

# An offer to help: Impacts of covid-19 lockdown on local sharing economies

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## Abstract

The preventive measures applied in response to the covid-19 pandemic have transformed social and economic activities. Based on a case study of the Norwegian digital sharing platform Nabohjelp (English: Neighbour help), this article describes how sudden introductions of social distancing policies, such as lockdowns, affect the usage of peer-to-peer (p2p) sharing economy platforms. The analysis includes all messages posted by users on the Nabohjelp platform over a period covering one month before and two and a half months after the announcement of the first covid-19 lockdown in Norway (N=14997). Statistical analysis is applied to understand the impact of the lockdown on different types of platform activities, and text analysis is performed on a stratified random sample of messages (n=400). We find evidence of a rapid response to the lockdown and highly increased app usage, as well as increased technology adoption rates, in the first five weeks of lockdown. Before the lockdown, the messages were mainly related to specific needs with a short deadline, while messages during the lockdown were more open-ended and general in nature. We find an initial spike in the number of messages from people offering to help others, driven by both pre-existing and new users. When society gradually opened up again after about two months, the daily number of posted messages remained about three times higher than before the lockdown. We conclude that p2p sharing platforms can play an important role in the robustness of local societies in times of a pandemic.

## Key words:

Sharing economy, peer-to-peer sharing, crisis management, covid-19

## Introduction

Since late 2019, social distancing has been an important policy in many countries for slowing the spread of the covid-19 virus. This paper explores how the sharing economy can help to alleviate the difficulties that social distancing imposes at the local level. Below, we present detailed evidence of how a smart phone sharing app called Nabohjelp (Eng: Neighbour help) was used in response to the national lockdown following the outbreak of the covid-19 pandemic in Norway. Through collaboration with the platform owner, we were given access to the full set of messages posted on the app for a period starting one month before lockdown measures were imposed to about ten weeks after (N = 14 997). Our findings provide new insights into the dynamics of how a peer-to-peer (p2p) app designed for collaborative consumption within local neighbourhoods was adopted and used by the public when the crisis struck. We describe how the app usage changed, and how usage evolved over the following ten weeks.

Before vaccines were developed and deployed, social distancing was among the primary strategies, along with testing and sanitation, to combat the novel corona virus known as covid-19. Social distancing takes many forms, from avoiding physical contact, e.g., handshakes and hugs, to isolation in homes, travel restrictions and the temporary closure of businesses and public institutions. Whether self-imposed or mandated by government, social distancing creates many challenges to everyday life. We find that thousands of Norwegians responded to the lockdown by going online to self-organize and either seek or offer help. The messages on the Nabohjelp platform are a clear expression of people's desire to help each other out in a time of large uncertainty. The findings are relevant to decision makers planning policy responses to new crises, e.g., potential future waves of the covid-19 pandemic. Firstly, improved understanding of societal resilience helps in estimating the social and economic costs of anti-contagion measures. Secondly, our findings support the notion that governments and policy makers should support the use of sharing apps as a means for communicating and helping people who are isolated. Thirdly, the results suggest that new app users were driven by the same motives as pre-existing users. Fourthly, the underlying data gives a first-hand account of how the public reacted when the covid-19 pandemic came to Norway in the spring of 2020. The next section covers the background for our study. It positions the current paper in the existing literature on the sharing economy and collaborative consumption. Next, it describes the Nabohjelp app in more detail and describes the social context in which our data was generated. In section three, we present the dataset and the research design. The results are presented in section four, followed by a discussion in section five. Finally, section six concludes the paper.

## Background

### The social benefits of the sharing economy

The concept of a sharing economy has proven hard to define (Botsman, 2013; Juliet B. Schor, Fitzmaurice, Carfagna, Attwood-Charles, & Poteat, 2016). It relates to several different empirical phenomena, such as collaborative consumption, collaborative economy, peer economy, and network economy, amongst others, where the exchange of goods and services is facilitated by a digital platform and what (Arvidsson, 2018) calls "an ideology of 'sharing'". In this paper, we follow Botsman and Rogers (2011) in defining the sharing economy as "an economic model based on sharing underutilized assets from spaces to skills to stuff for monetary and non-monetary benefits, largely focused on peer-to-peer transactions". These assets might be in terms of labour, material goods, or knowledge (Botsman & Rogers, 2011).

That sharing platforms generate both economic and social benefits is well known (Böcker & Meelen, 2017; J. Schor, 2014; Juliet B Schor & Fitzmaurice, 2015). For example, the sharing platforms link consumers with resources in what Schor (2014) calls "stranger sharing". The social aspect of the sharing economy tends to be especially important in local communities such as neighbourhoods (Akin, Jakobsen, Floch, & Hoff, 2021). When the parties of an exchange live close to each other, there is an increased chance that engaging in the local sharing economy may lead to repeat encounters on and outside the sharing platform. In this way, sharing platforms have the potential to move communities towards increased levels of trust (Arvidsson, 2018; Hamari, Sjöklint, & Ukkonen, 2016). There is also a potential for people to self-select to platforms that are locally oriented if social interaction is part of their motivation to participate (Akin et al., 2021). As such, bridging and bonding effects may in some cases be intentional, rather than unintended externalities.

Seddighi and Baharmand (2020) explore the role of the sharing economy in crisis management, including how ICT platforms has the potential to share information and coordinate actions, resources and needs across sectors and stakeholder groups. In a review of the related literature, they identified eight studies, of which four covered responses to natural disasters and the need to help refugees. None related to a health crisis such as a pandemic. The current study aims to contribute to fill this knowledge gap.

## The Nabohjelp mobile app

Nabohjelp is a digital sharing platform owned and developed by OBOS, the largest housing co-operative in Norway. The mobile app is free to download and use. It was Launched in 2017 and had about 125 000 registered users in March 2020 when the lockdown came into effect.

The key objective of Nabohjelp is to facilitate contact between neighbours. Users can post messages that become visible to other users living within an adjustable radius from their home. Messages are typically requests for help with practical issues, that require a quick response. Users can also post offers to share resources or general information. There is also an option for grassroots organisations to register places of interest or upcoming events through a web site.

Figure 1 shows how the app may appear on a cell phone. The main user interface contains a list of recent posts and a map displaying the location of nearby requests and offerings, upcoming activities and places of interest. At the bottom of the screen, five icons allow users to navigate to perform different actions. From left to right, they are: "Home" for displaying the active messages posted by users near your home; "Statistics" to bring up statistics about app usage in your area in the recent weeks; "Add message" for creating new posts; "Conversations" to see private messages between yourself and other users; "Profile" where you can change the information in your user profile and adjust the radius that determines the visibility of your posts. The maximum radius was changed from 3 km to 10 km in an update that was pushed to users soon after the lockdown took effect. This particularly benefited users in areas with a low adoption rate, e.g. in rural areas.

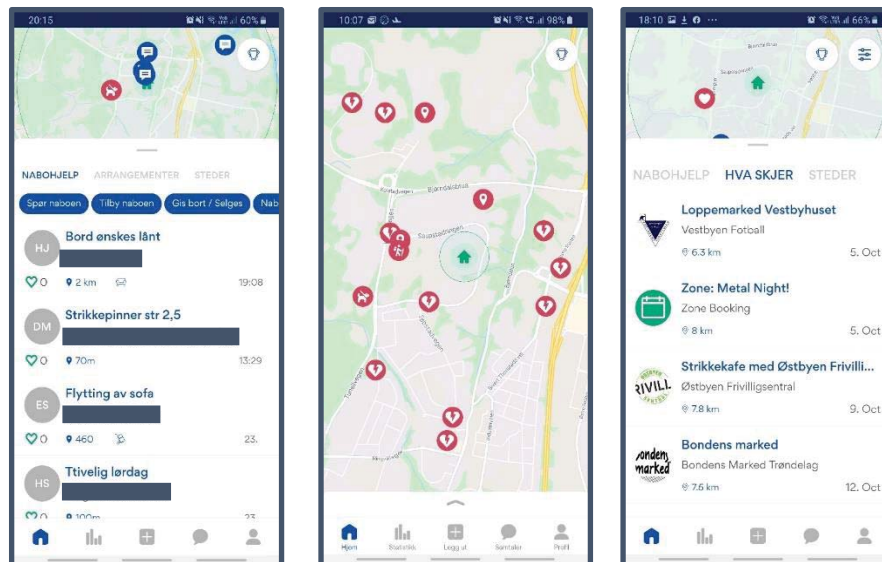


Figure 1 Screenshots from Nabohjelp

Note: Figure 1 shows screen shots of neighbour messages (left), a map of nearby places of interest (middle) and a list of local happenings arranged by NGOs (right).

## Policy measures introduced at the outbreak of covid-19 in Norway

The first confirmed case of covid-19 in Norway was registered on February 26th 2020. Around the same time, travellers were returning home from winter holidays in Italy and Austria, unknowingly bringing the virus with them. Within two weeks, the authorities lost the ability to trace the spread of the disease. At 2:00 pm. on March 12th 2020, the Norwegian government announced and implemented large-scale anti-contagion measures, introduced by the Norwegian Prime Minister Erna Solberg as "the most severe restrictions on personal freedom in peacetime" (NTB, 2020).

This included the temporary closure of workplaces, kindergartens, schools, universities, gyms, hairdressers, restaurants, bars, cultural and sports activities and more. Regulations were introduced to limit social contact in places that still were open, and those who could were encouraged to work from home. The measures were implemented to protect vulnerable groups and maintain a functioning health care system as the pandemic entered a new phase. The lockdown took the public by surprise, with almost no time to prepare for the new situation.

## Data description and research design

### Data description

Through collaboration with OBOS, we obtained the complete set of messages posted by Nabohjelp users in the period from February 12th to June 2nd, 2020. The dataset contains 14 997 messages, covering periods before, during and after the national lockdown of March 12th. Each message contains a title, a body of text with the message itself, and the date and time of publication. The user that published a message is registered by the date and time that the user registered him-/herself on the app, providing unique identification of users. Each message is registered with a type:

offering, request, commerce or information. The format and range of the variables are summarized in Table 1.

*Table 1 Variables included in the dataset*

Variable	Format	Range
Title	Text	Open
Body	Text	Open
Message type	Text	Offering, Request, Commerce, Information
Publication date	Timestamp: dd.mm.yyyy	12.02.2020 – 02.06.2020
Publication time	Timestamp: hh.mm.ss	00:00:01 – 23:59:59
User registration date	Timestamp: dd.mm.yyyy	06.09.2016 – 02.06.2020
User registration time	Timestamp: hh.mm.ss	00:00:01 – 23:59:59

## Research design

The number of observations and the level of detail in the dataset presented several opportunities for analysing the data. After an initial familiarisation with the data, we designed a mixed method research approach with an explanatory sequential design (Creswell & Plano Clark, 2010), combining quantitative and qualitative research methods to analyse the dataset. The analysis followed two phases. In the first phase, quantitative analysis was used to generate descriptive statistics based on the entire population of messages. In the second phase, we wanted to exploit the level of detailed insight that a manual investigation of the posted messages would give, but it was clear that a full readthrough of all the posts would be too time consuming. As an alternative, we decided to draw samples from subsets of the data, representing periods before, during and after the lockdown. The periods were selected based on the results from the quantitative analysis. Working with samples allowed for an in-depth content analysis focusing on the message titles and bodies.

The quantitative analysis utilized the entire dataset, covering the period of February 11th to June 2nd. Python scripts were used to aggregate the number of posted messages according to various criteria, such as publication date, message type and date for user registration. The quantitative analysis was scripted in Python 3.8.3 using PyCharm IDE 2020.1.2. The qualitative content analysis was guided by the empirical data, consistent with a grounded theory approach (Glaser & Strauss, 1967; Krippendorff, 2019). The messages were coded using Microsoft Excel version 16.48. Sampled messages were coded as whether and to what extent they contained any relation to covid-19, as well as the users' own tagging of messages related to type, and the payment option.

It was decided to use four sample periods of varying length. Period 1 covers the days in the dataset that occurred before the lockdown: Feb 12th to March 11th (28 days). Period 2 begins on the day when lockdown measures were introduced and extends about two weeks, from March 12th to March 26th (15 days). Period 3 covers the time from March 27th to April 11th (15 days). Finally, period 4 was defined as May 2nd to June 2nd (32 days). This period represents the final month in the available dataset and covers a time when most of the lockdown measures had been reversed or moderated, allowing society to open back up and partially return to normality.

100 messages were drawn from each of the sample periods. The title and body of these messages were read manually to identify indicators that would suggest whether the message was related or not to the ongoing pandemic and anti-contagion measures. The messages were then divided in

three groups, as either explicitly referring to the pandemic, implicitly related based on the content of the message, or unrelated. For classifying messages as explicitly referring to the pandemic, we looked for terms such as "quarantine", "home office", "temporarily laid off work" and "home-schooling", and messages describing people as being sick or at risk, as well as being healthy (indicating the ability to help people that are sick or at risk). Expressions such as "these times" or "these days" were also considered as explicitly referring to the pandemic.

The identification of implicit references to the pandemic is based on news reports during the lockdown. For example, certain products were in high demand and often sold out from stores in the initial weeks, such as yeast for baking bread and equipment for setting up home offices. Another example is requests of board games and recommendations for activities for children at home. Such messages were considered to implicitly refer to home schooling or -kindergarten and thereby implicitly referring to the pandemic. The remaining messages were coded as unrelated to the pandemic. One researcher read all of the four hundred sample messages and coded them, as the content was unambiguous and easy to code in most cases. Messages where the researcher was in doubt were presented and discussed in consensus meetings with all authors to decide on the coding.

## Results

### The distribution of messages over time

This section reports the results of the quantitative analysis for the distribution of posted messages over time. It provides an overview of the development and gives more insight into the motivation for dividing the dataset into sub-periods. Descriptive statistics are provided for each sub-period as an initial indication of changes in user behaviour motivated by the covid-19 pandemic.

Figure 2 shows the number of messages posted on Nabohjelp on each day from February 12th, 2020 to June 2nd, 2020. It is immediately clear that there was a large increase in the daily number of posted messages, corresponding with the date of the press conference where the lockdown measures were announced. Up until May 11th, the activity on Nabohjelp was relatively stable. For the first month in the data set, period 1, the number of messages averaged 54,9 with a standard deviation of 10,2, see Table 2. In the following two weeks, period 2, the average jumped to 183,4, with a standard deviation of 76,8. A peak was reached on March 15th 2020, when 429 messages were posted.

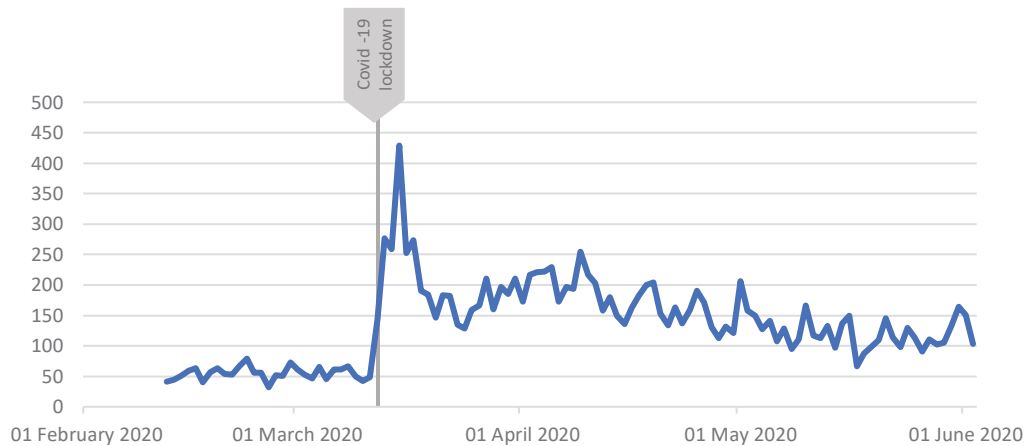


Figure 2 Number of messages posted during period Feb 12th - June 2nd

The activity remained high until April 9th, after which it started to gradually decrease. In the final month of the dataset, period 4, the average number of daily messages was 120,3 with a standard deviation of 23,9. This is more than twice as many as in the period before the lockdown.<sup>32</sup> It is also worth to notice that there is no indication in the data for period 1 that would suggest that a national lockdown was imminent. On March 11th, 2020, the number of posted messages was 42, about one standard deviation below the average of that period.

Table 2 Average number of daily messages posted to Nabohjelp and standard deviation

Period	Dates	Average number of daily messages	Standard deviation of daily messages
Period 1	February 12 - March 11	54,9	10,2
Period 2	March 12 - March 26	183,4	76,8
Period 3	March 27 - April 11	169,1	23,3
Period 4	May 2 - June 2	120,3	23,9
All data	February 12 - June 2	133,9	66,3

The metadata for each message contains information about the types of messages that were posted. There are four types which the user chooses among when posting a message: The type “commerce” deals with sharing items either for free or against payment, “information” with broadcasting an announcement to neighbours, “offer” and “request” for respectively offering and asking for support, either for free or against payment.

<sup>32</sup> A comparison of the sample means using a two-sided t-test gives a p-value <0.001.



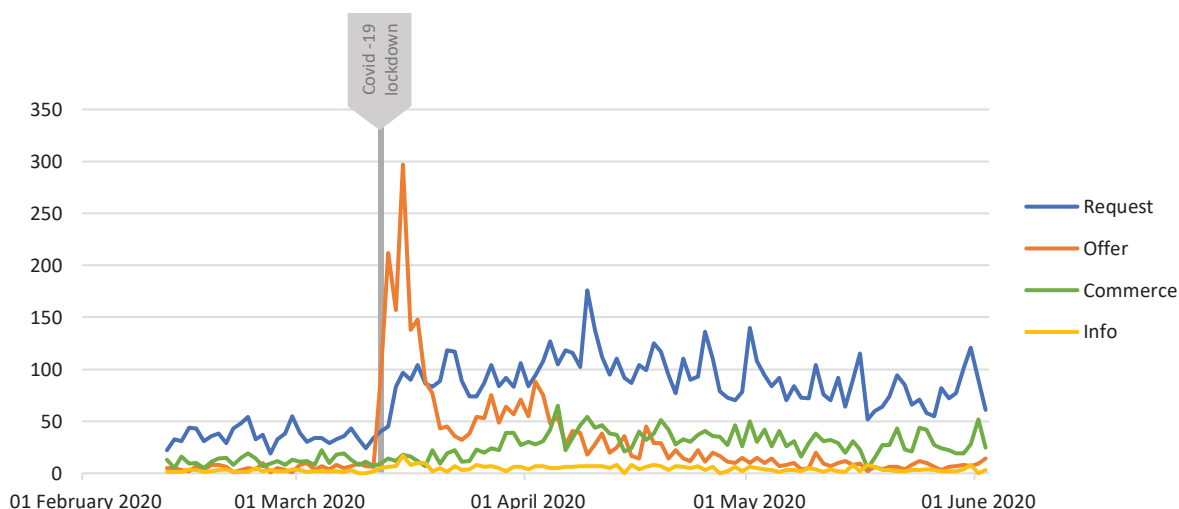


Figure 3 Number of messages per day, sorted by message type

By graphing the development of posts by message type, see Figure 3, it becomes even more clear that the spike in messages after March 12th was atypical. While the majority of messages posted are usually requests for help of some kind, there was a week from March 12th to March 18th where offers to help outnumbered the requests. Secondly, the peak in messages of the offering and information type occurred on March 15th, while requests for help occurred about three weeks later, on April 9th. The commerce type messages peaked on April 5th.

Table 3 The number and percentage of posted messages by type for each sample period

Message type	Period 1 Feb 12 - Mar 11	Period 2 Mar 12 - Mar 26	Period 3 Mar 27 - Apr 11	Period 4 May 2 - Jun 2	Complete dataset
Commerce	335	206	547	883	2781
Information	57	93	87	103	457
Offer	148	1455	789	252	3148
Request	1002	1189	1637	2510	8611
<b>Total</b>	<b>1542</b>	<b>2943</b>	<b>3060</b>	<b>3748</b>	<b>14997</b>
Commerce	22 %	7 %	18 %	24 %	19 %
Information	4 %	3 %	3 %	3 %	3 %
Offer	10 %	49 %	26 %	7 %	21 %
Request	65 %	40 %	53 %	67 %	57 %
<b>Total</b>	<b>100 %</b>	<b>100 %</b>	<b>100 %</b>	<b>100 %</b>	<b>100 %</b>

Note: The table reports the frequency of Nabohjelp messages of various types, in absolute numbers and as percentages. The percentages are calculated as the number of messages of a given type, divided by the total number of messages in the respective period.

Table 4 Distribution of covid-19 related messages in the samples (n = 400)

Period 1 Feb 12 - Mar 11	Period 2 Mar 12 - Mar 26	Period 3 Mar 27 - Apr 11	Period 4 May 2 - Jun 2
Covid-19	Covid-19	Covid-19	Covid-19



Type												
	Total	Explicit	Implicit	Total	Explicit	Implicit	Total	Explicit	Implicit	Total	Explicit	Implicit
<b>Commerce</b>	18			3	1	1	18			23		
<b>(% related)</b>	(0%)			(67%			(0%)			(0%)		
			)									
<b>Information</b>	2			2			1			1		
<b>(% related)</b>	(0%)			(0%)			(0%)			(0%)		
<b>Offer</b>	12			57	42	3	27	12	6	6		
<b>(% related)</b>	(0%)			(79%			(67%			(0%)		
			)				)					
<b>Request</b>	68	1		38	8	1	54	5	1	70		1
<b>(% related)</b>	(1%)			(24%			(11%			(1%)		
			)				)					
<b>Total</b>	<b>100</b>	<b>1</b>		<b>100</b>	<b>51</b>	<b>5</b>	<b>100</b>	<b>17</b>	<b>7</b>	<b>100</b>		<b>1</b>

Note: The table summarizes the number of messages that are either explicitly or implicitly related to the covid-19 pandemic, according to message type. % related shows the share for the given message type that was found to be related to covid-19. In total, 100 messages were sampled from each of the four periods, n= 400.

The results from the in-depth content analysis are summarized in Table 4, where the sample messages are also sorted according to message type. In period 1, only one message was found to implicitly refer to covid-19, and none did so explicitly. Thus, 99% of messages in period 1 were about unrelated topics. The single atypical message refers to the delayed delivery of a product from China due to covid-19. Most messages in period 1 (68) are of the request type, and most requests are concrete describing specific user needs and looking for helpers with or without professional competence. Some examples are:

*Car will not start - I have a [car model and colour] that won't start. It looks like the battery has run out of power. If anyone has a starter cable I could borrow, I would have greatly appreciated it [smiley emoticon]. I live in [address].*

*Help with moving - Hi, I am picking up a piano at [area] and transporting it to [area]. From 1<sup>st</sup> floor to 1<sup>st</sup> floor. Anyone? We'll agree on a price [smiley emoticon].*

In addition to such requests, some users ask for advice, e.g., about the best agreement with a power supplier, and some look for apartments available for rent. The sample in period 1 also includes 18 messages of commerce type, all of which were give-aways and sales adds, and 12 messages of offer type. The two messages of information type are both about lost and found items.

In period 2, 56 out of the 100 messages in the sample, refer to covid-19. Of these, 51 refer explicitly to the pandemic, and 5 messages make an implicit reference. Differently from period 1, and in line with the population of messages, offer is the most used type in period 2. Among the 57 messages of offer type in the sample, 45 (79 %) have a title and/or body relating them to covid-19. Request is the second most used type, with 9 out of 38 messages (24 %) related to covid-19. 2 out of 3 messages of type commerce were related to covid-19, one selling disinfectants, and one selling toilet paper, both of which we know were scarce commodities at the time. Finally, there were two messages of type information, both unrelated to covid-19.

The messages of type offer in period 2 were typically more open in scope and time than the messages from period 1. Some examples of period 2 offers related to covid-19 are:

*Walk dog - Hi! If anyone in these corona times have difficulties with walking their dog, I have a boy who would gladly help. He is 8,5 years old and has had his own dog since he was small.*

*Shopping help for corona exposed -Are you in quarantine or isolation? Are you in the risk group, and want to limit leaving home? If you need help to shop, go to the pharmacy or other important errands, I gladly assist. I'm not in the risk group and wish to do a "dugnad" [Norwegian term not translated] contribution and to limit the extent of the contagion we are exposed to. We will take necessary precautions to avoid infection! This will not cost you anything of course, other than paying for your own goods [smiley emoticon].*

*Quarantine help - I'm home on leave since I work in a kindergarten. My fingers ITCH after doing something! Need help with sundries, send me a message!*

Some examples of requests that relates to covid-19 are:

*Help to shop food - Hi! We have symptoms of cold and are staying indoors. We therefore need help from some kind souls to buy food for us. Send a message if you have the opportunity. Thank you!*

*Anyone who can pick up a delivery in [area]? - Have a postal package that must be picked up by [date]. I am in home quarantine and should avoid this myself.*

In period 3 we observe that, already within two weeks, the share of covid-19 related messages was on the way down. In total, 23 % were found to be either explicitly or implicitly related to the pandemic, compared to 56 % in period 2. This decrease can be associated with both a lower share of the offer type (27 %), and a lower share of request type being covid-19 related. In period 3, 11% of requests contained a reference to the pandemic, compared to 24% of requests in period 2. As shown in Figure 3, the number of daily requests on the app approximately doubled from the beginning to the end of period 3, but there is no evidence in the content of the messages that this increase relates to the pandemic.

In period 4, there were no messages with content explicitly related to covid-19. A single message, possibly implicitly related to the lockdown, came from a couple asking to borrow a modem after their home office internet broke down. Similar to many other countries, several Norwegian employees have worked from home during 2020 and 2021. In terms of the type of the messages, we observe that by period 4, the app usage had returned to a behaviour that resembles the pre-lock down time of period 1. Among the six messages of offer type in period 4, two were related to child- and animal care, while two were give-aways of furniture and a plant. The remaining two were general offers of helping with chores. 23 of the sample messages were posts of the commerce type, where most of them related to selling furniture, leftover materials (e.g., laminate flooring materials, kitchen cabinets, etc.) or interior. 70 of the messages were requests.

## Are the new users behaving like earlier users?

This section reports quantitative evidence of changes in user behaviour during the period covered by the dataset. It covers both the addition of new active users, and the number of messages posted by these users. The analysis gives new knowledge to the question of whether users registered shortly after March 12th behave differently than app users registered at an earlier date.

The term "active user" is used to refer to users who posted at least one message to Nabohjelp between February 12th 2020 and June 2nd 2020, so that the user's registration date is in the dataset. The app provider claims that the majority of people who register on the app never post a message.

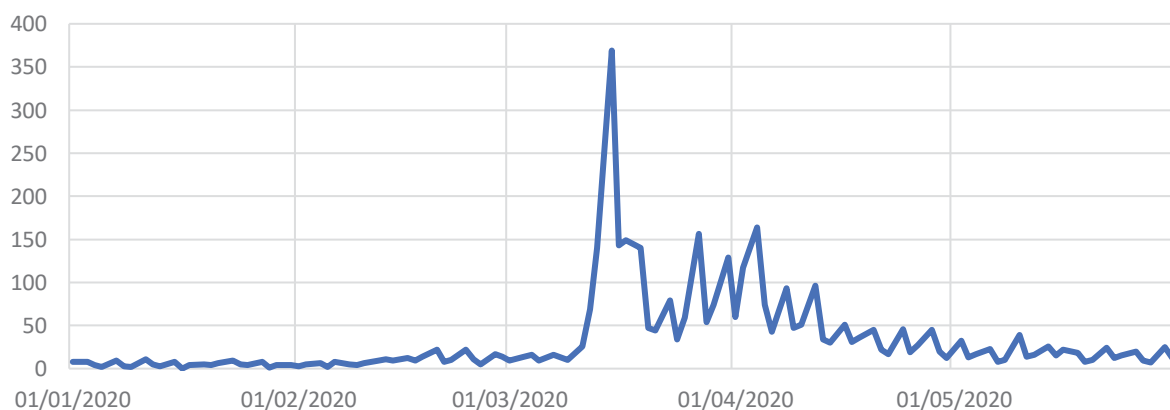
## User registration over time

The registration of active users has been relatively stable over the previous two years. In 2018, an average of 158 active users were registered per month. In 2019 the average was 132. For January and February in 2020, the average was 165 new active users. During March 2020, the number of active users increased dramatically with new 1799 users, and 1180 extra in April 2020. In May 2020 there were 395 registrations of active users. Table 7 lists the number of observed user registrations in each sample period. In the month leading up to the crisis (period 1) 256 active users were registered. This is twice as many as the monthly average of 2019 and indicates that the rate of user registration was already accelerating. In periods 2, 3 and 4, the respective numbers of observed user registrations were 1273, 987 and 390. In total, the dataset contains messages from 8665 individual users. 5384 (62 %) of them registered before March 12th 2020 and 3281 (38 %) registered on March 12th or later. In the following, we will refer to the first group as pre-existing users, and the latter as new users.

*Table 6 The number of new active users of Nabohjelp during the spring of 2020*

Period	Date	User registrations
Period 1	Feb. 12 – Mar. 11	256
Period 2	Mar. 12 – Mar. 26	1273
Period 3	Mar. 27 – Apr. 11	987
Period 4	May 2 – Jun. 2	390

The distribution of daily registrations in the first five months of 2020 is illustrated in Figure 5. It shows a spike in registrations on March 15th that coincides with the spike in messages the same day. It also shows that after the initial boost in period 2, the influx of new active users continued in period 3. April 16th, 2020 was the last day that Nabohjelp experienced more than 50 registrations of active users in a single day. The average number of daily registrations of active users in May 2020 was 12,7. This is about twice as high as the daily average between January 1st 2020 and March 11th of 6,2 new active users.



*Figure 5 Daily registrations of active users of Nabohjelp (1.1.2020 – 31.5.2020)*

### Sharing behaviour by new and pre-existing users

Figure 6 graphs the number of messages posted daily by users registered up to and including March 11th and those who registered on March 12th or later. It shows that both groups were active in posting messages in the initial days after the lockdown. In other words, the public responded rapidly to the crisis, also by downloading Nabohjelp if they had not done so already. On March 15th, new

users posted more messages than pre-existing users, with 228 and 201 messages respectively. However, despite that the number of new active users continued to grow, the number of daily messages soon fell back below that of pre-existing users. The fact that most messages throughout the lockdown came from pre-existing users may be attributed to a relatively high number of pre-existing users.

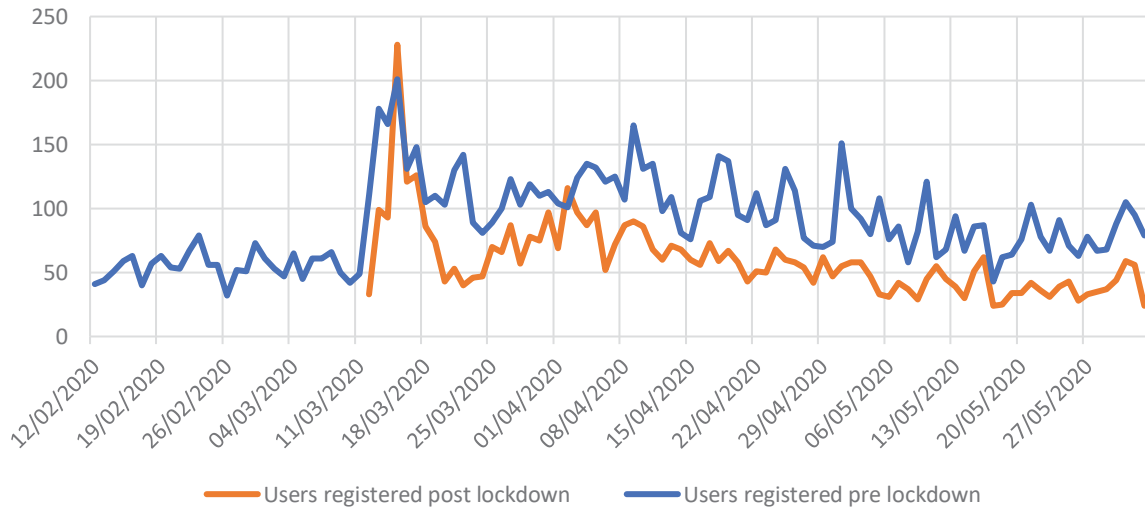


Figure 6 The number of daily messages by users registered before and after March 12<sup>th</sup> 2020

New users contributed with 0 % of messages in period 1, and 39 %, 40 %, 33 % of messages in periods 2-4 respectively. In the sample drawn for the in-depth study, 23 out of the 56 covid-19-related messages in period 2 (41 %) were posted by new users. The fact that new users posted 39% of all messages and 41% of the covid-19-related messages in period 2 suggests that the kind of messages posted by new and pre-existing users was similar in nature. Figure 7 provides more information on this point, by separating messages according to message type. The overall picture is that both new and pre-existing users posted few Commerce and Information type messages, and that the development of Request type messages is similar for the two user groups. The main distinction in the behaviour of new users seems to be that they were responsible for a second wave in Offer messages, between March 22nd and April 6th. This increase in offers is not apparent in the data for pre-existing users. Instead, it matches the high level of registrations of new active users in the same period.

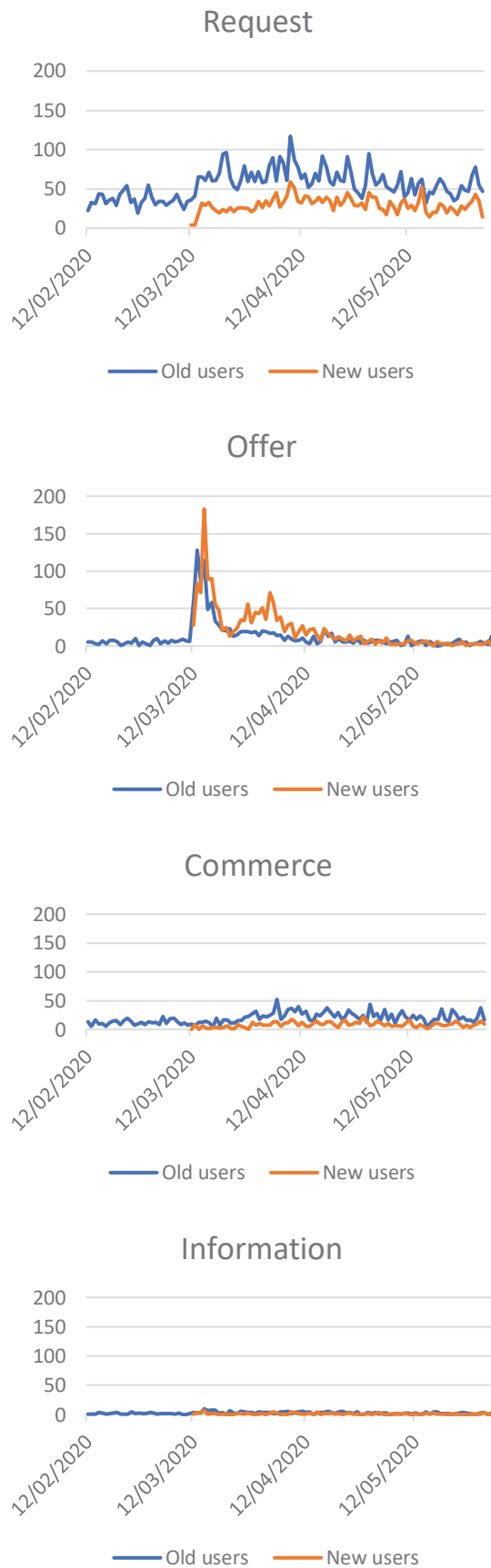


Figure 7 The number of daily messages posted by pre-existing and new users, by message type

Messages per user

To investigate whether the new users were more or less active in posting messages than pre-existing users, we calculated the share of users posting between 1 and 10 messages. The results are provided in Table 7. One thing to note here is that the pre-existing users had more time to post several messages, as they span the entire period that we investigate, totalling 111 days. The new users were, by definition, only present from March 12th, giving them 82 days to be observed. With 35 % more days, it should be expected that a higher share of the pre-existing users would be posting more than one message. This is also what is found in the data: 73 % of the new users have posted only one message on the app. This compares to 64 % of the pre-existing users.

In total, the 3 281 new users posted 4988 messages, giving an average of 1,52 messages per new user. In comparison, the 5 384 pre-existing users posted 10 009 messages, with an average of 1,86 messages per user. The maximum number of messages by a single user is 27, equally for both the new and pre-existing users. The 1 % of pre-existing users that posted 10 or more messages contributed 10 % of all messages posted by that group. Among the new users, 0,5 % of them posted 10 or more messages, generating 4 % of the messages by new users.

*Table 7 The number of messages per user, by user group (from February 12th, 2020 to and including June 2nd 2020)*

Messages per user	Share of messages posted by new users	Share of messages posted by old users	Share of new users	Share of old users
1	48 %	34 %	73 %	64 %
2	23 %	21 %	17 %	19 %
3	10 %	12 %	5 %	7 %
4-10	16 %	25 %	5 %	8 %
>10	4 %	9 %	0 %	1 %
<b>Sum</b>	<b>100 %</b>	<b>100 %</b>	<b>100 %</b>	<b>100 %</b>
<b>N</b>	<b>4 988</b>	<b>10 009</b>	<b>3 281</b>	<b>5 384</b>

Note: The table shows the number of messages that users post on the Nabohjelp platform. New and old users refer to users registered before and after the covid-19 lockdown of March 12<sup>th</sup> 2020 respectively.

## Discussion

The key question we address in this article is how the sharing economy can help to alleviate difficulties that arise with policies related to pandemic lockdown, including strict rules for social distancing. The previous section addressed the specific case of using the sharing app Nabohjelp in the first wave of the covid-19 pandemic in Norway. In this section, we summarize the results and discuss their relevancy to other settings and earlier findings in the literature on crisis management.

### The lockdown led to increased app usage

First of all, there is convincing evidence that the covid-19 lockdown strongly influenced both the usage and number of users of Nabohjelp. We observed a large jump in the number of messages posted per day that coincided in time with the announcement of the lock down measures on March 12th, 2020. Prior to this date, there were no indications in the data that there would be significant changes in the activity level. Indeed, the lockdown took the public by surprise. An official Norwegian report about the government's handling of the corona pandemic shows that the Norwegian director

of health was given the task of identifying relevant measures to stop the spread of covid-19 less than 24 hours before the lockdown became a reality (NOU 2021:6, , part 3).

The large changes in app usage that literally happened overnight from March 12th to 13th 2020 supports claims from Frenken (2017) and Seddighi and Baharmand (2020) that the sharing economy has the potential to serve rare peaks in demands from citizens in crisis and to reduce the burden on public organizations. In this case, the Nabohjelp app seems to have facilitated the matching of users with needs and users with residual capacities within a close geographic area. Placed in the framework proposed by Seddighi and Baharmand (2020) that defines the different roles the sharing economy may play in disaster management, Nabohjelp fits the role of contributor. In other words, Nabohjelp may enhance community resilience by providing access to an extended network of resources and things.

Our analysis of the content of the messages provides further evidence for that the spike in app usage was driven by the lockdown. Only one of the hundred sampled messages from the month leading up to the lockdown (period 1) is related to covid-19. In contrast, 56 % of the sampled messages from the following two weeks (period 2) were referring to the pandemic. The fact that 44 % of messages in period 2 did not have clear references to the pandemic does not necessarily mean that there would have been an increase in usage regardless of the social isolation policies. For example, several of these messages were offers to help with shopping for groceries, an activity that was not very prominent in period 1. This indicates that more messages in the samples are related to the need for social isolation than those identified as directly or indirectly related to covid-19. The challenge with classifying such messages as covid-19 related is that the phrasing does not support a clear differentiation from similar messages posted before the lock-down. As such, our measure of messages related to covid-19 should be regarded as a conservative lower bound, rather than a point estimate.

The increase in activity since March 12th is also evident in the number of daily new active users. Our findings show that the influx of new users was exceptionally high for about a month (until April 14th) and that it continued to sustain a higher rate than in the pre-lockdown period. The newly registered users immediately contributed to a large share of posted messages. This indicates that the public quickly identified Nabohjelp as a potentially relevant channel for communication and coordination. Within two weeks, the development team at OBOS responded by designing and launching an information campaign on how to install and use their app, which helps to explain the second wave of user registrations and offers by new users, starting from March 22nd.

The pattern of use changed significantly when the lockdown came into effect, but the changes appear to have been temporary. During period 2, both new and pre-existing users posted a higher share of messages classified as offerings, typically not demanding any payment, and with a scope that was more open than what was observed in messages from period 1. This pattern continued in the two following weeks (period 3) with a steady addition of new active users posting offering messages, while the pre-existing users returned to using the messages of type request as the most frequently used. One and half month after the effective date of the lockdown (period 4), overall app usage appears to be very similar to that of period 1, except for the number of daily messages being considerably higher than before the lockdown.



## Both new and pre-existing users were driven by context dependent motives

The temporal shift in message content that was observed likely indicates a temporal shift in the user's motivations to use the platform, and that this was a shift towards more socially oriented motives. The fact that the number of messages per user was very similar for new and pre-existing users, and that the two user groups have near equal shares of messages that are identified as covid-19 related, is consistent with the view that the lockdown did not attract users with fundamentally different motivations for participating in sharing.

We interpret the results as evidence for both new and pre-existing users having context dependent motivations for participating. When society is functioning with a large degree of normality, app usage appears to be driven primarily by specific short-term needs. But when the society enters a new situation, or context, such as a national crisis, this is immediately reflected in the sharing behaviour. In a time of crisis, there is an increased expression of social motives, such as the willingness to help, that is evident until society returns to normal. We see from the results that the altruistic behaviour is driven by both empathy with those who become socially isolated, and by new opportunities to help that arise from being more at home with more time for leisure activities.

At the individual level, context dependent motivations can be expressed as a desire for flexibility. Both (Akin et al., 2021) and (Gazzola, Vătămănescu, Andrei, & Marrapodi, 2019) have argued that flexibility and convenience are important prerequisites for users of sharing economy platforms, and that these aspects are key enablers for well-functioning sharing. One strategy to obtain flexibility is illustrated by Bellotti et al. (2015) who show that sharing economy participants may use different sharing platforms for different purposes. In their study, they make a clear distinction between users who provide resources on a platform (e.g., an Uber driver) and users who receive a resource (e.g., an Uber passenger), and show how the underlying motivations differ between these roles. As the current study has shown, Nabohjelp allows the users to act as both provider and receiver at will and the platform is flexible enough to accommodate sudden changes in the user needs and resource availability. This may explain how the activity on Nabohjelp increased as much as it did during the crisis.

## Business model implications

The observed changes in app usage provides new insights into the motivations driving sharing economy participation. Earlier studies have typically sought to differentiate between materialistic and altruistic motives among users and platform providers, relying on self-reported accounts in single round interviews or surveys (see e.g., Akin et al., 2021; Bellotti et al., 2015). Such studies are susceptible to experimenter-demand effects where subjects seek to comply with perceived expectations from the researcher. In addition, they are unlikely to capture dynamics that arise with unexpected changes in user needs.

In contrast, with detailed information of actual app usage, the quantitative data in this study are objective, and the findings derived from the qualitative data are only dependent on the researchers' own analysis and presentation. Secondly, the longitudinal dimension of our dataset enables us to follow evolutions in app usage over time. This also allowed us to identify the similar behaviour of

new and pre-existing users, both in the immediate crisis and in a more normalized situation. This finding rejects the idea that the crisis attracted a new kind of users to the platform, but further studies are needed to characterize the concept of context-dependent preferences of sharing economy participants.

While we have shown that Nabohjelp was used by thousands of people seeking or offering help in a time of great uncertainty, this study does not discuss how governments should engage with platform providers to mobilise the sharing economy in future crises. E.g., Seddighi and Baharmand (2020) observe that implementing sharing economy platforms in crisis management can challenge coordination by expanding the set of decision makers and stakeholders. It is also conceivable that some offers to help that were displayed on Nabohjelp would have made a larger impact if it was directed towards established organisations, such as the local red cross. These examples suggest that there is still a large need for studying collaboration and information sharing across stakeholders from different sectors, i.e., public, private, and volunteering.

## Concluding remarks

This paper presented the population of messages on the Nabohjelp app in the immediate time before and after lockdown measures were introduced in Norway in March 2020 due to the covid-19 pandemic. Besides providing a detailed description of the people's reaction to the "new normal", the study also gives new insights on the more general topic of the usefulness of sharing economy platforms as tools for crisis management.

The study provides new evidence for the claim that p2p sharing economy platforms, such as Nabohjelp, can create more robust societies and play an important role in crisis management. In the case of the covid-19 pandemic in Norway, the platform connected people at the local level without the need to meet physically, so that they could communicate needs and abilities to help. The willingness to help others in a time of crisis was spontaneous and the sharing economy platform was able to meet this sudden change in needs, as predicted by Frenken (2017). Both pre-existing and new users were quick to use Nabohjelp in this way.

Crisis management is not the intended purpose of the Nabohjelp platform, and the response happened without the involvement of public authorities. This is in line with Seddighi and Baharmand (2020) who found that disaster managers seldom coordinate with sharing economy providers before disaster strikes, despite the potential benefits this can have. The study further extends their framework to the recovery phase since Seddighi and Baharmand were unable to find any studies or examples that could validate the role of the sharing economy in the recovery phase of a crisis. The results of our in-depth analysis of message content indicate that app usage had returned to normal within the data period, and we show that the p2p sharing economy can assume the role of "contributor" also after the preparation and response phases.

The findings should be relevant for app developers and investors, as well as crisis managers, governments and local societies struggling with the pandemic. With vaccination efforts still ongoing in many parts of the world, the covid-19 pandemic continues to require social distancing through

forced and self-imposed isolation. Luckily, the p2p sharing economy can facilitate assistance to at least some who need it.

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## Appendix A

### Sample representativeness

Table A.8 presents the distribution of messages by type for the 100 messages that were randomly drawn from each sample period for the in-depth content analysis and for the total population of messages. The distribution of messages in the samples is close to that of the message population, indicating that the samples are representative for the app usage in these periods.

*Table A.8 The distribution of posted messages by type in samples from period 1-4*

Message type		Period 1	Period 2	Period 3	Period 4
		Feb 12 - Mar 11	Mar 12 - Mar 26	Mar 27 - Apr 11	May 2 - Jun 2
Sample amount	Commerce	18	3	18	23
	Information	2	2	1	1
	Offer	12	57	27	6
	Request	68	38	54	70
	<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>
Sample percentages	Commerce	18 %	3 %	18 %	23 %
	Information	2 %	2 %	1 %	1 %
	Offer	12 %	57 %	27 %	6 %
	Request	68 %	38 %	54 %	70 %
	<b>Total</b>	<b>100 %</b>	<b>100 %</b>	<b>100 %</b>	<b>100 %</b>
Population percentages	Commerce	22 %	7 %	18 %	24 %
	Information	4 %	3 %	3 %	3 %
	Offer	10 %	49 %	26 %	7 %
	Request	65 %	40 %	53 %	67 %
	<b>Total</b>	<b>100 %</b>	<b>100 %</b>	<b>100 %</b>	<b>100 %</b>

Note: The top panel in the table reports the frequency of messages of various types in absolute numbers. The middle and bottom panels display the distribution of messages by type for the samples and the overall population of messages respectively.