An Economic Evaluation of Sweden's Soft COVID-19 Strategy

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Abstract

Strategies tackling the COVID-19 pandemic have received considerable attention worldwide. A stylized view is that soft strategies that are less intrusive are less taxing on the economy as a whole, but with the negative effect of an increase in the number of cases and deaths. In this study we conduct an ex post economic evaluation of the Swedish COVID-19 strategy, an example of a country that has implemented a soft strategy. Comparing the outcome for Sweden with a counterfactual we find that the costs of this strategy cannot be motivated by a positive effect on the economy, a finding which questions a key feature of the Swedish COVID-19 strategy.

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1 Introduction

Countries worldwide have implemented different strategies to tackle the COVID-19 pandemic. Even within Europe have strategies differed across countries. Whereas many countries, including larger countries like France, German, Italy, and the United Kingdom, have introduced extensive policies to prevent the spread of COVID-19, from test-trace-isolate strategies and/or mandatory mask use, to complete national lock-downs, one country that has received substantial attention due to its relatively low level of interventions is Sweden. The Swedish COVID-19 strategy has to date consisted mostly of recommendations rather than regulations and the aim has been to to mitigate rather the suppress the disease. The objective of this has been herd immunity through infection with senior government advisers defending herd immunity as a valid strategy stating that "our most important task is not to stop spread, which is all but futile" [1].

The argument used by Swedish policy-makers (and the advocates of soft strategies) in favor of a less intrusive COVID-19 strategy is that focusing on what are considered risk groups, notably the elderly, while allowing the rest of society to live a less restrictive life, imposes less of a burden on the economy while the development of a vaccine eventually will tackle the disease altogether [1]. For instance, in contrast with many countries, or WHO guidelines, Swedish authorities have for long refused to recommend face masks [2], or recommended the population to avoid using public transport unless necessary [3]. Civil society in Sweden has, however, become increasingly vocal about the downside of such strategy. Important for this critique has been the observation that Sweden's death rates in relation to its population size has been high in comparison to other countries, and with deaths one order of magnitude higher than its neighbouring countries [4]. For instance, the relatively high mortality rate has been criticized by medical professionals, who are to adhere to the medical oath [5]. Swedish policy makers have also been criticized from a more general public policy perspective for failing in their duty of being transparent and correct regarding decisions taken [6,7], and regarding their responsibility towards the international community, which is tempted to mimic apparently successful COVID-19 strategies [8,9].

In this study we aim to evaluate the Swedish COVID-19 strategy from an economic perspective. There already exist studies that have evaluated COVID-19 strategies, the first one being Thunström et al. [10]. The difference between those studies and our is that they examined policies from an *ex ante* perspective, whereas we examine the Swedish strategy *ex post*. Hence, having access the outcome we examine whether the strategy can be argued as having achieved the results it aimed for.

To assess the Swedish strategy we use Denmark and Norway as our counterfactual. These two countries are similar in many aspects but implemented stricter policies compared to Sweden. We focus on the second and third quarters of 2020 for which we have data on GDP and excess COVID-19 cases, deaths, and hospitalizations. Leaving ethical and moral considerations aside, our findings suggest that the soft Swedish COVID-19 strategy can, based on its results so far, be questioned, since the costs exceed the benefits. In the following section we describe the methodological approach behind our calculations. We thereafter provide our results and the paper ends with a discussion and some conclusions.

2 Methodology

As described, in this study we aim to evaluate the Swedish COVID-19 strategy from an economic perspective. To evaluate welfare effects from different polices the preferred tool among economists is cost-benefit analysis (CBA)[11] which aims at incorporating all negative and positive effects due to the policies. We will not conduct a complete CBA, but instead what we referred to as a "restricted CBA" by focusing on effects related to the economic performance of a society, as measured by the gross domestic product (GDP). The reasons for this are twofold: (i) many of the effects from COVID-19 on the society are not fully known and still highly uncertain which does not allow us to conduct a complete CBA with good precision, and (ii) in the public debate on the effectiveness of COVID-19 strategies both advocates and proponents of strategies often base their arguments on the effect on the "economy" (GDP)[12,13]. Hence, our restricted CBA aims at examining if the Swedish strategy is justified based on its effect on the economy.

To quantify the effect of the policy, we compare its benefit and cost dimensions. Denmark and Norway are used as our counterfactual since these two countries are similar in many aspects but have implemented more stricter policies compared to Sweden. The rationale for this comparison is that above and beyond cultural, demographic, and socio-economic similarities, these countries are all Nordic small open economies, so in equilibrium (long-run) their performances should track each other. For instance, these economies are heavily reliant on international trade, located in close proximity to each other and, moreover, reasonably integrated. We focus on two quarters of 2020, 2020:Q2 and 2020:Q3, for which data are available on GDP and health outcomes related to COVID-19 in all three countries.

On the cost side, we aim to quantify the health costs of the pandemic. In our baseline scenario we focus on: (i) the monetized cost of excess deaths and (ii) the cost of excess illness. Specifically, our comparison is based on quantitative monetary estimates of excess excess deaths, hospitalization costs,

and productivity losses in Sweden compared to our counterfactual. Regarding the social costs we also present two alternative scenarios based on assumptions on how to quantify premature deaths and on how to account for the long-run effects of the disease, commonly called "long-COVID".

The estimation of the benefit side of the strategy is relatively straightforward, and relies on quantifying and comparing the economic performance of Sweden with our counterfactual. As described, this is done by comparing the economic performances of Sweden against those of Denmark and Norway as measured by GDP in 2020:Q2 and 2020:Q3.

3 Results

3.1 Baseline scenario

In the following two sections we first describe the cost and then the benefit calculations of the Swedish COVID-19 strategy. Details and explanations for the calculations are provided in the appendix where Appendix A first describes the calculations of the monetary costs of excess deaths and then the same calculations for excess morbidity cases, and Appendix B outlines the benefit calculations. This section ends with a discussion of the robustness of our findings based on alternative scenarios. Values are reported in USD 2020 price level.

3.1.1 Costs

To monetize the cost due to the pandemic the cost-of-illness approach was used that classifies costs according to[14]:

Medical costs Referred to as *direct costs* related do hospitalization, GP visits, medicine, transport, rehabilitation, etc.

Productivity losses Usually referred to as *indirect cost* due to the illness

By combining information of the number of excess cases of illness and deaths with monetary cost estimates of the elements of the direct and indirect costs the total cost can then be estimated. Figure 1 provides a simplified illustration of the possible outcomes from COVID-19. Not all cases result in negative health effects, i.e. the person experiences no symptoms. We assume here that the social cost related to those cases is equal to zero (even if a person who has been diagnosed, but who has no symptoms, may experience

stress). Moreover, for our calculations we also assume that the social cost from cases resulting in mild symptoms is zero. This is a simplifying assumption due to lack of data on these cases, but it can also be argued that mild symptoms could replace other mild illnesses, and hence the net effect from a social perspective is zero. Moreover, since we only have statistics on cases that have led to hospitalization and/or deaths we will focus on those cases. If we define those as *severe* it will mean that we also treat moderate cases as not leading to any social cost. In line with our reasoning for mild cases we would argue that they replace other moderate illnesses, but a more reasonable assumption is that it means that our cost estimates underestimate the total social cost from COVID-19.

[Figure 1 about here.]

Monetizing health effects, including the prevention of statistical deaths, can be seen as unethical, and also raises issues on whether monetary values should account for differences in, e.g., age and/or income, among the affected individuals. Here we refrain from that discussion, and instead refer readers to, e.g., Andersson et al. [15]. Following the literature, we use the value of statistical life (VSL) to monetize the burden on society from deaths of COVID-19. However, since VSL also captures preferences beyond market activities, such as pain and suffering, and to take into account the fact that most deaths occur at an advanced age, our VSL is recalculated first as a proportion of the total VSL and secondly we also convert it into a value of life year (VLY). In Table 1 we provide the cost components and the total costs due to the Swedish COVID-19 strategy compared with our counterfactual. The table is divided into costs related to hospital treatment, which is divided into regular hospitalization ("slutenvård" in Swedish) and intensive care, and post hospital care.

[Table 1 about here.]

3.1.2 Benefits

The expected benefit from the Swedish soft COVID-19 strategy compared with the counterfactual (Denmark and Norway) is the positive effect on the economy (as measure by the GDP) from a less restrictive approach to address the pandemic. Note that our analysis does not estimate the effect of COVID-19 on the Swedish GDP *per se*, but the consequences of the Swedish strategy compared with our counterfactual. Our comparison is, therefore, based on the estimation of the relative gains to the Swedish GDP compared to our counterfactual over 2020:Q2 and 2020:Q3.

Table 2 reports the GDP statistics for the first three quarters of 2020. The first quarter is used as a benchmark for the comparison and as can be seen the GDP drops in all three countries after the spread of COVID-19 at the end of 2020:Q1. The last row of Table 2 shows the difference in the effect from COVID-19 in Sweden and the counterfactual. Due to the difference in size of the three economies weights were used for the calculations, which are described in Appendix B, and the findings suggest that both in 2020:Q2 and 2020:Q3 the economic outcome was worse in Sweden than in Denmark and Norway. In total over our sample period, the Swedish economy was hit harder than the counterfactual in the amount of USD 22.7 billion. This amounts to 4.19% of the Swedish GDP in 2020:Q1. Hence, since the Swedish strategy led to positive costs in comparison to our counterfactual and the benefits are negative, it is obvious that the Swedish soft strategy led to a negative economic impact overall.

The negative benefit of the Swedish COVID-19 strategy comes from the fact that while the Swedish economy contracted by approximately 3.5% from 2020:Q1 to 2020:Q3, the economies of Denmark and Norway contracted by less, namely 2.44% and 0.32%. Due to the lack of comparable statistics on the health effects in Finland, another Nordic neighbouring country, it was left out of our analysis. However, had Finland also been included in the control group (i.e., together with Denmark and Norway) the estimated negative Swedish benefits would have been even larger, since Finland's contraction was also significantly lower than Sweden over the same time period, i.e. 0.73%.

[Table 2 about here.]

The figures in Table 2 are largely consistent with figures presented by Riksbanken (the Swedish Central Bank), in December 2020[12]. Based on an efficient vaccination scenario they estimated that the benefits, measured as the effect on GDP, would be in the range of USD $1.6 - 4.30$ billion per month, depending on how the infection spreads before the vaccination start, with a central scenario of USD 2.7 billion per month. Aggregated to our sample period (two quarters), the figures amount to a range of USD $9.8 - 26.1$ billion with a central scenario of USD 16.3 billion. Those estimates are lower than what the figures in Table 2 suggest, but that difference is largely driven by the significant drop in GDP in 2020:Q2.

3.2 Alternative scenarios

In our baseline scenario presented above we show that the Swedish strategy led to both costs and negative benefits. This means that our assumption that all individuals count when using productivity losses to measure the cost due to premature deaths does not impact the qualitative results. However, since it

could be argued that health costs related to "production losses" should only be estimated for individuals assumed active in the labor market it is of relevance and interest to examine the effect of excluding those assumed no longer productive. If we, e.g., assume that individuals over 70 years of age are no longer active in the labor market (or contribute to the GDP) and we, therefore, count only the health effects of those younger as a cost to society it would mean that only 11% of deaths would be considered for the analysis. That is, 89% of the COVID-19 deaths in Sweden over the time period were 70 years and older. However, the aggregate production loss due to deaths would "only" drop by 74%, i.e., the post hospital care production loss due to deaths would be 24% of the value reported in Table 1. This difference is due to the use of the value of the loss of life-years which values life of younger individuals higher than older individuals. However, even with the significant drop in costs this assumption would not lead to a change of the economic outcome of the Swedish strategy.

An important consequence of the pandemic yet to be understood has to do with the long-run effects of the disease. Patients with "long-COVID", or long-haulers, have symptoms consistent with neurological diseases from encephalitis, to stroke, hemorrhages, and cerebral venous embolism[16–18]. In Table 1, where we assumed that 50% of the recovered hospital patients would suffer from COVID-19 during 60 days, the post hospital care cost of recovered patients only amounts to 4.6% of the total costs. As explained in section 3.1.1 we took a conservative approach and only considered severe cases leading to hospitalization as a social cost for non-fatal cases. However, e.g. the UK COVID-19 Infection Survey estimates that approximately 20% (10%) of respondents testing positive for COVID-19 exhibit symptoms for a period of 5 (10) weeks or longer[19]. Adopting those estimates to our number of excess cases for Sweden compared to our counterfactual our cost estimate for non-fatal cases would increase from USD 184 million, as reported in Table 1, to USD 376 million, which corresponds to 9.0% of the total post hospital care cost. Moreover, results from a Swedish survey first conducted in August 2020, and then in January 2021, suggest that between $150,000$ and $160,000$ Swedes experience COVID-19 symptoms that lasts for 10 weeks or longer[20,21]. Adopting these values and converting them to excess cases for Sweden we find that the cost related to non-fatal cases would increase significantly to between 26.0% and 41.2%, if we assume 5 or 10 weeks of long-COVID, of the total post hospital care cost.

4 Discussion

This study has evaluated the Swedish COVID-19 strategy by comparing its effect on the economy, as measured by GDP, and number of deaths and severe illnesses with the development in Norway and

Denmark, two countries similar in many aspect to Sweden but that have implemented different COVID-19 strategies compared with Sweden. Our findings suggest that the costs of the strategy in the form of excess deaths and severe illnesses cannot be justified by any benefits in the form of a better economic performance.

We interpret the net loss of USD 27.3 billion as substantial and economically important. This figure was to a large extent driven by the fact the economic performance was not better in Sweden compared to the counterfactual, but actually worse. Alternatively, the benefits from the Swedish strategy were negative even before the costs were considered. In fact, approximately 83% of the loss comes from the relative loss in GDP growth when compared to the control group. This is of importance since based on assumptions made regarding especially mild and moderate symptoms we assume that our cost estimate is a lower bound of the total cost. For perspective, the per capita net loss over the sample period (six months) amounts to approximately USD $2,650$ or roughly half of the average gross (including social security contributions) monthly Swedish wage of USD $5,372$ in 2019 (see Table 1 for details and data sources).

However, the analysis face a number of limitations. First, the analysis is static, short-run. The phenomena studied has complex dynamics which are outside the scope of the analysis, and there is substantial interdependence of parameters considered in our analysis. For instance, a stronger death count or stronger adverse effect on productivity would naturally have a dynamic, long-lasting effect on future economic growth. Full-fledged economic models of the pandemic are an active area of research [22]. Moreover, there has not been established a clear link between the intensity of the disease and its long-run effects. This is also, however, outside the scope of the analysis, but important to keep in mind when interpreting the results.

Another limitation is the restricted CBA carried out in this study. A complete CBA would take into account all negative and positive effects of the Swedish strategy that affect individuals' welfare (utility). Such an analysis would have increased the cost due to the pain and suffering not captured in the monetary values used in the analysis in this study. However, if we assume that people also value, i.e., get a positive utility, from being less restricted in their daily lives, like being able to carry on with their lives, continue with leisure activities, socializing with family and friends, etc., then also the benefits would be underestimated. Whether they are sufficiently underestimated that they could become larger than the costs is an empirical question not addressed in this study, for the reasons explained in section 2.

Finally even if reporting is accurate, researchers face the challenge of the shadow number of cases and

deaths associated with COVID-19. These vary both across countries and over time within a country, a factor which is compounded with the substantial variation in testing over time and across regions documented in Sweden.

5 Conclusion

In an ideal world, a vaccine would mitigate any concerns about a pandemic, yielding herd immunity shortly after inoculation. In the short-term, however, policy-makers have resorted to different strategies in order to combat the pandemic. In particular, authorities in some countries have advocated a soft approach whereby much is left to the population and only loose recommendations are provided.

In this paper we have quantified through a restricted CBA the first-order effects of the Swedish COVID-19 strategy. The results suggest that the Swedish strategy based on arguments that the excess deaths and cases of severe illnesses can be justified by its economic benefits are not met. While the analysis is limited in scope and parameter values are uncertain due to COVID-19 being an emerging research area, it is important to emphasize that the above analysis leaves aside issues such as the ethical concerns regarding such a strategy and the treatment of the uncertainty associated to parameter values. That being the case, the figures reported above should be seen as a conservative estimate of the costs of such a strategy to society, thus questioning Sweden's soft approach in tackling the pandemic. The parsimony of this study when evaluating the effects of a COVID-19 strategy makes it suitable for adoption by policy-makers aiming to assess the involved trade-offs in pandemic strategies, in particular the COVID-19 pandemic.

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A Costs

A.1 Cost due to death

The monetary cost of excess deaths in Sweden compared with our counterfactual (Denmark and Norway) requires: (i) that the number of excess deaths is established, and (ii) a monetary cost related to premature deaths. Regarding the former, i.e. excess deaths, we rely on two sources to estimate our number. The first source is the *Public Health Agency of Sweden*'s report on excess deaths in 2020[23]. The report shows that the difference between actual deaths in 2020 and the predicted deaths based on historical data corresponds almost perfectly with the number of verified (confirmed by laboratory tests) COVID-19 deaths. We therefore assume that the reported number of COVID-19 deaths in Sweden corresponds to excess deaths due to COVID-19. The second source is used to establish number of excess deaths in relation to our counterfactual. Kontis et al.[24] show that whereas COVID-19 has lead to excess deaths in Sweden, for Denmark and Norway there is no evidence of excess deaths in 2020. We, therefore, assume that the number of excess deaths in Sweden also corresponds to the excess deaths compared with our counterfactual.

Regarding the monetary cost due to deaths we rely on official Swedish estimates of the value of a statistical life (VSL). However, since our benefit measure is based on the effect from COVID-19 on the GDP, the *Human Capital* (HC) approach would be more appropriate to estimate the cost related to the productivity losses due to COVID-19 (see, e.g., Andersson et al.[15], for a discussion of VSL and HC). To address this, our monetary equivalent will be based on the official VSL[25] and on calculations from[26] on the proportion of the VSL that relates to productivity losses.

Moreover, many of the deaths occur at an advanced age. Therefore: (i) we assume that the monetary equivalent of the productivity loss is used to reflect the social loss from a death independent of whether the person is active in the work force or not, and (ii) the productivity loss will be based on the expected loss of life-years which means that we need to convert our monetary value to an annual one. The conversion require a discounting parameter and we again rely on an official Swedish policy value of the discount rate[25]. Let r, ρ and T denote the discount rate, the proportion of VSL that reflects productivity losses, and the expected remaining life expectancy[1], and VSL be expressed in million SEK in 2020 price

[1]Life expectancy for 2019 from Statistics Sweden (SCB) (www.scb.se). Data and statistics used from SCB are available upon request.

level, then our "value of life year" (VLY) is estimated as,

$$\begin{aligned} \text{VLY} &= \frac{r(\rho VSL)}{1-(1+r)^T} && (1) \\ &= \frac{0.035(0.405 \cdot 45.82)}{1-(1+0.035)^{42.9}} = 0.82 && (2) \end{aligned}$$

Let subscript a denote an age and gender group. The cost due to deaths (D) is then estimated by multiplying the number of deaths (N) in each age and gender group with the age specific value of death, where T_a is the expected remaining life for that particular group,

$$D = \sum_a \left[N_a \sum_{t=0}^{T_a} \frac{VLY}{(1+r)^t} \right]. \tag{3}$$

Regarding the number of age groups. Our data are split into 48 groups for each gender, with the youngest group 15-34 years of age and the oldest 100 years and older. Due to few deaths among younger individuals and integrity issues the deaths are reported for age intervals among those age groups, whereas from 59 years of age deaths are reported for each (annual) age group.

A.2 Cost due to illness

Whereas the estimation of the cost of death is relatively straightforward, the cost due to illness is more problematic. Differences between Sweden and the counterfactual in the amount of tests carried out, the classification of severity and/or treatment when sick, and assumptions on the length of impaired health necessitate several assumptions for the calculations to be carried out.

Number of cases, hospitalizations and tests are based on official statistics from Sweden, Denmark and Norway (www.statista.com, retrieved 2020-11-28). However, since statistics on hospitalizations are not directly comparable between countries predicted hospitalizations for Sweden under the assumption that the risk level would be the same as for the counterfactual is based on a relative risk measure (R) that takes into account the difference in the amount of testing in the different countries, and hence expected number of cases detected. Let C, P, and Z denote cases, population size, and tests, and superscripts SE and G referring to Sweden and the the counterfactual. Moreover, let $\hat{C}$ denotes predicted cases and the relative risk is given by,

$$R = \frac{\hat{C}^{SE}/P^{SE}}{C^G/P^G} = \frac{C^{SE}\left(\frac{Z^G/P^G}{Z^{SE}/P^{SE}}\right)}{C^G}\frac{P^G}{P^{SE}} = \frac{C^{SE}}{C^G}\frac{Z^G}{Z^{SE}} \tag{4}$$

Let H denote hospitalizations. We then use R to calculate predicted hospitalizations $\hat{H}$ in Sweden under the assumption that Sweden would have implemented policies in line with our counterfactual, which is given by $\hat{H}^{SE} = H^{SE}/R$. Excess hospitalizations (H_E^{SE}) are then given by,

$$H_E^{SE} = (H^{SE} - \hat{H}^{SE}) = H^{SE}\left(1 - \frac{1}{R}\right), \tag{5}$$

which is positive since $R > 1$.

To estimate the monetary cost we need to establish the number of patients, and for how many days, treated either as a (regular) hospitalization or in intensive care. Whereas we have detailed daily data on number treated per day we only have detailed data an number admitted for intensive care. We therefore rely on statistics from *Statistics Sweden* on the relationship between the two to predict number of patients treated in regular hospital places. Moreover, since data were not available on patients in extracorporeal membrane oxygenation (ECMO) care, those patients are included in reported numbers for intensive care, which means that our cost estimate for intensive care should be treated as a lower bound.

The number of patients treated is also relevant for the calculation of post treatment costs since it also provides information on the proportion of deaths among hospitalizations and intensive care. According to official statistics, the death rate among hospitalized and intensive care patients were 13.9% and 25.3%. The long-terms consequences from COVID-19 are still very uncertain. To provide a baseline scenario for our cost estimations we rely on Marshall [27] and assume that on average 50% of those emitted from hospitals experience 60 days of illness preventing them from working or havind an active life.

B Benefits

To calculate the benefits of the Swedish pandemic strategy we compare how the Swedish GDP was affected during 2020:Q2 and 2020:Q3 compared with our counterfactual/control group consisting of Denmark and Norway. GDP is a measure of flow, often reported at the quarterly frequency. The total benefit accrued over a given period is thus the sum of benefits over time.

To account for the different currencies and domestic inflation rates, we use GDP figures (reported in EUR) and the monthly Harmonized Consumer Price Index (HCPI) which we convert to the quarterly frequency – both available from Eurostat, and the US CPI from the FRED database.[2]

[2]See `https://ec.europa.eu/eurostat/databrowser/view/nama_10_gdp/default/table?lang=en` for

To construct the GDP of the control group we first compute the relative weight of each economy considered before the period of analysis. In our case, the vector of weights $w = (w^{SE}, w^{DK}, w^{NO})$ is based on GDP figures for 2020:Q1, i.e., the quarter prior to the start of the period under consideration, and are kept fixed throughout. By construction, the benefit of period 2020:Q1, B_{Q1}, calculated as

$$B_{Q1} = GDP_{Q1}^{SE} - \frac{1}{2}\left(\frac{w^{SE}}{w^{DK}} GDP_{Q1}^{DK} + \frac{w^{SE}}{w^{NO}} GDP_{Q1}^{NO}\right) \tag{6}$$

is zero. Generalizing the above equation for any period and an arbitrary number of countries (g) in the control group (G), one obtains the per-period benefits,

$$B_t = GDP_t^{SE} - \frac{1}{\sharp g \in G} \sum_{g \in G} \left(\frac{w^{SE}}{w^g}\right) GDP_t^g, \tag{7}$$

noting that the weights – kept fixed over time – are based on the relative sizes of the economies pre-policy.

Intuitively, when computing B_t we adjust the GDP of each country g in the control group G to make it comparable to the Swedish GDP by adjusting it accordingly using the ratio $(w^{SE}/w^g, g = DK, NO)$. After performing the adjustment for every country, we sum the adjusted GDP figures and divide by the number of countries in the control group ($\sharp g \in G$). Thus, B_t reflects the difference in economic performances between Sweden and the control group (as measured by GDP) for a given time period. The total benefits accrued are obtained by summing the per-period benefits over time,

$$B = \sum_t B_t. \tag{8}$$

C Demographics and composition of the control group

In Table 3 we compare a number of demographic variables for Sweden, Denmark, and Norway using data from Eurostat. The first thing to note is that the age distribution of the countries is quite similar. This is important because age is an important mortality-risk factor of COVID-19. Second, when looking at the share of single households, this number is higher for Sweden than for both Denmark and Norway; shares for single adult households with puts Sweden somewhere between Norway and Denmark. Third, population origin is quite similar across countries, despite Sweden's slightly higher share of foreign, non-

2019 GDP levels, `https://ec.europa.eu/eurostat/documents/2995521/10662330/2-08122020-AP-EN.pdf/1795cf84-4c30-9bae-33b0-b8a1755925c4` for GDP growth, `https://ec.europa.eu/eurostat/databrowser/view/PRC_HICP_MANR__custom_118059/bookmark/table?lang=en&bookmarkId=45a0a8c6-966f-43c6-9d30-9edb61e4af3b` for EU HCPI, and `https://fred.stlouisfed.org/series/CPALTT01USQ659NforUSCPI`, all retrieved on 2021-02-11.

EU born, and stateless residents. All in all, the data suggest a great degree of similarity across the countries.

One exception of similarity is population density, for which Sweden is similar to Norway, but not Denmark. However, if Denmark were to be excluded from our analysis due to this difference, and only Norway would be used as the counterfactual, the findings on the net benefits of the Swedish strategy would have been starker due to the dominance of the benefit side, i.e. the economic performance as measured by GDP (see Table 2). Thus, while changing the composition of the control group may quantitatively change the results, the qualitative results are robust to changes in the composition of the control group, with the actual choice of including Denmark being a conservative one.

Tables and Figures

Table 1: Social cost from COVID-19 – Baseline scenario

Hospital care				
Cost element	**Unit**	**Value**	**Cases**	**Cost**[b]
Direct costs				
Hospitalization	Per day	851[c]	24,465	192
Intensive care	Per day	4743[c]	6654	290
Indirect costs				
Production loss	Per day	269[c,d]	31,119	77
Total[b]				559

Post hospital care				
		Recovered		
Elements	**Unit**	**Hospitalization**	**Intensive care**	**Deaths**
Cases	Individuals	20,204	2592	5877
Post illness[e]	Days	60	60	NA
Proportion affected[e]	Percentage	50%	50%	NA
Production loss	Aggregate[b]	163	21	3786[f]
Total[b]				3970

a: In USD, 2020 price level. (US$ 1 = SEK 9.20, www.riksbank.se, retrieved 2021-01-11)

b: In million USD.

c: Source, MSB and NBHW [28]

d: Gross income including social security fees and based 20 working days per month [29] and on average income from 2019 (www.mi.se, retrieved 2020-12-01).

e: Long-term COVID still highly uncertain. Values here based on discussion in [27] and used to provide "ballpark estimate".

f: See Eqs. (1)-(3) in appendix for calculation.

Table 2: Social Benefit of COVID-19 Strategy – Baseline scenario

Countries	**2020:Q1**	**2020:Q2**	**2020:Q3**	**Weights**	**Total**[a]
Sweden	542,619.9	500,693.7	529,058.2	0.42	
Denmark	350,894.2	327,546.8	346,131.3	0.27	
Norway	406,839.8	388,158.4	409,009.3	0.31	
Denmark+Norway[b]	542,619.9	512,109.7	540,384.0		
Sweden - Cont. group	0.0	−11,416.0	−11,325.7		−22,741.7

a: In million USD.

b: The control group.

Table 3: Comparison of Demographic Variables

Variable	**Sweden**	**Denmark**	**Norway**
Population density			
Population (mn inhab)	10.2	5.8	5.3
Country area (km^2)	404,810	41,893	307,885
Population density (Inhab/km^2)	25.3	138.6	17.3
Age distribution (%)			
Population $<$ 20 yo	23.1	22.6	23.8
Population 20-60 yo	51.5	52.2	53.6
Population 60-80 yo	20.3	20.8	18.4
Population $>$ 80 yo	5.1	4.4	4.2
Household composition			
Private Households ('000)	5335.1	2408.7	2439.2
Single adult without children ('000)	3058.9	1047.0	948.5
Single adult without children (%)	57.3	43.5	38.9
Single adult with children ('000)	322.4	202.8	110.6
Single adult with children (%)	6.0	8.4	4.5
Origin (%)			
Non-foreign population	90.9	90.9	89.0
Foreign/EU population	3.1	3.9	6.8
Foreign/non-EU population	5.7	5.0	4.2
Stateless population	0.2	0.1	0.0
Unknown nationality	0.1	0.0	0.0
Economic variables			
GDP per capita (real EUR)	43,900	49,720	69,560

Note: Data from https://ec.europa.eu/eurostat/databrowse/view/"online data code"/, with data codes TPS00003 (population), SDG_08_10 (GRP per capita), MIGR_POP3CTB (age groups), MIGR_POP1CTZ (nationality), LFST_HHNHWHTC (household composition), retrieved 2021-02-11. Data year = 2019. Household composition data for Norway from https://www.ssb.no/en/befolkning/statistikker/familie/aar/2020-06-25, accessed 28.02.2021.

Figure 1: Tree diagram COVID-19 Health Effects