Blending Economic Statistics and Big Data
The Chicago Fed Advance Retail Trade Summary

2021 NABE-TEC Conference
November 8, 2021

Scott A. Brave

The views expressed herein are my own and do not necessarily represent those of the Federal Reserve System or the Federal Reserve Bank of Chicago.
The Covid-19 pandemic heightened the need for *timely* measures of consumer spending.
At the Chicago Fed, we developed a new weekly index for this purpose that combines high-frequency Big Data with the U.S. Census Bureau’s Monthly Retail Trade Survey (MRTS).
What We Do
We take high-frequency data from 5 private companies and 1 federal agency to construct a weekly measure of **retail & food services sales excluding automotive spending** that

1. Is *benchmarked* to the Census Bureau’s Monthly Retail Trade Survey (MRTS)
   - Uses a mixed-frequency dynamic factor model to match the latest MRTS

2. Is both *timely* and *available more frequently* (*x2 per month*) than the MRTS
   - Covers the period from January 2018 - present with four weekly values per month

3. And accurately *predicts* the Advance Monthly Retail Trade Survey (MARTS)
   - Roughly 50% more accurate out-of-sample than consensus nowcasts since Feb 2020

See, Tracking U.S. Consumers in Real Time with a New Weekly Index of Retail Trade.
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See, *Tracking U.S. Consumers in Real Time with a New Weekly Index of Retail Trade*. 
We call it **CARTS**.

- A *Weekly Index of Retail Trade* summarizing data on credit and debit card transactions, retail foot traffic, gasoline consumption, and consumer sentiment.
- Available at [https://chicagofed.org/carts](https://chicagofed.org/carts)
- And in FRED and Haver Analytics SURVEYS database

See, *Introducing CARTS: A New Index Tracking National Retail Spending.*
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How CARTS Works: A single common factor matching the MRTS on a monthly basis
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[Image of the United States Census Bureau logo] + eia
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Retail & Food Services Sales Ex. Auto

*billions of $, seasonally adjusted*
Weekly Index of Retail Trade

$log\, \text{percent change, w/w}$

Scott A. Brave  (FRB Chicago)
Nowcasts for the Advance Monthly Retail Trade Survey (MARTS)

Retail & Food Services Sales Ex. Auto (m/m % Chg.)

Mean Absolute Error Ratio (CARTS/Consensus): 0.45

Sources: CARTS: https://chicagofed.org/carts; MARTS/Consensus: Haver Analytics AS1REPNA database
Inflation projections are based on a weekly index of online prices provided by State Street PriceStats.

<table>
<thead>
<tr>
<th>Recent Monthly Values</th>
<th>Oct '21</th>
<th>Sep</th>
<th>Aug</th>
<th>Jul</th>
<th>Jun</th>
<th>May</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retail &amp; food services sales ex. auto</td>
<td>+2.3*</td>
<td>+0.8</td>
<td>+2.0</td>
<td>-0.9</td>
<td>+1.7</td>
<td>-0.4</td>
</tr>
<tr>
<td>Inflation-adjusted</td>
<td>+1.5*</td>
<td>+0.5*</td>
<td>+1.4</td>
<td>-1.3</td>
<td>+1.1</td>
<td>-0.9</td>
</tr>
<tr>
<td>BEA price index</td>
<td>+0.8*</td>
<td>+0.3*</td>
<td>+0.6</td>
<td>+0.4</td>
<td>+0.5</td>
<td>+0.5</td>
</tr>
</tbody>
</table>
Next release of CARTS covering October 2021 is scheduled for 9 AM CT on Nov. 12.

Current Data: https://chicagofed.org/carts

Background: https://www.chicagofed.org/research/data/carts/background

Release Dates: https://www.chicagofed.org/research/data/data-release-calendar

Register for electronic notifications for CARTS and other Chicago Fed indexes at https://www.chicagofed.org/utilities/subscribe
Appendix
The Mixed-Frequency Dynamic Factor Model

\[ W_{n,i,t} = \alpha_n + \gamma_n F_{i,t} + \epsilon_{n,i,t} \]

\[ (1 - \psi_i L) \epsilon_{n,i,t} = \nu_{n,i,t} \]

\[ (1 - \rho_1 L - \rho_2 L - \rho_3 L - \rho_4 L) F_{i,t} = \alpha_F + \eta_{i,t} \]

\[ M_{i=4,t} = \frac{1}{4} F_{i=4,t} + \frac{2}{4} F_{i=3,t} + \frac{3}{4} F_{i=2,t} \]

\[ + F_{i=1,t} \]

\[ + \frac{3}{4} F_{i=4,t-1} + \frac{2}{4} F_{i=3,t-1} + \frac{1}{4} F_{i=2,t-1} \]

\[ (\nu_{n,i,t}, \eta_{i,t}) \sim N(0, \Sigma) \]
CARTS Versus Alternative Retail Spending Measures

Weekly Index of Retail Trade versus BEA measure
percent change from January baseline

Weekly Index of Retail Trade versus Opportunity Insights measures
percent change from January baseline
Nowcasts for the Monthly Retail Trade Survey (MRTS)

Retail & Food Services Sales Ex. Auto (m/m % Chg.)

Mean Absolute Error Ratio (CARTS/Consensus): 0.46

Sources: CARTS: https://chicagofed.org/carts; MRTS/Consensus: Haver Analytics USECON and AS1REPNA databases