Abstract
The COVID-19 pandemic is leading to unprecedented social and economic disruptions around the globe. This brief summarizes data on the Wisconsin economy from onset of the pandemic, through the statewide Safer at Home Order, and in the weeks since the order was invalidated.

In particular, I analyze economic activity using foot traffic in commercial locations around the state. I find that there was a sharp drop in activity during March, which bottomed out at a 59% year-over-year decline during the week of April 12. The decline was even more severe in some industries, with roughly 75% drops for hotels and 70% for restaurants. Since bottoming out, activity has recovered, accelerating following the May 13 invalidation of the Safer at Home order. Total activity is now down 17% year-over-year, closing more than 2/3 of the total drop. Notable are gains in the accommodations and food sector, which was hardest hit. Bars and full service restaurants have seen over 150% growth since April, although activity remains down 25-30%. Madison had a sharper activity drop than the rest of the state due to the closing of the UW, and its more gradual reopening has meant a slower recovery.

I also analyze labor market data from a sample of mostly small businesses. By mid-April more than 40% of these businesses were closed, with employment down more than 50%. There has been a substantial recovery, as employment is now down less 10%. The food and drink sector had a larger 70% employment drop through April, as not only did 50% of locations close, but those remaining open had minimal staffing. As food and drink establishments have reopened, they have brought back more workers, with employment now down about 15%.

Finally, I analyze data on consumer spending from weekly transactions. After plummeting in March into April, spending in Wisconsin has recovered and is now up 1.7% over 2019. Consumption patterns shifted, with more spending on groceries and less at restaurants, and a growing share of spending has moved on-line, as in-store sales remain over 10% down.
Overview
The COVID-19 pandemic is leading to unprecedented social and economic disruptions around the globe. During March 2020 the economies in many locations ground to a halt, as social distancing measures to slow the spread of the virus increasingly led to businesses being shut down and workers ordered to shelter in place. By early April, 42 of the 50 states in the US had imposed statewide “stay-at-home” orders to slow the spread of the virus and mitigate its impact, and many of the remaining states had similar orders in some localities. However over the past several weeks, all states had loosened restrictions and moved toward “reopening” their economies to some extent.

In Wisconsin, beginning in mid-March the state moved in steps toward implementing stronger measures, banning gatherings of specified sizes, closing restaurants, and then implementing the “Safer at Home” order on March 25. This order closed non-essential business and imposed severe travel restrictions. Grocery stores and big-box retailers remained open, but other non-essential retail closed. With dining areas of restaurants closed, many either closed completely or switched to takeout and delivery.

While the order remained in place, there was some loosening of restrictions in late April and early May, first allowing more retail transaction with curbside pickups, later allowing small retail businesses to open with severe capacity restrictions. Then on May 13 the order was invalidated by the state Supreme Court, and control reverted to the local level. While most counties removed restrictions, a few counties (Milwaukee and Dane, in particular) initially continued to follow most, if not all, of the provisions of the original state order, before later relaxing some restrictions.

In this brief I focus activity in Wisconsin, using a new data source of foot-traffic in commercial locations. I focus on year-over-year same-location changes in the state. There was a rapid drop of roughly 55% in overall activity during the last two weeks of March 2020 compared to 2019, which fell further to a roughly 60% decline during the week of April 12-18, the low point. Activity recovered some from that point, as businesses and consumers adapted and there was some loosening of restrictions. By May 9, total activity in Wisconsin was down roughly 45%, a rebound of 15 percentage points.

The recovery accelerated following the removal of the stay at home order. In particular, overall activity was down 17% year-over-year for the week ending June 13, and thus was up an additional 28 percentage points since the Supreme Court decision. Put another way, more than 2/3 of the total 60% drop in activity has been recovered. The recent gains have been especially strong for bars and restaurants, which have seen activity jump by roughly 150%, relative to their depressed April levels, after the order was invalidated.

In addition, I show that the metro areas of Milwaukee and Madison have suffered larger declines in activity throughout the pandemic. This is especially true for Madison, as the absence of students at the University of Wisconsin led to declines of 70-75% in activity through April. Both metro areas have implemented slower reopening plans with more restrictions, and have recovered at a slower rate than the rest of the state after the Safer
at Home order. In particular, Madison has recovered roughly 10 percentage points less than the rest of the state since May 13.

Both metro areas have also seen significant protests over the last two weeks following the killing of George Floyd on May 25. While I had thought that the protests may show up as additional foot traffic unrelated to regular economic activity, there seems to be little evidence of it. I do find a couple of isolated locations in Milwaukee and Madison where the foot traffic increases seem to correspond to protests, but these are isolated cases and do not seem to impact the overall statistics.

Beyond the foot traffic data, I also analyze labor market data from mostly small and medium sized-businesses, which largely follows the same trends. By mid-April more than 40% of these businesses were closed, with employment down more than 50%. Since that time, there has been a substantial recovery, as now only less than 10% of the locations remain closed and employment is also now down only about 5%. The food and drink sector had a larger 70% employment drop through April, as not only did 50% of locations close, but those remaining open had minimal staffing. As food and drink establishments have reopened, they have brought back more workers, with employment now down 15%.

Data Sources
The foot traffic data in this brief was provided by SafeGraph, a data company that aggregates anonymized location data from numerous applications in order to provide insights about physical places. To enhance privacy, SafeGraph excludes census block group information if fewer than five devices visited an establishment in a month from a given census block group. In particular, I use the SafeGraph Patterns dataset, which measures foot-traffic patterns to 3.6 million commercial points-of-interest from over 45 million mobile devices in the United States. The population sample is a panel of opt-in, anonymized smartphone devices, and is well balanced across USA demographics and geographies. In addition to the individual data being anonymized, SafeGraph only reports certain place traffic and data aggregations. The patterns data describe how many people visit a location, how long they stay, where they came from, where else they go, and more. This data provides incredible detail on the activity of a sample of roughly 10% of the US population.

SafeGraph provides daily observations on an evolving panel of locations that include at least 5 visits from the sample of devices. The data is typically released monthly, but has been released weekly starting in March 2020 (which also includes hourly data). The most recent release covers foot traffic through June 14, 2020. To deal with changes in the panel over time, I focus on same-location changes in foot traffic. That is, I analyze traffic at locations on dates in 2020 compared to the same date (or actually day-of-week to deal with weekly seasonals) in 2019. While this approach does have limits, in not considering entry and exit, it allows for a clear comparison of same-location changes in traffic, eliminating changes due to the sample makeup. As discussed below, I also break out the results into broad industries (using twodigit NAICS codes) as well as finer industries (five digit NAICS codes).
Since I focus on overall activity, I use foot traffic measured as visits per day per location. While this measure is clearly correlated with sales, especially for retail locations, it is also clearly imperfect. The number of visits does not capture changes in the ratio of visitors to buyers or changes in sales per buyer. Moreover, as noted above, many stores and restaurants have increased their delivery business during the COVID-19 pandemic and these delivery transactions are missed, although takeout orders for pickup would still be captured. As I showed in other work, consumers have shifted substantially toward online purchases, and are also buying more on each of their less frequent visits to stores. The foot traffic in this brief thus is best as a measure of in-store transactions, which is only part of sales. But especially for the question of reopening addressed here, focusing on gains in in-store transactions is appropriate.

For the labor market, I use data from Homebase, a company that provides scheduling software to tens of thousands of small businesses across the US. As described by Bartik et al. (2020), “This scheduling software generates granular data on exact hours worked every day for all hourly employees at customer firms, providing a much higher-frequency and more detailed picture of employment and hours than traditional labor market datasets. This greater detail and higher frequency come at some costs; Homebase’s customer base is disproportionately composed of small firms in food service, retail, and other sectors that employ many hourly workers.”

For consumer spending, I use weekly transactions data from Earnest Research, which provides a clearer picture on the behavior patterns of American consumers. This dataset provides a broad sample of aggregated consumption/transaction data, from a sample of roughly 6 million households (with 25-30 million credit and debit cards) nationwide. The data is weekly, and is released with a 1 week delay, with the latest data for the week ending June 10. The data set tags individual transactions at recognized brands and merchants, a collection of roughly 2,000 merchants, and then aggregates them into categories and sub-categories. Thus the Earnest data misses local retailers, non-chain restaurants, and others, as well as cash transactions. Nonetheless, in other work I have shown that aggregate Earnest sales match national retail sales data quite well, particularly for certain categories, where the Earnest data captures 80-90% of the variation in official statistics.

Furthermore, the Earnest data has multiple levels of disaggregation. The data allow for geographic decomposition (by region, state, CBSA, and city), although with varying degrees of coverage, and so varying accuracy. The data also has decompositions by category (apparel, grocers, department stores, etc.) and sub-category (i.e. grocers divided into: discount grocers, meal kits, online grocers, specialty grocers, and supermarkets). Finally, the data has separate metrics (sales, transactions, and sales per transaction), as well as separate purchasing channels (in-store, online, or store card). The Earnest data thus provides interesting insights which were unavailable elsewhere.
Changes in Economic Activity

As a baseline measure of the changes in economic activity due to COVID-19, I look at the aggregated daily number of visits at locations in Wisconsin beginning in March 2020. Because of the strong day-of-week effects, the data are aligned starting with the first Sunday in March (3/3/19 and 3/1/20). For simplicity I refer to the 2020 date in what follows. I focus on relative visits, defined as the ratio of same-location visits per day in 2020 over the corresponding value in 2019.

To illustrate the dynamics of different industries during the pandemic, it is useful to first look at visits for select industries. Figure 1 shows the total number of visits at hotels (NAICS 721110) and grocery stores (NAICS 445110) in 2019 and 2020. The hotel visits track each other quite closely for the first ten days in March, then start to diverge during the second week, with 2020 plummeting in the third week. This is consistent with how the crisis evolved: initially many people cut back on vacations and inessential travel, until in very rapid succession most travel altogether came to a halt. Only over the last few weeks have hotel visits started to recover, but they still remain roughly 48% below 2019 levels. Grocery stores have fared quite differently: 2020 visit traffic ramped up and spiked in the middle of March as people stocked up in preparation for lockdowns, before leveling off around the same values as 2019 for mid-March and early April. A sharp drop on Easter Sunday led to a further decline that week, before recovering and largely tracking the previous year over the rest of the sample.

![Hotel Visits](image1.png)

![Grocery Store Visits](image2.png)

Figure 1: Total same-location visits for hotels and grocery stores in Wisconsin during 2020 vs. the same period in 2019.

Table 1 lists the decline in year-over-year relative visits for selected industries, grouped by NAICS codes, and Figure 2 plots a select number of these industries. Since the dataset focuses on commercial foot traffic, industries not shown generally have few visits. Overall, the declines across all locations have been severe and generally followed the same trends across industries. There was a 52% overall drop in March, ticking down to a decline of nearly 60% in the week of April 12, before recovering somewhat later in the
month and into May. Not surprisingly, the largest declines were in industries that were effectively shut down: education (schools), information (especially movie theaters), and accommodation and food services (hotels and restaurants). While full-service restaurants were been able to salvage some revenue by moving to takeout and delivery, they saw a substantial drop in activity.

Both Table 1 and Figure 2 make clear that activity has substantially recovered from its low point in mid-April, and we can break this recovery into two stages. First, during April and early May consumers and businesses adapted to the new situation, and some minor restrictions in the Safer at Home order were lifted. For example, curbside pickup from retail establishments was allowed. By May 9, total activity in Wisconsin was down roughly 45%, a rebound of about 15 percentage points.

The recovery accelerated following the removal of the Safer at Home order on May 13, which is shown with a vertical black line in the figure. In particular, overall activity was down 20% year-over-year for the week ending June 6, and thus was up an additional 25 percentage points since the Supreme Court decision. Put another way, 2/3 of the total 60% drop in activity has been recovered. Activity increased in all sectors, but was especially strong for the hardest hit sector of accommodations and food services, and particularly full service restaurants. Hotels have recovered as well, but activity remains 48% down. Retail and transportation (shipping, not travel) are both almost back to last year's activity levels.

Figure 2: Relative same-location visits for all locations and select industries in Wisconsin during 2020 vs. the same period in 2019.
Recent Changes in Economic Activity

Figure 3 illustrates the recent rapid increase in activity at full service restaurants and bars. Following the Wisconsin Supreme Court case invalidating the stay-at-home order, there were numerous news stories of people rushing to bars in the state. The left panel of Figure 3 shows that there was indeed a large relative increase in activity on the initial weekend following the order, with foot traffic at bars up 60% and restaurants up 30%.

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-- | All Locations | -59.1 | -45.5 | -38.0 | -17.2
31-33 | Manufacturing | -62.3 | -61.5 | -53.6 | -33.1
42 | Wholesale Trade | -54.0 | -29.1 | -18.6 | -4.7
44-45 | Retail Trade | -44.1 | -24.2 | -15.0 | -2.9
445110 | Supermarkets & Grocery Stores | -32.2 | -11.1 | -9.4 | -2.1
48-49 | Transportation and Warehousing | -59.7 | -33.8 | -23.0 | -10.3
51 | Information | -78.6 | -73.3 | -65.3 | -56.7
52 | Finance and Insurance | -44.7 | -28.7 | -22.2 | -15.7
53 | Real Estate Rental and Leasing | -58.7 | -43.0 | -32.1 | -17.3
61 | Educational Services | -89.0 | -84.7 | -79.7 | -61.0
62 | Health Care and Social Assistance | -60.9 | -45.7 | -37.3 | -18.6
71 | Arts, Entertainment, & Recreation | -72.4 | -56.1 | -45.3 | -17.4
72 | Accommodation and Food Services | -64.8 | -54.0 | -40.7 | -24.5
722110 | Hotels and Motels | -74.6 | -70.7 | -59.7 | -47.8
722511 | Full-Service Restaurants | -71.6 | -64.0 | -47.8 | -26.9
81 | Other Services (except PA) | -57.5 | -40.4 | -33.2 | -21.3
92 | Public Administration | -45.1 | -16.6 | -13.1 | +7.5

Table 1: Relative same-location visits for selected industries in Wisconsin during 2020 vs. the same period in 2019. Averages over the noted weeks.

https://crowe.wisc.edu
from the previous weekend. These increases continued over the following week leading into Memorial Day weekend, with foot traffic on May 22 up 75% in bars and 64% in full service restaurants over May 8. Activity continued to grow over the next couple of weeks, and is now up over 150% since Safer at Home order was removed. However this was an increase from a very low level. The right panel of Figure 3 shows that although restaurants and bars have seen sharp recovery in recent weeks, activity still remained about 25-30% below levels of a year earlier at both restaurants and bars. Nonetheless, this is strong growth considering activity had been down 70-75% throughout April.

Changes in Metro Areas
In addition to breaking out traffic by industry, the SafeGraph data allows me to separate trends across different locations. Figure 4 shows the relative trends for the two largest metropolitan areas in Wisconsin -- Milwaukee and Madison -- as well as the remainder of the state. Both metro areas and the remainder of the state all show very similar overall trends, but with varying magnitudes of changes. The declines in total traffic were somewhat larger in these metro areas than in the state overall. The shutdown of UW-Madison and the absence of thousands of students drove an especially large decline in Madison, where traffic was down roughly 70% from late March through mid-April, before recovering later in the month into early May.

Moreover, following the Supreme Court decision, while much of the state went without any mandated restrictions, both Milwaukee County and Dane County imposed county-level orders that kept much of the statewide order in place. Both metro areas have eased restrictions recently, but under their slower reopening plans significant restrictions remain (particularly in Dane County). Thus while both metro areas have recovered, they have done so at a slower rate than the rest of the state, and the gap in activity to the rest of the state has widened. In particular, since May 13, Madison has seen a recovery of 15

![Figure 4: Relative same-location visits for Milwaukee MSA, Madison MSA, and the rest of the state.](https://crowe.wisc.edu)
percentage points and Milwaukee 24 percentage points, while the recovery in the rest of the state has been 28 percentage points.

Both metro areas, like many cities around the country and indeed the world, have seen significant protest activity over the last couple of weeks following the killing of George Floyd in Minneapolis on May 25. These protests have brought significant numbers of people into the streets, and I had thought that the protests may show up as additional foot traffic unrelated to regular economic activity. However there seems to be little evidence that the protest showed up significantly in the data.

By looking into the individual location data around the locations of most protest activity, I did find a couple of isolated locations in Milwaukee and Madison where the foot traffic increases seem to correspond to protests. Two examples are shown in Figure 5: Rightsize Facility, a furniture service company in downtown Milwaukee, and Curd Girl, a food cart near Capitol Square in Madison. The figure shows the daily visits for each location, indexed to the average during the first week of March. (Each location had one anomalous data point during the sample, which I replaced with an average on surrounding days. This did not affect the comparison.) Both locations show significant spikes in activity starting on May 30 that correspond to large protests which took place in their areas. However these are isolated cases, and I did not find any similar spikes even at locations in the same vicinity. Thus the protests do not seem to impact the overall economic activity statistics for the metro area, let alone for the state.

![Relative Visits at Select Locations](image)

**Figure 5:** Relative visits at locations in Milwaukee and Madison near protest activity.

**Labor Market Data**

While the foot traffic data is indicative of economic activity, it is an indirect measure that is correlated with sales. Thus I now turn to a labor market data source, which provides direct economic data on business closings and employment. In particular, I use data from Homebase, a company that provides scheduling software to tens of thousands of
small businesses across the US. As described by Bartik et al. (2020), “This scheduling software generates granular data on exact hours worked every day for all hourly employees at customer firms, providing a much higher-frequency and more detailed picture of employment and hours than traditional labor market datasets. This greater detail and higher frequency come at some costs; Homebase’s customer base is disproportionately composed of small firms in food service, retail, and other sectors that employ many hourly workers.” Thus this while this data provides direct labor market indicators, it is less comprehensive in coverage than the Safegraph foot traffic data. Nonetheless it provides a similar overall message on both on the scale and timing of the decline and recovery in activity.

In particular, Figure 6 shows summary data for all locations in Wisconsin, showing the changes in the number of employees working, the number of locations open, and the total hours worked. Each data series is indexed to the median value for that day of the week during the month of January, with the percentage changes shown. Since hours and employment generally track each other, I mostly focus on openings and employment in the following discussion.

Again, the data shows relative stability during early March, followed by a rapid decline in all measures which bottom out on April 12. There are very strong day-of-week effects throughout the pandemic, with more locations closing and fewer employees working on the weekends. At the low points through April, on weekdays roughly 40% of locations

Figure 6: Changes in employees working, locations open, and hours worked at small businesses in Wisconsin.
Figure 7: Changes in employees working, locations open, and hours worked at small businesses in the food and drink industry in Wisconsin.

were closed, and roughly 50% of employees were working. On weekends, these numbers dipped down to roughly 67% declines.

As in the foot traffic data, we can break the recovery into two phases. By early May, the number of locations open had gained nearly 10 percentage points and employment had gained nearly 20 points, with both down roughly 30% in early May relative to January. Following the removal of the Safer at Home order, the recovery accelerated with openings and employment gaining another 25 percentage points. In the most recent data, through June 17, locations open, employment, and hours worked are now all down less than 10%, with hours worked during the week back to baseline. Thus the labor market in Wisconsin, at least as captured by this set of establishments employing hourly workers, had recovered more than 3/4 of its decline.

Figure 7 shows the same data but now for what Homebase calls the “food and drink” industry, essentially restaurants and bars. The overall patterns are similar to all locations, but with a couple important differences. Hours and employees working generally track each other, but there is a much larger difference with locations open. That is, at the depths of the crisis roughly 50% of food and drink locations generally closed, but employment fell by over 70%. This reflects significantly reduced staffing, as restaurants moved toward takeout and delivery during the lockdown. The recent recovery has been especially strong in this industry, as 12% of locations have been closed on average in recent days, with employment down about 15%. Thus not only have more food and drink establishments opened, but they have expanded their services relative to the lockdown period, and have been able to bring back more workers.
The Wisconsin Economy During COVID-19: Lockdown and Reopening

Figure 8: Total spending in Wisconsin and the rest of the United States, four-week year-over-year growth.

**Consumer Spending**

Turning to consumer spending, the Earnest Research data shows similar overall patterns, but with less volatility in spending. That is, while consumption dropped with economic activity dropped, consumers were able to smooth the declines and shift their spending habits. This meant a shift in the channel of spending, with an increasing share of sales online, as well as the makeup of their consumption bundles, as spending on dining out dropped by groceries increased.

Figure 8 shows how consumption has changed, both nationally and in Wisconsin, through the COVID-19 pandemic. In particular, I show the four-week year-over-year sales growth, which smooths some of the weekly fluctuations. Overall, the trends were very similar nationally and in Wisconsin, with slightly larger declines nationwide than in the state. The patterns are also the same as in our other indicators: after hitting bottom in mid-April there has been sharp growth in consumption. In recent weeks consumer spending in Wisconsin has increased 1.7% year-over-year.

Figure 9 illustrates the shift consumption patterns in Wisconsin, by separating spending at grocers from all other locations. We see that grocery store spending spiked in March and into April, and has remained high. Over the past month, grocery spending is up over 18% from 2019. Spending on all other categories plummeted from mid-March to mid-April, but now has recovered and is roughly unchanged from 2019.

Figure 10 shows how the buying patterns of Wisconsin consumers have shifted toward online activity. As the pandemic spread, and then particularly after Governor Evers issued the statewide “Safer at Home” order on March 25 closing non-essential businesses and limiting travel, in-store sales and transactions fell sharply. Total sales were down 15% at the end of March, but in-store sales were down 30% at that point, while online spending increased.
sales ramped up over that period. Over the past month, as total sales have recovered and are now up year-over-year, in-store sales remain down nearly 11%, which is roughly consistent with the measures of activity from foot traffic above. While online sales played an important role in allowing consumers to cushion the impact of the pandemic shock, they have also diverted sales from local businesses. That is, while statewide businesses have increased their online presence during the crisis, much of the online transactions were through national retailers like Amazon.