Measuring Spending Using Card Transaction Data before, during and after the COVID-19 Pandemic

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Measuring spending using card transaction data

- The COVID-19 pandemic required an immediate response
  - Pandemic declaration and policy responses caused large, rapid shifts in economic conditions
  - High-frequency economic data (daily or weekly) are needed to trace the path of the economy
  - Concerns about survey data quality (mostly unfounded) and indicators
- We use card transactions to respond to this challenge
  - Rapid (3-to-5-day delay)
  - High frequency (daily)
  - Granular (3-digit NAICS based on merchant category)

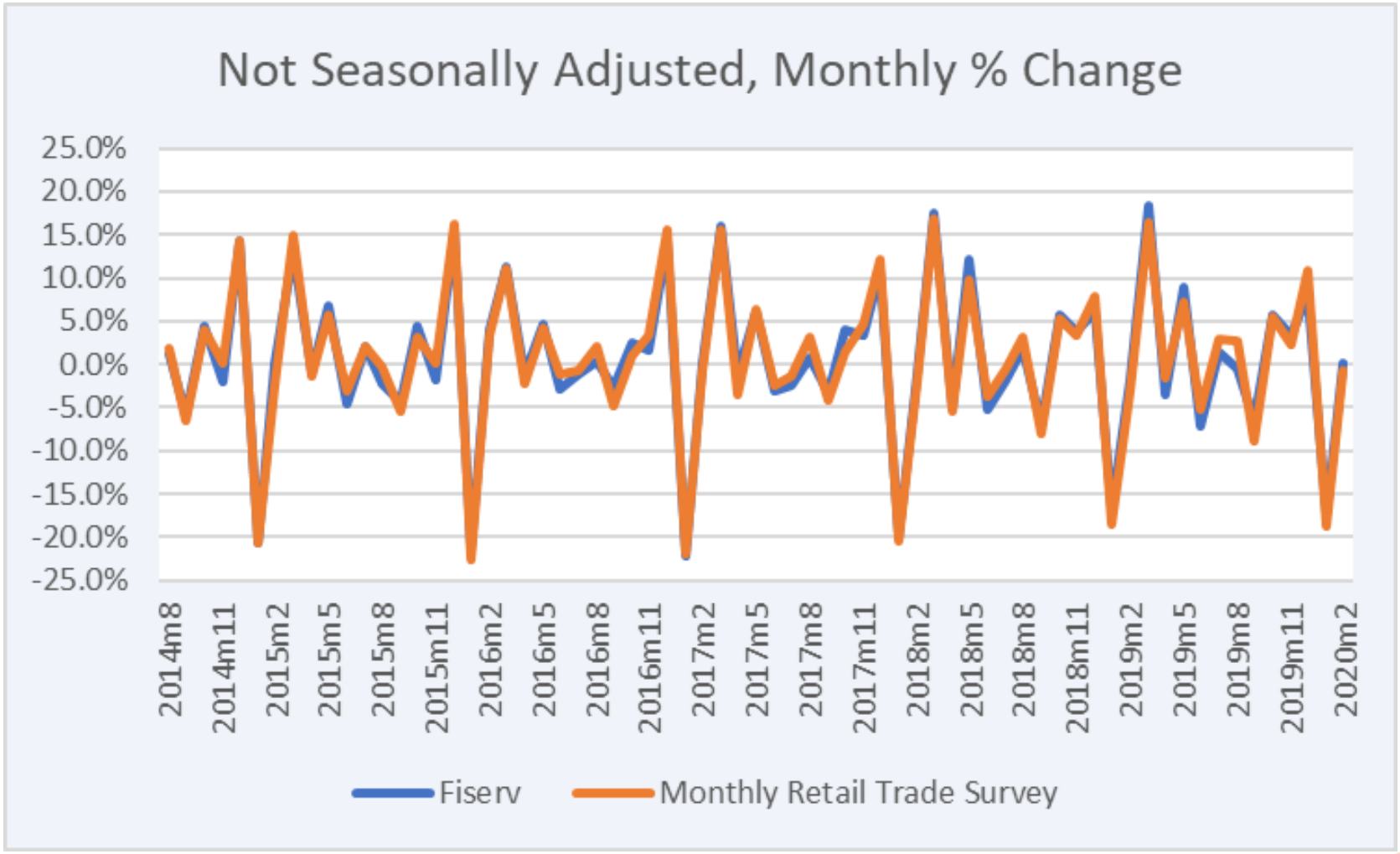
Overview

- High-frequency estimates and initial response
  - Overview of data source
  - We develop a simple model to eliminate seasonal patterns and trends and to evaluate the daily patterns after the pandemic was declared
  - We provide an overview of the daily estimates and discuss the timeline of how these estimates were released and updated
- Lessons from comparisons with source data before and after the pandemic
  - We compare card data with official sources before and after the pandemic to show the data's usefulness in more or less volatile periods
  - We find that the card data series were more informative than some pre-pandemic estimates had suggested
  - We provide an interpretation of these results
- Current work, future work and key questions

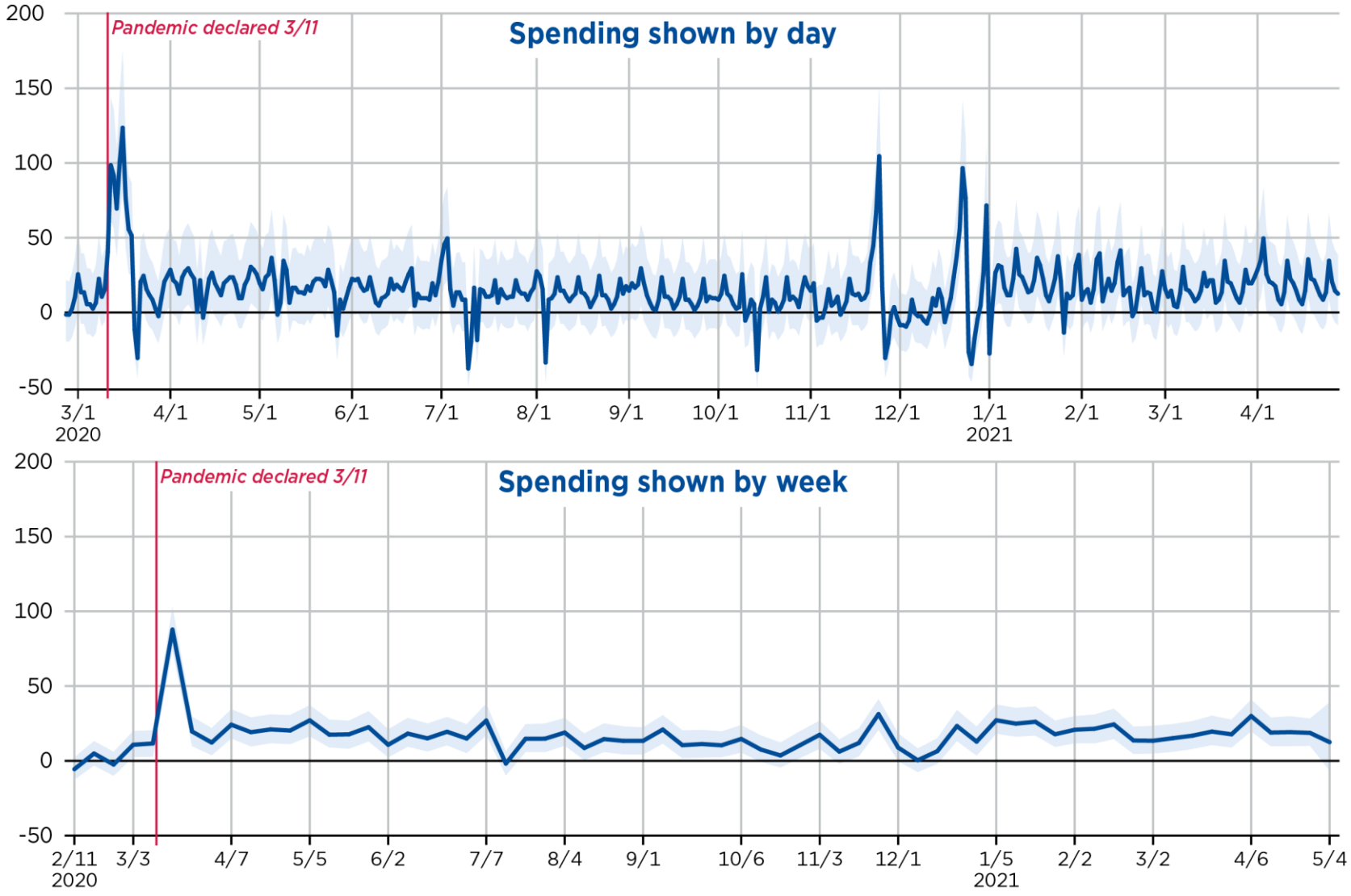
Data/method overview

- Fiserv card transaction data
  - Fiserv is one of the world's largest card transaction intermediaries: $2.6 trillion in annual card transactions worldwide
  - Each observation is a card swipe (e.g., debit, credit or gift card) or online transaction, but aggregated to national level by 3-digit NAICS
  - More details discussed by Dunn *et al.* (2020)
- Data series constructed using FRB and Palantir methodology
  - FRB Paper - Aladangady *et al*. (2019) – 13-month rolling panel methodology with benchmarking to 2012 Economic Census
  - Produces a much more stable and informative series
- The data have some limitations
  - They may not be representative, variable coverage across categories, and unclear how well entry/exit are captured
- Method: Regression on daily data eliminates some seasonality, long-term trends

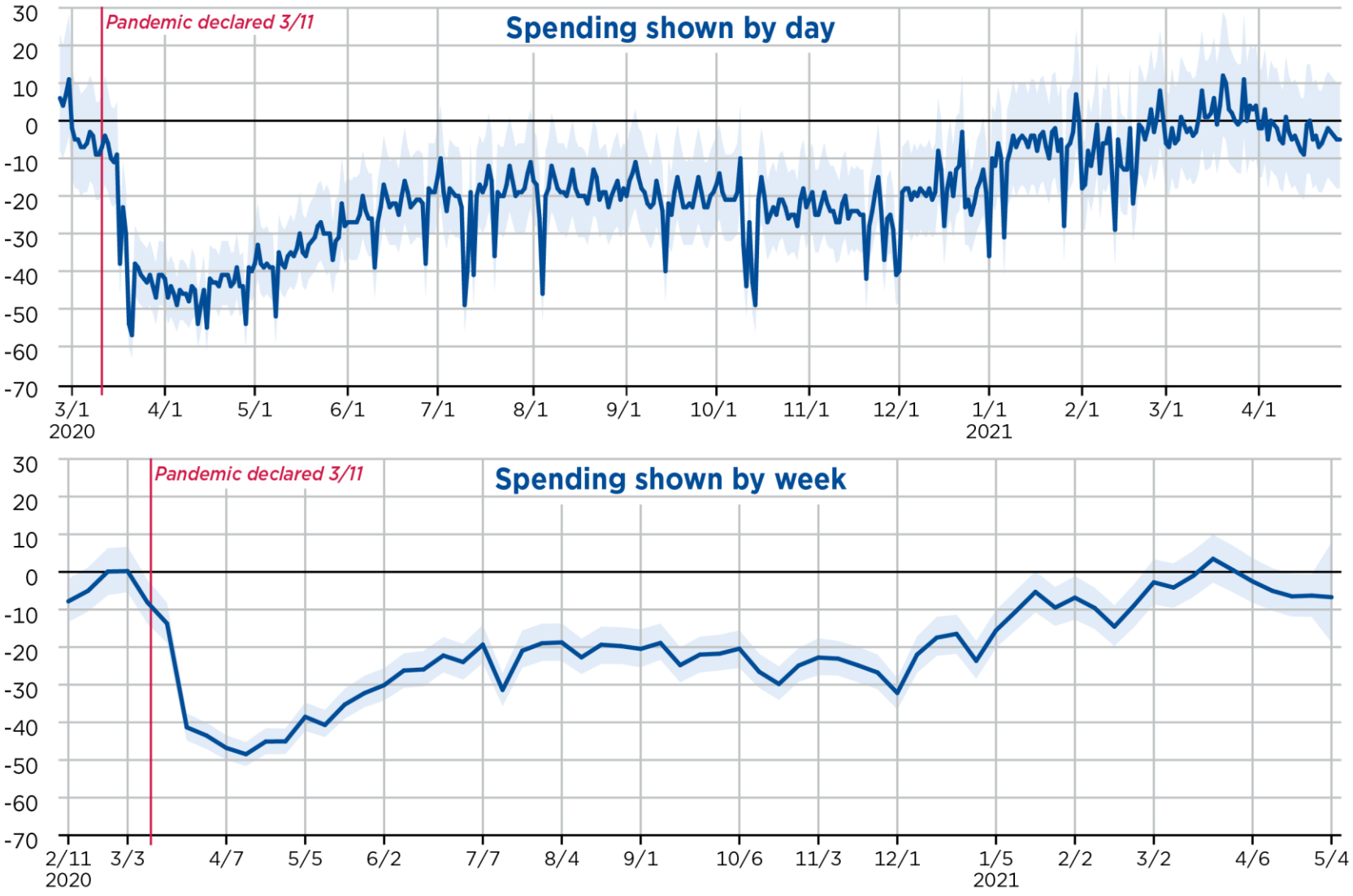
Comparison with MRTS



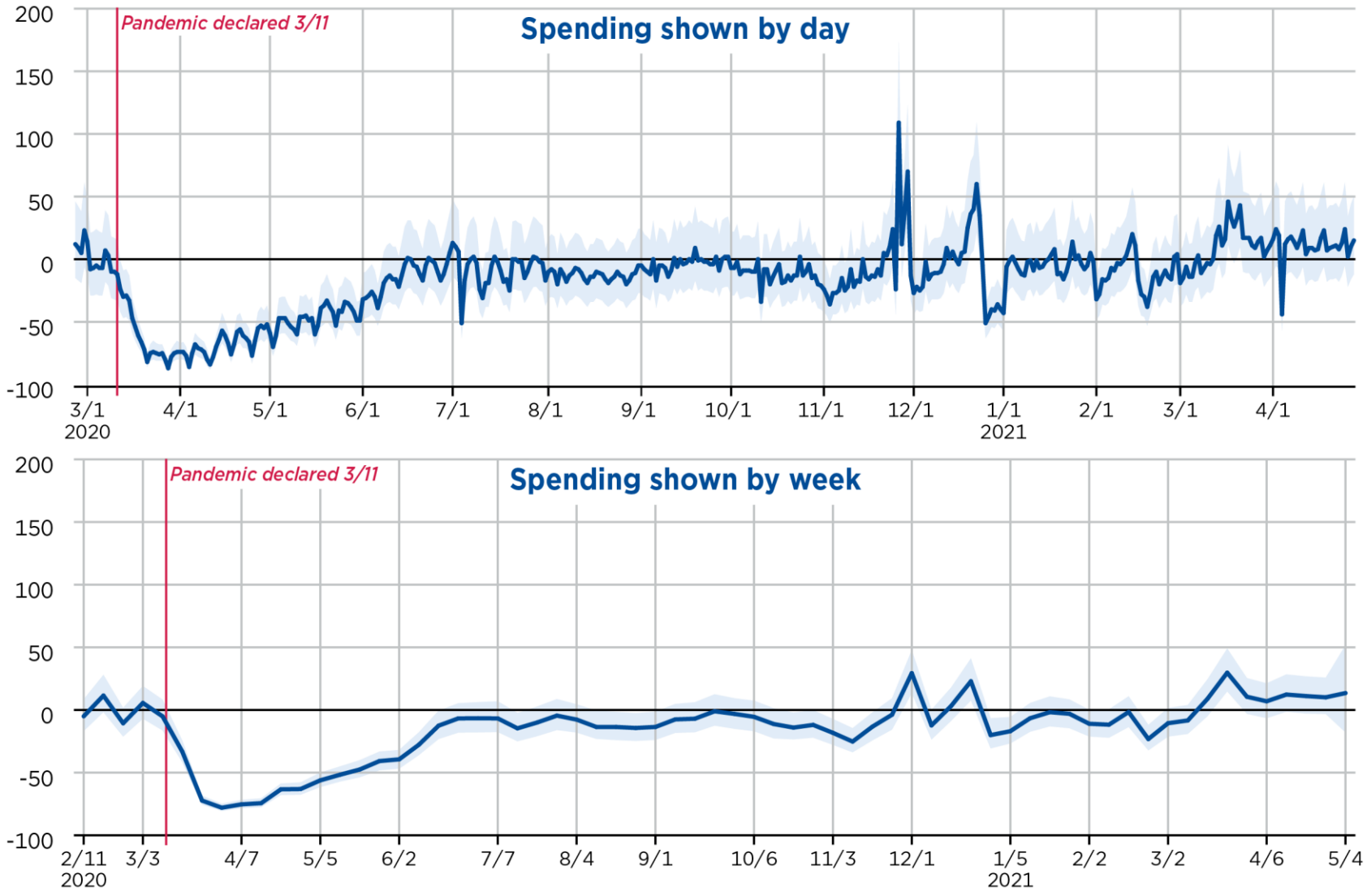
Food and beverage (445)



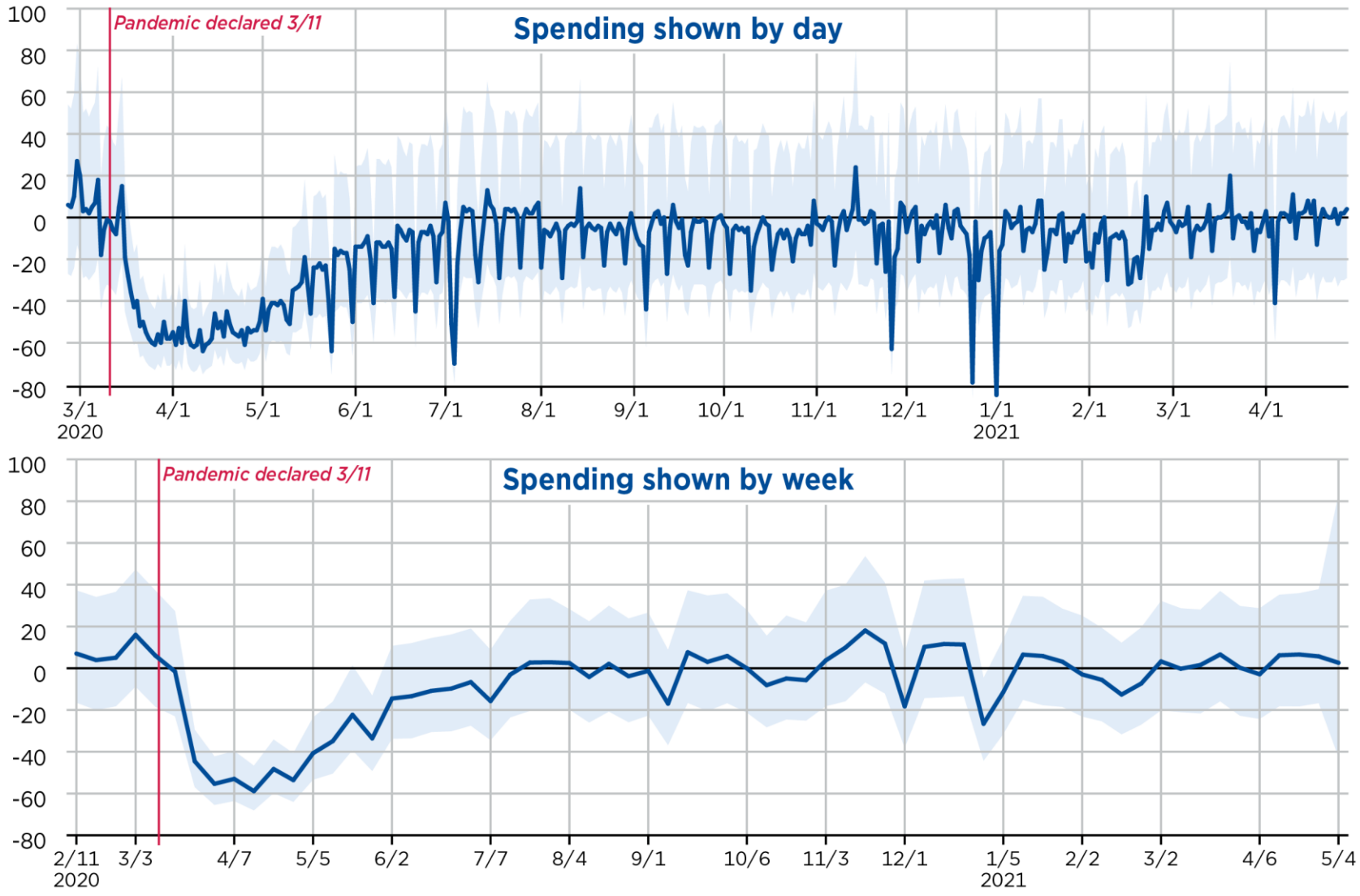
Gas stations (447)



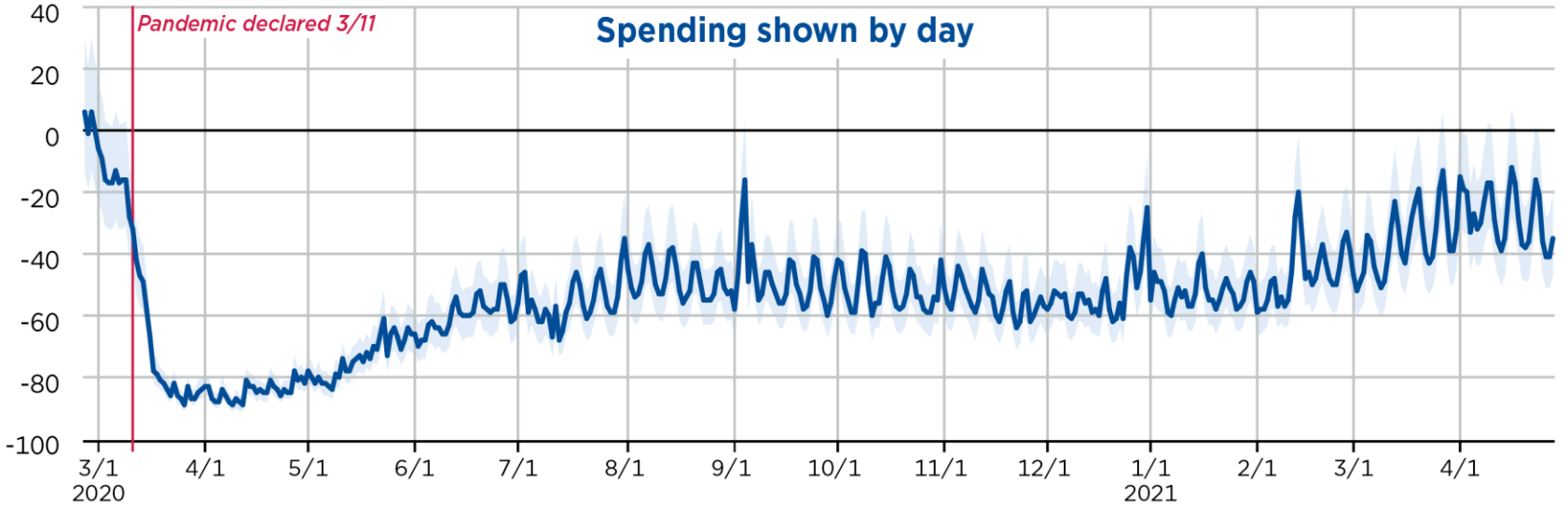
Clothing (448)

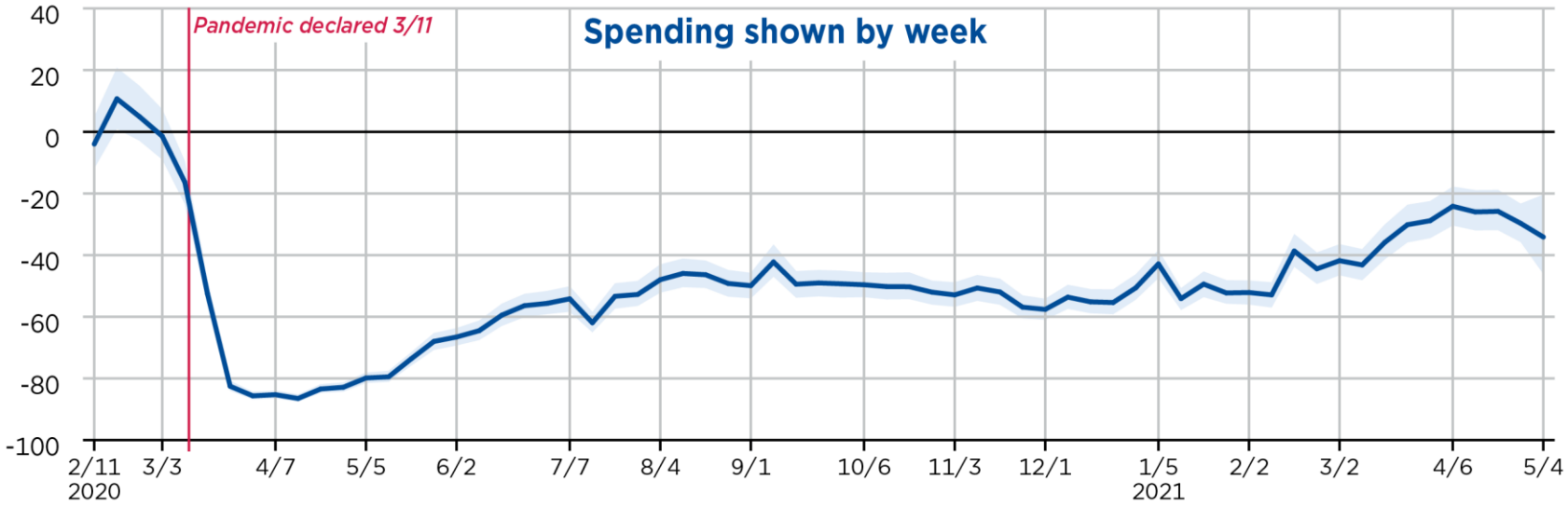


Ambulatory health care (621)

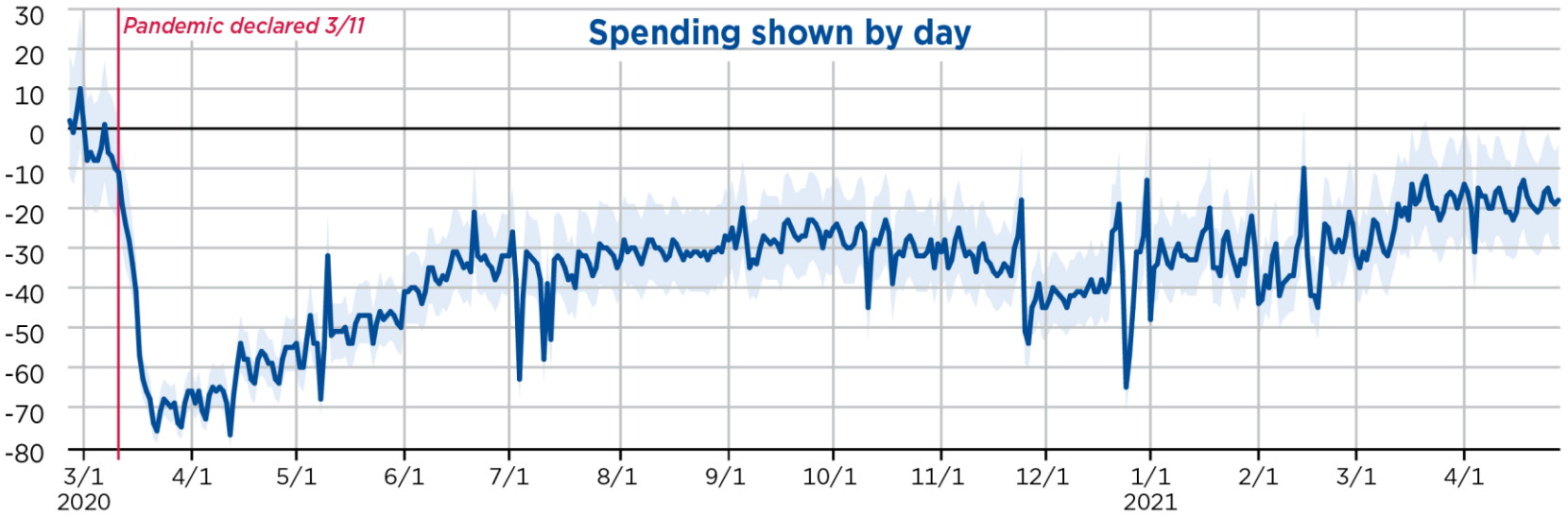


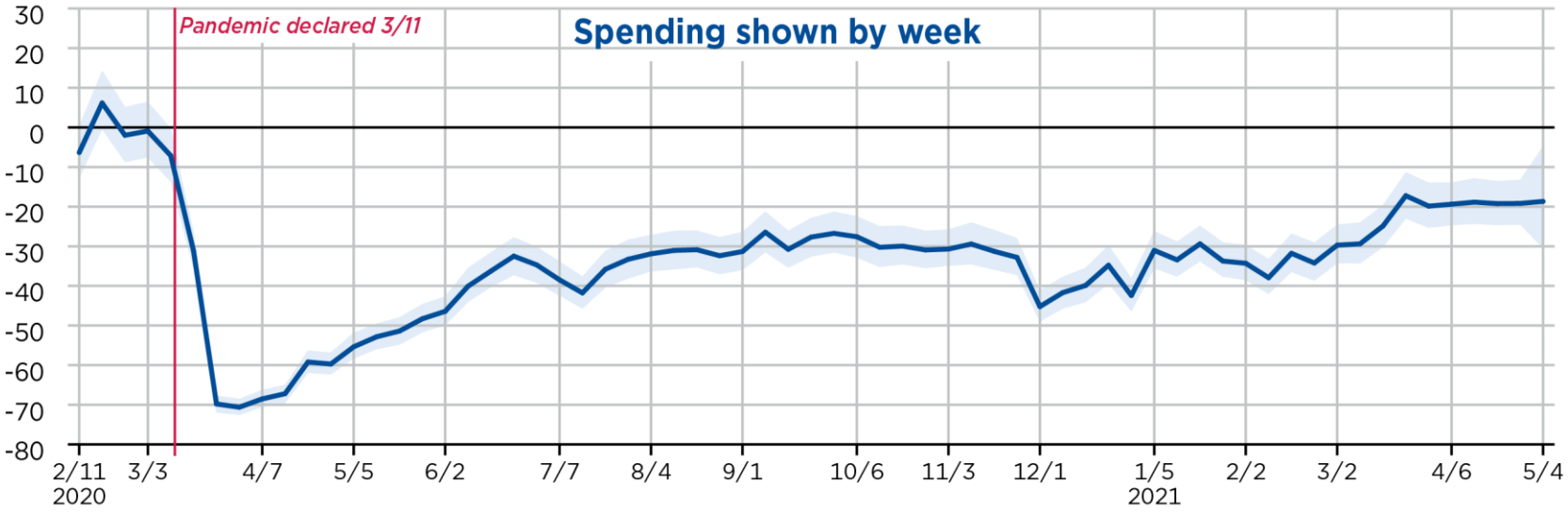
Accommodation (721)



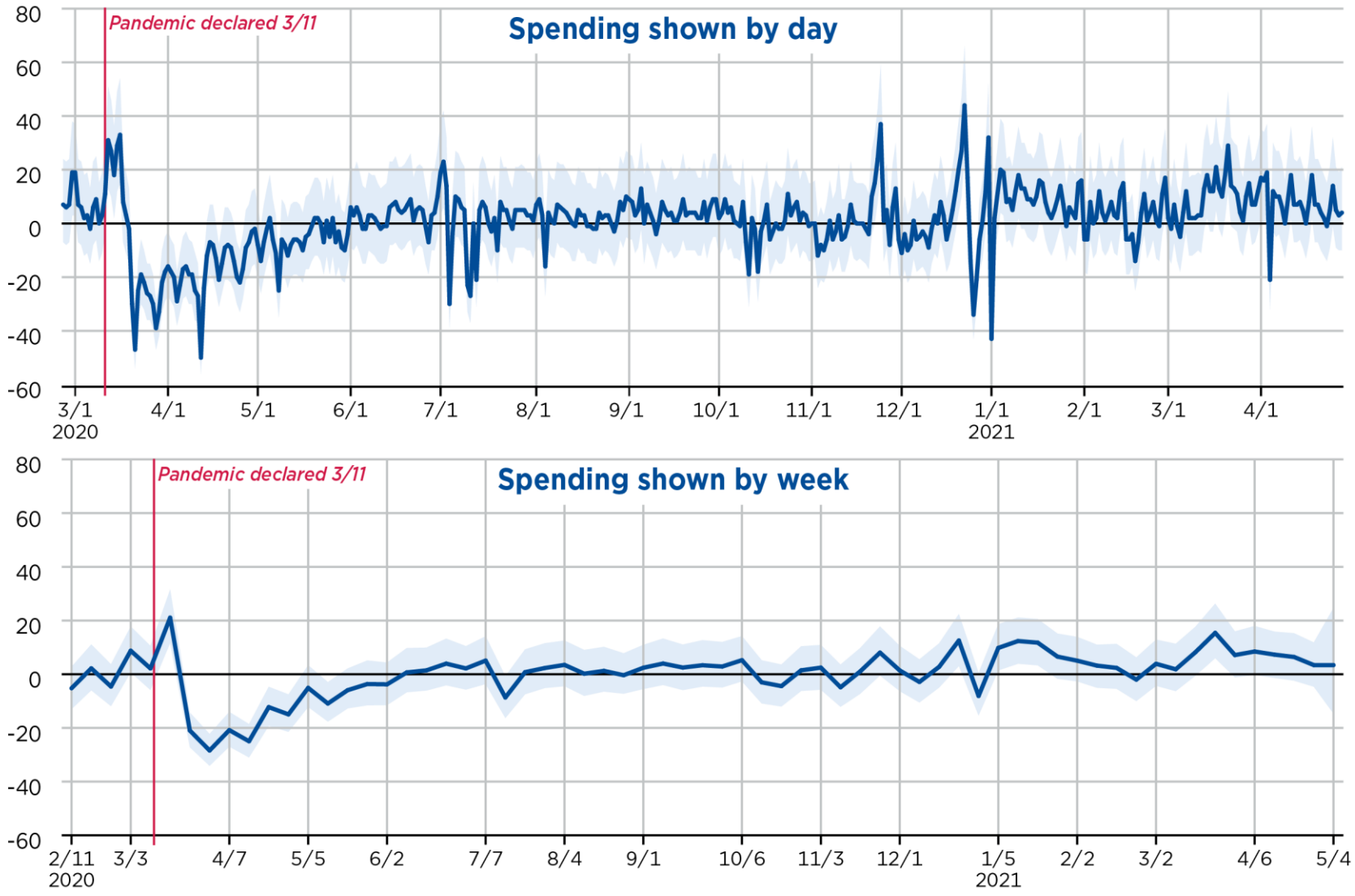


Restaurants (722)





Aggregate retail and food services



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COVID-19 and Recovery: Estimates From Payment Card Transactions

BEA has been researching the use of card transaction data as an early barometer of spending in the United States. Since the emergence of COVID-19, dramatic and fast-moving changes to the U.S. economy have increased the public and policymakers' need for more frequent and timely economic data. In response, BEA is presenting these estimates using daily payment card data to measure the effects of the pandemic on spending, updated approximately every two weeks.

Note that these payment card transactions are not necessarily representative of total spending in an industry and the data have other limitations, described below. The estimates in these charts and tables are not a substitute for BEA's monthly and quarterly official data, which are grounded in well-tested and proven methodologies.

An event study methodology is used to estimate the difference (in percentage points) in spending from the typical level (relative to the day of week, month, and annual trends) prior to the pandemic declared by the World Health Organization on March 11, 2020.

These estimates were last updated on September 21, 2021.

Daily Spending by Industry

Spending on Food Services and Drinking Places

Spending on Accommodation

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Contact Personnel

Assistant Chief Economist

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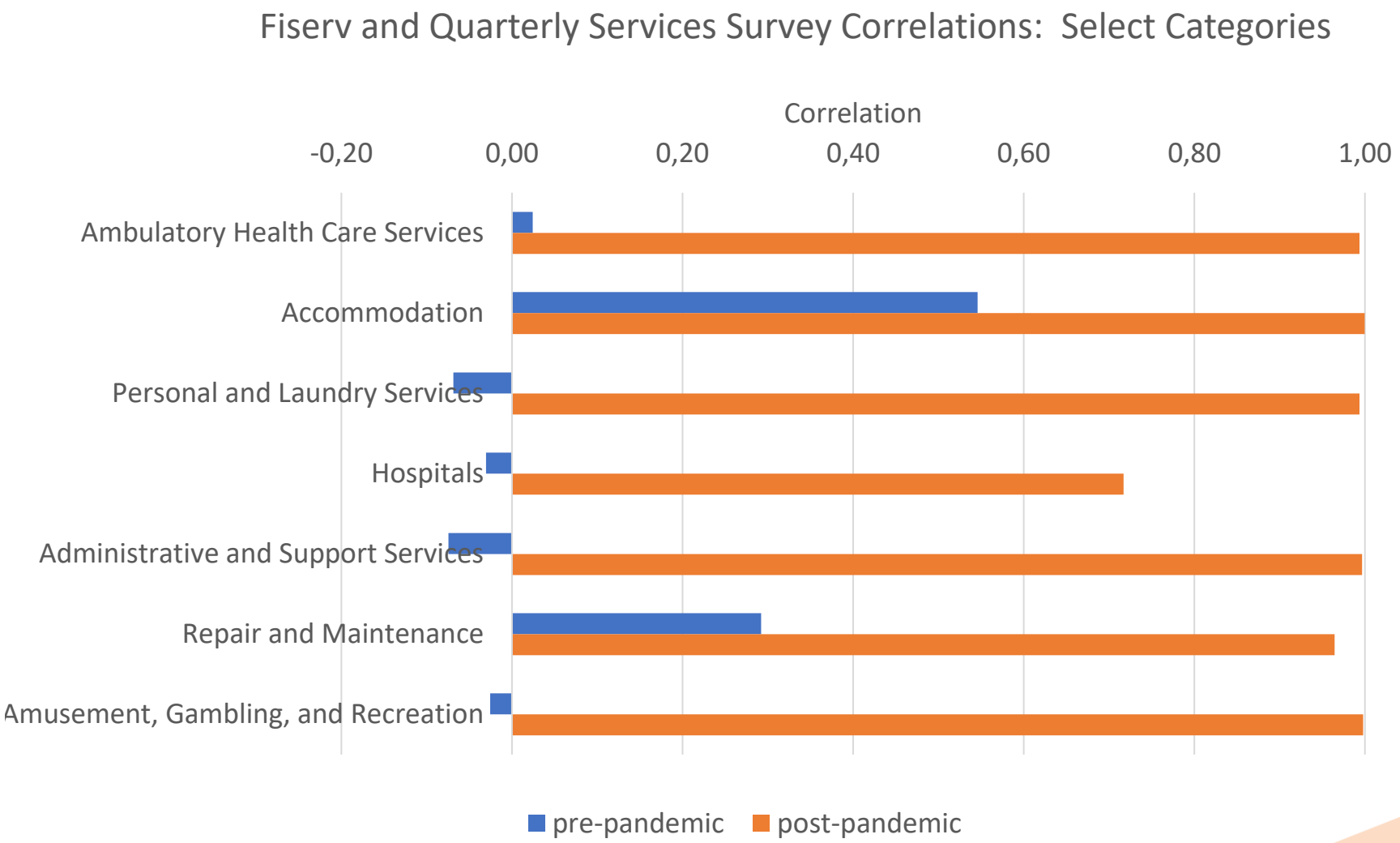
Development of Card Transaction Estimates

- After the initial pandemic declaration, we were able to release an event study within just over a month (see Dunn *et al.*, 2020)
- The data were used to inform estimates for some components of consumption expenditures
- In June of 2020, we began releasing updates regularly (first bi-weekly, then weekly)
- Familiarity with data sources enabled rapid deployment
  - We have been working with these data for a few years
  - Other forecasting projects (e.g., Chen *et al.*, 2019) and data use cases
  - We were able to anticipate for which categories Fiserv data would perform relatively well

Retrospective correlation exercise

- We compare the Fiserv series before the pandemic and after the pandemic with official series
  - QSS – Quarterly Services Survey (used for consumption of services estimate)
  - MRTS – Monthly Retail Trade Survey (used for retail and restaurants consumption)
- Fiserv data are collapsed to quarters and months, and are seasonally adjusted directly using X-13-ARIMA
- We compare correlations before the pandemic with those during the pandemic period for a selection of these series (where Fiserv and QSS/MTRS are matched based on industry category)

Fiserv and QSS correlations: Services



Fiserv and MRTS correlations: Retail

Retrospective

- Summary
  - Prior to the pandemic period, the Fiserv data exhibited high correlations in levels but lower correlations in growth rates with official series
  - We assumed that the correlations in levels were informative during the much more volatile pandemic period
  - After the pandemic the correlations in growth rates were much higher across the board
- Our interpretation of these results
  - Statistical relationships break down in the face of structural changes
  - Less volatile times: Idiosyncratic factors dominate
  - More volatile times: Economic signal dominates

Conclusions

- The BEA is exploring several avenues to increase timeliness and frequency of our statistics
- Alternative data sources offer the potential to help produce high-frequency, timely estimates
  - There were benefits to working with these data sources before the pandemic
  - Card data performed better than what was suggested by pre-pandemic estimates

Other work to improve timeliness/frequency

- Nowcasting PCE services estimates
  - We employ model selection and model averaging techniques, and nowcasting models
  - We use traditional indicators, common factors, and alternative data sources (Fiserv)
- Exploratory work and future projects
  - New data sources: Partnerships with other organizations (e.g., opportunity insights), and alternative private data products
  - Fiserv and other alternative data for subnational estimates of private consumption or for other subnational series

Key questions for new data sources/methods

- How do we determine acceptable magnitudes for potential revisions using proposed methods and data (for example, for more timely or frequent estimates, or for estimates at a finer level of geographic detail)?
- When do we consider alternative data for published series where carefully designed surveys do not exist to provide a “gold standard” estimate?
- How do we estimate models and assess performance when faced with a limited time series dimension, or with a time series dimension that includes significant volatility?
- How do we balance accuracy during less volatile periods with accuracy during highly volatile periods (such as the pandemic period or recessionary periods)