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May 2020



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THE INDIVIDUAL WELFARE COSTS OF STAY-AT-HOME POLICIES*

Ola Andersson^a, Pol Campos-Mercade^b, Fredrik Carlsson^c,
Florian Schneider^d, and Erik Wengström^e

ABSTRACT

This paper reports the results of a choice experiment designed to estimate the private welfare costs of stay-at-home policies during the COVID-19 pandemic. The study is conducted on a large and representative sample of the Swedish population. The results suggest that the welfare cost of a one-month stay-at-home policy, restricting non-working hours away from home, amounts to 9.1 percent of qSweden's monthly GDP. The cost can be interpreted as 29,600 quality-adjusted life years (QALYs), which roughly corresponds to between 3,700 and 8,000 COVID-19 fatalities. Moreover, we find that stricter and longer lockdowns are disproportionately more costly than more lenient ones. This result indicates that strict stay-at-home policies are likely to be cost-effective only if they slow the spread of the disease much more than more lenient ones.

JEL classifications: D62, I18

Keywords: Stay-at-home orders, welfare effects, choice experiment

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1 Introduction

Countries around the world have enforced stay-at-home policies to deal with the COVID-19 outbreak. As governments ponder over how to ease restrictions and deal with possible future waves, understanding the costs and benefits of stay-at-home orders is essential for policymaking. Theoretical models and cost-benefit analyses shed light on the potential tension between reducing mortality and stabilizing economic activity (Acemoglu et al. 2020; Alvarez et al. 2020; Callum et al. 2020; Eichenbaum et al. 2020; Thunström et al. 2020). Yet, it is clear that comprehensive policy evaluations have to look beyond the direct effects on mortality and the economy (Layard et al. 2020).

Stay-at-home policies bring a range of both direct and indirect welfare effects. One essential cost to measure is the suffering of individuals who become required to isolate themselves. These costs could take many forms, including mental distress, which at the very extreme may lead to increased rates of suicide and domestic violence (Cao et al. 2020; Holmes et al. 2020; Taub 2020). Less dramatically, stay-at-home orders also rule out social activities that naturally bring welfare.¹ These non-monetary costs are difficult to quantify using observational data. Hence, despite the importance of understanding the welfare costs of stay-at-home policies, little is known about their magnitude.

In this paper, we use a choice experiment to estimate the welfare costs of stay-at-home policies that limit people's opportunities to leave their homes during non-working hours. The experiment was administered to a representative sample of the Swedish population in mid-April 2020. At the time, Sweden maintained a relatively open society with very few formal restrictions. Combined with the ongoing increase in the number of COVID-19 cases at the time of the survey, this

¹ The value of social activities figures prominently as the core motivation of individual behavior in equilibrium models of pandemic disease control (Farboodi et al. 2020).

made the more strict stay-at-home policies in the choice experiment a salient set of possible future events, making the survey credible to the respondents (Vossler et al. 2012).

Our results suggest that the welfare costs of stay-at-home orders are considerable. For example, if adopted universally across Sweden, the welfare cost of a one-month stay-at-home policy allowing only eight non-working hours spent away from home each week amounts to 3,800 million USD. This is equivalent to 9.1 percent of Sweden's monthly GDP, or 0.8 percent of the annual GDP. This cost can also be interpreted as 29,600 quality-adjusted life years (QALYs), which roughly corresponds to between 3,700 and 8,000 COVID-19 fatalities. Importantly, we only consider costs associated with restricting people's non-working hours. Hence, to obtain the societal cost of more restrictive stay-at-home orders, our cost estimate should be added to the costs of shutting down workplaces, schools, and childcare facilities and of the corresponding reduction in economic activity.

In our design, respondents are presented with a series of possible program versions, each describing a specific stay-at-home policy, and then asked whether they would like to participate in it or not. In each program version, we vary the length of the stay-at-home policy and the number of non-working hours people would be allowed to leave their homes. Program participation is voluntary, and each version is coupled with a compensation that would be paid if the respondent opts in. Using this method, we can obtain a welfare measure for having to stay home, i.e., the willingness to accept compensation (WTA), for each of the different dimensions.

We find that stricter and longer stay-at-home policies are disproportionately more costly than more lenient ones. Isolation for 2 weeks but being allowed to leave home for 14 hours per week carries a cost of only \$30 per week, while isolation for 6 weeks and only being allowed to leave home for 2 hours per week

carries a cost of \$228 per week. This indicates that strict stay-at-home policies are likely to be cost-effective only if they slow the spread of the disease much more than more lenient ones do.

Our results also shed light on sociodemographic differences in the welfare costs of stay-at-home policies. Pandemic policies often target specific at-risk groups in society, such as the older people. Indeed, recent theoretical results on optimal policy responses to the pandemic prescribe stricter policies for older individuals (Acemoglu et al. 2020). To assess the cost-effectiveness of such directed policies, it is essential to understand the heterogeneity in welfare costs. We find that older people face much *higher* costs of staying home than the rest of the population, even after accounting for socioeconomic characteristics. This finding suggests that pandemic policies targeting the elderly may have more nuanced welfare implications than previously thought.

Choice experiments have previously been applied in many different areas, e.g., to measure subjective well-being (Benjamin et al. 2014), the value of kidney markets (Elías et al. 2019), the private cost of environmental regulations (Blackman et al. 2018; Cropper et al. 2014), and preferences for mitigation of climate change (Layton and Brown 2000). The method is particularly well suited for our context, as it allows us to obtain an encompassing welfare-cost measure of physical isolation for an entire population. Such an estimate would be hard to obtain using observational data since we cannot directly observe welfare, and it is hard to think of a suitable way to measure welfare indirectly.

This paper is organized as follows. Section 2 presents the choice experiment and the survey design. Section 3 describes the econometric specification. Section 4 presents the results. Section 5 concludes and discusses the policy relevance and implications of our results.

2 Survey and experimental design

In this section, we first introduce the design of the choice experiment and then describe the full setup of the survey and the characteristics of our sample.

2.1 *Choice Experiment*

We presented a situation where the government had designed a voluntary stay-at-home program to reduce the spread of the COVID-19 virus. As we wanted to focus on non-work time, we informed the subjects that schools would remain open and that people would still be able to work (from home or at their workplace).² We explained that in order for the program to be successful, 30% of the households would have to participate.³ Furthermore, we explained that this level of participation was required for different types of households, including households with the same age and location profile as the respondent. Because of uncertainties regarding how such a program should be designed, respondents were told that three aspects would be varied:

1. Number of weeks (2, 4, or 6),
2. Number of hours away from home allowed for each household member (2, 8, or 14 hours per week),

² Focusing on non-work time gives us more control over participants' beliefs and potential motives. Restricting individuals to work only from home would only be feasible for some individuals. Limiting the possibilities to work would also raise a number of questions related to job security and permanent job loss, issues that are important, but not our main focus. Moreover, by focusing on non-work time, participants do not have to worry about their decisions having an impact on the functioning of essential sectors in the economy, such as health care.

³ Since participants were asked to participate voluntarily, we chose 30% to make the scenarios credible. For example, we would expect few participants to believe that 70% of the population would participate in a program that forces them to stay at home for six weeks without compensation, or that (as in one of the survey versions) restaurants and shops would remain open if 70% of the population stayed at home.

3. Compensation to each adult participating (\$0, \$50, \$100, \$150, \$200, or \$250 per week).⁴

The number of weeks captures the main aspect of any stay-at-home program, i.e., the length of time households would have to isolate themselves. The number of weeks that countries have been under stay-at-home orders, or pandemic lockdowns, has varied greatly, although most countries have had such policies in place for at least one month. The number of hours people are allowed to be away from home reflects how much flexibility there is for household members to go shopping or engage in leisure activities. This has also varied between countries and parts of countries, and not all policies have specified an exact amount of time that people are allowed to spend away from home, although for example France set a restriction of a maximum of 1 hour per day. We explained that the payment was made as a way of recognizing that it would be costly for households to isolate themselves. It was explained that the program would be voluntary, but anyone participating would have to follow the provided rules for the stipulated time.

To understand whether the costs of stay-at-home orders depend on the outside options, we implemented two survey versions to which each participant was randomly assigned. In one version, respondents were informed that restaurants and stores would be open, but that public gatherings would be limited to a maximum of 50 people. The description was similar to the actual situation in Sweden at the time of the experiment. In the other version, the situation would be stricter with closed restaurants and stores and only pharmacies and supermarkets allowed to be open.

The respondents were asked to state whether their household would participate in each of nine versions of a voluntary stay-at-home program. The nine presented

⁴ We implemented the choice experiment with Swedish crowns (1 SEK = \$0.10). For an easier interpretation of our results, we express all magnitudes in dollars rather than in Swedish crowns.

program designs differed along the dimensions described above.⁵ Before they made their choice, an example choice scenario was presented. In order to reduce demand effects, we also explained that there was no right or wrong answer. Appendix B contains a complete description of the choice experiment scenario.

2.2 *The survey*

The choice experiment was the central module of a survey that consisted of four parts. A transcript of the entire survey is provided in the Online Appendix. In the first part, we asked the respondents about their behavior during the ongoing COVID-19 pandemic.⁶ The second part contained the choice experiment. The third part included a set of questions relating to the current Swedish policy. We asked to what extent participants worried about the economy, at both private and societal level, the functioning of the healthcare sector and to what extent they thought the government did enough to fight the pandemic. Finally, in the fourth part, we asked the respondents questions about socioeconomic status, such as age, education, gender, and housing.⁷

⁵ The nine potential program scenarios were generated with an orthogonal design using Ngene (ChoiceMetrics 2018), allowing us to estimate independent non-linear effects for all aspects. The total number of choice scenarios from the orthogonal design is 18. In the survey, each respondent was asked to consider nine scenarios randomly drawn from the total set of 18.

⁶ The questions measured e.g., whether respondents avoided social contacts, kept a distance to other people, and refrained from traveling, as well as whether they stayed informed about the pandemic and maintained personal hygiene routines, such as sneezing into the elbow and not touching the face. It was important to ask the questions about behavior before the choice experiment since the two survey versions might affect statements about behavior during the pandemic. We believe such spillovers to be less relevant for the socioeconomic variables, which we asked about after the choice experiment.

⁷ We also asked a set of questions measuring their risk, time, and social preferences using the well-established questions from Falk et al. (2018). These questions are used in another research project unrelated to the choice experiment (Campos-Mercade et al., 2020).

2.3 Sample

The survey was sent out to respondents using a representative online panel during the period April 8–30 of 2020. We obtained 1,845 responses, of which 215 were incomplete and therefore excluded. In addition, we excluded 135 respondents who completed the survey in less than 5 minutes. We expect this to be the minimum amount of time a person needs to fill out the survey with sufficient focus. This leaves us with a sample size of 1,495. Descriptive statistics of the sample are presented in Table A1. In comparison with the Swedish population, our sample is representative with respect to gender, age composition, and geographic location of households. However, we have an overrepresentation of university-educated people (37%) compared with the population (23%). For this reason, all estimates will be based on sampling weights where we correct for this misrepresentation.⁸

3 Econometric framework

In the choice experiment, we observe the choice of participating or not for each suggested design of the program. We apply a random utility model framework to analyze the data (McFadden, 1973). In program version i , the program is described with an attribute vector a_i and a compensation c_i . Given an income of M_k , the utility of not participating and participating is expressed as

$$V_{jk}(\text{Not participating}) = U(M_k) = \alpha + \gamma M_k + \varepsilon_{jk}$$

$$V_{ik}(\text{Participating}) = U(a_i, M_k, c_i) = \beta a_i + \gamma(M_k + c_i) + \varepsilon_{ik},$$

⁸ All results reported in the paper are very similar if we do not use sampling weights. The unweighted estimations are presented in the Online Appendix.

where ε_{ik} is an error term capturing, by the researcher, unobserved effects. β is a parameter vector, α is an alternative-specific constant for non-participation, and γ is the marginal utility of money. The probability that individual k chooses to participate in program version i can now be expressed as:

$$P_{ik} = P[\beta a_i + \gamma(M_k + c_i) + \varepsilon_{ik} > \alpha + \gamma M_k + \varepsilon_{jk}] = P[\beta a_i + \gamma c_i - \alpha > \eta_{ik}],$$

where $\eta_{ik} = \varepsilon_{jk} - \varepsilon_{ik}$. Thus, the probability of participation depends on the difference in utility between the two alternatives and the error term. To estimate this model, we assume that η_{ik} has a standard normal distribution, which means that we estimate a probit model.

From estimated model parameters, we can obtain welfare measures of the attributes. For attribute a_m , the willingness to accept compensation is simply the ratio between the attribute parameter and the marginal utility of money:

$$WTA(a_m) = \frac{\beta_m}{\gamma}.$$

Additionally, we can use the model's parameters to estimate the predicted probability of participation for different configurations of the program.

4 Results

In this section, we begin by presenting our core estimates of the welfare effects of stay-at-home policies. Thereafter, we explore the heterogeneity of the welfare costs with respect to socioeconomic background variables, including characteristics of the respondents' home and work arrangements.

4.1 *Welfare effects of stay at home policies*

We combine the responses from the two versions of the experiment and estimate a pooled model. We allow for non-linear effects for both non-monetary attributes through a dummy coding of the attribute levels, using the least restrictive scenario as the reference case (i.e., 2 weeks at home with 14 hours per week away from home allowed). Standard errors are clustered at the individual level. The estimated binary probit model is presented in Table A2 in the Appendix. In Figure 1, we display the estimated WTA compensation measures for different stay-at-home policies. Note that the welfare measures include the overall disutility/utility of participating in the program, as indicated by the sign and magnitude of the intercept in the probit model.⁹

⁹ We have also estimated a pooled model with interaction terms between the non-monetary attributes and a dummy variable capturing survey version. The probit model is presented in Table A2 in the Appendix and the corresponding WTA estimations in Table A3. The welfare estimates of the two survey versions are very similar. The only notable differences between the survey versions are observed for the two weeks scenarios with 8 or 14 hours allowed outside. One potential explanation is that the scenario differences become less salient when the stay-at-home policies become stricter (cf. Köszegi and Seidl, 2013).

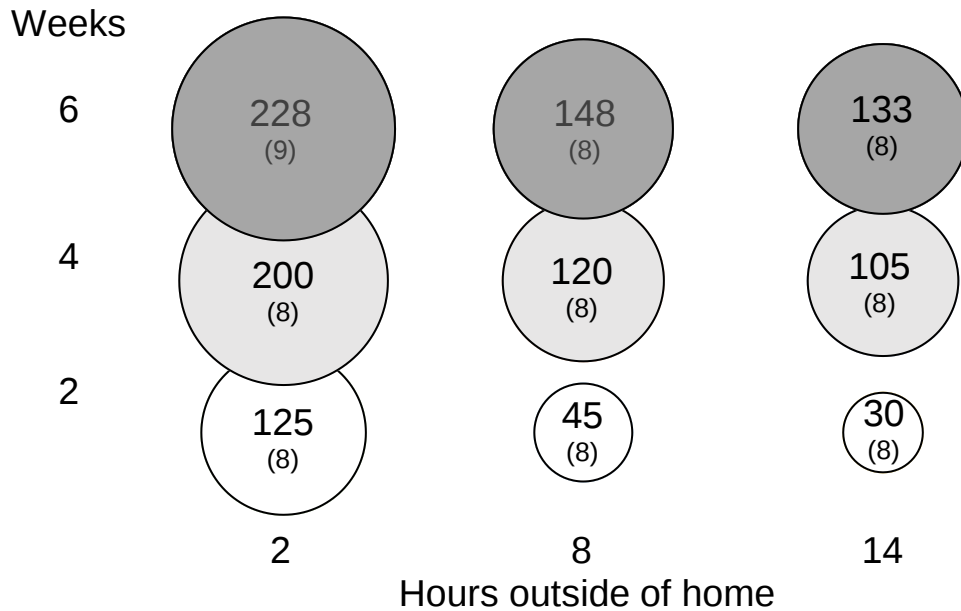


Figure 1. Willingness to accept compensation for stay-at-home policy in USD per week.

Notes: Estimated mean willingness to accept compensation in dollars per week and adult for a household to participate in the program. To obtain the total compensation required for participating in a program, the numbers given in the figure should be multiplied by the number of weeks. Standard errors obtained by the delta method in parentheses.

The negative welfare effect of a short period of social isolation (2 weeks) on households is very modest when the number of hours away from home allowed is relatively generous (14 hours). When the number of hours is more restricted, the negative welfare effect increases substantially; if set to only 2 hours per week, the estimated mean WTA is \$125 per adult and week. Similarly, increasing the length of social isolation from 2 to 4 weeks increases the mean WTA to \$105, even when they are allowed to be 14 hours per week away from home. Moving from 4 to 6 weeks also results in an increase in WTA, although smaller than moving from 2 to 4 weeks. As for the number of hours away from home allowed, the rise in WTA

when moving from 8 to 2 hours is substantial, while moving from 14 to 8 hours results in a smaller increase.

Another informative way of illustrating the results is to look at predicted participation probabilities for different compensation levels and program versions. In Figure 2, we report predicted participation probabilities for three versions of the program, i.e., a lenient version with 2 weeks of isolation and 14 hours per week away from home allowed, a medium version with 4 weeks of isolation and 8 hours per week away from home allowed, and a strict version with 6 weeks of isolation and 2 hours per week away from home allowed.

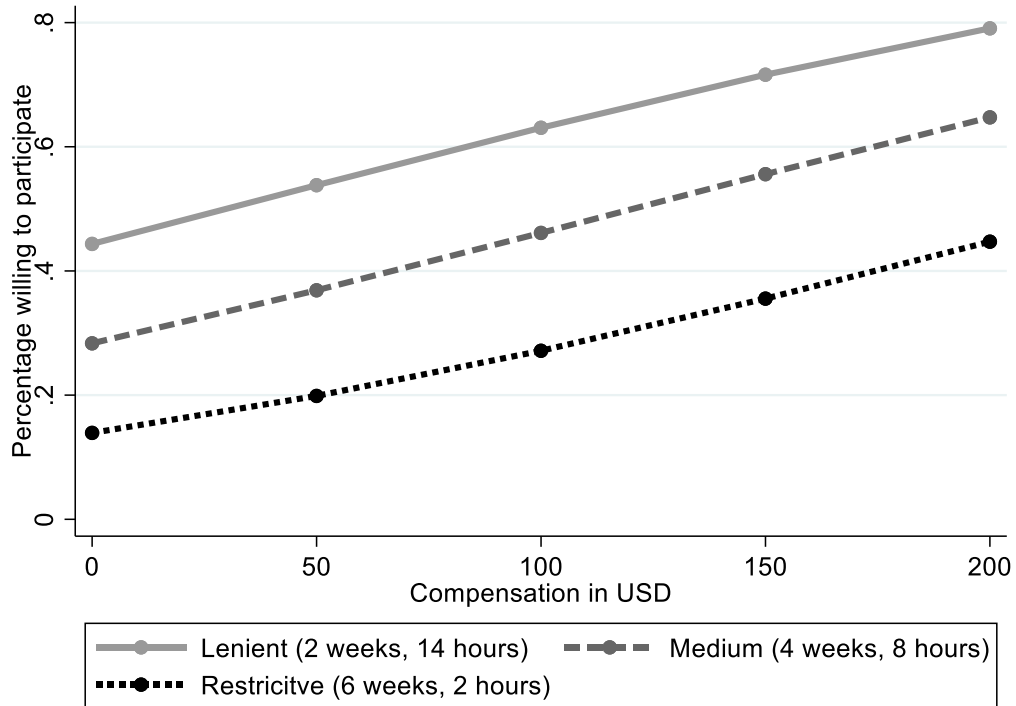


Figure 2. Predicted participation probabilities by level of compensation

Several observations can be made from the predicted program participation probabilities. To begin with, a sizeable fraction of the respondents would be

willing to participate even without any compensation. For the most lenient program, this fraction is about 44%. For the most restrictive program, the share drops to nearly 14%. Consequently, if voluntary self-isolation were implemented for a limited period, a sizeable share of the population would opt in to this, and the direct welfare consequences for these households would be modest. At the same time, even for a lenient program, a rather sizeable compensation of \$200 would not reach an 80% participation rate. For the most restrictive program, this fraction goes down to 45%. This indicates that self-isolation would result in large negative welfare consequences for a large part of the population.

4.2. Heterogeneous welfare effects

To explore heterogeneities in welfare costs, this section investigates to what extent the willingness to participate in the voluntary program and the welfare effects of social isolation vary with individual characteristics. In Table 1, we present estimates from two models. In the first model, we include a number of sociodemographic characteristics. In the second, we add a set of work and home characteristics that might affect the welfare cost of a stay-at-home policy.

Table 1. Marginal effects, pooled probit models with heterogeneous effects

	(1)	(2)
Female	0.044** (0.021)	0.040* (0.021)
39–39 years	-0.045 (0.035)	-0.044 (0.035)
40–49 years	-0.024 (0.036)	-0.021 (0.036)
50–59 years	-0.041 (0.033)	-0.042 (0.033)
60–69 years	-0.093** (0.036)	-0.094** (0.037)
≥70 years	-0.159*** (0.041)	-0.157*** (0.042)
Income per adult	-0.016 (0.011)	-0.015 (0.011)
Employed	-0.063** (0.025)	-0.065** (0.025)
University studies	0.084*** (0.021)	0.088*** (0.021)
One adult in household	0.068*** (0.024)	0.083*** (0.026)
No kids in household	0.027 (0.024)	0.037 (0.026)
Big city (>300,000 inhabitants)	-0.010 (0.027)	-0.008 (0.029)
City (<300,000 and >50,000 inhabitants)	-0.041 (0.029)	-0.040 (0.030)
Small city (<50,000 inhabitants)	0.005 (0.033)	0.003 (0.033)
Cannot work from home		-0.004 (0.028)
Apartment		0.048* (0.029)
House/apartment size		-0.001 (0.000)
Have access to garden		0.085*** (0.027)
Have access to balcony		0.020 (0.024)
Compensation in 100 USD	0.193*** (0.008)	0.194*** (0.008)
Choice experiment attributes	Included	Included
Observations	13,455	13,455

Notes: Models estimated with sampling weights to adjust for overrepresentation of university-educated respondents. Choice experiment attributes includes dummies for each of the categories of the choice experiment, namely weeks and hours outside. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

In Model 1, there are a number of demographic and socioeconomic characteristics that affect the likelihood of participation. To begin with, older individuals are considerably less likely to participate. A respondent belonging to the oldest category (70 years and older) has a participation probability that is around 16 percentage points lower than a respondent in the youngest group. This marginal effect corresponds to a difference in WTA for participating at all of 82 dollars per week.¹⁰ Women as well as university-educated and single-adult households are more likely to voluntarily participate, which means that the welfare cost of a stay-at-home program is lower for these groups. In contrast, having a job is negatively associated with participation. Households in larger cities are not different from households in rural areas when it comes to the likelihood of participating.

In Model 2, when including work and home characteristics that potentially are correlated with the welfare cost of the policy, the magnitudes of the coefficients are very similar as in Model 1. Whether or not the respondent can work from home does not have an impact on the willingness to participate. In addition, those living in an apartment and those with access to a yard are more likely to participate.

5 Discussion and conclusions

Most countries have enforced stay-at-home policies to deal with the first wave of the COVID-19 outbreak. As governments decide when to lift these restrictions and whether to implement them in future waves, understanding the costs and benefits of such policies is essential for policymaking.

¹⁰ Marginal effects on WTA are estimated as ratios between the coefficient in question and the compensation coefficient.

While stay-at-home policies are likely to be useful in preventing the spread of a disease, they come with substantial costs. Apart from slowing down the economy, we show that they give rise to considerable individual welfare costs. By performing a choice experiment with a representative sample of the Swedish population, we estimate the cost of different stay-at-home policies. A one-month stay-at-home policy allowing only eight non-working hours spent away from home each week is about \$480 for an average citizen. If universally implemented across Sweden, this amounts to a monthly cost of 3,800 million USD, which corresponds to around 9.1 percent of Sweden's monthly GDP, or 0.8 percent of the annual GDP. The cost can also be interpreted in terms of quality-adjusted life years (QALYs). The aggregated welfare cost amounts to 29,600 QALYs, which roughly corresponds to between 3,700 and 8,000 COVID-19 fatalities in Sweden.¹¹

In practice, there are many ways to implement a stay-at-home policy and our results also shed light on how people value different dimensions of the policy. First, people give high weight to the time that they are allowed to spend away from home. The weekly cost of a one-month stay-at-home policy for an average citizen is about \$105 if allowed to be away from home for 14 hours per week, and \$200 if only allowed to be away from home for 2 hours per week. Second, maybe more importantly, the weekly costs of stay-at-home policies increase sharply with the number of weeks that people are required to stay at home. The weekly cost of a 2-week stay-at-home policy for an average citizen is about \$45, while that for a 6-week is about \$148. Taken together, we find that the costs of stay-at-home policies are far from linear, ranging from \$30 per week (2 weeks with 14 hours

¹¹ The QALY calculation assumes a value of 128,000 USD per QALY, following the estimations in Sweden by Svensson and Nilsson (2016) and in line with the guidelines by Neuman et al. (2014). The calculations of COVID-19 fatalities are based on the quality-adjusted life expectancies in Briggs (2020). See Online Appendix B for a detailed explanation of the calculations.

away from home allowed per week) to \$228 per week (6 weeks with 2 hours away from home allowed per week).

These results indicate that stricter and longer lockdowns, such as those recently imposed in Italy and China, are disproportionately more costly than more lenient ones, such as those in Germany and Denmark. Whether the benefits in terms of reduced spreading of the virus outweigh such costs is outside of the scope of this paper. However, our results highlight that very strict stay-at-home policies are likely to be cost-effective only if the spread reduction is much higher than for more lenient policies.

Finally, we also document large heterogeneities in the individual welfare costs of staying home. For the most lenient policy that we analyze, the cost is close to zero for 44% of the citizens, while for 21% the cost is higher than \$200 per week. For the most restrictive policy, the cost is close to zero for 14% and over \$200 for 55% of the citizens. Importantly, age explains part of these heterogeneities. Even after controlling for other socioeconomic characteristics, older people face much *higher* costs of staying home than the rest of the population. This result indicates that pandemic policies that target specific at-risk groups in society, such as older people, may have more nuanced welfare implications than previously thought.

As in most choice experiments, our estimates may be sensitive to the underlying context in which participants make their decisions. We describe a situation where people keep working, children go to school, and the lockdown only applies to the non-working time of those who participate in the program. In reality, the context in which stay-at-home policies are applied differs by country and region, and people's welfare cost of staying at home may vary depending on the underlying conditions. However, we do not observe important differences in responses between the survey version in which there is a complete lockdown (with restaurants, gyms, and shops closed) and the version with a more normal level of

people's everyday life. This result suggests that the welfare costs of stay-at-home policies do not depend substantially on the outside options.

One potential concern with our sample is that the respondents did not have any personal experience with stay-at-home orders. At the time of the survey, the Swedish Public Health Agency had issued recommendations on social distancing, hand hygiene, and voluntary travel restrictions, but there was no strict stay-at-home policy in place. Interestingly, however, a majority of the respondents stated that they had cut down on their social activities and restricted their movements considerably. Combined with the extensive media reports of the situation in other countries that had implemented more harsh lockdowns, we believe it is fair to say that subjects had a good understanding of what a stay-at-home policy would mean.

We hope that this paper will serve as a stepping stone for future research to study the individual welfare costs of stay-at-home policies. Our suggested approach of using a choice experiment to measure the welfare effects of stay-at-home policies can be applied to other countries and contexts. In particular, we believe that understanding how such costs differ by individual, context, and country will be of utter importance for policymaking not only in the coming months, but also for future pandemics.

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Appendix A: Additional Tables

Table A1. Descriptive statistics sample

	Description	Mean	Std. dev
Female	= 1 if female	0.52	0.50
Age: 18–29 years	= 1 if between 18 and 29 years	0.15	0.36
Age: 30–39 years	= 1 if between 30 and 39 years	0.19	0.39
Age: 40–49 years	= 1 if between 40 and 49 years	0.17	0.37
Age: 50–59 years	= 1 if between 50 and 59 years	0.23	0.42
Age: 60–69 years	= 1 if between 60 and 69 years	0.16	0.37
Age: 70–89 years	= 1 if between 70 and 89 years	0.12	0.33
Income	Monthly household income in 1,000 dollars per adult household member	2.15	1.24
Work	= 1 if respondent works	0.56	0.50
University	= 1 if university education	0.37	0.48
One adult	= 1 if only one adult lives in household	0.34	0.48
Without kids	= 1 if no kids live in household	0.69	0.46
Big city	= 1 if household is in Stockholm, Gothenburg or Malmö	0.32	0.47
City	= 1 if households is in city with more than 50,000 inhabitants	0.25	0.43
Small city	= 1 if hh is in city with 20,000–50,000 inhabitants	0.15	0.36
Rural	= 1 if hh is in a city with less than 20,000 inhabitants	0.29	0.45
Cannot work from home	= 1 if respondent cannot work from home	0.15	0.36
Apartment	= 1 if hh lives in an apartment	0.51	0.50
House/apartment size	Size in square meter per household member	50.4	31.7
Garden	= 1 if hh has access to a garden	0.58	0.49
Balcony	= 1 if hh has access to a balcony	0.65	0.48

Table A2. Estimated probit model on willingness to participate in voluntary stay-at-home program

	(1)	(2)
4 weeks	-0.359*** (0.030)	-0.300*** (0.043)
6 weeks	-0.490*** (0.035)	-0.421*** (0.049)
2 hours away from home	-0.452*** (0.036)	-0.453*** (0.047)
8 hours away from home	-0.072** (0.032)	-0.073 (0.046)
Treatment: Closed		0.189** (0.075)
4 weeks * Closed		-0.122** (0.060)
6 weeks * Closed		-0.142** (0.069)
2 hours away from home * Closed		0.004 (0.072)
8 hours away from home * Closed		0.008 (0.064)
Compensation in 100 USD	0.475*** (0.019)	0.477*** (0.019)
Constant	-0.142*** (0.041)	-0.236*** (0.055)
Observations	13,455	13,455

Notes: Models estimated with sampling weights to adjust for overrepresentation of university educated respondents. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table A3. Willingness to accept (WTA) compensation for stay-at-home policy in USD
for the two survey versions.

Weeks	Survey version: Closed		
	Hours away from home allowed		
	14	8	2
2	11 (11)	29 (10)	113 (10)
4	94 (10)	112 (10)	196 (10)
6	125 (10)	142 (10)	226 (11)
Weeks	Survey version: Open		
	Hours away from home allowed		
	14	8	2
2	36 (10)	52 (10)	139 (9)
4	101 (9)	117 (9)	203 (10)
6	127 (10)	143 (10)	230 (11)

Notes: Estimated mean willingness to accept compensation in dollars per week and adult for a household to participate in the program when stores are closed and when they are open. Standard errors obtained by the delta method in parentheses.

Appendix B: Instructions Choice experiment

What would you do?

Imagine that in an attempt to reduce the number of people infected by the corona virus (COVID-19) in Sweden, the government is introducing a program with the possibility for households to voluntarily self-quarantine. For the program to be effective, at least 30 percent of all Swedish households must participate, this includes households in *your age group and where you live*. Adults who participate in the program would still be able to work (either from home or in their regular workplace), but they would **have to stay in their home during their non-working time** and would be allowed to leave home only for a limited amount of time each day.

Subsequently the participant saw one of the two versions below:

[Open:] We consider a situation where shops, restaurants, gyms, parks, and movie theaters would be open and only large events would be cancelled.

[Closed:] We consider a situation where shops, restaurants, gyms, parks, movie theaters, and big events would be closed and only grocery stores and pharmacies would be open.

If you choose to voluntarily participate in the program, you would need to do so throughout the duration of the program. Upon completion, you will be free to go back to your usual routines.

Exactly what such a program would look like depends on a number of aspects. For this reason, we will ask you about your household's willingness to participate in such a program under different circumstances. More precisely, we will examine the following aspects:

1) **Length of quarantine** (the number of weeks that each person in the household – both adults and children – needs to stay at home). We consider three different levels:

- 2 weeks
- 4 weeks
- 6 weeks

2) **Hours outside the home** (number of hours per week that each person in the household – both adults and children – is allowed to be away from home except for work/school). This would be monitored and violations of the rules would result in fines for those in the household who violate the rules. We consider three different levels:

- 2 hours a week
- 8 hours a week
- 14 hours a week

3) **Compensation** The authorities are aware that it is costly for people to participate and may therefore pay compensation. We examine six different levels of remuneration per adult in the household per week (after tax):

- SEK 0 per adult (no compensation)
- SEK 500 per week per adult
- SEK 1,000 per week per adult
- SEK 1,500 per week per adult
- SEK 2,000 per week per adult
- SEK 2,500 per week per adult

Let us show you an example of how we will ask you questions (you cannot mark any answer in this example).

If the program looked like what you see below, what would your household choose to do?

Quarantine length	4 weeks
Hours outside the home	8 hours a week
Compensation (after tax)	SEK 1,000 per week per adult

- ☐ I would want my household to participate
☐ I would not want my household to attend

We would like to know what you would like your household to do in these different situations. Note that you make a choice for the entire household so that participation will affect all members of your household. We will ask you to make nine such choices. It is important that you try to see each question as a stand-alone question.

Note that there is no right or wrong answer. We are interested in what different people think and what choices they make. Even we ourselves who are conducting this study feel different about participating in such a program.

Below are the nine different versions of the program that we ask you to consider. Please consider your choices carefully and feel free to go up and down the page and change your choices until you are satisfied.

THE INDIVIDUAL WELFARE COSTS OF STAY-AT-HOME POLICIES

Online Appendix

Ola Andersson, Pol Campos-Mercade, Fredrik Carlsson,
Florian Schneider, and Erik Wengström

This Online appendix contains the following parts:

- Online Appendix A presents the unweighted estimations.
- Online Appendix B describes the QALY calculations.
- Online Appendix C contains a translation of the full survey.

6 Online Appendix A. Unweighted results

7 To account for overrepresentation of university-educated people, the main results in the paper are based on sampling weights to account for this misrepresentation. This section presents the results reported in Figure 1 and Table 1 without sampling weights.

Table OA1. Willingness to accept compensation for stay-at-home policy in USD

Weeks	Hours outside of home		
	14	8	2
2	24 (7)	41 (10)	126 (7)
4	97 (7)	114 (7)	200 (7)
6	126 (7)	143 (7)	229 (8)

Notes: Estimated mean willingness to accept compensation in dollars per week and adult for a household to participate in the program. Standard errors obtained by the delta method in parentheses.

Table OA2 Marginal effects, pooled probit models with heterogeneous effects

	(1)	(2)
Female	0.034*	0.031
	(0.019)	(0.019)
39-39 years	-0.027	-0.027
	(0.033)	(0.033)
40-49 years	-0.025	-0.023
	(0.034)	(0.034)
50-59 years	-0.027	-0.030
	(0.031)	(0.032)
60-69 years	-0.076**	-0.076**
	(0.034)	(0.035)
≥70 years	-0.143***	-0.142***
	(0.038)	(0.039)
Income per adult	-0.016*	-0.015
	(0.009)	(0.010)
Employed	-0.055**	-0.058**
	(0.023)	(0.023)
University studies	0.076***	0.079***
	(0.020)	(0.020)
One adult in household	0.063***	0.073***
	(0.021)	(0.024)
No kids in household	0.027	0.035
	(0.022)	(0.024)
Big city (>300,000 inhabitants)	0.004	0.003
	(0.024)	(0.026)
City (<300,000 and >50,000 inhabitants)	-0.045*	-0.046*
	(0.026)	(0.027)
Small city (<50,000 inhabitants)	-0.014	-0.016
	(0.030)	(0.030)
Cannot work from home		0.013
		(0.025)
Apartment		0.045*
		(0.026)
House/apartment size		-0.000
		(0.000)
Have access to garden		0.062**
		(0.025)
Have access to balcony		0.004
		(0.021)
Compensation in 100 USD	0.195***	0.195***
	(0.007)	(0.007)
Choice experiment attributes	Included	Included
Observations	13,455	13,455

Notes: Choice experiment attributes includes dummies for each of the categories of the choice experiment, namely weeks and hours outside. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Online Appendix B. QALY calculation

The QALY calculations are based on the WTA estimate for the 4-weeks 8-hours program presented in Figure 1 of the main text. The mean WTA for participating in the program is $120 * 4 = 480$ USD. We arrive at the total nationwide cost of 3,800 million USD by assuming that the program involves all adults in Sweden (7.9 million).

The value per QALY used in our calculation is 128,000 USD, which is the present value of 120,000 USD in 2016 prices. This value is based on the upper-bound estimation by Svensson and Nilsson (2016), who estimate that the cost-effectiveness thresholds that are applied when evaluating medical treatments in Sweden is between 70,000 and 120,000 USD per QALY. The 128,000 USD value is also in line with the guidelines by Neumann et al. (2014), who recommend values between 100,000 and 150,000 USD per QALY.

The COVID-19 fatalities are based on the estimates in Briggs (2020). According to the estimates, the quality-adjusted life expectancy of those dying due to COVID-19 falls in a range between 3.7 and 8.08, depending on the degree of comorbidity. These estimates come from UK data, and there is no similar analysis based on Swedish data yet. However, one rough estimate of the number of lost life years due to COVID-19 in Sweden is 6.6 years (Rydén, 2020). This assumes the deceased to have had an average life expectancy conditional on age, gender, and whether the deceased lived in a nursing home or not. However, this estimate does not apply quality adjustment and does not factor in comorbidities (beyond those associated with living in a nursing home). Hence, the Swedish number is likely to fall within the range presented in Briggs (2020).

8 References:

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Online Appendix C. Survey

This section contains a transcript of the questionnaire sent out respondents. Text in brackets [...] are notes on the design.



Request to participate in corona virus study (COVID-19)

Background

We are a group of researchers from Uppsala University, the University of Gothenburg, and the University of Copenhagen conducting a study on the coronavirus (COVID-19). By participating in the study you contribute to the research in this area.

In the study, you will be asked to answer a number of questions about your behavior regarding the coronavirus. No special knowledge is required to participate in the study, and the information regarding your decisions and choices will be confidential and anonymous.

Management of data and confidentiality

The project will collect and record information about you and your opinions. You will be asked questions about your behavior, your income and your opinions. Your answers may be linked to previous surveys where you have provided information regarding your health, finances and opinions. Your response will be protected so that unauthorized persons will not be able to access it. This is ensured by an encrypted link between your personal data and the responses collected in the survey. The results of the project will be presented in research reports. The research reports will only contain summary statistics about the participants, i.e. the number of participants, proportion of women, age distribution, etc.

How do I get information about the project's results?

Research reports can be ordered from the responsible researcher (see below). It usually takes time (more than a year) before a full report is available.

Aggregated information on other participants' decisions can be obtained upon request.

Participation

Your participation is voluntary and you can choose to cancel the participation at any time by pressing a button that cancels the questionnaire. If you choose not to participate or want to cancel your participation, you do not need to state why.

Responsible researcher

Uppsala University is responsible for the project. Responsible researcher is associate professor Ola Andersson at the Department of Economics.

ola.andersson@nek.uu.se

Consent to participate in the study

☐ *I agree to take part in the study and that information about me are handled in the way described above.*

This study consists of two parts. The first part takes about 10 minutes and the second takes about 5 minutes.

First part

Now we will ask you about your behavior regarding the ongoing outbreak of the coronavirus (COVID-19).

1. To what extent do the following statements describe your current behavior in response to the outbreak of the coronavirus (COVID-19)?

- I try to avoid social contacts in person (for example, I attend fewer social gatherings)
- I inform myself about how the spread of the corona virus can be prevented
- I keep at least two meters distance from other people
- I refrain from private domestic trips outside my home municipality (e.g., to holiday homes and acquaintances)
- I cough and sneeze into my elbow or a tissue instead of the hand
- I touch my face less often than usual
- I wash my hands more often than usual when not at home

[Note: Participants answered on a 7-point scale ranging from from 1=“Does not apply at all” to 7=“Applies very much”]

2. If you exhibited mild symptoms of illness (e.g., coughing) tomorrow, how much do the following statements apply to your behavior in the next two weeks?

- I self-quarantine
- I immediately inform people who had contact with me
- I wear a mask, or something else to cover my mouth (e.g., a scarf), if I have to leave home

[Note: Participants answered on a 7-point scale ranging from from 1=“Does not apply at all” to 7=“Applies very much”]

What would you do?

Imagine that in an attempt to reduce the number of people infected by the corona virus (COVID-19) in Sweden, the government is introducing a program with the possibility for households to go on voluntary self-quarantine. For the program to be effective, at least 30 percent of households in Sweden must participate, *which includes your age group and where you live*. Adults who participate in the program would still be able to work (either from home or in the workplace), but they would **have to stay in their home during their free time** and only go out for a limited time each day.

[Subsequently the participant saw one of the two versions below if they were randomized into version Open or Closed]

[Open:] We consider a situation where shops, restaurants, gyms, parks and cinemas would be open and only large events are closed.

[Closed:] We consider a situation where shops, restaurants, gyms, parks, cinemas and big events would be closed and only grocery stores and pharmacies open.

If you voluntarily participates in the program you would need to do so throughout the duration of the program. When the maturity has expired, you are free to go back to your usual routines.

Exactly how such a program would look like depends on a number of aspects. For this reason, we will ask about your household's willingness to participate in such a program under different circumstances. More precisely, we will examine the following aspects:

1) **Length of quarantine** (the number of weeks that one needs to stay at home). We consider three different levels:

- 2 weeks
- 4 weeks
- 6 weeks

2) **Hours outside the home** (number of hours per week that each person in the household (adult and child) is allowed to be outside the home except for work). This would be controlled and violations of the rules would result in fines for those in the household who violate the rules. We consider three different levels:

- 2 hours a week
- 8 hours a week
- 14 hours a week

3) **Compensation** The authorities are aware that it is costly for people to participate and may therefore pay compensation. We examine six different levels of remuneration per adult in the household per week (after tax):

- SEK 0 per adult (no compensation)
- SEK 500 per week per adult
- SEK 1000 per week per adult
- SEK 1500 per week per adult
- SEK 2000 per week per adult
- SEK 2500 per week per adult

Let us show you an example of how we will ask you questions (you cannot mark any answer in this example).

If the program looked like below, what would your household do?

Quarantine length	4 weeks
Hours outside the home	8 hours a week
Compensation (after tax)	SEK 1000 per week per adult

☐ I would want my household to participate

☐ I would not want my household to attend

We would like to know what you would like your household to do in these different situations. Note that you make a choice for the entire household so that participation will affect all members of the household. We will ask you to make nine such choices. It is important that you try to see each question as a stand-alone question.

Note that there is no right or wrong answer. We are interested in what different people think and what choices they make. Even we ourselves who are conducting this study feel different about participating in such a program.

Below are the nine different versions of the program that we ask you to consider. Please consider your choices carefully and feel free to go up and down the page and change your choices until you are satisfied.

[Open:] Remember that shops, restaurants, gyms, parks and cinemas would be open regardless of whether you are in the program or not. Only major events are closed.

[Closed:] Remember that shops, restaurants, gyms, parks, cinemas and big events would be closed regardless of whether you are in the program or not. Only grocery stores and pharmacies open.

[All the choices come here but we only include one for sake of space. Please refer to the paper for the full set of parameter configurations]

If the program looked like below, what would your household do?

Quarantine length	X weeks
Hours outside the home	Y hours a week
Compensation (after tax)	SEK Z per week per adult

- ☐ I would want my household to participate
☐ I would not want my household to attend

During the last 7 days, how often did you leave your home to:

- Buy things other than food and medicine (e.g. clothes)
- Do physical activities with other people (e.g. gym, football, tennis, golf, group workouts)?
- hang out with friends and relatives who do not live in the same household?

[Possible answers: “never”, “1-2 times/week” “3-4 times/week” “5-6 times/week” “7-8 times/week” “more than 8 times/week”]

Think now about a normal week in **April last year**. During this week, how often did you leave your home to:

- Buy things other than food and medicine (e.g. clothes)
- Do physical activities with other people (e.g. gym, football, tennis, golf, group workouts)?
- hang out with friends and relatives who do not live in the same household?

[Possible answers: “never”, “1-2 times/week” “3-4 times/week” “5-6 times/week” “7-8 times/week” “more than 8 times/week”]

The second part

In this section, we will ask background questions and ask you to make some choices. This last part takes about 5 minutes.

What year were you born? (select year)

Do you identify yourself as a woman or a man?

[Possible answers: woman, man, neither man nor woman]

What describes you best?

[Possible answers: single, living apart, couple, married, other]

What is your main occupation?

[Possible answers: work, unemployed, student, retired, other]

What education do you have (fill out the highest you have)?

[Possible answers: elementary, highschool, professional training, ongoing university studies, university studies, research studies]

Which of the following topics describes best what you studied at the university?

[Possible answers: Humanities, pedagogics, business economics and law, social sciences (not including economics), medicine, health sciences and social work, natural sciences and math, technical education]

Does your job allow you to work from home?

[Possible answers: yes to a large extent, yes to some extent, no, I have no job]

Does your partner's job allow him/her to work from home?

[Possible answers: yes to a large extent, yes to some extent, no, She/he has no job]

How many children live in your household?

[Possible answers: no children, 1 child, 2 children, 3 children, 4 children, 5 or more children]

How many adults (over 18 years old) live in your household (including yourself)?

[Possible answers: 1 adult, 2 adults, 3 adults, 4 adults, 5 or more adults]

How much is your households total income per month after taxes including public benefits? Include also your student loan if you are a student. Please answer even if you're not sure.

[Possible answers: 0-10000kr, 10001-20000kr, 20001-30000kr, 30001-40000kr, 40001-50000kr, 50001-60000kr, 60001-70000kr, 70001-80000kr , 80001-90000kr, more than 90001 kr]

Where do you live?

[Possible answers: Stockholm, Gothenburg, Malmö, large city (more than 50000 inhabitants), middle city (between 20000 and 50000 inhabitants), small city (less than 20000 inhabitants)]

What type of home do you have?

[Possible answers: House, terraced house, flat]

How large is your home in square meters?

[Possible answers: 0-40, 41-60, 61-80, 81-120, 120-200, more than 200]

Do you have a garden?

[Possible answers: yes, no]

Do you have one or more balconies?

[Possible answers: yes, no]

What do you think is the risk of getting infected with the new coronavirus? Answer between 0 and 100%, where 0% is that you are absolutely certain that you will not be infected, and 100% that you absolutely believe you will be infected.

[Possible answers: 0%, 10%, ..., 100%]

How many relatives and close friends do you have that belong to the risk group for coronavirus? **[Possible answers: none, 1, 2-3, 4-5, 6-8, more than 8]**

To what extent do the following statements describe your concerns about the ongoing outbreak of the coronavirus (COVID-19)

- I'm worried about getting infected
- I am worried that healthcare will not be able to offer good care to everyone
- I am worried that my finances will be hit hard
- I am worried that the Swedish economy will be hit hard
- Sweden has responded strongly enough
- I believe that social distancing is important to overcome the outbreak of viruses

[Note: Participants answered on a 7-point scale ranging from from 1="Does not apply at all" to 7="Applies very much"]

In how many months do you think the restrictions imposed by the coronavirus will be removed? That is, when do you think life returns to normal in Sweden? (in months)

[Possible answers: 1,2,...,24 months]

Do you have facemasks home?

[Possible answers: yes, no]

How much do you trust the government?

[Possible answers: a lot, quite a lot, not so much, none at all]

Please tell me, in general, how willing or unwilling you are to take risks?, Respond using a scale from 0 to 10, where 0 means you are "completely unwilling to take risks" and 10 means you are "very willing to take risks." You can also use any number between 0 and 10 to indicate where you fall on the scale

[Possible answers: 0, 1, 2,...,10]

How willing or unwilling are you to take risks affecting your health? Respond to a scale of 0 to 10 where 0 means you are "totally unwilling to take risks that affect my health" and 10 means you are "very willing to take risks that affect my health".

Possible answers: 0, 1, 2,...,10]

How well does each of the following statements describe you as a person?

Please

indicate your answer on a scale from 0 to 10. A 0 means “does not describe me at all,”

and a 10 means “describes me perfectly.”

- I assume that people have only the best intentions.
- I am good at math.

[Possible answers: 0, 1, 2,...,10]

Now we describe a person. **How much do you think this person looks like you?**

- It is important for this person to always act correctly and to avoid doing what people would say is wrong

[Possible answers: a lot like me, like me, partly like me, a little like me, not like me, not like me at all]

We now ask you for your willingness to act in a certain way. Please again indicate your answer on a scale from 0 to 10. A 0 means “completely unwilling to do so,” and a 10 means “very willing to do so.”

- How willing are you to give to good causes without expecting anything in return?
- How willing are you to give up something that is beneficial for you today in order to benefit more from that in the future?

Possible answers: 0, 1, 2,...,10]

Imagine the following situation: You receive unexpectedly 18,000 SEK today. How much of that sum would you **donate to a charitable cause?** (Values between 0 and 18000 are allowed)

Possible answers: 0, 1, 2,...,18000]

Now we will ask you if you prefer an item or money. A computer will then randomly select 10 participants and they will get what they choose. **This means that if you become one of the 10 selected then you will get money if you chose it** (in the form of a gift card* distributed by the Enkätfabriken) and a coupon to buy the item if you chose it (the purchase is made anonymously through an online retailer). It is therefore important that you read the information below carefully and answer it truthfully.

*A SuperPresent card gives you a free choice among all gift cards on gogift.com - you can choose from more than 150 store chains.

You should choose between either SEK 200 or a cloth facemask (the mask is worth about SEK 250). Now follows some important information about facemasks:

- **Using a cloth facemask reduces the risk of infecting other people.** Since people without symptoms can still spread the infection, expert authorities in several countries recommend covering their face in public places to protect others.
- **Cloth facemasks are often not effective at protecting oneself against getting sick.** This is a reason why the cloth facemask that you would get would not be used by healthcare professionals, so you do not have to worry that your choice would reduce the availability of protection for healthcare professionals.

An image of the cloth facemask that you would get:



What do you choose?

Possible answers: Cloth facemask, 200 kr]

*Now we will ask you how much of SEK 200 you want to donate to fight the spread of COVID-19. You will keep whatever is left of the SEK 200 after you have made your donation. A computer will then randomly select 10 participants and they will get what they choose. **This means that if you become one of the 10 selected then we will make the donation for the money you choose below and you will receive the rest** (in the form of a gift card distributed by the Enkätfabriken). It is therefore important that you read the information below carefully and answer it truthfully.*

The World Health Organization (WHO) and UNICEF have started a solidarity fund to fight the pandemic. The fund will provide resources to **educate and equip the community and healthcare professionals to prevent, detect and treat COVID-19. It will help countries expand their healthcare capacity and mitigate the negative social effects**, especially for women, children and vulnerable groups.

How much do you want to donate?

Possible answers: 0 kr, 10 kr, 20 kr, ..., 100 kr]

The outbreak of the coronavirus (COVID-19) is a threat to many people's health. In what follows, we want to take the opportunity to inform you about how you can help mitigate the effects of the virus outbreak.

In the following links you will find more information on how you can contribute.

1) The Swedish Red Cross is very active in helping the weakest and buying equipment for healthcare professionals in Sweden and the rest of the world. Follow this link (opens in a new window) to learn more about what they are doing and how you can contribute to this work.

2) It is very important not only to know how to protect yourself but also how to protect others from becoming infected. Follow this link (opens in a new window) to learn about the latest updates from the Public Health Authority on how to help others.

3) Many are worried that during these times, there will be a large lack of blood in Sweden and that many will die because they do not receive blood on time. Follow this link (opens in a new window) to learn more about how to donate by donating blood.