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Change in meeting culture over time as a consequence of Covid-19

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Contents

1. Abstract

During the years 2019-2022 the Covid-19 pandemic affected and shifted the day-to-day of the world on a global scale. Nationwide lockdowns forced businesses to change their meeting culture internally and externally, to accommodate new restrictions set in place by the government to reduce the spread of the virus. In this research paper, we are exploring the research question: How did the meeting culture change as a result of Covid-19, and are the changes temporary or permanent? To answer this question we have gathered daily search volume data from Google Trends, globally and nation specific of three major virtual platforms: Teams, Skype and Zoom. As well as supplemented the analysis with two semi-constructed interviews with participants from widely differing businesses and their subjective perception of the meeting culture. Through Regression Discontinuity Design (RDD) analysis of Italy with Covid-19-related lockdown as a treatment, we find that search interest in virtual meeting platforms drastically increased after the lockdown. To further solidify our conclusion, we replicated our analysis in the year previous to the introduction of Covid-19, and found no change in search interest of virtual meeting platforms after the placebo lockdown date. RDD analysis was conducted for several countries (Australia, Italy, Sweden, and the UK) with both lockdown and reopening as a treatment. On average, we find that interest in virtual meeting platforms drastically increased after the introduction of a lockdown, and modestly decreased after the lockdown ended. When investigating how search interest in virtual meeting platforms evolves over time, we find that it gradually decreases over the duration of the lockdown but does not return to initial pre-lockdown levels. The supplemented interviews supported the main findings of this paper and gave insight into a larger adaptation of virtual meetings, with a remaining emphasis on physical meetings as a necessity to build relations. Additionally; the financial, social, and environmental consequences of the change in meeting culture were discussed. The implications of this paper suggest that businesses would benefit from having a more open mind and acceptance towards change and new technologies.

2. Acknowledgement

We would like to take this time to express our heartfelt gratitude towards the individuals who made this research paper possible.

First and foremost, we would like to thank our supervisor Hammad Shaikh for making this possible. Throughout this project he has been tremendously helpful, insightful, always responsive and has given us clear guidance. He has purveyed a contagious enthusiasm, which has kept us motivated and inspired.

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We would also like to thank both Sigrid Thors and Harald Sundalskleiv for their enthusiasm, time, and participation in the collection of data for the qualitative section of this paper. Their valuable insights and experiences have enriched this research, and we are deeply appreciative of their willingness to engage in meaningful discussions.

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3. Introduction

In late 2019, global media attention became focused on a specific town in China, signaling the onset of a series of strict government measures that would later be recognized as some of the most severe and unprecedented restrictions on personal freedom witnessed in recent history. The virus SARS-COV-2, more commonly known as Covid-19, was spreading at a rapid pace. By March of 2020, the World's Health Organization (WHO) declared the outbreak of Covid-19 a global pandemic. In order to limit the contagion of the virus, most governments introduced lockdowns, effectively shutting down all non-essential work, activities, and travel. Due to new restrictions and empty offices, work needed to be done from home, and the home office became the new temporary norm. The new norm did, however, not lend itself easily to most businesses, in particular, the large corporations operating on a global scale. The meeting culture had to change, at least temporarily. Which brings us to our motivation and research question for this thesis:

How did the meeting culture change as a result of Covid-19, and are the changes a temporary shock or permanent effect?

More specifically exploring how Covid-19 has influenced the meeting culture in the short term, and the long term. This includes, but is not limited to: How the meetings are being conducted, the environment the meetings are held in, the financial impact on the business, the social impact on the employees, and the consequences towards carbon footprint. The initial thought that comes to mind is the prevalence of virtual meetings as a solution to traditional gatherings being restricted. Although neither of the authors have been in full-time employment at the time of writing this paper, the effects of Covid-19 were apparent in part-time work and academic settings. This led us to wonder how much the use of virtual meeting platforms grew during Covid-19, and whether this was a solution for a temporary problem or a practical tool that just needed more exposure. Initial research showed no previous literature which captured the change in meeting culture as a result of Covid-19 and this thesis aims to fill in that gap. This thesis is the first to apply econometric methodology along with interviews to research impacts of Covid-19 on meeting culture. Our approach for the thesis is both a qualitative and a quantitative approach. Our main approach for data collection is the quantitative approach, with data derived from Google's Google Trends function and its

respective API. This gives us access to large amounts of daily data over any long period of time as long as the timeframe is lower than one year. The data is free and available making it ideal for our thesis. The data collected is the search interest of any given search term and displays search interest in a frequency range of 0 to 100 based on the highest search traffic within the selected period. The selected search terms for this thesis have been derived from initial research of virtual meeting platforms and their popularity and resulted in three platforms to be used as keywords for our data collection: Skype, Teams, and Zoom. The qualitative approach to this thesis is the inclusion of two 90-minute semi-constructed interviews of two representatives in widely different businesses. The interviews provide the subjective perception of change in the meeting culture of the participants, and how Covid-19 affected the meeting culture within their respective organizations. Through these interviews, the social, financial, and environmental aspects of the changes will also be briefly explored. The specific setting of this paper is a business administration master thesis by two master students, from the specializations: Leadership in a digital economy and Economics, a year after the "end" of Covid-19.
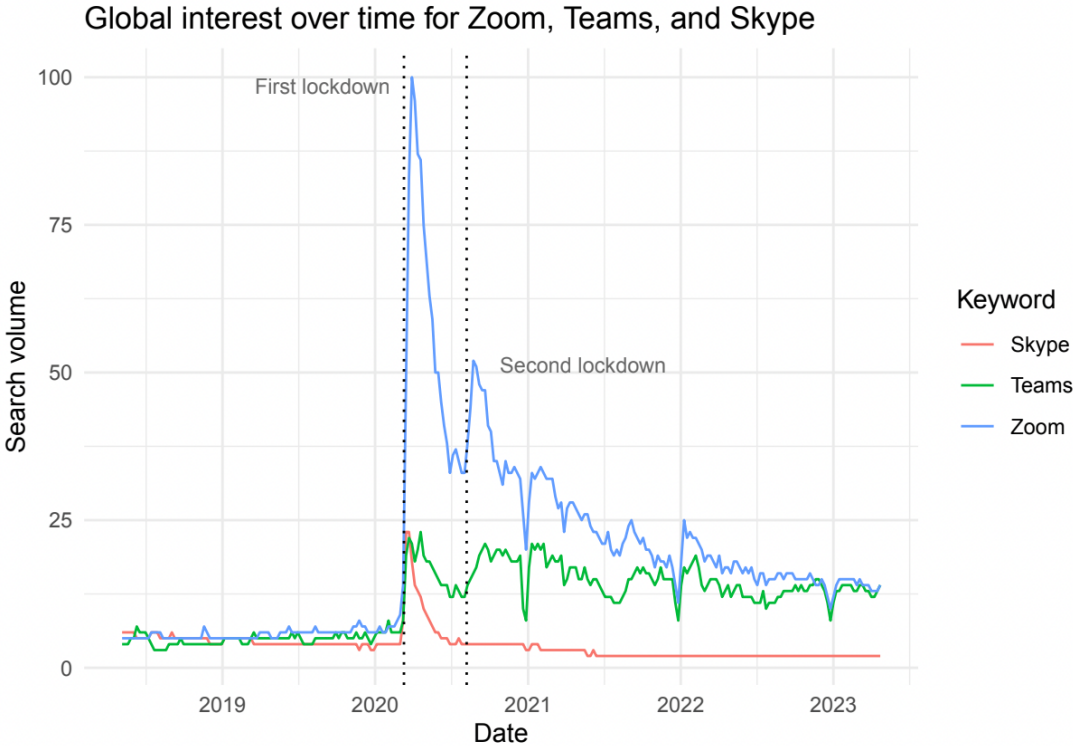
Despite the graph showing Teams relative search interest being 0, Teams came in to existence March 14th of 2017. The lack of search interest displayed shows a relative low search interest for Teams in the early years compared to the compared search terms

Figure A: Motivational plot for global search interest between 2019 and 2023

Figure A presented above illustrates our motivational plot, highlighting the massive spikes in search interest in proximity to the date of lockdowns. The plot indicates a massive shift towards virtual meeting platforms in periods of lockdown and subsequently raises the question of a change in a meeting culture.

A limitation of the thesis is the presumption that search volume equates to usage, while search volume gives an indication of usage, it is not as specific of a metric as actual daily users would be. But search volume is chosen as it is the most optimal metric accessible.

Based on our findings, our research reveals significant changes in meeting culture as a result of the Covid-19 pandemic. Our findings indicate a substantial increase in the search interest and usage of virtual meeting platforms during lockdown periods across multiple countries. Additionally, the results of the regression indicate that the increase reflects not only a temporary shock, but a permanent shift towards more usage of virtual meeting platforms. The countries that are being examined further in the study are Italy, Australia, Sweden, and the UK. These countries are being used in several analyses in terms of reviewing the periods of pre, during, and post-lockdown. The first conducted analysis consisted of an RDD analysis of Italy during lockdown. The findings of this analysis suggest a jump in search interest during this period. For further evidence, an analysis of Italy under a hypothetical lockdown has been made, which measures search interest one year prior which will be referred to as the placebo analysis of Italy. The results show no indication of any jump in search interest during this period as well as giving insignificant results. Furthermore, we presented all the countries mentioned in one RDD analysis, resulting in a significant jump in all countries during the lockdown. The primary findings of this research paper stem from the pooled analysis, where we observe a substantial increase in search interest upon the start of a lockdown, followed by a gradual decline during the lockdown period. Furthermore, as countries reopen after the lockdown period, the search volume decreases but to a level higher than prior to the lockdown.

The subsequent sections of this paper will be structured as follows:

Section 2 connects the thesis and our research to existing literature, explains how it's similar in its approach to previous work, and how it supplements existing literature on the topic. Section 3 aims to provide relevant background information and context over the major organizational, governmental, and institutional consequences and implications for the time frame in which the focus of the research lies. Section 4 explains and elaborates on our method

of data gathering, the nature of the scaling of the gathered data, argumentation for choice of input data and time frame as well as an overview of the analysis. Section 5 is our section for quantitative results and findings, it includes RDD, placebo analysis, pooled analysis, and plots. Additionally, this is the section where we explain and elaborate on our regressions. Section 6 is the qualitative results and findings from the conducted semi-constructed interviews. Section 7 explains the limitations of our research, and mentions areas for future research as well as the implication for our findings. Section 8 concludes this paper, and gives and seeks to provide a summary. Section 9 lists all of the relevant citations applied in this paper. Sections 10 and 11 provide figures and tables respectively, and section 12 provides the appendix.

4. Literature review

This paper draws upon multiple pre-existing bodies of literature as its foundation. The initial academic field of significance for this paper pertains to the domain of organizational communications, which is foundational for our concept of meeting culture. It substantiates the relevance of our research by giving an understanding and overview of the topic, the evolution of organizational communication, and its place in academic literature. However limited literature exists on the subject of meeting culture specifically, particularly in the field of economics.

As previously stated in the introduction, this paper is the first to use econometric methodology along with interviews to research the impacts of Covid-19 on meeting culture. This paper adds to an expanding body of literature focused on the general impacts of Covid-19 and its associated lockdowns (Briscese et al., 2020; Brodeur et al., 2020; Bennett et al., 2021; Birmingham et al., 2023; Saha et al., 2020; Brodeur et al., 2021). It distinguishes itself from the other articles by virtue of being the only paper focusing on the impacts on meeting culture, and as such serve as a unique contribution to the field.

This paper is situated within a broader body of literature that employs Google Trends data as a valuable tool for analysis (Walker et al., 2020; Dergiades et al., 2018; Schaub et al., 2020). However, it differentiates itself through the employed methodology and analysis.

This paper's methodology and approach are mainly inspired by the literature "COVID-19, lockdowns and well-being: Evidence from Google Trends" (Brodeur et al., 2021), as it provides valuable insights and methodological guidance for examining the impact of the Covid-19 pandemic and associated lockdown measures.

Furthermore, our paper is inspired by this article in terms of the data acquisition through Google Trends, as well as the incorporation of regression discontinuity design (RDD) as a fundamental aspect of its methodological approach. The article by (Brodeur et al., 2021) focuses on search terms for well-being of the individuals during lockdown, while our thesis differentiates itself by concentrating on the meeting culture and the use of virtual meeting platforms. Our thesis employs pooled analysis, which is not employed by (Brodeur et al., 2021), along with a distinct approach to the placebo analysis. As the aforementioned article was published in January 2021 with the pandemic still ongoing, there is limited emphasis on long-term analysis in the article. In our thesis, we present both short-term effects as well as long-term effects after most countries had administered the second dose of the Covid-19 vaccine, as effectively an "ending" date of Covid-19. This was accomplished by utilizing a "days to lockdown" factor and a "days to reopening" factor.

Additionally, this paper draws inspiration and methodology in the supplementary qualitative section from the literature "Interviewing as qualitative research: A guide for researchers in education and the social sciences" (Seidmann, 2006). The literature gave insights to how semi-constructed interviews should be conducted, and shaped our interviews for qualitative data gathering.

5. Institutional background setting

The context and background for our research is the global pandemic Covid-19, the institutions that regulated and restricted the meeting culture, and the impacts to the businesses and organizations involved. This section aims to give more information and context towards that. It is worth noting that the restrictions and government measures towards Covid-19 were decided at a national level, and as such countries will differ in how restricted the inhabitants were, and as such the following background only captures the context on a general level.

Government institutions:

Following the first casualties of the virus in Italy, and the following WHO announcement, each nation's government strategized and planned their approach towards limiting the spread of the virus. Most countries and their respective governments opted for a lockdown of the country, and restricted inhabitants of personal freedom in order to limit the contagion amongst its inhabitants. The main argument being to slow the contagion for the sake of keeping the health care stable, and functioning for the patients needing care. Sweden was the only country in the western world to opt for a herd immunity strategy through mass infection, and as a result, received no restrictions to their freedom from their respective government.

Impact of businesses and organizations:

The first wave of lockdowns in April and May 2020, resulted in forced closure of most businesses providing non-essential work. The service industry was effectively closed up, and non-service-oriented businesses had to adapt to still work. As offices closed, work now had to be performed from the individuals' homes.

Virtual platforms:

The closure of offices around the world led to a rapid increase in popularity of virtual platforms such as Skype, Teams, and Zoom. As shown in Figure A, earlier in this paper. These were used for general work communication, meetings, lectures, and connecting with people, while stuck in the confinement of the home.

WHO:

World's Health Organization (WHO) provided guidance and recommendations during the global pandemic. As an international organization, the impact they had was restricted to an advisory role, consulting the world on its response towards the virus.

Legal framework:

The governmental actions and legal framework at place, varied from country to country, and usually came from large press conferences from the respective countries' state leaders. Restrictions and legal repercussions varied depending on the strategy utilized by a county, as such Sweden for example did not have almost any legal framework while countries like UK and Australia had strict restrictions enforced by temporary law. These included but were not

limited to isolation, shutdowns, limited contact, and travel bans. Several countries also enforced these restrictions by handing out fines for individuals breaking the restrictions, increased border control and exercising strict quarantine for arrivals.

6. Data

This study applies both qualitative and quantitative approaches in terms of the acquisition of data. The data is provided by the Google Trends function and its respective API through the software RStudio. As for retrieving data for the analysis, the interviews were conducted for additional answers on hypotheses regarding search interest on the virtual platforms, and insights on how companies had to adapt to the lockdown.

Google trends data

Google Trends is a free online tool offered by Google that provides information and statistics on the search interest of a selected search term or topic over time (Google, 2023). The data gathered for this study are based on two specific time periods: 2018 to 2019 and 2019 to mid-2020. The first time period examines 1 year prior to the official lockdown, and the other is based on when the lockdown was already implemented in most countries. The intention behind these periods is to compare both periods and examine whether the lockdown is the main reason for the potential increase in search volume on Zoom, Teams, and Skype. The period 2018 to 2019 serves as the placebo analysis for Italy which is being compared respectively to the other countries. All our data consist of daily data based on the selected search terms as they are considered some of the most used platforms in terms of online meetings in companies. Based on our limited interviews, Teams is currently the most used platform across businesses. In the past, the most used virtual meeting platform was predominantly Skype. It is worth noting that Microsoft didn't provide its product "Microsoft Teams" until 2017 and it has gradually increased in terms of usage afterward.

The specifics of the quantitative data

Data gathered from Google Trends are set in a time period of 3 months before, and 1 month after the lockdown took place for each selected country. Our data includes countries such as Australia, Italy, Sweden, and the UK. The data presents limitations related to the scale of search interest on search terms. The search interest is limited from zero to 100, with 100 representing the highest search traffic during the selected period, and therefore presents only a

simplified view of the selected search terms. For collection of data, we mainly utilized the API function in Rstudio, with an exception of one case where manual download was necessary. The data frames consist of variables such as *search volume*, *keyword*, *country*, *days_to_lockdown*, and *post_lockdown*. These variables are presented in the plots and also used for estimating the regression model for the RDD analysis. For Sweden, we replaced the variable *Post_lockdown* and added the variable *days_to_announcement* instead, as Sweden did not have an official lockdown. To analyze whether the increase in search volume is driven by the lockdown rather than the WHO announcement, we utilized Sweden as a comparison. Our goal is to estimate the jump in search volume and determine if the lockdown primarily influences it. Therefore, we expected no significant increase in search volume for Sweden following the WHO announcement.

Furthermore, in addition to the previously mentioned collected dataset, we incorporated two additional datasets which define our pooled analysis. The pooled analysis combines data from all the selected countries, grouped by the periods of lockdown and reopening. Stacking the data together we aim to better understand potential fluctuations in search volume during the period of lockdown and the reopening phase.

The collected data for analysis is inspired by the varying lockdown situations in each selected country. Sweden was included as a comparison country, as it did not have an official lockdown, while Italy served as a placebo analysis case. This approach allows for the observation of significant similarities or differences among all the selected countries. Once all the necessary data is gathered, we proceed with generating various plots, figures, and results. These plots include both combined data for all platforms in each selected country and separate plots for individual virtual platforms. The objective of this approach was to provide a comprehensive view of the selected search terms.

After achieving the plots, we proceeded with conducting RDD (Regression Discontinuity Design) regression models to examine the results and derive further insights.

Qualitative data through semi-constructed interviews

As supplementation to the analysis presented in the thesis, two subjects were interviewed. When selecting participants for interviews, there were certain criteria that had to be met to make the interview subject relevant to this thesis. The subject needed to have knowledge of

the meeting culture, past and present as the questions revolved around the meeting culture before and after Covid-19.

It was preferred to get a participant with a medium to high-ranking role in the company, as the information would then be more available to the participant, as opposed to a lower role within the hierarchy of the business. Most importantly, participants needed to be someone involved in a lot of meetings.

With a low amount of total interviews or sample size, we opted to go for different and contrasting interview subjects which could potentially capture a larger historical picture. The last determining factor is the availability and the lack of a business network from the authors. Fortunately, both participants were willing, eager, and happy to contribute to this paper.

The first participant is Sigrid Thors, working for Asko Rogaland in a human resource role. She is very involved in the meeting culture at Asko Rogaland, as well as responsible for recruitment, making her a very relevant participant for the interview.

The second participant is a man named Harald. Harald is a Chief commercial officer at Earth Science Analytics AS and has over 20 years of international work experience. His career past and present has revolved around selling technology to the energy sector, more specifically mainly oil and gas. Additionally, this has led him to have multiple national and international customers, with which he regularly has business meetings.

The interviews are semi-constructed in nature, with a duration of 90 minutes. The reasoning for the specific allocated time slot is for the participant to feel it's taken seriously, while not being over demanding towards the participant's time (Seidmann, 2006, p.20). Additionally, the length is derived from a perception of 60 minutes or less being a time in which the subject is overly conscious of the time spent, contrarily 120 minutes present the feeling of being too extensive (Seidmann, 2006, p.20). The interviews consist of 13 questions, which can further be categorized into 6 different interview segments. According to the subject's answers to the 13 initial questions, we followed up on the tangents which were presented. The answers given to both initial questions and tangents will be presented as quotes alongside the segments in a discussion later on in the result section of this paper. The segments are the following:

Pre Covid-19 - Meeting culture

During Covid-19 - Meeting culture, degree of lockdown

Post Covid-19 - Meeting culture

Impacts of potential changes - Financially

Impacts of potential changes - Socially

Impacts of potential changes - Environmentally

7. Quantative results

This section presents the RDD analysis and discusses the findings obtained from the analysis, along with insights gathered from the two semi-constructed interviews conducted as part of the study. During the interviews, participants shared their subjective perceptions of the meeting culture in terms of pre, during, and post-lockdown.

Multiple regression model

To measure the impact of the lockdown on search interest in specific search terms, we employed a multiple regression model to estimate the search volume. The models utilized were inspired by the "level-level model," a widely used approach in data analysis that aims to estimate the impact of a treatment on an outcome while controlling for other observable determinants of the outcome. This modeling approach is commonly employed in social sciences and economics to examine relationships between variables measured at the same level. The RDD analysis models were inspired by the following model:

Regression Equations

Level-level model. The multiple regression model can generally be written as follows:

$$Y(i) = \beta 0 + \beta 1 T(i) + \beta 2 X(i1) + \ldots + \beta k + 1 X(ik) + \epsilon(i) \ . \tag{1}$$

In the given model, Y(i) represents the outcome variable. T(i) represents the independent variables, also known as the treatment variable. Each independent variable has its own β coefficient associated with it. This indicates the strength and relationship related to the dependent variable Y(i). Furthermore, X(i1), . . . , X(ik) represents the control variables included in the model.

Lastly, $\epsilon(i)$ denotes the error or residual in the model. These residuals capture the unexplained or random variation in the dependent variable that is not accounted for by the independent variables.

Drawing inspiration from the level-level regression model, we developed our own adapted model to analyze the search volume of the search terms Zoom, Teams, and Skype. The multiple regression model used to estimate the search volume for Zoom, Teams, and Skype is presented below:

$$SearchVol = B0 + B1*Days\_To\_Lockdown + B2*Post\_Lockdown + B3* \qquad (2)$$
$$Days\_To\_Lockdown*Post\_Lockdown$$

Brief presentation of the equation

The dependent variable in the model is represented as SearchVol, which serves as the outcome variable. The regression coefficients B0, B1, B2, and B3 correspond to the parameters associated with each independent variable. B0 denotes the intercept or the constant term in the regression equation, representing the expected mean value of SearchVol when all independent variables are set to zero.

B1 signifies the anticipated change in SearchVol for a one-unit change in *Days_To_Lockdown* while keeping the other variables constant. B2 represents the expected change in *SearchVol* when the *Post_Lockdown* variable is equal to one (compared to zero), holding other variables constant. B3 represents the expected change in the relationship between *SearchVol* and *Days_To_Lockdown* when the *Post_Lockdown* variable is equal to one.

The independent variable *Days_To_Lockdown* captures the number of days until the lockdown occurs and examines the impact of the timing of the lockdown on the outcome variable, *SearchVol*. Additionally, the independent variable *Post_Lockdown* takes a value of 0 before the lockdown and 1 after the lockdown. This variable elucidates the effect of the post-lockdown period on *SearchVol* compared to the pre-lockdown period.

Finally, the term *Days_To_Lockdown * Post_Lockdown* represents the interaction between *Days_To_Lockdown* and *Post_Lockdown*. It captures the combined effect of both variables on

SearchVol. The coefficient B3 indicates how the relationship between *SearchVol* and *Days_To_Lockdown* changes when *Post_Lockdown* is equal to one.

RDD of search interest in Italy during lockdown

The first RDD plot conducted in this study examines Italy during the lockdown period, which consists of 3 months before and 1 month after the lockdown was implemented. Examining Figure 1, our expectation was that there was an increase in search interest with a value of 50 during lockdown as the plot gives an indication of a significant jump in that period. To confirm the results of the plot and its accuracy, the variable of B2 in Table 1 needs to be equal to the expected value of the gap presented in the plot. When analyzing the results in Table 1 we can see that the search interest increased by 50.586 during lockdown on Zoom, Teams, and Skype in total. The results also provide evidence that the search interest increased by 0.095 before the pre-lockdown period and then decreased by 0.498 after the lockdown. In terms of model reliability, Table 1 shows an indication of statistical significance at a 1% level as the p-value is less than 0.01, assuming the null hypothesis is true.

RDD of search interest during the hypothetical lockdown in Italy

To gain a better understanding of the impact of the lockdown on search interest, we replicated the RDD analysis of Italy during the lockdown period. However, in this analysis, we changed the period to one year before the lockdown took place. The objective is to examine whether the search interest increases to the same extent as during the lockdown, providing further evidence of a connection between the increase in search interest and the lockdown.

Based on the observations from Figure 2, the figure shows a slight increase until the reopening phase, after which it gradually decreases, but shows no indication of any jump in search interest during lockdown in this period. Examining Table 2, it becomes apparent that there is a marginal increase of 0.066 in search interest over time during the pre-reopening phase, reaching a peak of 0.333 at the onset of the lockdown. Subsequently, there is a decrease to 0.117 in search interest over time post-lockdown.

Based on the result from the table there is no evidence of any jump as the there is no significant increase in search interest during this period. The result shows indication of statistical insignificance for Post_lockdown variable, which is the main estimation of this

analysis. in addition, Days_to_lockdown:Post_lockdown variable indicates statistical insignificance as well, implying that both variables do not have a significant impact on search interest.

RDD of search interest during the reopening of Italy

In addition to the second analysis conducted on Italy, we performed an RDD analysis specifically focusing on the two weeks before and after the reopening, which took place on June 3, 2020. The purpose of this analysis was to examine whether there was a noticeable decrease in search volume after the closure ended, shedding light on whether the surge in search interest was short-shock or had led to a permanent increase.

The results presented in Table 3 indicate that search interest decreased by 2.067 during the pre-reopening period, followed by a significant jump by 14.660 during the reopening, but is shown as not statistically significant, as presented in the table. During post-reopening phase it then gradually decreases by 1.051.

Furthermore, examining Figure 3, there is modest evidence that search interest may have increased after the reopening, but this is not statistically significant from 0 as shown in Table 3. One explanation for this could be that a reopening has som anticipation effects, where people within the organization start to discuss how they want to transition.

Studying Figure 3 there is evidence of a gradual decline in search interest leading up to the reopening, followed by a noticeable increase during the reopening phase (not statistically significant). However, after the reopening, the search interest continues to decline.

Based on the results, it suggests that the model is statistically significant during the pre-reopening period but not statistically significant in the other two periods. The result of this is that the observed data does not provide sufficient evidence to reject the null hypothesis. In other words, the p-value associated with the statistical test is greater than the predetermined significance level (e.g., 5% or 1%), indication that the observed result is likely to occur by chance.

RDD of all four countries during the lockdown and WHO announcement.

After analyzing Italy, we expanded our analysis to include other countries, namely Australia, Sweden, and the UK. The purpose of including these countries was to gain a broader understanding of the lockdown and to observe how companies adapt to the situation. Each country often operates differently and therefore often adapts differently. To ensure accuracy in our analysis, we collected data from these countries and merged it into a stacked dataset as shown in Table 4.

Observing Figures 1, 4, 5, and 6, all the figures show indications of an increase and jumps in search interest in the country Italy, Australia, Sweden, and the UK during the lockdown and announcement in Sweden. From examining Table 1, we can confirm this observation shown in the figures, showing an indication of statistically significant coefficients at 1% level. This indicates strong evidence of a significant increase in search volume for online meeting platforms immediately following the introduction of a Covid-19 closure.

When examining the results for each country, it becomes apparent that Italy exhibited the highest jump in search volume, witnessing an increase of 49.383. Australia closely followed with a substantial rise of 33.214, while Sweden experienced a similar upswing of 30.948. Comparatively, the UK demonstrated a slightly lower increase of 26.716.

Italy's response in implementing the lockdown may have contributed to its significant jump in search interest, especially considering that it was one of the first countries to witness substantial Covid-19-related fatalities. In the case of Australia, stringent and decisive measures were implemented during the lockdown, distinguishing it from countries like Norway, where restrictions were gradually imposed.

Regarding Sweden and the UK, it is conceivable that a pre-existing emphasis on virtual meeting platforms existed prior to the pandemic, which could explain the relatively lower jump in search interest in these countries. While it is possible to speculate on the connection between the measures implemented and the observed increases, conclusive evidence cannot be asserted with absolute certainty. Therefore, further research is warranted to delve into this aspect.

RDD of pooled analysis during the lockdown and reopening

Lockdown

Having gathered all the data needed for our study, we conducted a pooled analysis consisting of combining separate data into one single dataset. In this analysis, we are examining Australia, Sweden, and the UK as shown in Figure 10. However, since Sweden did not have any lockdowns, we implemented the data related to the WHO announcement. The respective dates for lockdown dates in Australia and the UK are the 23rd and 24th of March 2020. The figure indicates a noticeable increase in search interest across all selected countries during the lockdown period, further confirmed by Table 4. The table verifies that there is indeed a substantial jump in search interest, with an increase of 55.608 during the lockdown period. The observed increase in search interest strongly suggests a notable shift in company practices, specifically a transition from traditional office setups to remote work arrangements in response to the government-imposed lockdown measures.

Reopening

Furthermore, we also examined the period of the first reopening of the country Australia, Sweden, and the UK. Figure 11 indicates a recession in search interest on Zoom, Teams, and Skype during the reopening. The results shown in Table 8 for pooled analysis during the reopening phase, indicate a decrease in search volume by 7.238 on a 5% significance level.

Pooled analysis for each country during reopening

In addition to the two analyses above, we conducted the same analysis but separated based on platform during the reopening. The results indicate varying levels of search interest, changing from country to country. In terms of statistical significance, Australia is the only country with any significance level in the model, demonstrating a significance level of 1%. The results indicated varying levels of search volume changes for each country. Australia showed a reduction in search volume by 17.216 across Zoom, Teams, and Skype, while Sweden showed a slight decrease of 3.923. The UK showed a decrease as well in terms of 1.052.

8. Qualitative results

Semi-constructed interviews

This section aims to present the qualitative findings obtained from our study. It encompasses the participants' subjective perceptions pertaining to the aforementioned aspects, along with the most significant quotations extracted from the semi-structured interviews conducted. The participants in this study are Sigrid Thors, representing Asko, and Harald Sundalskleiv, representing Earth Analytics. Hereafter, they will be referred to as "the participants" or simply as Sigrid and Harald. It is important to note that these two businesses differ substantially in nature, as well as in their respective customer bases. Asko operates as a distributor engaged in the distribution of goods to a range of establishments including grocery stores, cafeterias, and other commercial entities. In contrast, Earth Analytics specializes in providing technology solutions to the energy sector on a national and international scale. Consequently, Asko's customer base and demand exhibit stability, whereas Earth Analytics pursues growth by continuously acquiring new customers.

Pre Covid-19 - Meeting culture

The prevailing meeting culture prior to the onset of the pandemic predominantly revolved around physical meetings, while organizations exhibited varying degrees of adaptation to virtual meeting platforms. The extent of virtual meeting adoption and integration prior to the emergence of Covid-19 was contingent upon factors such as company size and organizational characteristics. Notably, both interview participants emphasized the conventional practice of physical meetings, to the extent that individuals would undertake air travel to attend meetings in different cities and return on the same day.

"You traveled to Bergen for the day, traveled to Oslo for a meeting, then went home again, it was very common. You were supposed to always have the presence and the so-called physical meeting room contact to get to know people." -Harald Sundalskleiv

There was, nonetheless, a disparity in the utilization of virtual meeting platforms among the participants. Sigrid and the business of which she represents, demonstrated limited adoption of virtual meetings, and predominantly associated their usage with external meetings.

"The meetings before Covid-19 were mainly physical, there were very few Teams meetings before. Unsure if there were any, well I had a couple of skype meetings with a colleague. It got the job done, but it wasn't the same. Before the pandemic it was only external meetings which were done through the internet, after the pandemic it changed." -Sigrid Thors

In contrast, Harald indicated a more extensive integration of virtual meeting platforms, accompanied by distinct use cases. According to his experience, it was the internal meetings, rather than external ones, that were predominantly conducted using virtual meeting platforms.

"You had for example management meetings between several locations that were done through teams before the pandemic. It was weekly management meetings, quarterly reviews, monthly reviews. But sometimes you gathered some of the locations, at least the ones which were in the same time zone."-Harald Sundalskleiv

"Virtual meetings were more of an internal thing in the business, rather than having lots of meetings with the customer segment on teams. You had it in limited forms, but if you were to demo or present some technology, a representative was always present with the customer. In most cases you were physically present with the customer to present the product for the customer."-Harald Sundalskleiv

During Covid-19 - Meeting culture, degree of lockdown

The first questions asked in this segment revolved around how the lockdowns affected the businesses, and how the businesses responded to the lockdown. The lockdown referred to is the nationwide lockdown presented at a press conference in Norway by the prime minister on 12th of May 2020. Despite facing similar lockdown restrictions, Asko, represented by Sigrid, operated as a community critical business. This distinction resulted in different responses to the lockdown restrictions between the two businesses.

"At first we only followed the recommendations of stricter hygiene, while people still worked as per usual. But then there was a short period where parts of the workforce were forced to stay at home, something they didn't do willingly. But then we quickly ended up back in old

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*habits and people came in to work. Initially it was only the people with necessary reasons that were allowed in to work, and there were a lot of people upset by this and hesitantly said yes."
-Sigrid Thors*

"We just shut it down. Press conference on the day, then it was just to pack up, people brought equipment and emptied the offices. Well it would be some weeks, but people knew that it would last longer than that. That was the major transition where all communication went virtual."-Harald Sundalskleiv

The difference in response and severity between the two businesses, also resulted in varying degrees of impact. While Asko mainly could operate on a normal level, without much interference, except some personnel temporarily being forced to work from home. The business represented by Harald underwent a more extensive adaptation process and experienced more extensive ramifications as a result.

"When you were forced by the pandemic, virtual meetings became more of a thing, because you had no opposition. The only way to meet the customer was through video conference, and then you just had to do that straight away."-Harald Sundalskleiv

"Existing clients adapted quickly, but it was hard to sell new products because you didn't acquire new customers. You used a year to adapt to that part. Before it was an internal thing, but after the press conference everything was on teams, and people just called you on teams instead of booking a meeting" -Harald Sundalskleiv

Post Covid-19 - Meeting culture

Increased utilization of virtual meetings is a point which both interview subjects presented, although there was a perception of increased virtual meetings, physical meetings were perceived as maintaining a consistent level post-Covid-19.

"I would say there has been a slight increase in meetings after Covid-19, even though I feel the number of physical meetings has stayed the same."-Sigrid Thors

"We use virtual meetings all the time"-Harald Sundalskleiv

The surge in virtual meetings can be attributed to various factors, including the inherent characteristics of such meetings, the abandonment of certain traditional meeting practices, and an increased emphasis on their efficiency. One participant highlights the emergence of a new hybrid approach that deviates from traditional meeting culture, along with a greater acceptance of virtual meetings.

"This is due to virtual status meetings which are short and precise and are just magical. You don't sit longer than needed, and you remove the small talk after.
In addition, short meetings with other divisions in the country are held digitally" -Sigrid Thors

"The meetings up and down from Bergen, and to Oslo etc have disappeared, you don't bother those anymore. Not unless you have multiple meetings or it is a must."-Harald Sundalskleiv

"That sort of thing is accepted now. It's a hybrid solution now, before the pandemic we would never have done it. So if you're interested in the difference before and after Covid-19, I would say it is that there is an acceptance in the market to utilize virtual meetings to check for interest from new customers."-Harald Sundalskleiv

Nevertheless, this shift towards virtual meetings is not without limitations. However, some notable aspects favoring physical meetings over virtual ones is the value attributed to relationship building, fostering connections, building trust and engaging in collaborative idea creation.

"In my experience they still would mainly like physical meetings, which serve specifically important when you are building relations or need sessions of brainstorming. Doing long meetings with other divisions digitally does not capture the inclusion as well as physically and is more prone to distraction for other activities in the building."-Sigrid Thors

"You still travel a lot, usually to new customer prospects. But the threshold for setting a meeting, you still wouldn't directly call them as that is rude. But you would send a mail or a

meeting request for a catch up call. The communication on Teams is much better, you have quick meetings with the client where the camera is on etc. This only really relates to existing customers however, as you still need to travel to create the relation and the contact with the customer and build trust to be able to work together.”-Harald Sundalskleiv

Impacts of potential changes - Financially

The participants' perspectives varied on the financial implications of the changes. One participant highlighted short-term cost reductions, while noting that long-term costs remained relatively unchanged. In contrast, the other participant emphasized cost reductions in both the short and long term, particularly when the factor of business growth was not taken into consideration.

“At the start you saved money on travels, and whatnot, but they have decided that they would rather have physical meetings on the meetings that really matter. So I do not believe it has had any significant impact on the economics of a company like this.”-Sigrid Thors

“Yes, I'm guessing that travel costs have gone down for most businesses, but I can’t say for sure. When it comes to the costs, I would believe the travel cost for things like those have went down.”-Harald Sundalskleiv

“The costs for single day meetings must have gone down, there is no doubt about that.”- Harald Sundalskleiv

“If you were to disregard any growth the business has made, the costs have probably gone down.”-Harald Sundalskleiv

Impacts of potential changes - Socially

The participants' responses revealed a variance in the social impacts, likely stemming from the varying nature of their respective businesses. One participant indicated the absence of

negative consequences, highlighting positive outcomes in the form of enhanced synergies. This positive effect could be attributed to the pre-existing relationships among meeting participants, a milder extent of lockdown measures, and a lesser disruptive impact of Covid-19 overall. In contrast, the other participant expressed concerns about negative social consequences, emphasizing the influence of an individuals' network and life circumstances.

"No, I wouldn't say that ,not really. The virtual meetings are between people who already have an established relation, so the meetings are not about building relations but rather to connect."-Sigrid Thors

"More virtual meetings as an addition has given better insight as to how the different divisions in the company are doing on a day to day basis, so in a way that may prove positively socially. But in this business we already had a tight cooperation, so it may have affected other businesses more than us."-Sigrid Thors

"I would definitely claim there have been social consequences. I am not really the guy responsible for personnel, but I have a large network of people in the field and it's definitely a thing."-Harald Sundalskleiv

"I think a lot of people were sad at home with home offices during the pandemic, specifically the ones who are not established, where their only networks come from their employment."-Harald Sundalskleiv

"At my previous employment, there was a major issue getting workers back into the office. People become too comfortable, and then there is the focus of building a culture."-Harald Sundalskleiv

The latter participant also referenced the absence of casual conversation, the erosion of business culture, and the stifling of innovation as notable social ramifications.

"You need space really, and you need colleagues, because the conversation around the coffee machine isn't something you can replicate with a phone call, you also probably don't bother doing that when you are at home." -Harald Sundalskleiv

"During the pandemic there were a lot of virtual social drinks and lunch through teams, but it still wasn't the same. I think you lose the cultural dynamic, and you also lose innovation." ."-Harald Sundalskleiv

Impacts of potential changes - Environmentally

The participants referred to a decline in carbon footprint to differing degrees, accentuating an increased emphasis on the necessity of air travel.

"Yes, when you didn't have to travel as much you would use less resources so in that way yes, but we have gone back to more physical meetings and such here. But we would like to be sustainable and therefore it's a bigger focus as to if one needs to travel or if the person could take the meeting at home."-Sigrid Thors

"I would think that the carbon footprint has gone down as a result of most of the single day meetings being eliminated. "-Harald Sundalskleiv

9. Limitations and implications

The limitations of this paper is first and foremost the sample size of the data collected, both quantitative and qualitative. While our research provides valuable insights and a comprehensive overview, the amount of countries analyzed on an individual scale is limited, and it would prove helpful to expand the scope of countries analyzed on an individual level for future studies. Furthermore, the use of Google Trends and its API imposes certain constraints on the selection of time periods for data acquisition. Specifically the daily data acquisitions is restricted to a maximum time period of one year. Consequently, this paper's selected time period is limited to one year. Moreover, it should be noted that the data obtained from Google Trends is presented in scaled values ranging from 1 to 100 within the specified time period, rather than providing precise numerical values. This is a potential limitation, as it restricts our ability to determine the specific numerical search volume for a specific date.

The qualitative data acquisition in our study is also subject to certain limitations, notably the inclusion of only two participants. This constrained sample size is a result of various factors, including time constraints, limited networking opportunities, and the supplementary nature of the data. Thus the outcomes of this data is meant to complement and enrich our quantitative research, rather than exist as independent research. As such, this area presents a promising avenue for future research. Furthermore, it is important to acknowledge that our research is subject to the inherent limitations imposed by the scope of this paper, which restricts our ability to conduct an extensive investigation into the consequences highlighted in our qualitative results, through in-depth research and comprehensive data collection.

Another limitation of our paper is the source from which the search interest is generated. Virtual meeting platforms were not exclusive to businesses during the Covid-19 pandemic, making it difficult to determine whether the observed search interest primarily originated from businesses and their employees, or potentially included other entities such as academic institutions that also relied on virtual meeting platforms during this period. There is an argument for academic institutions also being included in the meeting culture at least on an administrative level, but the limitation is more focused towards non-meeting culture-related events such as lectures.

The final limitation and arguably one of the most important, is that the search volume does not directly equate to usage of the virtual meeting platform. While the search volume provides valuable insights and a comprehensive overview of the situation, it is important to acknowledge that it can also encompass searches triggered by news articles and general curiosity.

The findings of this study have significant implications, suggesting that businesses have not fully embraced and leveraged new technologies to their optimal extent. Prior to the onset of the Covid-19 pandemic, the utilization of virtual meeting platforms varied among companies, but it was the pandemic that forced businesses to undergo widespread adaptation. Through forced restrictions and altered circumstances, our findings reveal that businesses had to adapt and change the meeting culture to a more digital approach. Furthermore, our research reveals that search interest in virtual meeting platforms has surged in the post-pandemic period compared to a hypothetical scenario without a pandemic. These findings imply that there is a display of resistance to change within the meeting culture and the broader business landscape.

Consequently, businesses stand to benefit from cultivating a more receptive and adaptable mindset to capture new evolving technologies and innovative solutions. The question arises as to whether businesses will exhibit greater open-mindedness and an adaptable mindset, for new innovations such as artificial intelligence (AI), in the absence of restrictions and governmental force.

Additionally, our qualitative supporting findings indicate a continuing need for physical meetings as well as virtual, as there is an aspect of relation-building missing from virtual meetings. As such, the findings indicate that physical meetings will still serve a vital purpose when there is no previous relation, or building of trust is needed. However, it is worth noting that these findings are only indications and are based on supplementary interviews and as such would need further research.

10.   Conclusion

This section provides answers to our research question stated in the paper, elaborating upon findings from both RDD analysis and conducted interviews. The RDD analysis examines the impact of lockdowns and other variables on search interest, while the semi-constructed interviews gather qualitative insights from participants related to the research question.

The findings from the RDD analysis of Italy during the lockdown, placebo, and reopening periods indicate that the lockdown significantly impacted search interest. The analysis of the lockdown period shows statistical significance at a 1% level ($p<0.01$). In contrast, the placebo analysis does not demonstrate an increase in search interest during the same period one year prior, further supporting the significance of the lockdown. However, the reopening analysis does not provide reliable results, as they are not statistically significant.

Furthermore, the RDD analysis conducted in Australia, Italy, Sweden, and the UK during the lockdown/announcement period reveals that the lockdown had a positive impact on search interest for keywords such as Zoom, Teams, and Skype. The results demonstrate statistical significance at different levels (10%, 5%, and 1%). The pooled analysis of Australia, Sweden, and the UK during the lockdown also demonstrates a significant increase in search volume by 29.812, with statistical significance at a 1% level. Additionally, the analysis shows a reduction in search volume over time after the lockdown. When examining the weighted average within

each country, the treatment effect is significant for the UK (value of 2.507**, p<0.05) and Sweden (value of 7.238***, p<0.01), while Australia does not show statistical significance.

It is important to note that as the reopening approached, more individuals returned to physical offices, resulting in a decrease in remote work. This change in work dynamics also impacted the utilization of online meetings, as they became more optional rather than necessary in the workplace.

In addition to the RDD analysis, there were some limitations regarding the sample size of the data collected, both quantitative and qualitative. The sample gathered in terms of quantitative data covers one year at a time in terms of three months before the lockdown and one month after. The period could have been extended for retrieving more information of search interest on the search terms Zoom, Teams, and Skype in the selected countries. Having the data limited to three months before lockdown and one month after provides information based on short-term shock and not long-term. Extending the length of the period will provide further information regarding long-term shock for future studies.

In terms of the qualitative approach in this study, the amount of conducted interviews is limited to two companies. This amount of data is limited and as such can only supplement our quantitative findings as well as give an indication for future research. The qualitative data includes pre-lockdown meeting culture, during-lockdown meeting culture, post-lockdown meeting culture as well as give an insight to the social, financial and environmental consequences.

It is also worth mentioning that search interest only registers the amount of searches and not downloads. We can therefore not be precise on how many is actually using the virtual platforms.

Overall, the RDD plots and results in this study provide evidence of a significant relation between the presence of the lockdown and search interests in virtual meeting platforms. Based on the evidence from the figures and the results presented in Table 4, the lockdown had a positive impact on search interest, leading to an increase in search volume.

In summary, the findings from the conducted RDD analyses consistently give indications of statistical significance during the lockdown period, proving an increase in search interest. This suggests that the lockdown may be the primary contributing factor to the observed jumps

in search interest for Zoom, Teams, and Skype across Italy, Australia, Sweden, and the UK. Through our research, we can conclude that the impacts of Covid-19 and its lockdowns have changed the meeting culture in both the short-term and the long-term. Our main results originate from our pooled analysis, which demonstrates a significant rise in search volume at the onset of a lockdown, followed by a gradual decline during the lockdown period. Subsequently, as countries transition towards reopening, the search interest decreases, albeit remaining at a level higher than the initial baseline. Through our quantitative results, we discovered that lockdowns had contributed to short-term shock, as well as permanent long-term increase which would not have occurred in a scenario without the occurrence of lockdowns. Additionally, our qualitative findings suggest that the change in meeting culture has had a positive financial impact, both positive and negative social consequences and reduced the carbon footprint of businesses.

11.   Citations

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12.　　Figures

RDD plots of Italy, Australia, Sweden, and the UK based on the search terms Zoom, Teams, and Skype during lockdown
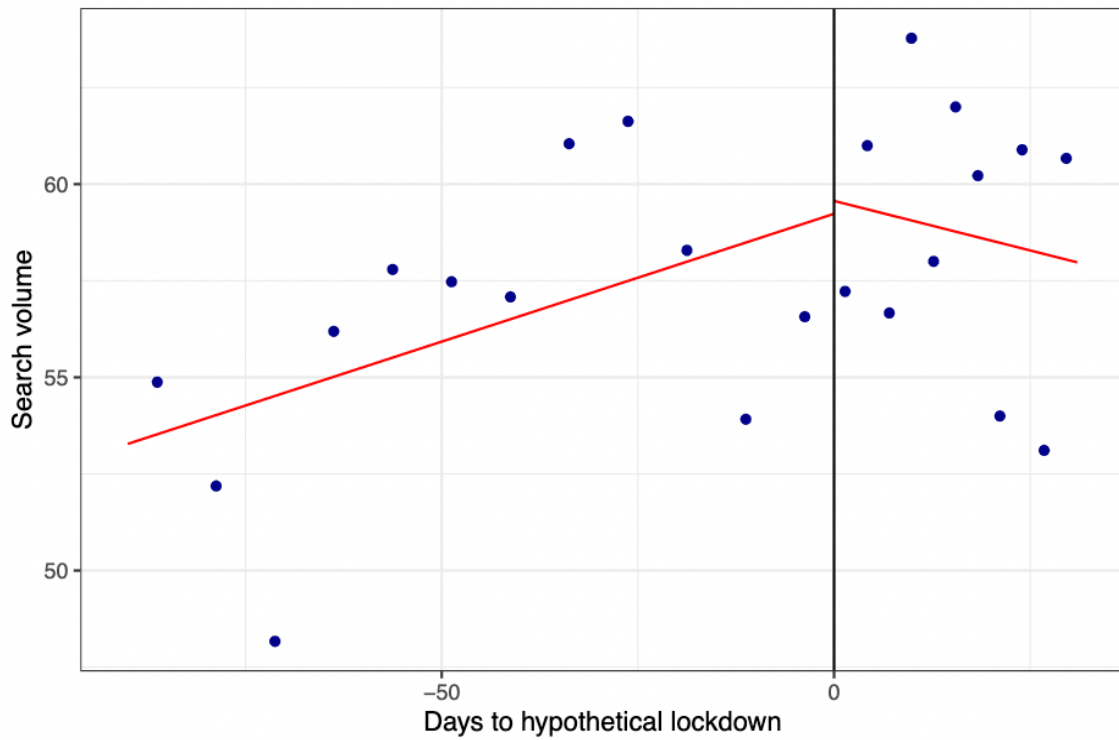
Figure 1
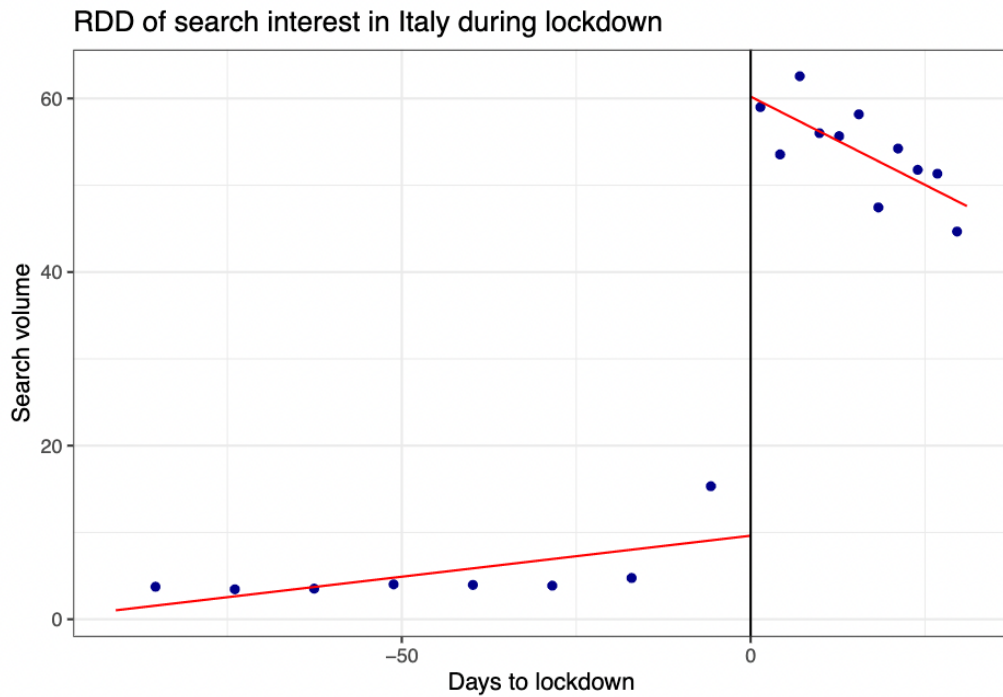
Note: The plot above shows the search volume for Italy in the period between the 10th of December 2019 and 10th of April 2020. The graph illustrates the effect of the treatment, which in this case is defined as the lockdown of Italy.

Figure 2

RDD of search interest during hypothetical lockdown of Italy

Note: The presented RDD plot above is a placebo analysis, which is replicated from the RDD analysis of Italy 3 months prior and 1 month after the lockdown date, but this time a year prior. The purpose of this analysis was to eliminate the possibility of seasonal trends, and further solidify the lockdown and Covid-19 as a shock effect. The analysis above is therefore a product of the period between 10th of December 2018 to 10th of March 2019.

Figure 3

RDD of search interest during reopening of Italy
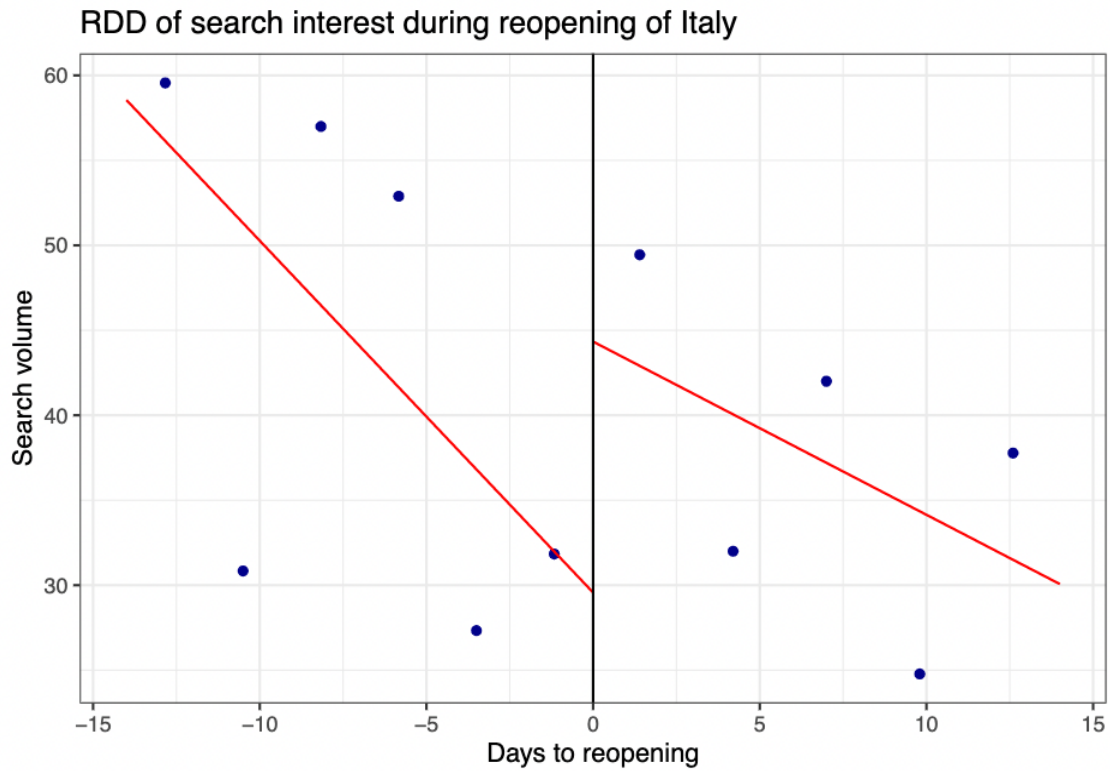
Note: The analysis presented above is a RD analysis of the period between two weeks prior and after the reopening/end of lockdown in Italy. The date of reopening used was the 3rd of June 2020. The purpose of this analysis was to check for discontinuous decrease in search volume after the lockdown ended.

Figure 4
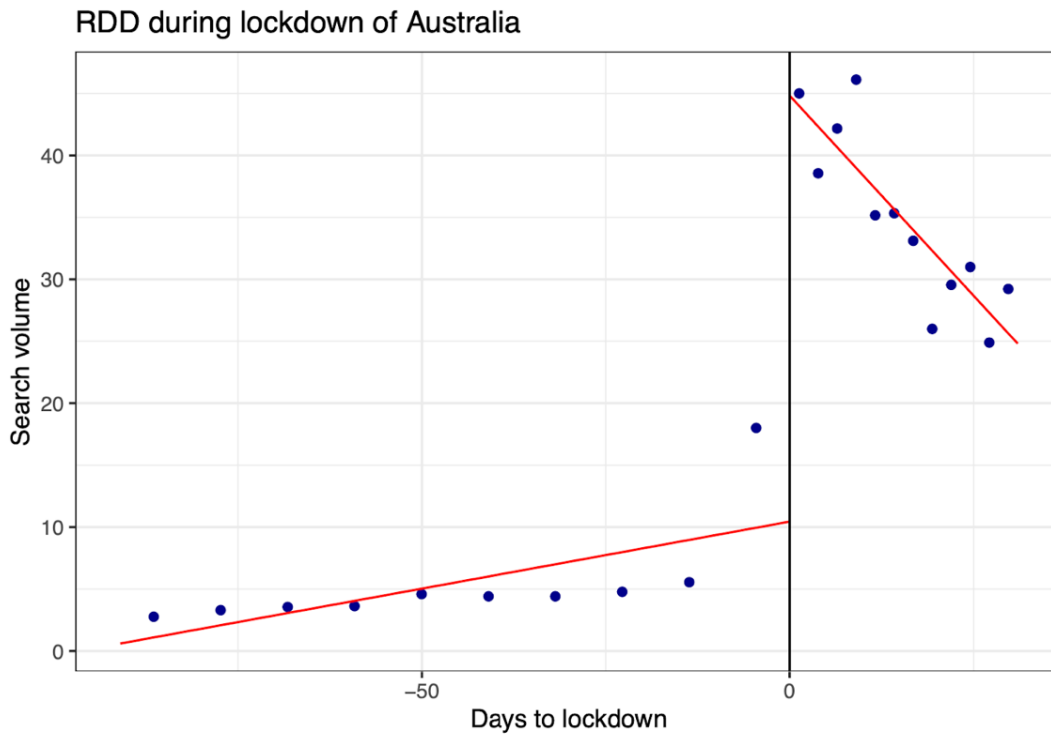
Note: The plot above shows the search volume for Australia in the period between the 23rd of December 2019 and 23rd of April 2020. The graph illustrates the effect of the treatment, which in this case is defined as the lockdown of Australia.

Figure 5
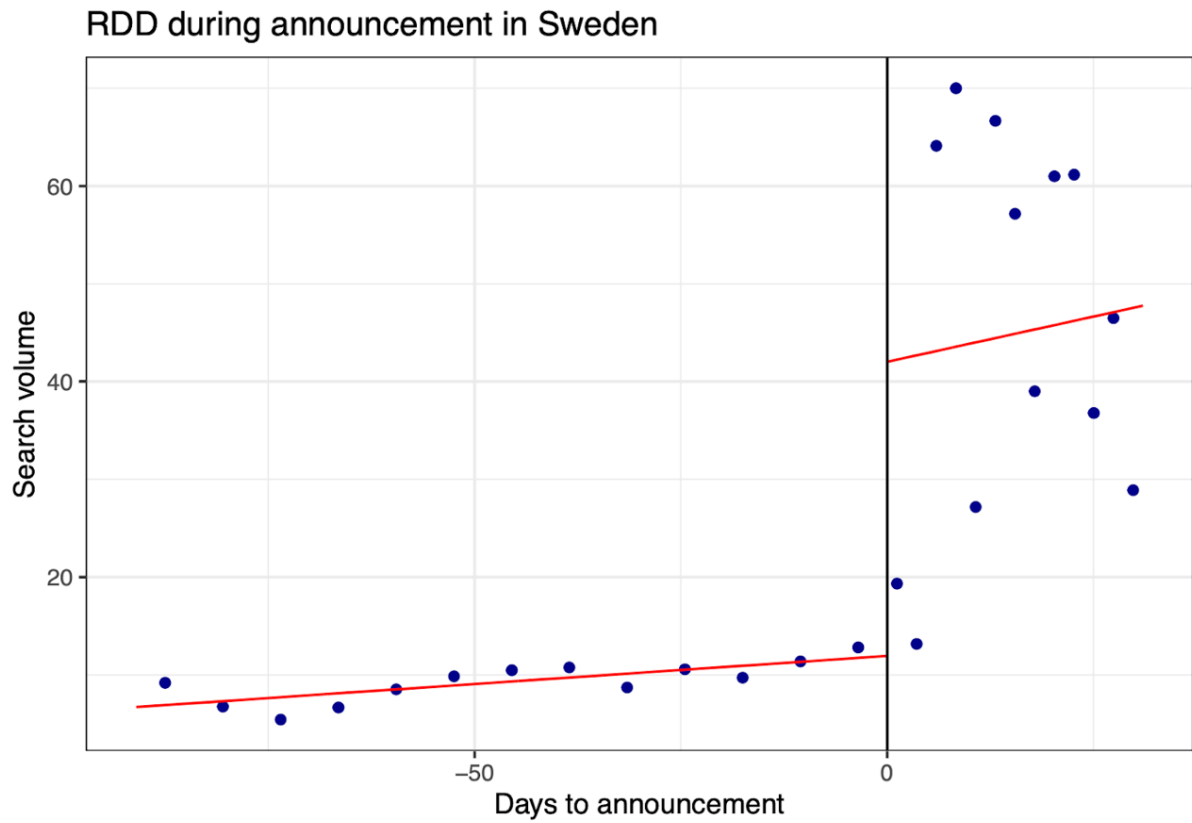
Note: The RD analysis presented above shows how the search volume of the virtual platforms
changed after WHO's announcement of Covid-19 as a pandemic, in Sweden. It is worth
noting that during the announcement of Covid-19 as a pandemic, most governments did not
have a plan or a strategy towards the virus, or made a stance on the use of lockdowns.

Figure 6
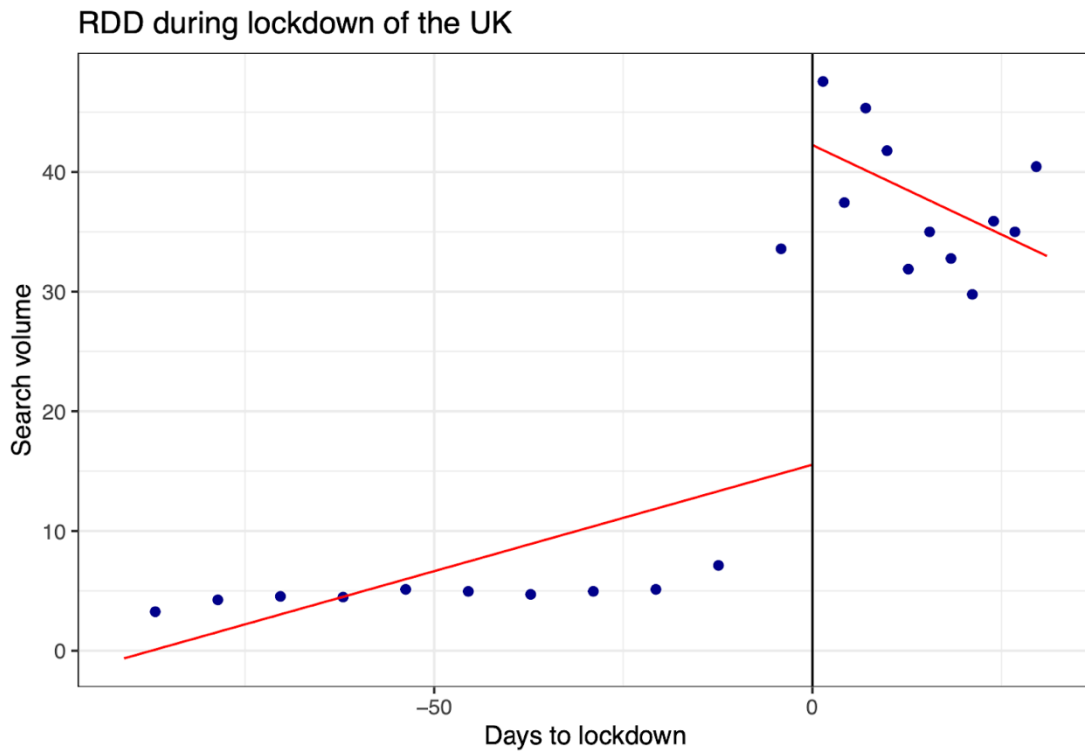
Note: The plot above shows the RDD analysis of search volume in the UK in the period between the 24th of December 2019 and 24th of April 2020. The graph illustrates the effect of the treatment, which in this case is defined as the lockdown in the UK.

RDD plots of Australia, Sweden, and the UK based on the search terms Zoom, Teams, and Skype during the reopening

Figure 7

RDD during first reopening of Australia
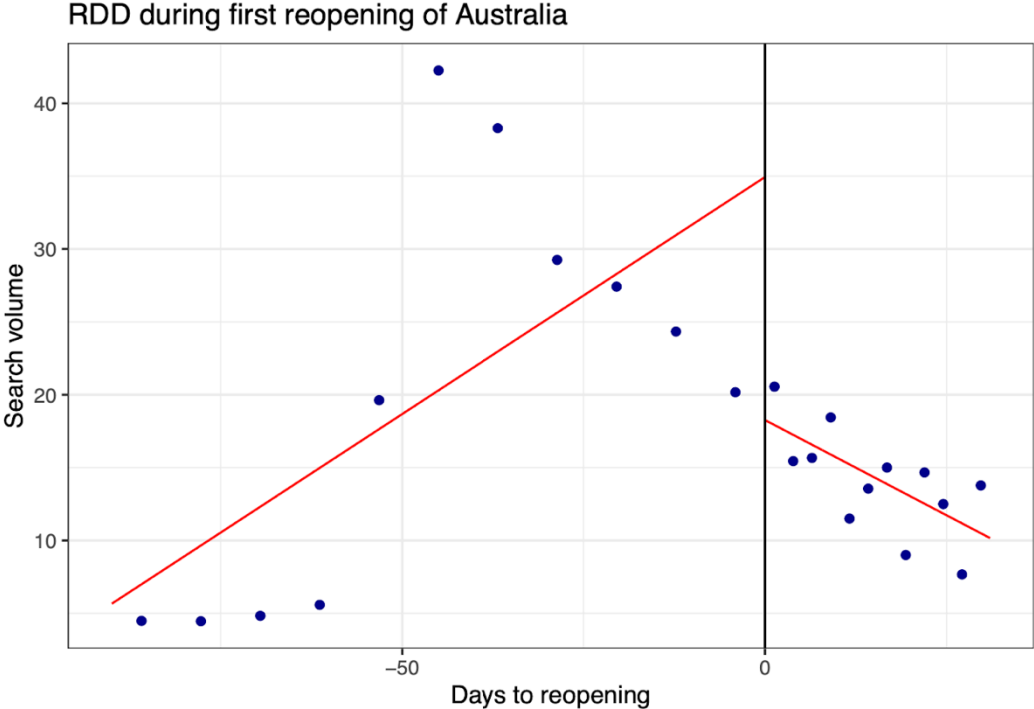
Note: The plot above presents the RDD analysis during the first reopening of Australia, for the search volume in Australia in the period between the 11th of February 2020 and 11th of June 2020. The graph illustrates the effect of the treatment, which in this case is defined as the reopening of Australia.

Figure 8

Note: *The plot above presents the RDD analysis of a hypothetical reopening of Sweden for the search volume in the period between the 3rd of March 2020 and 7th of July 2020. The graph illustrates the effect of the treatment, which in this case is defined as the hypothetical reopening of Sweden.*

Figure 9

RDD during first reopening of the UK

Note: The plot above presents the RDD analysis during the first reopening in the UK, for the search volume in the period between the 4th of April 2020 and 4th of August 2020. The graph illustrates the effect of the treatment, which in this case is defined as the reopening in the UK.
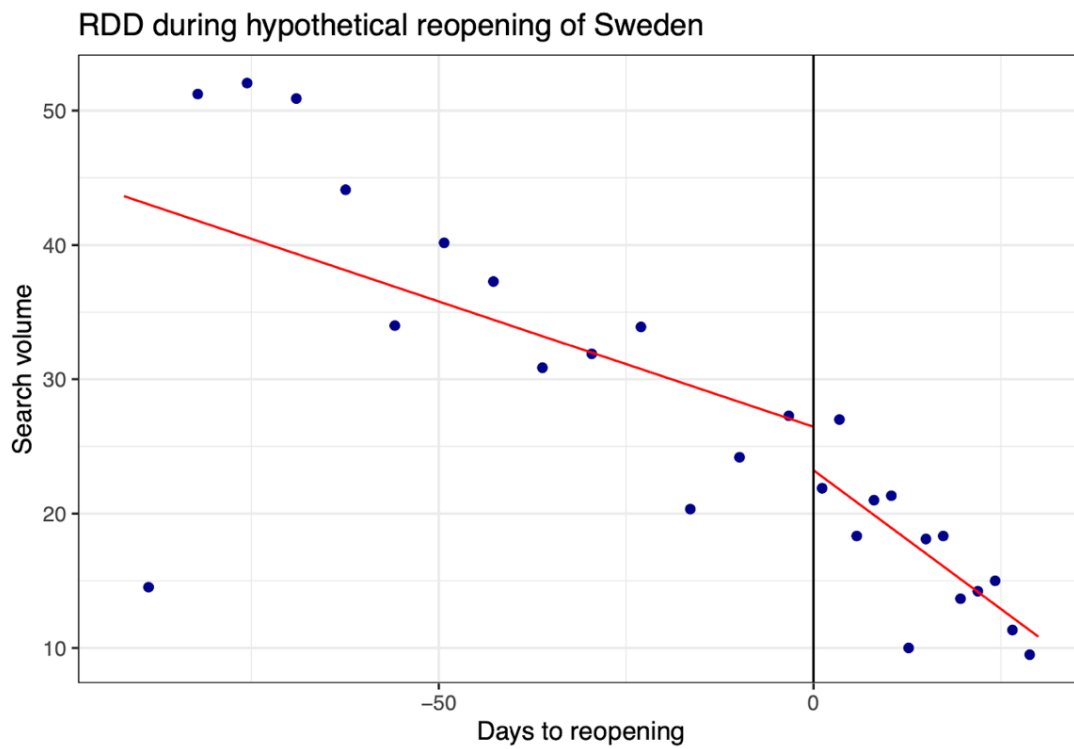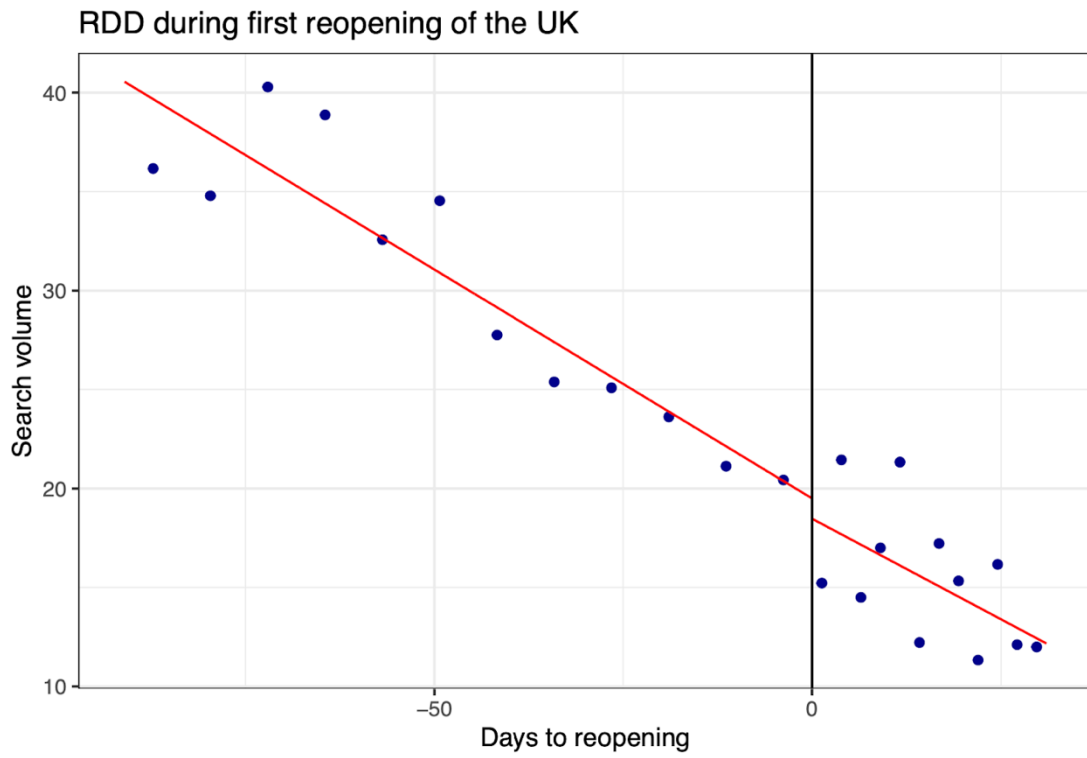
RDD plot of pooled analysis of all countries based on Zoom, Teams, and Skype during the lockdown and WHO announcement

Figure 10

Pooled analysis, lockdown and WHO announcement
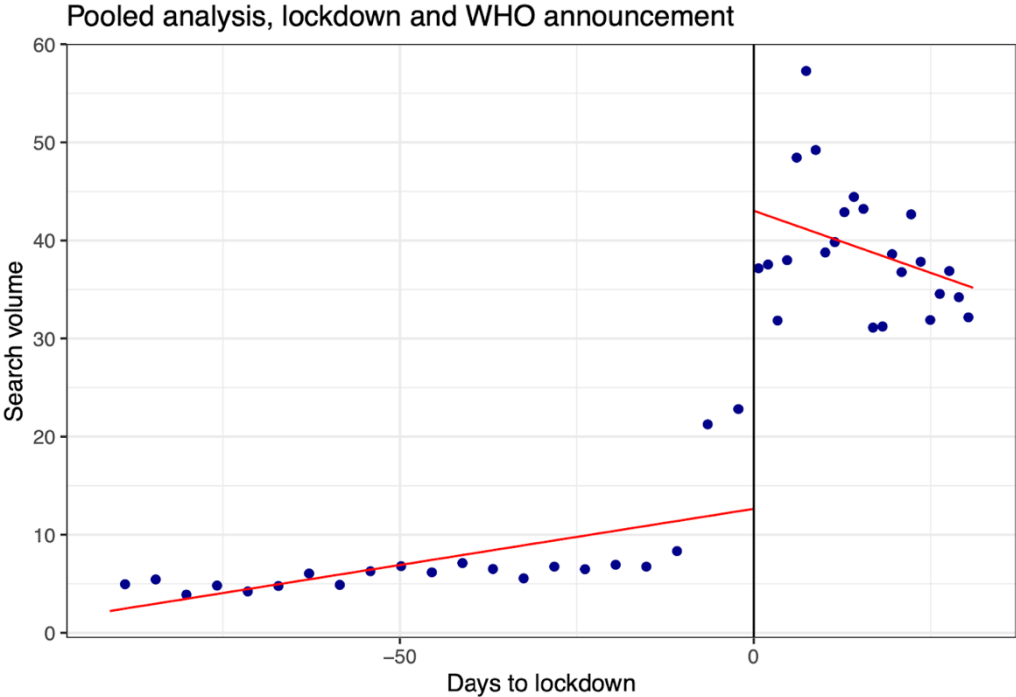
Note: The pooled analysis shows a combined RD analysis of Australia, UK and Sweden. The cutoff-point shows the date of the specific countries lockdown. Sweden did however not have any lockdowns, so the date of lockdown for Sweden is the WHO announcement. The respective dates being: Australia - 23rd of March 2020, UK - 24th of March 2020 and Sweden - 11th of March 2020.

RDD plot of pooled analysis of all countries based on Zoom, Teams, and Skype during reopening

Figure 11
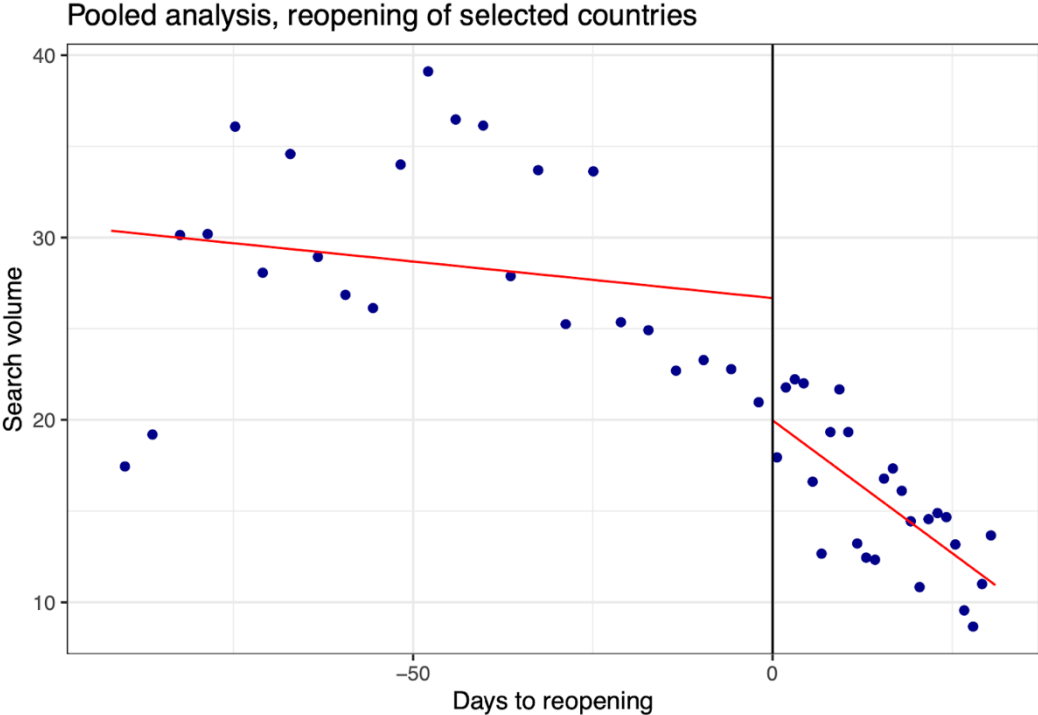
Note: *The pooled analysis shows a combined RD analysis of Australia, UK and Sweden during the first reopening after lockdown. The cutoffpoint indicates the day of reopening in each country, with the exception of Sweden which did not have any lockdown to reopen from, as such the date used for Sweden is the median of the reopening dates of Australia and the UK. The dates are as follows: Australia - 11th of May 2020, UK - 4th of July 2020 and Sweden - 7th of June 2020.*

13.   Tables

Table 1: RDD results of Italy, Australia, Sweden, and the UK based on Zoom, Teams, and Skype

RDD results of Italy, Australia, Sweden, and the UK based on Zoom, Teams, and Skype during lockdown and WHO announcement

	Dependent variable:			
	Search_volume			
	(1)	(2)	(3)	(4)
Days_to_lockdown	0.094***	0.104***	0.173***	
	(0.032)	(0.034)	(0.035)	
Post_lockdown	50.586***	33.440***	26.136***	
	(3.202)	(3.493)	(3.586)	
Days_to_lockdown:Post_lockdown	-0.501***	-0.736***	-0.465***	
	(0.155)	(0.169)	(0.173)	
Days_to_announcement				0.059*
				(0.030)
Post_announcement				30.014***
				(3.082)
Days_to_announcement:Post_announcement				0.169
				(0.149)
Constant	9.624***	10.015***	15.125***	12.192***
	(1.671)	(1.823)	(1.872)	(1.609)
Observations	369	369	369	369
R^2	0.714	0.435	0.444	0.599
Adjusted R^2	0.712	0.430	0.439	0.595
Residual Std. Error (df = 365)	13.695	14.938	15.338	13.183
F Statistic (df = 3; 365)	303.881***	93.597***	97.026***	181.391***

Note: Gtrends data, 2019-2020. The table shows all the results on the search volume on selected countries in one table, examining the search terms Zoom, Teams, and Skype. $^*p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

(1) Italy , (2) Australia, (3) Sweden, (4) The UK

Table 2: RDD results during the hypothetical lockdown in Italy

RDD results of a hypothetical lockdown in Italy based on Zoom, Teams and Skype

	Dependent variable:
	Search_volume
Days_to_lockdown	0.066***
	(0.021)
Post_lockdown	0.333
	(2.091)
Days_to_lockdown:Post_lockdown	-0.117
	(0.101)
Constant	59.233***
	(1.096)
Observations	366
R^2	0.042
Adjusted R^2	0.035
Residual Std. Error	8.929 (df = 362)
F Statistic	5.349*** (df = 3; 362)

Note: Gtrends data, 2018-2019. This table shows results on search volume in Italy during a hypothetical lockdown, examining the search terms Zoom, Teams, and Skype. $^*p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

Table 3: Regression results during the hypothetical reopening in Italy

RDD results of a hypothetical reopening in Italy based on Zoom, Teams and Skype

	Dependent variable:
	Search_volume
Days_to_reopening	-2.067**
	(0.863)
Reopening	14.660
	(9.744)
Days_to_reopening:Reopening	1.051
	(1.162)
Constant	29.590***
	(7.348)
Observations	87
R^2	0.109
Adjusted R^2	0.077
Residual Std. Error	22.546 (df = 83)
F Statistic	3.385** (df = 3; 83)

Note: Gtrends data, 2020. This table shows results on search volume in Italy during a hypothetical reopening, examining the search terms Zoom, Teams, and Skype. *p<0.1; **p<0.05; ***p<0.01

Table 4: RDD results of a pooled analysis of all countries based on the search terms Zoom, Teams, and Skype during the lockdown and WHO announcement

RDD results of pooled analysis of Australia, Sweden, and the UK based on Zoom, Teams, and Skype during lockdown and WHO announcement

	Dependent variable:
	Search_volume
Days_to_announcement	0.113***
	(0.020)
Post_lockdown	30.119***
	(1.994)
factor(Country)GB	2.312**
	(1.088)
factor(Country)SE	6.900***
	(1.088)
Days_to_announcement:Post_lockdown	-0.344***
	(0.096)
Constant	9.481***
	(1.216)
Observations	1,107
R^2	0.491
Adjusted R^2	0.489
Residual Std. Error	14.774 (df = 1101)
F Statistic	212.694*** (df = 5; 1101)

Note: Gtrends data, 2019-2020. This table shows a combined results of the country Australia, Sweden and The UK in one table, examining the search terms Zoom, Teams, and Skype for each country. *p<0.1; **p<0.05; ***p<0.01

Table 5: RDD results with country fixed effects of Zoom during lockdown

RDD results of pooled analysis of Australia, Sweden, and the UK based on Zoom during lockdown and WHO announcement

	Dependent variable:
	Search_volume
Days_to_announcement	0.149***
	(0.026)
Post_lockdown	55.608***
	(2.662)
factor(Country)GB	1.634
	(1.452)
factor(Country)SE	-0.301
	(1.452)
Days_to_announcement:Post_lockdown	-0.304**
	(0.129)
Constant	14.275***
	(1.623)
Observations	369
R^2	0.847
Adjusted R^2	0.845
Residual Std. Error	11.387 (df = 363)
F Statistic	402.482*** (df = 5; 363)

Note: Gtrends data, 2019-2020. This table shows a combined results of the country Australia, Sweden and The UK in one table, examining the search term Zoom for each country. *$p<0.1$; **$p<0.05$; ***$p<0.01$

Table 6: RDD results with country fixed effects of Teams during lockdown

Regression results on Teams based on the pooled analysis, based on the lockdown and WHO announcement

	Dependent variable:
	Search_volume
Days_to_announcement	0.110***
	(0.025)
Post_lockdown	19.114***
	(2.582)
factor(Country)GB	2.878**
	(1.408)
factor(Country)SE	11.163***
	(1.408)
Days_to_announcement:Post_lockdown	-0.328***
	(0.125)
Constant	9.427***
	(1.574)
Observations	369
R^2	0.485
Adjusted R^2	0.478
Residual Std. Error	11.042 (df = 363)
F Statistic	68.362*** (df = 5; 363)

The result indicate a significant jump in search volume on Teams by 19.114 during the lockdown and reduced by 0.328 overtime post-lockdown. Based on all the selected countries, Sweden had the highest increase in search volume during the lockdown. *$p<0.1$; **$p<0.05$; ***$p<0.01$

Table 7: RDD results with country fixed effects of Skype during lockdown

RDD results of pooled analysis of Australia, Sweden, and the UK based on Skype during lockdown and WHO announcement

	Dependent variable:
	Search_volume
Days_to_announcement	0.079***
	(0.016)
Post_lockdown	15.357***
	(1.579)
factor(Country)GB	2.610***
	(0.861)
factor(Country)SE	10.285***
	(0.861)
Days_to_announcement:Post_lockdown	-0.391***
	(0.076)
Constant	4.682***
	(0.963)
Observations	369
R^2	0.584
Adjusted R^2	0.579
Residual Std. Error	6.755 (df = 363)
F Statistic	102.051*** (df = 5; 363)

Note: Gtrends data, 2019-2020. This table shows a combined results of the country Australia, Sweden and The UK in one table, examining the search term Skype for each country. *p<0.1; **p<0.05; ***p<0.01

Table 8: Regression results of pooled analysis of all countries based on the search terms Zoom, Teams and, Skype during reopening

RDD results of Pooled analysis of Australia, Sweden and the UK based on Zoom, Teams, and Skype during the reopening

	Dependent variable:
	Search_volume
Days_to_reopening	-0.043
	(0.028)
Post_reopening	-7.208**
	(2.818)
factor(Country)GB	7.754***
	(1.535)
factor(Country)SE	14.164***
	(1.535)
Days_to_reopening:Post_reopening	-0.206
	(0.138)
Constant	19.261***
	(1.708)
Observations	1,104
R^2	0.139
Adjusted R^2	0.135
Residual Std. Error	20.803 (df = 1098)
F Statistic	35.316*** (df = 5; 1098)

Note: Gtrends data, 2020. This table shows a combined results of the country Australia, Sweden, and The UK in one table, examining the search terms Zoom, Teams, and Skype during the reopening for each country. *p<0.1; **p<0.05; ***p<0.01

Table 9: RDD results with country fixed effects of Zoom during reopening

RDD results of Pooled analysis of Australia, Sweden, and the UK based on Zoom during the reopening

	Dependent variable:
	Search_volume
Days_to_reopening	-0.005
	(0.048)
Post_reopening	-16.158***
	(4.900)
factor(Country)GB	15.414***
	(2.669)
factor(Country)SE	8.864***
	(2.669)
Days_to_reopening:Post_reopening	-0.478**
	(0.239)
Constant	40.681***
	(2.970)
Observations	368
R^2	0.264
Adjusted R^2	0.253
Residual Std. Error	20.885 (df = 362)
F Statistic	25.921*** (df = 5; 362)

Note: Gtrends data, 2020. This table shows a combined results of the country Australia, Sweden, and The UK in one table, examining the search term Zoom during the reopening for each country. *p<0.1; **p<0.05; ***p<0.01

Table 10: RDD results with country fixed effects of Teams during reopening

RDD results of Pooled analysis of Australia, Sweden, and, the UK based on Teams during the reopening

	Dependent variable:
	Search_volume
Days_to_reopening	-0.014
	(0.032)
Post_reopening	-4.788
	(3.275)
factor(Country)GB	6.794***
	(1.784)
factor(Country)SE	19.581***
	(1.784)
Days_to_reopening:Post_reopening	-0.183
	(0.160)
Constant	14.991***
	(1.985)
Observations	368
R^2	0.298
Adjusted R^2	0.288
Residual Std. Error	13.961 (df = 362)
F Statistic	30.757*** (df = 5; 362)

Note: Gtrends data, 2020. This table shows a combined results of the country Australia, Sweden, and The UK in one table, examining the search term Teams during the reopening for each country. *p<0.1; **p<0.05; ***p<0.01

Table 11: RDD results with country fixed effects of Skype during reopening

RDD results of Pooled analysis of Australia, Sweden, and, the UK based on Zoom during the reopening

	Dependent variable:
	Search_volume
Days_to_reopening	-0.111***
	(0.016)
Post_reopening	-0.678
	(1.659)
factor(Country)GB	1.055
	(0.903)
factor(Country)SE	14.047***
	(0.904)
Days_to_reopening:Post_reopening	0.043
	(0.081)
Constant	2.112**
	(1.005)
Observations	368
R^2	0.537
Adjusted R^2	0.530
Residual Std. Error	7.070 (df = 362)
F Statistic	83.899*** (df = 5; 362)

Note: Gtrends data, 2020. This table shows a combined results of the country Australia, Sweden, and The UK in one table, examining the search term Skype during the reopening for each country. *p<0.1; **p<0.05; ***p<0.01

14.   Appendix

How the RDD regression model was conducted in Rstudio

To create our RDD regression model in Rstudio software, we added more additional columns to the dataset such as Days_To_Lockdown and Post_Lockdown to countries having lockdowns and, additionally Days_To_Announcement and Post_announcement for Sweden which did not have. For creating these columns we conducted the function named mutate corresponding e period before the lockdown, and used the ifelse function on creating the column Post-Lockdown. Down below shows an example of the code used in R:

Country <- Country %>% mutate(Days_to_lockdown = as.numeric(difftime(date, as.Date("2020-03-23"), units = "days")),Post_lockdown = ifelse(Days_to_lockdown >= 0, 1, 0))

As mentioned this code adds two new columns: Days_to_announcement and Announcement. The Days_to_Lockdown column calculates the number of days to lockdown. The Post-lockdown column is assigned a value of 1 if Days_to_Lockdown is greater than or equal to 0 (indicating the period after the announcement), and 0 otherwise (indicating the period before the lockdown).

Once the columns were added, we proceeded to construct the RDD regression models to estimate the jump in search volume regarding Zoom, Teams and Skype.

The regression model using the lm() command is written as follows:

lm(SearchVol ~ DaysToLockdown + PostLockdown
+   LockdownInteracPost, data = data_name)