

# Social Media and Policy Responses to the COVID-19 Pandemic in Switzerland\*

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## Abstract

We study the role of social media in debates regarding two policy responses to COVID-19 in Switzerland: face-mask rules and contact-tracing apps. We use a dictionary classifier to categorize 612,177 tweets by parties, politicians, and the public as well as 441,458 articles published in 76 newspapers from February until August 2020. We distinguish between “problem” (COVID-19) and “solutions” (face masks and contact-tracing apps) and, using a vector autoregression approach, we analyze the relationship between their salience on social and traditional media, as well as among different groups on social media. We find that overall attention to COVID-19 was not driven by endogenous dynamics between the different actors. By contrast, the debate on face masks was led by the attentive public and by politicians, whereas parties and newspapers followed. The results illustrate how social media challenge the capacity of party and media elites to craft a consensus regarding the appropriateness of different measures as responses to a major crisis.

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# 1 Introduction

The rise of social media has affected political communication in multiple ways, notably by giving a wider range of actors a platform to potentially shape the political agenda, bypassing traditional gatekeepers such as media and party elites (Jungheer et al., 2020; Persily and Tucker, 2020). Although current debates emphasize problems such as the spread of disinformation, social media can be a democratizing tool, giving voice to groups and people who previously would have not been heard. While such diversity is in principle desirable, it also gives visibility to fringe opinions, or outright lies, that can be detrimental to the quality of the public discourse.

In the context of COVID-19, one question that arises is how different groups have been able to set the agenda, both regarding the overall salience of the “problem” and, more specifically, with respect to “solutions” put forward to contain the spread of the virus, such as face masks and contact-tracing apps. Compliance with policy measures is key for an effective response to the pandemic, which requires broad acceptance among the population. However, it is the nature of politics that no perfect consensus can exist regarding the appropriateness of policy decisions. Moreover, in times of crisis, decision-makers face heightened responsibility to not only make, but also communicate and justify critical decisions, whose effectiveness depends on some degree of consensus regarding their appropriateness (Boin, 2011, 2–4). Therefore, it is important to understand how social media contribute to the political discourse surrounding COVID-19, and how they may enable or constrain the capacity of political leaders to control it, with consequences for the acceptance and implementation of the policy measures.

This paper addresses these questions by studying the discourse on COVID-19 in Switzerland between February and August 2020. We distinguish between the overall COVID-19 issue and two specific policy responses: face masks and contact-tracing apps. We document the salience of these topics in newspapers as well as in the tweets of three groups of actors: parties, politicians, and the “attentive public,” that is, Twitter users who follow multiple news media. More specifically, we analyze which actors lead, and which follow, attention to COVID-19 in general as well as to the two policy measures. We expect that political actors (parties and politicians) are responsive to the media and to the public, but with a stronger relationship for the two policy responses than for the broader COVID-19 issue.

Our results show that attention to COVID-19 is not driven by endogenous dynamics between the different actors. The sheer importance COVID-19 prompted all actors to discuss it, independently of their interactions. Discussions of specific measures, however, follow a different pattern. The debate on face masks in particular was led by the attentive public and by politicians, whereas parties and newspapers followed.

These results have theoretical implications for the study of political agenda setting. First, they show that social media may strengthen the voice of individual actors, relative to institutional

actors. Second, they demonstrate the importance of distinguishing between attention given to an overall "problem" and to specific "solutions." This point has not been fully considered in the literature and is worth studying in future research.

Moreover, the findings also have broader implications for policy responses to COVID-19. In particular, the findings highlight how social media, by giving voice to a wide range of groups and people, challenge the capacity of party and media elites to craft a consensus regarding the appropriateness of different measures in a context where public acceptance is crucial for policy compliance and effectiveness. These questions have become even more salient in the context of efforts to promote vaccination against COVID-19.

## 2 Theoretical Background and Context

The role of social media in political communication has been studied in a growing literature (Jungherr, 2016; Jungherr et al., 2020; Persily and Tucker, 2020). One important strand in the literature has focused on explaining which politicians adopt social media and why they do so (Straus et al., 2016; Lassen and Brown, 2011). While much of this literature focuses on partisan differences (Russell, 2018, 2020), one key finding is that legislators use Twitter in the hope of directly reaching constituents, all the more when they are in opposition (Gainous and Wagner, 2014; Russell, 2020). While legislators struggle to get their message out via traditional media, social media seems to provide them with unfettered access to citizens.

In contrast, recent work has highlighted the limitations of this reach: Barberá et al. (2019, 883) conclude that "legislators are more likely to follow, than to lead, discussion of public issues." Instead, it is often traditional media that maintains a gate-keeping role: In a large-scale experiment, King et al. (2017) demonstrate that media coverage of certain topics has a sizeable, positive effect on Twitter discussions of those subjects. Similarly, Barberá et al. (2019) find that on Twitter, traditional media have a stronger influence on the subjects discussed by politicians and the public than vice-versa. Fazekas et al. (2020) argue that politicians can use Twitter to influence the public agenda but, in the context of European parliament elections, find that most political actors did not engage with the public specifically on EU issues. Gilardi et al. (2021) analyze the traditional media agenda, the social media agenda of parties, and the social media agenda of politicians in the Swiss context. This study finds that the three agendas are strongly interconnected and no agenda clearly leads the others. There is an important exception, namely, the environment issue. During the period covered by the analysis (2018–2019), environmental questions were highly salient due to international mobilizations such as the climate strikes, and some parties could take advantage of these events to further increase media attention to the environment through social media.

Contrary to most of this literature, our analysis considers a time of unprecedented crisis.

COVID-19 suddenly became the most important problem for policy-makers and the public all over the world. [Boin \(2011, 2–4\)](#) define crisis as a phase of disorder marked by a threat to norms that goes along with a sense of urgency and is characterized by uncertainty about the nature and potential consequences of that threat. As a consequence, political leaders are confronted with a heightened responsibility to make, communicate, and justify critical decisions. In addition to decision-making, a critical task of crisis leadership is sense-making ([Boin, 2011, 10–11](#)), that is, appraising the threat and deciding what the crisis is about. In public health crises, elite communication is crucial for compliance with policy measures, since perceptions of the scientific consensus are filtered by the values held by individuals ([Kahan et al., 2011](#)). In the context of COVID-19, [Green et al. \(2020\)](#) find that the social media communication of US Congress members was highly polarized. This is concerning because studies suggest that polarization and partisan cues may hamper compliance ([Allcott et al., 2020; Baum, 2011](#)) and therefore the effectiveness of policy responses.

The COVID-19 context might affect political agenda-setting dynamics. In a study of agenda setting regarding the 2007–2008 economic crisis, [Vliegenthart and Damstra \(2019\)](#) show that the media had an impact on the political agenda “above and beyond the effects of real-world economic developments” ([Vliegenthart and Damstra, 2019, 31](#)), but with differences depending on the depth of the economic crisis. The role of the media was stronger in countries less affected by the crisis, whereas they play a subordinate role in countries hit harder by the crisis.

In contrast to [Vliegenthart and Damstra \(2019\)](#) and most other studies, we distinguish explicitly between the salience of the “problem” and that of different “solutions.” Our empirical analysis includes attention to COVID-19 as well as to specific policy responses, namely, rules regarding the usage of face masks and the introduction of a contact-tracing app, the SwissCovid app.<sup>1</sup> Face masks are considered an effective measure against contagion whenever physical distance cannot be maintained ([Eikenberry et al., 2020](#)), while contact-tracing apps play an important supporting role for contact-tracing efforts, which are crucial to breaking contagion chains ([Troncoso et al., 2020](#)). In Switzerland, nation-wide face-mask rules for public transportation were introduced on July 6th, whereas the SwissCovid-App was launched on June 25th. In the explanatory notes to federal ordinances, these two measures are presented as two different ways to prevent infections respectively break of so-called “chains of transmission” to interrupt a wider spread ([BAG, 2020](#)). Both measures were also highlighted as effective and cost-efficient measures to reduce the virus in publications of Swiss Federal Agencies ([Rutz et al., 2020](#)).

Face masks and contact-tracing apps as policy responses are also relevant regarding political communication. First, compliance with face-mask rules can be a challenge since there is no consensus among the public about the need or effectiveness of such a measure ([Forschungsstelle](#)

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<sup>1</sup><https://www.bag.admin.ch/bag/en/home/krankheiten/ausbrueche-epidemien-pandemien/aktuelle-ausbrueche-epidemien/novel-cov/swisscovid-app-und-contact-tracing.html>.

sotomo, 2020, 37). Second, contact-tracing apps are effective only if a large share of the population use them. Although contact-tracing apps are not as controversial as face masks, some fear that the app may be a tool for state surveillance. Therefore, the public needs to be convinced that the app respects privacy and is worth using.

Based on these arguments, we formulate the following expectations to guide the empirical analysis. First, consistent with [Vliegthart and Damstra \(2019\)](#) and other studies discussed above, we expect that political actors (parties and politicians) are responsive to the media and to the public. Second, we expect that the relationship described in the first expectation is stronger for the two policy responses than for the broader COVID-19 issue. The magnitude of the problem may have increased its salience across the board, whereas policy responses may have been more sensitive to endogenous agenda-setting dynamics between the different actors.

### 3 Data and Methods

Our analysis relies on three textual sources. First, we collected all articles published in print or online in 76 Swiss newspapers, from which we selected articles that include keywords related to COVID-19. Second, we gathered all tweets from the accounts of Swiss political parties as well as of politicians, defined as candidates to the 2019 Swiss national elections. Third, we identified a subset of Twitter users following the accounts of at least five Swiss news outlets, as of March 16th, 2020.<sup>2</sup> Following [Barberá et al. \(2019\)](#), we describe this group as the “attentive public.” After identifying these users, we retrieved their tweets on a daily basis.

For both newspapers and tweets, we restrict the sample to German-language texts to avoid complications related to multilingual text analysis, which persist despite recent advances ([De Vries et al., 2018](#)). Based on previous analyses of similar corpora, we do not expect any systematic biases ([Gilardi et al., 2021](#)). We study the period between February 25th, 2020 (the day of the first confirmed case of COVID-19 in Switzerland) and August 12th, 2020.<sup>3</sup> The analysis therefore focuses on the “first wave” of the pandemic. Our final sample contains 441,458 unique articles from 76 news outlets, 612,177 tweets in total with 2,220 tweets from 69 party accounts (including national parties as well as their cantonal and youth sections), 68,023 tweets from 696 politicians, and 517,264 tweets from 19,487 “attentive” users.<sup>4</sup>

The analysis proceeds in two steps. First, we apply a keyword-based classifier to identify texts discussing COVID-19 in general, as well as face masks and the contact-tracing app more specifically. The search patterns for classification are shown in SI Section A. To validate the

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<sup>2</sup>We opted for five or more newspapers to avoid hitting a rate limit of Twitter’s API.

<sup>3</sup>We did not tracking “attentive users” beyond August 2020 because after this date many were no longer active and several no longer fit our initial criteria following at least five newspapers.

<sup>4</sup>Furthermore, the sample contains tweets from 31 governmental, 14 media and 34 organizational accounts, which we control for in the model.

classifier, we draw random samples of 100 texts for all three topics and then check how many texts were classified correctly. The classification works very well for COVID-19 and face masks, but is less reliable for the contact-tracing app. For this Topic, 12% of texts classified as related to the contact-tracing app are false positives. Very often, these tweets mention other apps that became popular during the crisis, such as apps for videoconferencing or online teaching. Finally, we annotate 250 Tweets that were classified as related to COVID-19. Of these tweets, 1.6% should have been classified as related to the Covid app, while 6% of the tweets relate to face masks. We also assess how many tweets of a random sample not classified as related to COVID-19 in fact dealt with the topic of COVID-19. We found 22 Tweets (9 %) could have been classified into one of our three topics of interest (20 for COVID-19, 1 for app and 1 for face masks). Yet, 15 of the 20 Tweets which cover the pandemic would not have been classifiable without understanding the meaning and context of the texts. Overall, the manual coding of 800 tweets indicates that the misclassification is rather small and not systematic which allows us to proceed with the rather simple, but very intuitive and easily interpretable dictionary classification.

We also validate the classification of newspaper articles. Generally, misclassification is limited here, however, we uncover that media outlets frequently mention their own apps in the articles. Although we could not eliminate such errors completely, a manual inspection of keywords-in-context (Benoit et al., 2018) for newspaper articles revealed that most mentions of apps indeed relate to the SwissCovid app. Moreover, the spike of tweets relating to the app occurs during the time when the app was released in late June (Figure 2), which speaks to the face validity of our classification. We further validate the keyword-based classification in SI Section B, which lists the search patterns and 50 most frequent terms in tweets about COVID-19, face masks and contract-tracing apps. These lists of words underscore that the relatively simple classifier picked up the relevant content.

Second, we examine which group's attention to COVID-19, face masks, and the contact-tracing app leads the attention of other groups to these topics. To do so, we follow Barberá et al. (2019) and use vector autoregression (VAR) models with fixed-topic effects to analyze the relationship between different groups. Specifically, we employ a model with a set of stationary time series  $Y_i$  representing the share of the daily attention each group  $i$  (newspapers, parties, politicians, and the attentive public) paid to the topics of interest  $j$  (COVID-19, face masks, and contact-tracing app). To facilitate the interpretation of the results, we use cumulative impulse response functions (IRFs), which allow us to display how a 10 percentage-point unit increase in attention to a given issue by a group changes the cumulative attention the other actors dedicate to the same topic summed over time. We do this for brief one-day changes in attention of 10 percentage points (from 0% to 10%) for a topic at a given day for a group of actors with a lag of seven days.<sup>5</sup> For more details see SI Section C.

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<sup>5</sup>The reasons for choosing a seven day lag are further explained in SI Section C.1

## 4 Results

We first describe how the salience of COVID-19, face masks, and the contact-tracing app changed over time in newspapers as well as in the tweets of parties, politicians, and of the attentive public.

Figure 1 focuses on COVID-19 in general. Two aspects stand out. First, COVID-19 attracted an incredibly high degree of attention, especially in newspapers, with a peak of over 50% of all articles around mid-March, when the Swiss government declared the state of emergency. Since then, the salience of COVID-19 decreased but always remained well over 20%. That means, between two and six out of ten published news articles across over 70 outlets mentioned COVID-19. Second, the salience of COVID-19 on social media followed a similar pattern, although with lower levels of attention and differences among users. In particular, in relative terms, the attentive public tweeted about COVID-19 more frequently than politicians, and parties more frequently than either group.

Figure 2 distinguishes between face masks and the contact-tracing app. The y-axis shows the share of news articles and tweets on face masks and the contract-tracing app over all texts classified as relating COVID-19. The left-hand panel on face masks provides intuitive evidence for the validity of our measures. Social media posts peaked in July, when a national mask mandate in public transport was introduced. Although the contact-tracing app was introduced more gradually (it was under public scrutiny long before its official roll-out and also had a prolonged trial phase), we also see a small peak for politicians' social media posts in the period when the app was introduced. However, compared to masks, the app never reached a comparable degree of salience. This finding confirms the impression that face masks are a polarizing measure that is debated broadly among the population, whereas the discussion of contact-tracing apps is concentrated among a more specific group of people interested in either the technical aspects of the app or its privacy implications. The difference may be related to the fact that masks were mandated at specific locations, while contact-tracing apps have remained a voluntary option for users.

We now turn to the results of our analysis on agenda-setting. Figure 3 shows how the salience of COVID-19, masks, and the Covid App in one source (newspapers or one of the user groups on social media) predicts salience in the other sources. We begin by inspecting the pink circles and pink confidence intervals that identify the mutual effects of a 10 percentage point increase of coverage on COVID-19 by one actor on coverage by the other actors. Many of them are indistinguishable from zero. Hence, the high salience of COVID-19, shown in Figure 1, is generally not driven by endogenous dynamics between the different sources. That is, newspaper did not publish more articles on COVID-19 as a response to increased attention to the topic on social media. Conversely, neither politicians nor parties tweeted more frequently about COVID-19 as a response to increased coverage in newspapers. Even the attentive public was only marginally

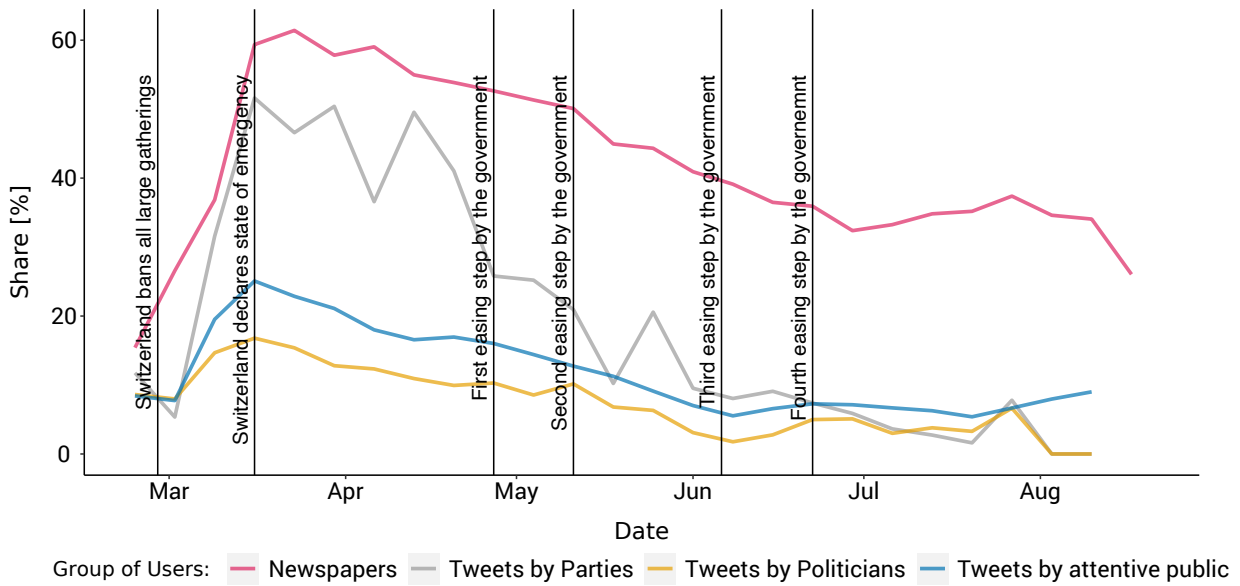


Figure 1: *Salience of COVID-19 in Swiss traditional and social media, January-August 2020. The y-axis shows the percentage of documents (newspaper articles or tweets) explicitly mentioning COVID-19.*

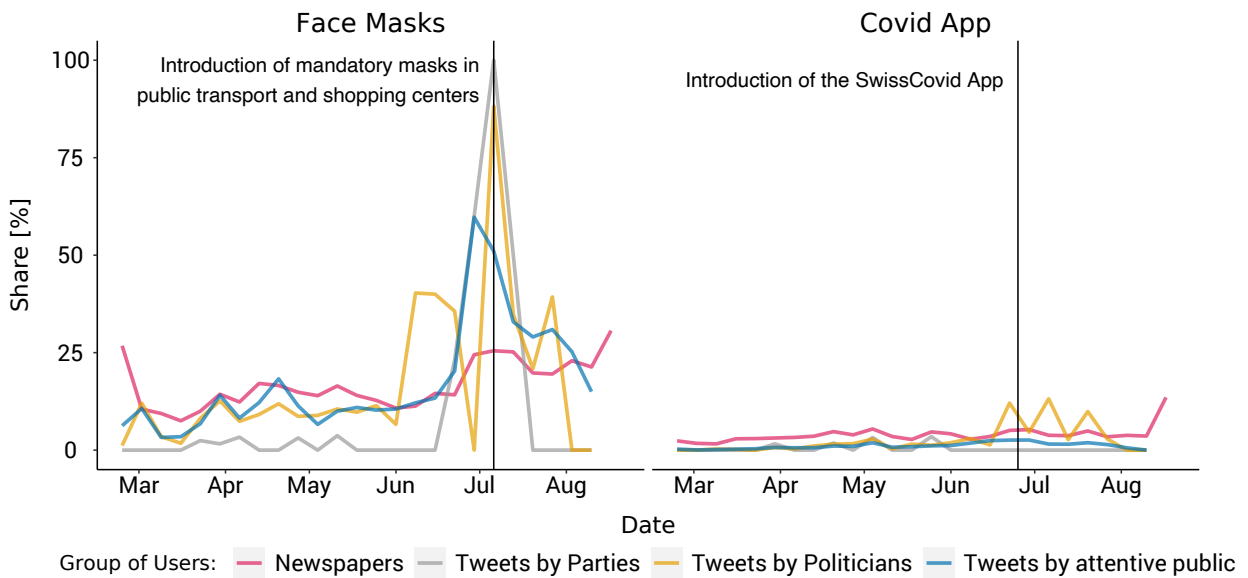


Figure 2: *Salience of face masks and of the contact-tracing app in the texts classified as relating to COVID-19.*



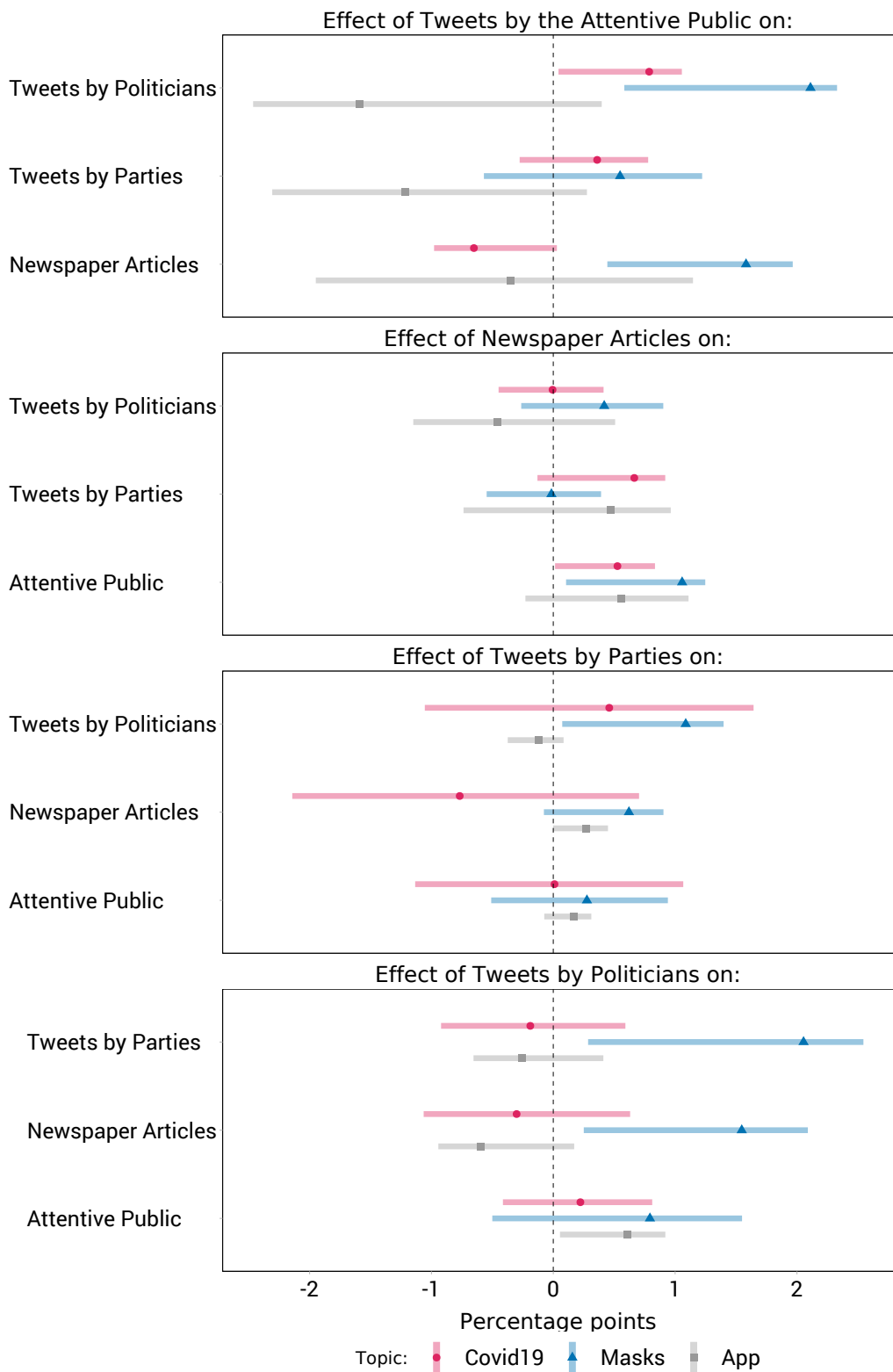


Figure 3: Responsiveness of newspapers, parties, politicians, and the attentive public. Bars denote 95% confidence intervals.

responsive to newspaper coverage. By contrast, politicians (but not parties) tweeted more about COVID-19 as response to the attentive public. These findings offer mixed support for our first expectation, which posited that political actors (parties and politicians) are responsive to the media and to the public. Politicians respond to the public, but attention to COVID-19 is otherwise not linked to endogenous dynamics among the different actors.

A similar pattern holds for the SwissCovid app, here depicted in gray with rectangular point estimates. Attention to the app on social media was not responsive to newspaper coverage, nor to tweets by the attentive public. Newspapers are marginally responsive to tweets by parties, but not to those by politicians or the attentive public. The clearest relationship is between politicians and the attentive public. The salience of the SwissCovid app among the attentive public follows that by politicians, although the relationship is quite weak, well below one percentage point.

The most significant relationships we observe concern face masks, here depicted with a blue triangle and blue error bars. Face-mask rules have been a controversial measure in Switzerland as well as in other countries. We find that tweets mentioning masks by the attentive public predict discussions of the same topic in tweets by politicians, consistent with our second expectation, as well as in newspaper articles. Furthermore, while tweets by the attentive public are predicted by newspapers (that is, the attentive public tweets more about masks when newspapers publish articles on that topic), the opposite relationship is stronger: newspapers publish more articles on face masks following public discussions of the topic on social media. Furthermore, tweets on masks by the attentive public are unrelated to tweets by either parties or politicians. In other words, consistent with our second expectation, the salience of masks flows from the attentive public to political actors rather than in the opposite direction. Finally, we note that for masks, the attention of newspapers follows politicians more than parties.

The results for masks are particularly interesting also regarding politicians. Not only do their tweets have a significant effect on parties and newspapers, Figure 2 also shows that politicians emphasized the topic of masks for a prolonged period before the introduction of the mask mandate. Thus, in combination with the attentive public, they seem to have worked as agenda-setters in preparing the ground for this policy measure.

## 5 Implications

The results discussed in Section 4 have a number of broader implications beyond the specific context of the analysis.

First, we find that the general debate on the “problem” (COVID-19) is largely not driven by endogenous dynamics between the different actors. This finding implies that events exogenous to the political communication system played a crucial role. It is consistent with [Vliegenthart and Damstra \(2019\)](#), who, although they emphasize the importance of the media for agenda

setting, also find that, in the most hard-hit countries, the salience of the 2007–2008 economic crisis was driven by real-world developments more than by the media.

Second, moving beyond the salience of COVID-19 in general and focusing on two specific “solutions,” we find that the debate on masks, which have been a politically controversial measure, was driven by politicians and the attentive public rather than by parties and newspapers. This result suggests potential limits for party and media elites to successfully shape the debate on COVID-19 policy responses, and therefore to craft the consensus required for effective compliance and implementation. This finding is particularly relevant for the COVID-19 vaccine, which was outside of the time frame of our analysis.

Third, the important role of the attentive public and of politicians in shaping the salience of face masks contrasts with the decision-making process on these measures, which was dominated by the executive branch of the government and, for several weeks, excluded members of parliaments as well as rank and file politicians.

Fourth, the COVID pandemic is a perfect example for a major crisis, in which the opinion-forming process changes just enough that the traditional actors are no longer able to use their traditional methods to influence public opinion. Social media play an important role, because they allow individual citizens and politicians to bypass institutional gatekeepers such as parties and newspapers. This limited capacity by the traditional elites to shape public opinion during an exogenous crisis underscores the importance of political science and communication research to help understand how these actors need to change their processes to achieve wide compliance in such times.

## 6 Conclusion

In this paper, we have studied the Swiss debate on COVID-19 in newspapers and on Twitter between February and August 2020. Addressing the larger question of who can set the agenda on critical policy issues, we have focused on such agenda-setting dynamics during emergency times when the ability of political leaders to shape the debate is crucial for ensuring compliance with public health measures among the population.

Notably, our analysis shows the momentous salience of COVID-19 across outlets. For newspapers, this meant that mid to late March, 60% of the articles covered COVID-19. During the first wave of COVID-19 in March and April 2020, the virus was highly salient across all actors. Studying the relationship between the various sources and actors, we distinguish between the salience of the “problem” (COVID-19) and of two “solutions” (face masks and contact-tracing apps). We find no agenda effects for COVID-19 in general. The magnitude of the crisis boosted its salience regardless of the relationship between the different agendas we study. By contrast, we find agenda-setting effects for face masks. As discussed in Section 5, politicians and the attentive

public drove the debate on this controversial attempt to contain the virus via social media. This highlights an important role for social media in enabling politicians to ensure the acceptance of measures during their temporary exclusion from decision-making processes during the state of emergency. We find less agenda-setting, as well as less salience, for the contact-tracing app which was adopted voluntarily on an individual basis.

Contributing to the larger picture of political communication in times of crisis, our results underscore how social media challenge the capacity of traditional elites to shape public opinion in times of uncertainty and crisis. To the extent that elite communication is crucial for compliance with policy measures, the findings suggest that social media may hamper the success of COVID-19 responses. This insight is particularly salient for the success of the vaccination efforts that are being rolled out worldwide. Social media seem to increase the diversity of voices and opinions without giving political elites a clear pathway to communicating their crisis response. We hope that future research will investigate interactions between politicians, the public and the media in times of crisis from a comparative perspective. Building on our findings, future research could distinguish between the salience of “problems” and of “solutions” in order to assess how our conclusions hold in other countries and contexts.

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## Supporting Information

### A Search Patterns for Classification

The keyword search described in the methods section is based on regular expression (regex) search patterns for all three topics. To make sure we retrieve most of the texts for each topic we built an extensive regex pattern which searches each term also *within* words. More specifically, the search pattern covid would also find and score #covid or Covid19. As described in the paper, the keyword-based classification works very well for COVID-19 content and face masks, but less well for the apps. As stated in Section 3, we validated the classification with three random samples, each sample consisting of 250 tweets. Table A1 lists the percentage of false positives and false negatives in each of these samples of 250 tweets. As described in the main text, the misclassification is usually low and unsystematic and additional analyses and underscore the face validity of our classification (e.g., Figure 2 and SI Section B).

Topic	False Positive Rate	False Negative Rate
COVID-19	1.0 %	8.0 %
Face Masks	3.0 %	0.4 %
Contact-Tracing-App	12.0 %	0.4 %

Table A1: *Classifier Validation Sample (Sample size for false positive is 100 per topic and for false negative is 250 tweets not classified in one of the three topics.)*

The classifier looks up the terms defined for the three topics (keywords are listed below). To improve the classification, we perform a case insensitive keyword search, meaning that terms are scored if they appear in uppercase, lowercase, or all capitals. For example, the dictionary key covid would score covid, COVID, and Covid. We adjusted the keyword search for texts relating to the SwissCovid App and only score search terms that contain the pattern app or apps. This “fixed” keyword search reduces the number of false positives, given that many common terms start with app\* but do not have anything to do with mobile applications (e.g., Appell). All texts scored as relating to the SwissCovid App or face masks are also scored as “general” COVID-19 content.

## **Classification of Content Relating to COVID-19**

For the COVID-19 category we used the following search terms: *corona, covid19, coronaschweiz, coronach, coronavirus, coronavirusschweiz, epidemie, social distancing, coronatests, pandemie, corona-pandemie, coronakrise, covid19ch, covidch, bag\_ofsp\_ufsp, coronainfoch, swisscovid, pandemie, covid, coronakrise, swiss-covid-app, coronapandemie, corona-sommer, covid-19-erkrankungen, corona-kredit, corona-infektionen, lockdown, schutzmaske, beatmungsgerät, beatmungsgeräte, pandémie, masques, crise sanitaire, covid-19, sars-cov-2, coronagraben, swisscovid, coronavirus, covid, epidémie, social distancing, garder ses distances, maske, contact tracing, masquer, maschera, respirator, hygienemaske, ffp2, atemschutz, swisscovid, covidioten, neuinfektionen, hospitalisierungsrate, covidapp, coronaapp, swiss-covid-app, contact-tracing-app, dp-3t, swisscovidapp, epidemiologisch, antikörper, maskenpflicht, maskenzwang, maskenwahn, herdenimmunität, coronawarnapp, contact-tracing, contact tracing, besondere lage, ausserordentliche lage, swisscovid-app, corona-app, covid-codes, corona app, corona warn app, contact tracing app, kontakt verfolgungs app, kontakt rückverfolgung*

## **Classification of Content Relating to Face Masks**

We use the following terms to retrieve articles and tweets relating to face masks: *schutzmaske, masques, maske, masquer, maschera, hygienemaske, ffp2, mascherina, masken, atemschutzmasken, atemschutz, maskenpflicht, maskenzwang, maskenwahn, mundnasenschutz, mund-nasen-schutz, gesichtsschutz, masque*

## **Classification of Content Relating to Contact-Tracing Apps**

The following terms are used to retrieve content relating to the SwissCovid app: *swiss-covid-app, covidapp, coronaapp, swiss covid app, contact-tracing-app, dp-3t, swisscovidapp, swisscovid-app, corona-app, covid-codes, contact tracing, swiss-covid-app, coronawarnapp, corona app, corona warn app, contact tracing app, kontaktverfolgungsapp, kontakt-verfolgungs-app, swisscovid, covid-codes, covid codes, corona app, dp3t, dp 3t, app and apps*



## B Assessing the Face Validity of the Classification

In this section, we provide plots with the most frequent terms in tweets classified as COVID-19, face-masks, and contract-tracing apps. We retrieve the most frequent words for each class. We exclude German stopwords, punctuation characters, and emojis (Benoit et al., 2018). Figure A1 plots the 50 most frequent terms in tweets classified as COVID-19. The five most frequent words all directly mention COVID-19 (*#coronavirus*, *#coronainfoch*, *#covid19*, *corona*, *#corona*). The Twitter handle of the Federal Office of Public Health of the Swiss Confederation (*@BAG\_OFSP\_UFSP*) is the sixth most frequent term. Word such as *schweiz* (“Switzerland”), *menschen* (“people”), *lockdown*, *pandemie* (“pandemic”) or *massnahmen* (“measures”) are among the top-50 and underscore that the tweets indeed seem to relate to COVID-19 in Switzerland.

Turning to content about face masks, Figure A2 shows that our list of keywords seems to have picked up relevant texts. *masken*, *maske* (“mask”, “masks”) are by far the two most frequent words in these tweets, followed by *tragen* (to wear), *maskenpflicht* and *#maskenpflicht* which are nouns referring to the compulsory requirement of wearing face masks. The list of tweets also contains many COVID-19 related terms and words such as *abstand* (“distance”), *schützen* (“protect”), *öffentlich* (“public”) and *einkaufen* (“shopping”). All of these terms relate to the debate about wearing masks in public spaces.

Figure A3 lists the 50 most frequent words in tweets relating to the Covid app. First of all, it is important to note that far the overall frequency of relevant tweets about the app is lower than tweets about masks. *app*, *#swisscovidapp*, *corona-app*, *#swisscovid*, and *@swisscovid* are among the top-10 words which clearly highlights that we retrieve tweets relating to the SwissCovid App. *contact* and *tracing* are the second and third most frequent words which further strengthens the validity, given that the app serves the purpose of contact tracing. Again, several COVID-related terms and *@BAG\_OFSP\_UFSP* are among the 10 most frequent words, indicating that the tweets indeed relate to contract tracing apps. The terms also include Twitter handle of Marcel Salathé, an epidemiologist who was involved in the development of the app, as well as the handles of politicians and journalists who were prominently involved in the debate around the app. Other words, such as *schweizer* (“Swiss”), *menschen* (“people”), *nutzen* (“to use”) and *freiwillig* (“voluntarily”), point to tweets that discuss the usefulness of apps as a policy response to COVID-19.

## C Vector Autoregression Models

To test our expectations we draw on vector autoregression models (VAR) with topic-fixed effects. This model explains the evolution of multiple variables based on their own lagged values as well as the lagged values of other terms, thereby allowing us to analyze the relation between

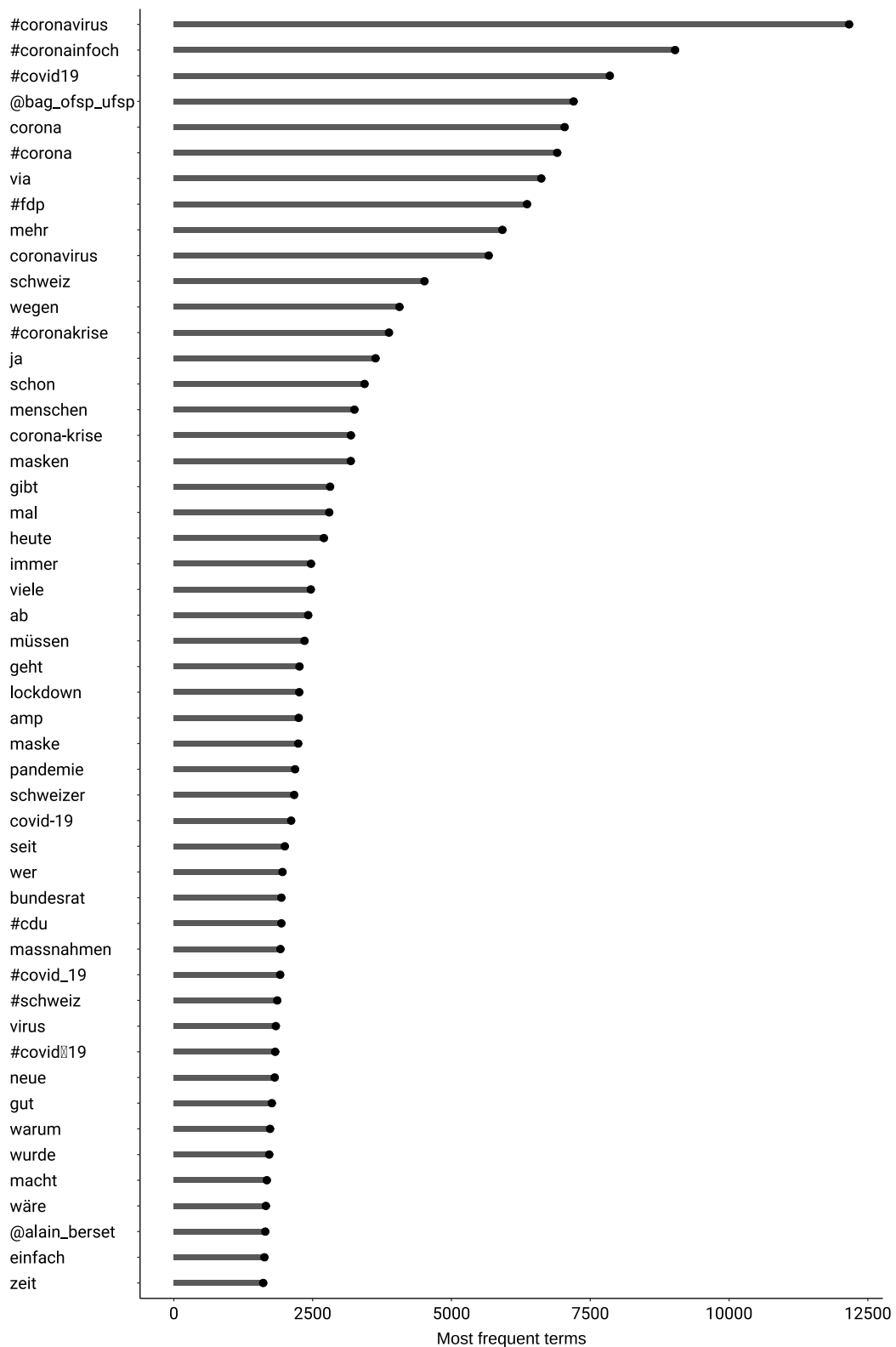


Figure A1: *Most frequent terms used in tweets with the topic COVID-19.*

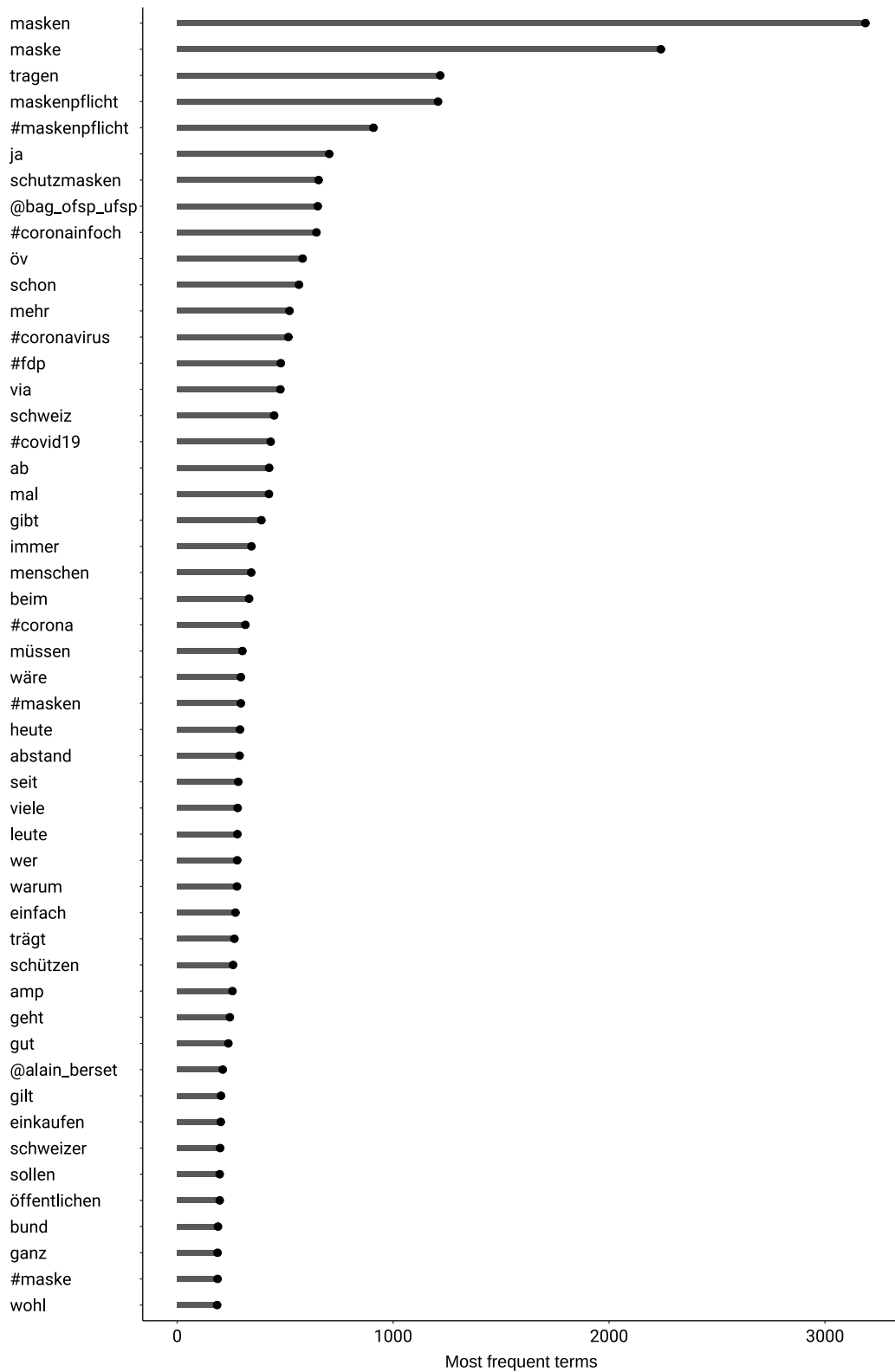


Figure A2: Most frequent terms used in tweets with the topic Face Mask.

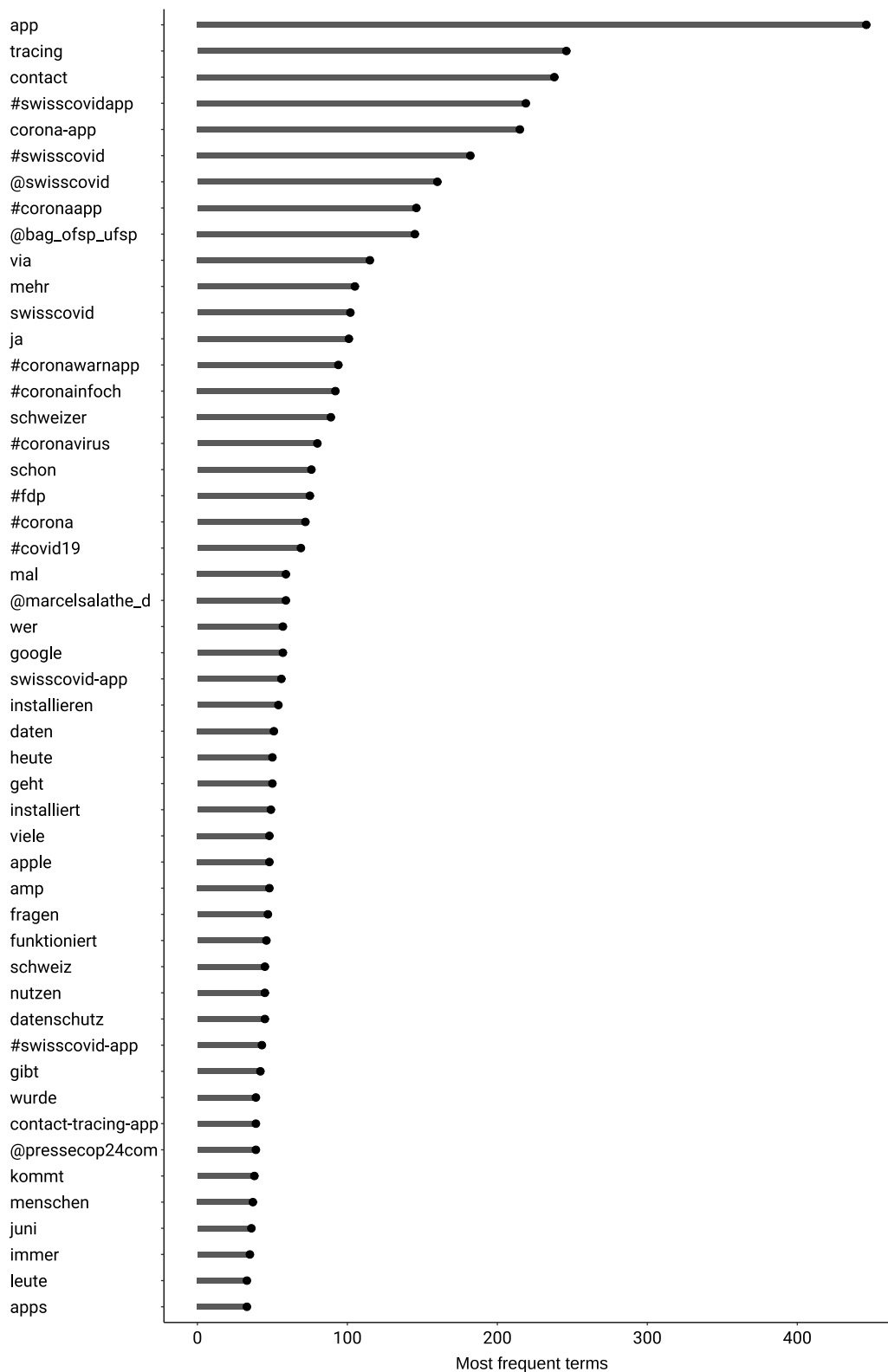


Figure A3: Most frequent terms used in tweets with the topic Covid App.

several evolving variables. VAR models are well suited to capture the process between endogenous variables and have been used by similar studies (Barberá et al., 2019; Wood and Peake, 1998; Edwards and Wood, 1999; Gilardi et al., 2021). In contrast to comparable modelling approaches, such as structural equation models, VAR models do not require a precise expectations regarding the mutual relationships between variables. Instead, the model merely requires to include all variables that hypothetically affect each other over time (Qin, 2011).

We build our model based on the design in Barberá et al. (2019). They use a VAR model with a set of stationary time series  $Y_i$  representing the share of daily attention by a group  $i$  paid to the topics  $j$  of interest. Since we use similar data (newspaper articles and Twitter data) from the Swiss context, we apply the same formula to make the interpretation of the results comparable to their and other existing work. Thus, our models employ a set of stationary time series  $Y_i$  which represent the proportion of the daily attention each group of actors  $i$  paid to each topic  $j$  of interest on day  $t$ . The values of these variables range from 0 to 1. Due to the often used transformation of the log odds  $Z_i$  of the described series  $Y_i$  in the model neither of the two edge values (0 or 1) can be present:  $0 < Y_{j,i,t} < 1$ . The reason for this is simply that mathematically we had to change observations with no hit to the value of 0.01. Since the formula used would not work with a zero value since the division within the log of  $0/(1 - 0)$  is forbidden. The distribution is strongly skewed to the right, as attention is distributed among many issues. As a result, we observe low attention to each issue on a given day. Hence, we use the log odds  $Z_i$  of the described series  $Y_i$ .

We express the endogenous relationship of these variables as a system of equations where each variable  $Z_i$  is a function of its own previous lags plus the lags of all the other variables. While we expect such responses to be rather fast on social media and, with a short delay, in news reports, we account for a possible longer-term decay by using a seven day lag structure. Using seven days as lag structure accounts for the differences in article numbers due to weekend editions for some of the outlets. We also use a seven day lag to account not only for the differences in news article frequencies over different weekdays, but also to account for the typical news cycle in Switzerland starting and ending with the weekly Sunday editions of many newspapers.

Furthermore, the announcement of actions relating to COVID-19 and their entry into force often took several days. Hence, our model therefore looks exactly like Barberá et al. (2019) and can be expressed as:

$$Z = \log \left( \frac{Y}{1 - Y} \right)$$

$$Z_{i,j,t} = \alpha_j + \sum_i \sum_{p=1}^{7days} \beta_{i,p} Z_{i,j,t-p} + \varepsilon_{i,j,t}$$

One important assumption made in this model is that the estimates of interest are constant across all issues of interest as given by the issue-fixed effect of  $\alpha_j$  in the model. While this as-

sumption is likely violated, we consider it sufficiently close to reality, since the differences will be rather small in case of the pandemic. The model allows us to estimate how much issue attention by one group needs to change on average to predict a subsequent reallocation of the issue attention of another group. Since the results of these models are hard to interpret, we use cumulative impulse response functions (IRFs), which allow us to display how a 10 percentage point unit increase in attention to a given issue by a group changes the cumulative attention the other actors contribute to the same topic over time. We do this for brief changes in attention of 10 percentage points (from 0% to 10%) for just one day at day zero. This change is calculated in a simulation for up to 60 days after the initial increase. These cumulative impulse responses are then summed over the first seven days to calculate the seven day lag structure to incorporate a whole news cycle of about one week <sup>1</sup>. The direction of the effects is identical across specifications.

### **C.1 Comparing Different Lag Structures**

To choose the most appropriate lag structure for our final analysis, we simulated the results from one up to 60 days. Figure A4 shows different lags from one to seven days. After just five days the cumulative IRF does not change much. This indicates that for an increase of issue attention of a given topic, other actors usually react (or do not react) within five days. Yet, as outlined in the previous subsection, we report seven-day lags because the typical news cycle lasts one week.

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<sup>1</sup>Why we choose a seven day lag is explained in the following section C.1

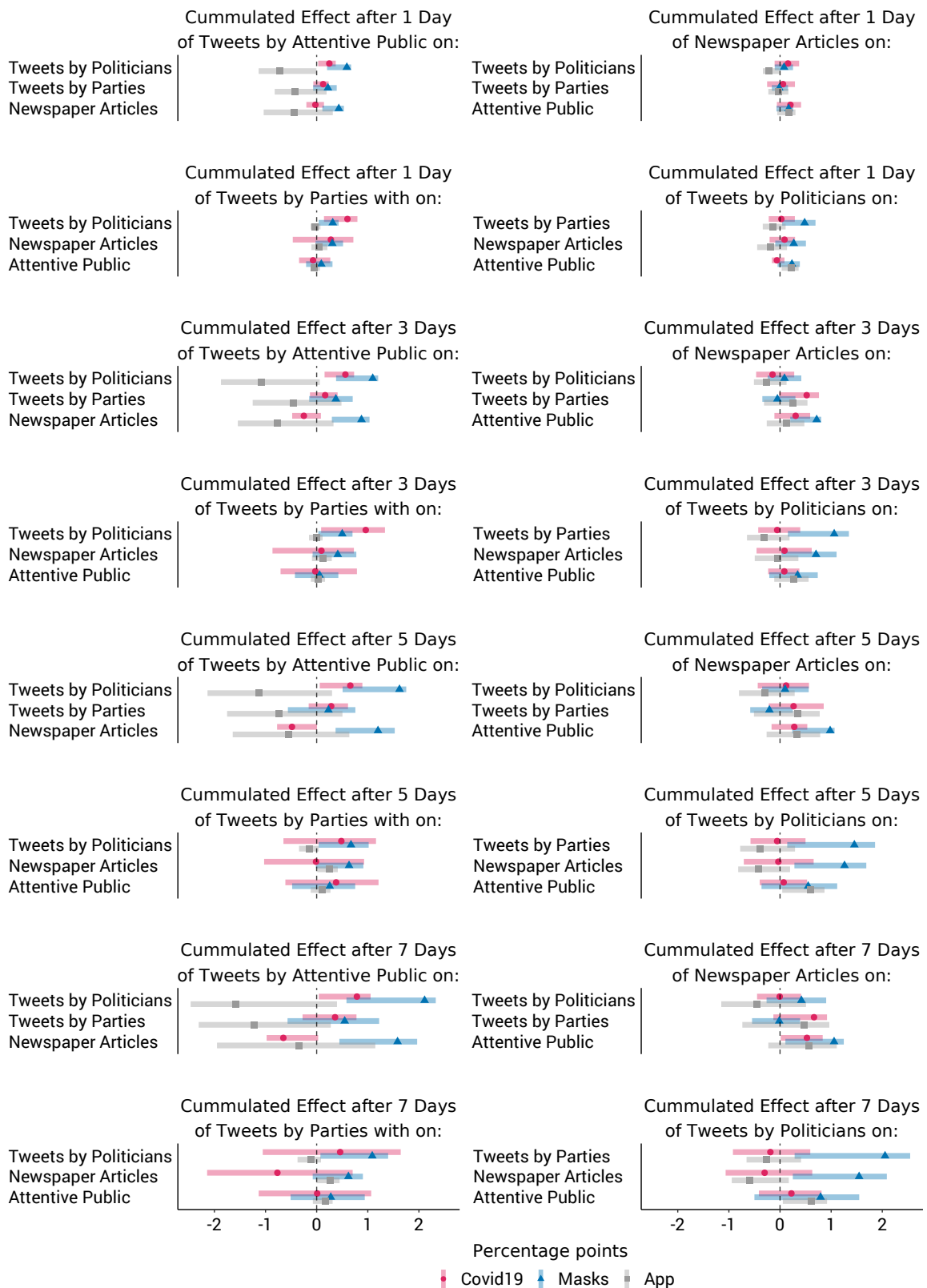


Figure A4: Agenda responsiveness of media, attentive public, parties and politicians with different lags. Bars denote 95% confidence intervals.