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

2021 NABE-TEC Conference
November 8, 2021

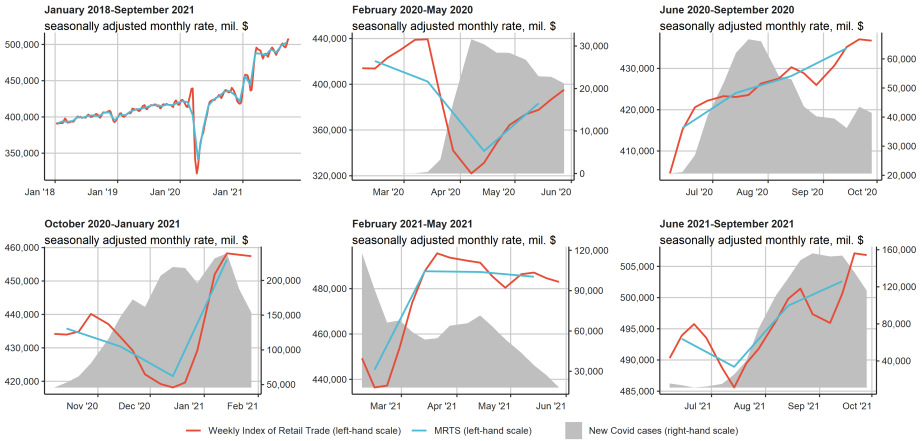
Scott A. Brave

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.

Source: Getty Images

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

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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.
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How CARTS Works: A single common factor matching the MRTS on a monthly basis

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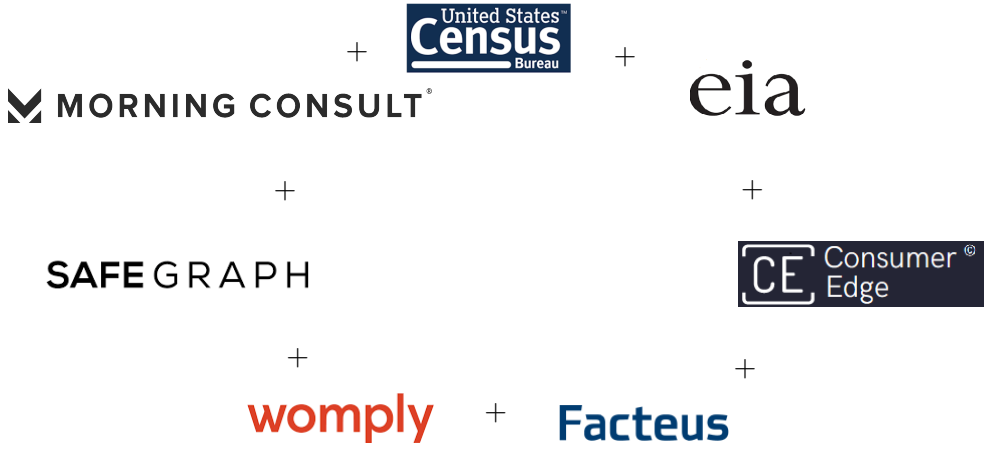

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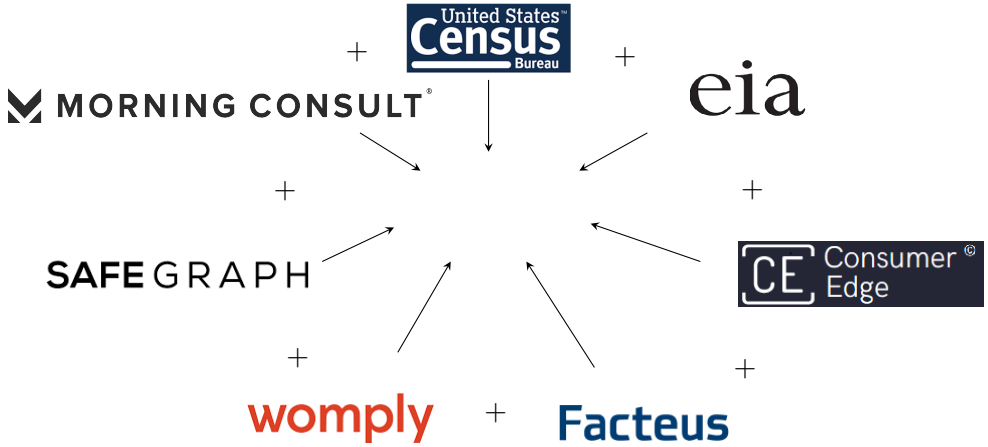

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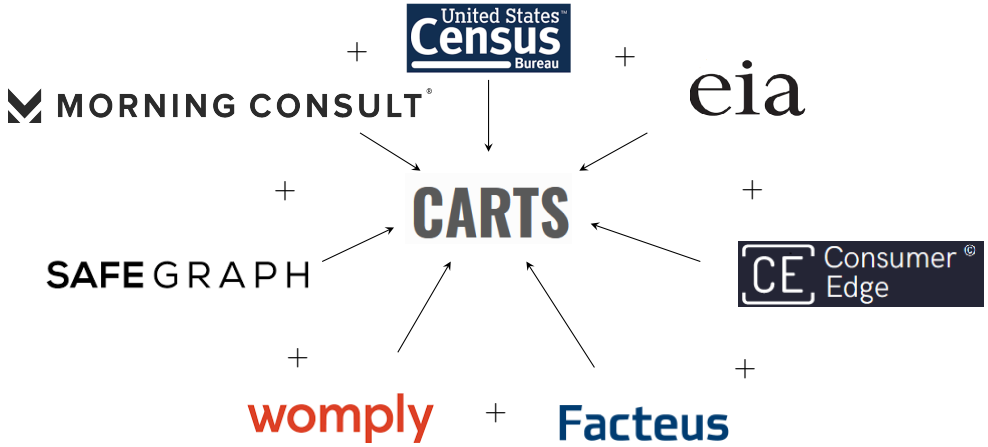
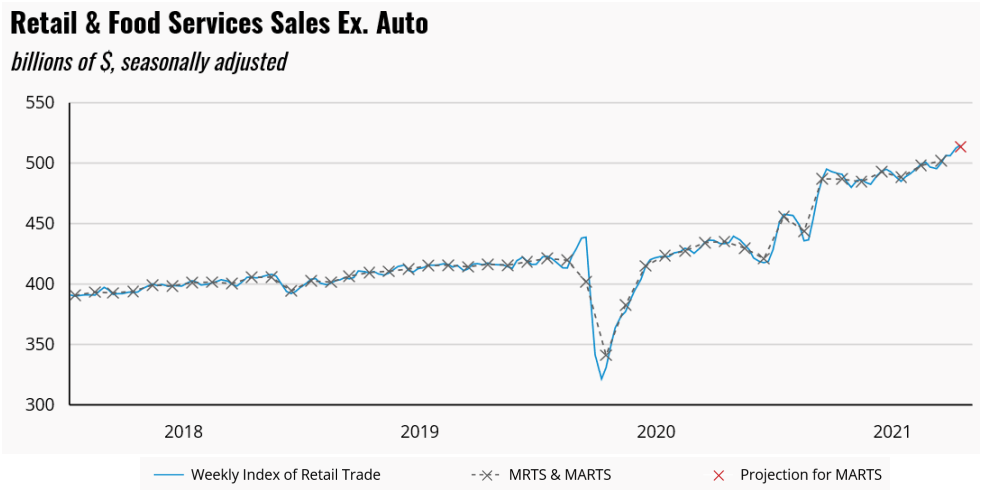
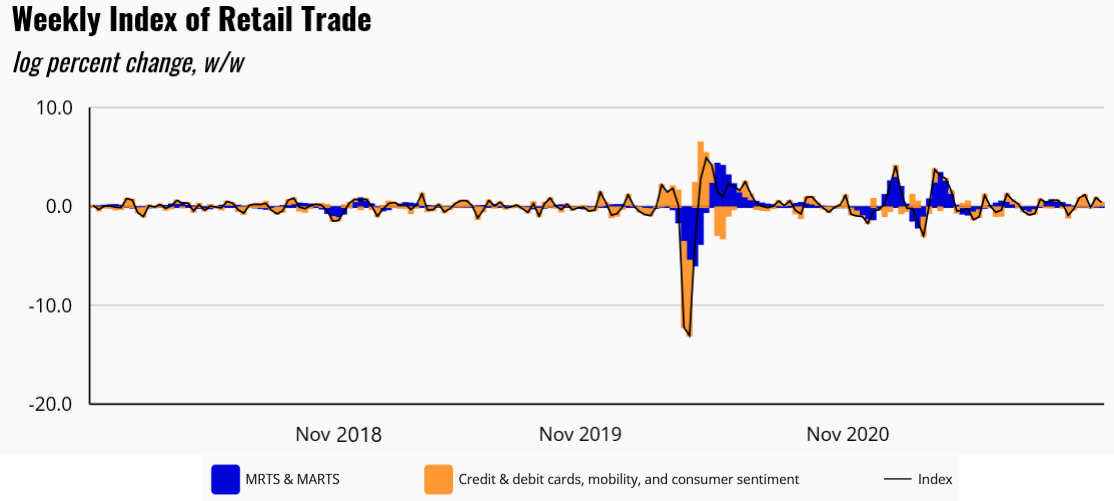
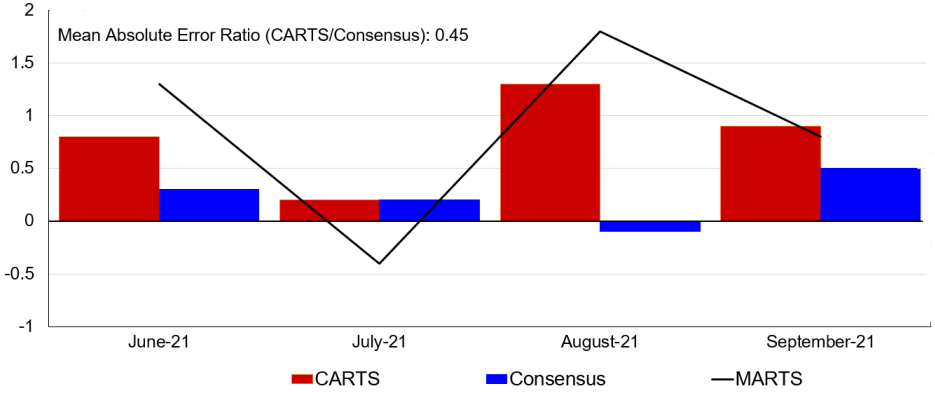



Retail & Food Services Sales Ex. Auto
billions of $, seasonally adjusted
550
500
450
400
350
300
2018
2019
2020
2021
Weekly Index of Retail Trade
MRTS & MARTS
Projection for MARTS


Weekly Index of Retail Trade
log percent change, w/w
10.0
0.0
-10.0
-20.0
Nov 2018
Nov 2019
Nov 2020
MRTS & MARTS
Credit & debit cards, mobility, and consumer sentiment
Index

Nowcasts for the Advance Monthly Retail Trade Survey (MARTS)

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



Sources: CARTS: https://chicagofed.org/carts; MARTS/Consensus: Haver Analytics AS1REPNA database

Recent Monthly Values

percent change, m/m

	Oct '21	Sep	Aug	Jul	Jun	May
Retail & food services sales ex. auto	+2.3*	+0.8	+2.0	–0.9	+1.7	–0.4
Inflation-adjusted	+1.5*	+0.5*	+1.4	–1.3	+1.1	–0.9
BEA price index	+0.8*	+0.3*	+0.6	+0.4	+0.5	+0.5

Inflation projections are based on a weekly index of online prices provided by State Street PriceStats.

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

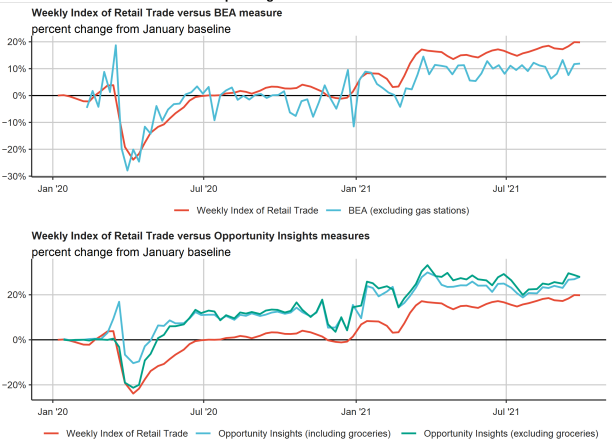
Register for electronic notifications for CARTS and other Chicago Fed indexes at https://www.chicagofed.org/utilities/subscribe

Appendix

The Mixed-Frequency Dynamic Factor Model

$$
\begin{aligned}
W_{n,i,t} &= \alpha_n + \gamma_n F_{i,t} + \epsilon_{n,i,t} \\
(1 - \psi_i L)\, \epsilon_{n,i,t} &= \upsilon_{n,i,t} \\
(1 - \rho_1 L - \rho_2 L - \rho_3 L - \rho_4 L)\, F_{i,t} &= \alpha_F + \eta_{i,t} \\
M_{i=4,t} &= \frac{1}{4} F_{i=4,t} + \frac{2}{4} F_{i=3,t} + \frac{3}{4} F_{i=2,t} \\
&+ F_{i=1,t} \\
&+ \frac{3}{4} F_{i=4,t-1} + \frac{2}{4} F_{i=3,t-1} + \frac{1}{4} F_{i=2,t-1} \\
(\upsilon_{n,i,t}, \eta_{i,t}) &\sim N(0, \Sigma)
\end{aligned}
$$

CARTS Versus Alternative Retail Spending Measures



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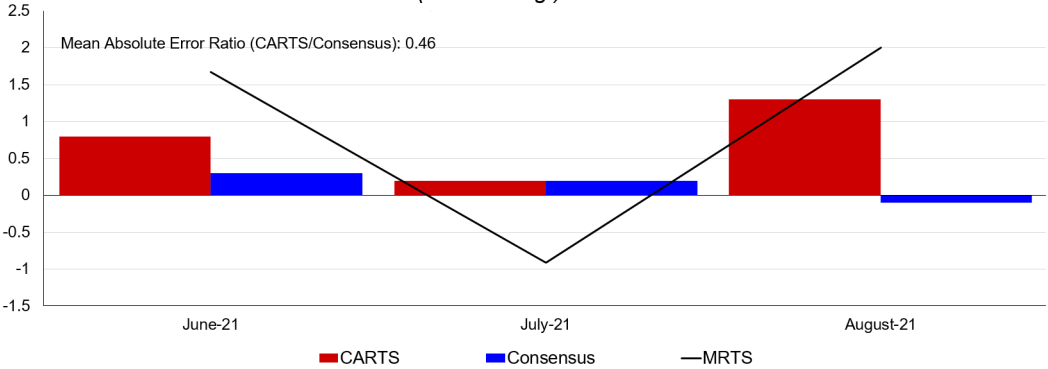

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