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A regional exploration of retail visits during the COVID-19 pandemic

Patrick Ballantyne ^a, Alex Singleton   ^b and Les Dolega   ^c

ABSTRACT

Despite evidence that the COVID-19 pandemic has precipitated significant regional (economic) inequalities, there is a substantial lack of regional insight into the impacts of COVID-19 on the retail sector. In this study, using data from SafeGraph, we adopt a regional approach to explore how visits to retail places changed during the early weeks of the COVID-19 pandemic in the Chicago Metropolitan area. In particular, we highlight that retail visits exhibited interesting spatio-temporal and structural trends.

ARTICLE HISTORY

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KEYWORDS

Retail; COVID-19; visualisation

BACKGROUND

Research is rapidly emerging that seeks to understand the interactions between COVID-19 and retail, specifically quantifying the impacts of reduced mobility on sector economics (Baker et al., 2020; Yilmazkuday, 2020). Many studies have used novel datasets (e.g., Google Mobility), identifying significant shifts in mobility and expenditure between different types of retail. However, despite evidence that the pandemic has precipitated significant regional inequalities between sectors (Bonet-Morón et al., 2020), and that COVID-19 is an inherently regional issue (Torrisi, 2020), there is a substantial lack of (regional) insight into the impacts of COVID-19 on the retail sector. Here we adopt a regional approach, focusing on the Chicago Metropolitan statistical area (MSA), and explore change in total visits to retail 'places' during the early weeks of the pandemic, unpacking this further to consider how these trends relate to retail type. This study is important, providing both an insight into the response of a regional retail sector to COVID-19, whilst also demonstrating the utility of mobility datasets and 'H3' (Uber, 2018) at conveying trends in mobility, whilst protecting store-level data.

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TRENDS IN REGIONAL RETAIL VISITS

Retail visits followed an uneven spatial distribution (Figure 1). The vast number of visits were concentrated in the central business district (CBD) of Chicago. Other significant but smaller concentrations were found in 'satellite cities' such as Joliet, and in established retail developments (e.g. Woodfield Mall). Temporally, there was a clear trend of decreasing retail visits, aligning with the first 'peak' of the pandemic (Baker et al., 2020), suggesting that as the pandemic worsened, consumer behaviour altered dramatically. The most significant decrease in visits occurred in the week of the 'Stay at Home' order (Pritzker, 2020), the 16th March 2020. Furthermore, an evident spatio-temporal pattern was that suburban/rural Chicago appeared to experience greater contractions in visits when compared with the CBD, prompting a future research agenda to better understand why this might be.

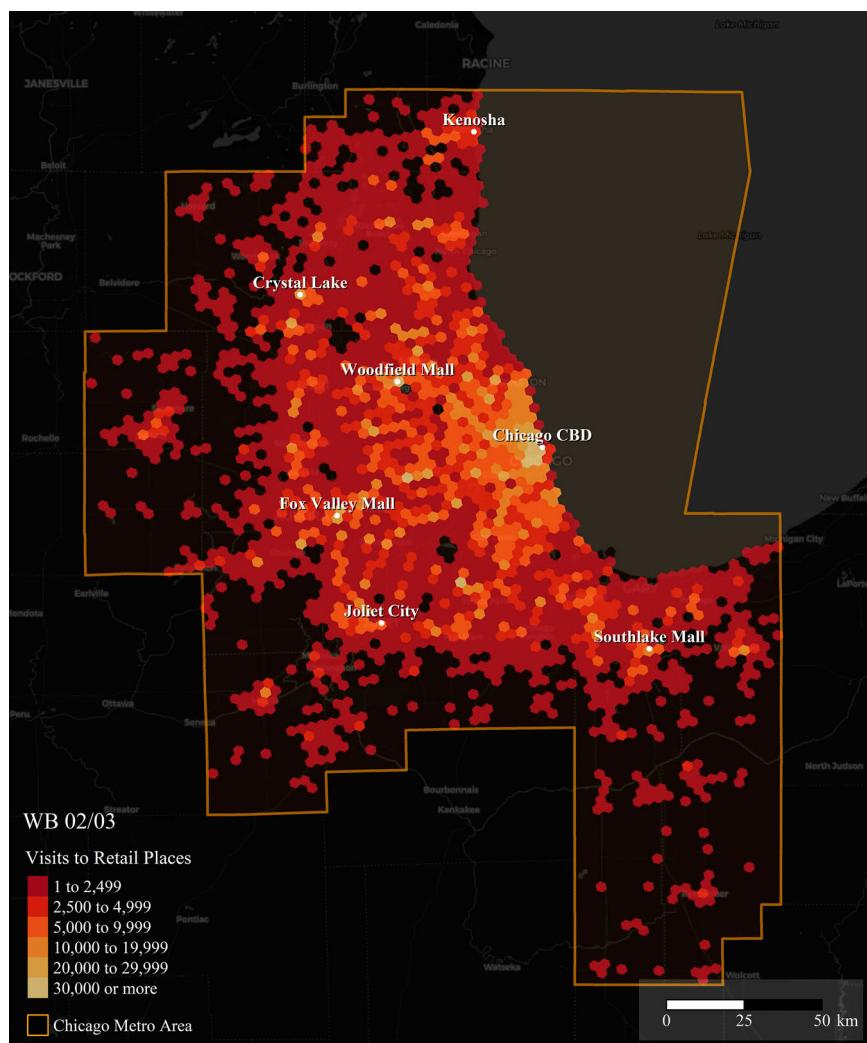


Figure 1. Weekly visits to retail places in the Chicago Metropolitan statistical area (MSA), from the week beginning 2 March to 6 April. Each iteration represents one week of data (e.g., WB 02/03). Source: <https://figshare.com/s/ed36c92e136c00925384>.

To unpack these trends further, we explored how they related to different types of retail (Figure 2). Convenience retail saw a substantial and sustained increase in visit proportions, from 28% to 35% following the ‘Stay at Home’ order, likely a result of increased demand of ‘essential goods’, characteristic of the early weeks of the pandemic (Nicola et al., 2020). Another interesting trend was the significant and sustained decline in visits to leisure (8%), a component of the retail sector that has faced some of the greatest impacts during the pandemic (Baker et al., 2020).

Further research is required to explain these regional trends, in particular seeking to quantify the role of geographical context (Figure 1) and retail type (Figure 2). Modelling of reductions in retail visits in relation to the offering (e.g., retail type, brands) and geographical context (e.g., urban versus rural, COVID-19 infections) of retail locations would likely yield significant insights into such trends. Although beyond the scope of this study, these insights could have significant merit in retail planning, for example, in identifying underperforming neighbourhoods and/or components of the retail sector that could be targeted with post-pandemic economic recovery strategies, such as the ‘Eat Out to Help Out’ scheme introduced in the UK to support the service sector (Fetzer, 2020).

TECHNICAL DETAILS

SafeGraph provide researchers with access to their datasets, including a register of ‘core places’ where consumers spend money or time (SafeGraph, Inc., 2020b), and corresponding mobility

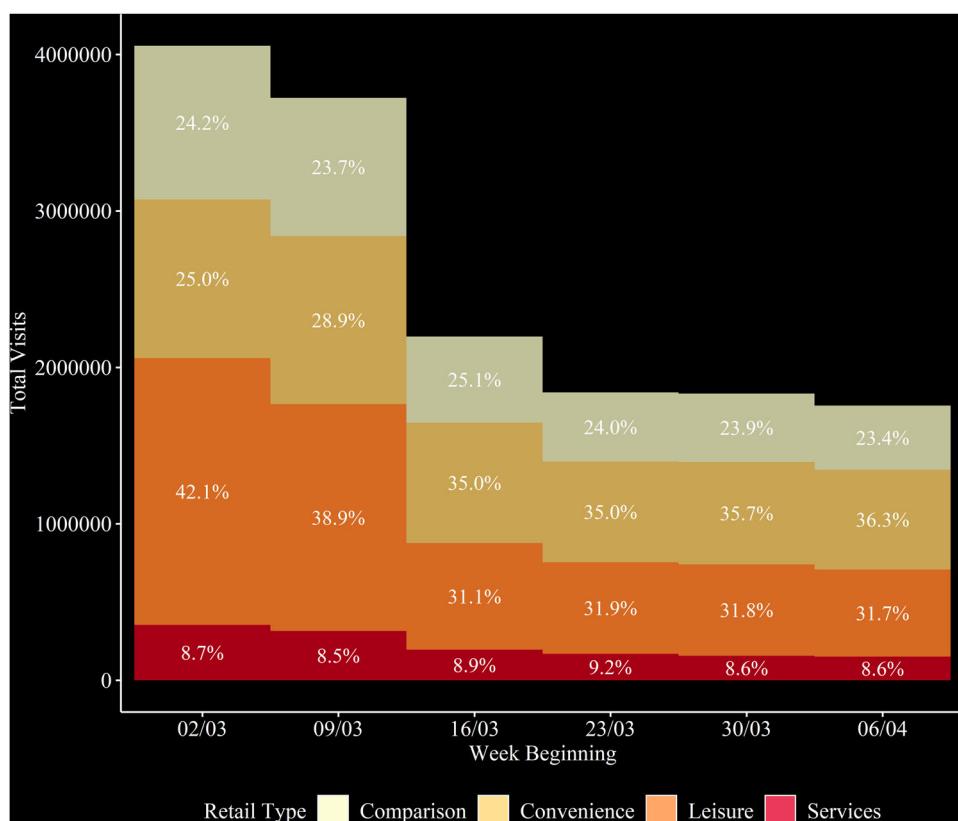


Figure 2. Weekly visits to retail places disaggregated by retail type. Note: For information about the retail types and their aggregation, see Table 1.

Table 1. Aggregation of ‘core places’ to retail types enabling extraction of ‘retail places’ from the dataset.

| Retail type | SafeGraph top category |
|-------------|---|
| Comparison | Clothing stores, department stores, furniture stores, automobile dealers, electronics and appliance stores, office supplies, stationery and gift stores |
| Convenience | Grocery stores, gasoline stations, health and personal care stores, beer wine and liquor stores, general merchandise stores, speciality food stores |
| Leisure | Drinking places, restaurants and other eating places, motion picture and video industries, gambling industries, traveller accommodation |
| Service | Automotive repair and maintenance, personal care services, insurance carriers, depository credit intermediation, taxi and limousine services |

Note: ‘Comparison’ relates to less frequently purchased, non-food retail (e.g., fashion); ‘convenience’ retail relates to frequently purchased ‘essential goods’ (e.g., food); ‘leisure’ retail incorporates all form of entertainment (e.g., drinking places); and ‘service’ retail covers all services/utilities offered in retail spaces (e.g., insurance).

data (‘weekly patterns’) collected from the GPS data of anonymised phone users (SafeGraph, Inc., 2020a). From the ‘core places’, those places pertaining to retail were extracted by matching the SafeGraph ‘top categories’ to one of four ‘retail types’, and removing all other ‘core places’, as seen in Table 1.

The ‘retail places’ were joined with ‘weekly patterns’ for a six-week period surrounding the first peak of the pandemic (week beginning 2 March–6 April). The places (and patterns) were then joined onto a hexagonal grid for the Chicago MSA, constructed using the ‘h3jsr’ R package (O’Brien, 2020), enabling visualization of the change in weekly visits across Chicago (Figure 1), using the tmap and magick R packages (Ooms, 2021; Tennekes et al., 2021). Figure 2 was constructed by calculating the proportion of total weekly visits occupied by each of the four retail types. For the code used to produce these outputs, see the authors’ GitHub (<https://github.com/patrickballantyne/RSRS>).

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DISCLOSURE STATEMENT

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