

Externality and Covid-19

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Abstract

Negative infectious-disease externalities are less prevalent in the absence of government intervention and less costly to society than is often supposed. That is so for three reasons. (1) Unlike externality creating behaviors in many classical externality contexts, such behaviors are often self-limiting in the context of infectious disease. (2) In market economies, behaviors that may create infectious disease externalities typically occur at sites that are owned privately and visited voluntarily. Owners have powerful incentives to regulate such behaviors at their sites, and visitors face residual infection risk contractually. (3) The social cost of infectious disease externalities is limited by the cheapest method of avoiding externalized infection risk. That cost is modest compared to the one usually imagined: the value of life (or health) lost to the disease if government does not intervene. We elaborate these arguments in the context of the Covid-19 pandemic.

JEL codes: I18, D62

Keywords: Covid-19; pandemic; externality; intervention; lockdowns; infectious disease

1 Introduction

Governments have responded to Covid-19 with costly interventions, most notably “lockdowns” that prohibit many commercial and social interactions. Such interventions are rationalized by the view that large negative externalities are inherent to pandemics. We argue that negative infectious-disease externalities are less prevalent in the absence of government intervention and less costly to society than this view suggests.¹

Three elementary but neglected considerations inform our argument. (1) Unlike externality creating behaviors in many classical externality contexts, such behaviors are often self-limiting in the context of infectious disease. (2) In market economies, behaviors that may create infectious disease externalities typically occur at sites that are owned privately and visited voluntarily. Owners have powerful incentives to regulate such behaviors at their sites, and visitors face residual infection risk contractually. (3) The social cost of infectious disease externalities is limited by the cheapest method of avoiding externalized infection risk. That cost is modest compared to the one usually imagined: the value of life (or health) lost to the disease if government does not intervene. We elaborate these arguments in the context of the Covid-19 pandemic.

2 Infectious Disease Externalities, with Special Reference to Covid-19

Externalities are net costs (negative externalities) or benefits (positive externalities) that a person’s behavior imposes on other people for which he does not account when deciding how to behave. In the context of infectious disease, behaviors that may create externalities are those that affect other people’s risk of infection.² Such behaviors are many when disease is transmissible by casual physical contact or by breathing the same air as an infected person, as is true of Covid-

19. They include, for example, wearing a mask, maintaining one's distance from others, limiting one's interactions—or not.

Each such behavior, moreover, may create externalities that affect many people. An infected person who, for instance, rides the subway increases the infection risk not only of uninfected subway riders but also of uninfected non-subway riders with whom subway riders later interact (and the infection risk of uninfected people with whom those people later interact, and so on). More subtly, an uninfected person who rides the subway also increases the infection risk of others, since riding the subway increases his infection risk and thus also the infection risk of uninfected people with whom he later interacts (and the infection risk of uninfected people with whom those people later interact, and so on).

Our discussion assumes that behaviors that increase other people's risk of Covid infection have the potential to create negative externalities exclusively. For certain subpopulations, at least, that assumption is false.³ Consider, for example, elderly people with preexisting health conditions. Members of this subpopulation face an elevated risk of death if they become infected with Covid.⁴ For that reason many such people “locked themselves down” soon after Covid emerged. The cost they incur by doing so does not vary appreciably with the prevalence of the disease: whether 10 percent or 30 percent of the population is infectious, what is sacrificed by self-isolating is nearly the same.⁵ The cost of locking oneself down, in contrast, varies positively with the duration of self-isolation and thus with the length of time for which one's infection risk remains nontrivial if he does not self-isolate. It follows that the sooner herd immunity arrives, the lower is the total cost borne by elderly people with preexisting health conditions. Herd immunity arrives sooner when everyone else faces a higher risk of infection. Hence, even if a “flat but fat”

infection curve is superior for the population overall, a “tall but skinny” infection curve may be superior for elderly people with preexisting health conditions.

Behaviors that increase other people’s risk of Covid infection may therefore confer positive externalities on members of certain subpopulations.⁶ Despite this possibility, externality concerns in the context of Covid-19 have been overwhelmingly with infection-related deaths, injuries, or healthcare congestion attendant to behaviors that increase the infection risk of others (see, for instance, Bethune and Korinek, 2020; Eichenbaum, 2020; Jones et al., 2020; Mulligan et al., 2020).⁷ We therefore restrict our attention to negative Covid externalities.

There would be no opportunities for Covid externalities if transaction costs were zero. In that case each person would strike a deal with every other person whose infection risk their behavior might affect or whose behavior might affect their infection risk. All costs of such behavior would thereby be internalized. Nor would there be opportunities for Covid externalities if avoiding infection risk were costless. In that case behavior that affects the infection risk of others could not impose any cost on them. In the case we confront, however, transaction costs are positive, as are the costs of avoiding infection risk. Potential for Covid externalities is therefore positive too.

We distinguish between two types of such externalities: *on-site* externalities and *cross-site* externalities. The former result from people ignoring the effect that their behavior at a given site has on the infection risk of others at that site. An infected person who, for example, rides the subway may create on-site externalities by increasing the infection risk of uninfected subway riders. Cross-site externalities, in contrast, result from people ignoring the effect that their behavior at a given site has on the subsequent infection risk of others at different sites. An infected (or uninfected) person who rides the subway may create cross-site externalities by

increasing the infection risk of uninfected non-subway riders who later interact with subway riders at another site.

Opportunities for cross-site externalities are not unique to infectious disease. Consider a gentleman's cigar smoke, which is absorbed by your sweater as he lights up next to you on a park bench. Later that day you find yourself in a crowded elevator where others are exposed to the scent of your sweater. Unless appropriate compensation for this exposure has been arranged, there are cross-site externalities. In contexts like this one, cross-site externalities are typically considered insignificant. And compared to the on-site externality of your exposure to the gentleman's smoke, they are.

In many classical externality contexts, moreover, cross-site externalities are absent entirely. Consider a factory whose production generates waste that finds its way into a nearby pond. The waste imposes a cost on the pond's fishermen—but the waste does not follow the fishermen home, to the theater, or to other ponds they fish and impose costs on the people at those sites. In the context of infectious disease, in contrast, cross-site externalities are centrally important. Indeed, for reasons we explain in Section 4 where we return to the distinction between on-site and cross-site externalities, the latter are in market economies perhaps the only Covid externalities of social consequence.

3 Self-Limiting Externalities in the Context of Covid-19

Externality creating behaviors in the context of Covid-19 are in two respects self-limiting. They differ in these respects from externality creating behaviors in many classical externality contexts. The self-limiting features of Covid externalities are therefore easily overlooked, with the result

that the prevalence of such externalities absent regulation—governmental or private—is easily overestimated.

To understand the first way that Covid externalities are self-limiting, return to the pond-polluting factory from above. In such externality contexts, private and external costs per unit of externality creating behavior are related negatively. Certain production methods available to the factory generate more waste per unit of output than others, for example producing without a waste filter versus producing with a filter. Producing without a waste filter is also cheaper for the factory: filters are privately costly. The factory thus maximizes profit by producing without a filter. Absent regulation, the factory creates “maximal” external costs (waste) per unit of its externality creating behavior (output).

In the externality context of Covid-19, however, the situation is different. Here private and external costs per unit of externality creating behavior are often related positively. Certain behaviors increase others’ infection risk more per interaction than alternative behaviors, for example interacting without keeping one’s distance versus interacting while keeping one’s distance. Such behaviors are on one dimension privately cheaper than behaviors that increase others’ infection risk less per interaction: keeping one’s distance is inconvenient for the distance keeper compared to not keeping his distance.

On a second dimension, however, such behaviors are privately more expensive: an uninfected person who does not keep his distance increases his own infection risk relative to if he does keep his distance. Utility maximizing people for whom the private cost of keeping distance is less than the private cost of increasing their own infection risk by not keeping distance will therefore choose to keep their distance. Even absent regulation, such people create only

submaximal external costs (infection risk) per unit of their externality creating behavior (interaction). Covid-externality creating behavior is in this sense self-limiting.

But not always: an infected person who, for instance, does not keep his distance does not increase his own infection risk per interaction. If he is selfish, the only private cost that weighs in his decision about whether to keep his distance is therefore the inconvenience of doing so. Such a person will, like the pond-polluting factory, create maximal external costs per unit of his externality creating behavior. Further, not every uninfected person will regard the increase in his own infection risk attendant to (say) not keeping his distance as more costly than the inconvenience of keeping his distance. The number of people for whom that is true falls as disease prevalence rises. But among people for whom it remains true, Covid-externality creating behavior is not self-limiting. If, however, one (mis)perceives the externality context of Covid-19 as being like that of the pond-polluting factory—where increasing external costs per unit of externality creating behavior is for the decisionmaker an unalloyed benefit—one will conclude that Covid external costs are always maximal per unit of externality creating behavior when, in fact, frequently they are not.

To understand the second way that Covid externalities are self-limiting, consider again the pond-polluting factory. In this externality context the private cost of externality creating behavior is independent of the aggregate external cost created. After months of polluting the pond and thus an accumulation of waste in the pond's water, the factory's cost of producing output is the same as when it began polluting and the concentration of waste in the pond's water was much lower. The factory's profit-maximizing output level has not changed. Hence, absent regulation, the quantity of externality creating behavior the factory engages in does not change either.

In the externality context of Covid-19, however, the situation is again different. Here the private cost of externality creating behavior is often increasing in the aggregate external cost created. After months of behavior by people that increases the infection risk of others, the disease becomes more prevalent. Until the disease becomes so prevalent that herd immunity is reached, the risk of infection that an uninfected person faces by interacting with others rises accordingly. Hence, so does his cost of interacting with others. Such a person's utility maximizing level of interaction therefore falls. Even absent regulation, the quantity of externality creating behavior he engages in therefore falls too. In this sense also, Covid-externality creating behavior is self-limiting.⁸

But again, not always: an infected person (who is selfish), for instance, faces the same private cost of interacting with others whatever the disease's prevalence and thus will not reduce his number of interactions despite a rising aggregate external cost. Even still, the endogenous behavioral response of many people to such a rise limits externality creating behavior in the context of Covid-19 partly. And in practice, "partly" may be a lot. Goolsbee and Syverson (2020), Farboodi et al. (2020), and Luther (2020), for example, find that private incentives account for most of the reduction in American social and commercial interactions amid the pandemic—a reduction that largely preceded government measures for the purpose.⁹ Similarly, Dave et al. (2020) find that the Wisconsin Supreme Court decision to abolish the state's "Safer at Home" order had no effect on social distancing.

The endogenous behavioral response of many people to a rising aggregate external cost may also limit the effectiveness of efforts to reduce the spread of Covid-19. Governmental or private efforts that reduce the disease's prevalence also reduce for many people the private cost of behavior that spreads the disease, contributing to its resurgence. A lockdown, for example,

that does not end the pandemic may suppress disease prevalence temporarily only to encourage behavior that leads the disease to become just as prevalent as before the lockdown.

4 Privately Regulated Externalities in the Context of Covid-19

Above we considered Covid externalities in the absence of any regulation on behavior that may create such externalities. In most cases, however, behaviors that would otherwise create on-site Covid externalities are subject to private regulation. Potential for on-site externalities, recall, results from people ignoring the effect that their behavior at a given site has on the infection risk of others at that site. In market economies, however, that potential is rarely realized. This fact is easy to overlook if one views Covid externalities through lens of conventional behavioral-pandemic models. Those models rely on optimal control theory. In them, interacting people are paired randomly, and interaction sites have unspecified property rights (see, for instance, Jones et al., 2020; Eichenbaum, 2020; Toxvaerd, 2020). That is akin to assuming that interaction sites are unowned and that people cannot choose with whom or where they interact. The former assumption precludes the possibility of site owners who regulate the behaviors of people who interact at their sites. The latter assumption precludes the possibility of people choosing sites of interaction in light of behavioral regulations that such owners might adopt. In the hypothesized environment, *all* interactions involve on-site externalities.¹⁰

The environment in market economies is different. Here most interaction sites are owned privately, and people choose the sites where they interact. In the United States, for example, shops, offices, and most other sites where people interact have proprietors. Further, save force or fraud, a person finds himself at particular shop, office, or other site only if he has voluntarily

elected to visit it. These features of market economies are crucial, for when all sites are owned and force/fraud is absent, *no* interactions involve on-site externalities.

In this environment, site owners must compete for interactions at their sites—for visitors such as customers or employees, whose value of site visitation amid a pandemic depends partly on the infection risk they face at the site. As the residual claimant on his site’s value to visitors, a site owner must account for visitors’ varying valuations of on-site behaviors that increase on-site infection risk, on the one hand, and visitors’ varying valuations of on-site behaviors that reduce that risk, on the other. On-site behavioral regulations that negotiate these tradeoffs optimally maximize the site’s value to its visitors, hence also to its owner. Owners therefore adopt rules that optimally regulate on-site behaviors that affect infection risk at their sites.

Such rules might require visitors to wear masks, require visitors to keep their distance, or limit the number of visitors who can occupy the site at one time. Indeed, each of these regulations has been adopted by owners at various interaction sites amid the Covid-19 pandemic, and they are but a few of the most popular private regulations. Qatar Airways requires flight attendants to wear hazmat suits (Hardingham-Gill, 2020). Grocery stores require that “workers wash their hands more frequently, use hand sanitizer, and clean surfaces more aggressively” (Khazan, 2020).¹¹ Protective shields at shop registers are now commonplace (Halkias, 2020). And many employers offer extended sick leave to ensure that workers who believe they might be infected stay home.

Private regulation of behaviors that would otherwise create on-site externalities is not unique to the context of Covid-19. In market economies, one observes private regulation of behaviors that would otherwise create such externalities in the context of scents (e.g., “smoking permitted in designated sections only”), in the context of sounds (e.g., “music headphones

required”), in the context of sights (e.g., “no shirt, no shoes, no service”), and most every other context that arises from people interacting in the same owned space. That includes contexts like Covid’s, where behaviors that would otherwise create on-site externalities are behaviors that increase others’ risk of contracting infectious disease. Salad bars, for instance, install “sneeze guards” to prevent visitors who are infected with contagious illnesses from contaminating food products. Gyms require visitors to wipe down equipment after use to prevent them from spreading germs. And commercial establishments post bathroom signs that implore visitors to wash their hands. These private regulations were common before the Covid-19 pandemic, adopted by site owners not to reduce infection risk from the Coronavirus but to reduce infection risk from cold and flu viruses.

In the context of Covid, it is unlikely that zero regulation will maximize value at many sites, for most people are willing to pay something to reduce on-site infection risk, and few people are willing to pay more for total on-site behavioral liberty. It is also unlikely that “total regulation” will maximize value at many sites, for most people are willing to pay something for partial on-site behavioral liberty, and few people are willing to pay more to reduce on-site infection risk to zero (or as far as technology will allow). Indeed, every person who chooses to leave his home and visit a site demonstrates a willingness to trade zero infection risk for whatever he expects to gain by the visit, which in an era of plentiful electronic-commerce alternatives is often modest: the ability to select his own cucumbers or simply “getting out of the house.”

Whatever regulations a site owner adopts, provided that there is no force or fraud—for example, an owner claiming that employees wipe down shopping carts after use when in fact they do not—there is no on-site Covid externality. Residual infection risk that visitors face from

the on-site behaviors of other visitors is infection risk that they face contractually and thus risk that does not impose on-site external costs. If you choose to visit a site that, say, requires masks but does not limit the number of simultaneous visitors, the cost of the remaining infection risk that you face as a result of the on-site behavior of other visitors must by your reckoning be compensated adequately by the site. Perhaps the site sells goods at lower prices (or pays higher wages).¹² Perhaps it sells a better range of goods (or offers better work conditions). Perhaps the site's service is better (or its health benefits are). No matter the form compensation takes, it must at least equal the cost to you of the residual on-site infection risk created by the behavior of other visitors or you would not willingly visit the site. That cost is therefore internalized.

As Section 2 considered, however, in contexts like Covid's that involve infectious disease, there is besides the prospect of on-site externalities also the prospect of cross-site externalities. The latter, recall, results from people ignoring the effect that their behavior at a given site has on the infection risk of others at different sites. And while on-site Covid externalities are addressed readily by private regulation and thus when interaction sites are owned, cross-site Covid externalities are not. That is chiefly because most interaction sites have different owners.

A site owner internalizes the cost of the residual infection risk faced by visitors at his site given the behavioral regulations he adopts. He does not, however, internalize the cost that this risk creates for visitors at other sites unless he happens to own those sites too. Insofar as the owner's regulations do not reduce on-site infection risk to zero, they make his site's visitors riskier for other sites, whose behavioral regulations will accordingly need to be more stringent to secure the desired level of on-site infection risk there. That is a cost for visitors at other sites and

therefore also for those sites' owners—a cost which the owner in question ignores when he regulates infection risk at his site.

Consider a grocer who requires shoppers to wear masks but does not limit the number of shoppers who may simultaneously occupy his store. The grocer regulates infection risk at his store optimally given his shoppers' valuations of infection risk and the cost of reducing that risk. But his choice of regulation neglects the fact that because it does not limit the number of simultaneous shoppers, more shoppers will contract the disease which, now being more prevalent, may require other grocers to limit the number of simultaneous shoppers at their stores more severely.

Above we said that the existence of cross-site Covid externalities is “chiefly” the product of interaction sites having different owners. That is because, strictly speaking, different owners are not sufficient for cross-site externalities to exist. If visitors' site-visiting histories were known to site owners, owners could charge visitors accordingly for access to their sites. Visitors who had recently been to other sites with stricter regulations could be charged less, and those who had recently been to other sites with laxer regulations could be charged more. The cost imposed on visitors at one site arising from the infection risk that people “bring with them” from other sites would thereby be internalized.

Site owners do not know visitors' visitation histories, so this is not the situation we confront. Yet the situation we do confront may not be entirely different. In the United States, some airlines and restaurants, for example, require Covid testing as a condition of visitor access (Parker, 2020; Betz, 2020). Other places of business have adopted regulations according to which visitors seeking site entrance may obtain it only if their temperature, taken via infrared thermometer at the door, is not feverish. A person's body temperature or even his Covid test

result is not a history of his site visitations. But having a fever or a positive test result is likely to be correlated with that history. Fever is a symptom of Covid infection, and one is more likely to be infected with Covid if he recently visited a site where infection risk is higher. Likewise, testing positive for Covid is more likely if one recently visited such a site. Refusing site entrance to people who have fevers or positive Covid tests amounts to charging them an infinite visitation price. Hence, in this private regulation of on-site behavior there is a mechanism of cross-site Covid externality internalization, albeit one that is crude and limited.¹³

Feverish temperature and Covid test results are not the only proxies that site owners can or do use to price discriminate among visitors according to their probable histories of visitation to other sites where infection risk is higher or lower. In the United States, numerous retail establishments have, for example, reserved certain hours and days of business for elderly shoppers, disabled persons, and pregnant women (see, for instance, *WIS News 10*, 2020). During such times only these people are permitted to visit the sites in question. At remaining times, others may visit—and if they wish, the aforementioned people also. Given their comparatively high private costs of infection risk, elderly people, disabled people, and pregnant women are likely to have histories of visiting other sites where infection risk is comparatively low. Permitting them access to the sites in question at any time and granting them exclusive site access at specified times amounts to the charging them a lower visitation price.

Conversely, restricting site access to everyone else—who is likely to have a history of visiting other sites where infection risk is higher—amounts to charging these people a higher visitation price. Unlike one's chance of becoming feverish or testing positive for Covid, one cannot influence her age, disabled status, or whether she is pregnant by adjusting her choice of visitation sites and thus cannot by such adjustment influence the price she pays for visiting the

sites in question. Nevertheless, by reducing on-site interactions between people whose site visitation histories are likely to exhibit significantly different risk profiles, the foregoing private regulation of on-site behavior may help reduce cross-site Covid externalities.

Even when segregating visitors by risk profile is not accompanied by price discrimination, it may help reduce cross-site externalities. Some restaurants, for instance, have adopted regulations whereby older visitors and families—who are less likely to have high-risk visitation histories—are seated apart from younger visitors—who are more likely to have such histories.¹⁴ Indeed, *any* private regulation of on-site behavior that reduces the number of on-site interactions reduces the potential for cross-site externalities, for it is only through on-site interactions that cross-site external costs come about.¹⁵ The enormous shift from in-person to electronic commerce observed amid the Covid-19 pandemic largely reflects private policies and regulations adopted by site owners and has likely reduced the prevalence of cross-site Covid externalities significantly. A prominent example is again that of restaurants, many of which now offer (and sometimes require) online ordering and contactless meal drop-off. On-site interactions are thereby reduced, hence opportunities for cross-site externalities are too.

5 The Social Cost of Externalities in the Context of Covid-19

Given the difficulty of addressing cross-site externalities through private regulation, the potential for these externalities furnishes the most compelling (externality based) justification for government intervention in the context of Covid-19. Yet if the magnitude of such intervention is to reflect the magnitude of the external costs that would be created if the market were left to its own devices, considerably less government intervention may be justified than is typically imagined.

It is tempting to measure the social cost of Covid externalities by the value of life (or health) lost to Covid if government does not intervene.¹⁶ It is also wrong. Covid-related deaths (and injuries) are tragic, and they are costs. In market economies, however, they are rarely *external* costs because, in market economies, interactions that transmit Covid typically occur on private property and are rarely involuntary or fraudulent. If you are lured to a grocery store that claims to require mask-wearing and distancing and, upon entering, you discover that no one is wearing a mask or distancing, you contract the disease from an infected visitor, and as a result you become sick or die, your death or illness is indeed an external cost. You could not avoid the infection risk you faced. You did not face that risk contractually. And it led to your death or illness.

If, however, you go to a grocery store that claims to and actually does require mask-wearing and distancing, you contract the disease from an infected visitor nonetheless, and as a result you become sick or die, your death or illness is the unfortunate outcome of contractually faced risk with a positive expected payoff that, *ex post*, paid negatively. That is cost to you and to society. But it is not an external cost and thus does not contribute to the social cost of Covid externalities.

That is not to say that in this situation there are *no* external costs. There may be external costs created by cross-site externalities. The grocer may require mask-wearing *and* distancing rather than the former alone because of additional on-site infection risk that his shoppers would otherwise face resulting from the behavior of people off-site. Distancing brings infection risk at his store down to the level his shoppers prefer and is the cheapest way of doing so, otherwise the grocer would use a different regulation for the purpose. Still, distancing is not free—and *that* is the external cost.¹⁷ It is the external cost whether you do not become infected with Covid while

visiting the store, you become infected but do not become ill, or you become infected and die. The outcomes differ, but the cheapest method of avoiding the externalized infection risk does not: in this example, distancing.

Note that the cost of distancing is smaller than the cost of dying. Summed at the population level, the cost of distancing and other behavioral regulations adopted to avoid externalized infection risk may be considerable. But surely it is less considerable than the cost of deaths (or illnesses) summed at the population level. And it is the former sum—not the sum of the costs of Covid-related deaths (or illness)—that measures the social cost of Covid *externalities*.

The difference is not small. Basing their estimates on the value of a statistical life lost, Bethune and Korinek (2020: 4), for example, find that “private agents perceive the cost of an additional [Covid] infection to be around \$80k whereas the social cost including infection externalities is more than three times higher, around \$286k.” Yet since the cost to a private agent of avoiding externalized infection risk is almost certainly far less than \$80k, this estimate of the social cost of Covid externalities is almost certainly far too high. If, for instance, an individual can avoid infection with certainty by wearing a hazmat suit, then under no circumstance can the external cost imposed on him exceed his cost of wearing a hazmat suit.

6 Conclusion

Covid-19 externalities are less prevalent in the absence of government intervention and less costly to society than is often supposed. That is so for three reasons. (1) Unlike externality creating behaviors in many classical externality contexts, such behaviors are often self-limiting in the context of Covid-19. (2) In market economies, behaviors that may create Covid

externalities typically occur at sites that are owned privately and visited voluntarily. Owners have powerful incentives to regulate such behaviors at their sites, and visitors face residual infection risk contractually. (3) The social cost of Covid-19 externalities is limited by the cheapest method of avoiding externalized infection risk. That cost is modest compared to the one usually imagined: the value of life (or health) lost to the disease if government does not intervene.

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¹ We set aside considerations of whether government has the information and incentives required to intervene sensibly amid a pandemic. But the idea that government has such information and incentives could also be challenged. See, for instance, Boettke and Powell (2021), Coyne et al. (2021), Redford and Dills (2021), and Storr et al. (2021).

² Gersovitz and Hammer (2004) distinguish between “pure infection” externalities, which result from people ignoring how their becoming infected affects the risk of others becoming infected, and “pure prevention” externalities, which result from people, even when they do not become infected, ignoring the effect that their behavior has on the risk of others becoming infected.

³ And perhaps it is false more generally. See Rachel (2020).

⁴ As of November 23, 2020, 91.8 percent of Covid-related deaths in the United States have been of people age 55 or older (National Center for Health Statistics, 2020).

⁵ On marginal versus inframarginal externalities, see Buchanan and Stubblebine (1962).

⁶ And elderly people with preexisting health conditions are not the only subpopulation for whom this might be true. Working parents with young children are another: when childcare facilities shutter each time that a single child in their care contracts Covid, parents may benefit by a pandemic that trades mildness for brevity.

⁷ Rachel (2020) and Garibaldi et al. (2020) are to our knowledge the only papers that focus on potential positive externalities of behavior that increases the infection risk of others in the context of Covid-19.

⁸ Assuming, as we are, that the externality is negative. If it is positive, the logic described above will exacerbate rather than attenuate the externality problem: there was “too little” interaction to begin with (rather than “too much”), and it becomes even less.

⁹ Watanabe and Yabu (2020) find that changes in the number of daily infections account for three-quarters of the reduction in Japanese social activity amid the pandemic, whereas government measures account for only a quarter of the reduction.

¹⁰ Provided that there is uncertainty about infection status. If randomly paired interactors have perfect information about each other's infection status and both happen to be uninfected, each will be certain that the other does not increase his infection risk. Hence, their interaction will not involve an on-site externality.

¹¹ In addition to providing customers with sanitizing wipes to disinfect shopping carts.

¹² Whole Foods, for example, paid its hourly employees an additional \$2/hr and doubled overtime pay in the spring to compensate them for the increased risk of Covid infection (Khazan, 2020).

¹³ Some government regulations make information about visitation histories harder to obtain and communicate. Employers in the United States, for example, are barred from disclosing Covid-related health information to customers or vendors (Gordon et al., 2020).

¹⁴ Private regulations of this sort, which segregate site visitors by risk profile, may be able to at least partly substitute for selective lockdown policies advocated by some, which seek to more severely restrict the liberty of people for whom the private cost of Covid infection is higher (see, for instance, Acemoglu et al., 2020).

¹⁵ It is also only through on-site externalities that cross-site external benefits could come about. In the case of positive Covid externalities, private regulation of on-site behavior that reduces the number of on-site interactions therefore exacerbates rather than attenuates the externality problem.

¹⁶ For examples of Covid research whose cost-benefit analyses use the value of a statistical life, see: Alvarez et al. (2020); Bairoliya and Imrohoroglu (2020); Barnett-Howell and Mobarak (2020); Béland et al. (2020); Bethune and Korinek (2020); Greenstone and Visham (2020); Gros et al. (2020); Hall et al. (2020); Robinson et al. (2020); Scherbina (2020); Thunström et al. (2020); Ugarov (2020); Wilson (2020).

¹⁷ Philipson and Posner (1993) make an analogous point in the context of the AIDS epidemic.