter address A. Merkel, (3) Leopoldina report, (5) Government statement A. Merkel, (6,8) Meeting A. Merkel with trade associations and unions, (7) Government interrogation Bundestag, (9) Meeting with OECD, IMF and ILO. Data source: Civey Online Panel 2020.

In Figure 4 we show the tests for the question on general restrictions.[17] Out of the 37 placebo coefficients, 29 (35) are insignificant at a significance level of 95% (99%). Point estimates are mostly small or even negative. This is also documented in Panel b where we plot the empirical cumulative distribution function of placebo and treatment estimates. The coefficients of the first

[16] We also ran specifications with three to seven day distances from cut-off, this reduces the number of available placebos but results in comparable estimates.

[17] In Appendix III.2 in Figure A.7 we also show the placebo results for school closures and the *Bundesliga*. As expected, results are less clear for these outcomes, as the evidence of the main specification is less clear.

and the third press conference are above the 90% percentile of all estimates, which underlines the impact of the events in terms of magnitude of the point estimates.

5.4 Uncertainty in beliefs

In this section, we investigate if policy communication also affects uncertainty in beliefs. We analyze the occurrence of undecided and extreme responses to the expectations questions and, in addition, analyze the second moments of individuals' beliefs before and after the press conferences.

Undecided and extreme responses

Based on linear probability models with our preferred multivariate specification, we do not find that the press conferences changed undecided and extreme response behavior in any systematic way (Table A.7 in Appendix IV). The share of respondents who said they did not know when restrictions would end moderately increased over time, but with no significant changes around the press conferences (with the exception of restrictions related to schooling, here the first press conference increased the share of undecided responses by 4 percentage points). There is some evidence that the second press conference reduced the probability of choosing an extreme response to the question on general restrictions: the share of respondents who said restrictions would never end decreased by 5 percentage points. Overall, however, extreme response behavior remains relatively stable over time and does not vary systematically with policy communication.

Second moment analysis

Intuitively, one can expect individuals' expectations to be more responsive to policy communication when prior uncertainty is high. While we do not measure uncertainty directly, we can compare the variability in individuals' responses before and after the press conferences (Figure A.8 in Appendix IV). Overall, variability in expectations is relatively high. For example, the standard deviation of beliefs before the first press conference is 124 days for general restrictions and 54 days for restrictions related to school closures. Variability is highest in expectations about the duration of sports restrictions, with a baseline standard deviation of 171 days. We run two-sample variance comparison tests to analyze descriptively if standard deviations changed after the press conferences. We find a sizeable and significant decrease by 14 days in the standard deviation of beliefs about the duration of sports restrictions following the first press conference (p=0.007), and further reductions that do not pass the threshold of statistical significance after the other two events. Hence, although the press conferences did not significantly affect mean beliefs about sport restrictions, a descriptive analysis indicates that policy communication may have reduced the dispersion of these beliefs. The variability in beliefs about general restrictions did not change notably after the first two press conferences but fell slightly by 4 days following the third press conference (p=0.0237). In contrast, the variability in beliefs about restrictions related to schooling increased significantly after the first

(13 days, p=0.0000) and the third (9 days, p=0.0000) press conference. This is partly explained by an overall increase in the variability of beliefs about school restrictions over time, and we do not control of the time trend in this analysis. Nevertheless, these descriptive results corroborate our main findings that individuals adjusted their expectations about when children would be back in school in response to policy announcements.

5.5 Heterogeneous effects

Next, we explore effect heterogeneity and study if policy communication has different effects on subgroups and varies over the distribution of expectations.

First, we study if individuals' responses to the press conferences differ by individual characteristics (Table 6).[18] We split the sample by observable variables, such as gender, education, age, presence of children in the household, political preferences, region, and regional exposure to Corona[19] and run separate regressions using equation 1 with time trends for the different subgroups. Overall, effect heterogeneity is rather low. We only find significant gender differences for the effect on all restrictions. The first and the third press conference shift expectations of women significantly more than the expectations of men. This gender difference is consistent with previous results on gender differences in COVID-19 attitudes and behavior. For example, using data from eight OECD countries including Germany, Galasso et al. (2020) show that women are more likely to perceive the pandemic as a very serious health problem and are also more likely to agree and to comply with restraining measures. Moreover, Coibion et al. (2019) propose that women may respond more strongly to information treatments because of lower ex-ante confidence in their beliefs. When accounting for multiple hypotheses testing, the gender effect is no longer significant, therefore we interpret this result with caution.[20] For all other subgroups, effects are not significantly different. One important reason for this lack of heterogeneity might be related to the high uncertainty and missing knowledge about COVID-19, which affects all groups alike.

In Table 7, we turn to the effects of policy communication on the distribution of expectations and present results from unconditional quantile regressions. Specifically we present, in addition to the mean effect, estimates of equation 1 for the median as well as the 25th and the 75th percentiles using the method proposed by Firpo et al. (2009). Policy communication does not just shift mean expectations but it also significantly affects the distribution. The pattern for the expectations regarding all restrictions suggests that more optimistic individuals, who expect

[18] We pre-registered the set of characteristics that we expected to interact with the policy announcements at `https://aspredicted.org/eb4iv.pdf`. In addition to the characteristics we pre-registered, we also study heterogeneity with respect to political preference, which we were granted access to by *Civey* only after completing the pre-registration.

[19] We use official information about COVID-19 cases by county as reported by the Robert-Koch-Institute (RKI) and use quartiles to categorize counties with low, low to medium, medium to high, and high prevalence. We combine this information with the *Civey* data based on respondents' zip-code.

[20] The results adjusted for multiple hypothesis testing can be obtained from the authors upon request.

Table 6: Heterogeneity: Expectation updating in response to new COVID-19 announcements

	1st Press Conference			2nd Press Conference			3rd Press Conference		
	All	School	BL	All	School	BL	All	School	BL
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Full sample	25***	13**	-20	10	0	-28	50***	11	-28
Demographic variation									
Women	38***	20*	-27	13	19	-16	68***	30*	-35
Men	19***	11*	-19	9	-5	-31	41***	5	-28
p-val(Δ)	0.01	0.39	0.77	0.76	0.12	0.71	0.07	0.13	0.84
University	23***	16**	-25	10	8	-18	45***	13	-30
No university	26***	10	-16	9	-11	-39	55***	5	-29
p-val(Δ)	0.66	0.48	0.67	0.96	0.19	0.50	0.49	0.52	0.97
Age: < 40	31*	4	-54	19	10	-389***	51	-29	-26
Age: 40-64	24***	14***	-19	9	-1	-19	49***	12	-27
Age: 65+	23***	11*	-18	10	-11	-11	64***	16*	-32
p-val(Δ < 40/40-64)	0.65	0.73	0.58	0.63	0.80	0.00	0.95	0.32	1.00
p-val(Δ 65+/40-64)	0.70	0.62	0.83	0.86	0.07	0.31	0.05	0.43	0.62
Children in HH	35***	14	-39	19	-17	-90	42*	-6	-87*
No children	23***	13**	-18	8	2	-21	51***	13	-18
p-val(Δ)	0.20	0.95	0.53	0.47	0.41	0.18	0.66	0.37	0.11
Political pref.: Union/FDP	26***	14*	-25	16	-11	-28	57***	8	-5
Political pref.: RRG	22***	9	-15	-6	8	-25	27*	7	-30
Political pref.: AfD	23**	16	-25	18	-6	-14	58***	18	-67*
p-val(Δ RRG/ Union)	0.61	0.65	0.70	0.07	0.23	0.93	0.06	0.98	0.45
p-val(Δ AfD/ Union)	0.72	0.83	0.99	0.92	0.76	0.72	0.94	0.57	0.09
Geographic variation									
Region: North/West	23***	1	-36*	20*	5	-28	54***	8	-27
Region: South	23***	22***	-10	11	-5	-25	48***	17	3
Region: East	30***	15	-17	-6	3	-36	45**	-0	-83**
p-val(Δ South/NW)	1.00	0.02	0.30	0.48	0.51	0.93	0.71	0.55	0.36
p-val(Δ East/NW)	0.41	0.16	0.49	0.07	0.90	0.85	0.62	0.61	0.13
Pop. Density: High	22***	8	-20	8	10	-42	43***	1	-25
Pop. Density: Low	26***	17**	-21	11	-7	-17	55***	17*	-31
p-val(Δ)	0.60	0.28	0.94	0.74	0.23	0.41	0.41	0.26	0.84
Purch. Power: High	20***	18**	-26	6	-0	-28	50***	0	-22
Purch. Power: Low	28***	8	-14	13	2	-31	49***	21*	-35
p-val(Δ)	0.22	0.21	0.58	0.52	0.88	0.93	0.92	0.12	0.64
By COVID-19 exposure									
New cases/ state: < P25	64***	-4	-74	7	-2	-94	37	15	-87
New cases/ state: P25-P50	38***	30**	-9	-10	-6	28	43*	-7	-39
New cases/ state: P50-P75	23**	6	-16	4	-7	-43	62***	-5	-64*
New cases/ state: > P75	18***	15**	-21	16*	6	-22	49***	21*	-6
p-val(Δ P25-P50/< P25)	0.12	0.14	0.22	0.54	0.91	0.15	0.85	0.44	0.46
p-val(Δ P50-P75/< P25)	0.01	0.66	0.25	0.91	0.88	0.52	0.41	0.44	0.70
p-val(Δ > P75/< P25)	0.00	0.36	0.26	0.67	0.77	0.34	0.66	0.83	0.15
New cases/ county: < P50	36***	12	-63**	12	-6	24	15	22	-9
New cases/ county: > P50	20***	13**	-4	9	2	-44*	56***	8	-34*
p-val(Δ)	0.03	0.88	0.01	0.82	0.65	0.06	0.02	0.36	0.51

Note: Civey Online Panel, April 2-May 27, 2020. Table shows the change in the expected duration in days associated with each of the three public announcements for various subgroups, with p-values (p-val) indicating if mean differences are statistically significant across groups. Cells contain the coefficient estimates from a binary indicator that takes on 0 if the outcome was measured before the event, it takes on 1 if it was measured after the event. All estimates based on multivariate OLS with a linear trend centered at zero at the event interacted with the before/after indicator, adjusted for gender (male/female), education (university/other), age (below/above 50), children in household (yes/no), region (northwest/south/east), population density (high/low), purchasing power (high/low), political party preference (Union/FDP, Red/Red/Green, AfD, Other) and county-level quartile of COVID-19 new infection rate. Estimation with standard errors clustered at the person-level. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 7: Heterogeneity: Quantile regression estimates

	1st Press Conference				2nd Press Conference				3rd Press Conference			
	Mean	Q25	Q50	Q75	Mean	Q25	Q50	Q75	Mean	Q25	Q50	Q75
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
All restrictions	25***	22***	27***	7**	10	62***	74***	-7*	50***	32***	35**	12***
	(3)	(2)	(4)	(2)	(5)	(5)	(9)	(3)	(7)	(7)	(11)	(3)
N	15,560	15,560	15,560	15,560	8,675	8,675	8,675	8,675	12,708	12,708	12,708	12,708
School closures	13**	5**	1	-7**	0	-11	35***	45***	11	-6	-7	3
	(4)	(2)	(3)	(2)	(7)	(6)	(5)	(8)	(7)	(6)	(4)	(7)
N	4,215	4,215	4,215	4,215	2,913	2,913	2,913	2,913	3,450	3,450	3,450	3,450
Bundesliga	-20	15*	-26*	2	-28	-23	-56**	-40	-28	-47**	-29	17
	(11)	(7)	(13)	(13)	(15)	(12)	(20)	(21)	(14)	(16)	(20)	(21)
N	3,560	3,560	3,560	3,560	2,448	2,448	2,448	2,448	3,017	3,017	3,017	3,017

Note: Civey Online Panel, April 2-May 27, 2020. Table shows the change in the expected duration in days associated with each of the three public announcements. Cells contain the coefficient estimates from a binary indicator that takes on 0 if the outcome was measured before the event, it takes on 1 if it was measured after the event. Multivariate regressions with a linear trend centered at zero at the event interacted with the before/after indicator, adjusted for gender (male/female), education (university/other), age (below/above 50), children in household (yes/no), region (northwest/south/east), population density (high/low), purchasing power (high/low), political party preference (Union/FDP, Red/Red/Green, AfD, Other) and county-level quartile of COVID-19 new infection rate. Mean = OLS, Q25/Q50/Q75= unconditonal quantile regression estimates. Standard errors clustered at the person level in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

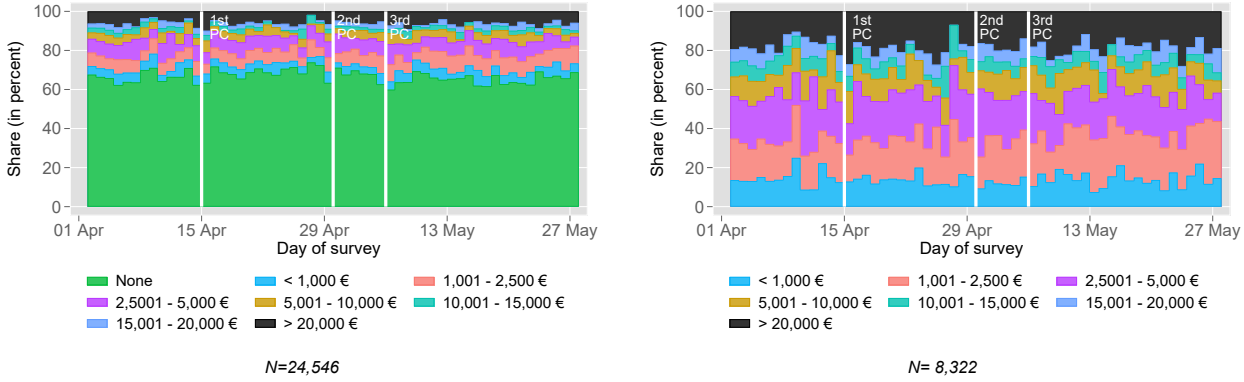
a shorter duration of restrictions, respond more strongly to policy communication than more pessimistic individuals with expectations at the 75th percentile. Interestingly, we even find significant effects for the second press conference at the 25th percentile and the median, despite the insignificant mean effect. The pattern for the duration of school restrictions and restrictions of sports events is less clear. At the first press conference, optimistic individuals respond more, whereas the second press conference has no effect on the most optimistic group but mostly affects individuals at the median and the 75th percentile. For the third press conference, effects are not significant. The mixed picture for the *Bundesliga*, with partly positive and negative effects that are mainly insignificant, underlines the finding that policy communication of politicians seemed to have no effect on the expected duration of sport restrictions.

6 Behavioral effects: Evidence from planned expenses and mobility indicators

In the final section, we analyze whether the policy communication by Angela Merkel and the German government succeeded in changing the actions and the behavior of German citizens. Data on planned expenses provide some evidence about intended consumption behavior. In addition, we use aggregate mobility data and explore if individuals reduced their mobility in response to the press conferences. We present behavioral effects on planned consumption here and briefly discuss the findings from mobility data, but defer the details from the mobility analysis to Appendix VI.

To measure consumption behavior, we collected information about planned non-routine consumption expenditures between April 2 and May 27, 2020, using an additional *Civey* survey.

The question wording is as follows: *Are you planning an unusually high expense within the next 3 months, e.g. for a car, a vacation or a construction measure?* Individuals can choose from eight categorical response categories: No, 0-1000 euros, 1001-2500 euros, 2501-5000 euros, 5001-10000 euros, 10001-15000 euros, 15001-20000 euros, more than 20000 euros. Based on the midpoints of the categorical response categories, we construct a measure of planned expenses. We also construct a binary indicator that distinguishes positive and zero amounts to study extensive margin responses.



(a) **All responses** (b) **Positive amounts only**

Figure 5: Planned non-routine consumption expenditure over time

Notes: Plots show how responses evolved over time. Solid vertical lines indicate the three press conferences (PC). Data source: Civey Online Panel 2020.

In contrast to individual expectations about the duration of the pandemic, planned consumption expenses do not show a clear time trend (Figure 5). Moreover, the figures do not suggest that there were major changes in planned consumption before and after the press conferences. Also, the share of individuals with no planned consumption expenses remains relatively stable over time at about 70 percent . A regression analysis supports these findings. Using the same specification as above, we find no extensive margin responses in planned non-routine consumption expenses to any of the three press conferences of Angela Merkel (Table 8). Yet, there is some evidence that planned expenses on the intensive margin decreased after the first press conference. The result is even stronger for those individuals with positive planned expenses. However, these intensive-margin effects are not present after the other two press conferences.

Next, we conduct an analysis of mobility behavior before and after the three press conferences. We use aggregate data on the daily mobility of German citizens, relative to pre-year mobility, based on mobile communications data. Mobility plummeted in March 2020, but was beginning to rise again during the time period that we study (Figure A.11). We then compare how mobility changed after each of the three press conferences, using a similar regression discontinuity design and adjusting for the overall time trend. We find no significant shift in the level of mobility after the first and the third press conference, but some evidence of a trend break in the slope

Table 8: Estimation results: Planned non-routine consumption expenses

	1st Press Conference		2nd Press Conference		3rd Press Conference	
	Linear Trend (1)	Quadratic Trend (2)	Linear Trend (3)	Quadratic Trend (4)	Linear Trend (5)	Quadratic Trend (6)
Pr(Planned expenses>0)	-0.06	-0.10	-0.02	0.06	-0.04	-0.02
	(0.03)	(0.06)	(0.04)	(0.06)	(0.04)	(0.06)
N	4,441	4,441	3,246	3,246	3,901	3,901
MDV (pre-event)	0.35	0.35	0.30	0.30	0.34	0.34
Planned expenses (euros)	-1192**	-2610**	160	-106	-109	229
	(416)	(799)	(504)	(864)	(497)	(816)
N	4,441	4,441	3,246	3,246	3,901	3,901
MDV (pre-event)	3296	3296	2657	2657	2935	2935
Planned expenses (euros) excl. zeros	-2056*	-5174**	917	-1547	275	580
	(980)	(2002)	(1234)	(2067)	(1111)	(1850)
N	1,471	1,471	1,045	1,045	1,320	1,320
MDV (pre-event)	9445	9445	8832	8832	8712	8712

Note: Civey Online Panel, April 2-May 27, 2020. Table shows the change in planned non-routine consumption expenditure associated with each of the three public announcements. Cells contain the coefficient estimates from a binary indicator that takes on 0 if the outcome was measured before the event, it takes on 1 if it was measured after the event. Multivariate OLS with linear trend or with quadratic trend centered at zero at the event interacted with the before/after indicator, adjusted for gender (male/female), education (university/other), age (below/above 50), children in household (yes/no), region (northwest/south/east), population density (high/low), purchasing power (high/low), political party preference (Union/FDP, Red/Red/Green, AfD, Other) and county-level quartile of COVID-19 new infection rate. Estimation with standard errors clustered at the person-level in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

of mobility changes after the latter (Figure A.12, Table A.9). The second press conference did reduce the mobility of German citizens significantly, but the effect was only short-lived. Our results on the behavioral effects of policy communication should be interpreted with some caution. First, planned expenses are only an approximation of realized consumption expenses. Second, the intensive-margin effects on consumption behavior obtained in the regression models are not consistent over time. Third, the evidence on mobility patterns is based on aggregate data, which may conceal heterogeneous effects.

Taken together, our results suggest only a limited role of policy communication for consumption behavior and for citizens' mobility, which is consistent with the results of previous literature. For example, Coibion et al. (2020*b*) do not find any effect of the expected duration of the COVID-19 pandemic on individuals' marginal propensity to consume out of stimulus checks in the United States. In their analysis of "unconventional" fiscal and monetary policy measures, D'Acunto et al. (2020) find mixed effects of policy announcements on households' consumption plans: while the announcement of a VAT change in Germany affected planned spending on durables, the ECB's forward guidance on inflation does not appear to have such effects. It would be interesting to study the effects of the COVID-19 press conferences further with data on realized consumption and with individual-level data on mobility. In particular, public announcements about the severity of the pandemic might also contain additional information about the state of the economy and might change behavior indirectly (an "information effect" as described by

Nakamura & Steinsson (2018)).

7 Conclusion

In this paper, we provide empirical evidence that the expectation management of policy leaders can affect the expectation formation of the public. For identification, we use variation in expectations about the duration of restrictions before and after press conferences of German policy makers in the first months of the COVID-19 pandemic. We conduct a large online survey to elicit individuals' beliefs about the duration of three well-defined restrictions: (1) when will the majority of school children be back in school; (2) when will the main football league return to normal operations with stadium visitors; and (3) when will all current restrictions related to the Corona crisis be fully lifted?

While Coibion et al. (2020*a*) do not find effects of policy communication in survey experiments in the US, we use real-world press conferences in Germany as natural experiments. Our results show that policy communication indeed did affect expectations in the case at hand. In particular, we find that the first press conference of Angela Merkel and her colleagues had a sizable impact and significantly prolonged the expected duration of the regulatory measures. In this press conference, Merkel conveyed a strong sense of caution. Studying the heterogeneous effects of the policy communication, we document a surprising pattern of consistency. We only find some differences in responses by gender, but no consistent and significant differences by education, age, region, regional exposure to COVID-19, or political preferences. Moreover, our results suggest that policy communication is most effective for individuals with higher ex-ante optimism in expectations (i.e. individuals who expect a shorter duration of restrictions).

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Appendix

Appendix I *Civey* online survey

Appendix I.1 Survey method

Figure A.1: Example of an embedded *Civey* question on online news page

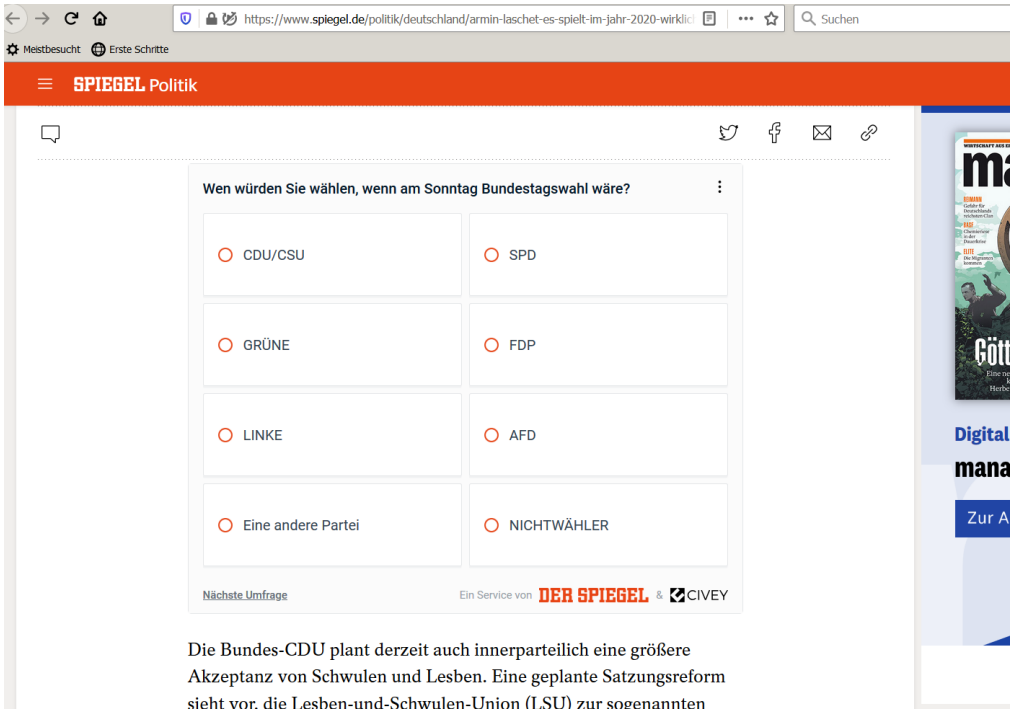
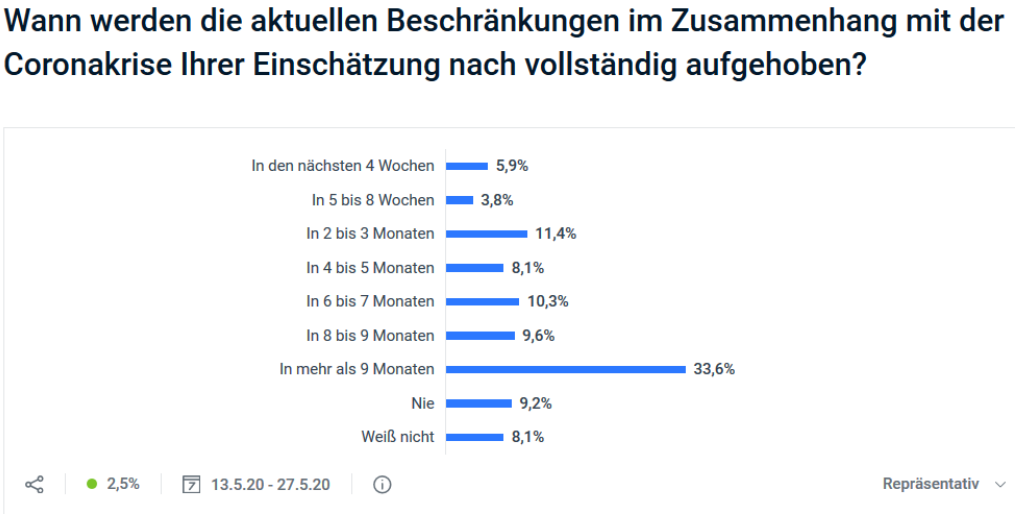


Figure A.2: Example of a live display of *Civey* responses



Appendix I.2 Question wording

1. When will the current restrictions related to the Corona crisis be fully lifted?

- within the next 4 weeks
- in 5 to 8 weeks
- in 2 to 3 months
- in 4 to 5 months
- in 6 to 7 months
- in 8 to 9 months
- in more than 9 months
- never
- don't know

2. When will the majority of school children be back in school?

- within the next 4 weeks
- in 5 to 8 weeks
- in 2 to 3 months
- in 4 to 5 months
- in 6 to 7 months
- in 8 to 9 months
- in more than 9 months
- never
- don't know

3. When will the main football league (Bundesliga) return to normal operations with stadium visitors?

- within the next 4 weeks
- in 5 to 8 weeks
- in 2 to 3 months
- in 4 to 6 months
- in 7 to 9 months
- in 10 to 12 months
- in more than 12 months
- never
- don't know

Appendix I.3 Sample statistics

Table A.1: Observations and sample statistics

Number observations	Overall	All restrictions	School	Football
Total/ survey period	123,840	82,051	22,693	19,096
Mean/ day	2,211	1,465	405	341
Median/ day	1,043	488	227	187
Min/ day	334	114	84	64
Max/ day	16,291	15,058	2,294	1,846

Note: Civey Online Panel, April 2-May 27, 2020.

Table A.2: Sample characteristics of *Civey* respondents

	Civey Online Panel (Q1)	(Q2)	(Q3)	Official
Female	29.5	23.0	20.9	50.7
Age categories				
18-39 yrs.	1.5	1.1	1.0	16.3
30-39 yrs.	5.7	4.4	4.4	15.5
40-49 yrs.	10.9	8.5	8.4	14.7
50-64 yrs.	38.2	35.8	35.8	27.5
65+ yrs.	43.7	50.2	50.4	26.0
Region				
North/West	33.3	33.4	34.9	37.7
South	42.1	41.5	41.3	42.8
East	24.5	25.1	23.7	19.5
Political party preference				
Union/FDP	40.9	37.1	39.1	45.0
Red/Red/Green (RRG)	33.8	34.6	34.8	39.0
AfD	20.6	24.6	22.9	9.0
Other	4.7	3.7	3.2	7.0
Education				
University degree	52.1	55.7	55.6	19.6
Vocational degree	45.9	42.3	42.4	59.2
No degree	2.0	2.0	2.0	20.8

Note: Cells contain shares in percent. Official statistics on gender, education, age and region from Federal Statistical Office (Destatis), based on 2019 microcensus and 2019 forward projection of 2011 census. Official statistics on political party preference based on Forsa Sonntagsfrage of May 30th, 2020. *Civey* samples differ by question: Q1= All restrictions, Q2=School closures, Q3= Bundesliga.

Appendix I.4 Converting number months to calendar date

In analyzing and interpreting the responses to the expectation questions over a period of two months, one must take into consideration that the categorical response categories relate to the day of the survey. A given choice (e.g. "in 2 to 3 months") reflects a different subjectively expected end of the restrictions in early April, when the survey was started, compared to the end of May, when the survey ended. Hence, to take out the mechanical effect of survey day, we calculate the implicit calendar date by which individuals expect restrictions to end as follows: Based on the categorical answer categories, we first generate a continuous expected duration in months, using the midpoint of each interval as the expected duration. For example, we set the expected duration to 2.5 months if individuals chose the category "2 to 3 months." For the boundary cases, we define the following expected duration: 12 months if an individual chose category "more than 9 months" for the questions on general restrictions and school restrictions, 18 months if an individual chose category "more than 12 months" for the question on the football league. We then calculate the implicit calendar date until which individuals expect the restrictions to end, based on the exact day of the survey and the continuous expected duration in months.

Appendix I.5 Mean and median expected duration of restrictions

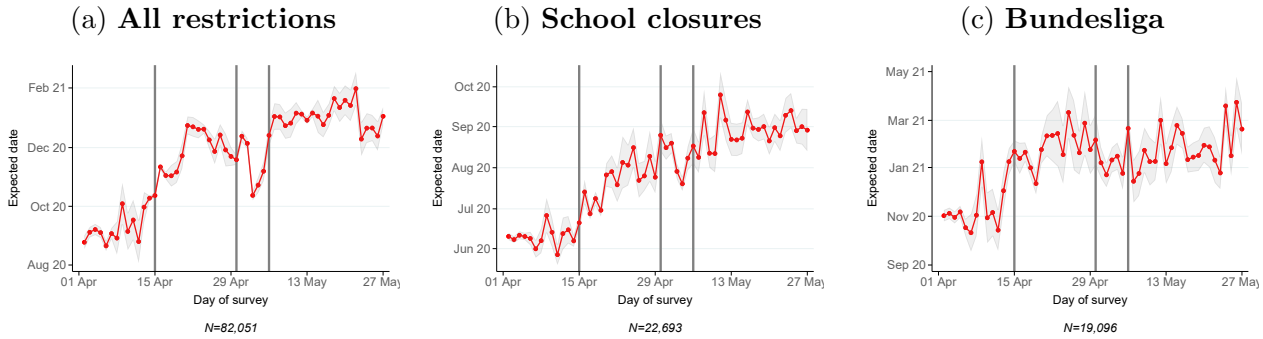


Figure A.3: Mean expectations over time

Notes: Means with 95-% C.I., adjusted for population weights. Vertical lines indicate three major press conferences. Data source: Civey Online Panel 2020.

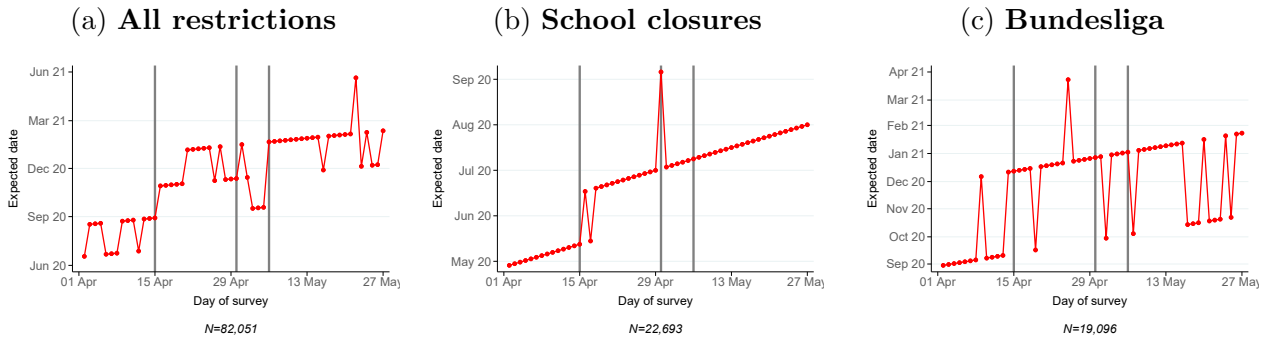


Figure A.4: Median expectations over time

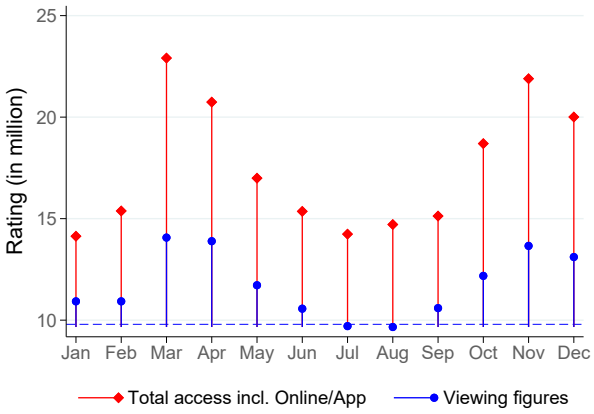
Notes: Medians adjusted for population weights. Vertical lines indicate three major press conferences. Civey Online Panel 2020.

Appendix II Context of press conferences

Appendix II.1 Media coverage of press conferences

In this section, we provide descriptive evidence that a large share of the German population followed daily news forecasts during the early phases of the pandemic. On the days of the press conferences, daily news shows primarily summarized the content of the press conferences and showed sequences of Angela Merkel's speeches. Hence, ratings of daily news shows provide some indications of the press conferences' initial media reception, which was then multiplied by online and printed press and through social media outlets.

(a) **'Tagesschau' ratings in 2020**
Daily averages by month



(b) **News ratings in spring 2020**
Joint daily news ratings

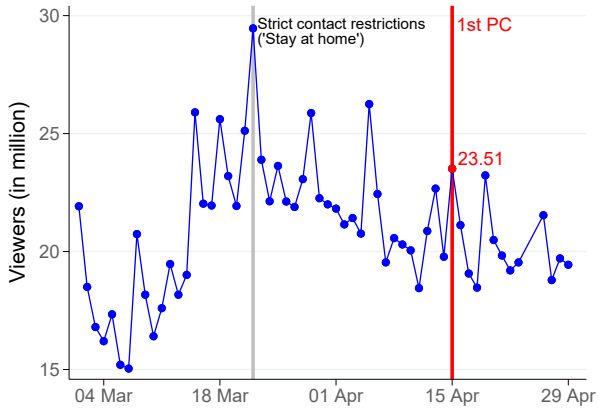


Figure A.5: News ratings in the pandemic

Notes: Plots show average daily ratings of Germany's main news broadcast, the 8pm 'Tagesschau', throughout 2020, with the dashed horizontal line indicating 2019 average viewing figures (Panel a), as well as joint daily ratings for the four major news shows (Tagesschau, heute, heute Journal and RTL Aktuell) during the early phase of the pandemic (Panel b). Data source: AGF, GfK, Media Control and INFOnline.

During the pandemic, news ratings reached an all-time peak in March 2020 and remained above pre-year average ratings until June 2020. Nearly 30 million Germans watched a news broadcast on March 22nd, when the German government announced the implementation of strict contact restrictions and urged the population to 'stay at home'. Viewing figures slightly declined between mid March and April, but continued to exceed average pre-year ratings by 40 percent. On April 15, the day of the first press conference studied in this paper, more than 23 million Germans watched a summary of the press conference in a news show, corresponding to about 30 percent of the German population.[21] Between the first and the third press conference in early May, viewing figures fell by 30 percent, indicating an emerging trend of news fatigue.[22]

[21] Corresponding to the data collection for TV viewing figures, the population share was calculated with respect to the population aged 3 years and above.

[22] In April 2020, online news websites lost market shares whereas healthy eating and gardening websites boomed (`https://meedia.de/2020/05/08/agof-top-100-nachrichtenmedien-verlieren-teile-des-corona-plus-mein-schoener-garten-waechst-um-81-proz` accessed August 18, 2021.).

Appendix II.2 Popularity of the government and Angela Merkel

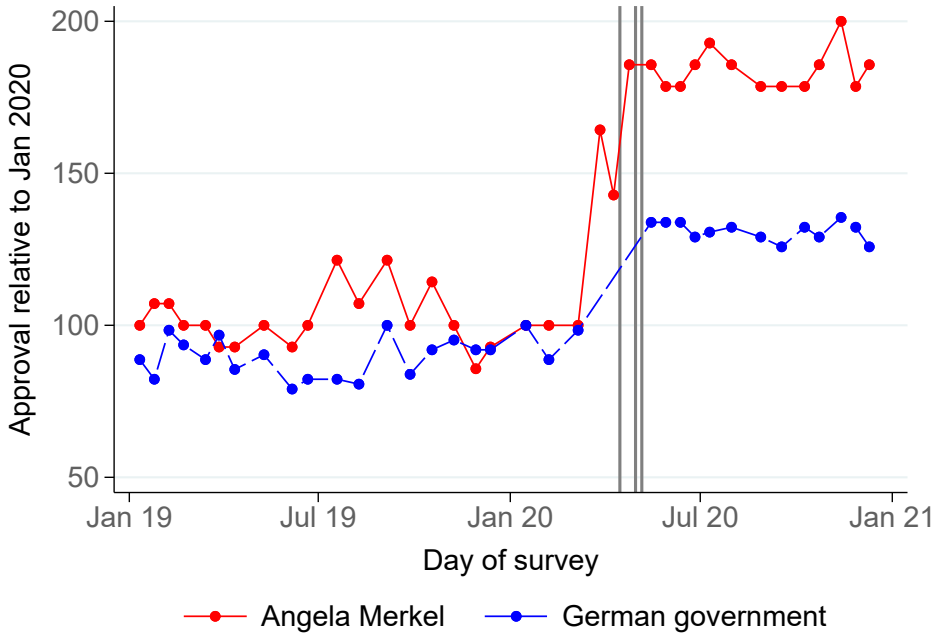


Figure A.6: Popularity of Angela Merkel and the German government over time

Notes: Plot shows the approval ratings for Angela Merkel (solid red line) and the German government (dashed blue line) relative to approval rates in January 2020. Solid vertical lines indicate the three press conferences. Data source: Forschungsgruppe Wahlen, Politbarometer 2019-2020.

Appendix III Robustness

Appendix III.1 Manipulation around the cut-offs

To rely on the regression discontinuity (RD) design, respondents who answered just before the press conference must be comparable in terms of characteristics to respondents who answered just after the press conference. The table below compares sample means of key characteristics before and after the 3 press conferences.

Table A.3: Sample composition before and after the press conferences

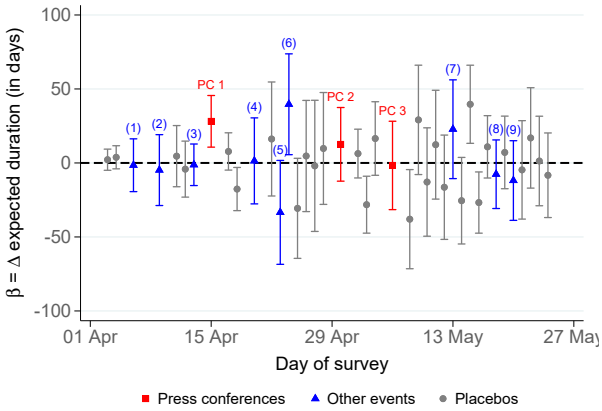
	1st Press Conference			2nd Press Conference			3rd Press Conference		
	pre	post	p (Δ)	pre	post	p (Δ)	pre	post	p (Δ)
Female	0.31	0.28	0.00	0.31	0.27	0.00	0.27	0.26	0.18
University	0.51	0.51	0.79	0.51	0.52	0.09	0.52	0.54	0.01
Age above 50	0.79	0.84	0.00	0.82	0.86	0.00	0.85	0.85	0.06
Children in HH	0.20	0.16	0.00	0.17	0.14	0.00	0.14	0.15	0.03
Political pref.: Union/FDP	0.39	0.39	0.59	0.36	0.34	0.03	0.34	0.38	0.00
Political pref.: RRG	0.34	0.31	0.00	0.29	0.30	0.09	0.30	0.31	0.02
Political pref.: AfD	0.19	0.23	0.00	0.26	0.28	0.02	0.28	0.23	0.00
Political pref.: Other	0.08	0.07	0.04	0.09	0.08	0.01	0.08	0.08	0.70
Pop Density: High	0.41	0.40	0.54	0.41	0.41	0.43	0.41	0.42	0.32
Purch. Power: High	0.47	0.49	0.01	0.48	0.48	0.75	0.48	0.50	0.02
Region: North/West	0.33	0.32	0.33	0.33	0.32	0.02	0.32	0.34	0.00
Region: South	0.41	0.42	0.17	0.41	0.42	0.31	0.41	0.42	0.21
Region: East	0.26	0.26	0.62	0.26	0.27	0.19	0.27	0.24	0.00

Note: Civey Online Panel, April 2 - May 27, 2020. Cells contain sample means before (pre) and after (post) the press conferences (PC) and p-values (p) from two sample mean comparison tests on the pre/post mean difference (Δ).

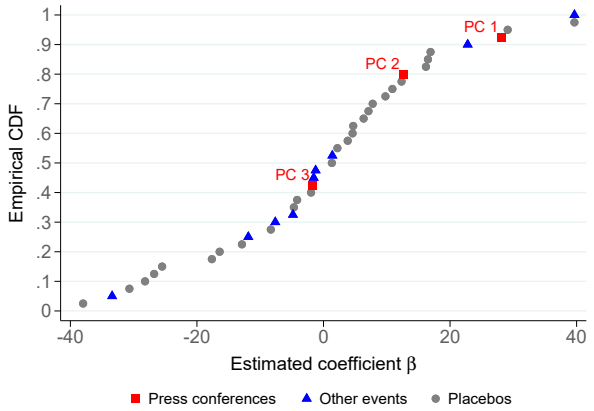
Appendix III.2 Placebo checks

Figure A.7 corresponds to Figure 4, based on the other two outcome variables, school closures and football Bundesliga.

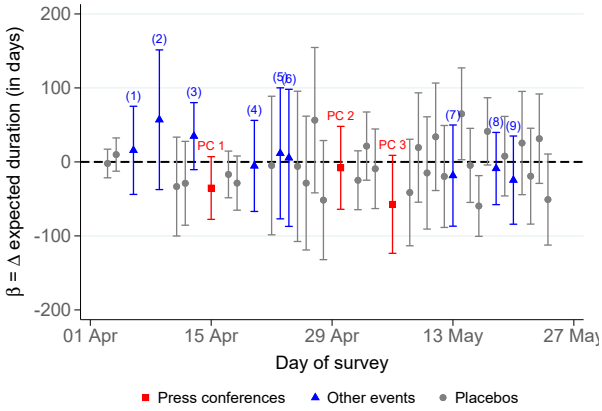
(a) Children back in school
Coefficient estimates β with 95% C.I.



(b) Children back in school
Distribution of placebo/treatment estimates



(c) Bundesliga with stadium attendees
Coefficient estimates β with 95% C.I.



(d) Bundesliga with stadium attendees
Distribution of placebo/treatment estimates

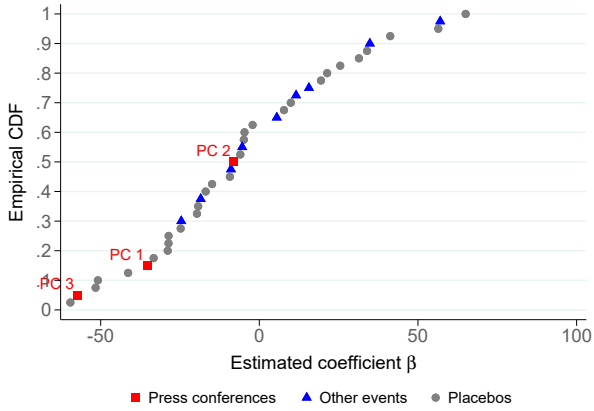


Figure A.7: Placebo checks and comparison to other events

Notes: Plots show coefficient estimates of the pre/post indicator from multivariate regression with an interacted linear trend. Red squares denote the three press conference treatments (PC), blue triangles show other events: (1,4) Corona Cabinet, (2) Easter address A. Merkel, (3) Leopoldina report, (5) Government statement A. Merkel, (6,8) Meeting A. Merkel with trade associations and unions, (7) Government interrogation Bundestag, (9) Meeting with OECD, IMF and ILO. Data source: Civey Online Panel 2020.

Appendix III.3 Attentiveness

One concern with online surveys is that respondents may be distracted or poorly motivated, and thus provide answers without paying sufficient attention to the question. This would lead to measurement error and likely to attenuation bias in regression results. Inattention in web surveys has been studied in a large literature in survey research (see Shamon & Berning (2020) for a recent example and further references).

The following features of the *Civey* online survey should encourage attention: (i) when a respondent starts an online survey with *Civey*, a sequence of questions is displayed in randomized order, (ii) the randomized sequence also contains questions that *Civey* displays for other clients, therefore topics vary, (iii) each question comes with a small number of closed response options requiring only a single click which should reduce cognitive load and survey fatigue, (iv) all questions offer a response option for undecided respondents ("don't know"), (v) respondents may skip questions, (vi) respondents can exit the survey at any time. While we believe that these features of the survey design limit the probability of inattentive responses, we cannot implement direct checks of attentiveness which are commonly used in longer online surveys: The fact that the *Civey* algorithm displays all questions in randomized order, and the short length and duration of the survey, rule out many of the checks used in the survey methods literature; Shamon & Berning (2020).

In order to characterize the potential biases that might arise from inattention, we re-estimated our models using simulated responses based on a mixture model which assumes that a certain share of respondents was inattentive and chose answers randomly. For this sensitivity check, we set the rate of inattentiveness to 20 percent. We select a random subset of one fifth of the respondents and replace their chosen outcome category by a random draw from the support of the dependent variable where each category is chosen with equal probability. We then re-estimate our regression specifications, using the simulated values of the outcome variables as dependent variables.

The results from this exercise are presented in Table A.4. The size of coefficient estimates is slightly reduced, as one would expect. Nevertheless, the effects remain significant for the question on general restrictions. The baseline standard deviation of beliefs about the duration of school restrictions increases notably with random inattentiveness, and the effect of the first press conference on beliefs about school restrictions turns insignificant as a result.

Table A.4: Estimation results: Sensitivity to 20% inattentiveness rate

	1st Press Conference			2nd Press Conference			3rd Press Conference		
	BV	MV	MV Trend	BV	MV	MV Trend	BV	MV	MV Trend
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
All restrictions	24***	25***	18***	-12***	-12***	5	36***	32***	45***
	(2)	(2)	(3)	(3)	(3)	(5)	(2)	(2)	(7)
MDV (pre-event)	09 Oct	09 Oct	09 Oct	16 Nov	16 Nov	16 Nov	06 Nov	06 Nov	06 Nov
S.D. (pre-event)	123	123	123	130	130	130	130	130	130
N	15,172	15,172	15,172	8,604	8,604	8,604	12,543	12,543	12,543
School closures	24***	24***	9	4	4	9	14***	14***	11
	(3)	(3)	(6)	(4)	(4)	(8)	(3)	(3)	(7)
MDV (pre-event)	23 Jun	23 Jun	23 Jun	08 Aug	08 Aug	08 Aug	13 Aug	13 Aug	13 Aug
S.D. (pre-event)	78	78	78	92	92	92	92	92	92
N	4,080	4,080	4,080	2,834	2,834	2,834	3,358	3,358	3,358
Bundesliga	3	6	-19	-26**	-28***	-25	8	8	-24
	(6)	(6)	(11)	(8)	(8)	(16)	(7)	(7)	(15)
MDV (pre-event)	04 Dec	04 Dec	04 Dec	10 Jan	10 Jan	10 Jan	20 Dec	20 Dec	20 Dec
S.D. (pre-event)	174	174	174	181	181	181	177	177	177
N	3,536	3,536	3,536	2,467	2,467	2,467	3,032	3,032	3,032

Note: Civey Online Panel, April 2-May 27, 2020. Table shows the change in the expected duration in days associated with each of the three public announcements, assuming 20% of respondents were inattentive and chose answers randomly. Cells contain the coefficient estimates from a binary indicator that takes on 0 if the outcome was measured before the event, it takes on 1 if it was measured after the event. MDV= mean dependent variable measured before the event. S.D. = baseline standard deviation in days. BV= bivariate OLS. MV= multivariate OLS adjusted for gender (male/female), education (university/other), age (below/above 50), children in household (yes/no), region (northwest/south/east), population density (high/low), purchasing power (high/low), political party preference (Union/FDP, Red/Red/Green, AfD, Other) and county-level quartile of COVID-19 new infection rate. MV Trend = multivariate OLS with a linear trend centered at zero at the event interacted with the before/after indicator. Estimation with standard errors clustered at the person-level in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix III.4 Reweighted estimates

In this section we reweight estimates of our main results to match the population on key characteristics. Specifically, we reweight estimates to make the sample comparable to the German population in terms of age, gender, voting behavior and current political party preference, county-level purchasing power and municipal population density. Weights are constructed based on the joint distribution of age and electoral behavior as well as the joint distribution of gender and electoral behavior in the last Bundestag election using the German Microcensus, county-level income distributions provided by Land Statistical Offices and population counts and area provided by the Federal Agency for Cartography and Geodesy.

Appendix III.4.1 Reweighted estimates: Mean effects

Table A.5: Estimation results: Expectation updating in response to new COVID-19 announcements

	1st Press Conference			2nd Press Conference			3rd Press Conference		
	BV	MV	MV Trend	BV	MV	MV Trend	BV	MV	MV Trend
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
All restrictions	32***	31***	32***	-10*	-11**	12	39***	35***	51***
	(3)	(3)	(4)	(4)	(4)	(8)	(3)	(3)	(10)
MDV (pre-event)	16 Oct	16 Oct	16 Oct	05 Dec	05 Dec	05 Dec	28 Nov	28 Nov	28 Nov
S.D. (pre-event)	123	123	123	129	129	129	130	130	130
N	15,560	15,560	15,560	8,675	8,675	8,675	12,708	12,708	12,708
School closures	27***	29***	8	3	5	22	16*	14*	15
	(4)	(4)	(8)	(6)	(6)	(11)	(6)	(6)	(15)
MDV (pre-event)	11 Jun	11 Jun	11 Jun	04 Aug	04 Aug	04 Aug	08 Aug	08 Aug	08 Aug
S.D. (pre-event)	64	64	64	80	80	80	83	83	83
N	4,215	4,215	4,215	2,913	2,913	2,913	3,450	3,450	3,450
Bundesliga	12	15	-11	-42**	-46**	-32	2	1	-51
	(9)	(9)	(18)	(14)	(14)	(26)	(12)	(12)	(26)
MDV (pre-event)	25 Dec	25 Dec	25 Dec	15 Feb	15 Feb	15 Feb	12 Jan	12 Jan	12 Jan
S.D. (pre-event)	171	171	171	176	176	176	183	183	183
N	3,560	3,560	3,560	2,448	2,448	2,448	3,017	3,017	3,017

Note: Civey Online Panel, April 2-May 27, 2020. Table shows the change in the expected duration in days associated with each of the three public announcements. Cells contain the coefficient estimates from a binary indicator that takes on 0 if the outcome was measured before the event, it takes on 1 if it was measured after the event. MDV= mean dependent variable measured before the event. S.D.= baseline standard deviation in days. BV= bivariate OLS. MV= multivariate OLS adjusted for gender (male/female), education (university/other), age (below/above 50), children in household (yes/no), region (northwest/south/east), population density (high/low), purchasing power (high/low), political party preference (Union/FDP, Red/Red/Green, AfD, Other) and county-level quartile of COVID-19 new infection rate. MV Trend = multivariate OLS with a linear trend centered at zero at the event interacted with the before/after indicator. Estimation adjusted for population weights with standard errors clustered at the person-level in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.5 shows reweighted estimates of the policy announcements on expectations for the full sample of respondents. The magnitude of coefficient estimates slightly varies in comparison to the unweighted estimates in Table 2, for instance, the first press conference shifted expectations about the end of all restrictions by 32 days in the weighted model rather than by 25 days in the unweighted case, based on the main specification (column 3). Overall, effect sizes and statistical significance of the weighted and the unweighted estimates are very similar for the question on

general restrictions and the football Bundesliga.

For school closures, the magnitude of coefficients is also similar but the effect of the first press conference does not pass the threshold of statistical significance in the main specification of the weighted model. In comparison to the question on general restrictions, the sample size for the question on school restrictions is notably smaller and, hence, is more strongly affected by dispersed survey weights which reduce the effective sample size, one disadvantage of reweighting procedures.

Appendix III.4.2 Reweighted estimates: Heterogeneous effects

We present reweighted estimates of heterogenous treatment effects in Table A.6. Results are similar to unweighted estimates in Table 6, and significant subgroup differences between men and women in response to the first press conference also persist when estimates are reweighted.

Table A.6: Heterogeneity: Expectation updating in response to new COVID-19 announcements

	1st Press Conference			2nd Press Conference			3rd Press Conference		
	All	School	BL	All	School	BL	All	School	BL
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Full sample	32***	8	-11	12	22	-32	51***	15	-51
Demographic variation									
Women	42***	4	-7	16*	42***	-1	65***	30**	-95***
Men	23***	9	-15	10	-2	-56*	36***	1	-18
p-val(Δ)	0.03	0.77	0.82	0.69	0.04	0.28	0.12	0.32	0.14
University	31***	11	-38*	11	32***	-24	41***	31***	-48*
No university	34***	6	12	14	4	-35	61***	-4	-42
p-val(Δ)	0.76	0.76	0.15	0.84	0.19	0.83	0.29	0.21	0.90
Age: < 40	45***	-11	-24	33*	28	-311***	60***	-42*	-122**
Age: 40-64	31***	16***	-11	7	13	-1	50***	18*	-35*
Age: 65+	27***	11	-30	0	-12	-13	70***	28**	-37
p-val(Δ <40/40-64)	0.42	0.54	0.87	0.32	0.72	0.00	0.79	0.28	0.32
p-val(Δ 65+/40-64)	0.30	0.76	0.39	0.20	0.01	0.42	0.10	0.44	0.61
Children in HH	50***	16	-13	23*	19	-111**	44**	-1	-112***
No children	28***	5	-13	10	16*	-13	53***	23**	-30
p-val(Δ)	0.05	0.61	1.00	0.51	0.93	0.13	0.75	0.51	0.16
Political pref.: Union/FDP	31***	12	-7	27**	10	-15	72***	9	-27
Political pref.: RRG	35***	-2	-17	-10	43***	-19	24*	24*	-46*
Political pref.: AfD	29*	19	-44	24	-14	-129*	49	0	-100*
p-val(Δ RRG/ Union)	0.68	0.48	0.79	0.03	0.19	0.95	0.02	0.64	0.74
p-val(Δ AfD/ Union)	0.85	0.64	0.42	0.90	0.42	0.08	0.36	0.80	0.19
Geographic variation									
Region: North/West	36***	-6	-48*	11	27*	-46	52***	47***	9
Region: South	26***	14	2	24**	20	-36	54***	-25*	-57*
Region: East	35***	22*	5	-7	7	-39	42**	37**	-134***
p-val(Δ South/NW)	0.28	0.31	0.19	0.43	0.81	0.86	0.92	0.01	0.25
p-val(Δ East/NW)	0.90	0.15	0.24	0.39	0.47	0.90	0.68	0.80	0.02
Pop. Density: High	29***	-10	-35	9	39***	-50	53***	14	-30
Pop. Density: Low	34***	18**	-3	14*	10	-27	51***	17*	-64***
p-val(Δ)	0.55	0.09	0.37	0.76	0.17	0.64	0.90	0.92	0.49
Purch. Power: High	29***	3	-40*	15	25*	-44	66***	-4	-26
Purch. Power: Low	34***	14*	9	10	20	-36	38***	35***	-64**
p-val(Δ)	0.59	0.48	0.15	0.76	0.81	0.86	0.14	0.17	0.41
By COVID-19 exposure									
New cases/ state: < P25	67***	23	-94*	20	13	-115	42	30	-73
New cases/ state: P25-P50	51***	41***	-17	12	-2	28	44*	26	-14
New cases/ state: P50-P75	29***	7	17	-14	34*	8	50**	58***	-53
New cases/ state: > P75	23***	2	-24	20**	21*	-55*	57***	-5	-43*
p-val(Δ P25-P50/< P25)	0.52	0.53	0.26	0.82	0.69	0.16	0.96	0.90	0.56
p-val(Δ P50-P75/< P25)	0.11	0.59	0.10	0.32	0.60	0.25	0.86	0.52	0.83
p-val(Δ > P75/< P25)	0.05	0.46	0.26	0.99	0.81	0.52	0.71	0.25	0.74
New cases/ county: < P50	45***	32***	-42*	16	20	52	19	17	-78*
New cases/ county: > P50	27***	-0	-0	12	19*	-72***	59***	17*	-41*
p-val(Δ)	0.06	0.07	0.28	0.78	0.99	0.02	0.11	0.98	0.52

Note: Civey Online Panel, April 2-May 27, 2020. Table shows the change in the expected duration in days associated with each of the three public announcements for various subgroups, with p-values (p-val) indicating if mean differences are statistically significant across groups. Cells contain the coefficient estimates from a binary indicator that takes on 0 if the outcome was measured before the event, it takes on 1 if it was measured after the event. All estimates based on multivariate OLS with a linear trend centered at zero at the event interacted with the before/after indicator, adjusted for gender (male/female), education (university/other), age (below/above 50), children in household (yes/no), region (northwest/south/east), population density (high/low), purchasing power (high/low), political party preference (Union/FDP, Red/Red/Green, AfD, Other) and county-level quartile of COVID-19 new infection rate. Estimation adjusted for population weights with standard errors clustered at the person-level. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix IV Uncertainty in beliefs

Appendix IV.1 Undecided and extreme responses

Table A.7: Effect of the press conferences on undecided and extreme responses (LPM)

	1st Press Conference			2nd Press Conference			3rd Press Conference		
	All	School	BL	All	School	BL	All	School	BL
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
A. Don't know	0.01	0.04**	0.04	-0.01	-0.02	-0.05	-0.00	-0.03	0.03
	(0.01)	(0.02)	(0.02)	(0.01)	(0.02)	(0.03)	(0.01)	(0.02)	(0.03)
N	17,671	4,581	4,560	10,763	3,227	3,274	15,545	3,841	4,024
MDV (pre-event)	0.05	0.05	0.16	0.08	0.08	0.20	0.08	0.08	0.16
B. Will never end	0.01	-0.00	-0.01	-0.05***	-0.00	0.02	-0.03	-0.01	-0.05*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.02)
N	17,671	4,581	4,560	10,763	3,227	3,274	15,545	3,841	4,024
MDV (pre-event)	0.06	0.01	0.06	0.12	0.02	0.07	0.12	0.02	0.09

Note: Civey Online Panel, April 2-May 27, 2020. Linear probability models with the dependent variables indicating if individuals say they do not know when restrictions will end (Panel A) or if they say they will never end (Panel B). Cells contain the coefficient estimates from a binary indicator that takes on 0 if the outcome was measured before the event, it takes on 1 if it was measured after the event. Estimation results from multivariate OLS with a linear trend centered at zero at the event interacted with the before/after indicator. Estimation with standard errors clustered at the person-level in parentheses. MDV= mean dependent variable measured before the event. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix IV.2 Second moment analysis

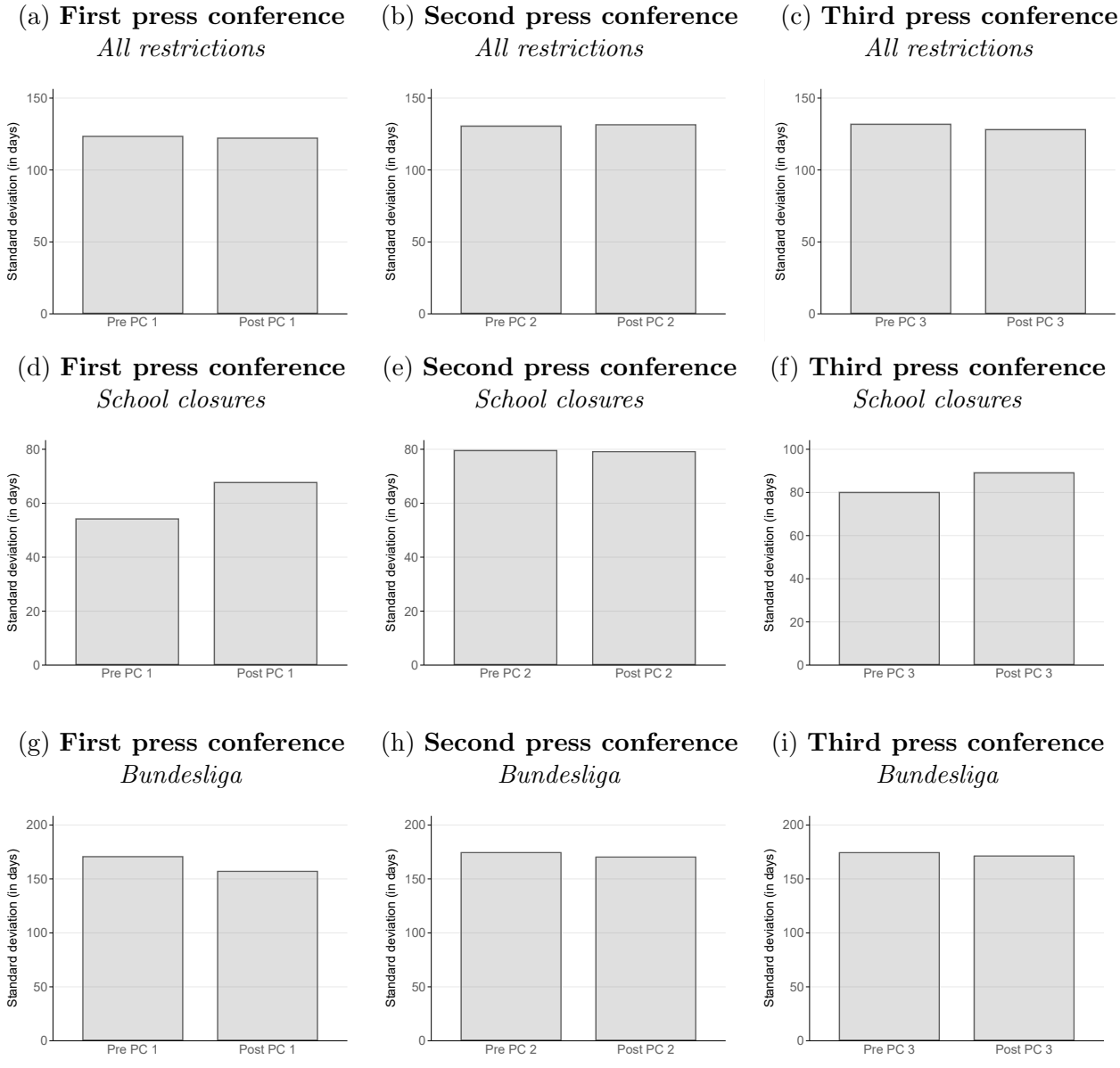


Figure A.8: Standard deviation pre/post event

Notes: Plots show the standard deviation of beliefs about all restrictions, restrictions related to schooling and sport restrictions before and after the three press conferences. Data source: Civey Online Panel 2020.

Appendix V Expectations of managers and individuals

In this section, we present additional results based on the *ifo Manager Survey*, where we introduced similar questions about the expected duration of the pandemic. In contrast to the online survey of individuals conducted by *Civey*, the *ifo Manager Panel* does not provide responses on a daily basis but is only conducted once a month. Therefore, we lack variation to estimate the impact of policy communication on manager expectations for individual press conferences. However, we can compare the overall level and the change of expectations between managers and individuals in early April - that is, before the three press conferences - and in late May - that is, after the three press conferences. We find strong similarity in both level and time trend of individual and manager expectations around the time of the three press conferences.

Appendix V.1 *ifo Manager Survey*

The *ifo* Institute collects information about the expectations of managers of firms through various surveys. For this paper, we conducted two special surveys as part of the *ifo Manager Survey* (see Demmelhuber & Garnitz (2019) for more information on the survey). This survey is sent out online to about 500 managers from different companies in all major industries in Germany using the *SoSci Survey* platform. We included special questions in the waves in April (conducted between April 6 and 19) and May (conducted between May 25 and June 2). The response rates were 322 in the April wave and 310 in the May wave.

In both waves of the *ifo Manager Survey*, we introduced the following expectation questions related to restrictions due to Corona:

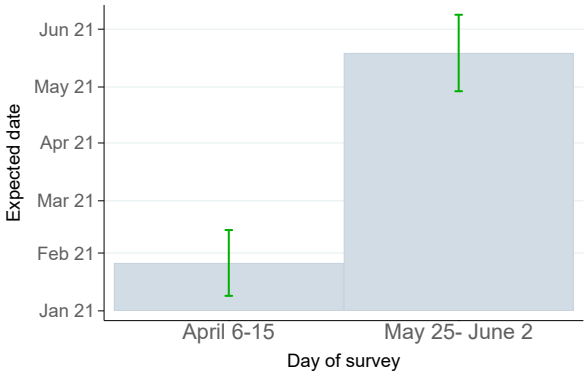
1. When will public life have fully normalized?
2. When will the majority of school children be back in school?
3. When will the main football league return to normal operations with stadium visitors?
4. When will travel restrictions be lifted?
5. When will the situation of the German economy have normalized?
6. When will the situation of your company have normalized?

Appendix V.2 Manager expectations

Figure A.9 shows the average answers to these six questions - again translated to calendar dates for both waves[23]. For all six questions, the answers after the third press conference are (significantly) more pessimistic than those before the first one, suggesting that managers

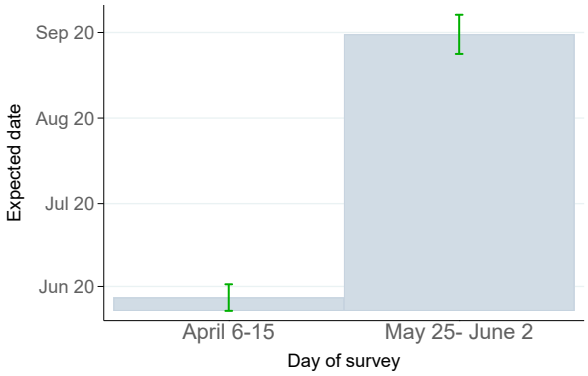
[23]Note that for the first wave, we only use the 306 observations that responded before the first press conference on April 15.

(a) **All restrictions fully lifted**



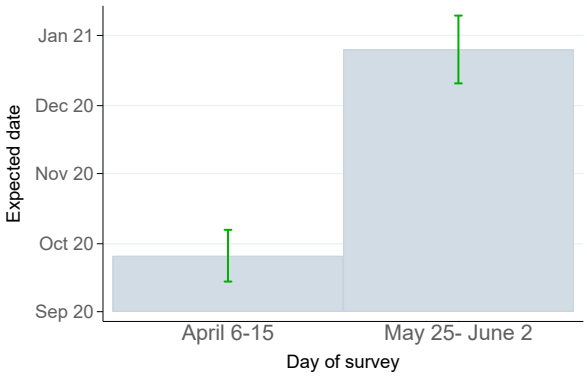
N (pre)= 299, N (post)= 297

(b) **Children back in school**



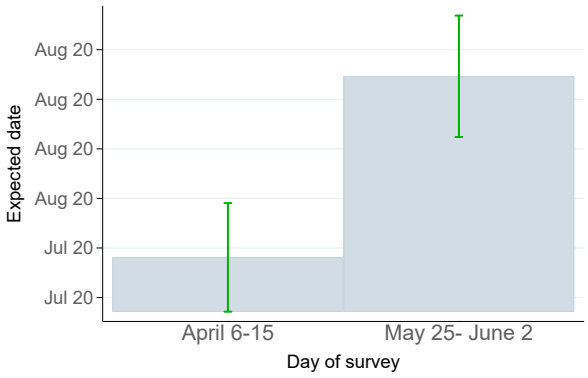
N (pre)= 301, N (post)= 299

(c) **Bundesliga with stadium attendees**



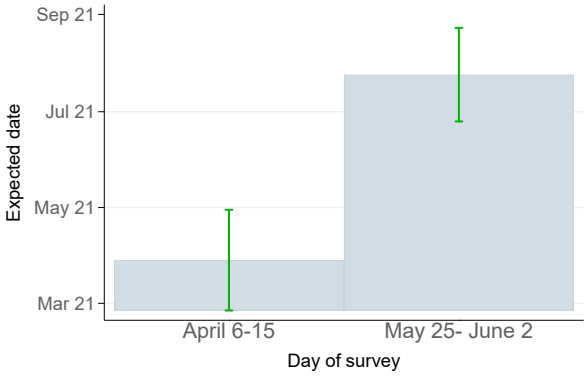
N (pre)= 294, N (post)= 289

(d) **Travel restrictions lifted**



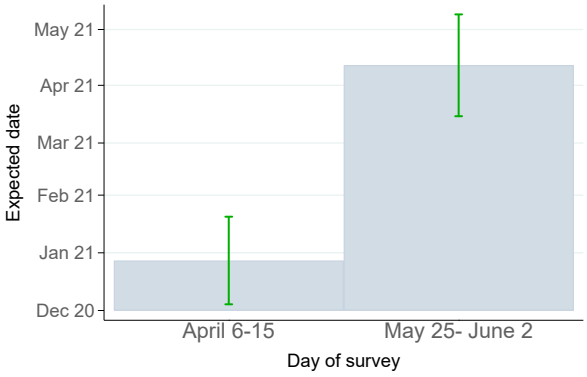
N (pre)= 302, N (post)= 300

(e) **German economy normalized**



N (pre)= 306, N (post)= 302

(f) **Own company normalized**



N (pre)= 277, N (post)= 255

Figure A.9: Expected duration of restrictions and of economic recovery
Notes: Means with 95%-C.I.; Data source: ifo Manager Panel 2020.

strongly updated their beliefs about the duration of the pandemic between early April and late May 2020.

Appendix V.3 Comparison of individual and manager expectations

Figure A.10 and Table A.8 compare the answers of individuals and managers to the three common questions. Baseline expectations about the end of restrictions are very similar for the question on school closures and the German football league, but differ for the expected end of all restrictions. Here, it is worth noting, that the question on general restrictions was phrased differently for managers and individuals, whereas the wording was identical for the other two questions, which may partially explain the observed discrepancy. Belief updating between early April and late May does not significantly differ between individuals and managers for any of the three expectation questions.

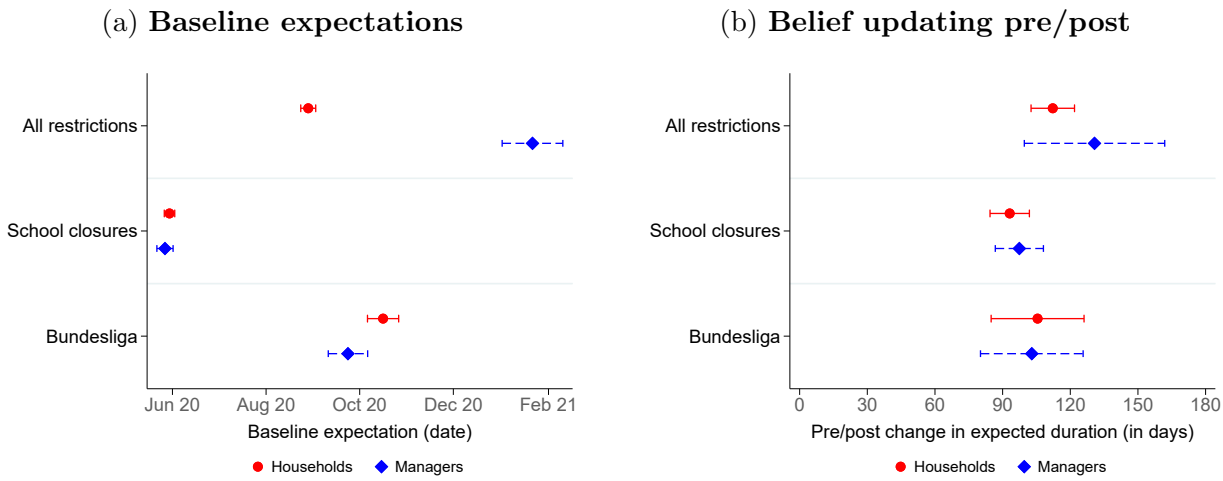


Figure A.10: Comparison of household and manager expectations

Notes: Coefficients from multivariate OLS with 95%-C.I.; Data source: Civey Online Panel and ifo Manager Panel 2020.

Table A.8: Comparison of households' and managers' expectations

	All restrictions		School closures		Bundesliga	
	HH	MP	HH	MP	HH	MP
	(1)	(2)	(3)	(4)	(5)	(6)
MDV *(pre)*	Aug 20	Jan 21	May 20	May 20	Oct 20	Sep 20
MDV *(post)*	Dec 20	May 21	Aug 20	Aug 20	Feb 21	Dec 20
Δ *(pre/post)* BV	111***	118***	92***	96***	108***	96***
	(5)	(13)	(4)	(4)	(9)	(9)
Δ *(pre/post)* MV	112***	131***	93***	97***	106***	103***
	(5)	(16)	(4)	(5)	(10)	(12)
N	3,294	489	1,459	491	1,236	479

Note: Civey Online Panel 2020 for household (HH) expectations and Manager Panel (MP) 2020 for firm expectations. Table shows mean expectations before (MDV pre = April 6-8) and after (MDV post = May 25-27) the three press conferences, as well as coefficient estimates for the change in expectations over time (in days), using bivariate OLS (Δ BV) and multivariate OLS (Δ MV). All estimates with standard errors clustered at the person level in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix VI Behavioral effects: Mobility

Appendix VI.1 Mobility patterns during the pandemic

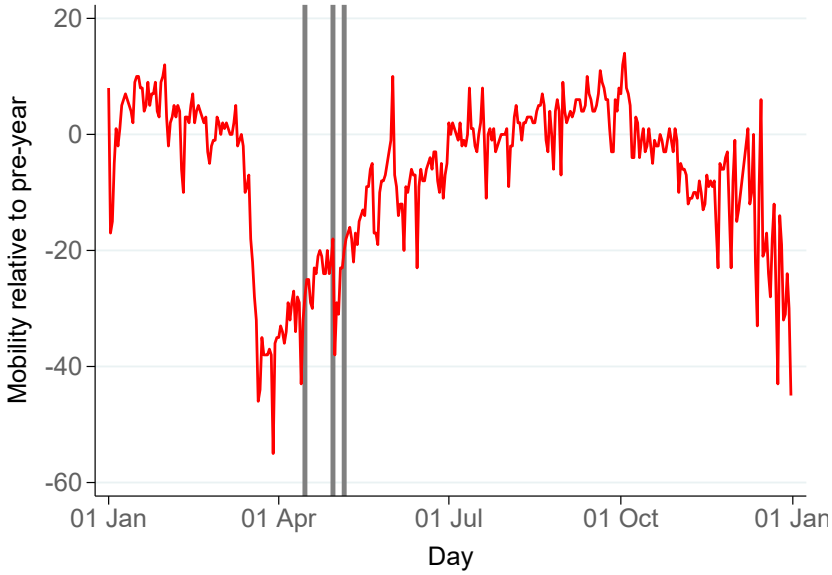


Figure A.11: Mobility behavior in 2020 relative to pre-year

Notes: Plot shows the holiday-adjusted mobility in Germany in 2020 relative to 2019, based on aggregate mobile communications data. Data source: Destatis Mobility Indicators.

Appendix VI.2 Mobility effects of the three press conferences

(a) **First press conference** (b) **Second press conference** (c) **Third press conference**

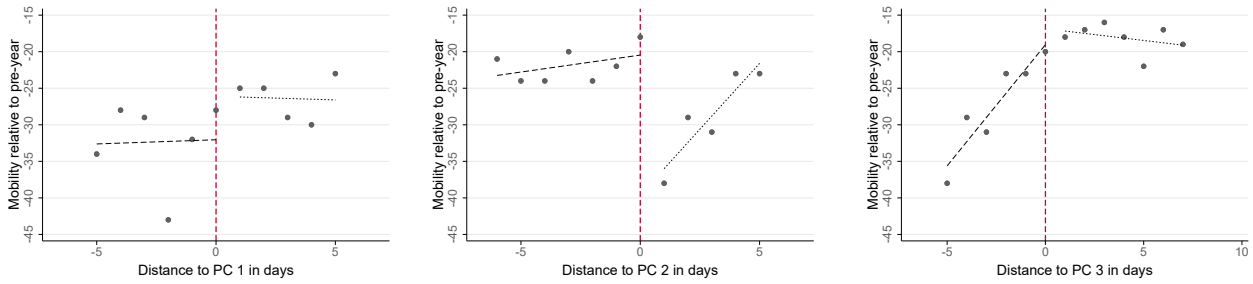


Figure A.12: Conditional means with linear fit

Notes: Plots show the holiday-adjusted mobility in Germany relative to pre-year mobility before and after each press conference (PC). The dashed vertical lines denote the press conference cut-offs. The solid trend lines are based on regressions using binned data. Data source: Destatis Mobility Indicators.

Table A.9: Estimation results: Mobility behavior relative to pre-year

	1st Press Conference	2nd Press Conference	3rd Press Conference
Δ Mobility/2019	5.95	-19.14***	2.19
	(6.81)	(3.25)	(2.60)
N	11	12	13
MDV (pre-event)	-32.33***	-21.86***	-27.33***
	(-13.77)	(-24.71)	(-10.06)

Note: Destatis Mobility Indicators, 2020. Table shows the change in holiday-adjusted mobility relative to pre-year mobility in percentage points associated with each of the three public announcements. Cells contain the coefficient estimates from a binary indicator that takes on 0 if the outcome was measured before the event, it takes on 1 if it was measured after the event. MDV= mean dependent variable measured before the event. Results from bivariate OLS with a linear trend centered at zero at the event interacted with the before/after indicator. Regressions are obtained using binned daily data. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$