The Effects of the Coronavirus on Hours of Work in Small Businesses

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1. Introduction and Summary

The onset of the Covid-19 pandemic has led to a dramatic reduction in employment and hours worked in the US economy. The decline can be measured using conventional data sources such as the Current Population Survey and in the number of individuals filing for unemployment. However, given the unprecedented pace of the ongoing changes to labor market conditions, detailed, up-to-date, high-frequency data on wages, employment, and hours of work is needed. Such data can provide insights into how firms and workers have been affected by the pandemic so far, and how those effects differ by type of firm and worker wage level. It can also be used to detail – in real time – the state of the labor market.

In this report, we study hours and employment patterns in 2020, focusing on hourly workers in small businesses. Our analysis is based upon data provided by Homebase[2], a company which provides scheduling and timesheet software to a large number of small businesses in North America. Our main findings concern the experience of a set of firms that were operating in the last 2 weeks of January. We present results for the U.S. as well as for Connecticut, New York, and New Jersey, three states that were especially hard-hit in the early stages of the pandemic. Our report builds upon and covers some of the same ground as reports by Bartik et al (2020)[3] who also use the Homebase data.

Our five key findings are that:

- *Average hours fell dramatically in March.* They started to recover in mid-April but were still*, as of July 11, 29.5% below their value in late January.*

[1] We are very grateful to Homebase for making the data available for this research and thank Ray Sandza and Andrew Vogeley at Homebase for assisting us in understanding the data. We also thank Alex Bartik and Jesse Rothstein for sharing insights about the data and David Wilkinson for facilitating the project and helpful discussions We are grateful to the Tobin Center for Economic Policy at Yale University for funding. Mistakes and opinions are our responsibility.

[2] https://joinhomebase.com/

[3] Bartik, A., Bertrand, M, Ling, F., Rothstein J., & Unrath, M. (2020) https://www.chicagobooth.edu/research/rustandy/blog/2020/labor-market-impacts-from-covid19

- *The hours decline was more severe in New Jersey, Connecticut and New York, three of the states hit hardest by Covid-19 in the early stages of the pandemic. While New Jersey and Connecticut have caught up to the rest of the U.S. in this measure, hours remain lower in New York.*
- *Hours fell in all industries, but especially for those working in leisure and entertainment, beauty and personal care, and food and drink.*
- *Reductions in the number of firms in operation and in the number of employees accounted for most of the hours reductions. Changes in hours worked by continuing employees are secondary.*
- *Reductions in hours and employment were larger for workers with lower wages.*
- *States with larger increases in Covid-19 cases in June and July are experiencing a second wave of declines in hours and employment.*

2. Data and Methods

2.a The Homebase Data.

Homebase is a company that provides software which can be used by businesses to schedule and record the hours worked by their employees. They provide this service to over 80,000 firms, with almost 2 million employees in the US. Homebase have made anonymized versions of their data available to researchers interested in studying the pandemic's ongoing impact.

The timeliness of the data makes it particularly valuable for studying a rapidly changing labor market. Homebase provides daily updates of the data to researchers. The data in this report covers the period up to July 11th.

A feature of the data that is worth emphasizing, however, is that it is not representative of US firms or employees. The businesses that use the software are mostly small; the employees are hourly-paid and are largely drawn from the bottom half of the wage distribution. This data set is therefore complementary to data sets such as the annual County Business Patterns data and the monthly Current Population Survey. These are less frequent and only available to researchers after a delay but are representative of the US population of businesses and individuals respectively.

2.b Methods.

We present a series of graphs showing weekly data on employment, hours per employee, and whether a firm was operating during the week. We typically use the two weeks starting in the third or fourth Sunday of January as the baseline period, and report results relative to this baseline. In 2020, the baseline is January 19 until February 1. We present results both from the perspective of firms and from the perspective of employees. For all graphs we also show the results for 2019 using the same methodology. Further details are included in a Methodological Appendix.

3. Trends in Employment and Hours

Bartik et al. (2020)[4] were the first external researchers to work with the Homebase data, and they continue to provide regular updates of their valuable analyses. As a first step, we replicate some of their results. Our focus, however, differs from theirs. We look at how business closures (and re-openings) and reductions (and increases) in hours worked differ by size of the firm and the wage of the employee. Additionally, we have a particular focus on the tri-state area, the part of the country which was initially most affected by the pandemic. We also provide an explicit comparison of these results to 2019 to help isolate the effect of Covid-19.

3a. *Average hours fell dramatically in March and started to recover in mid to late April.*

We start by documenting the dramatic impact of Covid-19 on average hours worked. Figure 1 displays the trends in average weekly hours at the firm level relative to the last two weeks in January. Dashed lines for the same period in 2019 are provided as a comparison.[5] It is important to keep in mind that the analysis in Figure 1, and most of the subsequent figures, is based on a sample of firms that were operating during the base period. New firms that open are not included. The grey line shows the time trend of average hours relative to the baseline for the United States as a whole. Weekly hours are flat until the week of March 1-7. They start to drop in the week of March 8-14, and then plummet. Hours worked for employees in the Homebase data during March 22-28 are 60% lower than the baseline value. They flatten out, and then begin to recover during the week of April 19-25, rising to a net reduction of around 30% of the baseline hours in July 5-11, the last week of our data. No decline is evident in 2019, indicating that the dramatic decline after the first week of March in 2020 is due to effects related to Covid-19. It is important to note that these effects can be explained by several factors.
While state-ordered restrictions certainly play a large role, there are is also certain to be non-mandated decreases in business activity in a time of uncertainty around public health, safety, and individuals' economic conditions.[6]

[4] https://www.chicagobooth.edu/research/rustandy/blog/2020/labor-market-impacts-from-covid19

[5] In this graph we show only how the mean number of hours has evolved. For week by week estimates of the entire distribution of hours, see Figure 1 in Bartik et al. (2020). https://www.chicagobooth.edu/research/rustandy/blog/2020/week-7-labor-market-impacts-from-covid19

[6] For more details, please check the work by Goolsbee, Austan, and Chad Syverson. *Fear, Lockdown, and Diversion: Comparing Drivers of Pandemic Economic Decline 2020*. No. w27432. National Bureau of Economic Research, 2020.

Figure 1: Changes in hours worked by firms, US and tri-state area

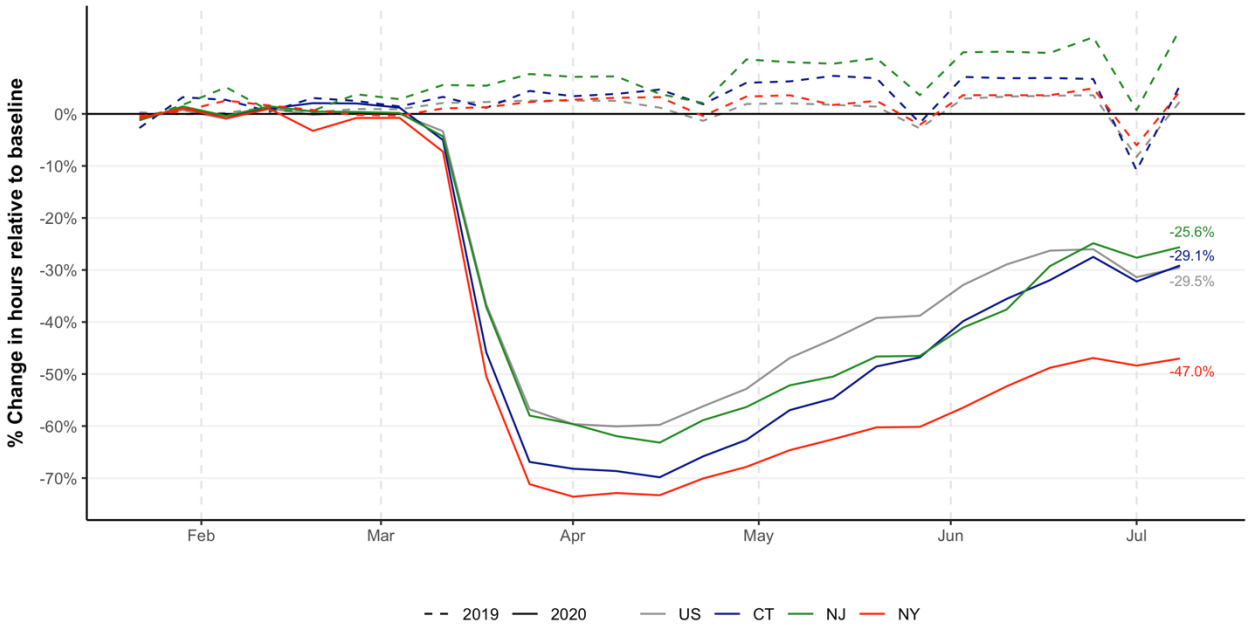
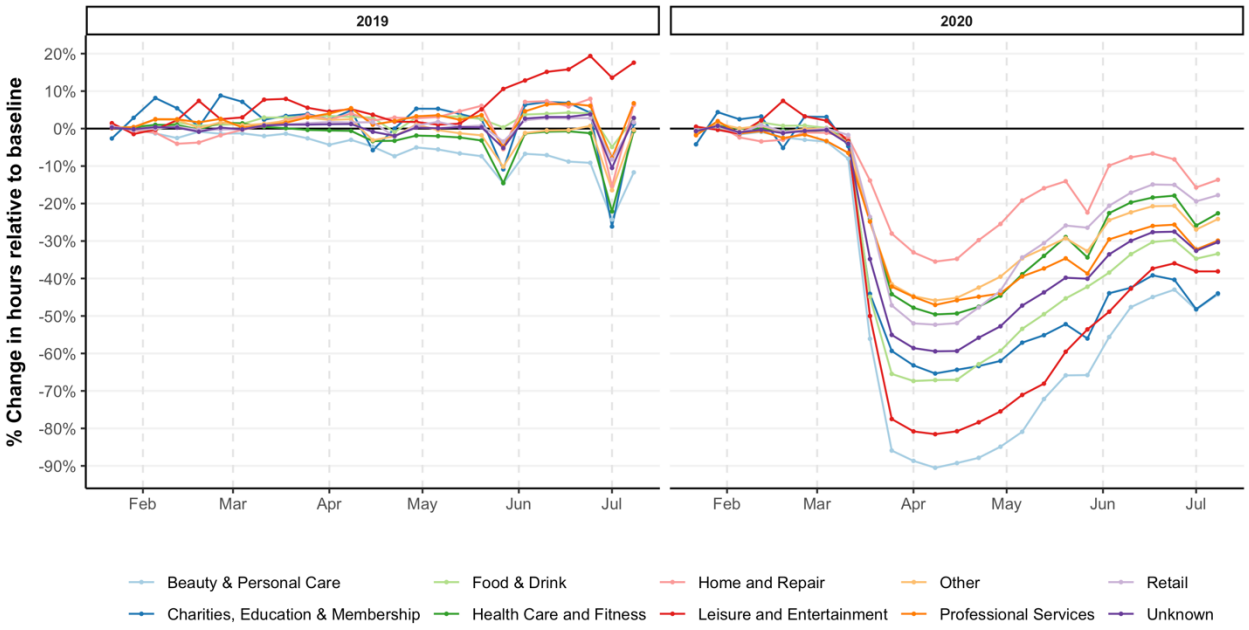


Figure 1 also shows the path of average hours relative to the baseline in Connecticut (blue), New Jersey (green) and New York (red). All three states resemble the national pattern. However, work hours in New York and Connecticut were especially hard-hit, and the recovery in New York has been slower. The differences probably reflect the differences in the number of Covid-19 cases and in the actions by government, firms, and individuals to reduce social contact. The paths of hours are very similar when we reweight firms in each state to match the industrial composition of the jobs represented in Homebase for the US as a whole.

3b: *Hours fell in all industries, but especially in leisure and entertainment, beauty and personal care, food and drink.*

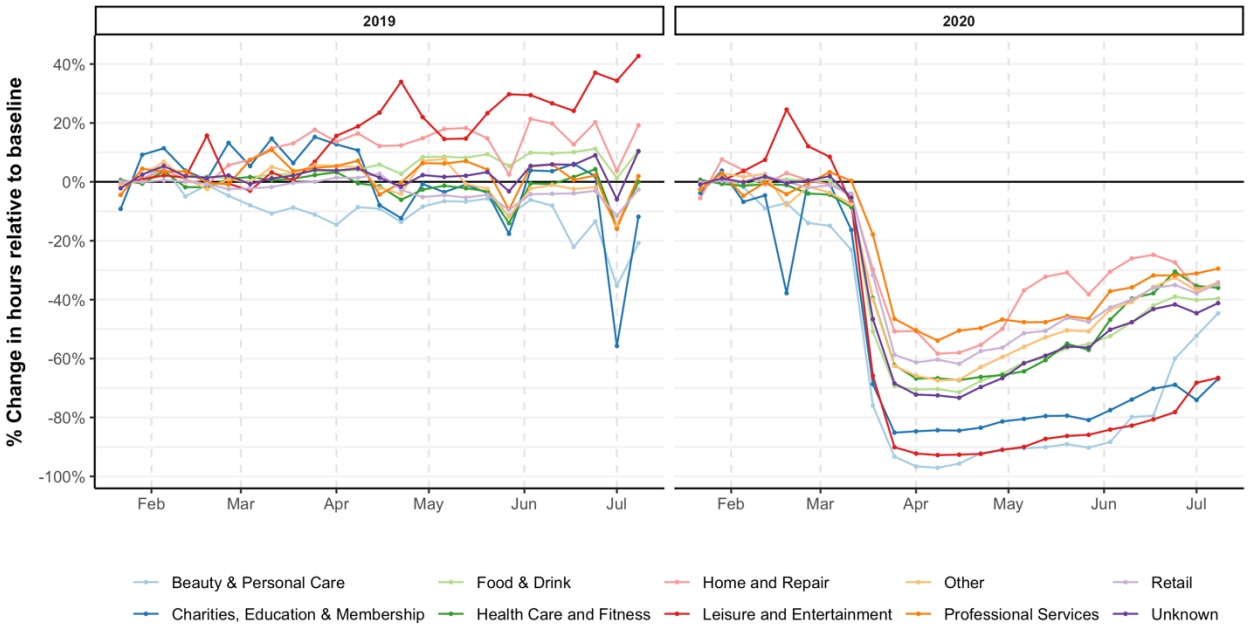
The Homebase data provides a broad classification of the industry to which each firm belongs. Figure 2 displays the path of hours relative to the late January base period, by industry. We display results both for 2019 and for 2020. Hours are relatively flat in all industries in 2019 over the weeks we consider, in sharp contrast to the 2020 experience. The largest declines are among firms in the 'beauty and personal care' industry, where hours in the first week of April were 90% lower than in the base period, and then began to recover. In the first week of July, hours in beauty and personal care were still 45% lower than in the baseline. Hours in bars and restaurants ('food and drink'), the industry which accounts for the largest share of employees in the Homebase data, fell by almost 60% relative to the baseline period and have partially recovered to a level approximately 35% below their baseline level.

Figure 2: Comparing changes in hours worked by industry, 2019-2020



The results for the tri-state area in Figure 3 show a similar pattern but are more extreme. Hours in beauty and personal care and in leisure and entertainment fall to close to zero by the beginning of April. They were still close to -90% in early June, which may be due in part to more cautious policies governing re-opening in NY, NJ, and CT given the severity of the Covid-19 outbreak in those states. Beauty and personal care recovered quickly to -45% from mid-June to early July, likely reflecting policies allowing salons to reopen in these states, while leisure and entertainment has been slower to recover.

Figure 3: Comparing changes in hours worked by industry (Tri-state), 2019-2020



3c. *Reductions in the number of firms in operation and in the number of employees account for most of the hours reductions. Changes in hours worked by continuing employees are secondary.*

Total hours of work can fall for a number of reasons. It could be that firms are shutting down. It could be that firms, while they are continuing to operate, are laying off some of their employees. Or it could that firms, while they are retaining their employees, are offering them fewer hours of work. In Figure 4 we decompose the mean hours reduction shown in Figure 1 into these three channels.

Figure 4 shows results for the US as a whole and Figure 5 is for Connecticut, New Jersey, and New York. None of the three components changed much until March 1-7. In the following week, there was a sharp drop in the number of employees who are working (dark blue bar) as well in hours per worker (green) and a more modest reduction coming from a fall in the number of firms that are operating (light blue). In subsequent weeks, the contribution of hours per worker declined. Reductions in the number of employees at work and in the number of firms operating became dominant. The pattern suggests that at the start of the crisis firms remained open but reduced both hours per worker and the number of employees with positive hours during the week. As time went on, firms that continued to operate reduced the number of employees but not hours, and additional firms closed altogether. The partial recovery of hours since mid-April was driven primarily by an increase in the number of firms operating. The recovery continued in May-July, again mainly due to an increase in the number of firms operating and as well as a higher number of employees working.

Figure 4: Decomposing change in firms' operating hours, 2019-2020

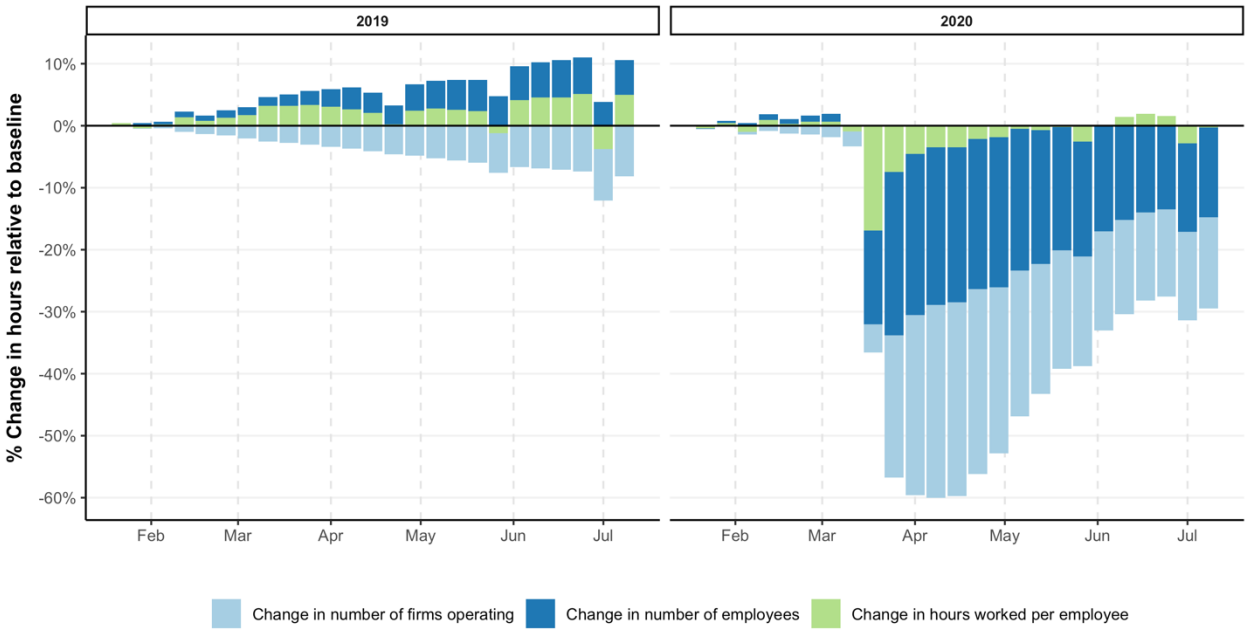
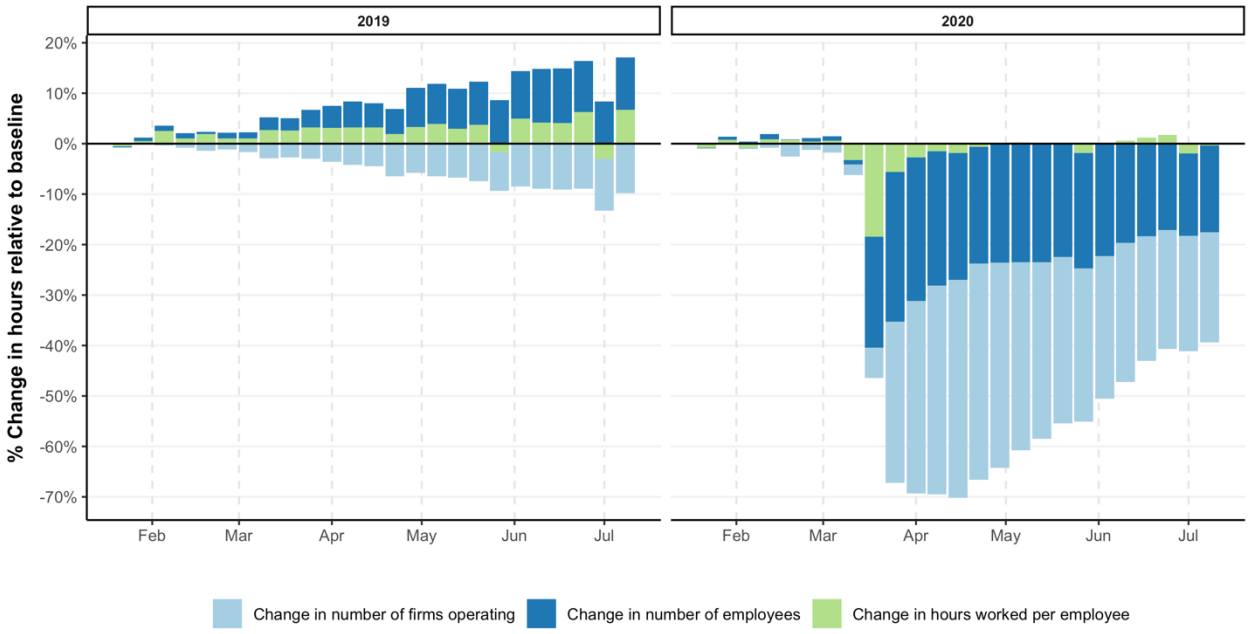


Figure 5: Decomposing change in firms' operating hours (Tri-state), 2019-2020

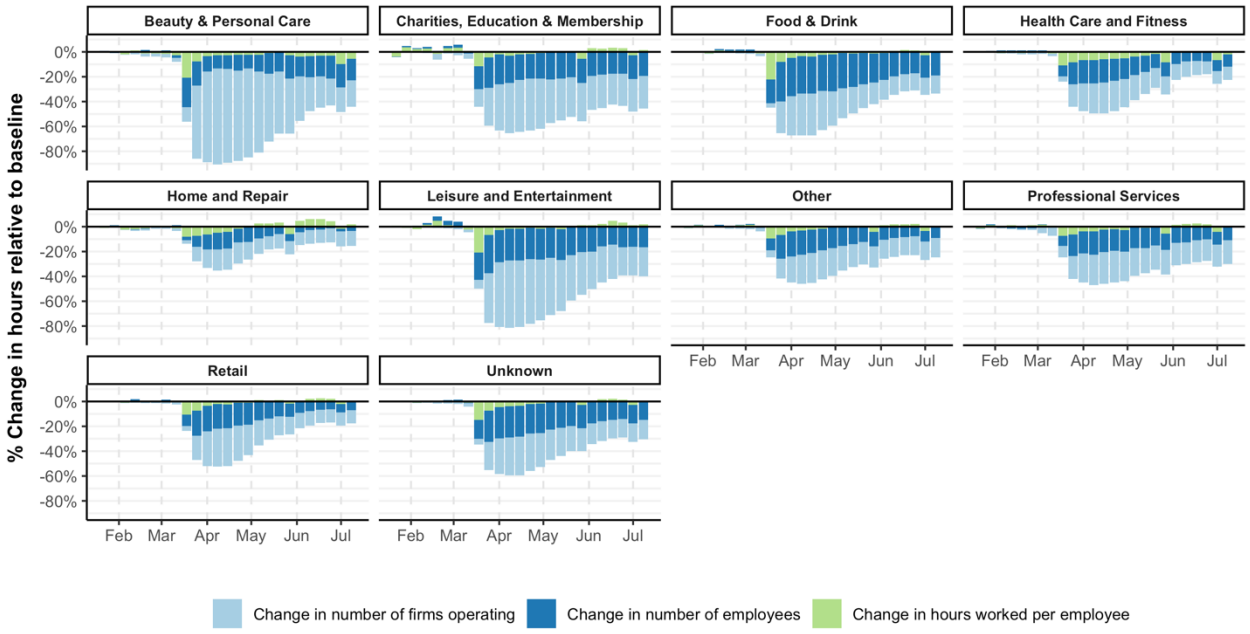


The figure includes an equivalent decomposition for 2019 as a comparison. Overall hours changed little between late January and the first week of July in 2019, but this is a net result of three factors: a decline in the number of firms observed operating in a given week, an increase in hours per employee, and an increase in the number of employees among firms that continued to operate. The pattern for 2018 is very similar to the pattern for 2019 (not shown). Thus, if we consider the profiles for 2019 as a good estimate of what might have happened to the firms in Homebase in the absence of Covid-19, the figure for 2020 *overstates* the degree to which Covid 19 led to a reduction in hours through firm closings.[7] By the same token, the figure *understates* the extent to which Covid-19 reduced hours through reductions in the number of employees and reductions in hours per employee. We can conclude that the largest contribution to the fall in hours is through reduced employment in firms which continue to operate, followed by firm closings.

The decompositions differ by industry (Figure 6). In beauty and personal care, the decline in hours is driven almost entirely by the drop in the number of firms that are operating. This is true to a lesser extent for leisure and entertainment. In other industries, including retail and food and drink, a decline in the number of employees with positive hours in each week also plays an important role.

[7] That is, some of the firms that we see closing in 2020 would likely have closed (or stopped using Homebase) even in the absence of the emergence of Covid-19.

Figure 6: Decomposing change in firms' operating hours, by industry



3d. Hours declined slightly more for small firms, mostly because of firm closures.

Figure 7 displays the trend in hours worked per firm relative to the base period in the last two weeks of January. The trend is shown for five firm size quintiles. Because the firm size distribution differs across industries, we defined the quintiles separately for each industry. Each quintile groups firms according to their number of employees in the base period. The first quintile contains the smallest 20% of firms in each industry, with an average number of employees of 2.7. The average number of employees is 4.8 for the second quintile, 7.1 for the third, 10.4 for the fourth, and 25.1 for the fifth. The left side of the figure displays the paths for 2019 and the right side shows the paths for 2020. In 2020 hours dropped dramatically relative to baseline for all five quintiles and then started to recover in mid-April. Differences across the quintiles are modest.

The fact that there is little difference between mean hours worked in firms of different sizes is due to two offsetting effects. Smaller firms were substantially more likely to shut down than were larger firms (shown in Figure 8).[8] Larger firms that stayed open, on the other hand, were substantially more likely to reduce their number of employees (shown in Figure 9). The first of these effects pushed hours down for smaller firms. The second pushed them down for larger firms. The net effect is that, as documented in Figure 7, there is little difference between average hours reductions between firms of different sizes in our sample. We observe a slight decline in firms operating and hours worked from mid-June to early July. The levels of employment and hours in early July 2020 are still much lower than those at the same point in 2019.

[8] The results for 2019 indicate that in normal times smaller firms are less likely to continue operating. In 2020, the decline was much larger for firms in the first and second quintiles than for firms in the fifth quintile. The disparity by firm size is much larger in 2020 than in 2019, suggesting that Covid-19 had a larger effect on small firms.

Figure 7: Firms' reductions in operating hours, 2019-2020

By firm size quintiles

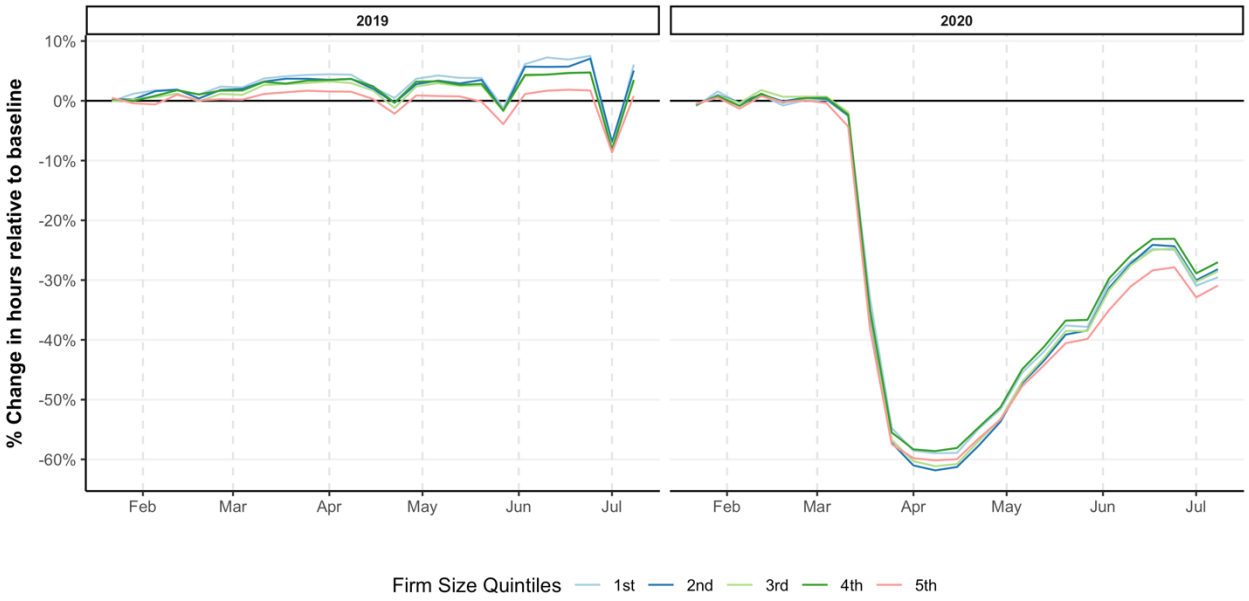


Figure 8: Probability of firm operation, 2019-2020

By firm size quintiles

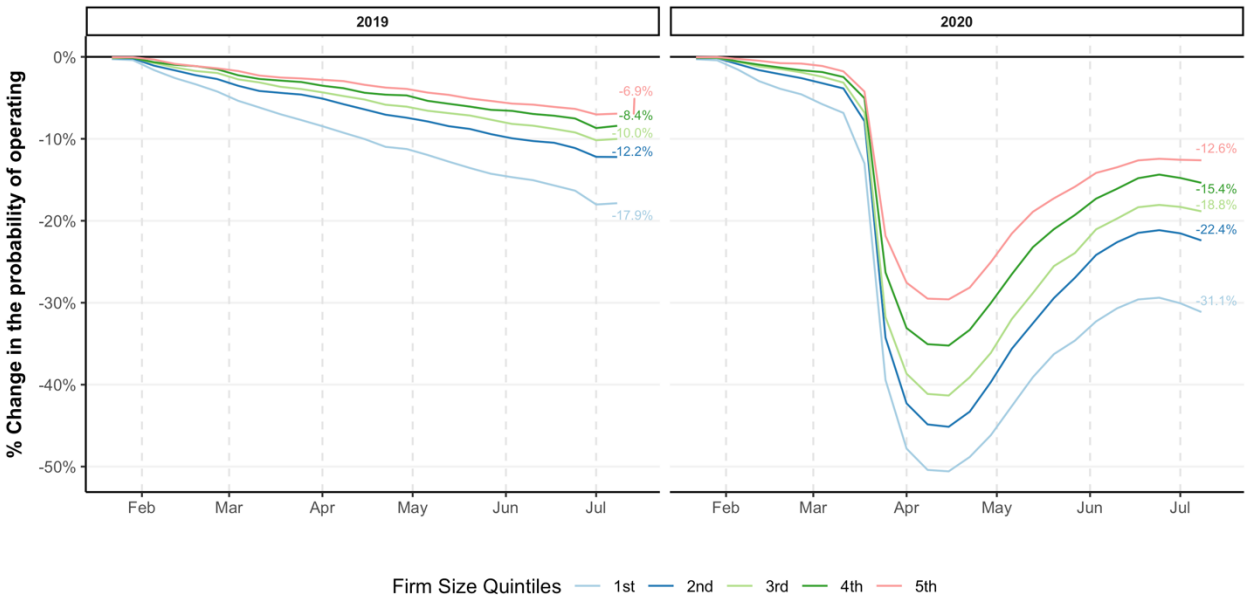
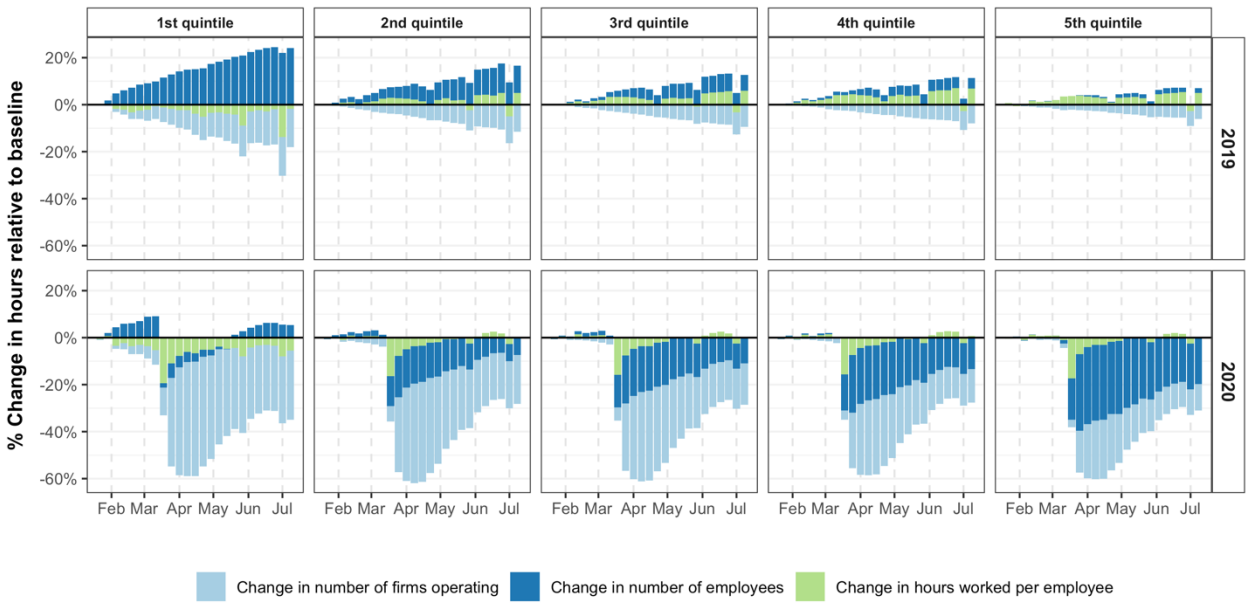


Figure 9: Decomposing change in firms' operating hours, 2019-2020

By firm size quintiles



3e. Reductions in hours and employment were larger for workers with lower wages.

The economic effects of the pandemic have differed across the wage distribution. To quantify the extent of this difference, we divide the employees in the Homebase data into groups based on the wage they earn in the baseline period. To do this, we use the Current Population Survey to divide the hourly earning distribution of each state into five quintiles of workers. Those in the first quintile are among the 20% of employees in their state with the lowest hourly earnings. Those in the fifth income quintile are among the top 20% hourly earners of employees in their state. Those in the second, third, and fourth quintiles are in intermediate groups with successively higher hourly earnings.

We then assign each employee in the Homebase data set to a wage quintile based on the wage they earned in the baseline period. As the employees in this data are mostly drawn from those towards the bottom of the wage distribution, we show results only for those in the first, second and third wage quintiles.[9] Most of workers are in the first quintile (62.3%), while 33.2% are in the second quintile and 4.5% in the third. The mean hourly wage for the workers in our sample is $9.38 for the first quintile, $14.27 for the second quintile, and $20.03 for the third quintile.

Figures 10 and 11 show trends in the number of hours worked by wage quintile and in the worker's probability of employment, respectively. Both graphs show, for comparison, similar profiles for 2019. It is important to emphasize one difference in the 2019 wage quintile graphs relative to those shown in the previous graphs. All preceding graphs show the path of average hours recorded by a fixed sample of firms (those operating in Homebase in our baseline period). Here, as we are focusing on an attribute of individual workers (their wage), we use a fixed sample of *employees* (those working for a firm in

[9] By excluding those in the top two quintiles, we omit 1% of the sample

Homebase in our baseline period). As a result, we see a sharp decline in hours worked for each quintile in 2019, our comparison year, due to employees leaving their jobs. Given the strong economy in 2019, most of these employees likely left for another firm (not observed in the Homebase data and so not in our sample). They were probably replaced by new employees (observed in the Homebase data but not in our sample as they were not working in the baseline period). This usual turnover must be kept in mind in evaluating the size of the declines in hours in 2020.

Figure 10: Change in hours worked in base period firm by CPS wage quintile, 2019-2020



The graphs show a clear pattern by wage quintile. Those with the lowest earnings were most likely to leave employment and exhibited the greatest falls in hours worked. Fewer of those in the highest wage group left employment. However, the recovery in employment and hours worked was quicker for those with the lowest wages until mid-June. Since mid-June, however, this trend has not continued, and differences between wage quintiles have remained constant. The decline in hours worked for all groups beginning in mid-June could be explained either by state changes in reopening policies as some states experience surges in Covid-19 cases or by the same natural trend of worker turnover observed in 2019.

Figure 11: Probability of employment in base period firm by CPS wage quintile, 2019-2020



3f. States with larger increases in Covid-19 cases in June and July are experiencing a second wave of declines in hours and employment.

Some states, such as New York, New Jersey, and Connecticut, experienced large outbreaks of Covid-19 as early as mid-late March and thus imposed restrictions on businesses early on. However, other states were not hit as hard in this first stage, but are now experiencing outbreaks of their own. To examine the differential trends in hours and employment among states that are experiencing surges of cases in late June and early July, we divide firms in the Homebase data based on how quickly cases of Covid-19 are rising (or falling) in their states. To compare states, we compute the change in new weekly cases from the week ending June 13 to the week ending July 11. We group states into those where: i. weekly new cases decreased ("Decreasing"), ii. weekly new cases increased by less than 250 percent ("Increasing"), and iii. weekly new cases increased by more than 250 percent ("Increasing Fast"). Of all states, 11 states, corresponding to 12.7% of observations, show a decrease in the number of new cases, while 29 states are experiencing an increase in the number of weekly cases (58.7% of our sample) and 11 states are categorized as having a fast increases in the number of cases (28.6% of our sample).

Figures 12 and 13 show trends in hours and employment for firms in states classified in these three groups. We emphasize that we do not claim any causal relationship between trends in business activity and Covid-19 cases. Rather, we present results broken out by Covid-19 case trends to assess how states with different trends in cases behave during the second-wave surges in late June and early July. States where Covid-19 cases are currently increasing more also experienced lesser declines in hours and employment in March and April. This could have occurred for several reasons. These states may not have had as-severe outbreaks in these months and thus may not have needed to impose restrictions on businesses to the same extent that states with early, severe outbreaks did. Now that these states are experiencing surges in cases, they are experiencing declines in hours and employment whereas states

with declining numbers of cases are experiencing increases in hours and employment. Note that there is a small drop in hours in the week ending July 4 due to a federal holiday.

Figure 12: Firms' reductions in operating hours, 2019-2020

By COVID Case Trends (state level), July 11th

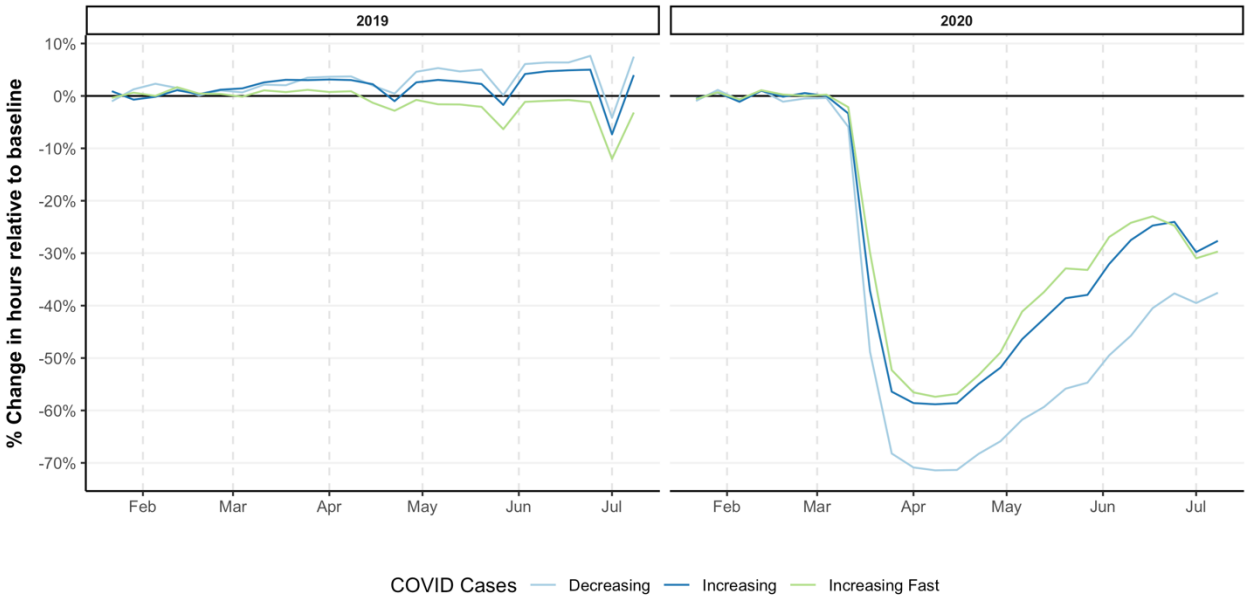
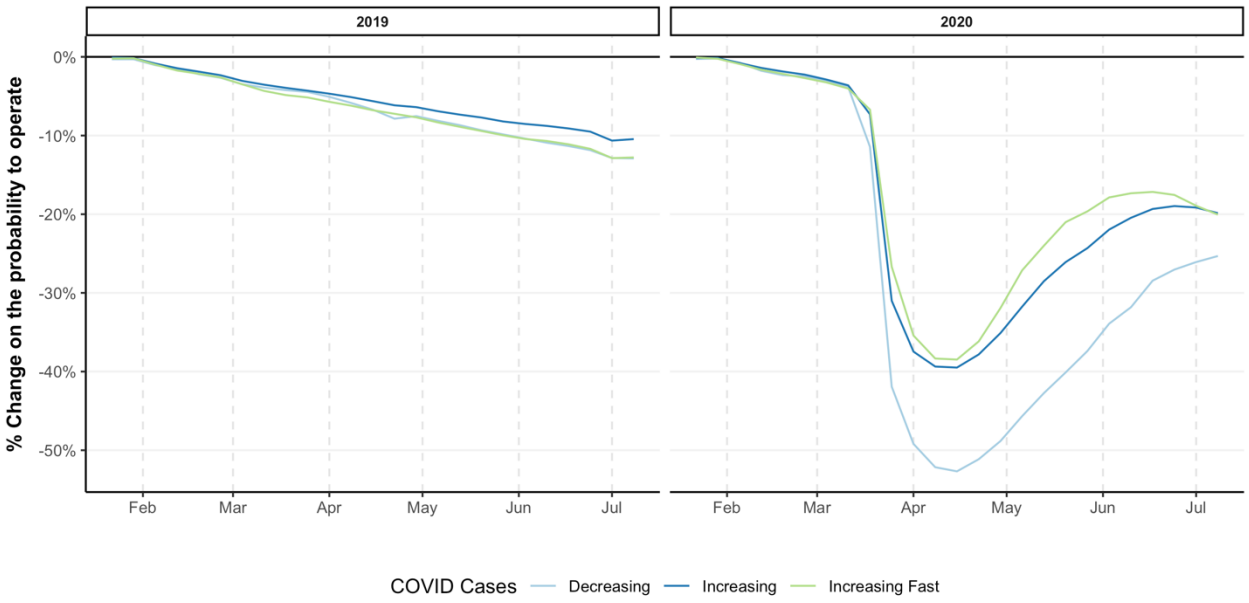


Figure 13: Probability of firm operation, 2019-2020

By COVID Case Trends (state level), July 11th



4. Closing Remarks

Using the Homebase data, we track worked hours through July 11 for a set of small businesses that were operating during the last two weeks of January. By contrasting the 2020 experience with that of a similar set of firms in 2019, we can isolate the effect of Covid-19 from other factors. We decompose the

decline in hours into the contribution of hours per worker, employment reductions, and firm closures. We find that the smallest firms and lowest wage employees were the most affected, and we also find large differences across industries. However, the main story is the dramatic drop in hours across the board, which was particularly severe in the tri-state area. Hours started recovering in mid-April but are still far below their pre-pandemic levels. Especially those states that are experiencing a new surge in Covid-19 cases halted their recovery and showed a decline in hours of work between mid June and early July.

Appendix: Notes on Methodology

1. We use the word *firm* to refer to a company operating in a specific industry at a specific location. For example, a company that operates a restaurant in New York City and a restaurant in Boston would be treated as two different firms. A company that operates a restaurant in New York City and a grocery store in New York City would also appear in our analysis as two separate firms. The unit of observation in our analysis of employees (Figures 10 and 11) is an individual in a firm. The small number of employees who we observe in the Homebase data working for more than one firm enter the data twice as distinct employees. The weekly data that we report is aggregated from shift level reports on individual workers at a firm.

2. We exclude cases in which the state identifier is missing (< 1%). We also eliminate shifts longer than 18 hours (2.2%), which are likely to be mis-reports. We exclude hourly wage reports of less than two dollars an hour, most of which are zero and likely refer to shifts by managers who are salaried rather than paid by the hour. Finally, we exclude workers whose lifetime recorded hours in the database is less than one (2.5%). To eliminate firms who used the software for a short period of time and then stop using it, we exclude firms that logged hours in the software for fewer than five weeks.

3. In all cases, we weight the values for each firm by hours worked in the base period. Similarly, for the exercises at the worker level we weight by the individual number of hours worked in the baseline period.

4. The firm size quintiles were computed within each industry using the Homebase data. The values of the wage quintiles are based on the Current Population Survey and were computed separately for each state.

5. In Figures 4, 5 and 9, we decompose the hours reduction into three sources. The first is the change in the number of firms that are operating, which we define as the number who have positive hours during the week (light blue bar). This is the product of the number of employees working in the base period and average hours per employee working in the base period. The second is the change in the number of employees among firms who continue to operate (dark blue bar). This is the difference between the number of employees in the particular week and the number of employees in the base period multiplied by average hours per employee in the base period. The third component is the change in average hours per employee (green bar). It is the product of the change in average hours per week relative to the base period and the number of employees in the current week.

6. In Figures 12 and 13 we classified US states comparing the new weekly cases from the week ending June 13 to the week ending July 11, using the data compiled by The New York Times. The data can be accessed here: https://github.com/nytimes/covid-19-data . The classification for each state can be found in the table below.

Table 1 - State classification based on new Covid-19 cases

Location	Cases Change	Classification	Location	Cases Change	Classification
Puerto Rico	-60%	Decreasing	Michigan	108%	Increasing
Connecticut	-52%	Decreasing	New Mexico	108%	Increasing
Northern Mariana Islands	-50%	Decreasing	Wyoming	110%	Increasing
Maine	-47%	Decreasing	Washington	110%	Increasing
New Hampshire	-45%	Decreasing	Oregon	120%	Increasing
Vermont	-43%	Decreasing	Alaska	122%	Increasing
Rhode Island	-37%	Decreasing	Kentucky	126%	Increasing
Massachusetts	-31%	Decreasing	Colorado	134%	Increasing
New Jersey	-26%	Decreasing	California	158%	Increasing
District of Columbia	-20%	Decreasing	Arizona	174%	Increasing
New York	-16%	Decreasing	Missouri	175%	Increasing
Maryland	-13%	Decreasing	South Carolina	180%	Increasing
South Dakota	-9%	Decreasing	Ohio	193%	Increasing
Virginia	4%	Increasing	Tennessee	230%	Increasing
Illinois	9%	Increasing	Nevada	250%	Increasing Fast
Nebraska	11%	Increasing	Louisiana	256%	Increasing Fast
Wisconsin	12%	Increasing	Georgia	263%	Increasing Fast
Indiana	43%	Increasing	Guam	300%	Increasing Fast
Minnesota	47%	Increasing	Hawaii	300%	Increasing Fast
North Carolina	52%	Increasing	Oklahoma	308%	Increasing Fast
Pennsylvania	53%	Increasing	Kansas	316%	Increasing Fast
Arkansas	55%	Increasing	Texas	380%	Increasing Fast
Iowa	56%	Increasing	Florida	497%	Increasing Fast
North Dakota	90%	Increasing	West Virginia	582%	Increasing Fast
Delaware	95%	Increasing	Montana	963%	Increasing Fast
Utah	98%	Increasing	Idaho	3576%	Increasing Fast
Alabama	99%	Increasing	Virgin Islands	6900%	Increasing Fast
Mississippi	105%	Increasing			

Notes: We compute the change in new weekly cases from the week ending June 13 to the week ending July 11, and we classified in three groups: decreasing (less than 0%), increasing (less than 250%) and increasing fast (more than 250%). We are using the data compiled by The New York Times.