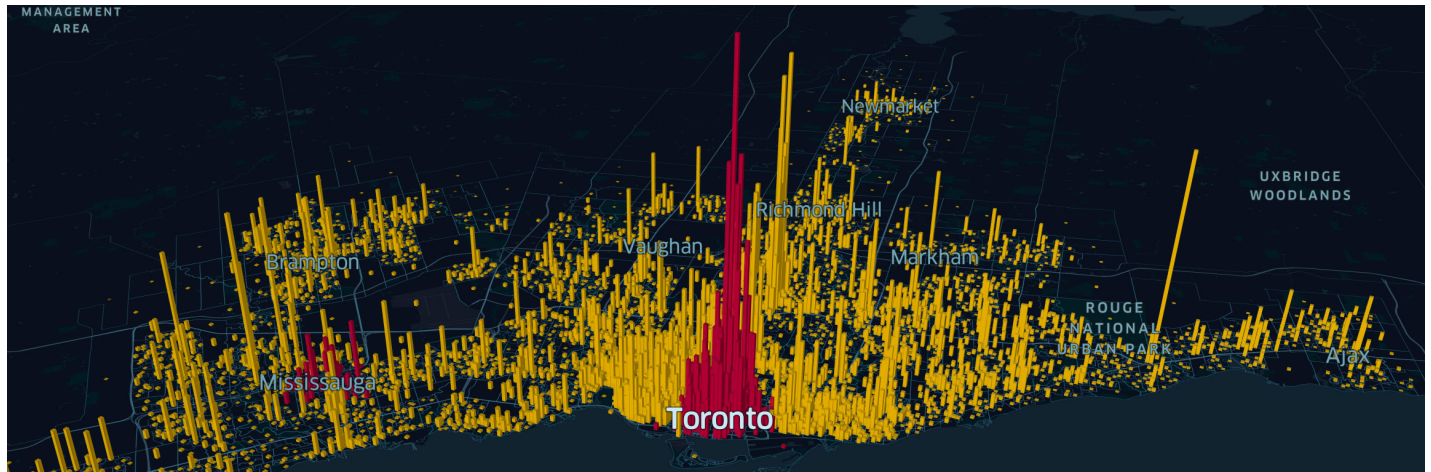




The Death of Downtown?

Pandemic Recovery Trajectories across 62 North American Cities

Karen Chapple, Michael Leong, Daniel Huang, Hannah Moore, Laura Schmahmann, and Joy Wang



Introduction

The onset of the Covid-19 pandemic renewed long-term debates about the future of downtowns in North America. The last forty years have seen the rise of suburban malls and downtowns, a back-to-the-city movement, and new patterns of remote work.¹ In the process, many downtowns have transitioned from daytime-only office zones to lively 24-hour mixed-use spaces. But with the initial shock of the pandemic, downtowns emptied out as people were forced to stay at home. And even as life has gradually returned to malls and neighborhood commercial corridors, the urban core is no longer a bustling center of activity. This trend has led many to wonder: is this finally the death of downtown?

Researchers typically measure downtown vitality via three key indicators: office vacancy rates, public transportation ridership, and retail spending. The growing availability of mobile phone data containing user locations provides us with a new way to directly measure downtown activity patterns. In this research,

we examine visits over time to 62 downtown areas using mobile phone data, comparing the most recent activity (as of June 6, 2022) to pre-pandemic levels (in 2019). We find wide variation in the extent of recovery, with activity ranging from a low of 31% of pre-pandemic levels in San Francisco to a high of 155% in Salt Lake City. The key factors influencing recovery rates for downtowns are population and business densities, commuter mode shares particularly high car use, along with presence of industry sectors that are continuing to support remote work (such as tech and finance). To survive in the new era of remote work, downtowns will need to diversify their economic activity and land uses.

In the following we describe previous research on downtown recovery, detail our data and methods, rank the performance of the 62 largest cities across the United States and Canada, and identify the key explanatory factors behind recovery. A conclusion outlines policy implications and next steps for research. For more details, visit downtownrecovery.com.

Understanding Downtown Recovery

Economic activity and employment tend to agglomerate in the dense core of a city-region, which can facilitate access to labor and markets as well as knowledge spillovers.² Today's regions are often polycentric, as suburbanization has created new centers that include not just office but retail and leisure activity.³ Even though many downtowns have added new housing, offices continue to dominate, comprising, on average, 71% of real estate.⁴

Early in the Covid-19 pandemic, the media began reporting significant migration out of cities, particularly a flight of knowledge and tech workers towards the suburbs or other cities.⁵ In general, places with a higher share of employment in knowledge-based industries and occupations, and/or more highly paid workers, are more likely to shift towards remote work.⁶ Surveys suggest this shift will be permanent for up to half of the workforce in cities that are large and congested (e.g., New York), or powered by the tech sector (e.g., San Francisco).⁷ This new increase in remote work may result more from long-term trends related to the affordable housing crisis in leading urban centers and the shortage of highly skilled labor than from the pandemic.⁸ Either way, a lively debate is emerging about whether the pandemic will lead to a full-blown, 1970s-style urban crisis or more of the adaptive bounce back we saw in many downtowns after the Great Recession.⁹

Early studies suggest that downtowns will struggle to recover from the pandemic, due to their disproportionate share of business closures, the lessening demand for downtown real estate due to remote work, and challenges associated with the loss of business travel and rise of ecommerce; however, the resurgence of leisure and hospitality spending is one bright spot.¹⁰ Although small and mid-size cities may benefit from the influx of new population, the pandemic is likely to have a disproportionate impacts on older industrial or "legacy" cities.¹¹ Various studies have utilized mobility data to measure activity and

recovery in certain countries or cities, however, to our knowledge no other studies focus explicitly on downtown or analyze the potential causes.¹²

The pandemic has led to a plethora of ideas for the reinvention of downtowns, with leaders suggesting that the vacuum left by office workers be filled by cultural and recreational uses, along with new residents.¹³ Despite these opportunities, it has been difficult for cities to respond given the constantly fluctuating nature of the pandemic. Many cities are watching to see if activity will return before making any major changes to recreate their downtown.¹⁴ Should we start planning for the new downtown? Our analysis provides some clues.

Methods and Analysis

SafeGraph POI Data and Downtown Definitions

To measure the level of economic and social activity in a downtown at a point in time, we aggregated mobile phone trajectory data documenting the number of visits to Places of Interest (POI) downtown from SafeGraph, Inc. Patterns dataset. SafeGraph obtains GPS location trajectories of 18,000,000 smartphones throughout North America and reports the number of observed device visits to each POI. Visits to POIs are determined by an algorithm which uses machine learning to detect stops within POI geofences based on proximity, duration of stay, and characteristics of the POI such as opening hours, industry, or type of place. SafeGraph makes the full dataset of visits by POIs, which include but are not limited to businesses, offices, shops, restaurants, parks, community facilities, and stadiums, available for use through academic licenses and COVID-19 data sharing consortiums.

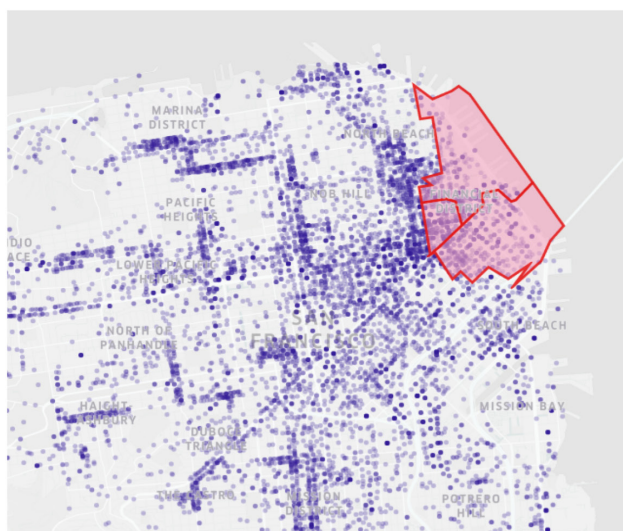
For this study, we aggregated each POI by city, and further determined whether each POI was within the city's downtown. We then compiled the raw visit

"To survive in the new era of remote work, downtowns will need to diversify their economic activity and land uses"

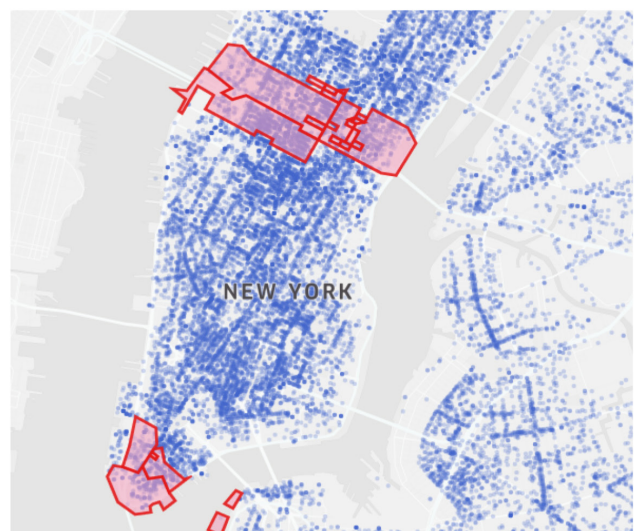
counts to each POI scaled by the total number of visits to represent the overall economic and social activity within and outside a defined downtown. For the purpose of this study, downtowns are defined as the locations with the greatest employment density, based on a Kernel Density Estimation (KDE) and rules-based definition method by Sergerie et al (2021) from Statistics Canada.¹⁵ This report defined downtowns as a set of Dissemination Areas (DAs) by using an appropriate initial boundary from KDE analysis, as

well as contextual boundaries from water bodies, arterial roads, freeways, or other natural landmark boundaries. We used these boundaries for Canadian downtowns. For United States downtowns, we used employment data from the United States Zip Code Business Patterns to replicate this method at the Zip Code Tabulation Area level. Figure 1 shows the POI locations and downtown definitions of Toronto, New York City, Chicago, and San Francisco.

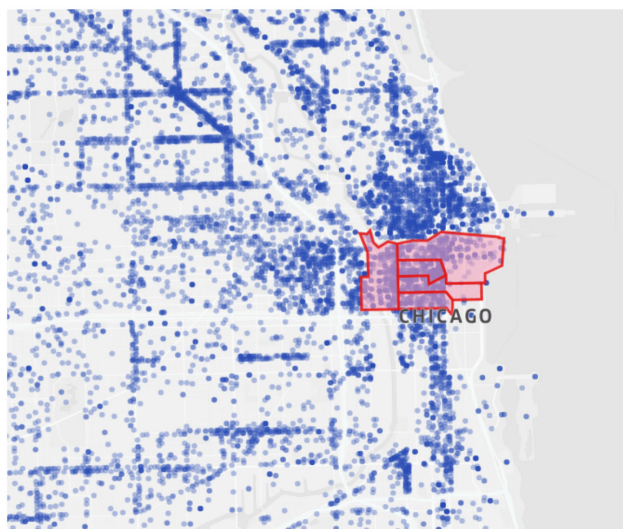
Figure 1: Downtown Definition of Select Cities



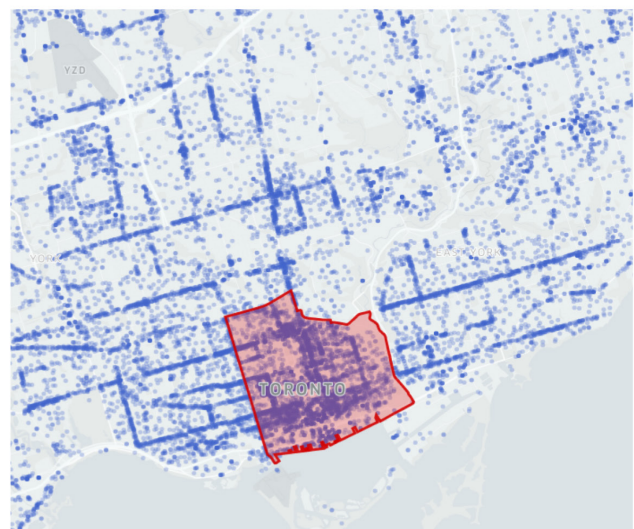
Downtown San Francisco, CA



Downtown New York, NY



Downtown Chicago, IL



Downtown Toronto, ON

Downtown Recovery Rankings

Our analysis incorporated data for 27 months from March 2020 to May 2022 for 62 cities of at least 350,000 people across the US and Canada. We then calculated a Recovery Quotient (RQ) for both downtowns and entire cities by comparing the total normalized device counts from the most recent 3 months of data compared to the first 3 months of data.

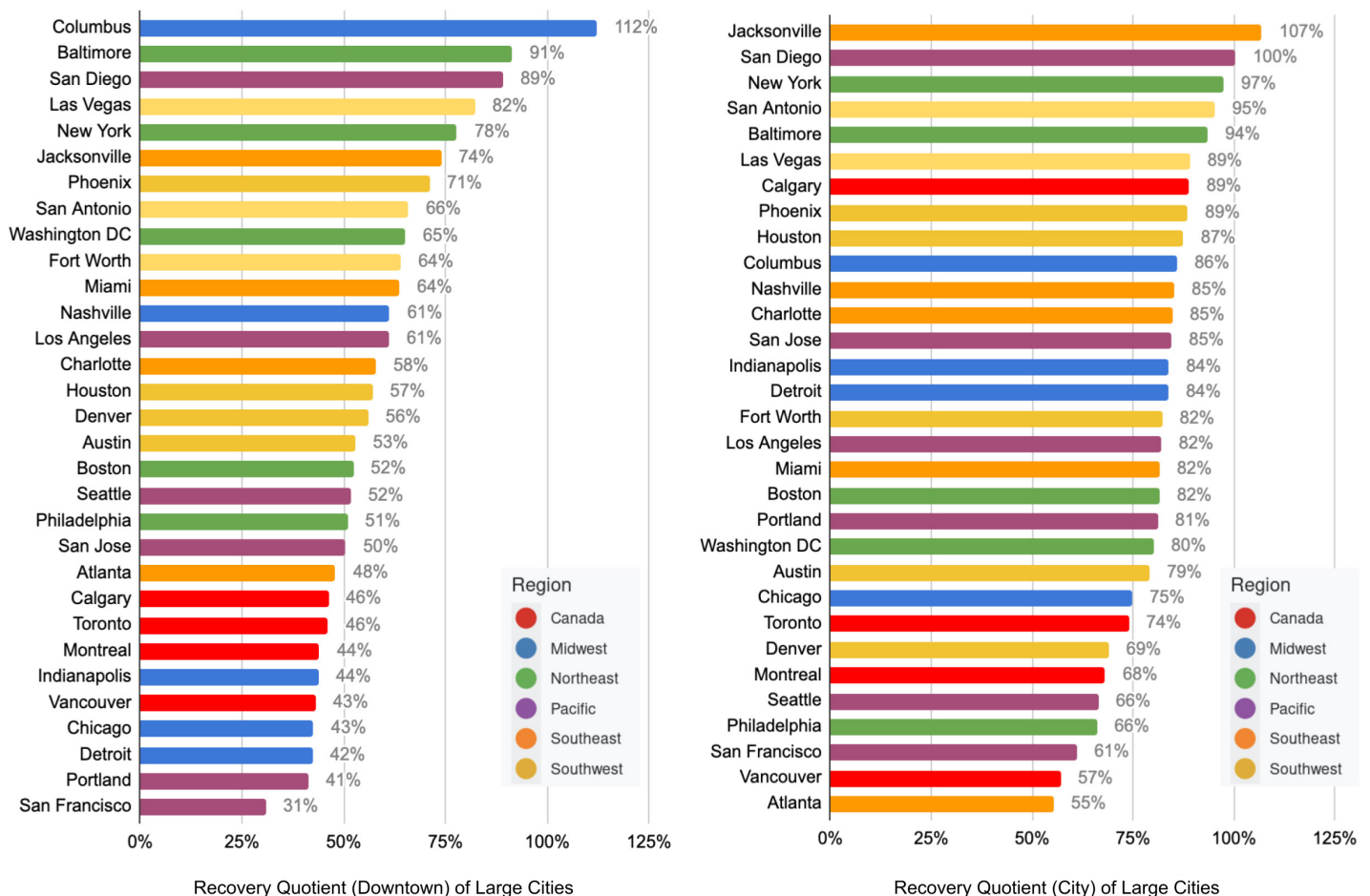
The calculation formula for Recovery Quotient (RQ) is shown below as a percentage:

$$RQ = \frac{\text{Device Count in March 2022 to May 2022}}{\text{Device Count in March 2019 to May 2019}} \times 100\%$$

Figure 2 present the ranking of downtown recovery of both the downtown core and the entire city across the 31 large cities in the United States and Canada.¹⁶ The X axis is the RQ, which shows the percent of activity that has come back (e.g., almost 112% in Columbus). Most of the downtowns that have bounced back are in the southern U.S., while the downtowns that have struggled are primarily in the north.

The RQ for the entire city is often higher than the downtown areas alone, indicating that downtown areas have been consistently lagging behind in activity recovery as remote working and the digitization of services continues.

Figure 2: Ranking of Downtown and City RQ in Large-Sized Cities



Downtowns within medium-sized cities (Figure 3) have generally recovered more quickly than the larger-sized ones, and the high-performing downtowns are more dispersed across North America. Like the large cities, the RQ for the entire city area is often higher than that of the downtown core. A handful of medium-sized cities had RQs over 100%, indicating that they are seeing more overall activity now compared to pre COVID-19.

Time-series recovery patterns can also be used to track downtown recovery at different phases of the

pandemic, when the public health situation and accompanying policies were constantly changing, and varied regionally. Figure 4 displays this for various selected cities in the United States and Canada.

Other metrics, such as the Location Quotient measuring the recovery of downtowns relative to the rest of the city, as well as the rate of recovery of downtowns, can be found on our [website](#). Interactive widgets allow for a customized comparison of multiple cities' recovery trajectories over time.

Figure 3: Ranking of Downtown and City RQ for Medium-Sized Cities

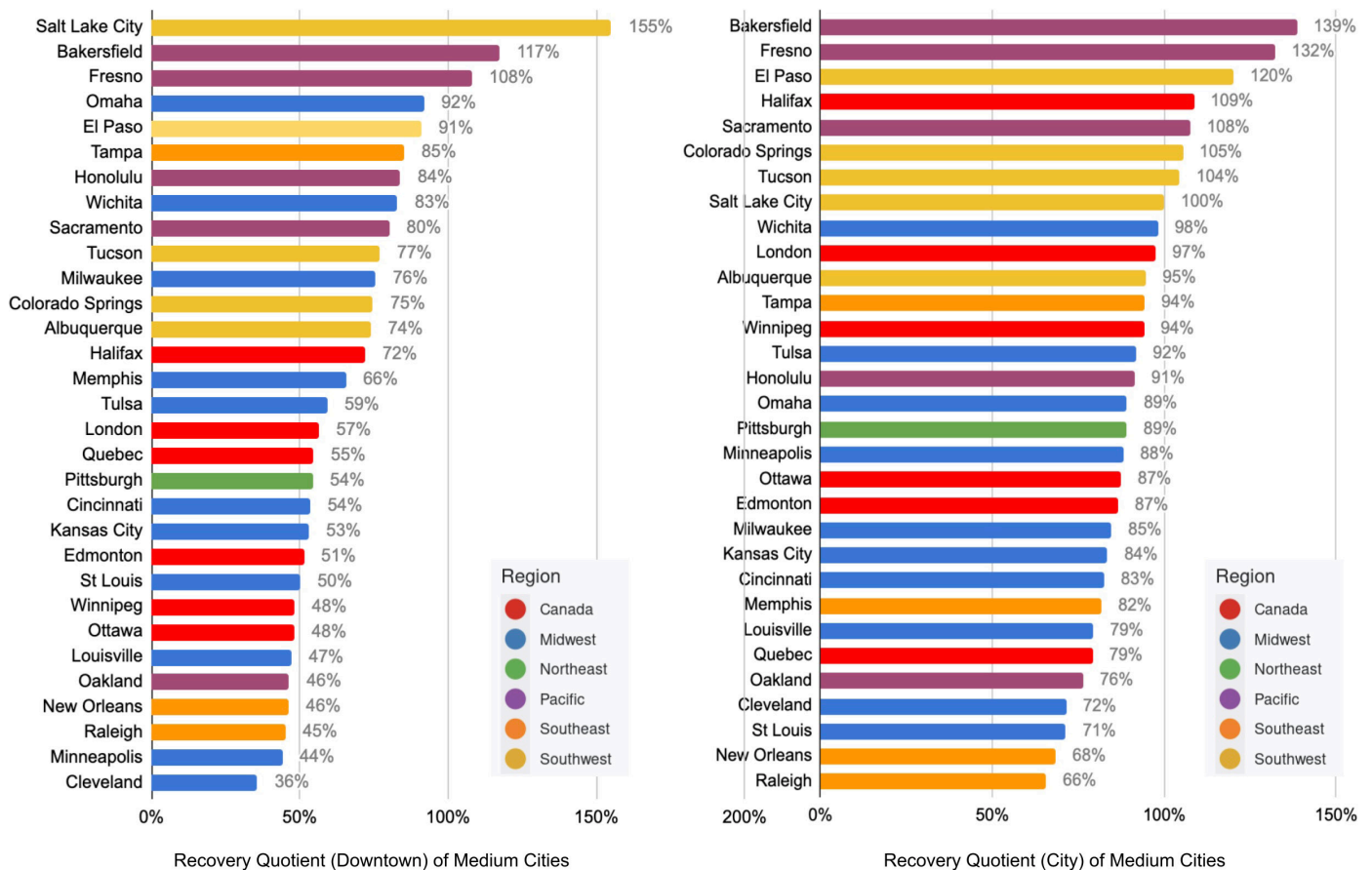
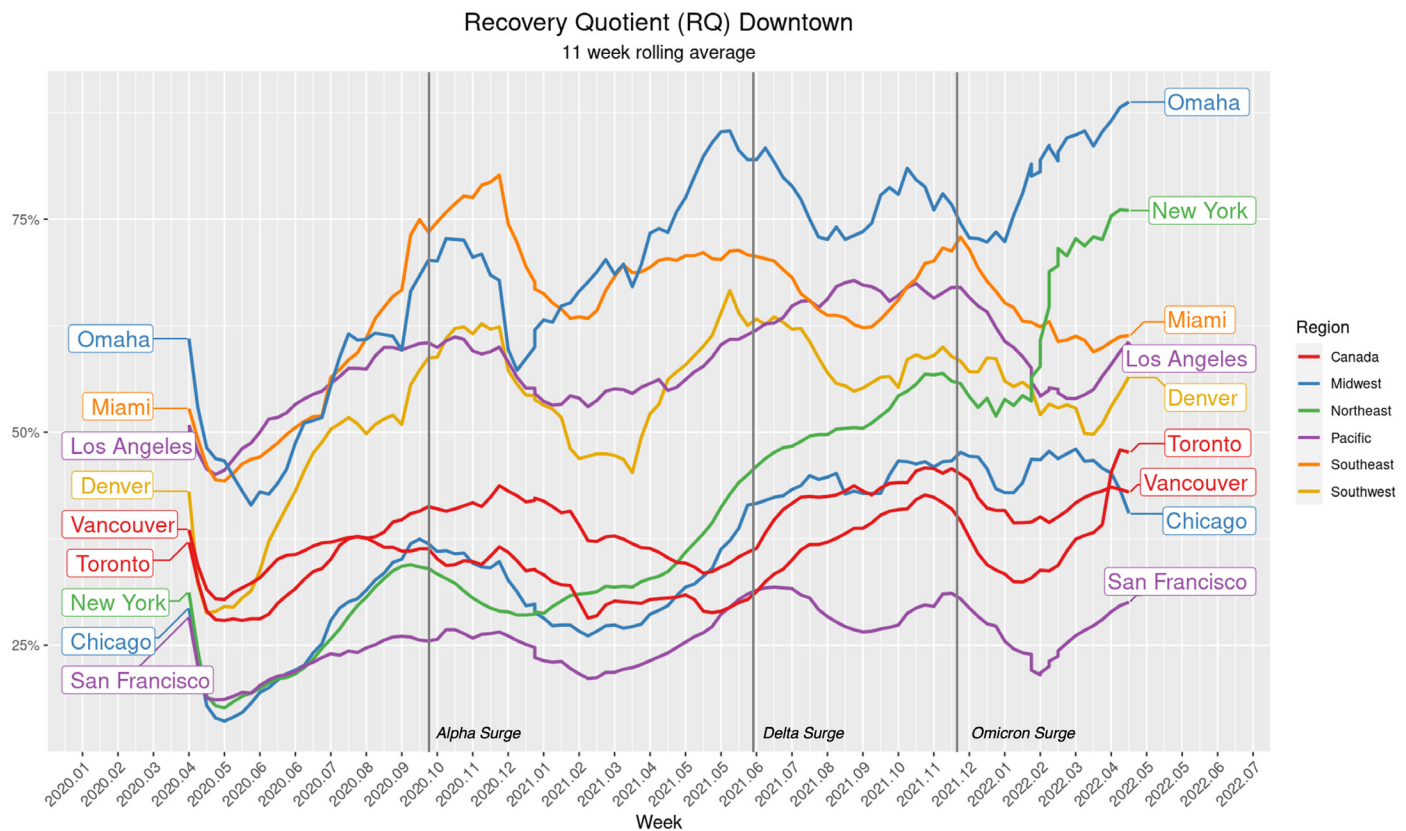


Figure 4: Recovery Quotient Trajectories in 9 Select North American Cities



Explaining Recovery: Downtown Employment and Socioeconomic Explanatory Variables

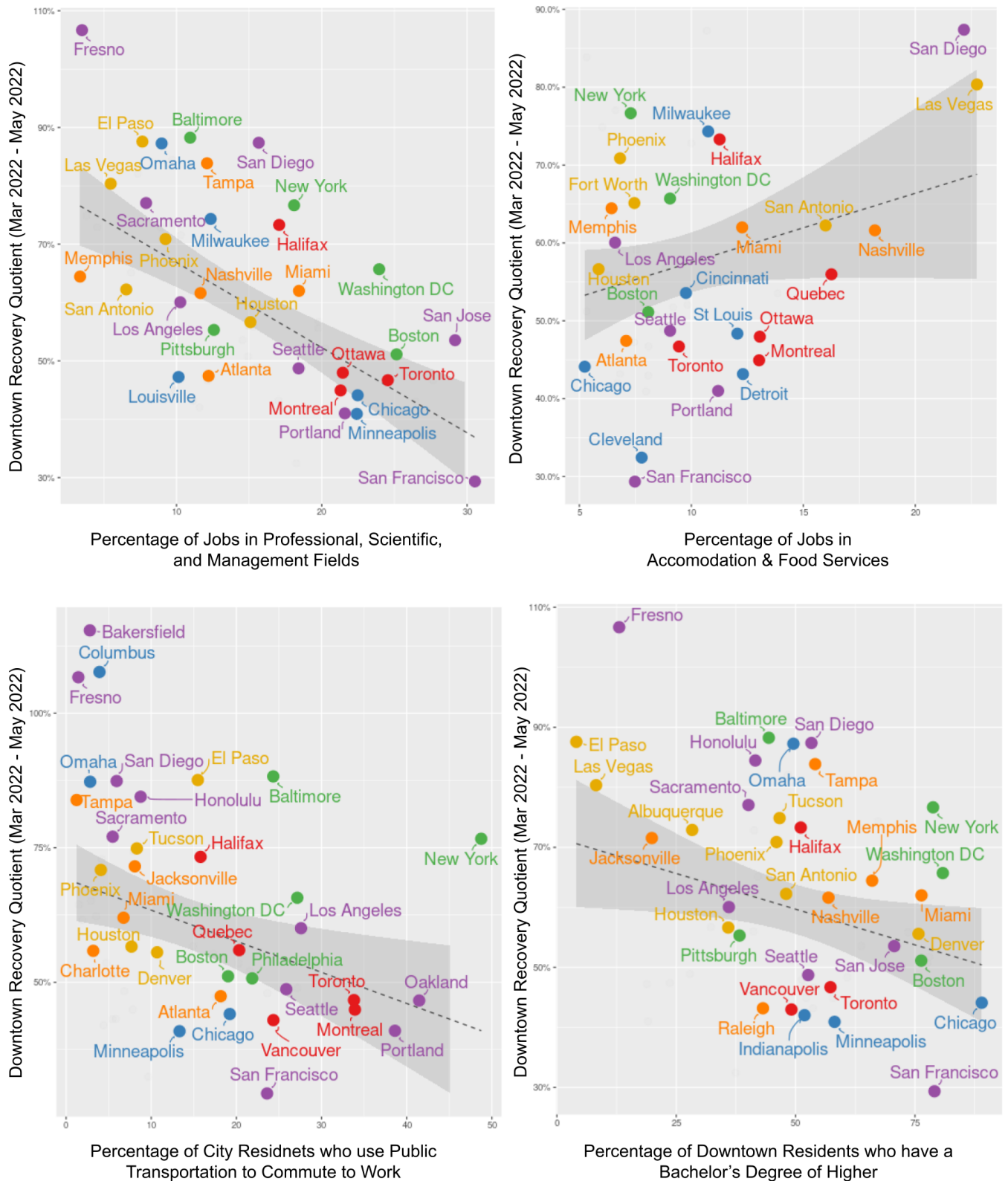
In order to explain recovery patterns, we joined downtown POI data to 43 explanatory employment and socio-economic variables representing the industry mix of downtown employment and the characteristics of downtown residents (see Appendix). We collected data at the zip code level from the United States Census Bureau and at the DA level from Statistics Canada, and then aggregated into the defined downtown regions.

Next, the research team ran random forest and linear regressions to determine the importance of these variables in explaining the variation of

Downtown RQs. Based on the results of the models, the most important and correlated variables include the percentage of jobs in information, professional, scientific and technical fields, accommodation & food services, healthcare & social assistance, and finance & insurance. RQs were also highly correlated to mode share to work, mean commute time to work, education level of downtown residents, business and population density, and the housing stock in the downtown area. Figure 5 shows some of the correlations between these explanatory variables and the RQ of downtown areas.

More factors, such as employment by all industries included in North American Industry Classification System (NAICS), socio-economic variables, and commuting variables can be found on our [website](#).

Figure 5: Most Strongly Correlated Explanatory Variables for Downtown RQ from March 2022 - May 2022



Conclusion and Policy Implications

This research shows that downtowns throughout North America are recovering more slowly than the rest of the city, and that a distinct set of downtowns – typically older, denser downtowns reliant on professional or tech workers and located within large metros – continue to struggle to return to pre-pandemic levels. Recent surveys suggest that remote work will likely be a permanent feature of these types of metros, even under a hybrid model.¹⁷ Although many employers are beginning to enforce in-person work requirements, tight labor markets for high-skilled workers mean the employers have little leverage.

Thus, particularly for these large metros, it may be time to reinvent downtown. Most importantly, downtowns should look to diversify their economies to focus on resilient sectors such as education, health, and government. Cities could help developers convert older (Class B and C) office buildings to residential, institutional, and recreational uses.

But as a recent policy hackathon held by Politico suggests, downtowns also need to be proactive about recreating downtowns for people.¹⁸ This could mean creating outdoor spaces with cultural events; rethinking streets for transit, bikes and pedestrians; moving parking to the outskirts of downtown; and attracting diverse segments of the population to visit (both in terms of age and race/ethnicity). Unlike past recoveries, this may take significant public-private collaboration to accomplish, given the extensive intervention required to remake space.

This policy brief offers a glimpse into downtown recovery at this point in time, but it will be important to continue to track recovery with this data granularity, in order to pinpoint trends. Future research should also examine the role of lockdown policies, political leanings, weather, and new downtown development in the recovery.

In the meantime, we hope that www.downtownrecovery.com will become a information hub for policymakers seeking to shape downtown's next chapter.

About IGS

The Institute of Governmental Studies is California's oldest public policy research center. As an Organized Research Unit of the University of California, Berkeley, IGS expands the understanding of governmental institutions and the political process through a vigorous program of research, education, public service, and publishing.

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Appendix

Employment Variables

Total Jobs in Downtown
Employment Density in Downtown
Employment Entropy in Downtown
Percentage of Jobs in Agriculture, Forestry, Fishing, and Mining in Downtown
Percentage of Jobs in Mining, Quarrying, Oil, and Gas in Downtown
Percentage of Jobs in Utilities in Downtown
Percentage of Jobs in Construction in Downtown
Percentage of Jobs in Manufacturing in Downtown
Percentage of Jobs in Wholesale Trade in Downtown
Percentage of Jobs in Retail Trade in Downtown
Percentage of Jobs in Transportation and Warehousing in Downtown
Percentage of Jobs in Information in Downtown
Percentage of Jobs in Finance & Insurance in Downtown
Percentage of Jobs in Real Estate in Downtown
Percentage of Jobs in Professional, Scientific, and Management in Downtown
Percentage of Jobs in Management in Downtown
Percentage of Jobs in Administrative Support & Waste Management in Downtown
Percentage of Jobs in Educational Services in Downtown
Percentage of Jobs in Healthcare & Social Assistance in Downtown
Percentage of Jobs in Arts, Entertainment, and Recreation in Downtown
Percentage of Jobs in Accommodation & Food Services in Downtown
Percentage of Jobs in Public Administration in Downtown

Socioeconomic Variables

Total Population Downtown
Population Density Downtown
Total Housing Stock Downtown
Housing Density Downtown
Percentage of Rented-Occupied Units in Downtown
Percentage of Single-Family Homes in Downtown
Percentage of Multi-Family Homes in Downtown
Median Age of Downtown Residents
Percentage of Downtown Residents with a Bachelor's Degree or Higher
Percentage of Vacant Housing Units in Downtown
Median Rent of Downtown Housing Units
Median Household Income of Downtown Residents
Percentage of White Residents in City
Percentage of Black Residents in City
Percentage of Hispanic Residents in City
Percentage of Asian Residents in City
Average Commute Time in City
Percentage of City Residents who Commute to Work by Car
Percentage of City Residents who Commute to Work by Public Transit
Percentage of City Residents who Commute to Work by Bicycle
Percentage of City Residents who Commute to Work by Walking

Endnotes

1. Eugenie Ladner Birch, "Having a Longer View on Downtown Living," *Journal of the American Planning Association* 68, no. 1 (2002): 5-21, [doi:10.1080/01944360208977188](https://doi.org/10.1080/01944360208977188); Robert Cervero, *America's Suburban Centers: The Land Use—Transportation Link* (Routledge, 2018); Patricia L Mokhtarian, "Telecommuting and Travel: State of the Practice, State of the Art," *Transportation* 18, no. 4 (1991): 319-342, [doi:10.1007/BF00186563](https://doi.org/10.1007/BF00186563).
2. Alfred Marshall, *Principles of Economics* (London: Macmillan, 1920); Allen J. Scott, "Locational Patterns and Dynamics of Industrial Activity in the Modern Metropolis," *Urban Studies* 19, no. 2 (1982): 111-141, [doi:10.1080/0266482820080261](https://doi.org/10.1080/0266482820080261).
3. Truman A. Hartshorn and Peter O. Muller, "Suburban Downtowns and the Transformation of Metropolitan Atlanta's Business Landscape," *Urban Geography* 10, no. 4 (1989): 375-395, [doi:10.2747/0272-3638.10.4.375](https://doi.org/10.2747/0272-3638.10.4.375).
4. Tracy Hadden Loh and Joanne Kim, "To Recover from COVID-19, Downtowns Must Adapt," *Brookings* (blog), <https://www.brookings.edu/research/to-recover-from-covid-19-downtowns-must-adapt/> (accessed August 20 2021).
5. Nellie Bowles, "They Can't Leave the Bay Area Fast Enough," *The New York Times*, January 14 2021, <https://www.nytimes.com/2021/01/14/technology/san-francisco-covid-work-moving.html?referringSource=articleShare> (accessed January 28 2021); Matthew Haag, "Office Vacancies Soar in New York, a Dire Sign for the City's Recovery," *The New York Times*, July 1 2021, <https://www.nytimes.com/2021/07/01/nyregion/manhattan-vacant-office-space-real-estate.html> (accessed August 20 2021); C. J. Hughes, "Coronavirus Escape: To the Suburbs," *The New York Times*, May 8 2020, <https://www.nytimes.com/2020/05/08/realestate/coronavirus-escape-city-to-suburbs.html> (accessed August 17 2021); Mihir Zaveri, "Suburban Home Sales Boom as People Move Out of N.Y.C.," *The New York Times*, August 31 2020, <https://www.nytimes.com/2020/08/31/nyregion/suburbs-nyc-pandemic.html> (accessed August 17 2021).
6. Erik Brynjolfsson et al., "COVID-19 and Remote Work: An Early Look at US Data," NBER Working Paper No. 27344, <https://www.nber.org/papers/w27344>; Joakim A. Weill et al., "Social Distancing Responses to COVID-19 Emergency Declarations Strongly Differentiated by Income," *Proceedings of the National Academy of Sciences* 117, no. 33 (2020): 19658-19660, [doi:10.1073/pnas.2009412117](https://doi.org/10.1073/pnas.2009412117).
7. Jose Maria Barrero, Nicholas Bloom, and Steven J. Davis, "Why Working from Home Will Stick," NBER Working Paper No. 28731, <https://www.nber.org/papers/w28731>; Matthew Boyle and Olivia Rockeman, "New Yorkers Plan to Cut Time Spent in the Office by Half, Survey Finds," *Bloomberg*, March 31 2022, https://www.bloomberg.com/news/articles/2022-03-31/new-yorkers-plan-to-work-from-home-half-the-time?cmpid=BBD033122_CITYLAB&utm_medium=email&utm_source=newsletter&utm_term=220331&utm_campaign=citylabdaily
8. Richard Florida and Joel Kotkin, "America's Post-Pandemic Geography," *City Journal* (Spring 2021), <https://www.city-journal.org/americas-post-pandemic-geography>; N. David Milder, "Remote Work: An Example of How to Identify a Downtown-Related Trend Breeze That Probably Will Outlast the COVID-19 Crisis," *Journal of Urban Regeneration & Renewal* 14, no. 2 (2020): 135-154, <https://hstalks.com/article/6027/remote-work-an-example-of-how-to-identify-a-downto/>.

9. Edward L. Glaeser, "Urban Resilience," *Urban Studies* 59, no. 1 (2022): 3-35, [doi:10.1177/00420980211052230](https://doi.org/10.1177/00420980211052230); Loh and Kim, "To Recover from COVID-19," 2021.
10. Price Waterhouse Cooper Canada, "The Impact of the Pandemic on the Downtown Areas of Canada's Six Major Cities," Report for the City of Montreal, (Toronto: Price Waterhouse Cooper Canada, 2021); Murtaza Haider and Amar Iqbal Anwar. "The Prevalence of Telework under COVID-19 in Canada," *Information Technology & People* (2022), [doi:10.1108/ITP-08-2021-0585](https://doi.org/10.1108/ITP-08-2021-0585); Yasuyuki (Yas) Motoyama, "Is COVID-19 Causing More Business Closures in Poor and Minority Neighborhoods?," *Economic Development Quarterly* 36, no. 2 (May 2022): 124-33, [doi:10.1177/08912424221086927](https://doi.org/10.1177/08912424221086927); Taner Osman, "COVID's Impact on Downtown Economies: What Does the Future Hold?," (Riverside, CA: UC Riverside School of Business, 2021).
11. Lavea Brachman, "The Perils and Promise of America's Legacy Cities in the Pandemic Era," *Brookings* (blog), August 12, 2020, <https://www.brookings.edu/research/the-perils-and-promise-of-americas-legacy-cities-in-the-pandemic-era/>; Florida and Kotkin, "America's Post-Pandemic Geography," 2021
12. For two examples of return-to-office indicators, see <https://www.avisonyoung.com/return-to-office-vitality-index#:~:text=Avison%20Young%20has%20launched%20The,intelligence%20and%20location%20analytics%20partner> ; https://www.economist.com/graphic-detail/tracking-the-return-to-normalcy-after-covid-19?utm_source=YouTube&utm_medium=Economist_Films&utm_campaign=Endscreen&utm_term=Business_and_Finance&utm_content=Correspondent
13. Florida and Kotkin, "America's Post-Pandemic Geography," 2021; Renuka Rayasam, "Policy Hackathon: Recreating America's Downtowns," *Politico* (2021) <https://www.politico.com/news/2021/10/21/recreating-americas-downtowns-post-covid-515999>
14. Gary Sands, Laura A. Reese, Chade Saghir, and Pierre Filion, "Planning for Post-Pandemic Downtowns of Mid-Size Urban Areas," *Planning Practice & Research* (2021): 1-13, [doi:10.1080/02697459.2021.2016200](https://doi.org/10.1080/02697459.2021.2016200).
15. François Sergerie, Karl Chastko, Dylan Saunders, and Patrick Charbonneau, "Defining Canada's Downtown Neighbourhoods: 2016 Boundaries," *Statistics Canada* (2021) <https://www150.statcan.gc.ca/n1/pub/91f0015m/91f0015m2021001-eng.htm>
16. This analysis omits Dallas, Orlando, Oklahoma City, and Mississauga due to data inconsistencies.
17. Quoc Trung Bui, "Delta Variant Hasn't Yet Changed Many Return-To-Office Plans," *The New York Times*, August 12 2021, <https://www.nytimes.com/2021/08/12/upshot/covid-return-to-office.html?searchResultPosition=4>; Emma Goldberg, "Just 8% Of Manhattan Office Workers Are Back Full Time, Survey Shows," *The New York Times*, May 10 2022, <https://www.nytimes.com/2022/05/10/business/return-to-office-manhattan.html?searchResultPosition=1>
18. Rayasam, "Policy Hackathon," 2021.