IFC-Bank of Italy Workshop on “Data Science in Central Banking: Applications and tools”

14-17 February 2022

Using non-traditional point of interest data as merchant survey sample frames[1]

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[1] This contribution was prepared for the workshop. The views expressed are those of the authors and do not necessarily reflect the views of the Bank of Italy, the BIS, the IFC or the other central banks and institutions represented at the event.

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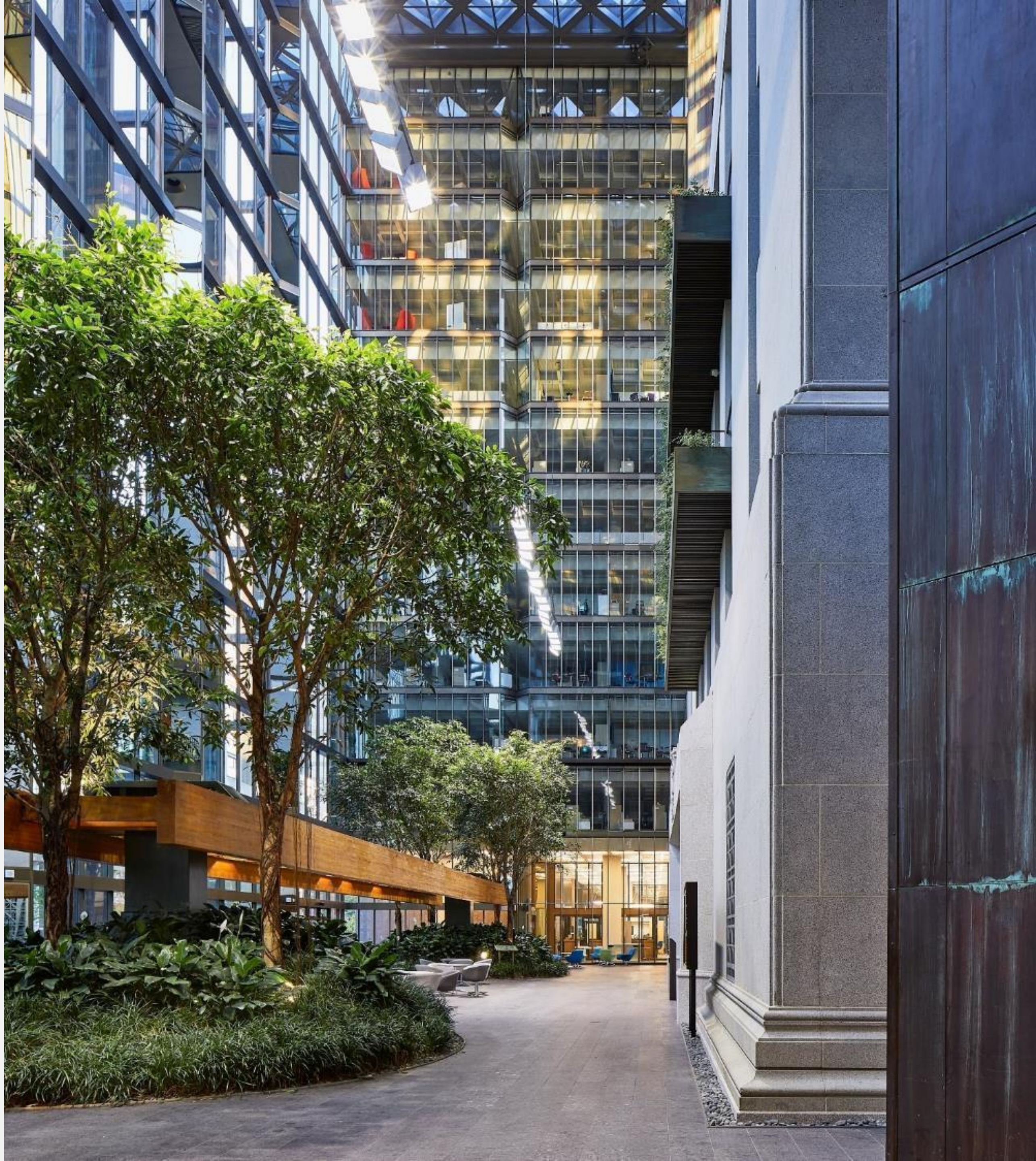
16 FEBRUARY 2022

Using Non-traditional Point of Interest Data as Merchant Survey Sample Frames

BIS-IFC and Bank of Italy workshop on "Data science in central banking"

Presenter: Joy Wu with Marcel Voia and Angelika Welte



Motivation

- The Bank of Canada is conducting a 2021 Merchant Acceptance Survey (MAS)
  - **Objective:** collect data on how method of payment acceptance at physical point-of-sale has evolved over the COVID-19 Pandemic
- Previous Merchant Surveys faced challenges in constructing the sample frame
  - **Issues with previous frames**:
    - Invalid addresses, closed businesses and bad phone numbers
- **Proposed Solution:** Use SafeGraph to improve data quality of record-level business observations in the sample frame

Sources of data and trade-offs

National Statistical agency

- Administrative data
- Probabilistic sampling
- Confidential
- Updates (bi-annual/quarter/months)
- Examples: Statistics Canada (Business Register (BR), Payroll Deduction (PD-7))

Non-traditional data sources

- Convenience/Big Data
- Non-Probabilistic sampling
- Data as a Service (DaaS)
- Updates (weeks/days)
- Examples: Google places, SafeGraph

SAFEGRAPH

Places – 11M+ Global Points of Interest (POI), 844K+ POI in Canada

Updated Monthly

Geometry – 7.8 Million Points of Interest (POI) in Canada , US, and GB.

Updated Monthly

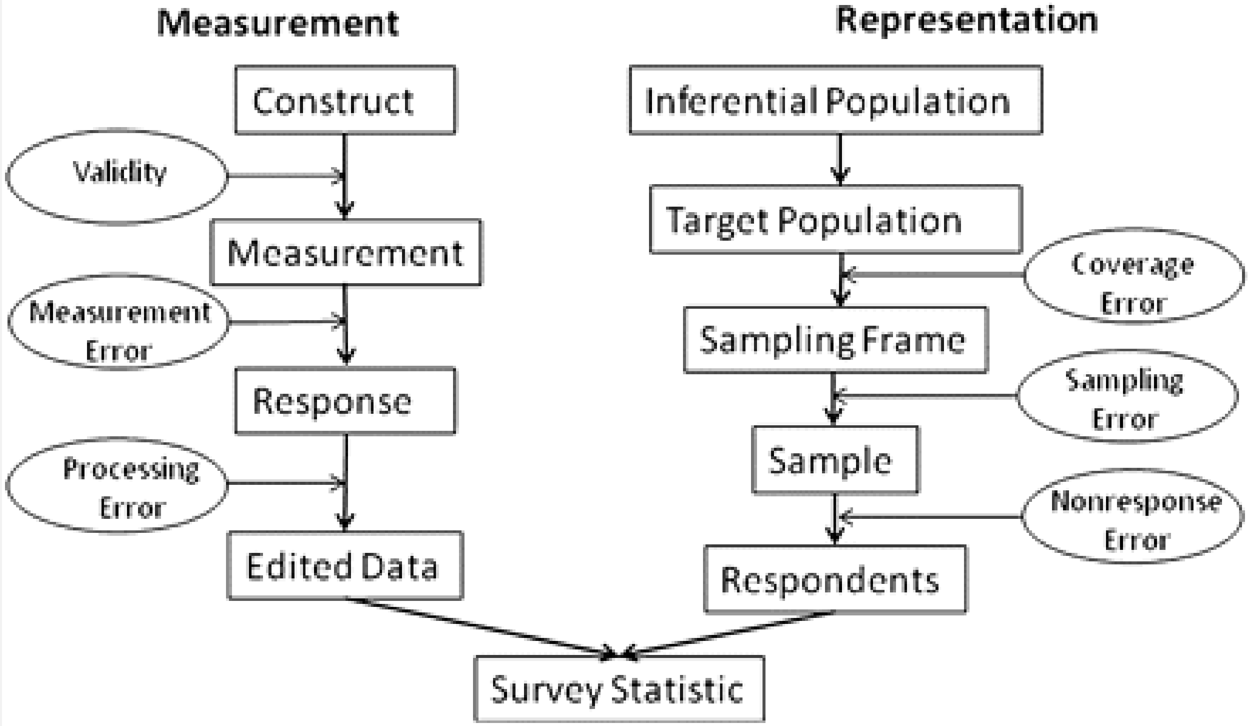
Canada Weekly Patterns [BETA] – 400k POIs and 800 Brands.

Updated Weekly

SafeGraph data is automatically ingested on a weekly basis using AWS to Azure (Bank of Canada) blob

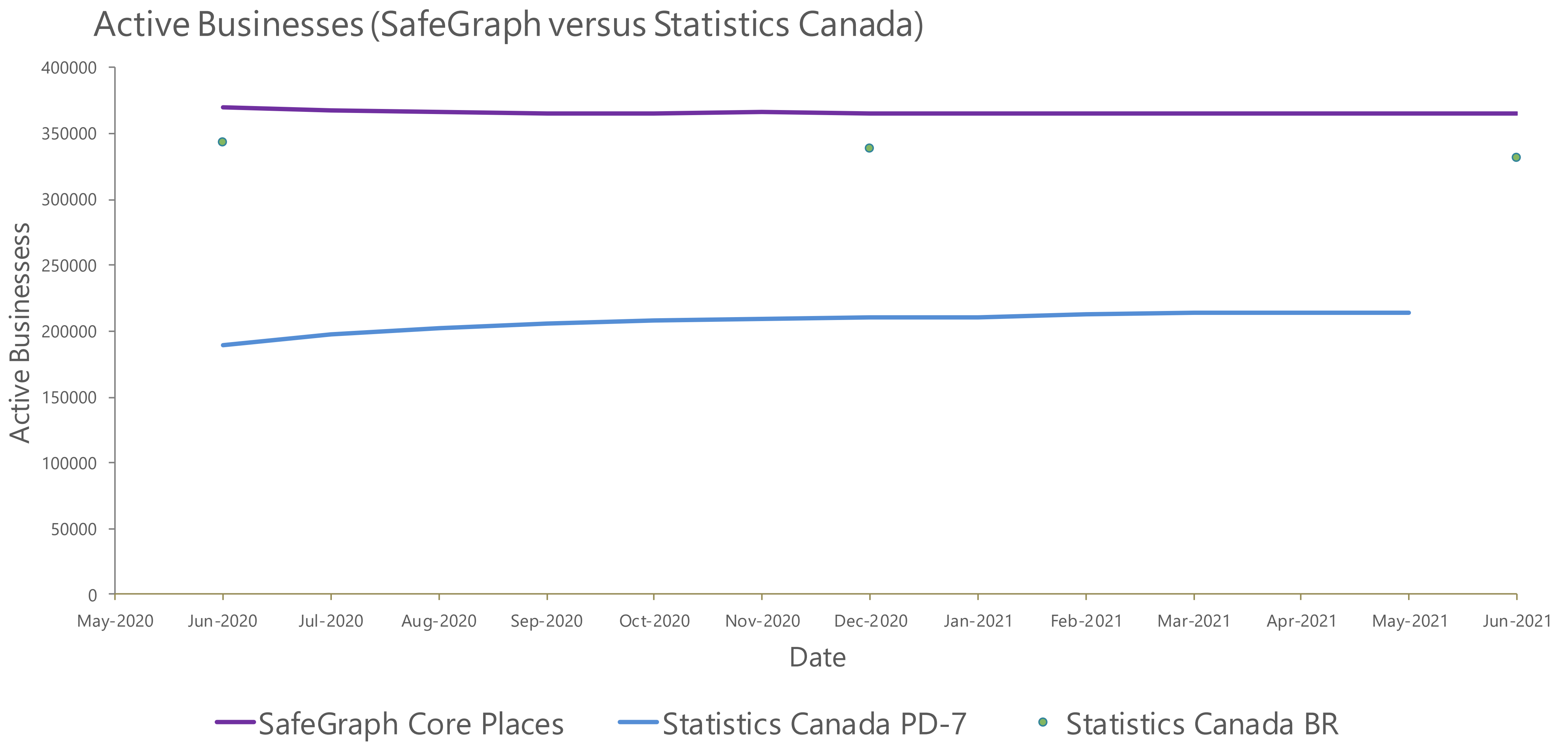
Correspondence with Official Statistics

	Official Statistics	SafeGraph
Base Information (Business name, industry, phone number etc.)	Statistics Canada BR	Places
Business Activity (Recent and historical)	Statistics Canada PD-7	Places / Canada Weekly Patterns (Foot traffic)



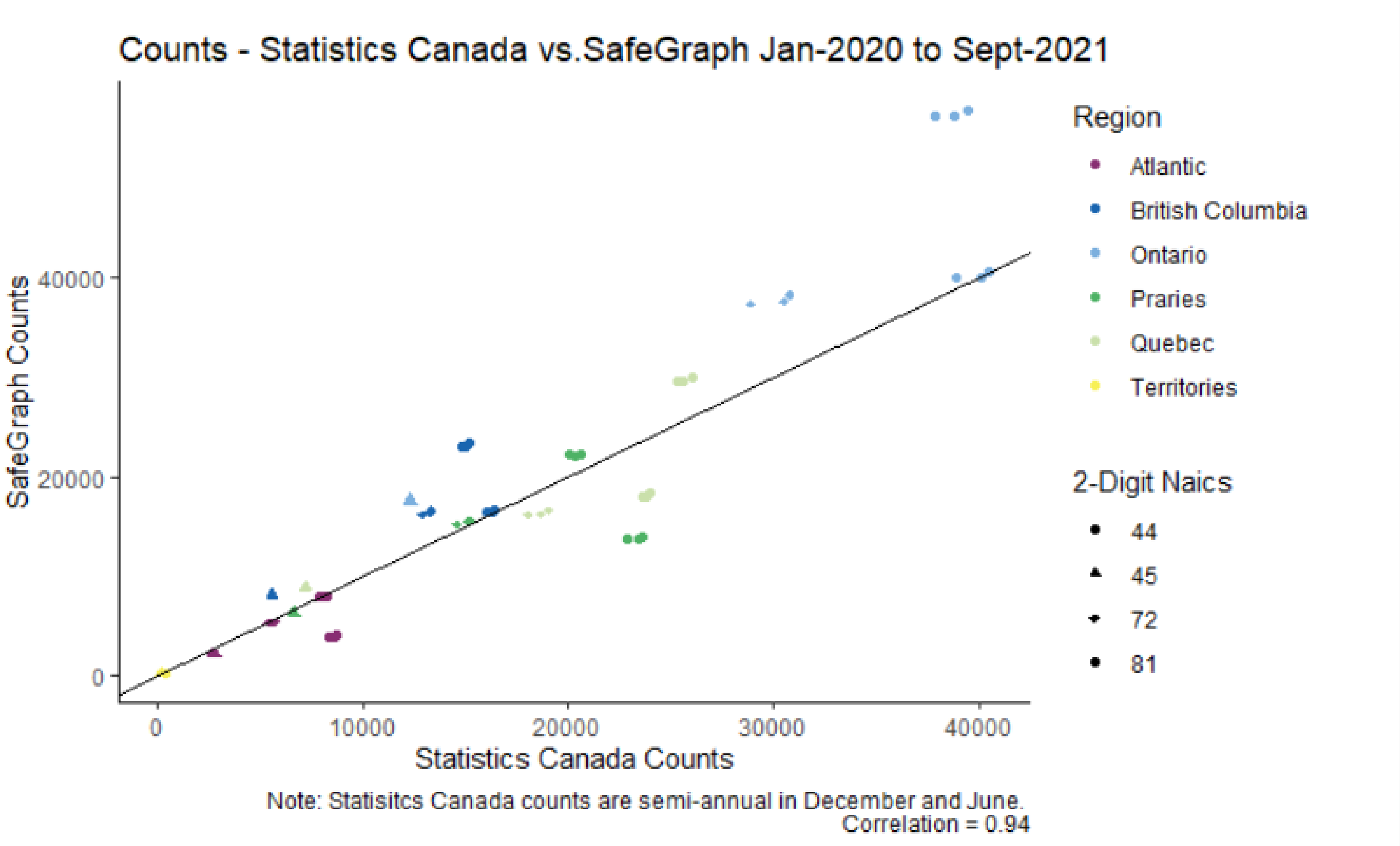
Total Survey Error Components Linked to Steps in the Measurement and Representational Inference Process (Groves et al. 2004)

Comparison with Official Statistics



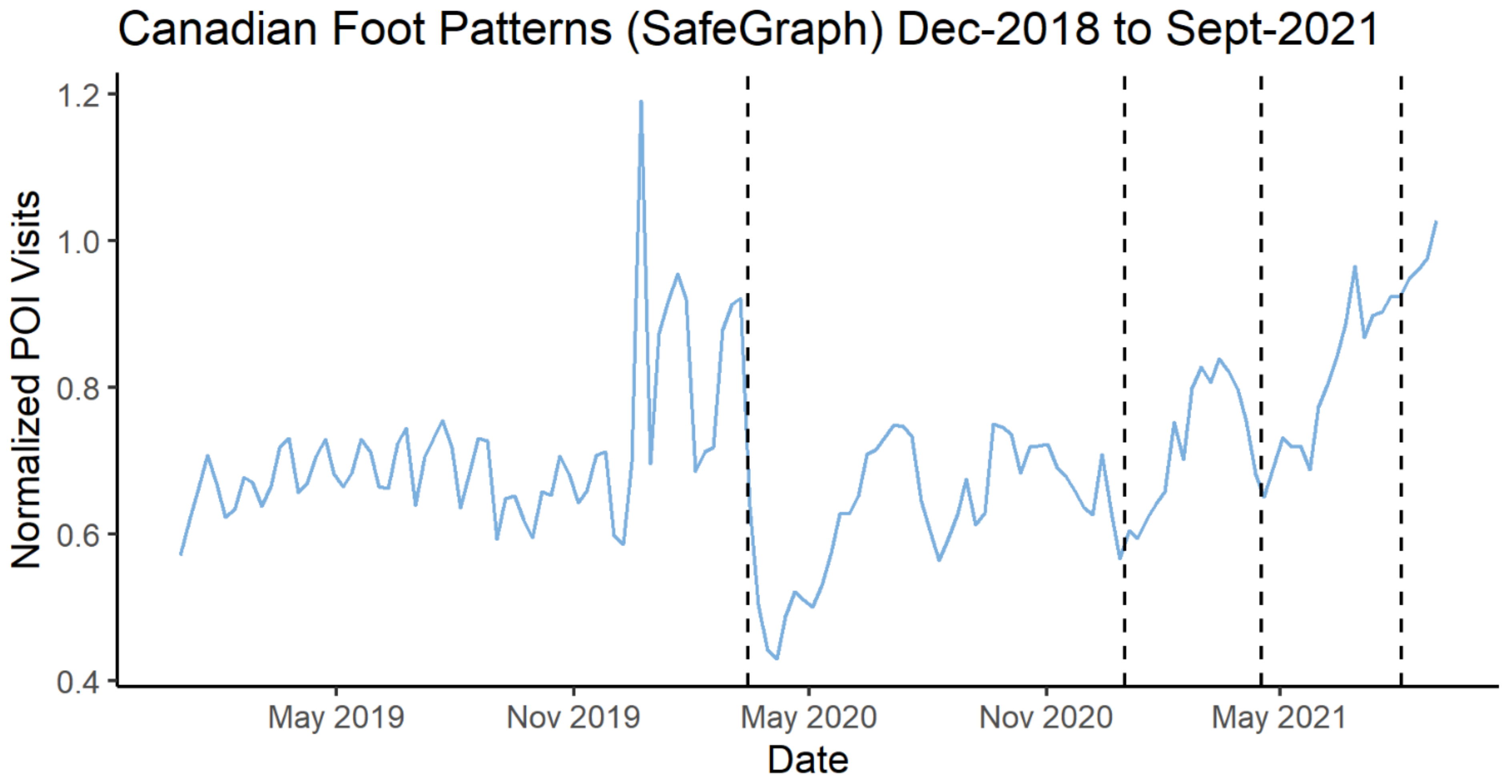
Note: NAICS 44, 45, 72, and 81. All business sizes.
Chart produced in September 2021
SafeGraph is updated weekly, PD-7 is updated monthly with a three month lag, the BR is updated bi-annually with a lag of two months

SafeGraph Overcount by Region and Industry



- SafeGraph overcounts in distinct region and industry clusters:
  - Ontario 44, 45 and 81
  - British Columbia 44, 81

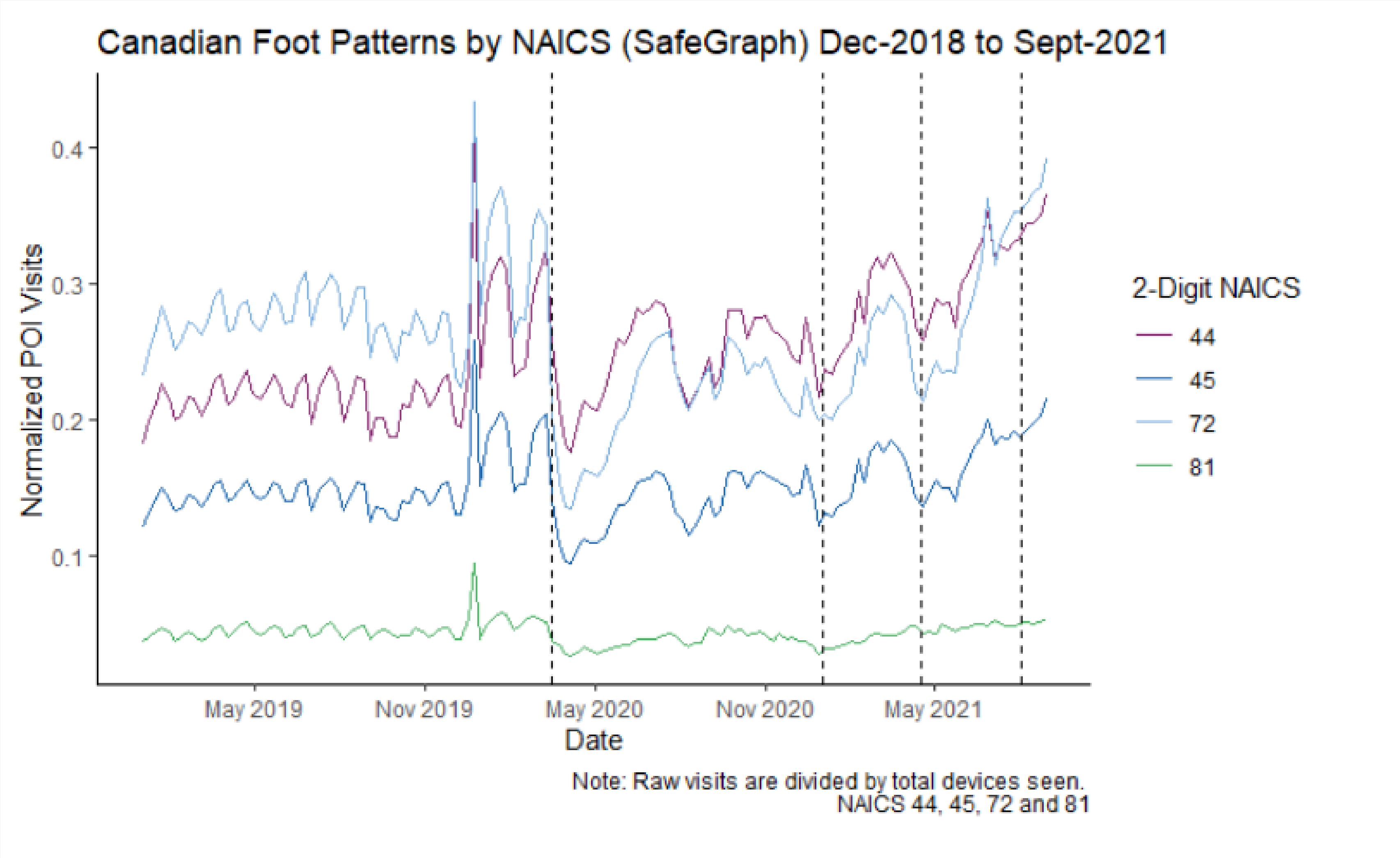
Foot Patterns



Note: Raw visits are divided by total devices seen.

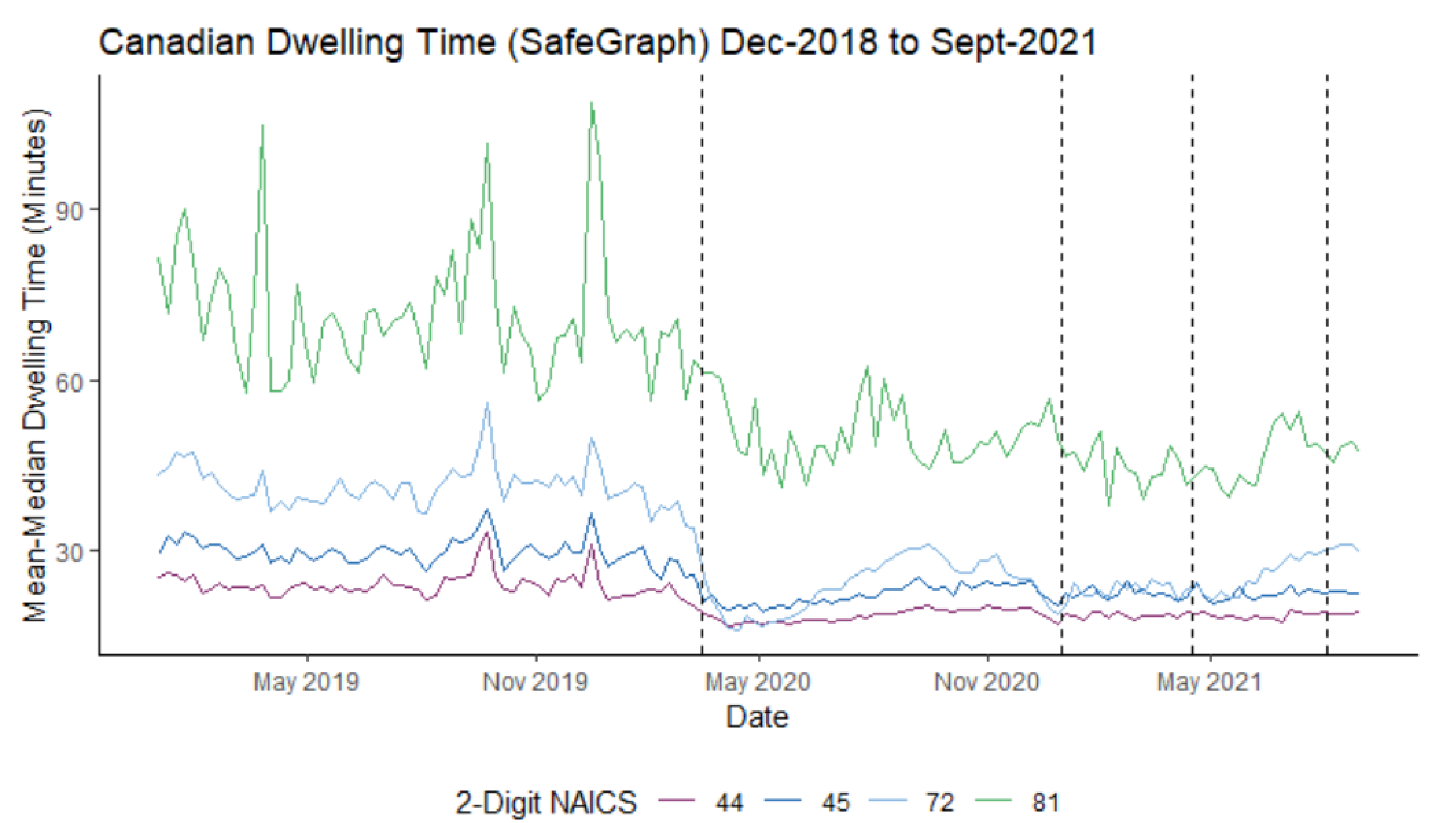
Note: Approximate Canadian COVID-19 pandemic wave dates indicated by dashed line.
Note: Raw visits are divided by total devices seen.

Foot Patterns by Industry



- Overall increase in foot traffic primarily driven by NAICS 44, 72

Dwelling Time by Industry



- Increased foot patterns corresponds with decreased dwelling time

2021 Merchant Acceptance Survey Pilot

- MAS Batch 1 was conducted from in 2021
  - >3000 businesses from an in-house survey frame were contacted

Of > 3000 numbers called

- 47% had a SafeGraph match
  - **4%** had Phone number issues
  - 96% did not
- 53% did not have a SafeGraph match
  - **8%** had Phone number issues
  - 92% did not

Conclusion

- Complement to national statistical agency data
- SafeGraph provides timely updates on physical business openings/closures
- SafeGraph makes the survey process more efficient
  - Can help verify addresses, whether businesses are open and closed and bad phone numbers
- More research to automate/integrate processes

Thanks/Merci