# The Plague of Complaint: How Network Effects Explain the Breakdown of Consumer Sentiment Forecasts

Bryan Wang

Overview

Now several years beyond the inception of COVID-19 lockdowns and economic recession, the United States has returned, slowly but surely, back to prior levels of output and activity. Yet despite the many reasons for optimism in today's economy, consumer sentiment lies depressed, languishing in an antiquated period of six feet apart, forehead thermometers, bulging bins over-stuffed with toilet paper and packages of masks.

Since 1946, the University of Michigan has kept an ongoing 5-question survey of consumer sentiment, asking each month a new representative sample of 600 Americans about their household financial conditions and thoughts/predictions about economic trends—questions such as *"Would you say that you (and your family living there) are better off or worse off financially than you were a year ago?"* and *"Generally speaking, do you think now is a good or bad time for people to buy major household items?"* Using survey responses, university researchers have accurately forecasted consumer spending sentiments for over forty years, up until the pandemic-marked year of 2020 when actual consumer sentiments plummeted beneath predicted sentiments produced by models trained on economic data from 1980-2016, as shown in the following chart provided by *The Economist* ("The pandemic has broken a closely followed survey of sentiment"):
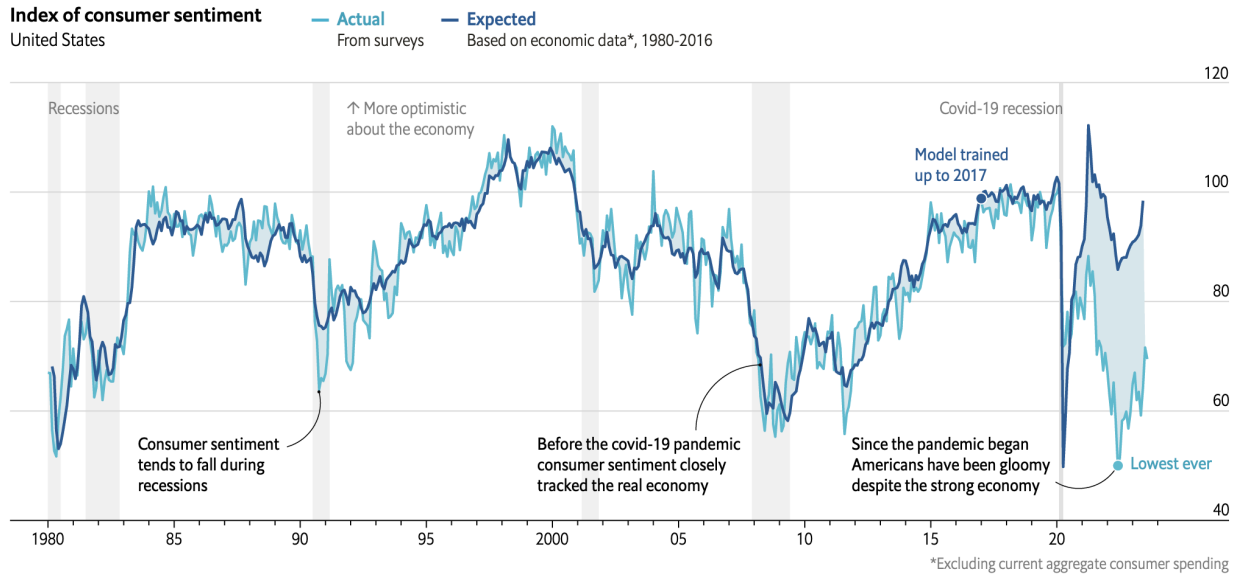
In other words, given the same economic conditions, consumers post-pandemic have far bleaker economic outlooks than their pre-pandemic counterparts. Indeed, while consumer sentiment, like economic variables, was once correlated with consumer spending, that link has since malfunctioned. Another chart from *The Economist* illuminates this discontinuity:
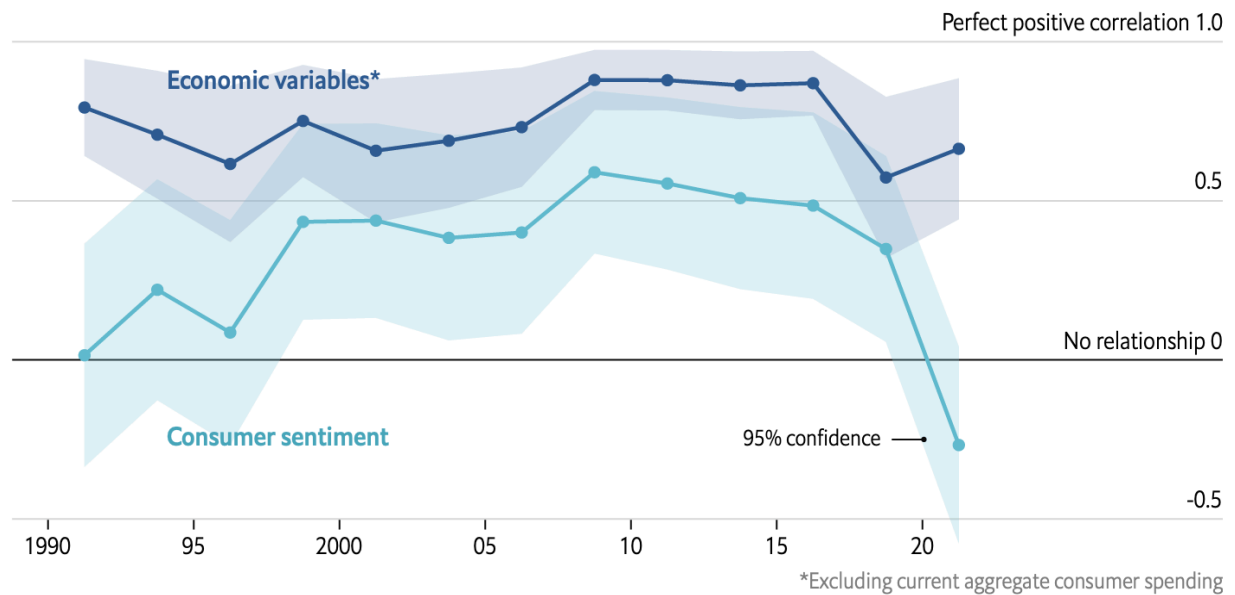
Beyond 2020, consumer sentiment appears to have a negative correlation with consumer spending: The more positively consumers feel about their financial security and prospects, the correlation suggests, the *less* they are likely to spend; and so it appears, how consumers reportedly *feel* about financial realities clashes with how they *act* regarding their finances, as measured in spending. Though consumers may bleakly respond to Michigan's sentiment polling, their actions in the exchange of dollars and swipes of credit cards reveal what they truly believe.

What about the pandemic era explains this cognitive dissonance between belief and behavior? A naive approach might credit the pandemic-induced financial depression. However, since 1946, there has been a slew of many slumps and even crises—most recently before the pandemic, the 2008 Housing Crisis/Great Recession—through which consumer sentiment remained trustworthy. But fundamentally, how would any economic depression explain this inversed relationship between sentiment and spending, as appears to be the case post-pandemic? Something more visceral and psychological seems to have affected the American consumer.

While the COVID-19 pandemic might have been uniquely devastating, it would be facile to address this sentiment-spending divergence as a wholly monetary issue. Rather, this paper highlights a pandemic of *complaint* spread over conduits of internet connectivity, examining how the network effects of public, visible reactions to COVID disposed consumers toward complaint and pessimism but left private, lesser-visible behaviors untouched and consistent with economic realities.

The Data

The OWID COVID-19 Cases dataset ("Coronavirus (COVID-19) Cases") documents daily coronavirus-related statistics for 255 different countries, beginning in January 2020 and continuing to the present with persisting updates. With 67 different feature variables and nearly 4 years of day-to-day information, this dataset is both deep and wide and useful for examining pandemic trends. We use the OWID data for our "truth" variables, capturing the actual landscape of the disease to see in what areas and at what times consumer sentiments follow or depart from COVID realities. In particular, we track six different variables:

1. New Cases
2. New Deaths
3. Weekly Hospital Admissions

4. New Tests
5. Positive Rate
6. Tests Per Case

The Gallup Poll surveys then illuminate consumer sentiments and behaviors in response to changing pandemic conditions. We look at a set of 9 survey questions split into two categories relevant to our analysis, "public" and "private. "The two "public" survey questions are:

1. Covid Better Worse: *What's your impression of the coronavirus situation in the U.S. today? Is it -- getting a lot worse, getting a little worse, staying about the same, getting a little better or getting a lot better?*

2. Wore Mask: *There are some things people may do because of their concern about the coronavirus. For each one of the following, please indicate if this is something you have*

done, are considering doing or have not considered in the past 7 days: Worn a mask on your face when outside your home

Five of the seven "private" survey questions follow the same worded format as Wore Mask, only appending a different precautionary-measure suffix:

1. Avoid Large Events: *Avoided going to events with large crowds*

2. Avoid Crowded Transport: *Avoided traveling by airplane, bus, subway or train*

3. Avoid Public Places: *Avoided going to public places, such as stores or restaurants*

4. Avoid Small Gatherings: *Avoided small gatherings of people, such as with family or friends*

5. Stocked up: *Stocked up on food, medical supplies or cleaning supplies*

The final two "private" survey questions are:

6. Isolation Effort: *Next, thinking about everything you've done in the past 24 hours, which of the following comes closest to describing your in-person contact with people outside your household?*

7. Worry: *How worried are you that you will get the coronavirus -- very worried, somewhat worried, not too worried, not worried at all?*

Analysis

In the first stage of our analysis, we look at the OWID Coronavirus dataset, limiting the timeframe to the five months between April and September 2020, around the time states initiated lockdown policies, to keep the dates consistent between our OWID and Gallup Poll datasets. We plot a line graph for each OWID variable, as the following grid of charts depicts:
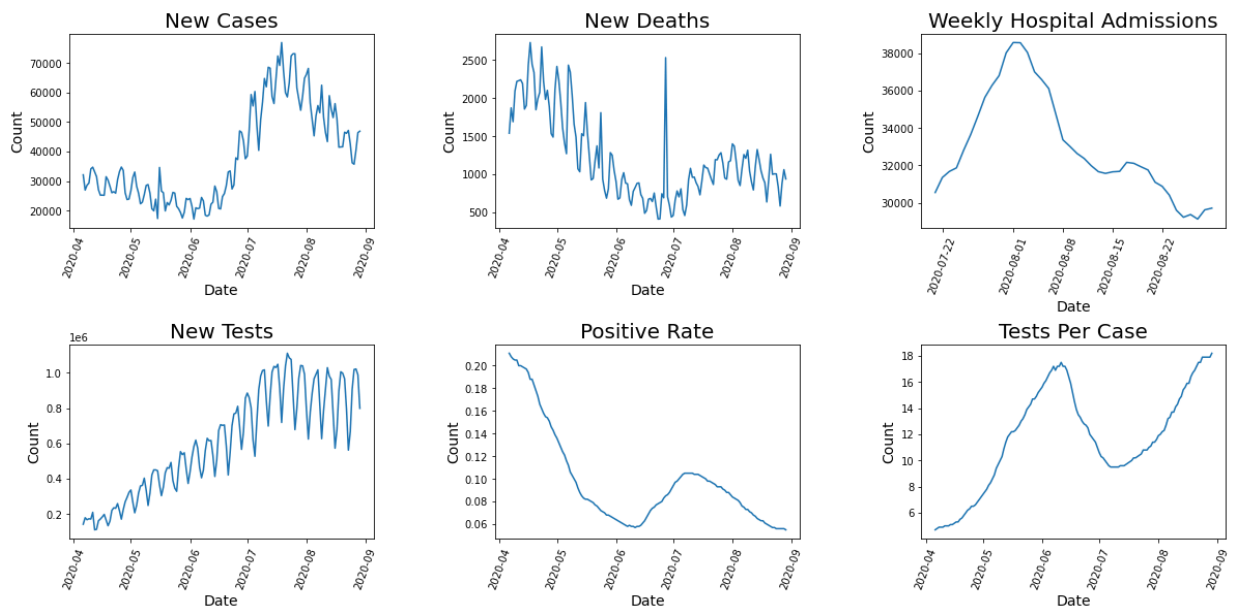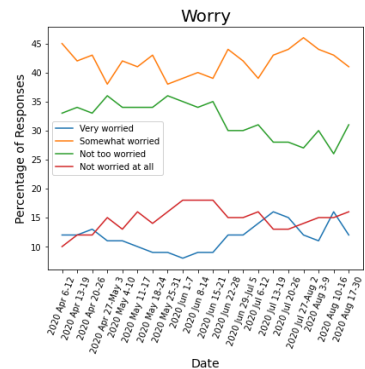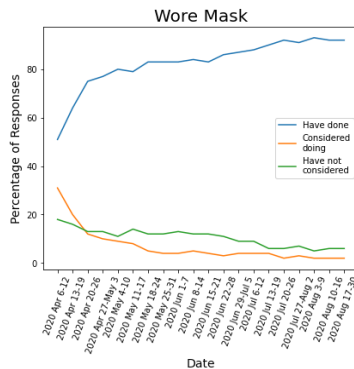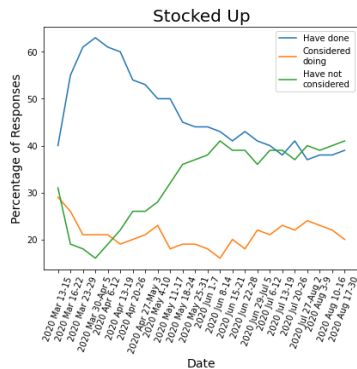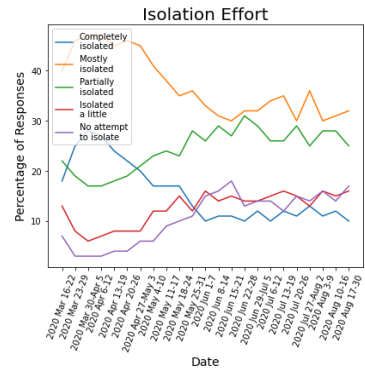

From the New Cases graph, we see that between April and the middle of June, the number of new COVID-19 cases remained fairly stable. However, between the middle of June and July, the number of daily positive cases jumped up by over 100%, going from ~30,000 new cases a day to a mid-summer high of over 70,000 cases. The Weekly Hospital Admissions graph tells a similar story, depicting a mid-summer spike in hospitalization from 30,552 admissions in the week of July 21, where the data starts, to a high of 38,572 admissions the week of August 1.

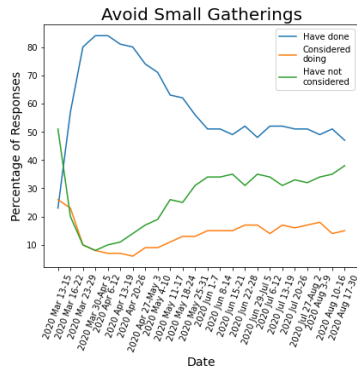Yet the number of hospitalizations and positive cases tells us only part of the story. Looking at the New Tests graph, we see that the volume of testing continued to increase through the mid-summer which would explain some of the spike in the New Cases graph, warranting

more conservative estimates about the density of cases. Trends in the New Deaths graph should also have mitigated mid-summer COVID fears and suggest progress in the pandemic response even during the spike: Although we see increased daily coronavirus deaths in the mid-summer, we also observe the degree of that increase to be less than the dramatic spike in New Cases.

Moreover, in the months before July, the count of deaths fell dramatically from the April 23 high of 2673 deaths to the June 23 low of 413 deaths, an *84.55% decrease* in two months. Along with a drop in the daily death count, a report in the Journal of Hospital Medicine found adjusted in-hospital mortality rates to have fallen from 25.6% in March 2020 to 7.6% in August 2020 (Horwitz et al. 92). All things considered, over time, with better testing and treatment protocols, people were testing more for COVID and significantly less likely to die from the disease. Therefore, although spikes in COVID cases and hospitalizations might cause alarm, the true state of the pandemic was far better than these two trends suggest in isolation.

We might then expect consumers to choose levels of precaution proportional to the level of coronavirus risk, showing precaution during the mid-summer spike and less when the number of cases tapers down; and what's more, for this "proportional" level of response to reflect the true state of the pandemic, compromising the pessimistic cases/hospitalizations data and the optimistic testing/deaths data. To test these initial expectations, we bring in the Gallup Poll coronavirus dataset and graph the nine surveyed variables, each represented by a line chart, to demonstrate response changes over time. The results appear as follows:

Avoid Large Events

Avoid Crowded Transport

Avoid Public Places

Avoid Small Gatherings

Covid Better Worse

Isolation Effort

Stocked Up

Wore Mask

Worry
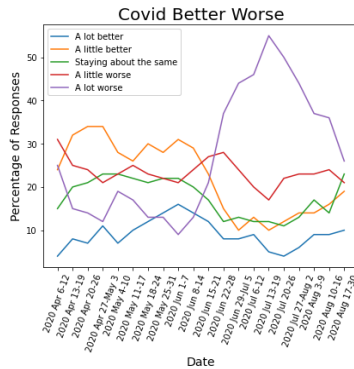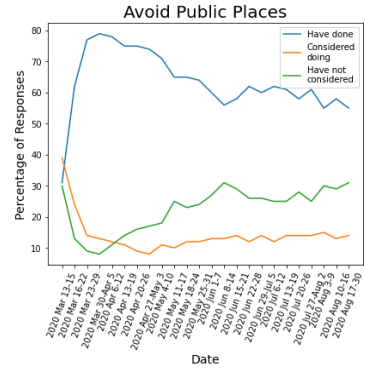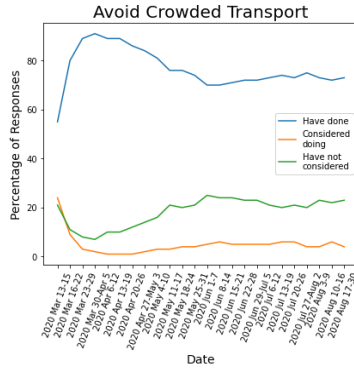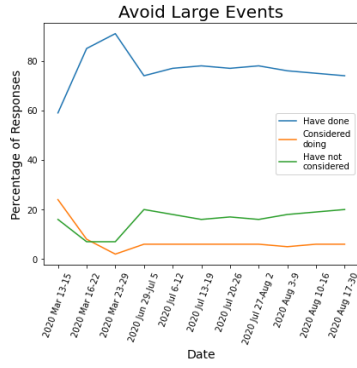
In a cursory look at the shape of the lines, one or two graphs leap out among the other seven: The middle fifth graph, Covid Better Worse, and the eighth graph, Wore Mask. Whereas every other graph seems to indicate that covid concerns lessen (or at least remain stable) over time, this highlighted duo behaves in a way that suggests the opposite: The percentage of people who believe that the pandemic has become "a lot worse" in Covid Better Worse seems to follow the changing volume of new positive cases and hospitalizations, and the percentage of people who wear masks outside their home seems to have stalwartly climbed over time. This seems to

disprove our second expectation: Rather than "listening" to both pessimistic and optimistic data, respondents seem to only hear the somber voice of the New Cases and Weekly Hospital Admissions graphs from earlier, as evident in the nearly identical shapes of the "a lot worse" response in Covid Better Worse and the daily number of cases in New Cases.
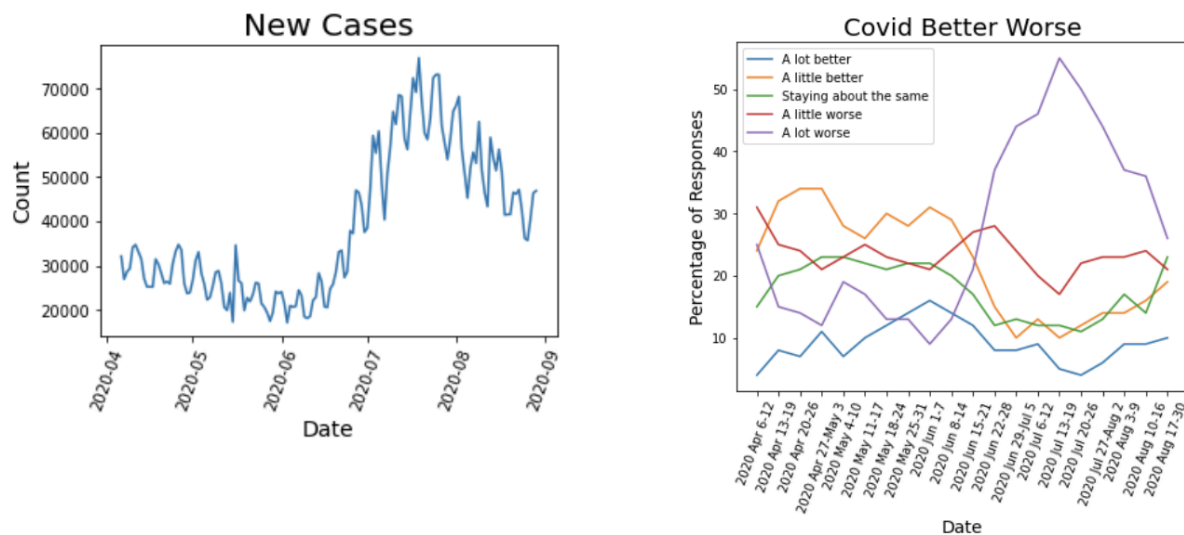
Looking only at these two graphs, it seems plausible that how respondents feel about the state of the pandemic (measured in Covid Better Worse) is most sensitive to the number of new daily cases, disregarding the positive claims posited by other pandemic metrics.

This is one potential story that the University of Michigan consumer sentiment index breakdown tells us: Consumers are very sensitive to changes in the infection rate, and the unique severity of both the perceived *cost* of contracting COVID-19 (both the terribleness of the disease and the original mandated 14-day quarantine) and the perceived *probability* of contracting it has in some ways traumatized America's risk sensitivity, inducing a malaise of pessimism even after coronavirus fears have largely abated.

However, this story falls apart when considering the seven other graphs: Their lines appear to all converge in the middle as the percentage of respondents who have taken each act of

precaution decreases, irrespective of improvements or setbacks in combating the pandemic spread. The same can be said for Isolation Effort in which we observe the two highest levels of isolation, "completely isolated" and "mostly isolated," falling, as the lower three levels claim a greater share of respondents. And although rates of Worry seem to remain in place—those who are and are not worried about contracting COVID-19 remain just as or not as worried—like the other six graphs, Worry also seems unaffected by changes in pandemic conditions.

If respondents are, indeed, nearly exclusively sensitive to the New Cases and Hospitalization data, why do they appear sensitive in only maybe two responses and blithe to the data in seven others? Is there a critical difference between the former two and the latter seven surveyed pandemic responses? Indeed, this paper's argument hinges on the likely assumption that there is. As mentioned previously in the Data section, I divide the nine surveyed responses into two groups: The first group of the diverging duo, the "public" group, and the second group of the seven others, the "private" group.

The Public Group: Complaint and masking

Opinions about the coronavirus spread and wearing masks outside the home are highly visible to others—the former appearing as complaint and other verbal indicators of precaution, and the latter, visible to whoever one might encounter outside and to social media followers via selfies and photos of masked faces. In other words, complaint, as measured by Covid Better Worse, and masking, as measured by Wore Mask, are things people can do to signal their thoughts about the pandemic.

The Private Group: Avoidance, supply stocking, and worry

On the other hand, avoiding high-infection-risk situations (small/large gatherings, public spaces, and crowded transportation) and efforts to isolate are all examples of lesser noticed, "negative" acts of precaution—decisions to *not* do something—whereas complaint and masking are "positive" acts of precaution—of *doing* something. For instance, while people can post masked selfies with long captions about the terribleness of COVID, they cannot post photos of themselves *avoiding* private gatherings or *avoiding* public places: They cannot easily depict themselves *not* doing something. So public actions like complaint and masking are marked by a distinct degree of visibility, unlike private actions.

Network Effects: Public v. Private

What then makes people more likely to perform public actions over private actions, as our line charts suggest, if all of these actions either reflect or determine precaution? Under the naive assumption that the only variable pertinent to coronavirus precaution is the likelihood of infection, we can model the demand for precaution as $y = r(x)$, where r(x) measures Consumer X's intrinsic interest in precaution/avoiding infection: It is Consumer X's *reservation price* and is a continuous function that strictly decreases, meaning that each next person (X+1) values precaution less than the previous person.

However, under the univariate assumption, we cannot explain why some precautionary responses seem sensitive to changes in the pandemic landscape, and other responses, unaffected. Using the network effects model of connectivity, however, we can explain this jarring incongruity. We first admit that the intrinsic value of precaution is not the only variable considered and amend our original model to $y = r(x)f(z)$, where *f(z)* represents how much each consumer benefits from precaution when an increased fraction of people, represented by *z*, is also

choosing precaution. As the fraction of total possible consumers (z) increases, the higher the reservation price for all consumers—most obviously those who have less of an intrinsic interest in precaution. For instance, Consumer X=½ has the highest reservation price for precaution even though they have less of an intrinsic interest in precaution than Consumers X<½. The difference between these two models is, once again, this *f(z)* variable that measures the benefit derived from others also investing in a certain good. This model then invites a further question: Does the *type* of precaution, whether it is public or private, change the network effect benefit of undertaking that precaution?

We first look at the public precautionary act of complaint. When friends FaceTime from their isolated bedrooms or, in rare cases early in the pandemic, in small groups separated by six feet, inevitably someone complains about the hardship of lockdowns and the terribleness of the pandemic. Complaining about covid became as New Yorkers complain about traffic or as North Easterners complain about the winter cold: It became both a coping mechanism to tolerate prolonged lockdowns as well as a social ritual, fostering *esprit de corp* in shared suffering.

Next, the public precautionary act of masking. During the pandemic, there were two powerful, perhaps even coercive reasons to wear a mask: First, there was the allegation that those who did not mask were responsible for the hundreds of thousands of American coronavirus deaths; second, the enshrinement of masks as a badge of virtue, that those who wore them were especially careful and thoughtful, sacrificing personal comfort for the good of others. While both claims contain some level of truth, they certainly inflated the value of masking to the point where some would wear their mask even when driving alone in their car or outside in sparsely populated areas, where the risk of infection is relatively low.

In both cases, complaining and mask-wearing consumers benefited from their activity in a way *other* than lowering the risk of infection: For complainers, strengthened connections to social network members and a greater sense of belonging, a resource made scarce by pandemic isolation; and for maskers, deterrence of scathing judgment and the approval of peers. What then about private precautionary acts? Because the private act is rarely seen by others in one's network, there is no network effect. No one can applaud another's persistent effort to stay inside or avoid seeing friends if they do not see these efforts; thus, these private precautionary acts receive no network-effect benefit.

The Role of Internet Connectivity

These network effects were then enlarged by enormous lockdown-engendered gains in social media use and internet connectivity, as a 2023 study underscores: "Many physical activities were banned or shifted online. As a result, people spent more time on social media during the COVID-19 lockdown, making social media mainstream channels that dominated information acquisition and social support" (Cho et al.). Indeed, a 2020 study of 260 American parents and their children found that, in the early stages of the pandemic, "92.3% of parents and 82.3% of children had increased their technology use to connect with others" (Drouin et al.).

With increased connectivity, the size of one's social network expanded from perhaps a small group of friends meeting in person to a long list of online friends and followers likewise constantly engaged with social media as their main source of socialization, eager to interact with new posts and updates from their networks. Thus, due to distended web-based social networks and increased demand for socialization/connection due to lockdown-wrought deprivations, the magnitude of network effects for "public" acts of precaution dramatically increased, biasing

agents toward precautionary measures that could be shared via online posts, captions, and comments. This explanation confirms what we see in the OWID and Gallup data: Out of all nine of our precautionary reactions, only the two of the public group, complaint and masking, appear to be overly pessimistic about the pandemic, when in reality, and as the other seven private reactions reveal, pandemic conditions were far better than how they might have been portrayed over social media and other means of internet connectivity.

Conclusion

We again return to the mystery of the University of Michigan consumer sentiment index: What about the coronavirus pandemic explains the dissonance between pessimistic belief, as measured by consumer sentiment, and optimistic behavior, as measured in consumer spending?

The data seems to tell a particular story. During the pandemic, consumers were trained to complain with the incentive of network effects: Complaining became the thing to do at all levels and kinds of social networks, as network members collectively sought comfort against the lack and loneliness of lockdowns and isolation, uniting against a shared enemy, COVID-19. And after years of coronavirus worry and unabated complaint, the pandemic had traumatized America's *discourse*, though not its genuinely held *beliefs*: Americans, though more likely to signal pessimism through their complaint—to friends, family, and the University of Michigan consumer index survey staff—continue to practice optimism by their spending. It is merely what people say that has changed, not what they do and believe.

Yet as more recent sentiment polling suggests, this phase of pessimism might have been just that, merely a phase, as the consumer sentiment index made an 8.4-point leap from 61.3 in November to 69.7 in December of 2023, the largest gain since 2005 and 0.3 points higher than a Bloomberg survey of economists predicted the index would be (Golle et al.). This 69.7 might still lie below scores produced by *The Economist*'s sentiment-prediction model, perhaps, yet the large 1-month increase and slight exceeding of expectations might signal a hopeful return to normalcy: That not only is America's health and income steadily recovering, but now, so too is its spirit.

Works Cited

Cho, Hichang, et al. "The bright and dark sides of social media use during COVID-19 lockdown: Contrasting social media effects through social liability vs. social support." *Computers in Human Behavior*, vol. 146, 2023.

"Coronavirus (COVID-19) Cases." *Our World in Data*, https://ourworldindata.org/covid-cases. Accessed 21 December 2023.

"Coronavirus Pandemic." *Gallup News*, https://news.gallup.com/poll/308222/coronavirus-pandemic.aspx. Accessed 21 December 2023.

Drouin, Michelle, et al. "How Parents and Their Children Used Social Media and Technology at the Beginning of the COVID-19 Pandemic and Associations with Anxiety." *Cyberpsychology, Behavior, and Social Networking*, vol. 23, no. 11, 2020, https://www.liebertpub.com/doi/abs/10.1089/cyber.2020.0284?casa_token=5O_XQ9PVR BkAAAAA%3A_eb-LKk_zK_TWZ0ODsblnrKkx5L1LKobZcBw09eHffTgO-tZnGobC qa0XnTqlJZGlhWdRfGY5gc-hw&journalCode=cyber.

Easley, David, and Jon Kleinberg. *Networks, Crowds, and Markets: Reasoning about a Highly Connected World*. Cambridge University Press, 2010. Accessed 21 December 2023.

Golle, Vince, et al. "US Short-Term Inflation Expectations Hit Lowest Since 2021." *Bloomberg.com*, 22 December 2023, https://www.bloomberg.com/news/articles/2023-12-22/us-consumers-short-term-inflation -expectations-lowest-since-21?utm_source=website&utm_medium=share&utm_campaig n=email?sref=m0aVO2qb. Accessed 22 December 2023.

Horwitz, Leora I., et al. "Trends in COVID-19 Risk-Adjusted Mortality Rates." *Journal of*

Hospital Medicine, vol. 16, no. 2, 2020, pp. 90-92. *SHM Publications*,

https://shmpublications.onlinelibrary.wiley.com/doi/epdf/10.12788/jhm.3552.

"The pandemic has broken a closely followed survey of sentiment." *The Economist*, 7 September

2023,

https://www.economist.com/graphic-detail/2023/09/07/the-pandemic-has-broken-a-closel

y-followed-survey-of-sentiment. Accessed 21 December 2023.