



The labor market impact of Covid-19 on Asian Americans

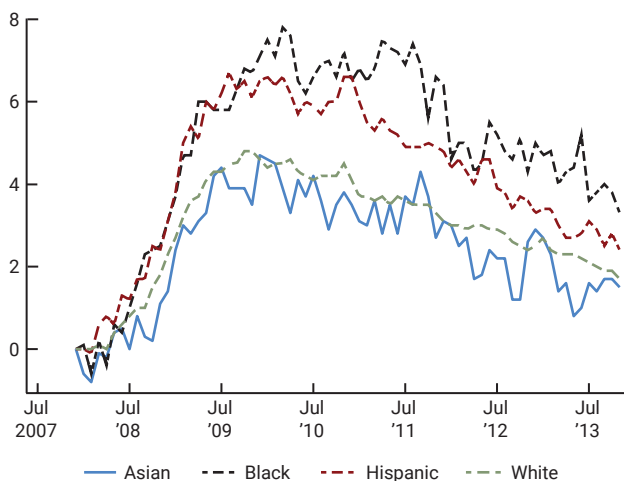
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Introduction and summary

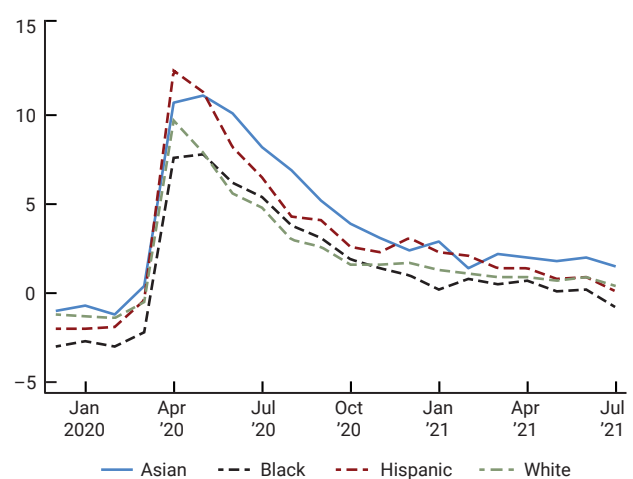
In terms of employment, Asian Americans fared better than other racial and ethnic groups during the Great Recession and its aftermath, whereas the reverse was observed during the pandemic recession and its immediate aftermath. As shown in panel A of figure 1, the gap in the unemployment rate—that is, 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 [National Bureau of Economic Research](#), or NBER). However, the opposite was true during the coronavirus-driven recession (which concluded in April 2020 according to the NBER) and its wake. Panel B of figure 1 illustrates that the unemployment gap during the pandemic was significantly higher and more persistent among Asian Americans than among other groups (with their gap only being exceeded briefly by that of Hispanic Americans in April, May, and December of 2020 and in February of 2021).¹ 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?

1. The gap in the unemployment rate by racial and ethnic group

A. Great Recession (January 2008–June 2009) and aftermath
percentage points



B. Covid-19 recession (March–April 2020) and aftermath
percentage points



Notes: The depicted gaps in both panels are the gaps in the unemployment rate (seasonally adjusted) 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, as determined by the National Bureau of Economic Research. The base month is December 2007 for the Great Recession and February 2020 for the Covid-19 recession.

Source: Authors' calculations based on data from the U.S. Bureau of Labor Statistics.

The existing literature has generally explored labor demand stories for why Asian Americans were not 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 with a high school diploma or less educational attainment working in the service sector, which was harder hit than most by the pandemic. Honoré and Hu (2021) 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 Americans were more cautious about potentially becoming infected with the Covid-19 virus, which resulted in higher selectivity in jobs taken and a higher unemployment rate. This explanation is consistent with the fact that Asian Americans had a lower infection rate and a higher vaccine take-up rate than other groups. According to the U.S. Centers for Disease Control and Prevention (CDC), the Covid-19 infection rate of Asian Americans was 20% lower than that of White Americans, while other racial and ethnic groups exhibited higher infection rates than White Americans.² Furthermore, CDC data show that the vaccine take-up rate was the fastest and highest among Asian Americans.³

We empirically investigate the labor supply explanation for Asian Americans' labor market outcomes during the pandemic. If Asian Americans were indeed more averse to Covid-19 infection risk than other racial and ethnic groups in pandemic times, then we would expect a greater reduction in their physical mobility. Thus, we examine changes in mobility from the pre-pandemic period to the pandemic period by race and ethnicity using [SafeGraph](#) data. Although individual-level mobility data are not available, we explore mobility by variations in the racial/ethnic composition across census block groups (CBGs).⁴ We find that CBGs with a higher proportion of Asian Americans experienced a significant decline in both work- and nonwork-related mobility compared with other CBGs. Though the larger decline in work-related mobility could be attributed to both labor supply and demand factors, the larger reduction in nonwork mobility suggests Asian Americans had a greater aversion to Covid infection risk during the pandemic, supporting a labor-supply-side explanation for their labor market outcomes.

Our data come from SafeGraph, a data provider that aggregates location data from various mobile phone applications. Specifically, we use SafeGraph's Social Distancing data set, which provides 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 nonwork 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 [Open Census Data](#), which are sourced from the U.S. Census Bureau's 2016 [American Community Survey](#) (ACS) and provide 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 impacted mobility across CBGs with varying shares of Asian Americans, using regression analysis. We consider overall mobility and mobility for work or nonwork 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 were heterogeneous across counties and over time. We estimate the average effect of the pandemic on Asian Americans' mobility relative to other racial and ethnic groups' mobility, as well as the dynamic impact by month.

Our results suggest that Asian Americans reduced their physical mobility more than the general population during the pandemic. This is supported by significant drops in mobility in areas with higher proportions of Asian residents.⁵ Specifically, mobility decreased by a 0.17 percentage points per 1% increase in the Asian American population during the pandemic. Notably, the reduction in nonwork-related mobility accounts for about 75% of the overall decline in Asian Americans' mobility. Mobility associated with work activities also declined more in CBGs with a higher concentration of Asian Americans. When examining monthly variations in the pandemic's impact on mobility, we observe a sharp initial decline in Asian Americans' mobility, which persisted throughout the summer of 2020. Although there was a mild recovery from the lowest point in

May 2020, mobility remained significantly lower than pre-pandemic levels. This drop in mobility was primarily driven by large declines in nonwork-related mobility and part-time work mobility.

We conducted three additional analyses to support our argument. First, we found similar reduced mobility patterns in areas with higher proportions of Asian residents in Canada, Brazil, and the United Kingdom, using [Facebook's Data for Good Movement Range Maps](#), to provide international evidence. Second, using the [Household Pulse Survey](#) conducted by the U.S. Census Bureau in collaboration with multiple federal agencies, we found empirical support for our labor supply argument. The survey asked respondents why they did not work for pay or profit in the last seven days, and Asian Americans reported Covid-19 concerns more frequently than any other group, validating the impact of their aversion to Covid infection risk on their labor market outcomes. Finally, despite the documented rise in hate crimes against Asian Americans in the United States, we found that the potential for racist harassment and violence did not significantly contribute to the reduction in Asian Americans' physical mobility. Asian Americans reduced their trips to neighborhoods with a high proportion 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 racial and ethnic groups is applicable to contact-intensive workers, but not to teleworkers. It is well known that education is the key determinant of the capacity to telework. Honoré and Hu (2021) find that Asian Americans with high school diplomas or less had 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 did not. They find that controlling for industry accounts for roughly half of the decrease in probability for those with a high school diploma or less. Because this is the same subgroup that was less likely to be able to find an opportunity to work remotely, a higher aversion to Covid infection risk might have been a contributing factor to the remaining variation.

This article 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.⁶ Using the *Current Population Survey*, sponsored jointly by the U.S. Census Bureau and the U.S. Bureau of Labor Statistics (BLS), Honoré and Hu (2021) find that Asian Americans without a college education were disproportionately affected by job losses compared with other racial and ethnic 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, Couch, and Xu (2020) attribute the persistent Asian–White unemployment gap during the pandemic to geographical distribution.

The second strand of the literature studies how Covid-19 risk perception differs by demographic characteristics. Using online surveys, Fan, Orhun, and Turjeman (2020) find that female and Democratic respondents were less Covid 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 reported 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 were 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 explained most of the decline in activity, while stay-at-home policies were only associated with a modest 5–10% decline in activity, as documented in the literature review by Gupta, Simon, and Wing (2020).⁷ These studies largely find that physical mobility started declining before the policies were enacted, suggesting that individuals' voluntary decisions drove the large decline.

The rest of the article is organized as follows. In the next section, we describe the data. Then, we present the regression analyses we conducted to illustrate our empirical findings. Following that, we explain our robustness checks on the main empirical results. Finally, we present our conclusions.

Data

In this section, we describe two main data sources for our analyses. First, we cover the physical mobility data, which come from SafeGraph, at CBG-level observations. Second, we discuss the demographic data at the CBG level, which come from SafeGraph's Open Census Data. We then present novel facts that show areas with higher shares of Asian American residents experienced a larger decline of physical mobility during the Covid-19 pandemic.

Mobility and demographic data

SafeGraph is a data company that aggregates anonymous location data from numerous cellphone 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.⁸ We utilize two data sets from SafeGraph: Social Distancing and Open Census Data.

SafeGraph created the Social Distancing data set after the pandemic's onset to provide real-time data about social distancing patterns in response to the pandemic. The data set compiles mobility metrics for devices assigned to a CBG as the home location at 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.⁹ 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.¹⁰ 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 *nonwork 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 work away (full-time or part-time) or nonwork away and then aggregate these data into a monthly frequency to gauge the amount of work-related and nonwork-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.¹¹ 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.¹² 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 for oversampling and undersampling across different census block groups (for details, see the appendix).

We incorporate various demographic variables, such as race/ethnicity, sex, age, income, occupation, and employment, at the census block group level using SafeGraph's Open Census Data that are derived from the five-year estimates of the 2016 *American Community Survey*.

Stylized facts

We now present motivating facts about the physical 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 their Asian American population: no-Asian (0%), low-Asian (greater than 0%, but 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% of them are Black. The three types of CBGs do not differ in the percentage of Hispanic households (14%).¹³

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 family households with children (28%), and the ratio of adults to children (1:3.6). However, they do differ substantially according to other demographic dimensions, which are presented in the upper half of figure 2. The high-Asian CBGs have the lowest share of elderly residents (those aged 65 and older); they also have the highest proportion of married households, the lowest rate of people employed in essential industries,¹⁴ the highest (pre-Covid) employment rate, the highest share of the population with a bachelor's degree or more, and the highest median household income among all three CBG categories. In the next section, we will explore how these demographic variables had an impact on mobility during the pandemic.

We next examine the median statistics of physical mobility in the pre-Covid and Covid periods for the three categories of CBGs by Asian population share using the Social Distancing data set. The pre-Covid period is from January 1, 2019, through March 13, 2020, and the Covid period is from March 14, 2020, through September 30, 2020.¹⁵ The bottom half of figure 2 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 was 5 percentage points in the low-Asian CBGs, and it was only 1 percentage point in the no-Asian CBGs.

Similarly, the share of devices that displayed part-time or full-time work behavior fell in all CBGs during the pandemic, but the decline was the largest in the high-Asian CBGs. For example, 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 did go out, median nonhome dwell time fell for all CBGs, but again the decline by 97 minutes in the high-Asian CBGs was the most significant drop among the three groups. In contrast, the median nonhome dwell time decreased by 62 minutes in the low-Asian CBGs and by 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 physical mobility declined more during the pandemic for CBGs with a greater share of Asian American residents. However, it is still necessary to control for the potential influence of covariates, such as income and educational attainment, which also vary by category. There were other factors, such as state, county, or city policies, that could have been conceivably at work and should also be accounted for. Additionally, the trends we observe may be the products of our fairly arbitrary no-Asian, low-Asian, and high-Asian group definitions; therefore, we want to analyze the percentage of Asian American residents as a continuous variable. We address these concerns in the following section.

2. Summary statistics of census block groups by Asian population

	No Asian		Low Asian		High Asian	
Demographics						
Share of population 65 years and older	0.17 (0.10)		0.15 (0.10)		0.13 (0.08)	
Share of married households	0.45 (0.19)		0.49 (0.19)		0.52 (0.19)	
Share of essential workers among population	0.13 (0.06)		0.12 (0.05)		0.10 (0.05)	
Share of employed in working-age population	0.54 (0.13)		0.59 (0.12)		0.60 (0.11)	
Share of population with bachelor's degree or more	0.26 (0.22)		0.35 (0.21)		0.45 (0.26)	
Median household income, in thousands	45 (24.7)		60 (39.3)		75 (42.2)	
Mobility	Pre-Covid	Covid	Pre-Covid	Covid	Pre-Covid	Covid
Percentage of devices staying at home	29.41 (10.77)	30.51 (11.60)	28.57 (10.10)	33.77 (11.57)	27.88 (9.96)	40.62 (13.02)
Percentage of devices away for part-time work	8.33 (5.63)	5.88 (4.50)	9.02 (5.55)	5.56 (4.12)	9.33 (5.79)	4.55 (3.98)
Percentage of devices away for full-time work	4.14 (4.50)	3.12 (3.14)	4.48 (4.61)	2.95 (2.93)	4.76 (4.73)	2.86 (3.13)
Nonhome dwell time (minutes)	95.00 (97.39)	64.00 (83.60)	107.00 (99.05)	45.00 (90.72)	115.00 (98.51)	18.00 (93.69)
Observations (millions)	42.4	17.2	47.9	19.5	5.6	2.3

Notes: Mobility data come from SafeGraph's Social Distancing data set, and demographic data come from SafeGraph's Open Census Data and the U.S. Census Bureau's 2016 *American Community Survey*. No-Asian census block groups are those with 0% reported Asian American residents in the ACS. Low-Asian census block groups have greater than 0%, but less than or equal to 20%, Asian American populations. And finally, high-Asian census block groups have greater than 20% Asian American populations. The home location for a given device is its typical overnight location. The working-age population is the population aged 15–64. The pre-Covid period is from January 1, 2019, through March 13, 2020, and the Covid period is from March 14, 2020, through September 30, 2020.

Sources: Authors' calculations based on data from SafeGraph and the U.S. Census Bureau.

Empirical analysis

We now use regression analysis to examine how Asian Americans responded to the Covid-19 pandemic differently than other racial and ethnic groups did in terms of physical 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 nonwork 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 American residents experienced a larger decline in mobility during the pandemic. This evidence suggests that Asian Americans had a higher risk aversion to Covid-19 infection than other racial and ethnic groups in the pandemic period.

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 2020.¹⁶ 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 American 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. Note that ε_{it} is the error term associated with the observation of CBG i at time t .

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 or Hispanic or belongs to another minority group or is multiracial; the percentage of the population that has no high school diploma, some college experience, or a bachelor's degree or more; 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 with a high school diploma as the highest level of educational attainment is the omitted group and is, therefore, treated as the base group.

We are most interested in coefficient β , which captures the relationship between an origin (or home) CBG's Asian American 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 Asian residents reduced their mobility more than non-Hispanic White residents, then we would expect this coefficient to be negative.

Our estimates are within county-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 γ , which characterizes the impact of our controls—other demographic factors—on mobility reduction.

The first column of data in figure 3 reports coefficients and corresponding standard errors of the baseline 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 was associated with a 0.17% decline in the share of devices that were away during the pandemic, relative to an additional 1% of non-Hispanic White residents. That is, the predicted decline in mobility was 17 percentage points larger in an all-Asian CBG than an all-non-Hispanic-White CBG during the pandemic. Meanwhile, areas with an additional 1% of Black or Hispanic residents exhibited a relative decrease in mobility of 0.01%.

It is also worth noting that several demographic factors had a large influence on mobility during the pandemic. CBGs with higher median household income and larger populations saw a significantly larger decline in residents traveling outside the home area. Not surprisingly, an additional 1% of elderly residents reduced such outgoing traffic by 0.05%. By contrast, a higher share of employed people, particularly essential workers,

3. Covid-19 impact on mobility

	Away	Nonwork away	Work away	Full-time work	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(household income)	-4.07 (0.12)	-2.31 (0.09)	-1.76 (0.10)	-0.75 (0.05)	-1.01 (0.05)
Log(population)	-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)
Aged 65 and older (%)	-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 worker (%)	0.05 (0.01)	0.06 (0.00)	-0.01 (0.00)	-0.01 (0.00)	0.00 (0.00)
Homes with children (%)	-0.05 (0.00)	0.01 (0.00)	-0.06 (0.00)	-0.04 (0.00)	-0.03 (0.00)
No high school diploma (%)	0.02 (0.00)	0.00 (0.00)	0.02 (0.00)	0.01 (0.00)	0.01 (0.00)
Some college (%)	-0.00 (0.00)	-0.01 (0.00)	0.01 (0.00)	0.01 (0.00)	0.00 (0.00)
Bachelor's degree or higher (%)	-0.07 (0.00)	-0.05 (0.00)	-0.02 (0.00)	-0.00 (0.00)	-0.02 (0.00)
Observations	4,403,754	4,403,754	4,403,754	4,403,754	4,403,754
Adjusted R^2	0.721	0.591	0.742	0.665	0.749

Notes: The regressions presented are of the form $y_{it} - \bar{y}_i = \beta A_i + \gamma X_i + \delta_{c(i)t} + \varepsilon_{it}$, where i corresponds to the origin census block group and where $c(i)$ is the county in which census block group i is located. See the text for further details on this equation (equation 1 in the text). The instances of -0.00 are the result of rounding to the hundredth place for those negative values. Standard errors are clustered by county and reported in parentheses.

Sources: Authors' calculations based on data from SafeGraph and the U.S. Census Bureau.

among the working-age population (that is, those aged 15–64 years old) raised outgoing mobility during the pandemic. Specifically, for every additional 1% of the population employed in essential industries, the share of devices that were not completely at home rose by 0.05% in the pandemic. The CBGs with an additional 1% of family households with children also showed a statistically significant decrease in mobility of 0.05% during the pandemic, possibly because of school closures.

Educational attainment also mattered for the mobility impact of the pandemic, which was 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 was positive for the population without a high school diploma (or equivalent) and close to neutral for the population with some college experience, relative to those whose highest educational attainment was a high school diploma.

We now analyze the reduction of physical mobility associated with work-related and nonwork-related activities during the pandemic. We are interested in seeing whether CBGs with more Asians had a larger decline in work-related or nonwork-related mobility, similar to overall mobility, during the pandemic. To do this, we change the measure of mobility y_{it} in equation 1 from the share of devices that are away from CBG i to four alternative measures: 1) the percentage of devices in CBG i that exhibited nonwork-away behavior, 2) the percentage of devices in CBG i that exhibited work behavior, 3) the percentage of devices in CBG i that exhibited full-time work behavior, and 4) the percentage of devices in CBG i that exhibited part-time work behavior. The second through fifth columns of data in figure 3 report these results.

Two key empirical patterns stand out for Asian Americans' physical mobility during the pandemic. First, CBGs with more Asian residents saw substantially larger mobility declines in both nonwork-related and work-related activities than other CBGs during the pandemic. Relative to an all-non-Hispanic-White CBG, nonwork-related activities would be reduced by an *additional* 13 percentage points in an all-Asian CBG, while they would only be decreased by 2 or 3 more percentage points in an all-Black or all-Hispanic CBG. During the pandemic, work-related activities in an all-Asian CBG would drop by 3 percentage points more than an all-non-Hispanic-White CBG. In contrast, an all-Black CBG or an all-Hispanic CBG would see a slight increase in 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 would decline significantly more in an all-Asian CBG than in all-non-Hispanic-White, all-Black, and all-Hispanic CBGs. Part-time work displayed a stronger pattern across CBGs of different racial and ethnic groups: For instance, it would decrease by 3 percentage points more in an all-Asian CBG than in an all-non-Hispanic-White CBG. This result aligns with the summary statistics in figure 2; work-related mobility declined more sharply in the high-Asian CBGs than in the low-Asian and no-Asian CBGs.

Several demographic factors played an important role in changes in work- and nonwork-related physical mobility during the pandemic. CBGs with higher household income, educational attainment, and elderly population shares displayed a larger reduction in mobility during the pandemic, when measured for either work-related or nonwork-related behavior. Interestingly, an increase in the share of family households with children, one of our control variables, raised the pandemic mobility for nonwork behavior, but lowered the pandemic mobility for work behavior. This lends some support to the anecdotal story that the increased burden of childcare on parents kept them out of the workplace.

The finding that Asian Americans reduced nonwork-related physical 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 Americans reduced visits to a nonessential location with higher infection risk (for example, a restaurant) more than visits to an essential business with lower infection risk (for example, a grocery store). Using SafeGraph's data on the points of interest, we assess the changes in traffic to either restaurants or grocery stores from the pre-pandemic to pandemic periods across CBGs as in equation 1. We find that the coefficient β 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 (the full results are reported in figure A1 of the appendix).¹⁷ These findings provide additional support that Asian Americans had a higher risk aversion to Covid infection risk than other racial and ethnic groups during the pandemic.

Time-varying impacts of Covid-19 on Asian Americans

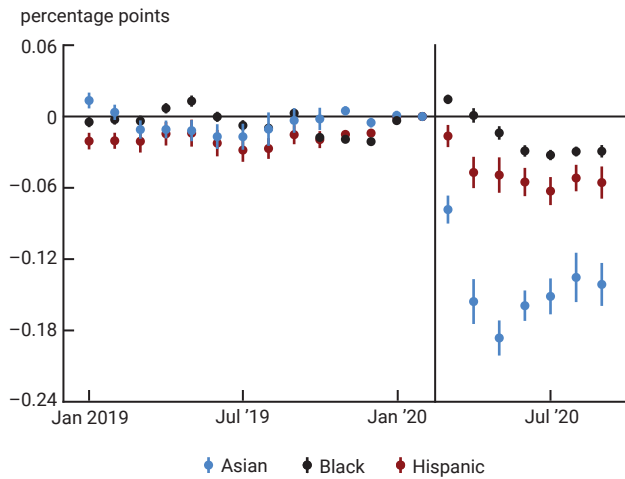
In the previous subsection, we estimated the average impact of Covid on the physical mobility of Asian Americans. We now examine the dynamics of this impact over the pandemic months in our sample. Specifically, we run the following cross-sectional regressions for different measures of mobility and each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

$$2) \quad y_{it} - y_{i_{t_0}} = \alpha_t + \beta_t A_i + \gamma_t X_i + \delta_{c(i)} + \varepsilon_{it},$$

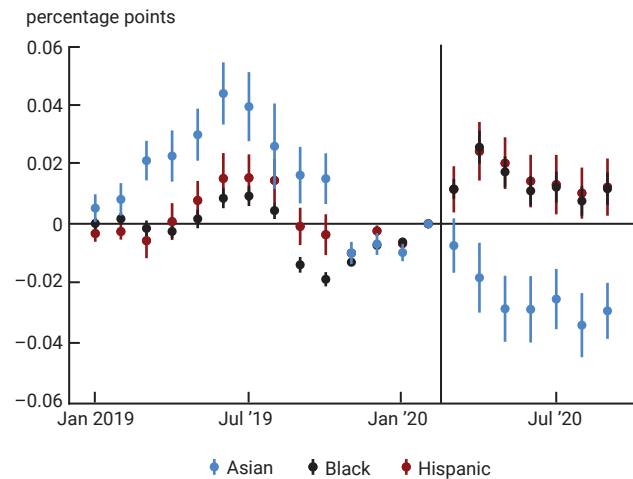
where the base month t_0 is February 2020. The movements in coefficient β_t illustrate how Asian American residents' mobility changes relative to that of non-Hispanic White residents before the pandemic and during

4. Dynamic impact of Covid-19 on nonwork-away and work behavior

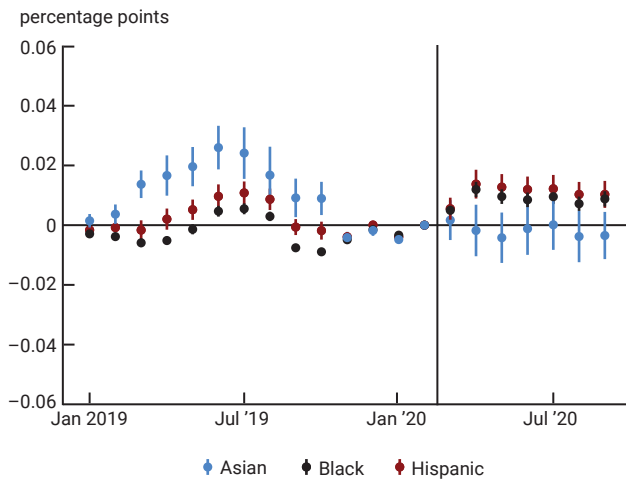
A. Nonwork-away behavior



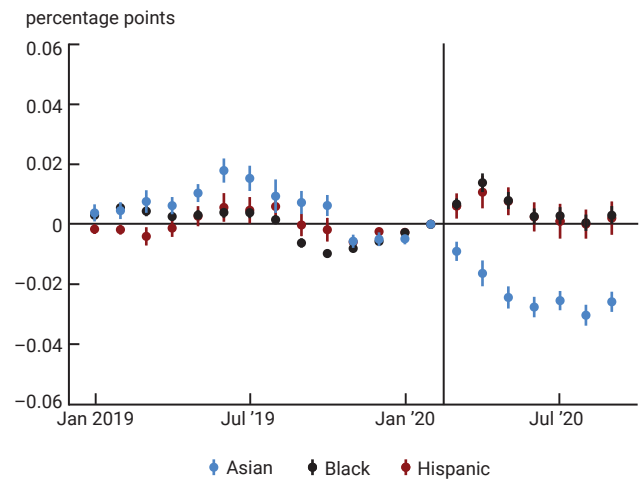
B. Work behavior



C. Full-time work behavior



D. Part-time work behavior



Notes: The regressions presented are of the form $y_{it} - y_{i_{t_0}} = \alpha_t + \beta_t A_i + \gamma_t X_i + \delta_{c(i)} + \varepsilon_{it}$, where i corresponds to the origin census block group and where $c(i)$ is the county in which CBG i is located, t is time, and t_0 (the base month) is February 2020. Note that 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 in the panels for ease of comparison. See the text for further details on this equation (equation 2 in the text). The blue dots represent point estimates of β_t from the regression, the predicted effects of having a 1% larger proportion of Asian residents on the total mobility in that CBG. The lines running through the dots are confidence intervals on the point estimates. Note the included subscript t implies that now we are letting the effects of A_i be time varying. The same applies to the control variables.

Sources: Authors' calculations based on data from SafeGraph and the U.S. Census Bureau.

the pandemic. For the ease of comparison, we also add the coefficients of other racial and ethnic groups, all relative to the non-Hispanic White group. The term α_i and the coefficients of other demographic variables γ_i also vary over time to capture the time-varying impact of other co-determinants of mobility. We include county fixed effects, $\delta_{c(i)}$, again implying our estimates are *within* county and not driven by any government policy from the county or state. Note that ε_{it} is once again an observation-specific error term.

Panel A of figure 4 plots the dynamic impact of Covid-19 on nonwork-related mobility measured by the percentage of devices that are nonwork away. Prior to the pandemic, Asian Americans' nonwork-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.

Asian Americans experienced a substantially larger decline in nonwork-away mobility than other groups. In response to the pandemic, the mobility of an all-Asian CBG would decline by as much as 20% in May 2020 and remain significantly lower than that of an all-Hispanic or all-Black CBG throughout the sample. An all-Hispanic CBG would experience a drop in mobility of at most 6%, while an all-Black CBG would 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 panel B of figure 4. 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 that of White Americans, while Hispanic and Black Americans' work-related mobility rose relative to that of White Americans. The relative decline in Asian Americans' work-related mobility is smaller than the relative decline in their nonwork-related mobility, with the largest predicted drop being 4% in August 2020. Panels C and D of figure 4 make it clear that this decline was driven by a decline in part-time work.

Further evidence

In this section, we present additional evidence to support our claim that Covid-19 infection risk aversion among Asian Americans led to their labor supply reductions. We first explore if similar physical mobility patterns in the United States appear in other countries among their localities with more Asian residents. Thus far we have been agnostic as to what would cause Asian Americans to have a greater aversion to infection risk. We do not have enough evidence to conclude a cultural basis of this risk aversion (nor is claiming this one of the goals of this article); however, our findings in a small sample of other countries align with what one would expect if that were a cause. We also link Asian Americans' coronavirus fears to labor supply decisions more explicitly with household survey data. Then we round out this section by showing that patterns in reduced mobility among Asian Americans during the pandemic relative to pre-Covid times were not consistent with this having been driven by fears of racist harassment or physical attacks.

International evidence

If Asian Americans on average have a higher degree of aversion to Covid-19 infection risk for some broad cultural reasons, we would expect to see Asians reducing their physical 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, through 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 2020.¹⁸ 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

5. International comparison of change in mobility and Asian resident concentration

	United States Δ in movement	Canada Δ in movement	Brazil Δ in movement	United Kingdom Δ in movement
Asian share (%)	-0.91 (0.008)	-0.51 (0.019)	-1.06 (0.026)	-0.87 (5.630)
Observations	918,968	71,984	597,182	1,548
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. See the text for further details on the comparison.

Source: Authors' calculations based on data from Meta, Facebook, Data for Good.

across regions, similar to equation 1. For the purposes of comparison, we also include the United States in this analysis using this alternative data source of mobility. The results in figure 5 show that in each of these countries, regions with a larger Asian concentration show a larger decline in mobility, supporting our main findings.

Independent survey evidence

The *Household Pulse Survey* provides independent support to our labor supply story. One question in the survey (that is, question 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 the following options:

- “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 with all other racial and ethnic groups, directly supporting our story that Asian Americans' high aversion to Covid-19 infection risk impacted their labor market outcomes relative to those of other racial and ethnic groups. This finding is robust when we control for income, age, week fixed effects, and state fixed effects. The appendix (specifically, figure A2) shows the detailed analysis. Overall, these results lend further support to the narrative that Covid-19 risk beliefs were directly related to labor provision decisions. Moreover, the results suggest that this pattern of risk aversion translating into lower labor force participation was much stronger among Asian American workers than workers in other racial and ethnic groups during the pandemic.

A competing story of racial discrimination

So far, we have documented the empirical finding that Asian Americans' physical mobility declined 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 physical attacks, because the Covid-19 pandemic fueled racism and violence against Asian Americans in the United States. We explore this alternative explanation using SafeGraph's Social Distancing data, which also provide the information on the destination CBG of a trip. If Asian Americans reduced trips to certain locations out of fear of racial discrimination and violence,

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 specter of hate crimes might have caused mobility reductions, but they do show that avoiding racial discrimination was not the most important factor behind Asian Americans' reduced mobility that was observed during the pandemic.¹⁹

Conclusion

Using aggregated anonymous cellphone mobility data from SafeGraph, we illustrate that areas with more Asian Americans exhibited larger declines in physical mobility after the onset of the Covid-19 pandemic. The declines mainly came from reductions in nonwork-related mobility, reflecting Asian Americans' higher aversion to Covid-19 infection risk. Measures of work-related mobility for both full-time and part-time work also showed 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' aversion to Covid infection risk might have been a factor that helps account for the observed heterogeneity in mobility choices among different racial and ethnic groups. Being more averse to Covid infection risk than other racial and ethnic groups, Asian Americans potentially had a higher selectivity for job offers and experienced a higher unemployment rate during pandemic times. This labor supply story helps explain the poor labor market outcomes of Asian Americans during the pandemic.

Notes

- ¹ The share of the unemployed who have been out of work for 27 weeks or more (that is, the long-term unemployed) also increased the most for Asian Americans, going from 21% in the fourth quarter of 2019 to 46% in the fourth quarter of 2020 (Bennett, 2021).
- ² See this [page in the CDC archive](#) for Covid cases data through April 19, 2023.
- ³ For more details, see Ndugga et al. (2022).
- ⁴ A census block group is a statistical division of a census tract with between 600 and 3,000 people. Further details on CBGs are [available online](#).
- ⁵ In this article, we will sometimes use "Asian" as shorthand for "Asian American" when discussing the data and our results in a U.S. context.
- ⁶ A subset of such studies includes Alon et al. (2020), Borjas and Cassidy (2020), Dingel and Neiman (2020), Fairlie, Couch, and Xu (2020), Gezici and Ozay (2020), Hean and Chairassamee (forthcoming), Kim et al. (2021), and Montenegro et al. (2022).
- ⁷ Previous studies that use SafeGraph data to examine the various impacts of stay-at-home policies and other factors are as follows: Allcott et al. (2020), Andersen (2021), Cronin and Evans (2020), Dave et al. (2020), Goolsbee and Syverson (2021), and Wang et al. (2021).
- ⁸ For SafeGraph's definitions of places, see this [online guide](#).
- ⁹ SafeGraph determines the common nighttime location of each mobile device over a six-week period as the home location. SafeGraph defines the "devices completely at home" measure as a device that has not left its assigned 153 meters by 153 meters "residence" (roughly the size of a city block). For further details, see this [SafeGraph page](#).
- ¹⁰ 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.
- ¹¹ See SafeGraph's [online guide to its foot traffic data](#).
- ¹² For a more detailed discussion of some of these biases, see Coston et al. (2021).

- ¹³ For each of our three categories of CBGs, the “residual” percentage consists of other minority (not identifying as solely Asian, Black, or Hispanic) populations as well as households where the householder is of two or more races/ethnicities (the householder is normally a person in whose name the residence is owned, being purchased, or rented).
- ¹⁴ Essential workers were classified based on common employment occupation groupings from government announcements. The occupations categorized as essential included health care practitioners or related occupations, protective service occupations, and production, transportation, and material moving occupations.
- ¹⁵ The demarcation of the two periods is based on the U.S. President’s declaration of a national emergency concerning Covid-19, which was [issued](#) on March 13, 2020.
- ¹⁶ Previously we noted that the pre-Covid period is from January 1, 2019, through March 13, 2020, and the Covid period is from March 14, 2020, through September 30, 2020. However, when the daily data are aggregated at a monthly frequency, the month of March 2020 is entirely part of the pandemic period.
- ¹⁷ We use SafeGraph’s Weekly Patterns data set (which is now maintained by Advan Research Corporation, LLC) for this analysis.
- ¹⁸ These data are [available online](#). The administrative regions are comparable to counties in the United States.
- ¹⁹ Honoré and Hu (2021) use implicit bias estimates to control for potentially discriminatory attitudes and find this possible factor does not drive higher unemployment among Asian Americans.

APPENDIX

Here in the appendix, we provide additional methodological details of our research, as well as extensions of our analysis. First, we document how we correct for undersampling or oversampling of devices in the SafeGraph data we use. Then, we provide an analysis of physical mobility to essential businesses (grocery stores) and nonessential businesses (restaurants). Finally, we provide a regression analysis of survey results, specifically the likelihood of someone reporting they are not working because they are concerned about being infected by the Covid-19 virus or spreading it.

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 because of data granularity. To address this, we adjust the device counts of individual CBGs by a factor of $\frac{W_i^P}{W_{t,i}^S}$, where W_i^P is CBG i ’s proportion of the total U.S. population and $W_{t,i}^S$ is its proportion of a given sample in SafeGraph’s data. Therefore, for CBG i at time t , the adjusted device count, $\tilde{D}_{t,i}$, is given by

$$A1) \quad \tilde{D}_{t,i} = D_{t,i} \frac{\bar{D}}{D_t} \frac{W_i^P}{W_{t,i}^S}.$$

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.

Points of interest

As mentioned in the main body of the article, the Weekly Patterns data set collected by SafeGraph (though it is now maintained by Advan Research Corporation, LLC) includes data on specific points of interest (such

A1. Summary statistics of racial and ethnic groups' change in traffic to two business types after the onset of the Covid-19 pandemic

	Grocery stores	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	14,286,425	14,806,889

Notes: The mobility data come from SafeGraph's Weekly Patterns data (now maintained by Advan Research Corporation, LLC), and the demographic data come from SafeGraph's Open Census Data and American Community Survey. The regressions presented are of the form $y_{it} - \bar{y}_i = \beta A_i + \gamma X_i + \delta_{c(i)t} + \varepsilon_{it}$, where i corresponds to the origin census block group and where $c(i)$ is the county in which CBG i is located. Note that 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. For further details, see the associated text in this appendix.

Sources: Authors' calculations based on data from SafeGraph and the U.S. Census Bureau.

as individual stores). By using this data set, we can examine whether the decline in mobility among Asian American residents affected traffic to various types of businesses during the pandemic evenly. If Covid-19 infection risk aversion was the driving force behind the reduction in mobility, we would anticipate a more significant decrease in trips to nonessential, high-contact businesses (such as restaurants) compared with essential, low-contact businesses (such as grocery stores).

To test this hypothesis, we compare the change in traffic by racial and ethnic group to two types of businesses—restaurants and grocery stores—after the onset of the pandemic, presented in figure A1. 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 reduced traffic to nonessential, contact-intensive restaurants relative to non-Hispanic White Americans, reinforcing the theory that the decline in Asian mobility was driven by Covid infection risk aversion. Additionally, figure A1 reveals that other minority groups, such as Black and Hispanic Americans, significantly increased traffic to both restaurants and grocery stores relative to non-Hispanic White Americans during the pandemic.

Reasons for not working: Evidence from the Household Pulse Survey

Household opinion polls indicate the link between labor market participation and Covid risk attitudes. The U.S. Census Bureau, in collaboration with multiple federal agencies, conducts the *Household Pulse Survey* on a weekly basis. This survey asks individuals who have not worked for pay or profit in the past seven days to choose a reason for their inactivity. From June 4, 2020, through the end of our sample period, the survey included the respondent being concerned about contracting or spreading the coronavirus as an option for answering this question, 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 and ethnic groups. The predicted probabilities reported in figure A2 are positive and statistically significant for Asian survey respondents, suggesting that they are more likely to reduce labor force participation because of pandemic concerns than non-Hispanic White survey respondents. The validity of this outcome persists even after controlling for income, age, week fixed effects, and state fixed effects. It's worth mentioning that compared with the non-Hispanic White group, other racial and ethnic 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.

A2. Probability of stating concern with getting or spreading 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 and age	No	Yes	Yes	Yes	Yes
Week fixed effects	No	No	Yes	No	Yes
State fixed effects	No	No	No	Yes	Yes
Observations	1,371,245	1,371,245	1,371,245	1,371,245	1,371,245

Notes: The *Household Pulse Survey* sample period used here is from June 4, 2020, through December 19, 2022. We exclude the initial period between 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 a survey response. Note that the different numbered columns represent the regression being run with different sets of control variables and fixed effects, which are detailed in the three bottom rows above the final row (for the number of observations). Standard errors are in parentheses.

Source: Authors’ calculations based on data from the U.S. Census Bureau.

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