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# The Labor Market Impact of Covid-19 on Asian Americans\*

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## Abstract

*Asian Americans faced a disproportionately larger surge in unemployment rates than other racial and ethnic groups during the Covid-19 pandemic. While existing literature typically examines labor demand channels to explain this, we instead explore a labor supply channel. Our hypothesis is that Asian Americans are more cautious about Covid-19 infections and thus more selective about job opportunities, contributing to their higher unemployment rate than other groups. Analysis of cellphone data during the pandemic indicates that non-work mobility significantly decreased in areas with larger Asian populations, supporting our hypothesis.*

*JEL Classifications: J2, J7, I0*

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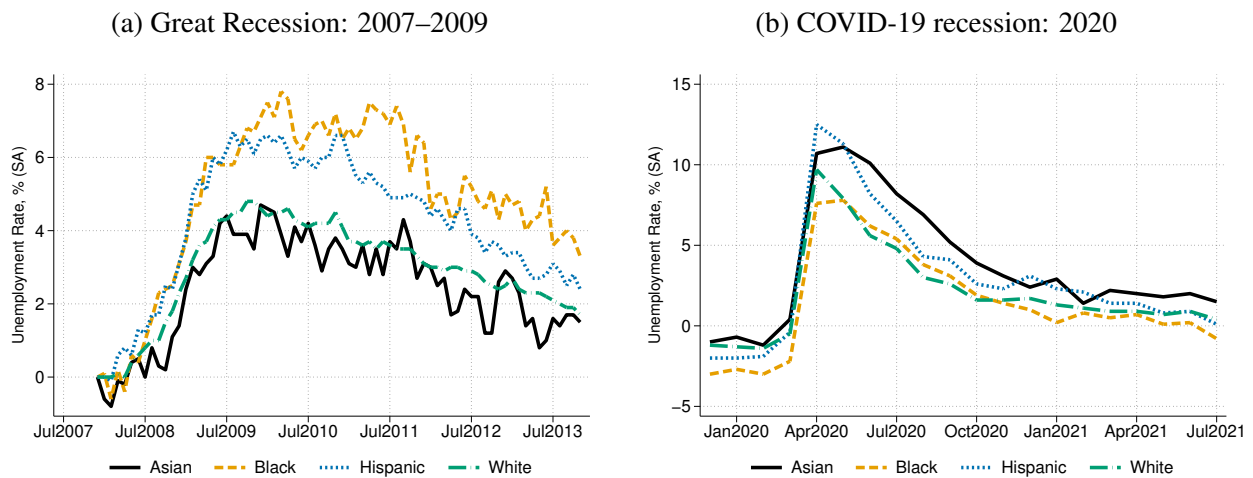
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In terms of employment, Asian Americans have fared better than other racial and ethnic groups during economic recessions prior to the Covid-19 recession of 2020. For instance, the left panel of Figure 1 shows that the gap in the unemployment rate—that is, the increase in the rate relative to its pre-recession level—was consistently lower for Asian Americans than for other racial and ethnic groups during the Great Recession and over the years immediately after it officially concluded in mid-2009 (as determined by the NBER). However, the opposite has been true during the coronavirus-driven recession (which concluded in April 2020 according to the NBER) and its aftermath. The right panel illustrates that the unemployment gap during the pandemic is significantly higher and more persistent among Asian Americans than among other groups (with their gap only being exceeded briefly by that of Hispanic Americans during April and May of 2020).<sup>1</sup> The cause of this outsized labor market impact of the pandemic on Asian Americans is not well understood. Has it been due more to labor demand factors or to labor supply factors?

Figure 1: The Gap in the Unemployment Rate by Racial and Ethnic Group



Notes: Depicted are gaps in the unemployment rate for each racial or ethnic group. The gap is defined as the difference between the current rate and the rate in the month prior to the recession. The base month is December 2007 for the Great Recession and February 2020 for the Covid recession. The data come from the Bureau of Labor Statistics.

The existing literature has generally explored labor demand stories for why Asian Americans have not been able to find or keep jobs during the Covid-19 pandemic. One explanation is that prior to the pandemic there was a high concentration of Asian Americans without college degrees working in the service sector, which has been harder hit than most by the pandemic. [Honore and Hu \(2020\)](#) show that industry composition explains up to half of the difference in the likelihood of remaining employed between White Americans and Asian Americans. Our work instead explores a labor supply explanation—namely, that relative to other racial and ethnic groups, Asian Ameri-

<sup>1</sup>The share of the unemployed who have been out of work for 26 weeks or more (that is, the long-term unemployed) also increased most for Asian Americans, going from 21% in 2019Q4 to 46% in 2020Q4 ([Bennett, 2021](#)).

cans have been more cautious about potentially becoming infected with the Covid-19, which has resulted in higher selectivity in jobs and a higher unemployment rate. This explanation is consistent with the fact that Asian Americans have a lower infection rate and a higher vaccine take-up rate than other groups. According to the Centers for Disease Control and Prevention (CDC), the Covid-19 infection rate of Asian Americans is 20% lower than that of White Americans, while other racial and ethnic groups exhibit higher infection rates than White Americans.<sup>2</sup> Furthermore, CDC data show that the vaccine take-up rate was the fastest and highest among Asian Americans.<sup>3</sup>

We empirically investigate the labor supply explanation for Asian Americans' poor labor-market outcomes during the pandemic. If they are indeed more averse to Covid-19 infection risk than other groups, then we would expect a greater reduction in their mobility during the pandemic. Thus, we examine changes in mobility from the pre-pandemic to pandemic period by race and ethnicity, using SafeGraph data. Although mobility data are not available at the individual level, we explore variation in the racial/ethnic composition across census block groups (CBGs).<sup>4</sup> We find that mobility—whether for work or non-work purposes—in CBGs with a larger share of Asian Americans fell significantly more than in other CBGs during the pandemic. Though the larger decline in work-related mobility by Asian Americans could be attributed to both labor supply and demand factors, their larger reduction in non-work mobility suggests they have a greater aversion to Covid infection risk, which we interpret as evidence for a labor supply-side explanation.

Our data come from [SafeGraph](#), a data provider that aggregates location data from a myriad of mobile phone applications. SafeGraph's Social Distancing dataset reports daily mobility statistics at the CBG level, including the percentages of devices that are completely at home or away from home for work (full-time or part time) or non-work purposes during the day. We aggregate daily data into a monthly frequency from January 2019 through September 2020, covering both the pre-pandemic and pandemic periods. We merge these data with SafeGraph's OpenCensus dataset, which is sourced from the 2016 American Community Survey (ACS) and provides demographic data for each CBG, such as race/ethnicity, gender, age, income, education, employment, occupation, and marital status.

With the combined data, we study how the pandemic impacts mobility across CBGs with varying shares of Asian Americans, using regression analysis. We consider overall mobility and mobility for work or non-work purposes. We control for a rich set of demographic factors as well as county-time fixed effects, which are important in our analysis given that developments of the pandemic and corresponding lockdown policies are heterogeneous across counties and over time. We estimate the average effect of the pandemic on Asian Americans' mobility relative to other

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<sup>2</sup>See [the CDC website](#) for up-to-date information.

<sup>3</sup>See [the Census Bureau website](#) for more details.

<sup>4</sup>A census block group is a statistical division of a census tract with between 600 to 3,000 people.

racial and ethnic groups' mobility, and also the dynamic impact by month.

Our results suggest that Asian Americans were indeed reducing their physical mobility more than the rest of the population during the pandemic. This is confirmed by large drops in the reported mobility of areas with relatively more Asian residents: during the pandemic, mobility is reduced by a 0.17 percentage point per percent Asian share of the population. In particular, mobility reduction associated with changes in non-work behavior makes up a large share—about 75%—of the total observed decline in mobility among Asian Americans. Mobility associated with work behavior has also declined more in CBGs with more Asian Americans. When we allow the impact of the pandemic on mobility to vary by month, we see that Asian Americans' mobility declined relatively sharply at the onset of the pandemic and remained suppressed throughout the summer of 2020. The recovery from the nadir of May 2020 is mild, and mobility remains much lower than the pre-pandemic level. This decline is driven by large (relative) declines in non-work mobility and part-time work mobility.

We conduct three additional analyses to support our argument. First, we provide international evidence by documenting a similar pattern of reduced mobility in localities with more Asian residents in Canada, Brazil, and the United Kingdom using Facebook's Data for Good Movement Range Maps. Second, we use the Household Pulse Survey to provide additional empirical support for our labor supply argument. The survey asks respondents why they did not work for pay or profit in the last seven days and shows that Asian Americans reported Covid-19 concerns more frequently than any other group, supporting our argument that their aversion to infection risk impacted their relative labor market outcomes. Finally, we show that racism and violence against Asian Americans during the pandemic did not play a significant role in reducing their mobility.<sup>5</sup> Despite the documented rise in hate crimes against Asians in the US, we find that Asian Americans reduced their trips to neighborhoods with a high share of Asian residents more than to those with few or no Asian residents.

Our labor supply story based on the differential aversions to Covid-19 infection risk across ethnic groups operates for contact-intensive workers but not for teleworkers. It is well-known that education is the key determinant of the capacity to telework. [Honore and Hu \(2020\)](#) find that Asian Americans with high school degrees or lower have a larger decline in the employment rate and lower probabilities of remaining employed and finding new work during the pandemic than other groups, while Asian Americans with higher levels of education do not. They find that controlling for industry accounts for roughly half of the decrease in probability for those with high school diplomas or less. Because this is the same subgroup that is less likely to be able to find

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<sup>5</sup>There has been a documented rise in hate crimes against Asians living in the US, and polls find that Asian Americans are more likely to report racist/discriminatory experiences since the pandemic began. See [Findling et al. \(2022\)](#) and [Ruiz et al. \(2020\)](#).

an opportunity to work remotely, a higher aversion to Covid infection risk may be a contributing factor to the remaining variation.

This paper is related to three strands of the empirical literature on the Covid-19 pandemic. The first strand studies the differential impact of the pandemic on the labor market outcomes across racial and ethnic groups.<sup>6</sup> Using the Current Population Survey, [Honore and Hu \(2020\)](#) find that Asian Americans without a college education have been disproportionately affected by job losses compared with other racial and ethnicity groups. [Mar and Ong \(2020\)](#) use aggregated unemployment rates and unemployment insurance claims to highlight the disparities between Asian Americans and their non-Hispanic White counterparts. Both studies show labor demand factors such as industry concentrations and area fixed effects do not fully explain the disparities in labor market outcomes for different racial and ethnic groups. [Fairlie et al. \(2020\)](#) attribute the persistent Asian–White unemployment gap during the pandemic to geographical distribution.

The second strand of the literature studies how Covid risk perception differs by demographic characteristics. Using online surveys, [Fan et al. \(2020\)](#) find that female and Democratic respondents are less risk tolerant, more likely to practice social distancing, and less optimistic about their health outcomes. Using a national survey, [Bordalo et al. \(2020\)](#) find that younger respondents report higher perceived probabilities of infection, hospitalization, and death for “people like you,” compared with a sample of older respondents. [Heffetz and Ishai \(2021\)](#) find that self-reported beliefs about the average chance of Covid infection and the undertaken protective behaviors are in fact correlated. These studies motivate our examination of the heterogeneity in social distancing behaviors between racial and ethnic groups.

The third strand studies how government stay-at-home policies impacted social distancing behavior and economic activity. Most studies find that individual avoidance behavior or other exogenous population preferences explain most of the decline in activity, while stay-at-home policies are only associated with a modest 5–10% decline in activity, as documented in the literature review by [Gupta et al. \(2020\)](#).<sup>7</sup> These studies largely find that human mobility started declining before the policies were enacted, suggesting that individuals’ voluntary decisions drove the large decline.

The rest of the paper is organized as follows. In Section [I.](#), we describe the data. Then, in Section [II.](#), we present the regression analysis we conducted to illustrate our empirical findings. Next, in Section [III.](#), we illustrate our robustness checks on the main empirical results. Finally, we present our conclusion in Section [IV.](#)

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<sup>6</sup>A subset of such studies includes [Alon et al. \(2020\)](#), [Borjas and Cassidy \(2020\)](#), [Dingel and Neiman \(2020\)](#), [Fairlie et al. \(2020\)](#), [Gezici and Ozay \(2020\)](#), [Hean and Chairassamee \(2022\)](#), [Kim et al. \(2021\)](#), and [Montenovo et al. \(2022\)](#).

<sup>7</sup>Previous studies that use SafeGraph data: [Allcott et al. \(2020\)](#); [Anderson \(2020\)](#); [Cronin and Evans \(2020\)](#); [Dave et al. \(2020\)](#); [Goolsbee and Syverson \(2021\)](#); and [Wang et al. \(2020\)](#).

## I. Data

In this section, we describe two main data sources for our analyses. First, mobility data which comes from SafeGraph at the census block group (CBG) level observations. Second, demographic data at the census block group level come from SafeGraph’s OpenCensus data. We then present novel facts that areas with higher shares of Asian residents experienced a larger decline of mobility during the Covid-19 pandemic.

### A. Mobility and Demographic Data

SafeGraph is a data company that aggregates anonymous location data from numerous cell phone applications and provides us with information spanning from January 2019 through September 2020. The location data are used to determine visits to CBGs or other “Points of Interest” (POIs), where consumers can spend money or time. In addition, SafeGraph determines a device’s common nighttime location and designates it as the device’s home location.<sup>8</sup> We utilize two datasets from SafeGraph: Social Distancing and OpenCensus.

SafeGraph created the Social Distancing dataset after the pandemic’s onset to provide real-time data about social distancing patterns in response to the pandemic. The dataset compiles mobility metrics for devices assigned to a CBG as the home location on a daily frequency. The statistics include the fraction of devices completely at home, the fraction of devices exhibiting part-time or full-time work behavior, the average time away from devices’ home locations, and several other metrics for a census block group.<sup>9</sup> Our key measure of mobility is the share of devices that are away from their home CBG. The share of devices that are away from home is constructed as one minus the share of devices that are completely at home.

Furthermore, SafeGraph data allow us to study work-related mobility as well. SafeGraph defines devices that are away from home in one location for at least six consecutive hours as exhibiting full-time work behavior; similarly, it considers devices that are away from home in a single spot for three to six straight hours to be exhibiting part-time work behavior.<sup>10</sup> We construct the number of devices that are *work away* as the sum of the number of devices exhibiting either full-time or part-time work behavior. Likewise, we compute the number of devices that are *non-work away* by subtracting the number of devices exhibiting work behavior from the number of devices that are not completely at home. We use these counts to compute daily shares of total devices that are

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<sup>8</sup>See <https://docs.safegraph.com/v4.0/docs/places-manual> for SafeGraph’s definitions.

<sup>9</sup>SafeGraph determines the common nighttime location of each mobile device over a six-week period as the home location. SafeGraph defines their “devices completely at home” measure as a device that has not left its assigned 153m × 153m residence (roughly the size of a city block).

<sup>10</sup>Note that remote work is clearly outside the scope of these variables. If someone works from home all day they will not be counted in either category of work behavior.



non-work away or work away (full-time or part-time) and then aggregate these data into a monthly frequency to gauge the amount of work-related and non-work-related travel by residents in each CBG over time.

We should sound a note of caution about the representativeness of the data sample. SafeGraph maintains that its data are well-sampled from anonymous participants representing a wide range of demographics across a broad geography of the United States.<sup>11</sup> However, smartphone ownership is correlated with age, as is app usage. Since SafeGraph’s data are collected by a conglomerate of mobile applications, older individuals are likely underrepresented in the data.<sup>12</sup> We have no precise way to correct for such undersampling because individual data are not collected by SafeGraph. We do, however, correct any count variables for changes in the sample size over time as well as over/undersampling across different census block groups.<sup>13</sup>

We incorporate various demographic variables, such as race/ethnicity, sex, age, income, occupation, and employment at the census block group level using SafeGraph’s OpenCensus data that are derived from the 5-year estimates of the 2016 American Community Survey.<sup>14</sup>

## B. *Stylized Facts*

We now present motivating facts about the mobility patterns of CBGs with different Asian American concentrations. To do this, we divide census block groups into three groups based on the percentage of Asian population: No-Asian (0%), Low-Asian (less than or equal to 20%), and High-Asian (greater than 20%). In the High-Asian CBGs, an average of 32% of households are Asian, 43% are White, and 7% are Black. Meanwhile, 4% of households are Asian, 68% are White, and 11% are Black in the Low-Asian CBGs. Finally, in the No-Asian CBGs, no households are Asian by construction, 69% of households are White, and 17% are Black.<sup>15</sup> The three types of CBGs do not differ in the percentage of Hispanic households (14%).

We start by looking at the summary statistics of many key demographic characteristics across these three types of CBGs. They do not differ in some demographic variables: the share of female residents (51%), the share of families with children (28%), and the ratio of children to adults (1:3.6). However, they differ substantially according to other demographic dimensions, which are presented in the upper panel of Table 1. The High-Asian CBGs have the lowest share of elderly residents (those aged 65 and older). They also have the highest proportion of married

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<sup>11</sup> See SafeGraph’s blog post: <https://www.safegraph.com/blog/safegraphs-data-on-brick-and-mortar-customer-demographics-is-the-most-accurate-foot-traffic-dataset>.

<sup>12</sup> For a more detailed discussion of some of these biases, see Coston et al. (2021).

<sup>13</sup> For details see Section A in the Online Appendix.

<sup>14</sup> These data are available at <https://docs.safegraph.com/v4.0/docs/open-census-data>.

<sup>15</sup> For each of our three categories, the residual percentage consists of other minority populations as well households where the householder is of two or more races.

households, the lowest rate of people employed in “essential” industries, the highest (pre-Covid) employment rate, the most educated population, and the highest median home income among all three categories.<sup>16</sup> In the next section, we will explore how these demographic variables impact mobility during the pandemic.

Table 1: Summary statistics of CBGs by Asian population

	No Asian		Low Asian		High Asian	
<b>Demographics</b>						
Share of Pop. 65+ years old	0.17		0.15		0.13	
	(0.10)		(0.10)		(0.08)	
Share of Married households	0.45		0.49		0.52	
	(0.19)		(0.19)		(0.19)	
Share of Essential workers among pop.	0.13		0.12		0.10	
	(0.06)		(0.05)		(0.05)	
Share of Employed in working-age pop.	0.54		0.59		0.60	
	(0.13)		(0.12)		(0.11)	
Share of Pop. with college degree or higher	0.26		0.35		0.45	
	(0.22)		(0.21)		(0.26)	
Median household income, thousand	45		60		75	
	(24.7)		(39.3)		(42.2)	
<b>Mobility</b>						
	Pre-Covid	Covid	Pre-Covid	Covid	Pre-Covid	Covid
% of devices staying at home	29.41	30.51	28.57	33.77	27.88	40.62
	(10.77)	(11.60)	(10.10)	(11.57)	(9.96)	(13.02)
% of devices away part-time	8.33	5.88	9.02	5.56	9.33	4.55
	(5.63)	(4.50)	(5.55)	(4.12)	(5.79)	(3.98)
% of devices away full-time	4.14	3.12	4.48	2.95	4.76	2.86
	(4.50)	(3.14)	(4.61)	(2.93)	(4.73)	(3.13)
Non-home dwell time (min)	95.00	64.00	107.00	45.00	115.00	18.00
	(97.39)	(83.60)	(99.05)	(90.72)	(98.51)	(93.69)
Observations (mil.)	42.4	17.2	47.9	19.5	5.6	2.3

Notes: Mobility data come from SafeGraph, and demographic data come from SafeGraph OpenCensus data and the American Community Survey (ACS). No-Asian CBGs are those with zero reported Asian residents in the ACS. Low-Asian CBGs have between zero to 20% Asian populations. And finally, High-Asian CBGs have 20% or higher Asian populations. The home location for a given device is its typical overnight location.

We next examine the median statistics of mobility in the pre-Covid and Covid periods for the three categories of Asian CBGs using the Social Distancing dataset. The pre-Covid period is from January 1, 2019 to March 13, 2020, and the Covid period covers the period from March 14, 2020 onward. Table 1 shows that the decline in overall mobility across the two periods is not uniform across the three types of CBGs. As the pandemic hit the United States, the share of devices that were completely at home rose in all CBGs, but the increase was the largest for the High-Asian CBGs—a 13 percentage point jump. In contrast, the increase is 5 percentage points in the Low-Asian CBGs and only 1 percentage point in the No-Asian CBGs.

<sup>16</sup>Essential workers were classified based on common employment occupation groupings from government announcements. The occupations categorized as essential include healthcare practitioners or related occupations, protective service occupations, and production, transportation, and material moving occupations.

Similarly, the share of devices that display part-time or full-time work behavior declines in all CBGs during the pandemic, but the decline is the largest in the High-Asian CBGs. The share of part-time work behavior dropped by 51% in the High-Asian CBGs, 38% in the Low-Asian CBGs, and only 30% in the No-Asian CBGs. When people do go out, median non-home dwell time declines for all CBGs, but again the decline by 97 minutes in the High-Asian CBGs is the most significant among the three groups. In contrast, the median non-home dwell time declines by 62 minutes in the Low-Asian CBGs and only 31 minutes in the No-Asian CBGs. Interestingly, residents in High-Asian CBGs were the least likely to be completely at home or not working and spent the longest time away from home prior to the pandemic, but we observe the opposite after the pandemic's onset.

Therefore, the data suggest that the decline in mobility during the pandemic rises with the share of Asian residents across CBGs. However, it is still necessary to control for the potential influence of covariates such as incomes or educational attainment, which also varies by category. There are also other factors, such as state, county, or city policies that could conceivably be at work and should also be accounted for. Additionally, this trend may be the product of our fairly arbitrary group definitions; therefore, we want to analyze the percentage of Asian residents as a continuous variable. We address these concerns in the following section.

## **II. Empirical Analysis**

We now use regression analysis to examine how Asian Americans respond to the Covid-19 pandemic differently than other racial and ethnic groups do in terms of mobility. Our data cover all CBGs in the United States over the period of January 2019 through September 2020. Our key measure of mobility is the share of devices that are not completely at home in a CBG according to SafeGraph's Social Distancing database. We also study the mobility measure for work and non-work purposes and further distinguish between full-time and part-time work behavior. We explore both the average and time-varying effects of the pandemic on mobility. We find that CBGs with larger shares of Asian residents experienced a larger decline in mobility during the pandemic. This evidence suggests that Asian Americans have a higher risk aversion to Covid-19 infections than other racial and ethnic groups.

### *A. Average Mobility Effects of Covid-19 on Asian Americans*

We start with the average mobility effects of Covid-19 on Asian Americans. Our monthly data cover the period between January 2019 and September 2020—that is, both pre-pandemic and pandemic times. Specifically, the pre-pandemic period covers the period from January 2019 through February 2020, and the pandemic period covers the period from March 2020 through September

2020. Let  $y_{it}$  denote a mobility measure of CBG  $i$  in month  $t$  and  $\bar{y}_i$  denote the average mobility in the *pre-pandemic* period. We study how the impact of Covid on mobility relates to the share of Asian residents,  $A_i$ , across CBGs with a panel regression over the pandemic months as follows:

$$(1) \quad y_{it} - \bar{y}_i = \beta A_i + \gamma X_i + \delta_{c(i)t} + \varepsilon_{it},$$

where  $X_i$  controls for a host of CBG characteristics from the 2016 American Community Survey. The regression includes county-time fixed effects,  $\delta_{c(i)t}$ , where  $c(i)$  specifies the county in which CBG  $i$  belongs. These fixed effects control for time-varying differences in county-level policy or other factors that could lead to differential impacts on mobility, such as stay-at-home orders and local weather.

The vector of controls,  $X_i$ , comprises log population; population density; log median household income; the percentage of family households with children; the percentage of the population that is at least 65 years old, the percentage of the population that is Black, Hispanic, or either belongs to another minority group or is multiracial; the percentage of the population that has no high school degree, some college experience, and a bachelor’s degree or higher; the percentage of the population employed; and the percentage of the population classified as essential workers. We drop the percentage of non-Hispanic White residents in the regression to avoid multicollinearity; this implies that they are treated as a base group and the coefficient reported for each racial or ethnic group is *relative* to this base. Similarly, for education, the percentage of the population that has a high school diploma is the omitted group.

We are most interested in coefficient  $\beta$ , which captures the relationship between an origin CBG’s Asian proportion and the change in this area’s mobility from the pre-pandemic period to the pandemic period, relative to the change in mobility of the base group. If Asians reduced their mobility more than non-Hispanic Whites, then we would expect this coefficient to be negative. Our estimates are within county  $\times$  time cells, so the source of variation is differences across census block groups in a county in a month. We are also interested in the coefficient vector  $\gamma$ , which characterizes the impact of our controls—other demographic factors—on mobility reduction.

The first column of Table 2 reports coefficients and corresponding standard errors of the base-line regression with our key measure of mobility, the share of devices that are completely at home. The coefficient on the share of Asian residents is statistically significant and negative:  $-0.17$  with a standard error of 0.01. This coefficient implies that an additional 1% of Asian residents is associated with a 0.17% decline in the share of devices that are away during the pandemic, relative to an additional 1% of non-Hispanic White residents. That is, the predicted decline in mobility is 17 percentage points larger in an all-Asian CBG than an all-White CBG during the pandemic. Meanwhile, areas with an additional 1% of Black or Hispanic residents exhibit a relative decrease in mobility of 0.01%.

Table 2: Covid-19 Impact on Mobility

	(1) Away	(2) Non-work Away	(3) Work Away	(4) Full-time Work	(5) Part-time Work
Asian%	-0.17 (0.01)	-0.13 (0.01)	-0.03 (0.00)	-0.01 (0.00)	-0.03 (0.00)
Black%	-0.01 (0.00)	-0.02 (0.00)	0.01 (0.00)	0.01 (0.00)	0.00 (0.00)
Hispanic%	-0.01 (0.00)	-0.03 (0.00)	0.02 (0.00)	0.01 (0.00)	0.01 (0.00)
Other%	-0.00 (0.01)	-0.02 (0.00)	0.02 (0.00)	0.01 (0.00)	0.01 (0.00)
log(HH income)	-4.07 (0.12)	-2.31 (0.09)	-1.76 (0.10)	-0.75 (0.05)	-1.01 (0.05)
log(pop)	-0.96 (0.06)	0.44 (0.07)	-1.41 (0.06)	-0.65 (0.03)	-0.76 (0.03)
log(density)	-0.45 (0.03)	-0.42 (0.03)	-0.03 (0.02)	0.02 (0.01)	-0.05 (0.01)
65+%	-0.05 (0.00)	-0.03 (0.00)	-0.03 (0.00)	-0.02 (0.00)	-0.01 (0.00)
Employment share%	0.01 (0.00)	0.03 (0.00)	-0.02 (0.00)	-0.02 (0.00)	-0.01 (0.00)
Essential%	0.05 (0.01)	0.06 (0.00)	-0.01 (0.00)	-0.01 (0.00)	0.00 (0.00)
Homes w. children%	-0.05 (0.00)	0.01 (0.00)	-0.06 (0.00)	-0.04 (0.00)	-0.03 (0.00)
NoHSDiploma%	0.02 (0.00)	0.00 (0.00)	0.02 (0.00)	0.01 (0.00)	0.01 (0.00)
SomeCollege%	-0.00 (0.00)	-0.01 (0.00)	0.01 (0.00)	0.01 (0.00)	0.00 (0.00)
BachelorsOrHigher%	-0.07 (0.00)	-0.05 (0.00)	-0.02 (0.00)	-0.00 (0.00)	-0.02 (0.00)
Observations	4403754	4403754	4403754	4403754	4403754
Adjusted $R^2$	0.721	0.591	0.742	0.665	0.749

Notes: Regressions presented are of the form  $y_{it} - \bar{y}_i = \beta A_i + \gamma X_i + \phi_{J(i)t} + \varepsilon_{it}$ , where  $i$  corresponds to the origin census block group and where  $J(i)$  is the county in which CBG  $i$  is located. Standard errors are clustered by county and reported in parentheses.

It is also worth noting that several demographic factors have had a large influence on mobility during the pandemic. CBGs with higher median household income and larger populations have seen a significantly larger decline in outgoing visitors. Not surprisingly, an additional 1% of elderly residents has reduced outgoing traffic by 0.05%. By contrast, a higher share of employed people, particularly essential workers, among the working-age population has raised outgoing mo-

bility during the pandemic. Specifically, for every additional 1% of the population employed in essential industries, the share of devices that are not completely at home has risen by 0.05% in the pandemic. The CBGs with an additional 1% of households with children have also shown a statistically significant decrease in mobility of 0.05% during the pandemic, possibly because of school closures.

Education also matters for the mobility impact of the pandemic, which has been more pronounced for those with more education. All else being equal, after the onset of the pandemic, a CBG whose entire population had a Bachelor’s degree or higher would see a larger reduction in outgoing traffic (a difference of 7 percentage points) than a CBG whose entire population had only a high school diploma. In contrast, the mobility impact of the pandemic has been positive on the population without a high school diploma (or equivalent) and close to neutral on the population having some college experience, relative to those with at most a high school diploma.

We now analyze the reduction of mobility associated with work-related and non-work-related activities during the pandemic. We are interested in seeing whether CBGs with more Asians have a larger decline in work-related or non-work related mobility, similar to overall mobility, during the pandemic. To do this, we change the measure of mobility  $y_{it}$  in regression (1) from the share of devices that are away from CBG  $i$  to four alternative measures: (i) the percentage of devices in CBG  $i$  exhibiting “non-work behavior,” (ii) the percentage of devices in CBG  $i$  exhibiting “work behavior,” (iii) the percentage of devices in CBG  $i$  exhibiting “full-time work behavior,” and (iv) the percentage of devices in CBG  $i$  exhibiting “part-time work behavior.” Columns 2–5 of Table 2 report these results.

Two key empirical patterns stand out for Asian Americans’ mobility during the pandemic. First, CBGs with more Asian residents have seen substantially larger mobility declines in both non-work-related and work-related activities than other CBGs during the pandemic. Relative to an all non-Hispanic White CBG, non-work activities are predicted to be reduced by 13 percentage points in an all Asian CBG, while they only decrease by 2 or 3 percentage points in an all Black or all Hispanic CBG. During the pandemic, work-behavior in an all Asian CBG falls by 3 percentage points more than an all non-Hispanic White CBG. In contrast, an all Black CBG or an all Hispanic CBG increases its share of devices displaying work behavior during the pandemic, relative to an all non-Hispanic White CBG. Second, both part-time work and full-time work behavior decline significantly more in an all Asian CBG than in all non-Hispanic White, all Black, and all Hispanic CBGs. Part-time work displays a stronger pattern across CBGs of different racial and ethnic groups: it decreases by 3 percentage points more in an all Asian CBG than in an all non-Hispanic White CBG. This aligns with the summary statistics in Table 1; the work-related mobility declined more sharply in the High-Asian CBGs than in the Low-Asian and No-Asian CBGs.

Several demographic factors continue to play an important role in changes in work and non-

work mobility during the pandemic. CBGs with higher household income, educational attainment, and elderly population shares show a larger reduction in pandemic mobility, when measured for either work-related or non-work-related behavior. Interestingly, an increase in the share of homes with children, one of our control variables, raises the pandemic mobility for non-work behavior, but decreases the pandemic mobility for work behavior. This lends some support to the anecdotal story that the increased burden of childcare on parents has kept them out of the workplace.

The finding that Asian Americans reduced non-work mobility more than other racial and ethnic groups during the pandemic is most indicative of their higher aversion to Covid-19 infection risk. To provide further evidence, we check whether Asian American reduced visits to a nonessential location with higher infection risk (e.g., a restaurant) more than visits to an essential business with lower infection risk (e.g. a grocery store). Using SafeGraph’s data on the POIs, we assess the changes in traffic to either grocery stores or restaurants from the pre-pandemic to pandemic periods across CBGs as in specification (1). We find that the coefficient  $\beta$  of the regression on log visits to restaurants is significantly negative, unlike that of the regression on log visits to grocery stores, which has a positive point estimate.<sup>17</sup> This finding provides additional support that Asian Americans have a higher risk aversion to Covid infection risk than other racial and ethnic groups.

### B. *Time-Varying Impacts of Covid-19 on Asian Americans*

In the previous subsection, we estimate the average impact of Covid on the mobility of Asian Americans. We now examine the dynamics of this impact over the pandemic months in our sample. Specifically, we run the following cross-sectional regressions for different measures of mobility and each month from January 2019 through September 2020:

$$(2) \quad y_{it} - y_{it_0} = \alpha_t + \beta_t A_i + \gamma_t X_i + \delta_{c(i)} + \varepsilon_{it},$$

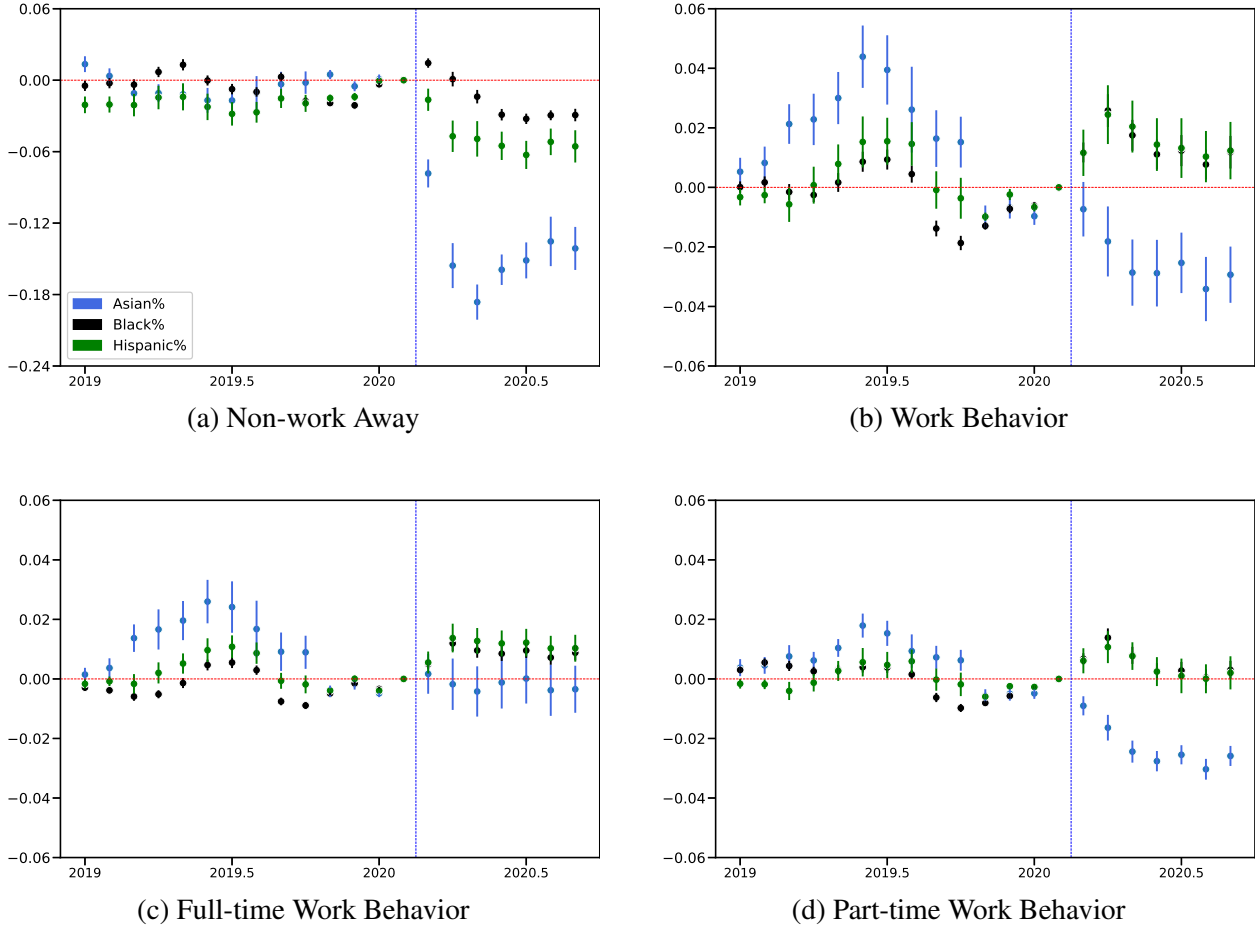
where the base month  $t_0$  is February 2020. The movements in coefficients  $\beta_t$  over time illustrate how Asian Americans’ mobility changes relative to that of non-Hispanic Whites prior to the pandemic and during the pandemic. For the ease of comparison, we also add the coefficients of other racial and ethnic groups, all relative to non-Hispanic Whites. The term  $\alpha_t$  and the coefficients of other demographic variables  $\gamma_t$  also vary over time to capture the time-varying impact of other co-determinants of mobility. We include county fixed effects.

The upper left panel of Figure 2 plots the dynamic impact of Covid-19 on non-work mobility measured by the percentage of devices that are non-work away. Prior to the pandemic, Asian Americans’ non-work away behavior, similar to that of other racial and ethnic groups, displayed small variability over time. However, the onset of the pandemic drastically changed these patterns.

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<sup>17</sup>We use SafeGraph’s Weekly Patterns dataset for this analysis, and results are presented in the online appendix.

Figure 2: Dynamic Impact on Covid-19 on Work and Non-Work Behavior



Notes: Regressions presented are of the form  $y_{it} - y_{it_0} = \alpha + \beta_i A_i + \gamma_i X_i + \phi_{J(i)} + \varepsilon_{it}$ , where  $i$  corresponds to the origin census block group and where  $J(i)$  is the county in which CBG  $i$  is located,  $t$  is time, and  $t_0$  (the base month) is February 2020.  $A_i$  is the fraction of residents in CBG  $i$  who are Asian, and  $X_i$  is a vector of controls including CBG  $i$ 's fraction of residents who are Black and fraction of residents who are Hispanic, the coefficients for which are plotted above for the ease of comparison.

Asian Americans experienced a substantially larger decline in non-work away mobility than other groups. Mobility of an all Asian CBG is predicted to decline by as much as 20% in May 2020 and to remain significantly lower than that of other groups throughout the sample. In contrast, an all Hispanic CBG is predicted to experience a drop in mobility of at most 6%, while an all Black CBG is predicted to experience an even smaller drop of at most 3%, in response to the pandemic.

We next turn to the pandemic impact on work mobility, which is illustrated in the upper right panel of Figure 2. Prior to the pandemic, a higher Asian population was associated with an increasing level of work-related mobility. Black and Hispanic populations show less variation in their respective work-related mobility than the Asian population during the pre-pandemic period. Once the pandemic began, Asian Americans' work-related mobility dropped significantly relative to White Americans', while Hispanic and Black Americans' work-related mobility rose relative



to White Americans’. The relative decline in Asian Americans’ work mobility is smaller than the relative decline in their non-work mobility, with the largest predicted drop being 4% in August 2020. The two lower panels of Figure 2 make it clear that this decline is driven by a decline in part-time work.

### III. Further Evidence

#### A. International Evidence

If Asians have a higher degree of aversion to Covid-19 infection risk, we would expect to see Asians reducing their mobility more than other racial and ethnic groups during the pandemic in other countries. Limited by the data availability, we explore international evidence in three countries: Canada, Brazil, and the United Kingdom. The daily mobility data come from Facebook’s Data for Good Movement Range Maps, spanning from March 1, 2020, to March 22, 2021. Facebook measures the percentage change in mobility as the change in movement in a given administrative region relative to a baseline in February 2020.<sup>18</sup> The demographic data come from each country’s respective census, and the Asian resident concentration in each region is measured by the population share of residents whose country of origin is in Asia. We run regressions of the change in mobility on the Asian concentration across regions, similar to equation (1). For comparison purposes, we also include the United States in this analysis using this alternative data source of mobility. The results in Table 3 show that regions with a larger Asian concentration show a larger decline in mobility in each of these countries. Overall, this exercise supports our main findings.

Table 3: International comparison

	USA	Canada	Brazil	UK
	$\Delta$ in movement	$\Delta$ in movement	$\Delta$ in movement	$\Delta$ in movement
Asian share (%)	-0.91 (0.0082)	-0.51 (0.019)	-1.06 (0.026)	-0.87 (5.63)
Observations	918968	71984	597182	1548
Adjusted $R^2$	0.054	0.045	0.003	0.013

Notes: Standard errors are in parentheses. Facebook’s Data for Good Movement Range Maps provide the daily mobility data on the change in movement in a given region relative to a baseline in February 2020. The data span from March 1, 2020, to March 22, 2021. The Asian share is the share of the total population in a given region whose country of birth is a country in Asia, sourced from each country’s census.

<sup>18</sup>Data are available at <https://dataforgood.fb.com/tools/movement-range-maps/>. The administrative regions are comparable to counties in the United States.

### B. *Independent Survey Evidence*

The Household Pulse Survey provides independent support to our labor supply story. One question in the survey (EMP4) asks respondents why they did not work for pay or profit in the last seven days. The respondents can select only one answer from 12 potential reasons including “I did not want to be employed at this time,” “I was concerned about getting or spreading the coronavirus,” “My employer closed temporarily due to the coronavirus pandemic,” and “My employer went out of business due to the coronavirus pandemic.” We find that the predicted probability of reporting Covid-19 concerns as the reason for not working is the highest for Asian Americans compared to all other racial groups, directly supporting our story that Asian Americans’ high aversion to Covid-19 infection risk impacts their labor market outcomes relative to other racial and ethnic groups. This finding is robust when we control for income, age, kids, week and state fixed effects. The online appendix shows the detailed analysis. Overall, this result lends further support to the narrative that Covid-19 risk beliefs are directly related to labor provision decisions, and moreover, this pattern of risk aversion being translated into lower labor force participation is much higher for Asian American workers than workers in other racial groups.

### C. *A Competing Story of Racial Discrimination*

So far, we have documented the empirical finding that Asian Americans’ mobility declines significantly more than that of other racial and ethnic groups during the pandemic. This finding might be caused by Asian Americans’ fear of being the subject of harassment or violence, because the Covid-19 pandemic fueled racism and violence against Asian Americans in the United States. We explore this alternative explanation using Safegraph’s data, which also provide the information on the destination CBG of a trip. If Asian Americans reduced trips to certain locations out of fear for racial discrimination, then we would expect the decline in mobility to be the greatest to destinations with fewer Asian residents. We find the opposite: rather than avoiding No-Asian areas, the residents of High-Asian CBGs reduced their trips to other High-Asian CBGs (25%) more than their trips to Low-Asian CBGs (21%) and No-Asian CBGs (10%). Of course, these findings do not rule out the existence of labor-market racial discrimination against Asian Americans, nor that the spectre of hate crimes could cause mobility reductions, but they do show that avoiding racial discrimination is not the most important factor behind Asian Americans’ reduced mobility that we have observed during the pandemic.<sup>19</sup>

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<sup>19</sup>Honore and Hu (2020) use implicit bias estimates to control for potentially discriminatory attitudes and find this possible factor does not drive higher unemployment among Asian Americans.

#### **IV. Conclusion**

Using aggregated anonymous cellphone mobility data from SafeGraph, we illustrate that areas with a higher Asian population exhibit a significantly larger decline in mobility after the onset of the Covid-19 pandemic. Much of this decline comes from reduced non-work mobility, which suggests that this relatively larger voluntary reduction among Asian Americans reflects their higher aversions to Covid-19 infection risk. Measures of work mobility for both full-time and part-time work also show larger declines in areas with a larger share of Asian Americans during the pandemic. Our analysis demonstrates these shifts in behavior are robust to controls for local pandemic policy, demographic characteristics and employment, among other factors. Our qualitative results are supported with international data as well, further suggesting that Asians' aversions to Covid-19 infection risk could be a factor that helps account for the observed heterogeneity in mobility choices. Being more averse to Covid infection risk than other racial and ethnic groups, Asian Americans potentially have a higher selectivity for job offers and experience a higher unemployment rate during the pandemic. This labor supply story might help explain the poor labor-market outcomes of Asian Americans during the pandemic.

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## Appendix

### A. Device Count Sampling Correction

When using device counts from SafeGraph, we need to address two concerns. The first concern is that the number of devices sampled varies over time. To address this, we use a scale factor  $\frac{\bar{D}}{D_t}$  to adjust the total sample size to its average,  $\bar{D}$ . The second concern is that the sample weights of certain CBGs may not correspond well with their weights in the national population due to data granularity. To address this, we adjust the device counts of individual CBGs by a factor of  $W_j^P / W_{t,j}^S$ , where  $W_j^P$  is CBG  $j$ 's proportion of the total US population and  $W_{t,j}^S$  is its proportion of a given sample in SafeGraph's data. Therefore, for CBG  $j$  at time  $t$ , the adjusted device count,  $\tilde{D}_{t,j}$ , is given by

$$(1) \quad \tilde{D}_{t,j} = D_{t,j} \frac{\bar{D}}{D_t} \frac{W_j^P}{W_{t,j}^S}.$$

It's worth noting that these adjustments do not affect the key variables used, which are all proportions of devices in an area exhibiting a certain behavior, since the adjustment would be applied to both the numerator and denominator of the variable.

### B. Points of Interest

As mentioned in the main body of the paper, the Weekly Patterns dataset collected by SafeGraph includes data on specific Points Of Interest (such as individual stores). By leveraging this dataset, we can examine whether the decline in mobility among Asian residents affects traffic to various types of businesses evenly. If risk aversion is the driving force behind the reduction in mobility, we would anticipate a more significant decrease in trips to non-essential, high-contact businesses (e.g., restaurants) compared to essential, low-contact businesses (e.g., grocery stores).

To test this hypothesis, we compare the results of two types of businesses—restaurants and grocery stores, presented in Table A.1. The coefficient of the share of Asian population is insignificant for traffic to grocery stores, but it's significantly negative for traffic to restaurants. This suggests that Asian Americans substantially reduce traffic to non-essential, contact-intensive restaurants relative to non-Hispanic Whites, reinforcing the theory that the decline in Asian mobility is driven by risk aversion. Additionally, the table reveals that other minority groups, such as Blacks and Hispanics, significantly increase traffic to both restaurants and grocery stores relative to non-Hispanic Whites.

### C. Reasons for Not Working: Evidence from Household Pulse Surveys

Household opinion polls indicate the link between labor market participation and Covid risk attitudes. The Census Bureau conducts the Household Pulse Survey on a weekly basis, which asks individuals who have not worked for pay or profit in the past seven days to choose a reason for their inactivity. Since June 4, 2020, the survey has included a question on whether the individual was concerned about contracting or spreading the coronavirus, which we used to create a binary indicator variable. We then used logistic models to predict the likelihood of reporting Covid-19 concerns as the reason for not working, broken down by different racial groups. The predicted probabilities

Table A.1: Summary statistics of CBGs by Asian population

	(1) Grocery Stores	(2) Restaurants
Asian%	0.02 (0.01)	-0.10 (0.02)
Black%	0.16 (0.01)	0.16 (0.01)
Hispanic%	0.08 (0.01)	0.07 (0.01)
Other%	0.04 (0.01)	0.06 (0.01)
Observations	14286425	14806889

Notes: Mobility data come from SafeGraph, and demographic data come from SafeGraph OpenCensus data and the American Community Survey (ACS). Regressions presented are of the form  $y_{it} - \bar{y}_i = \beta A_i + \gamma X_i + \phi_{J(i)t} + \varepsilon_{it}$ , where  $i$  corresponds to the origin census block group and where  $J(i)$  is the county in which CBG  $i$  is located.  $y_{it}$  is the number of visitors to points of interest—grocery stores or restaurants—from CBG  $i$ . Standard errors are clustered by county and reported in parentheses.

reported in Table A.2 are positive and statistically significant for Asian survey respondents, suggesting that Asian Americans are more likely to reduce labor force participation due to pandemic concerns than non-Hispanic White survey respondents. The validity of this outcome persists even after controlling for income, age, week, and state fixed effects. It’s worth mentioning that, compared to non-Hispanic Whites, other minority groups are also inclined to express apprehension about contracting Covid-19 as the primary reason for not working. However, this trend is less pronounced than it is for Asian Americans.

Table A.2: Probability of stating concern with getting Covid-19 as reason for not working

	(1)	(2)	(3)	(4)	(5)
Asian	0.031 (0.002)	0.019 (0.002)	0.019 (0.002)	0.017 (0.002)	0.017 (0.002)
Black	0.022 (0.001)	0.013 (0.002)	0.013 (0.002)	0.013 (0.002)	0.013 (0.002)
Hispanic	0.031 (0.002)	0.017 (0.002)	0.018 (0.002)	0.016 (0.002)	0.016 (0.002)
Other	0.016 (0.002)	0.006 (0.002)	0.007 (0.002)	0.006 (0.002)	0.007 (0.002)
Income & Age	No	Yes	Yes	Yes	Yes
Week FEs	No	No	Yes	No	Yes
State FEs	No	No	No	Yes	Yes
Observations	1371245	1371245	1371245	1371245	1371245

Notes: The sample period is from June 4, 2020 to December 19, 2022. We exclude the initial period during April 23, 2020 and June 3, 2020 when there was not an option to select “I was concerned about getting or spreading the coronavirus” as their response. Standard errors are in parentheses.