The Economic Impacts of COVID-19: Evidence from a New Public Database Built Using Private Sector Data

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OPPORTUNITY INSIGHTS

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Measuring the Impacts of Macroeconomic Shocks and Policies

- How has COVID-19 affected the American economy?

- Since Kuznets (1941), macroeconomic policy decisions have been based on data from surveys of households and businesses

- These data provide vital aggregate information (GDP, unemployment rates), but have two limitations

  1. Available only at low frequencies, sometimes with significant lags
  2. Cannot be disaggregated to examine variation across areas or subgroups

→ We build a new publicly available database using transaction data from private companies to address these challenges and apply it to analyze the impacts of COVID-19

Data

A New Public Database Built From Private Sector Data

- Many papers have used transaction data to analyze economic impacts of COVID crisis
  [e.g., Alexander & Karger 2020, Baker et al. 2020, Bartik et al. 2020, Cajner et al. 2020, Chen et al. 2020, Chiou & Tucker 2020, Cox et al. 2020, Kurman et al. 2020, Kahn et al. 2020, Autor et al. 2020, Granja et al. 2020, Mongey et al. 2020]

- Here, we construct and analyze *public* statistics based on private sector data rather than directly analyzing confidential sources of microdata

  - Challenge: constructing public statistics that are sufficiently granular for research yet sufficiently aggregated and masked to protect privacy

- Combining data on spending, employment, and other outcomes offers a more complete picture of chain of macroeconomic events than studies that focus on one set of outcomes

Data Partners

Consumer Spending

affinity solutions   COINOUT

Small Business Revenues

WOMPLY

Employment

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Job Postings

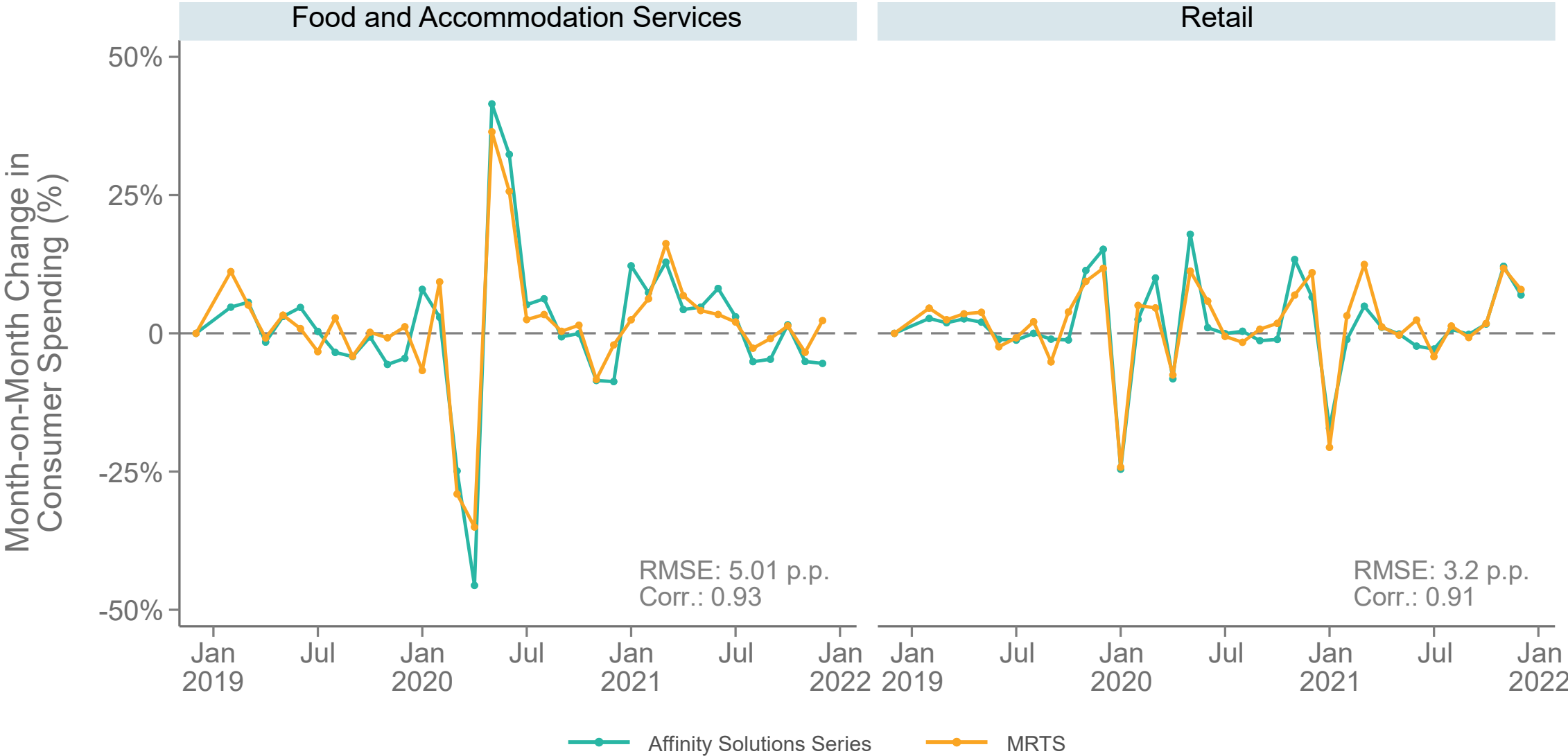burningglass TECHNOLOGIES

Education

ZEARN

Constructing Publicly Available Economic Indices Based on Private-Sector Data

- Starting from raw data, construct series suitable for economic analysis as follows:

  1. **Clean** series to remove artifacts that arise in transaction data

  2. **Smooth** seasonal fluctuations using data from 2019

  3. **Protect privacy**: index to January 2020 values, exclude small cells, combine data from multiple companies

  4. **Benchmark** to national statistics to characterize group each dataset represents to mitigate bias from non-representative selection

Consumer Spending: National Accounts vs. Credit/Debit Card Data

Retail and Food Services in Affinity Solutions vs. Monthly Retail Trade Survey

Food and Accommodation Services — RMSE: 5.01 p.p. Corr.: 0.93

Retail — RMSE: 3.2 p.p. Corr.: 0.91

Y-axis: Month-on-Month Change in Consumer Spending (%)

Legend: Affinity Solutions Series, MRTS

Data

Impacts of
COVID-19

Impact of
Stimulus
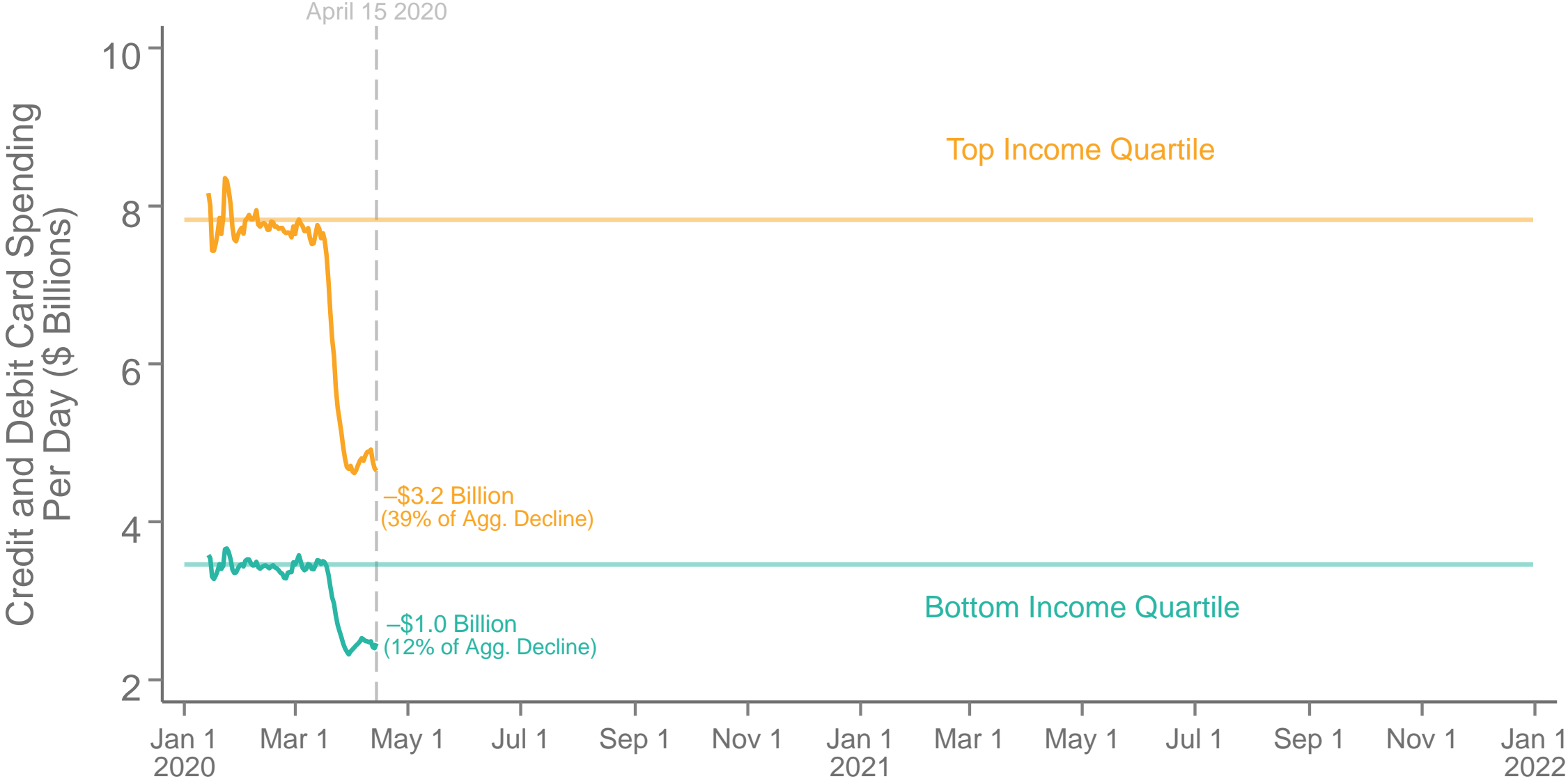Policies

Broader
Implications

Impacts of COVID-19
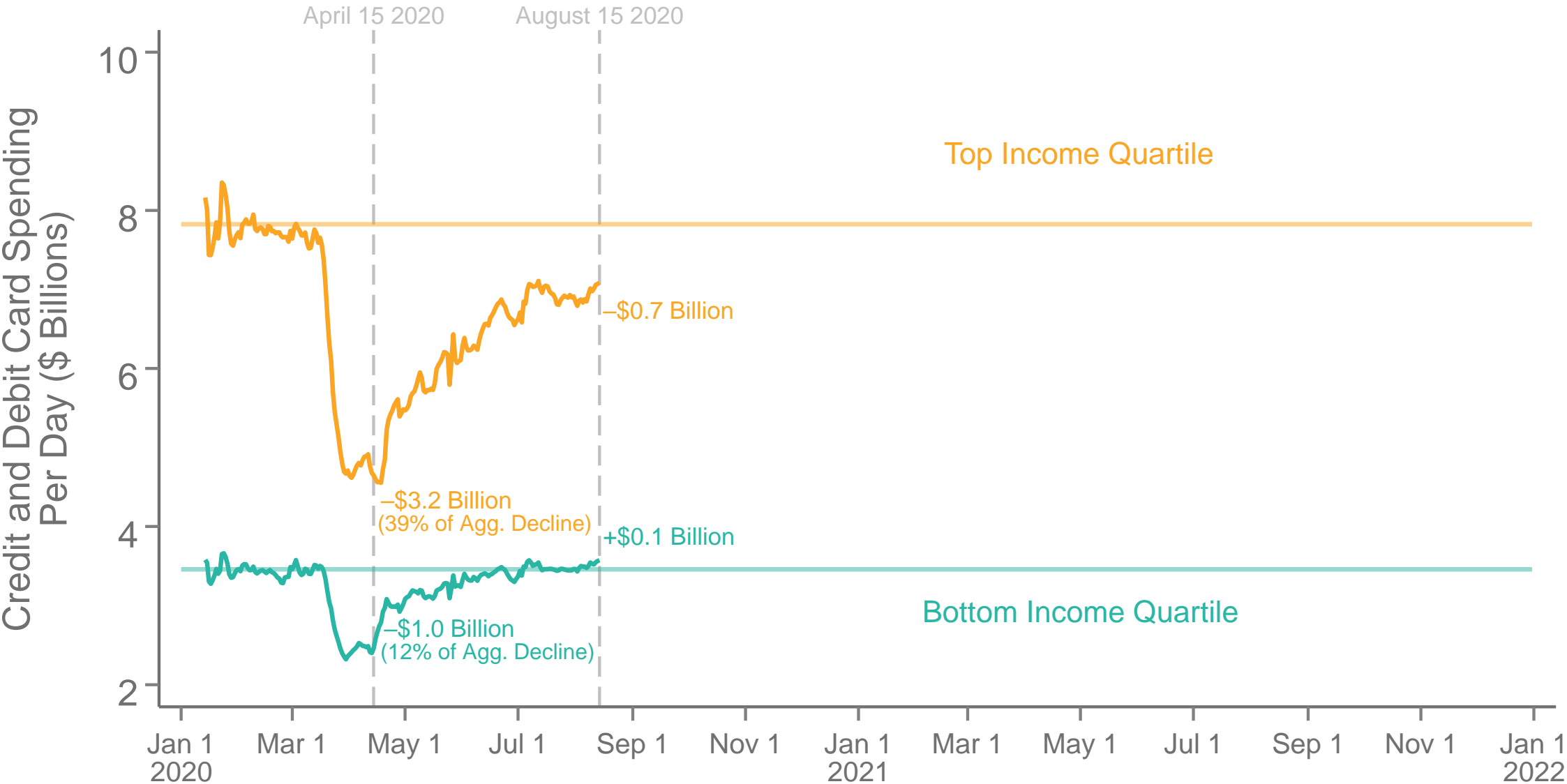
Data

Impacts of
COVID-19

Impact of
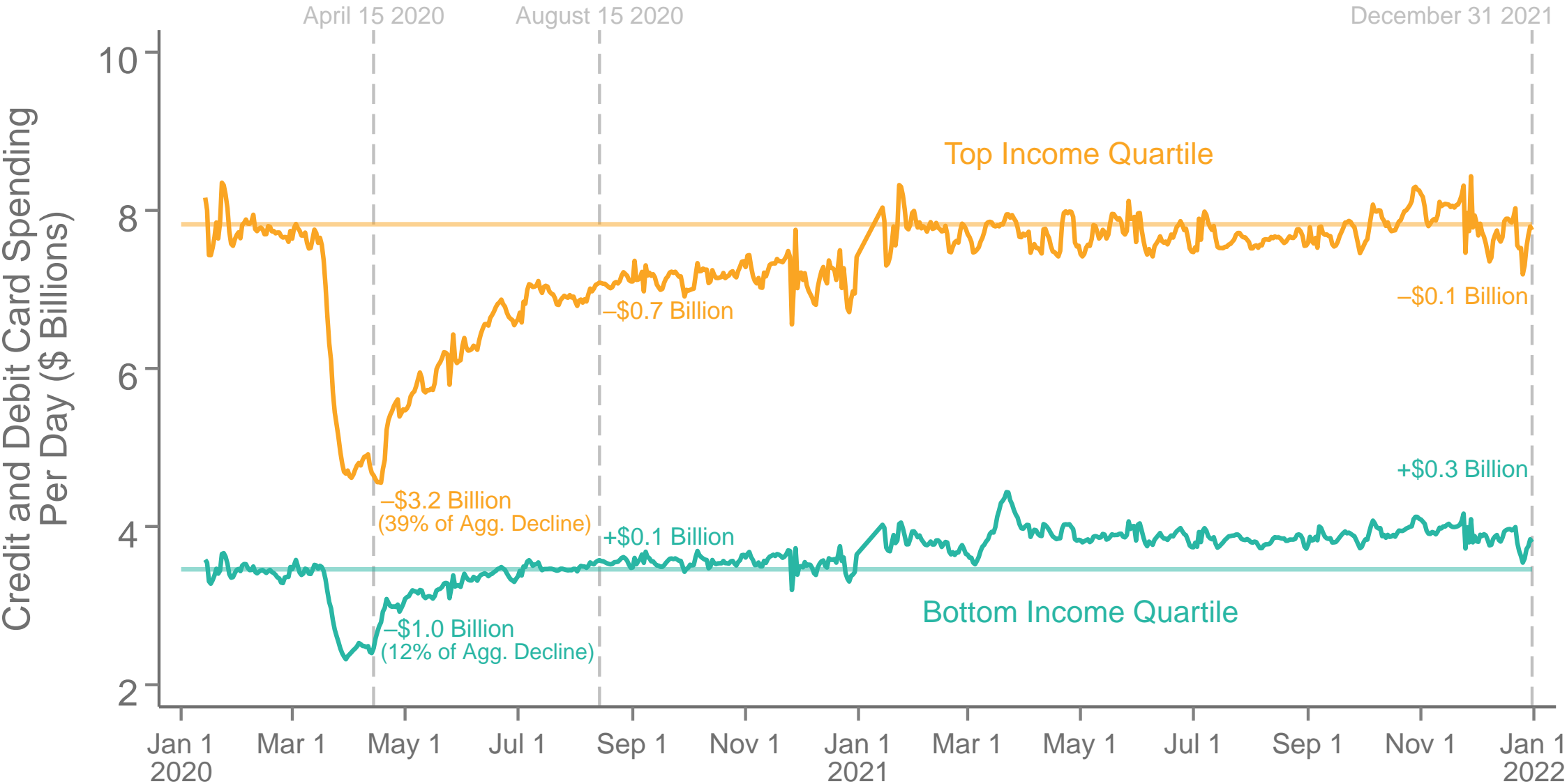Stimulus
Policies

Broader
Implications

Spending

Consumer Spending by Income Quartile

Consumer Spending by Income Quartile

Top Income Quartile

−$0.7 Billion

−$3.2 Billion
(39% of Agg. Decline)

+$0.1 Billion

−$1.0 Billion
(12% of Agg. Decline)

Bottom Income Quartile

April 15 2020

August 15 2020

Credit and Debit Card Spending Per Day ($ Billions)

10

8

6

4

2

Jan 1
2020

Mar 1

May 1

Jul 1

Sep 1

Nov 1

Jan 1
2021

Mar 1

May 1

Jul 1

Sep 1

Nov 1

Jan 1
2022

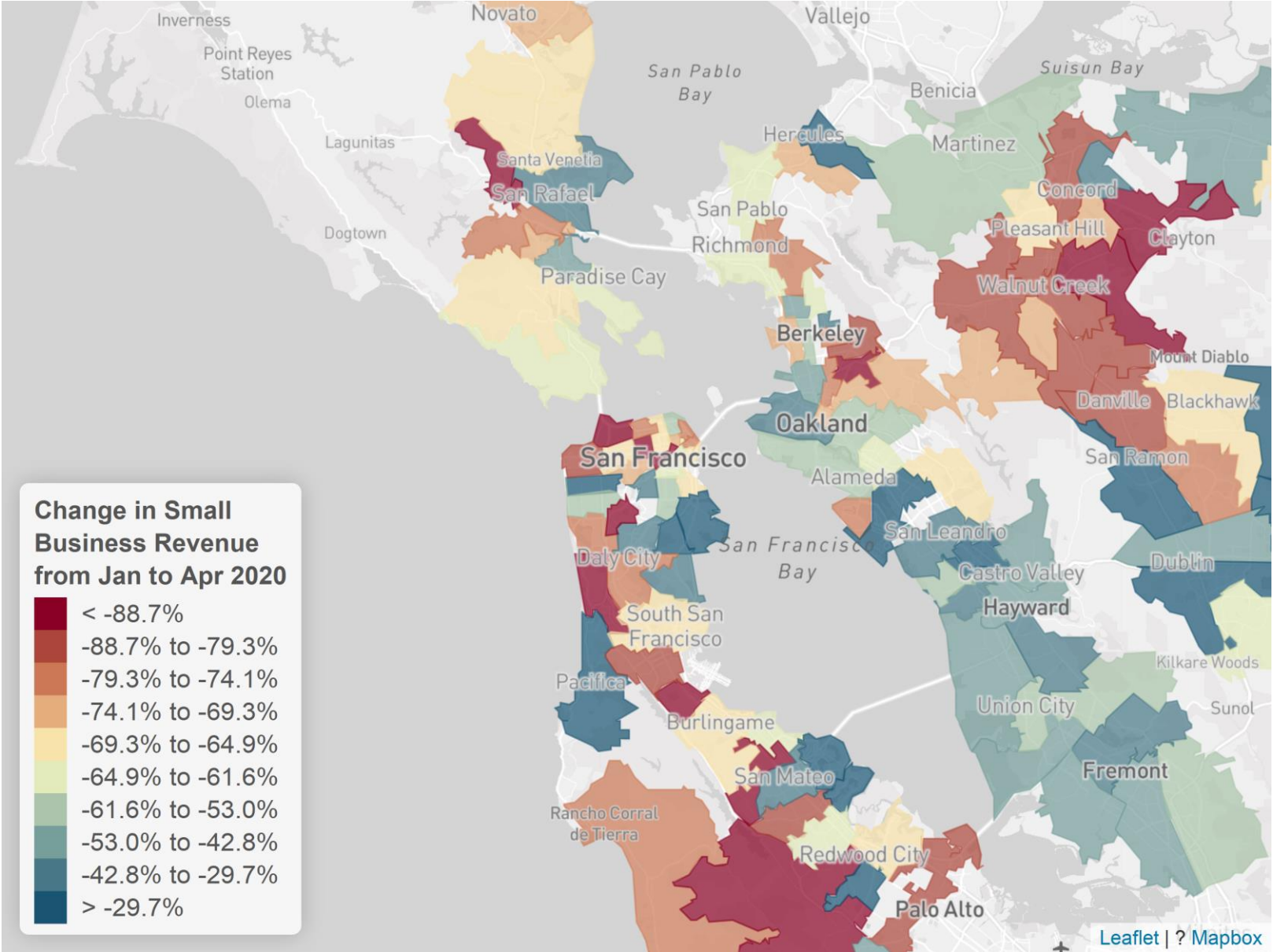# Consumer Spending by Income Quartile

Data

Impacts of
COVID-19

Impact of
Stimulus
Policies

Broader
Implications

Business Revenues

Changes in Small Business Revenues from January to April by ZIP Code
San Francisco

Change in Small Business Revenue from Jan to Apr 2020

- < -88.7%
- -88.7% to -79.3%
- -79.3% to -74.1%
- -74.1% to -69.3%
- -69.3% to -64.9%
- -64.9% to -61.6%
- -61.6% to -53.0%
- -53.0% to -42.8%
- -42.8% to -29.7%
- > -29.7%

Leaflet | ? Mapbox

Changes in Small Business Revenues vs. Rent, by ZIP Code
From January to April 2020
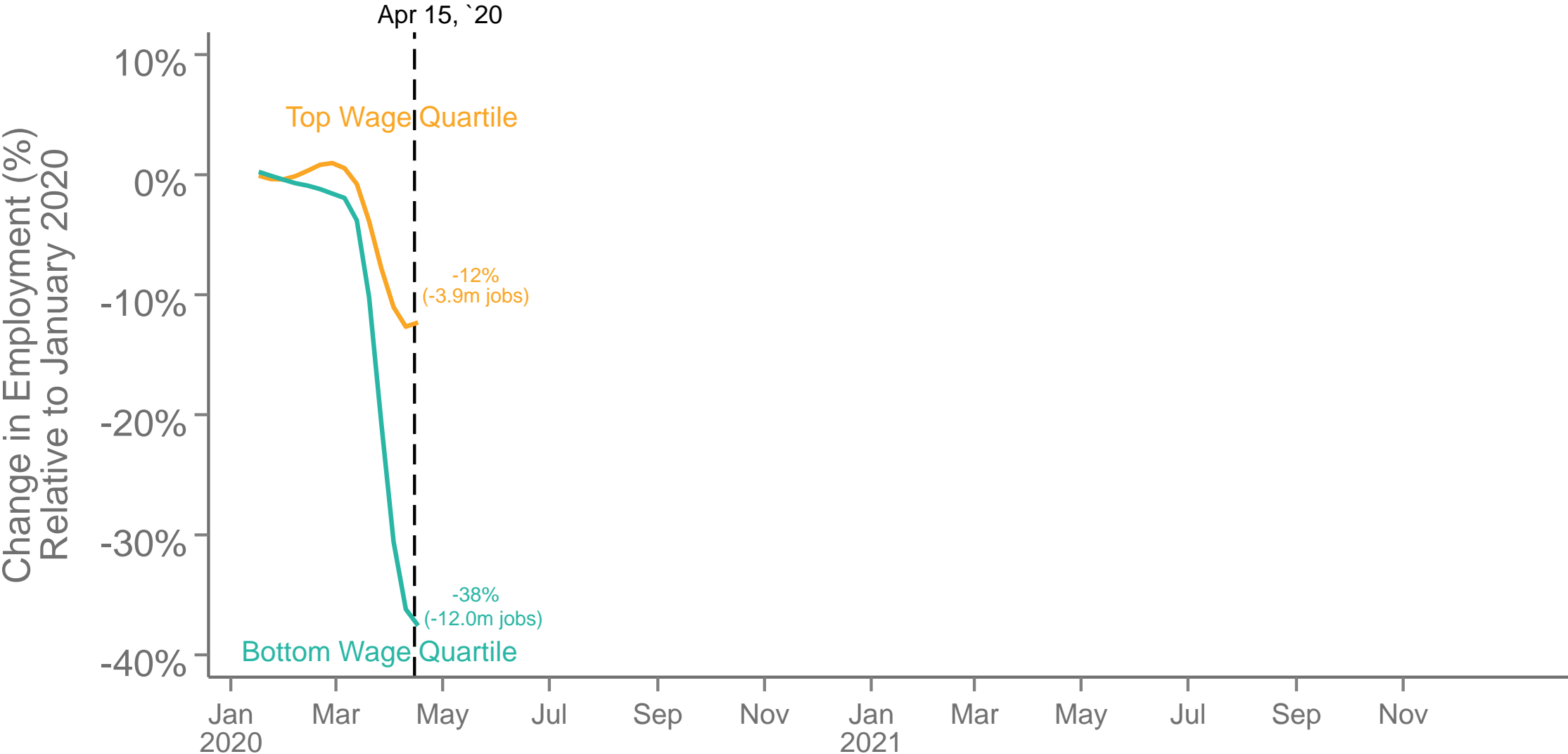
Change in Small Business Revenue
Relative to January

Slope = -16.45%/$1000 (s.e. = 0.95)

Median Two Bedroom Monthly Rent in 2014-2018 ($)

Employment

Employment Changes by Wage Quartile

Employment Changes by Wage Quartile

July 15, `20

Top Wage Quartile

10%

0%

Change in Employment (%)
Relative to January 2020

-4%
(-1.3m jobs)

-10%

-20%

-20%
(-6.2m)

-30%

Bottom Wage Quartile

-40%

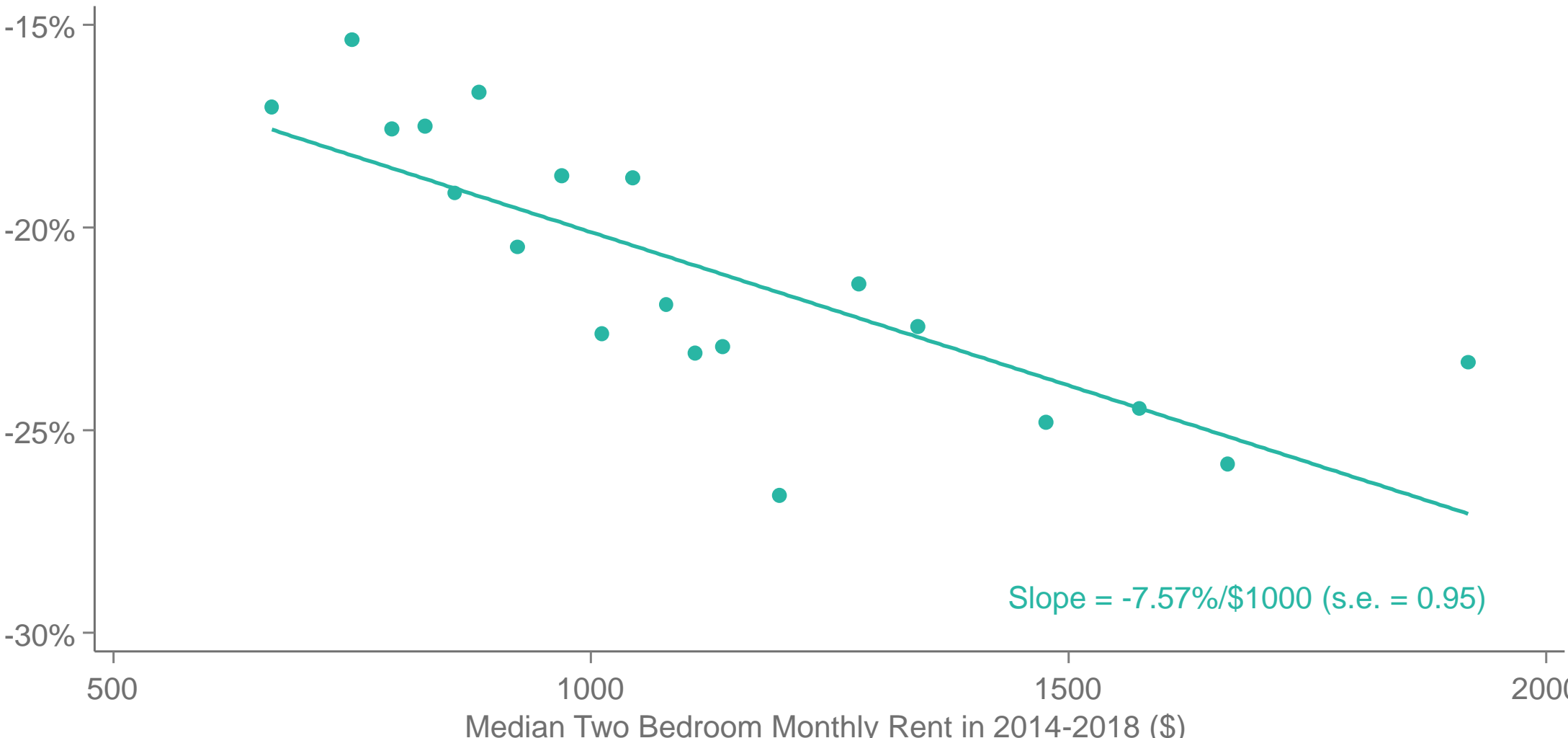Jan
2020   Mar   May   Jul   Sep   Nov   Jan
2021   Mar   May   Jul   Sep   Nov

Changes in Bottom-Wage-Quartile Employment vs. Rent, by County
From January to July 2020

Change in Employment
Relative to January 2020

Slope = -7.57%/$1000 (s.e. = 0.95)

Median Two Bedroom Monthly Rent in 2014-2018 ($)

Changes in Low-Skill Job Postings vs. Rent, by County
From January to July 2020

Change in Low-Skill Job Postings
Relative to January 2020

Slope = -27.65% (s.e. = 1.53)

Median Two Bedroom Monthly Rent in 2014-2018 ($)

Change in Spending for Low-Income Households
From January to April 2020, By Workplace Rent
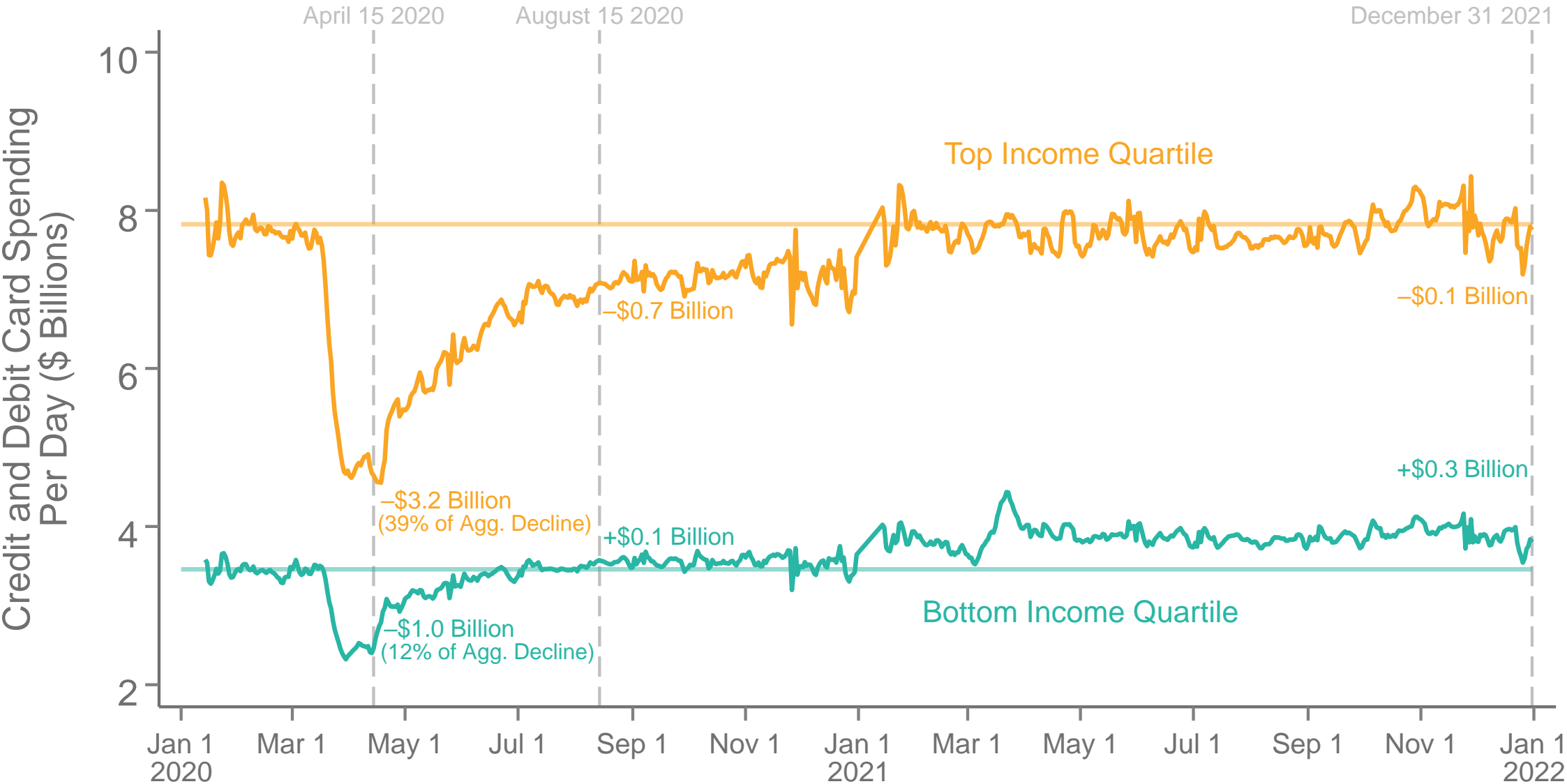
Change in Spending
Relative to January 2020

Slope = -9.40%/$1000 (s.e. = 0.75)

Average Two Bedroom Monthly Rent in 2014-2018 in Workplace ZIP ($)

Recovery

Consumer Spending by Income Quartile

April 15 2020

August 15 2020

December 31 2021

Top Income Quartile

−$0.7 Billion

−$0.1 Billion

−$3.2 Billion
(39% of Agg. Decline)

+$0.3 Billion

+$0.1 Billion

−$1.0 Billion
(12% of Agg. Decline)

Bottom Income Quartile

Credit and Debit Card Spending Per Day ($ Billions)

10

8

6

4

2

Jan 1 2020   Mar 1   May 1   Jul 1   Sep 1   Nov 1   Jan 1 2021   Mar 1   May 1   Jul 1   Sep 1   Nov 1   Jan 1 2022

Changes in Low-Skill Job Postings vs. Rent, by County
Gradient Flattens Over Time

Employment Changes by Wage Quartile

Top Wage Quartile

Bottom Wage Quartile

July 15, `20

10%

0%

-10%

-20%

-30%

-40%

Change in Employment (%) Relative to January 2020

-4%
(-1.3m jobs)

-20%
(-6.2m)

Jan
2020

Mar

May

Jul

Sep

Nov

Jan
2021

Mar

May

Jul

Sep

Nov

Employment Changes by Wage Quartile

Change in Employment (%) Relative to January 2020

Top Wage Quartile

Bottom Wage Quartile

Dec 31 2021

-4%
(-1.4m)

-20%
(-6.2m)

10%

0%

-10%

-20%

-30%

-40%

Jan
2020   Mar   May   Jul   Sep   Nov   Jan
2021   Mar   May   Jul   Sep   Nov

Employment Changes by Wage Quartile

Change in Employment (%) Relative to January 2020

10%
0%
-10%
-20%
-30%
-40%

Dec 31 2021

53% (10.3 p.p.) of decline unexplained

47% (9.3 p.p.) of decline explained by wage growth

Bottom Wage Quartile

Jan 2020 · Mar · May · Jul · Sep · Nov · Jan 2021 · Mar · May · Jul · Sep · Nov

Changes in Bottom-Wage-Quartile Employment vs. Rent, by County
Gradient <u>Does Not</u> Flatten Over Time

Stimulus Payments

Three Rounds of Stimulus Payments to Households During the COVID-19 Pandemic

$1,200

$600
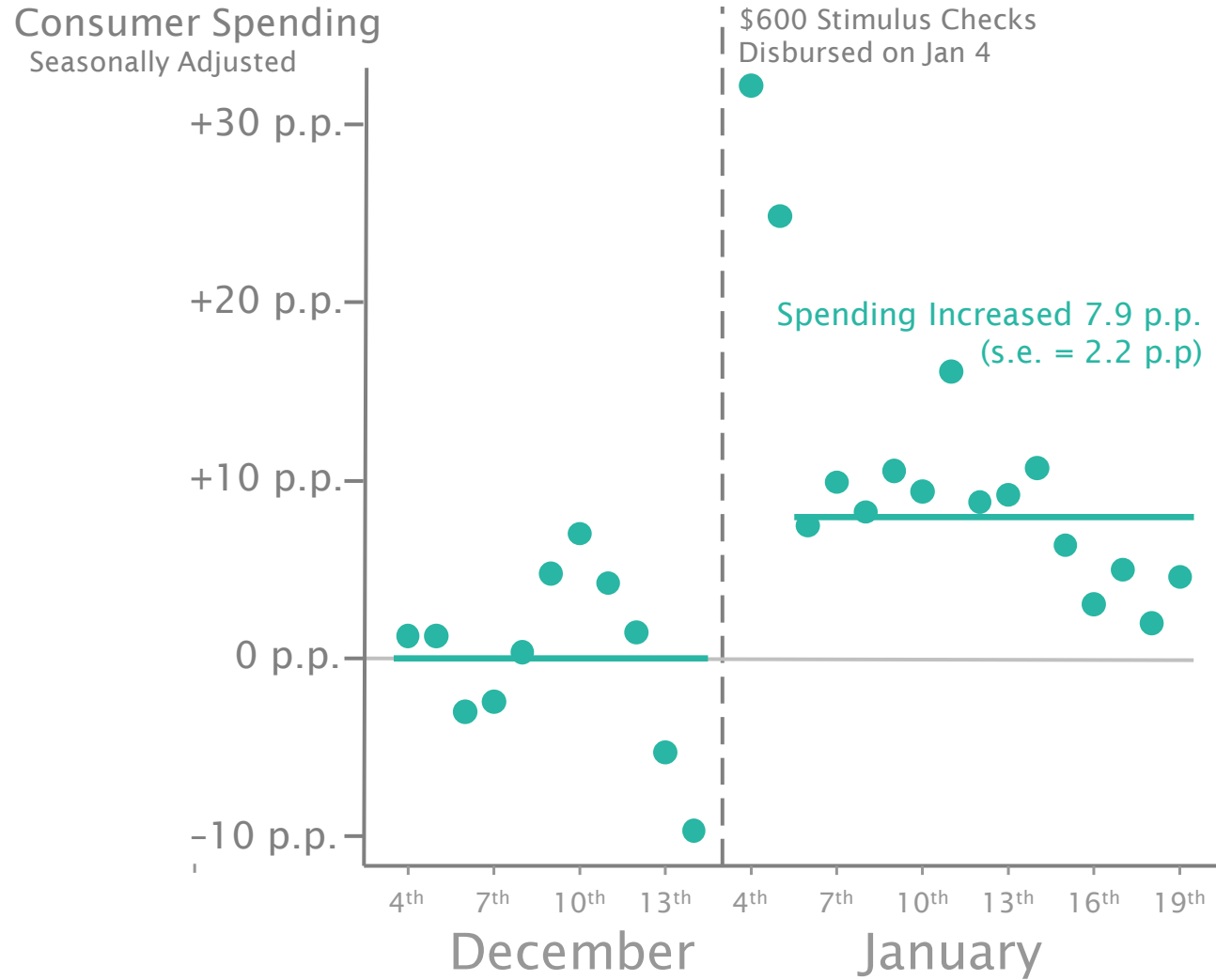
$1,400

April 15, 2020

January 4, 2021

March 17, 2021

Effect of the **January 2021** Stimulus Checks on Daily Consumer Spending

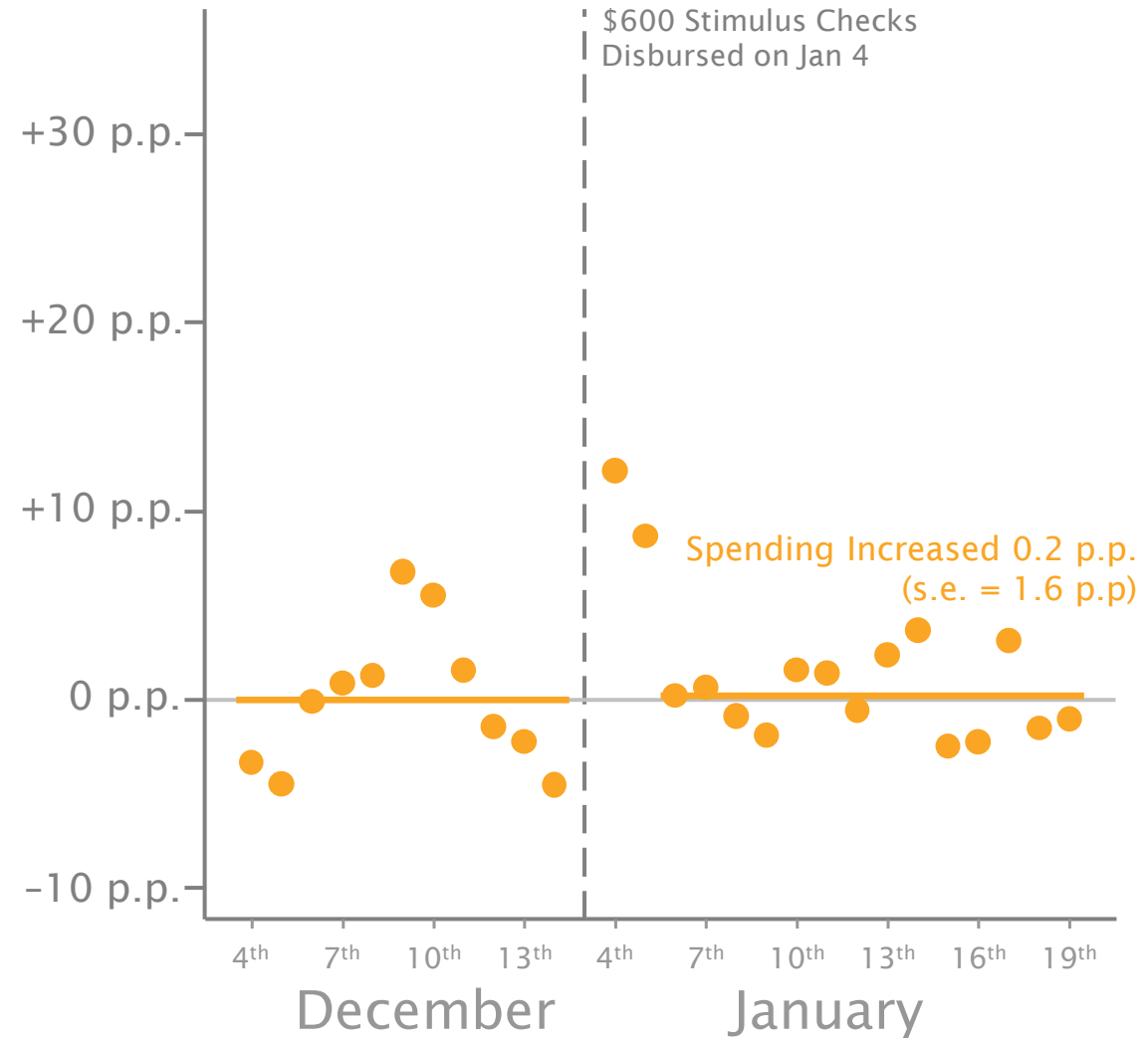**Bottom Income Quartile ZIP Codes**
Median Household Income < $46,000

Consumer Spending
Seasonally Adjusted

$600 Stimulus Checks
Disbursed on Jan 4

Spending Increased 7.9 p.p.
(s.e. = 2.2 p.p)

+30 p.p.

+20 p.p.

+10 p.p.

0 p.p.

−10 p.p.

4th   7th   10th   13th   4th   7th   10th   13th   16th   19th

December   January

permutation   holidays

Effect of the **January 2021** Stimulus Checks on Daily Consumer Spending

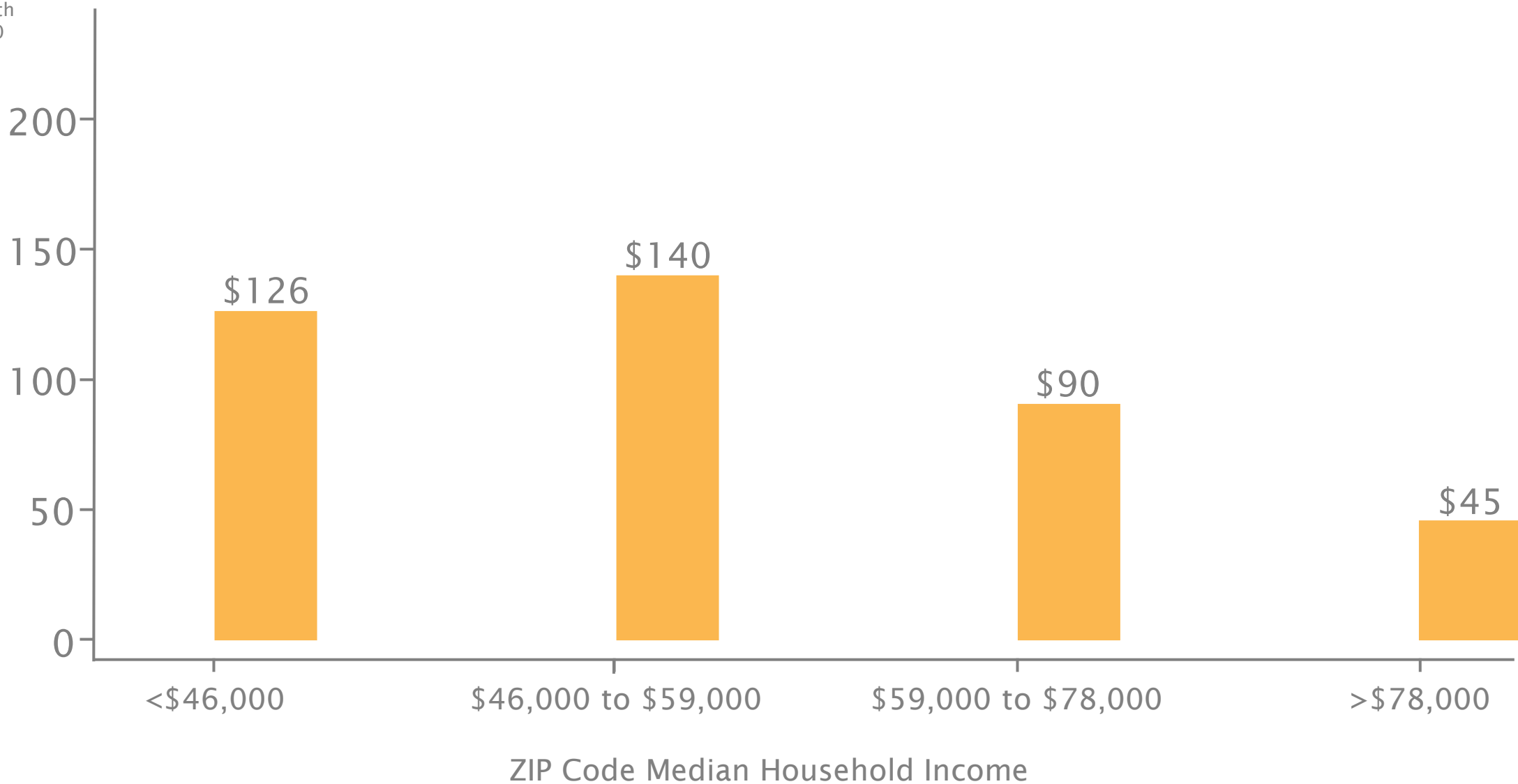## Bottom Income Quartile ZIP Codes
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4ᵗʰ   7ᵗʰ   10ᵗʰ   13ᵗʰ | 4ᵗʰ   7ᵗʰ   10ᵗʰ   13ᵗʰ   16ᵗʰ   19ᵗʰ

December   January

Top Income Quartile ZIP Codes
Median Household Income > $78,000

$600 Stimulus Checks
Disbursed on Jan 4

Spending Increased 0.2 p.p.
(s.e. = 1.6 p.p)

+30 p.p.
+20 p.p.
+10 p.p.
0 p.p.
−10 p.p.

4ᵗʰ   7ᵗʰ   10ᵗʰ   13ᵗʰ | 4ᵗʰ   7ᵗʰ   10ᵗʰ   13ᵗʰ   16ᵗʰ   19ᵗʰ

December   January

permutation   holidays

Effect of the COVID Stimulus Bills on Spending, by Income Group

Consumer Spending
Estimate of 1-month spending per $600

COVID Relief Act (January 2021)

$126 | $140 | $90 | $45

ZIP Code Median Household Income

<$46,000 | $46,000 to $59,000 | $59,000 to $78,000 | >$78,000

Effect of the COVID Stimulus Bills on Spending, by Income Group

Consumer Spending
Estimate of 1-month spending per $600

Legend:
- CARES Act (April 2020)
- COVID Relief Act (January 2021)

ZIP Code Median Household Income	CARES Act (April 2020)	COVID Relief Act (January 2021)
<$46,000	$189	$126
$46,000 to $59,000	$225	$140
$59,000 to $78,000	$229	$90
>$78,000	$235	$45

Projected Effect of Stimulus Checks on Spending

Couple with No Children

Projected Effect of Stimulus Checks on Spending

Couple with No Children

January 2021 Stimulus Policy

$600

$0 $75,000 $150,000 $174,000

March 2021 Stimulus Policy Proposal

$1400

Fiscal cost = $200 billion

Projected 1-month spending increase < **$15 billion**

$0 $75,000 $150,000 $200,000

Household Income

Projected Effect of Stimulus Checks on Spending

Couple with No Children

Effect of the COVID Stimulus Bills on Spending (per $600 check), by Income Group

Broader Implications

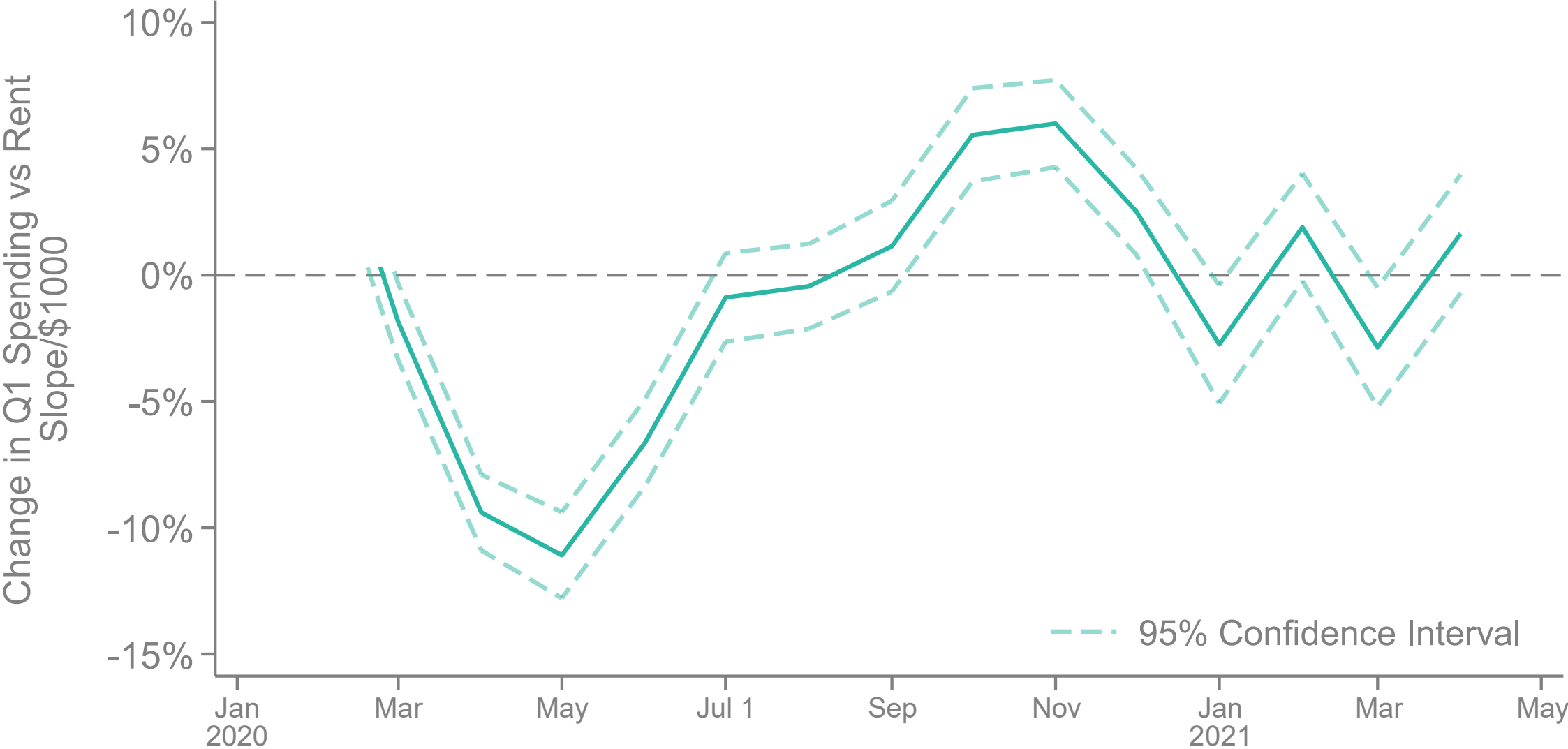# Widespread Use of Economic Tracker Statistics

- Publicly available data from Economic Tracker has been an input into many other analyses of COVID and associated policies. For instance:

  1. UI Expansions (Coombs et al. 2022)

  2. Employment Support (PPP) (Granja et al. 2020)

  3. Eviction Moratoria (An et al. 2021)

Broader Implications and Future Work

- **RETINA: Real Time National Accounts**

  - Current paper demonstrates that it is feasible to construct public statistics from private sector data that are useful for research and policy analysis but protect privacy

  - US national statistical agencies are exploring feasibility of augmenting current data releases with granular, real-time data based on the prototype constructed here

  - Ongoing collaboration with Statistics Canada to create visualization tool to explore granular data releases in real time, based on the prototype constructed here

- **Policy: New data may permit real-time fine tuning of policy based on observed state of the economy and empirical impacts of policies**

  - Similar but much more flexible than state-contingent policies based on unemployment rates

Government Policy Limits the Downward Spiral Over Time
Low-Income Spending vs. Workplace Rent Gradient, by Month

Broader Implications and Future Work

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- **Policy: New data may permit real-time fine tuning of policy based on observed state of the economy and empirical impacts of policies**

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  - **Ex: could we have known there had "enough" stimulus in Dec 2020 from flattened spending gradient by rent?**