

The Economic Impacts of COVID-19: Using Big Data for Real-Time Economic Analysis

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Measuring the Impacts of Macroeconomic Shocks and Policies

- How has COVID-19 affected economic activity?
 - 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

Impacts of
COVID-19

Impact of
Stimulus
Policies

Conclusion &
Next Steps

Data

A New Public Database Built From Private Sector Data

- Many papers 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, Carvalho et al. 2021]
- Here, we construct and analyze **public** statistics based on private sector data rather than directly analyzing confidential sources of microdata
- Goal: transparency and reproducibility of findings [Miguel et al 2014, Christensen and Miguel 2018]
- Challenge: constructing public statistics that are sufficiently granular for research yet sufficiently aggregated and masked to protect privacy
- Demonstrate how data from private companies can be combined to produce publicly available statistics available in real time to support diagnostic analyses and policy decisions

Data Partners

Consumer Spending

affinity
solutions

COINOUT

Small Business Revenues

WOMPLY

Employment

PAYCHEX

intuit.

 earnin™

Job Postings

 burningglass®
TECHNOLOGIES

Education

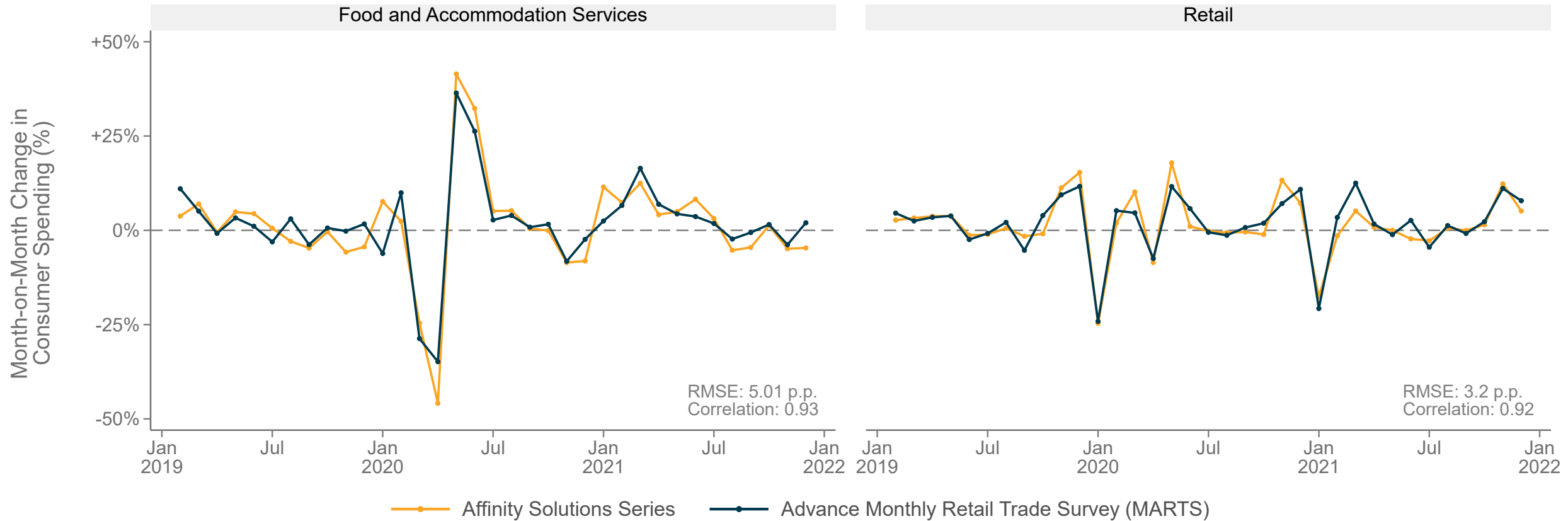
→EARN

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
- Posting resulting data publicly for free download and visualization on a weekly basis at www.tracktherecovery.org

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

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



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Policies

Conclusion &
Next Steps

Impacts of COVID-19

Data

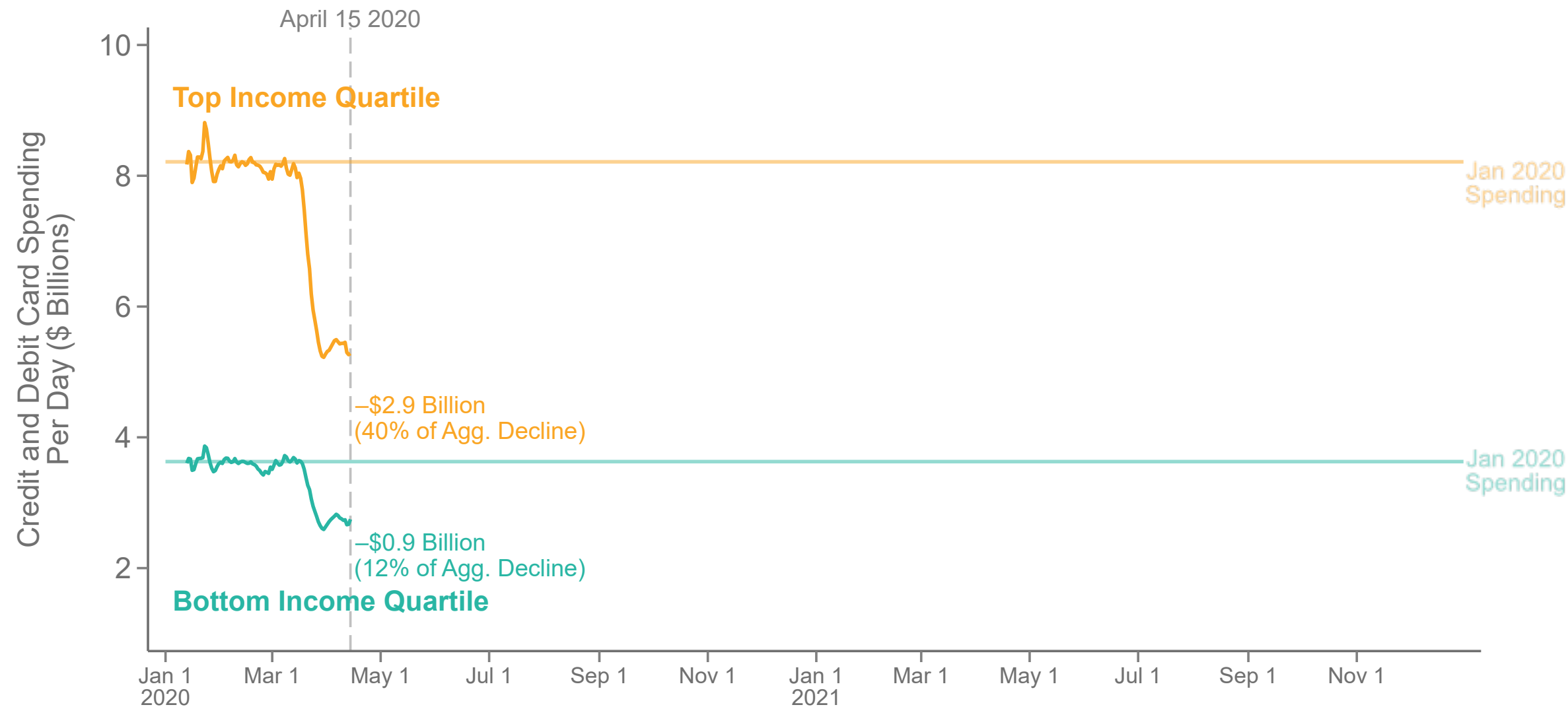
Impacts of
COVID-19

Impact of
Stimulus
Policies

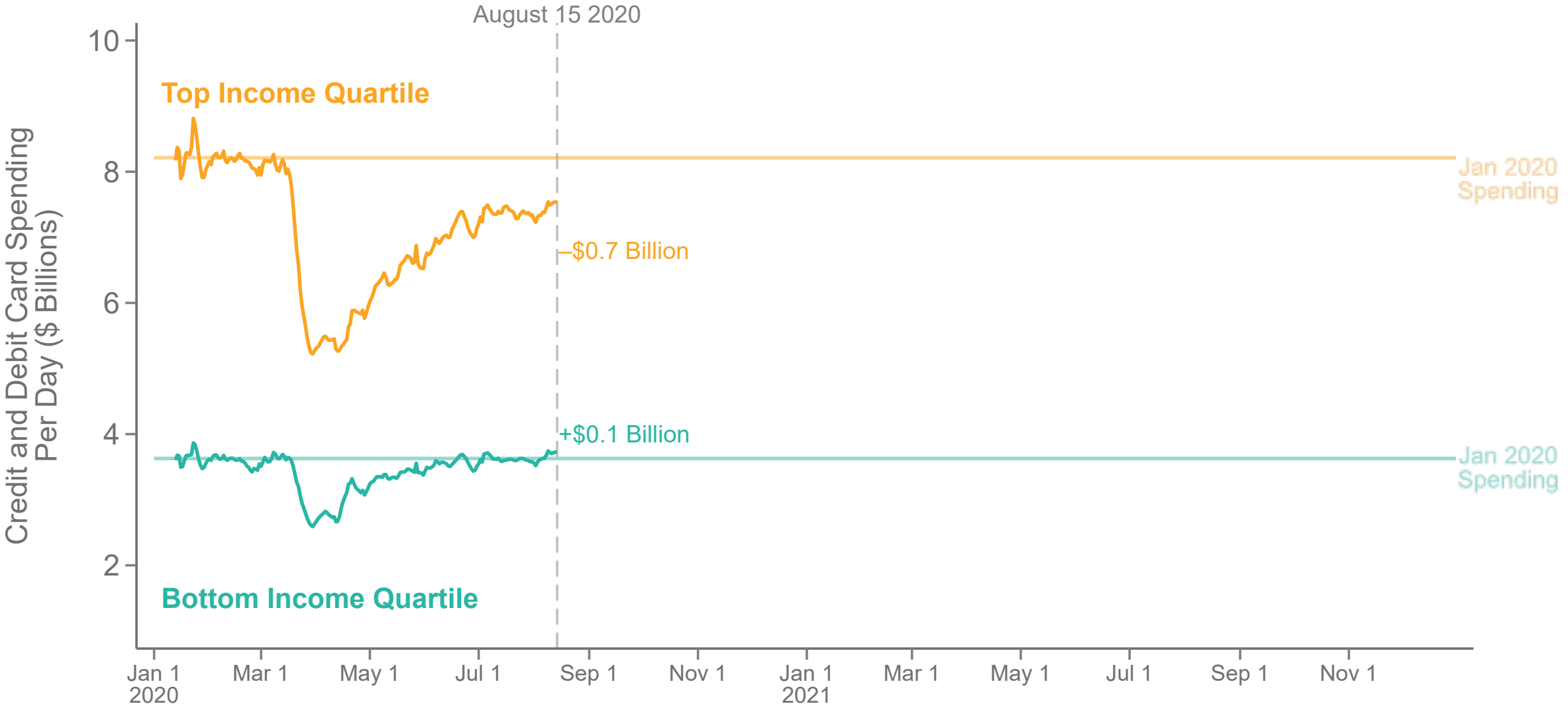
Conclusion &
Next Steps

Spending

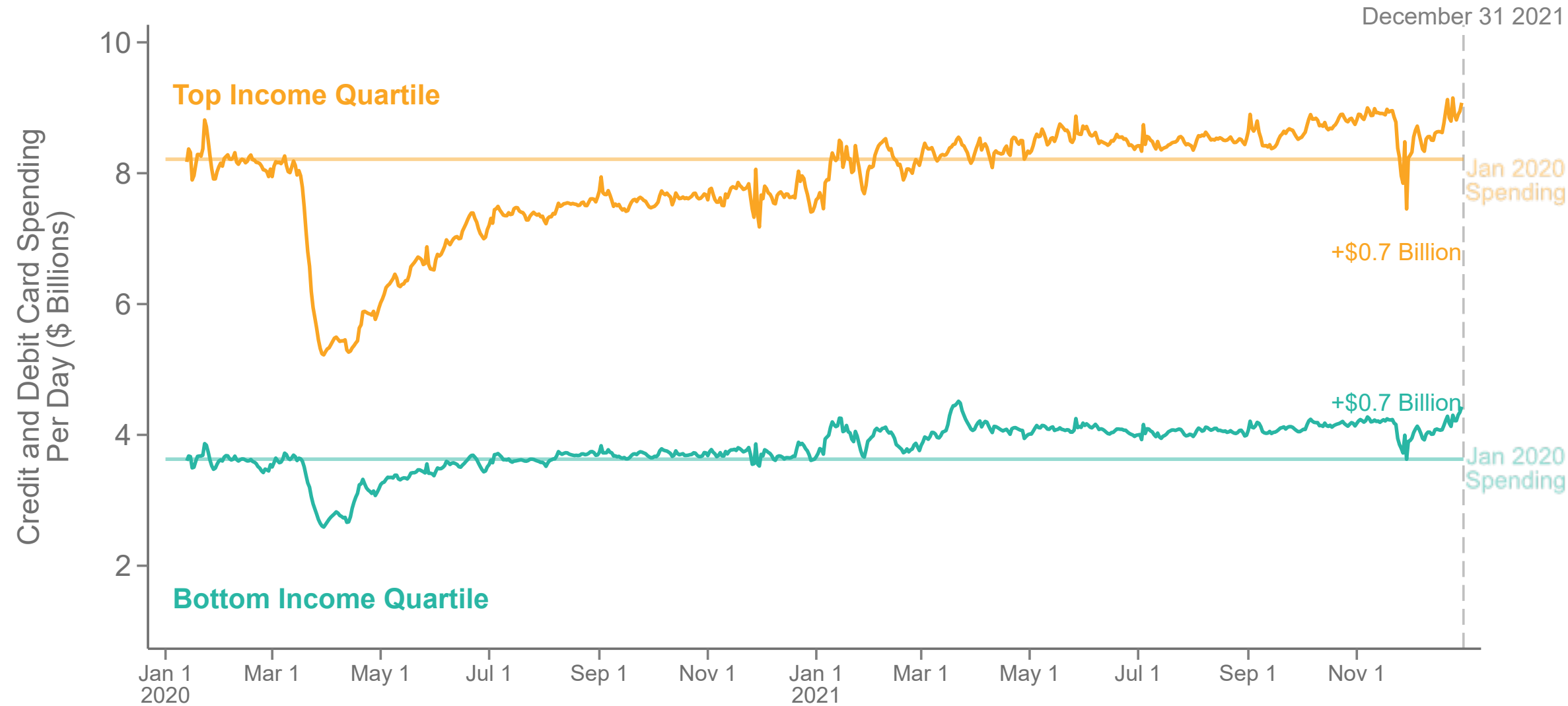
Consumer Spending by Income Quartile



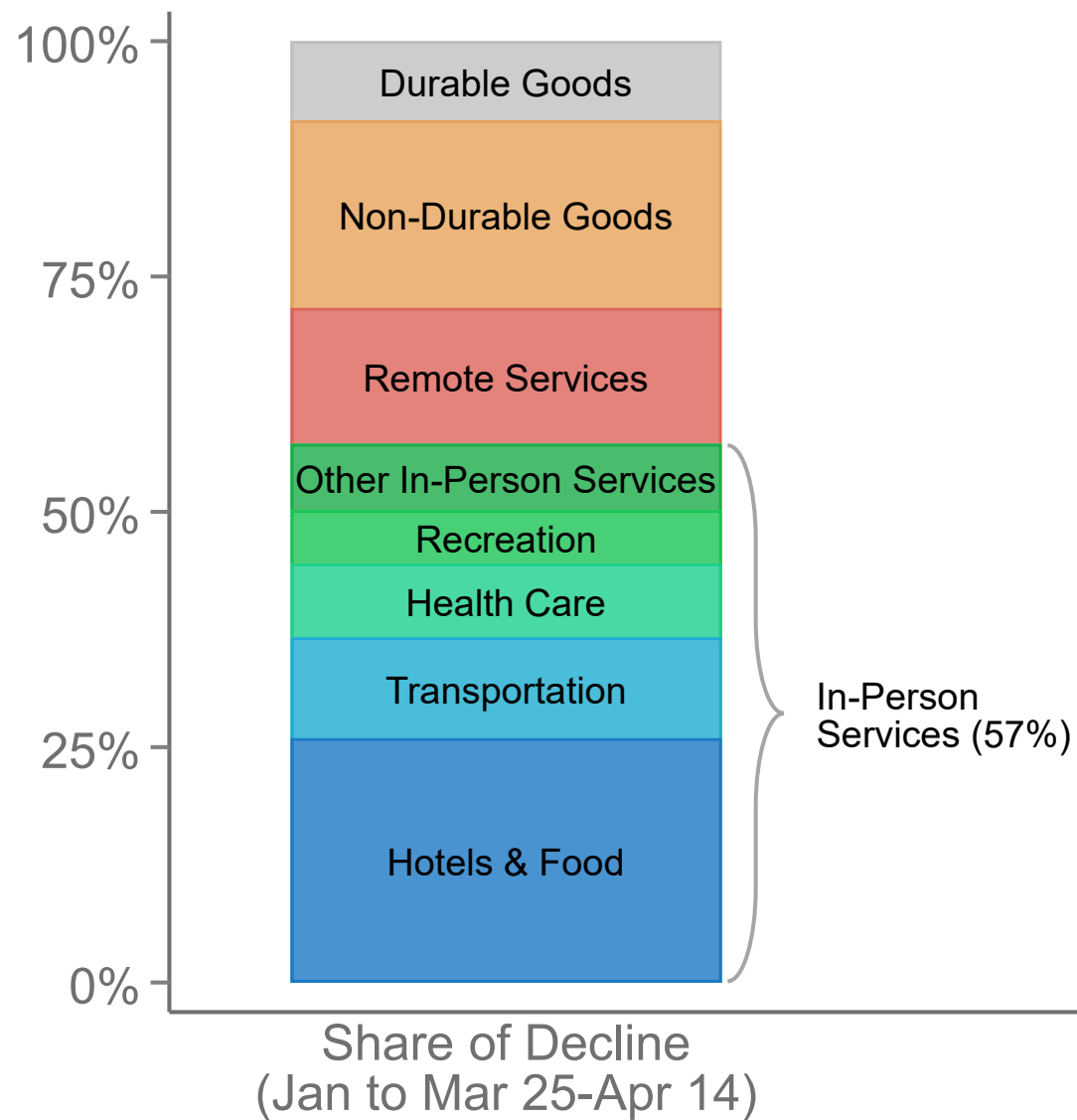
Consumer Spending by Income Quartile



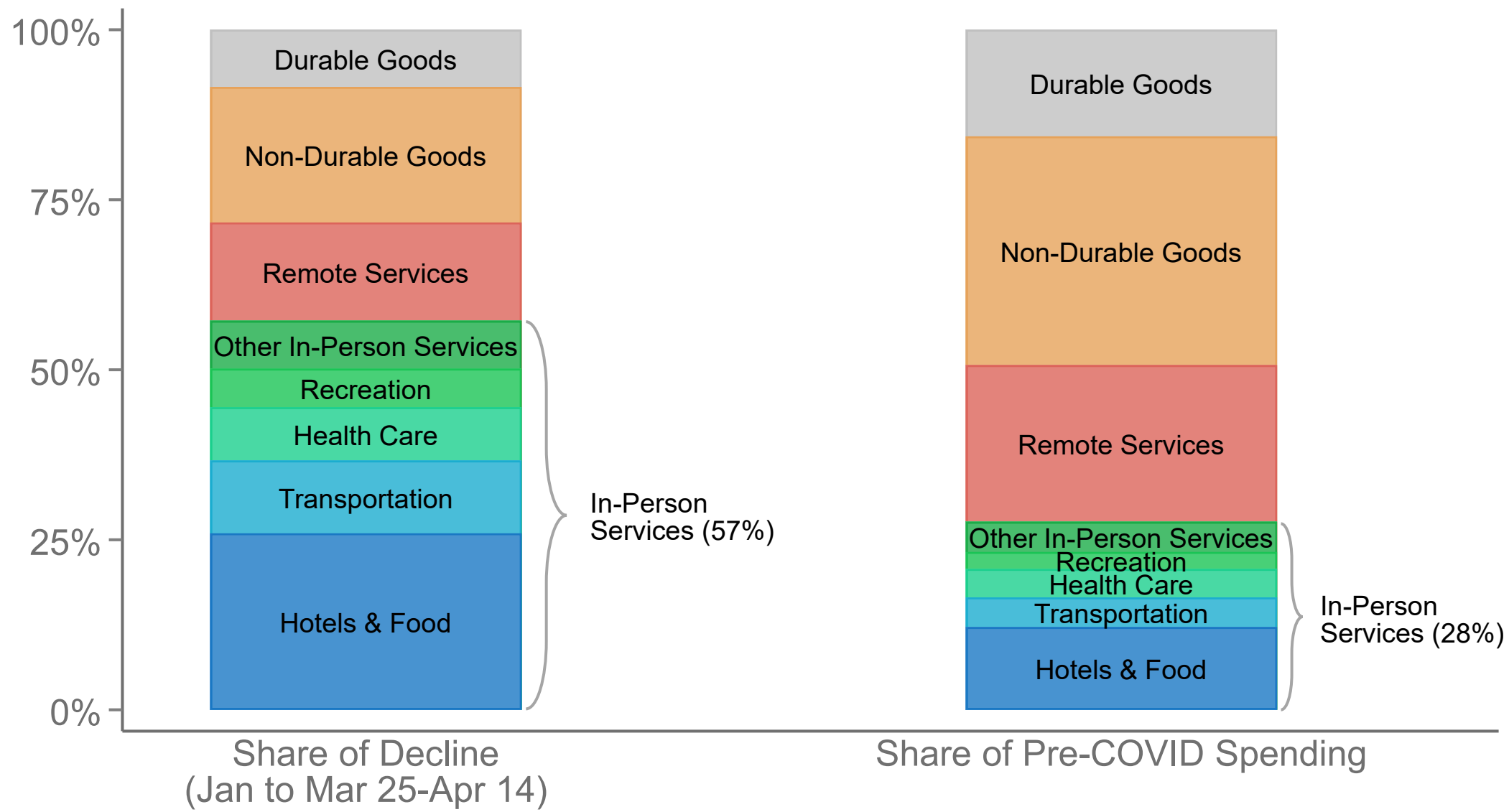
Consumer Spending by Income Quartile



Change in Consumer Spending by Sector



Change in Consumer Spending by Sector



Data

Impacts of
COVID-19

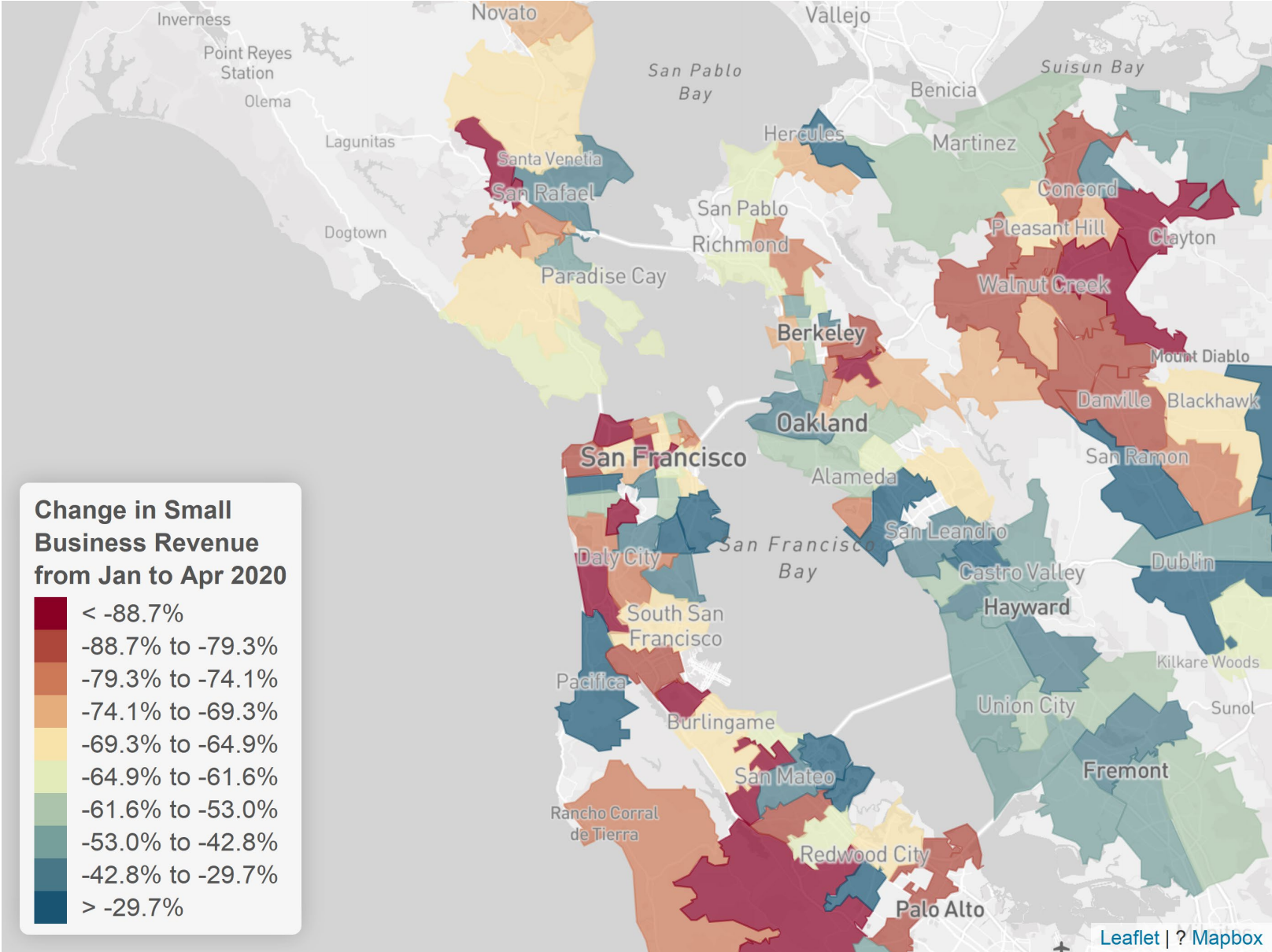
Impact of
Stimulus
Policies

Conclusion &
Next Steps

Business Revenues

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

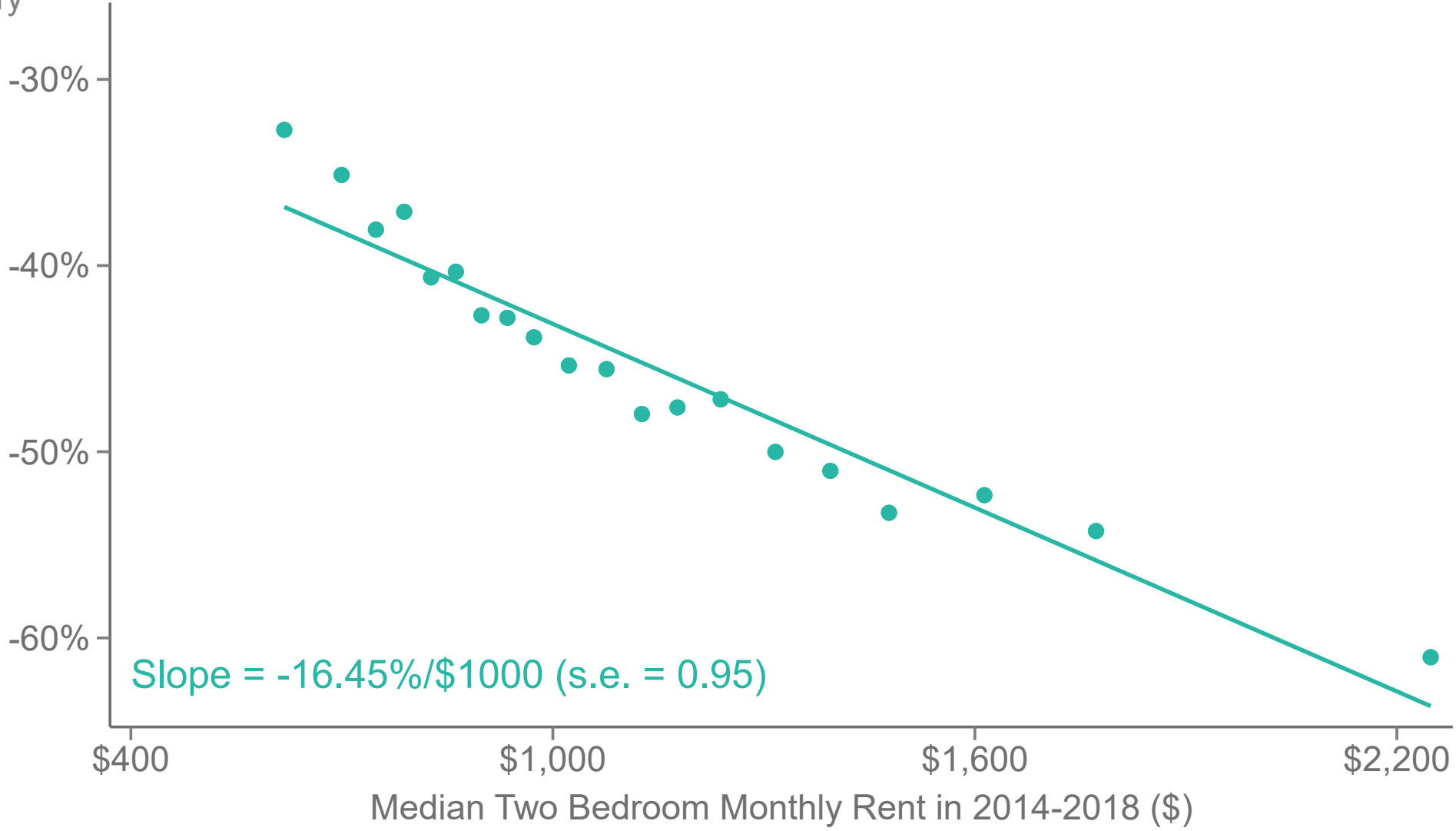
San Francisco



Changes in Small Business Revenues vs. Rent, by ZIP Code

From January to April 2020

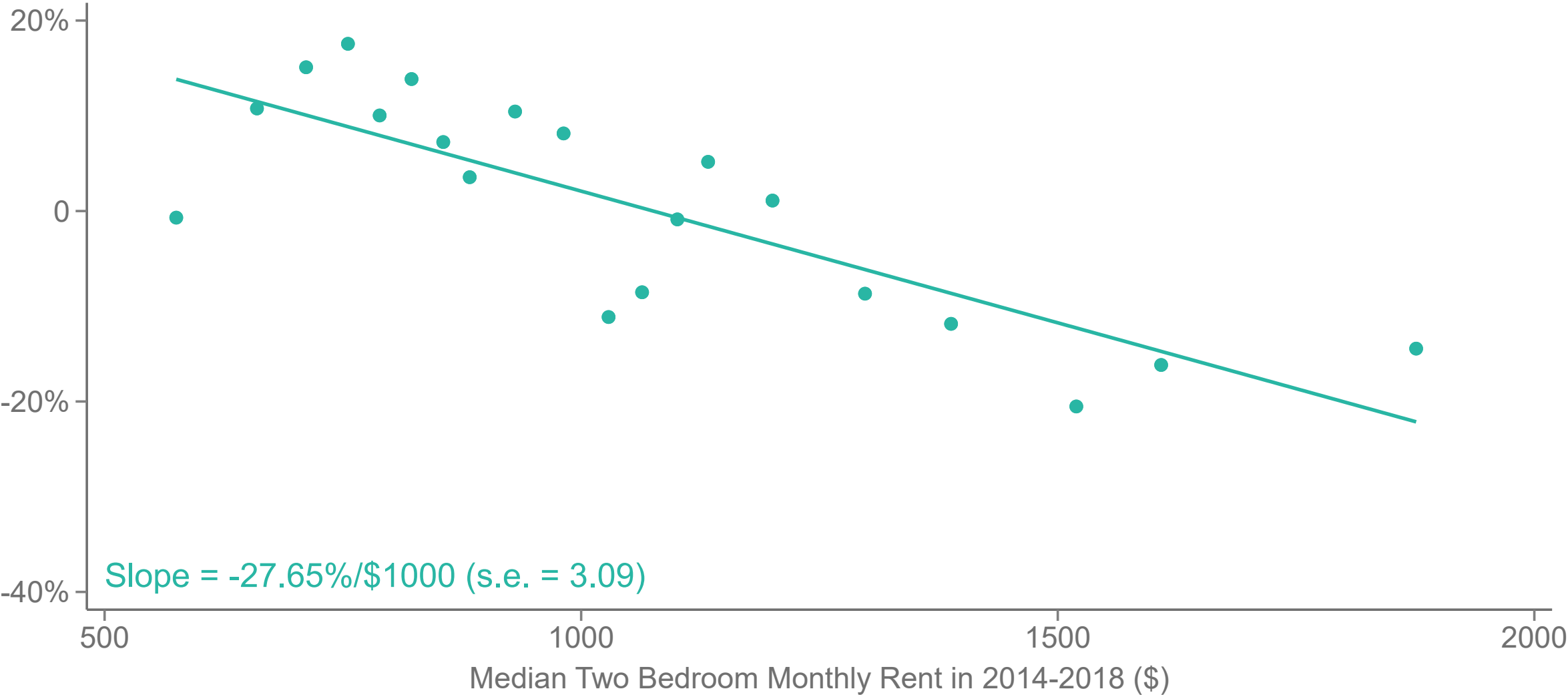
Change in Small Business Revenue
Relative to January



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



Data

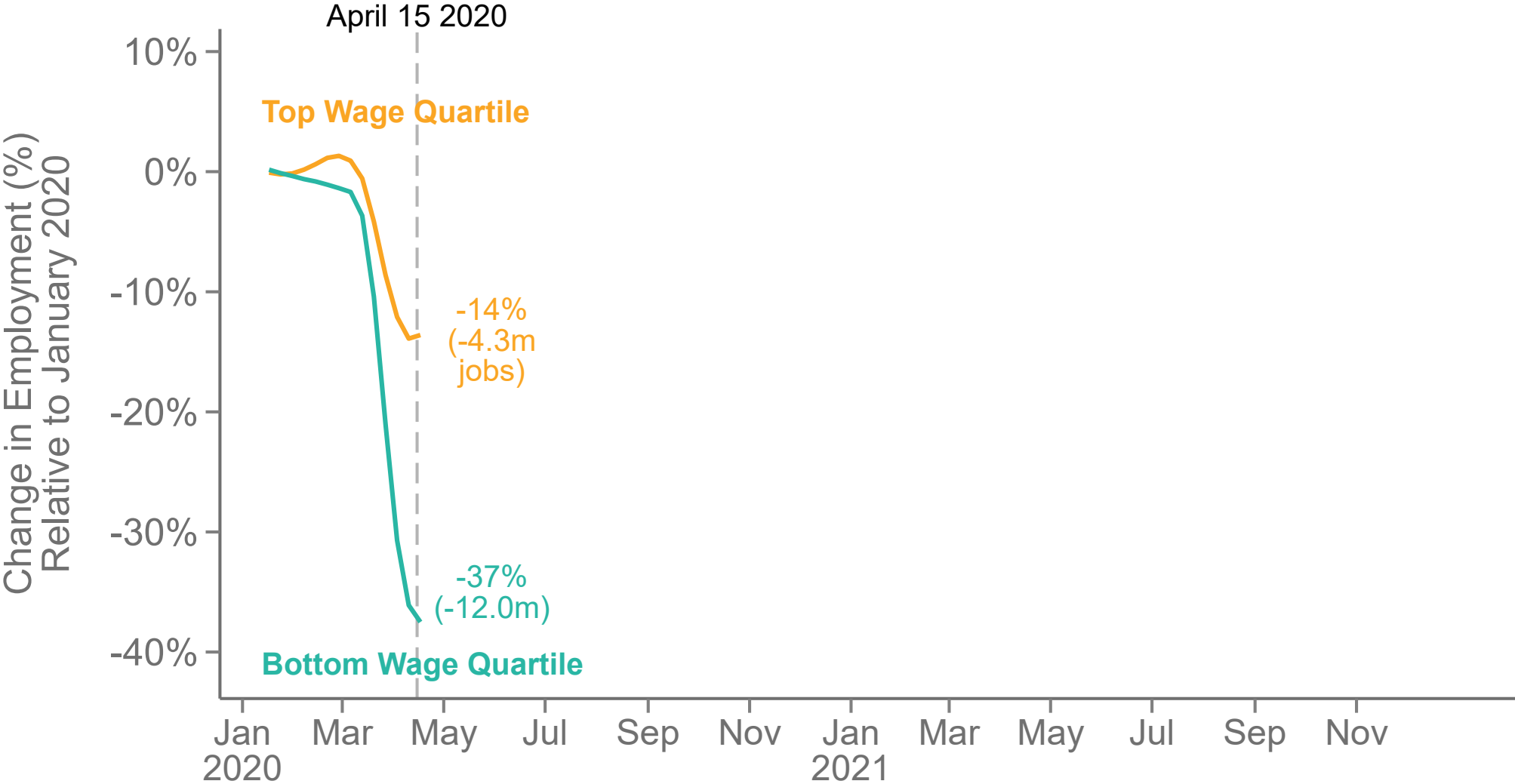
Impacts of
COVID-19

Impact of
Stimulus
Policies

Conclusion &
Next Steps

Employment

Employment Changes by Wage Quartile



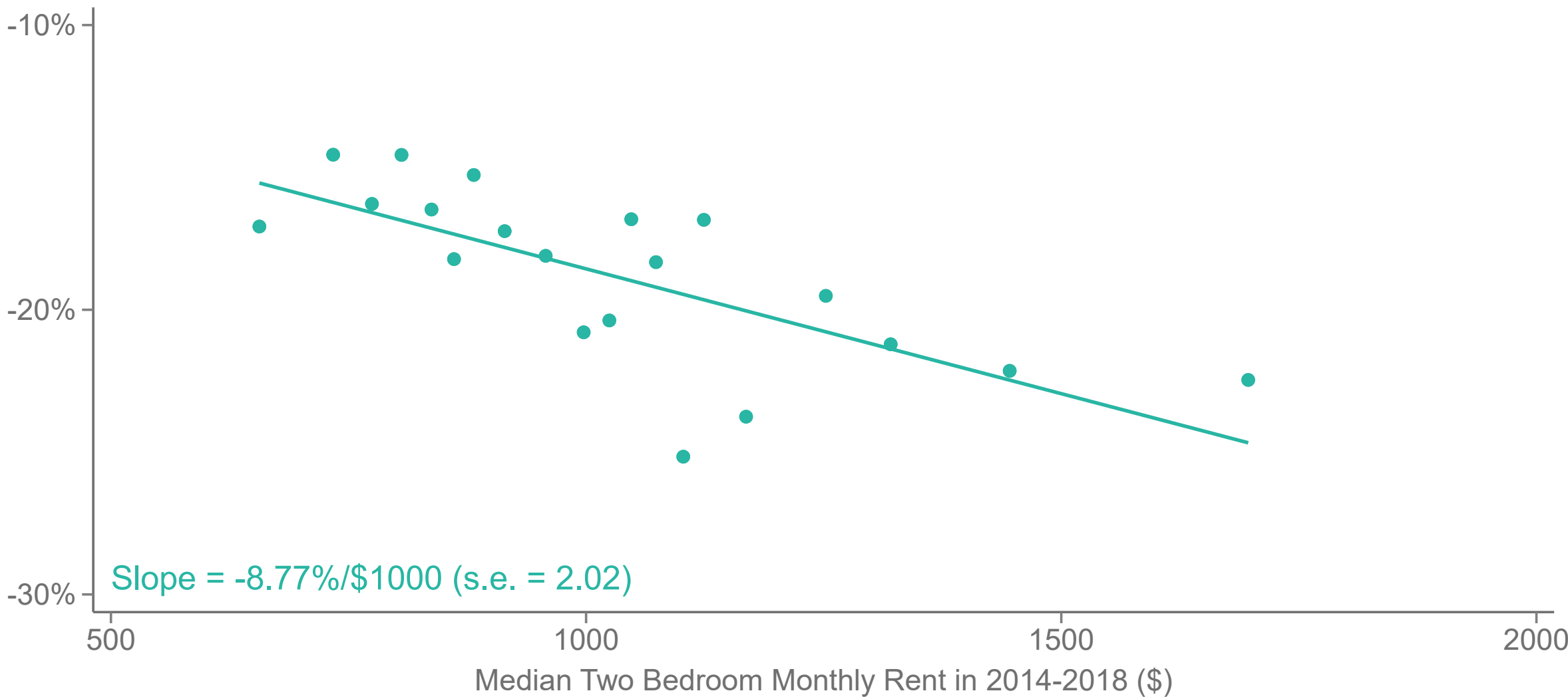
Employment Changes by Wage Quartile



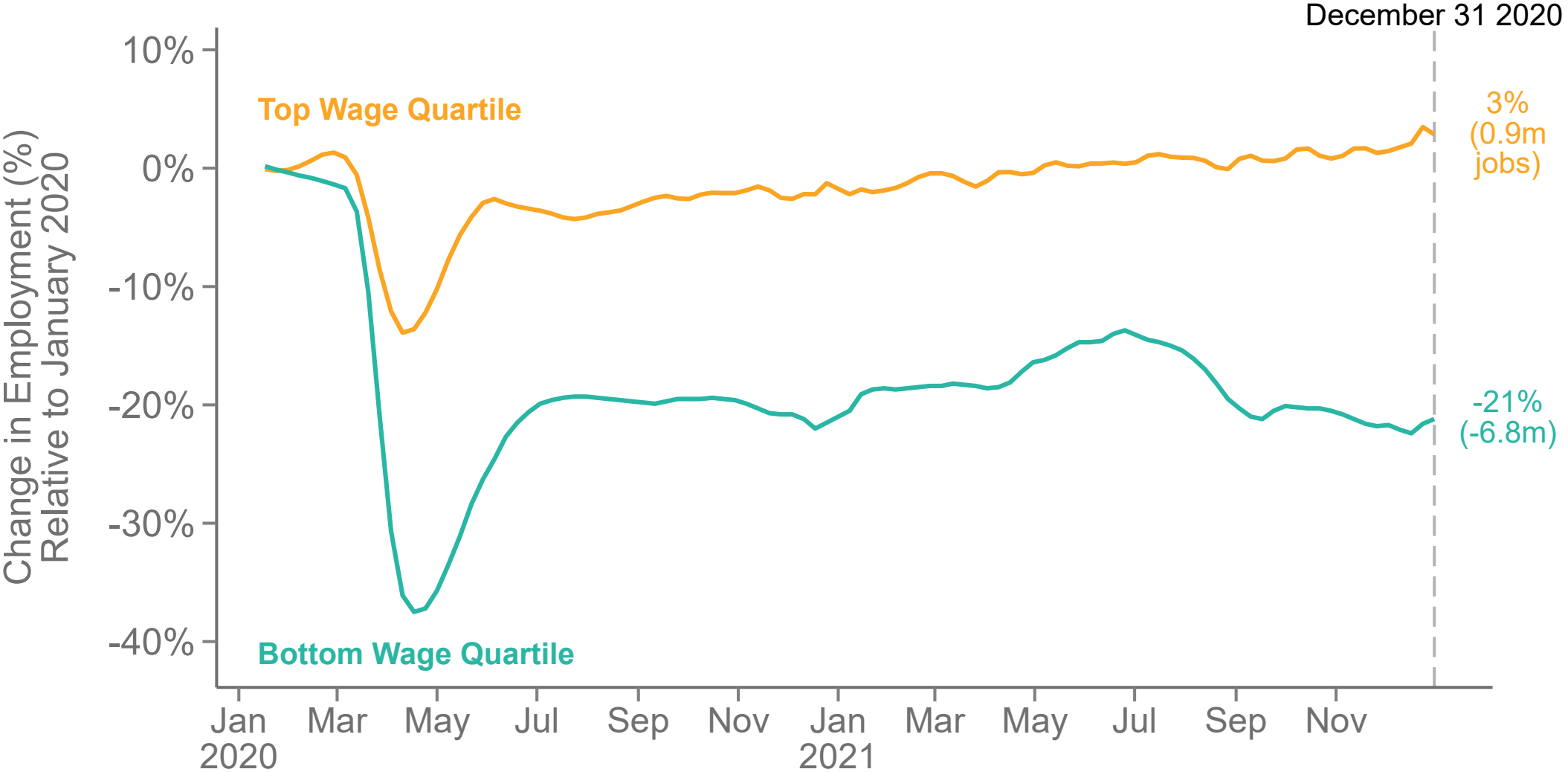
Changes in Bottom-Wage-Quartile Employment vs. Rent, by County

From January to July 2020

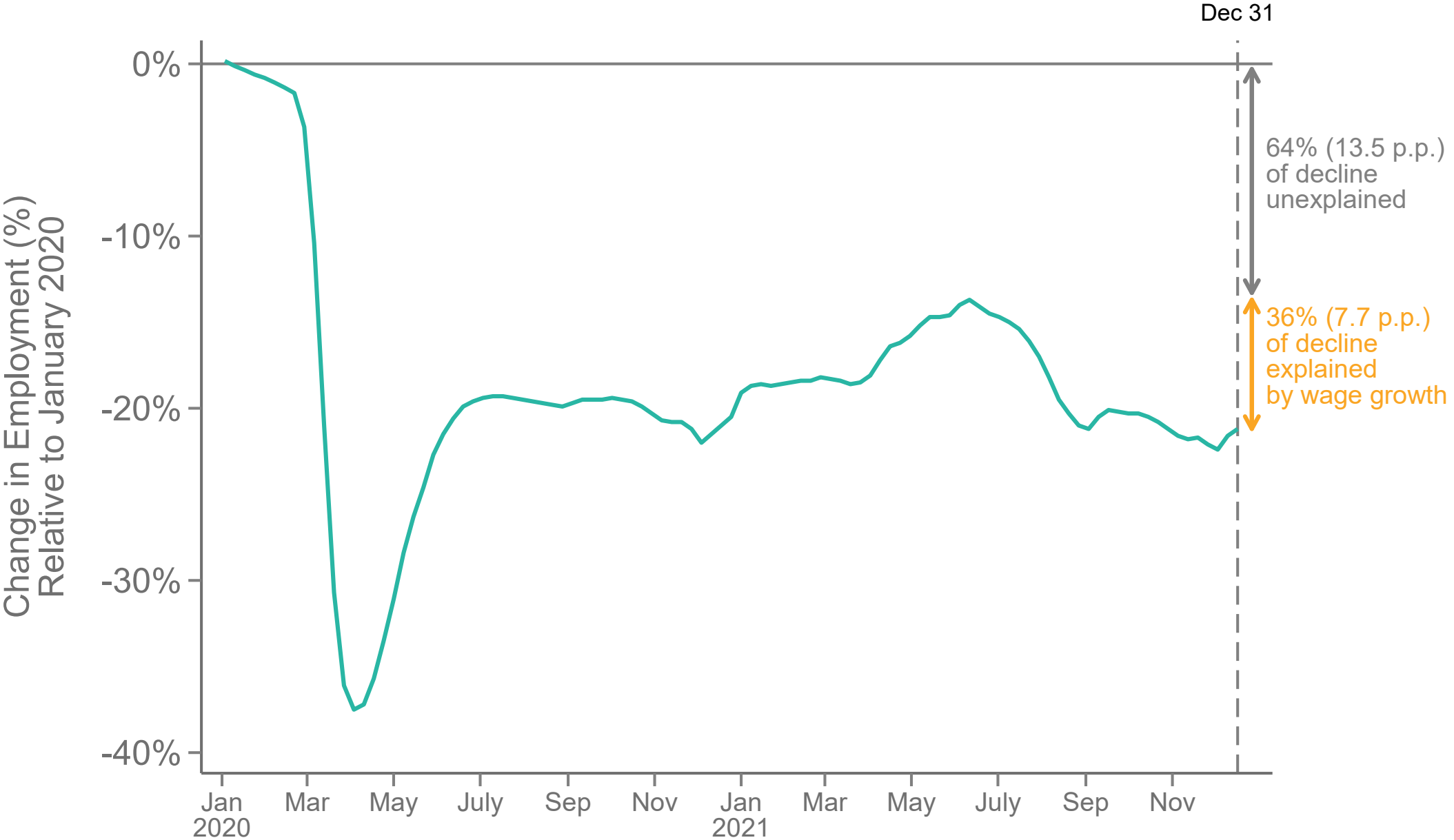
Change in Employment
Relative to January 2020



Employment Changes by Wage Quartile

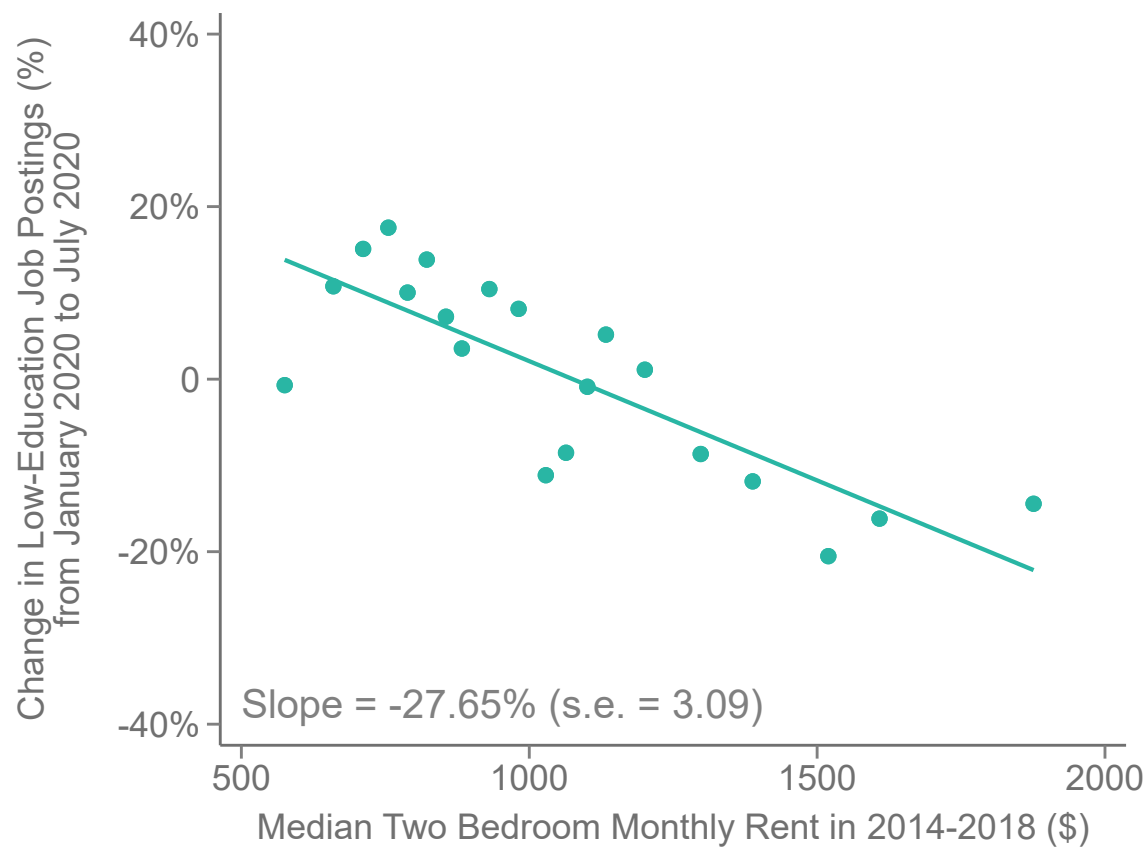


Employment Changes by Wage Quartile



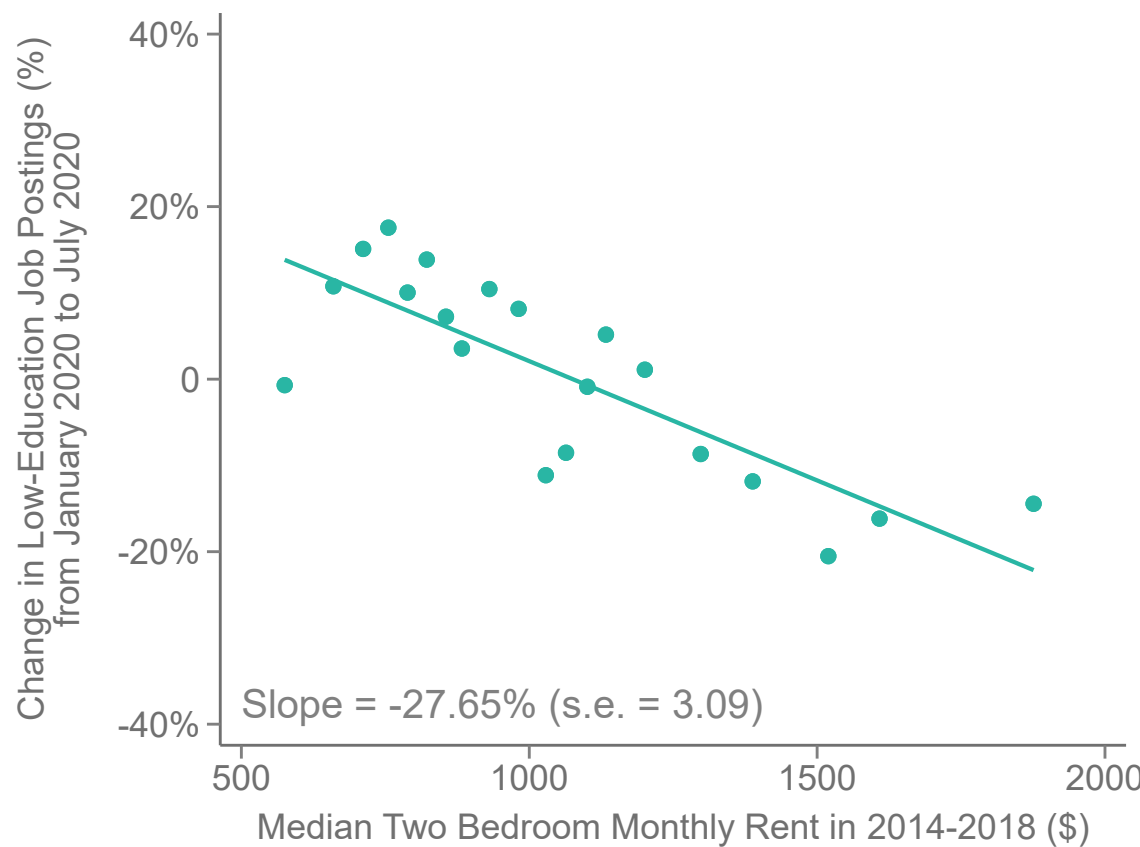
Changes in Low-Skill Job Postings vs. Rent, by County

July 2020

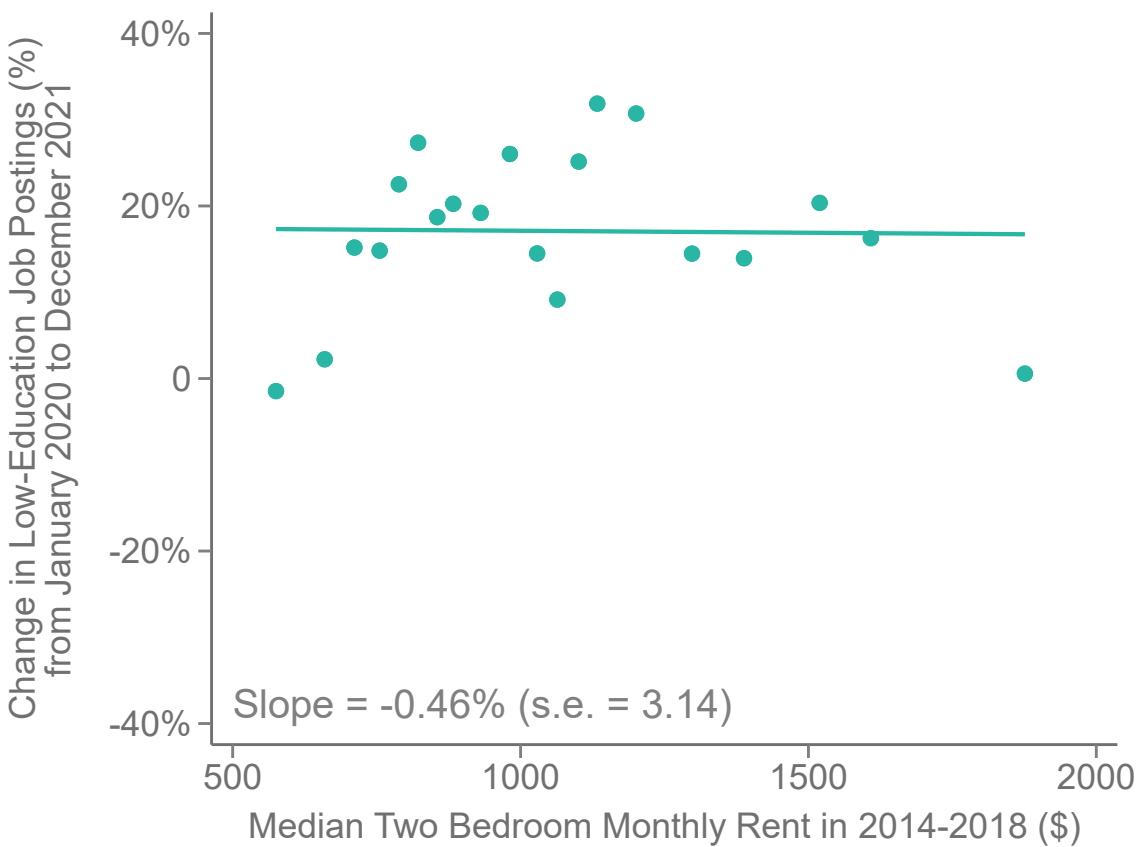


Changes in Low-Skill Job Postings vs. Rent, by County

July 2020

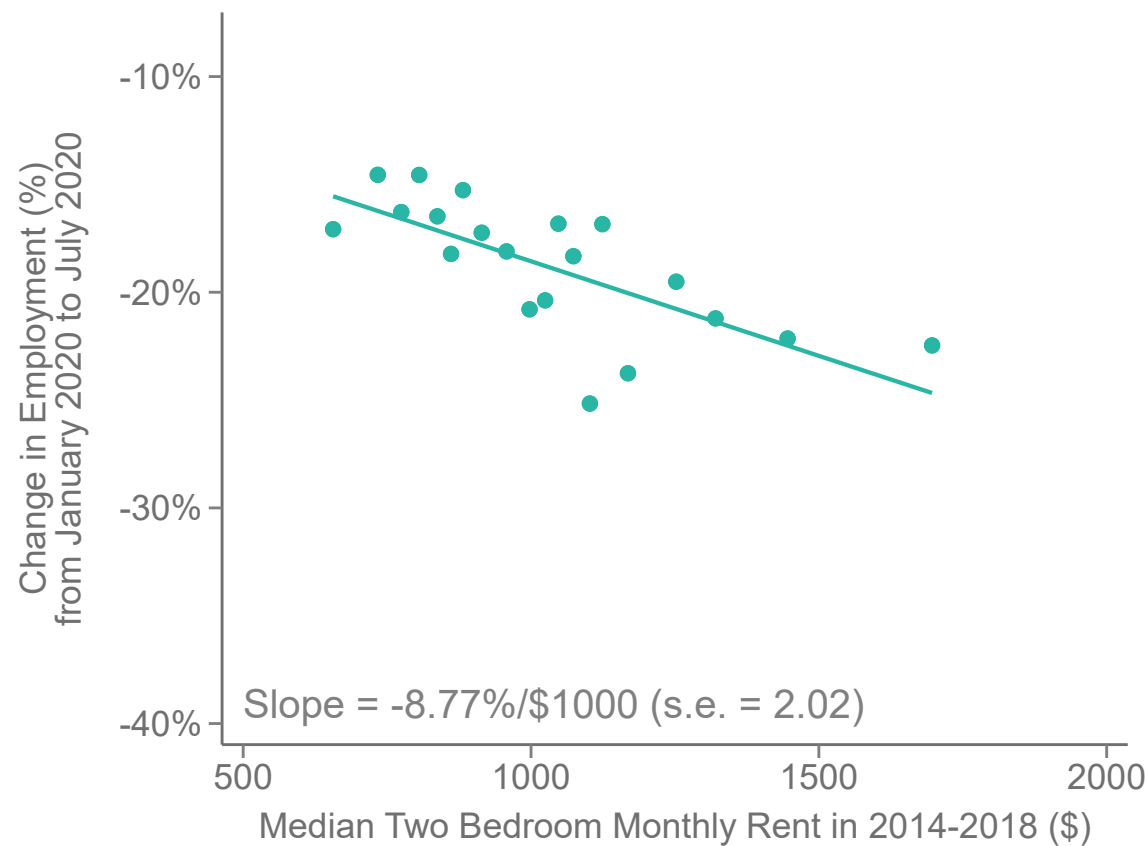


December 2021

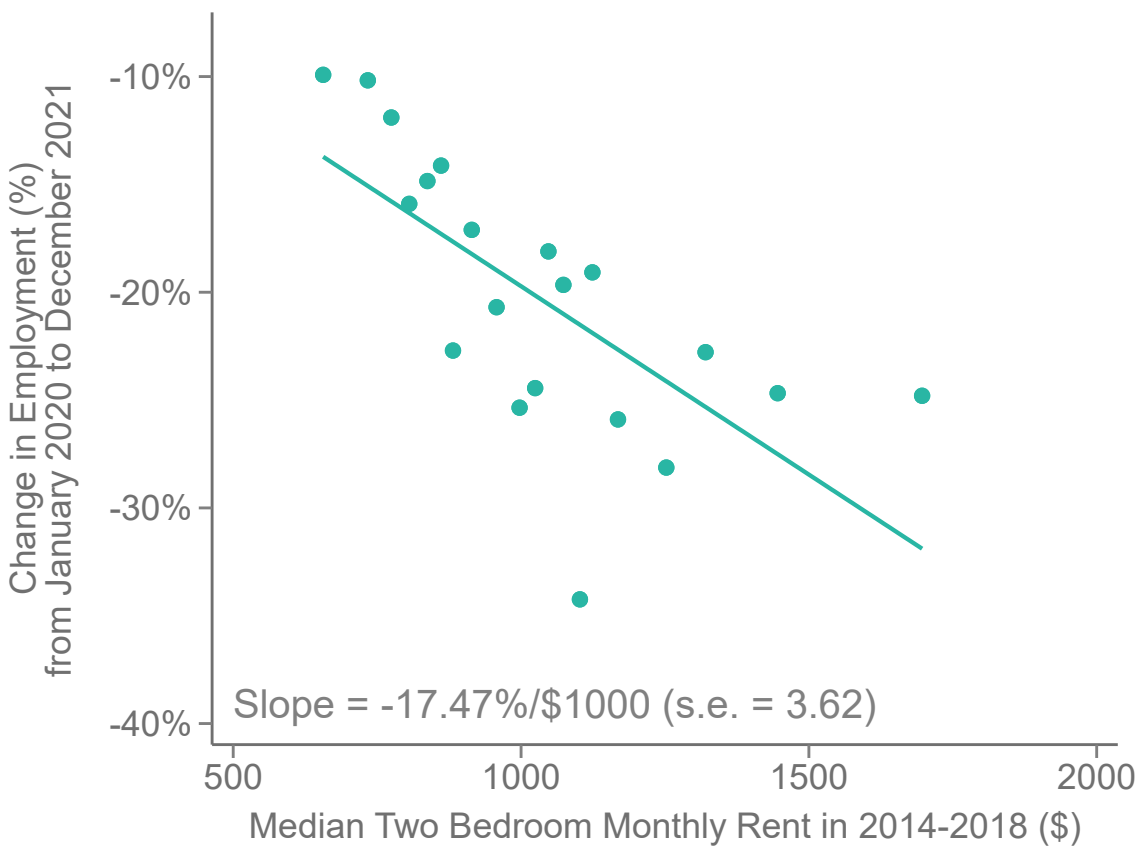


Changes in Bottom-Wage-Quartile Employment vs. Rent, by County

July 2020



December 2021



Data

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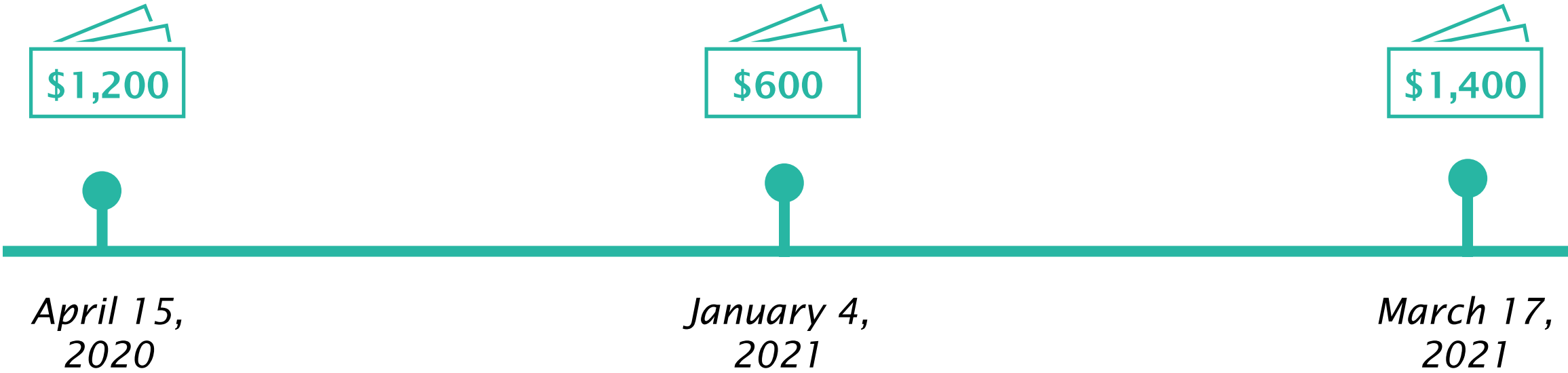
Conclusion &
Next Steps

Impacts of Stimulus Policies

Evaluating the Impacts of Government Policies

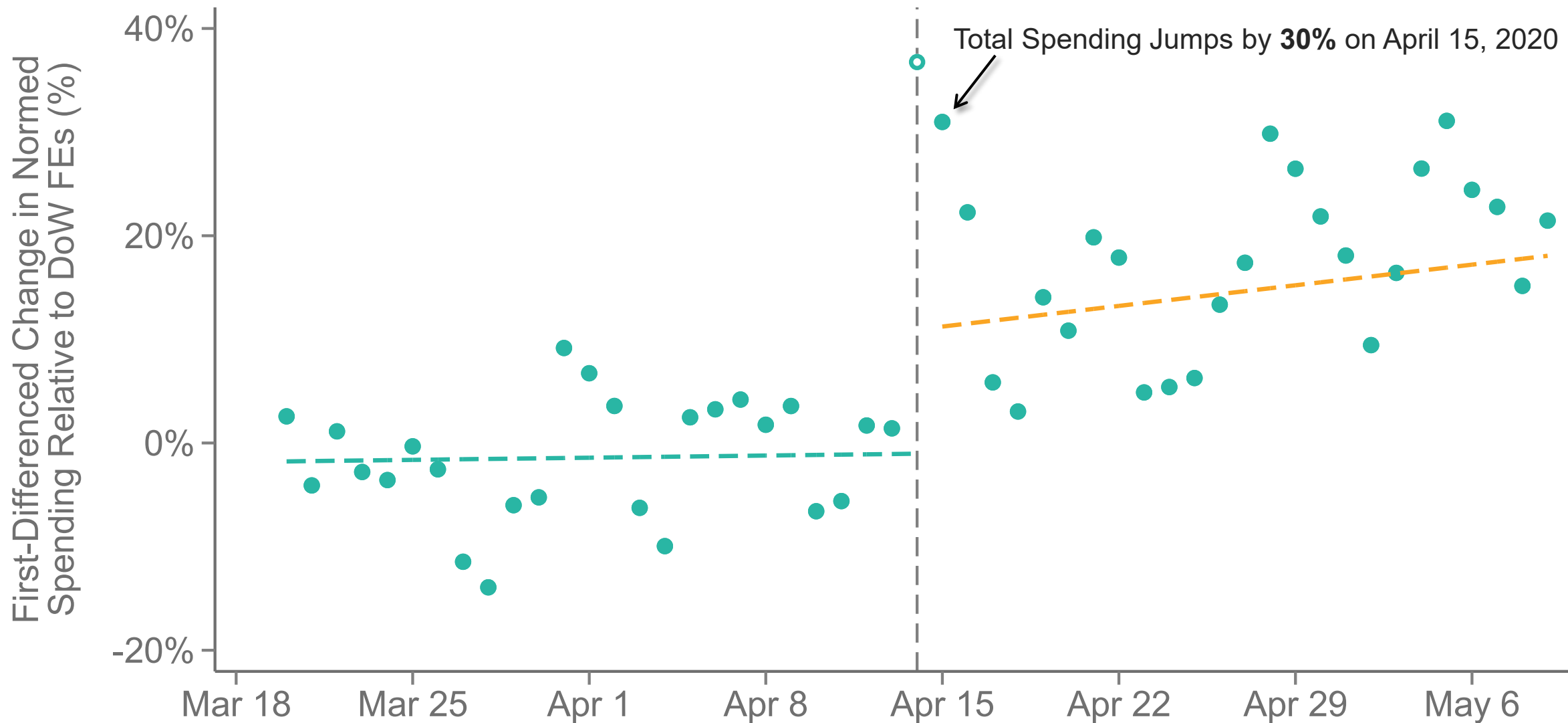
- Were government policies effective in stemming the chain of events we have documented?
- Illustrate how new data can help us evaluate impacts of government policies nearly in real time by focusing on impacts of stimulus payments made to households

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



Impact of First Stimulus Payments on Consumer Spending in April 2020

Bottom Income Quartile Households



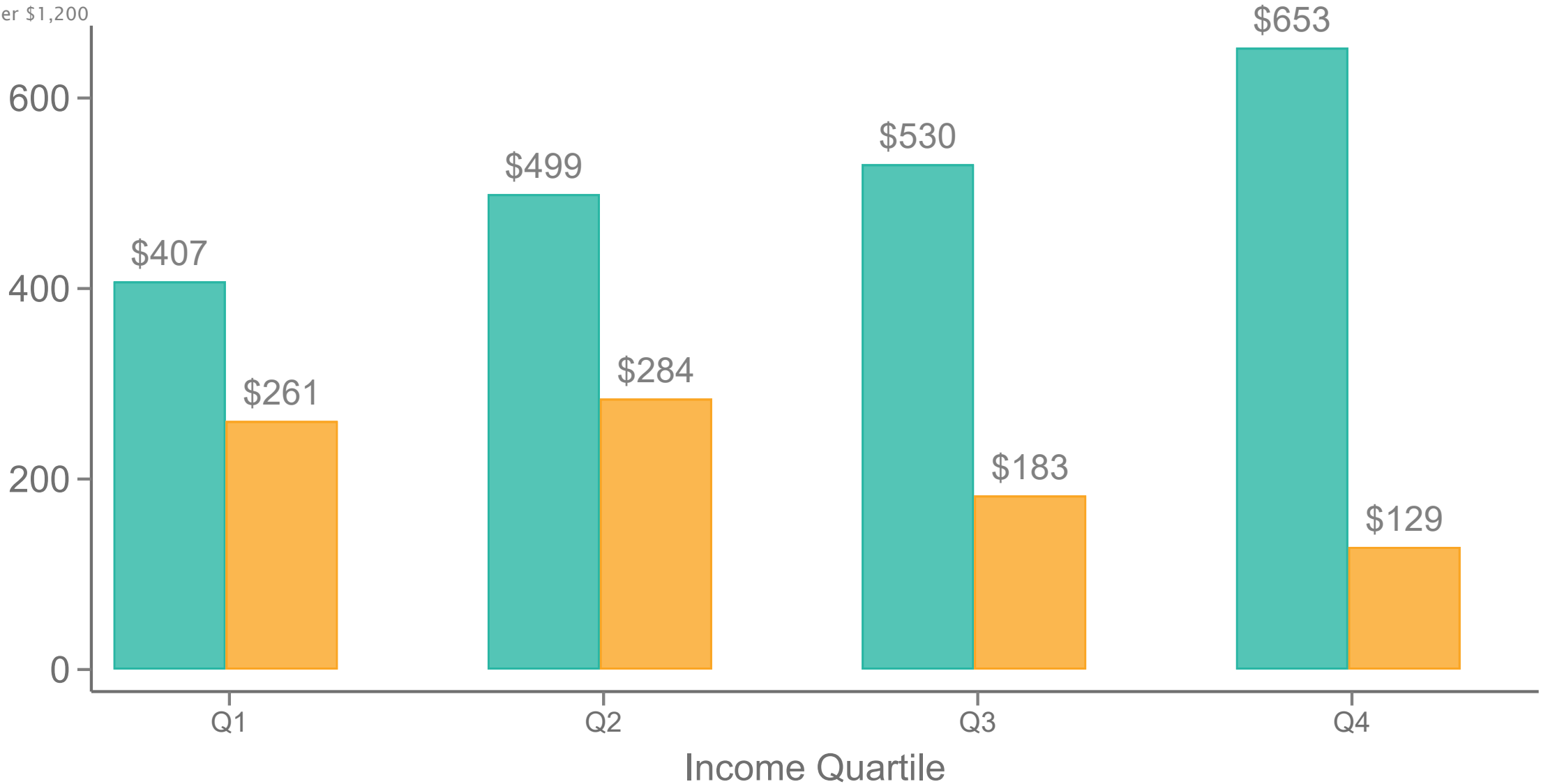
Effect of the COVID Stimulus Bills on Spending, by Income Group



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

April 2020 impacts
January 2021 impacts

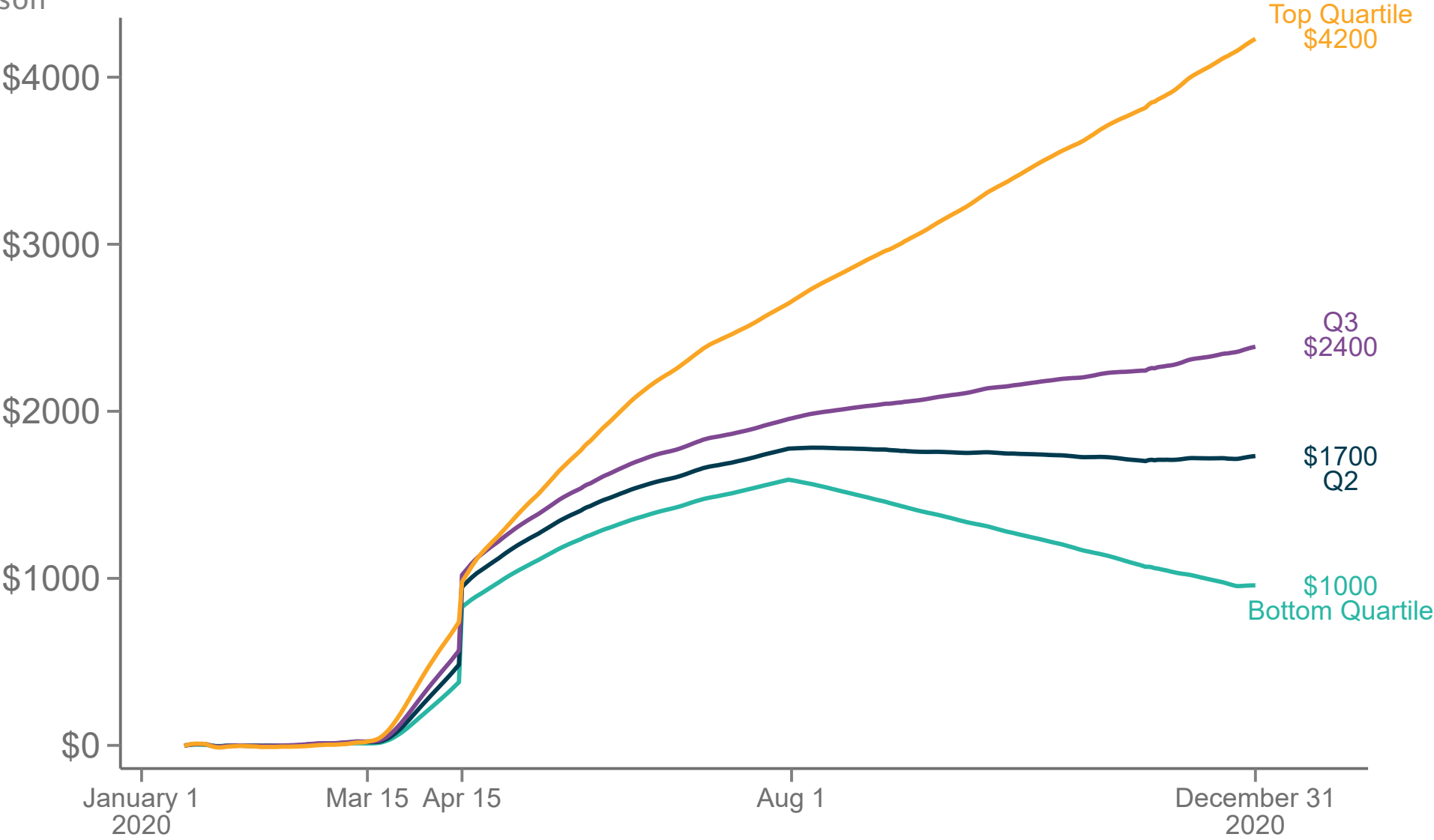
Consumer Spending
Estimate of 1-month
spending per \$1,200



Estimated Cumulative Increase in Savings

$\text{Savings} = \text{Earnings} + \text{Unemployment Insurance} + \text{Stimulus Checks} - \text{Spending}$

Δ Savings Per Person
compared to 2019



The Washington Post

January 26, 2021

Cutting off stimulus checks to Americans earning over \$75,000 could be wise, new data suggests

Biden is debating another round of \$1,400 stimulus payments. Some in Congress have urged the president to target aid to lower-income families only.

February 1, 2021

The New York Times

Live Updates: 10 Republicans Outline Smaller Stimulus Proposal Before Meeting With Biden

The Washington Post

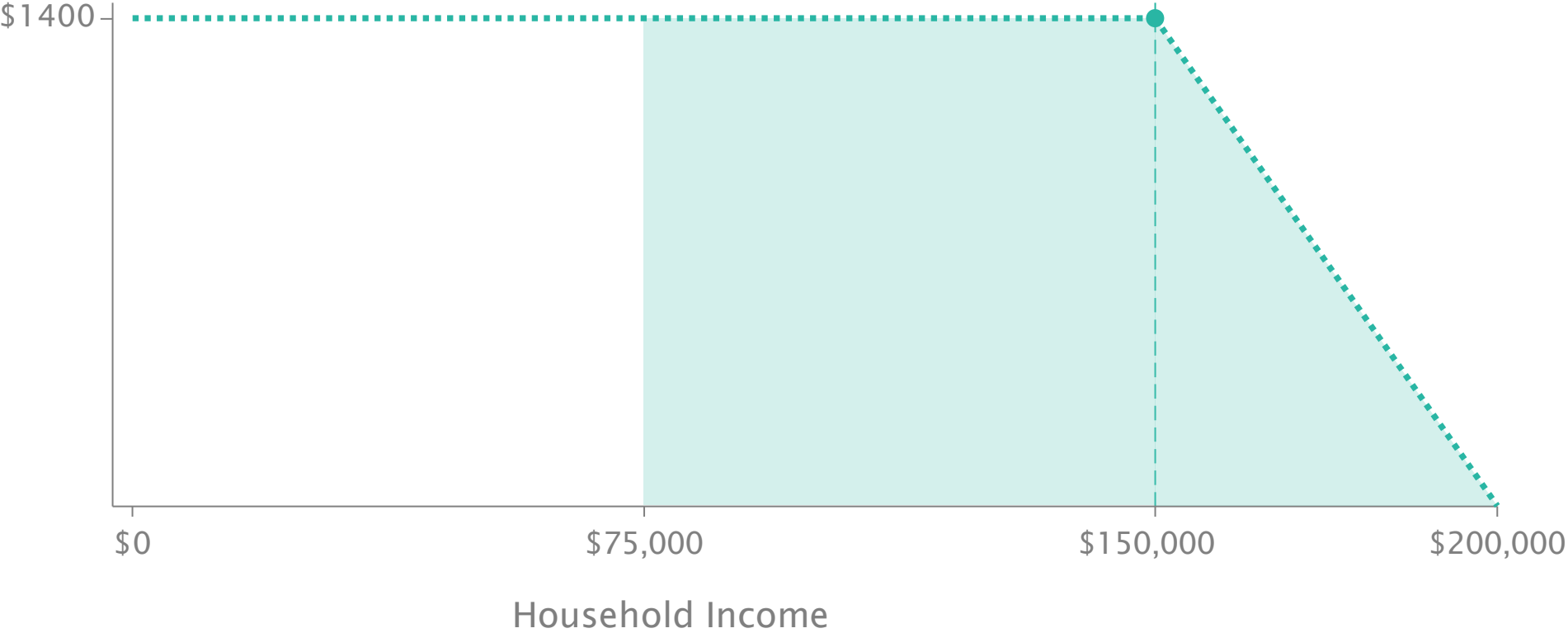
January 28, 2021

Opinion: It's not progressive to give money to the rich

Stimulus Payments by Income Level

Couple with No Children

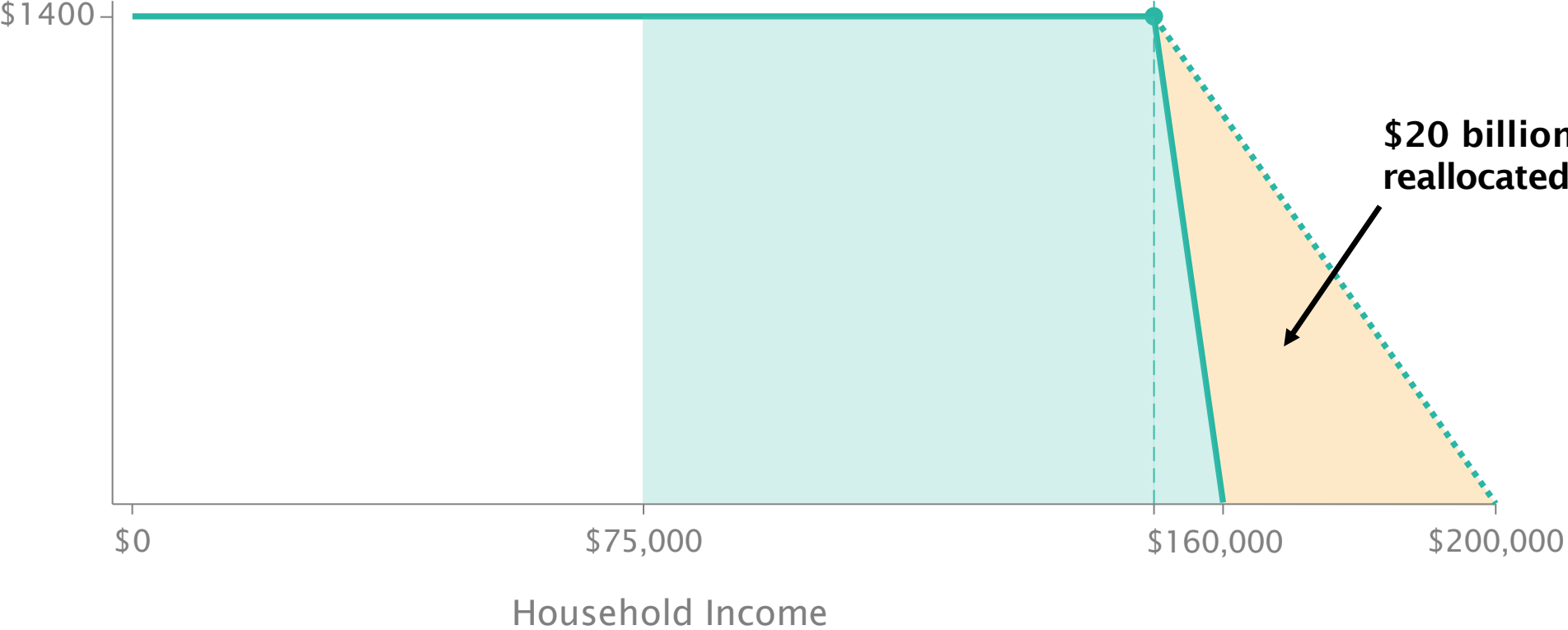
March 2021
Stimulus
Proposed Policy



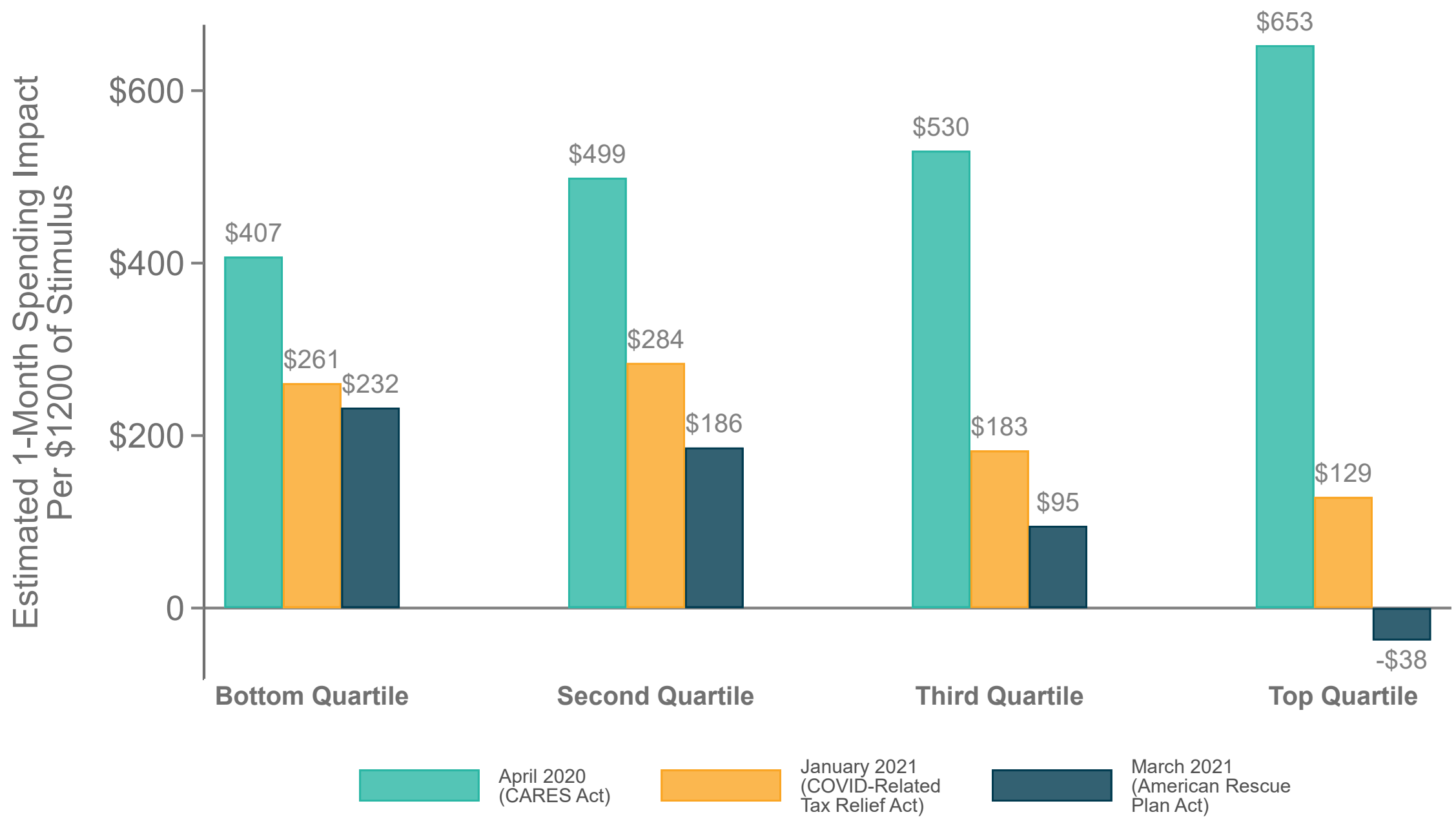
Stimulus Payments by Income Level

Couple with No Children

March 2021
Stimulus
Actual Policy



Effect of the COVID Stimulus Bills on Spending (per \$1,200 check), by Income Group



Evaluating the Impacts of Government Policies

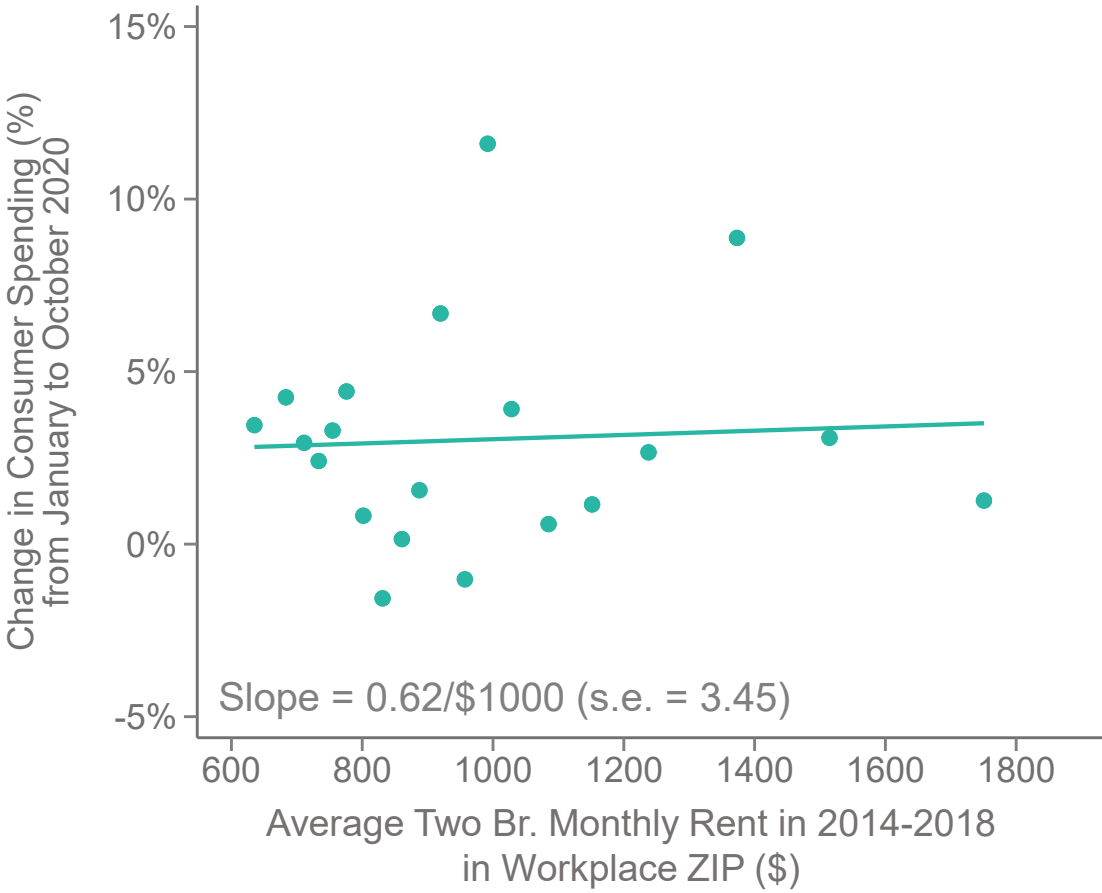
- Publicly available data released here have been used to evaluate many other stabilization policies
 - UI expansions [Casado et al. 2020, Coombs et al. 2022]
 - Paycheck Protection Program [Granja et al. 2020]
 - Eviction moratoria [An et al. 2021]
- Were these policies effective in stemming the downward spiral in economic activity?

Changes in Bottom-Income-Quartile Spending vs. Workplace Rent, by ZIP Code

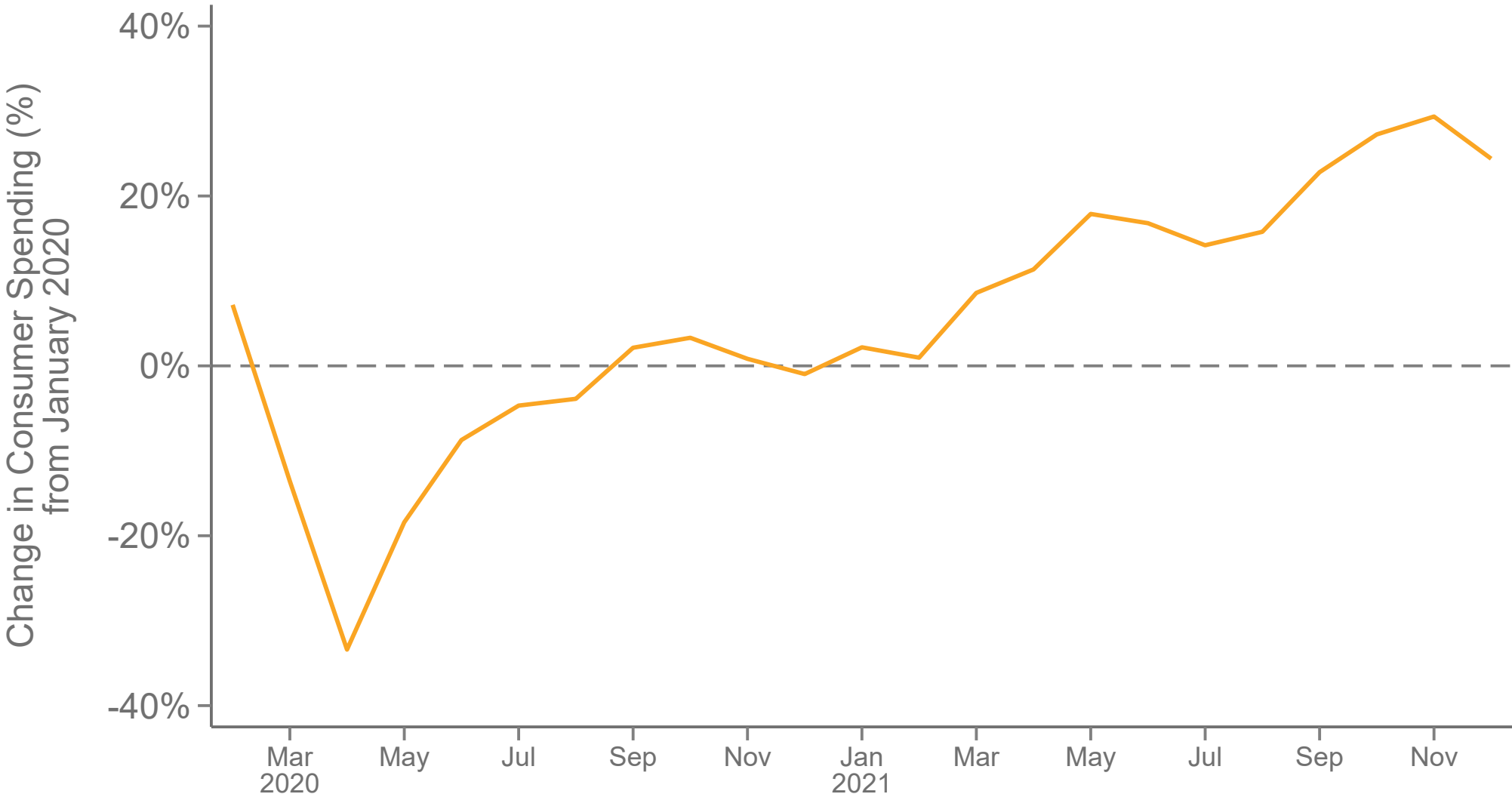
April 2020



October 2020



Evolution of Bottom-Income-Quartile Spending in High-Rent ZIP codes



Data

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COVID-19

Impact of
Stimulus
Policies

Conclusion &
Next Steps

Conclusion and Next Steps

Conclusions

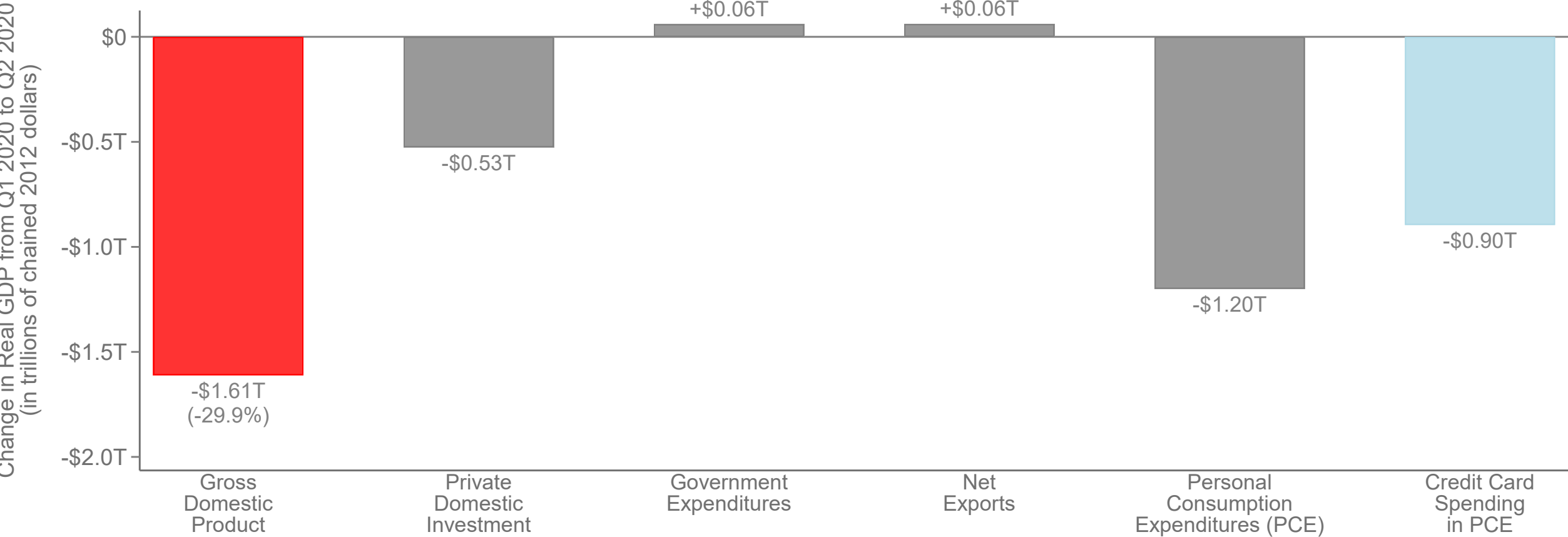
1. Fiscal policies can be helpful in limiting **secondary declines** in consumer spending that arise from loss of income when workers lose their jobs
2. But fiscal policy itself does not have the capacity to restore full employment when root cause of reduction in spending is health concerns [Guerrieri et al. 2020]
 - Full economic recovery requires addressing health concerns themselves
3. Furthermore, even after health concerns have abated, changes in labor supply among those who have lost their jobs may lead to **persistent employment reductions**

Looking Forward: A New Way to Measure Economic Activity

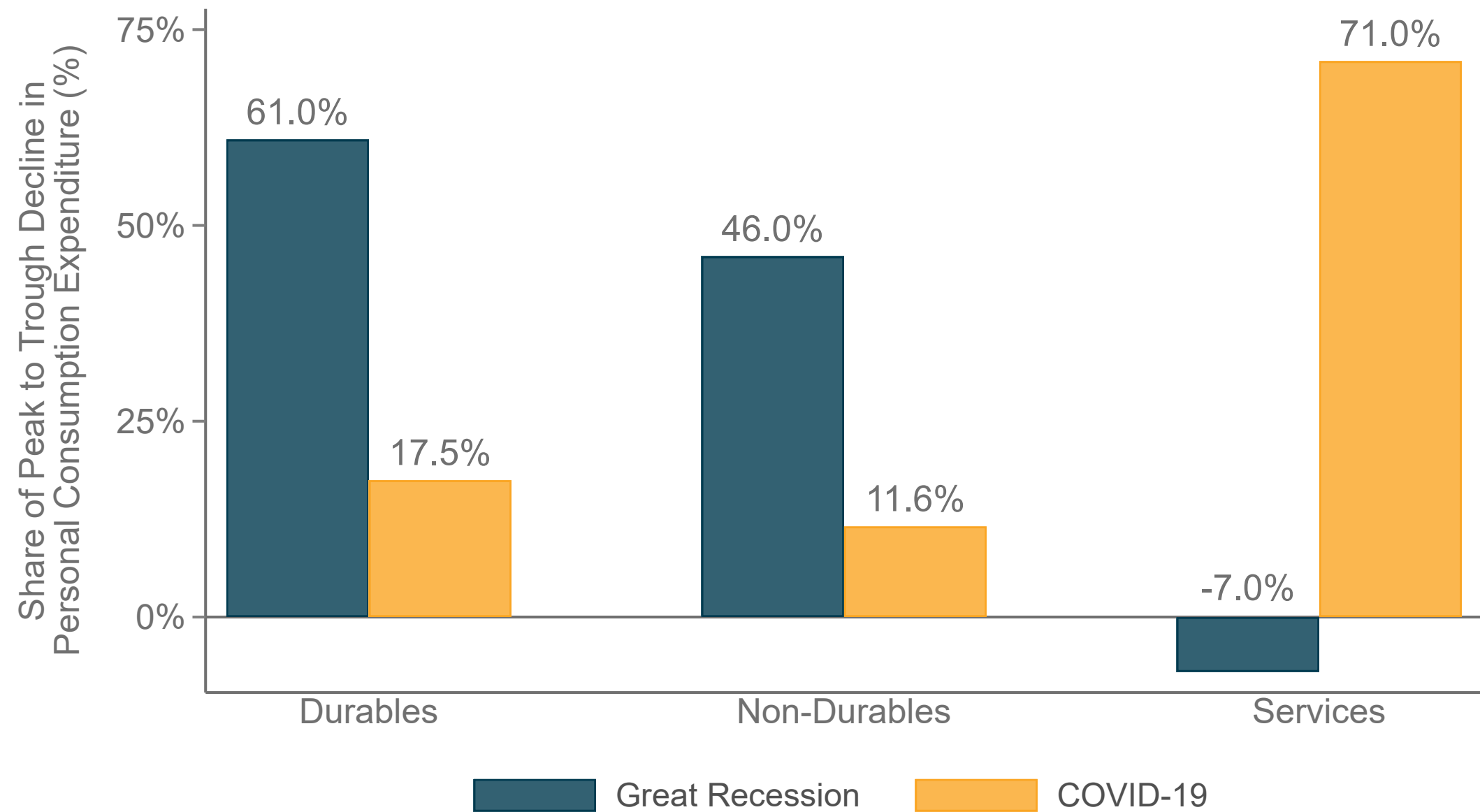
1. Big data can help us design a new system of real time national accounts that can be useful for diagnosing issues in the economy
 - Currently collaborating with U.S. govt. agencies to construct a more permanent system of granular, high frequency national accounts, building on prototype constructed here
2. Big data can also open new pathways for macro policy: fine tuning based on state of the economy and observed policy impacts
 - Can link between local spending levels and employment shocks tell us when fiscal policies are adequate?
 - Can real-time data be used to monitor where hysteresis is emerging in the labor market and target job retraining programs accordingly?

Supplementary Appendix

Consumer Spending in National Accounts vs. Credit and Debit Card Data



Spending Changes by Sector: COVID vs Great Recession

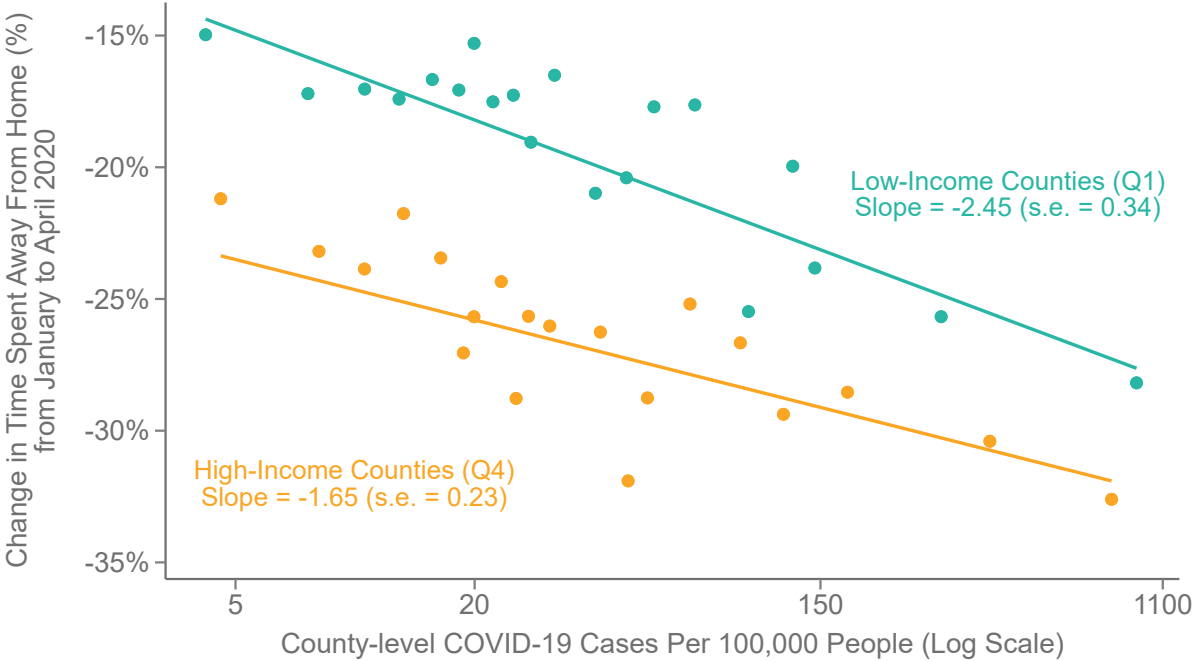


Association Between COVID-19 Incidence, Spending, and Mobility

Change in Consumer Spending vs. COVID-19 Case Rate, by County

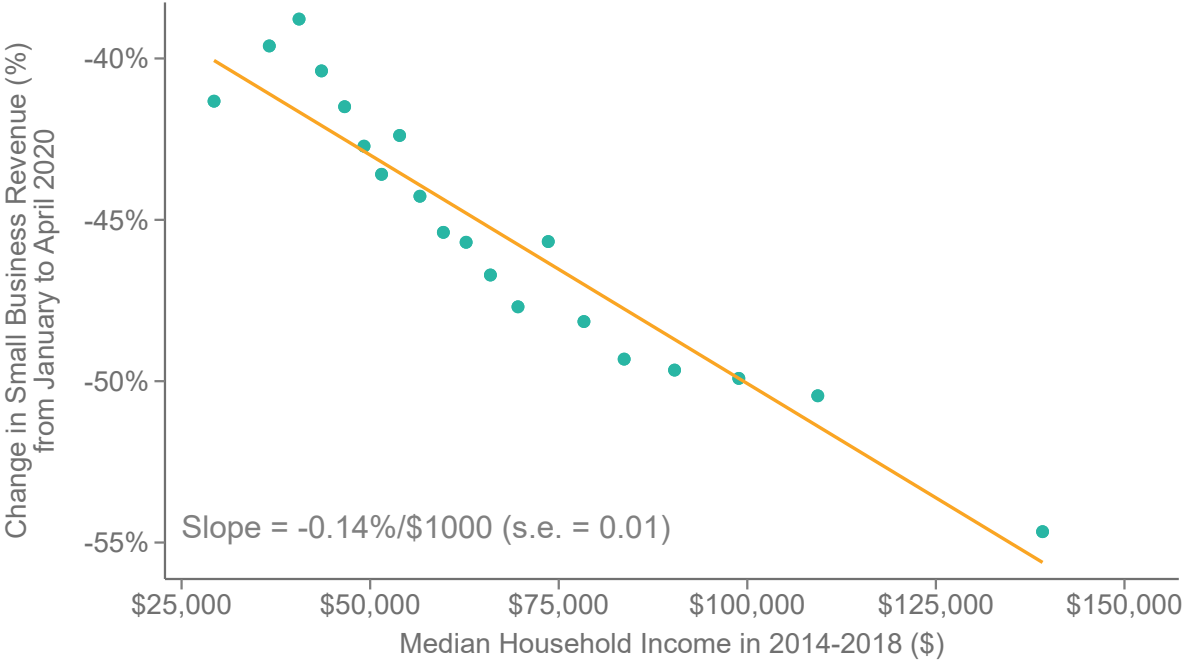


Change in Mobility vs. COVID-19 Case Rate, by County

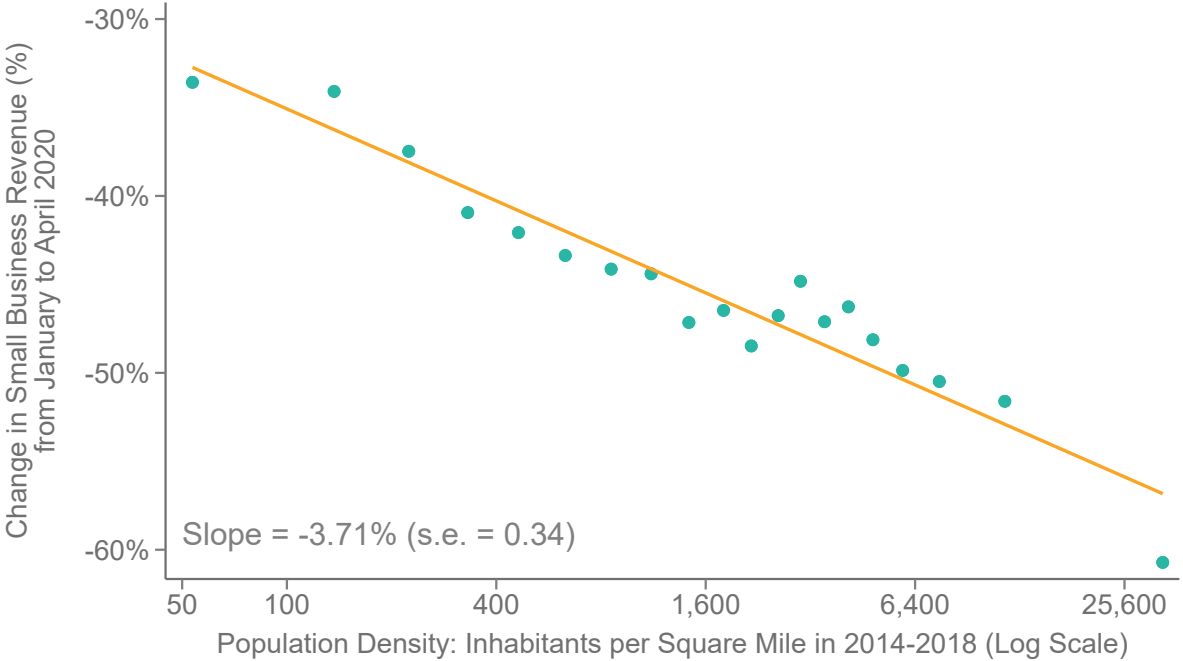


Changes in Small Business Revenues vs. ZIP Code Characteristics

Median Income, by ZIP

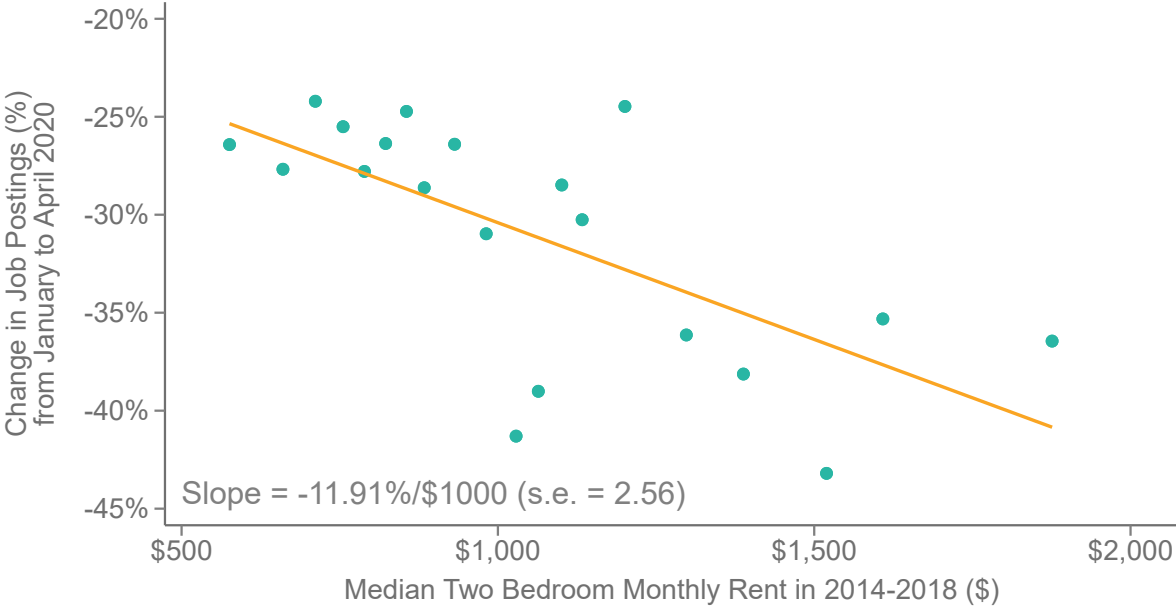


Population Density, by ZIP

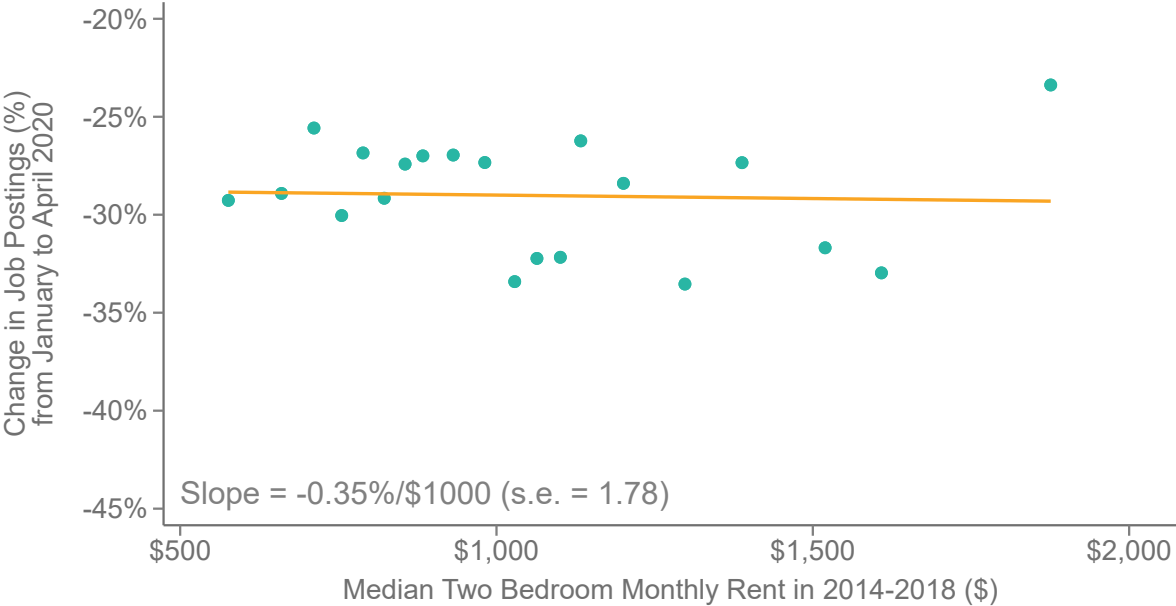


Changes in Job Postings vs. Rent

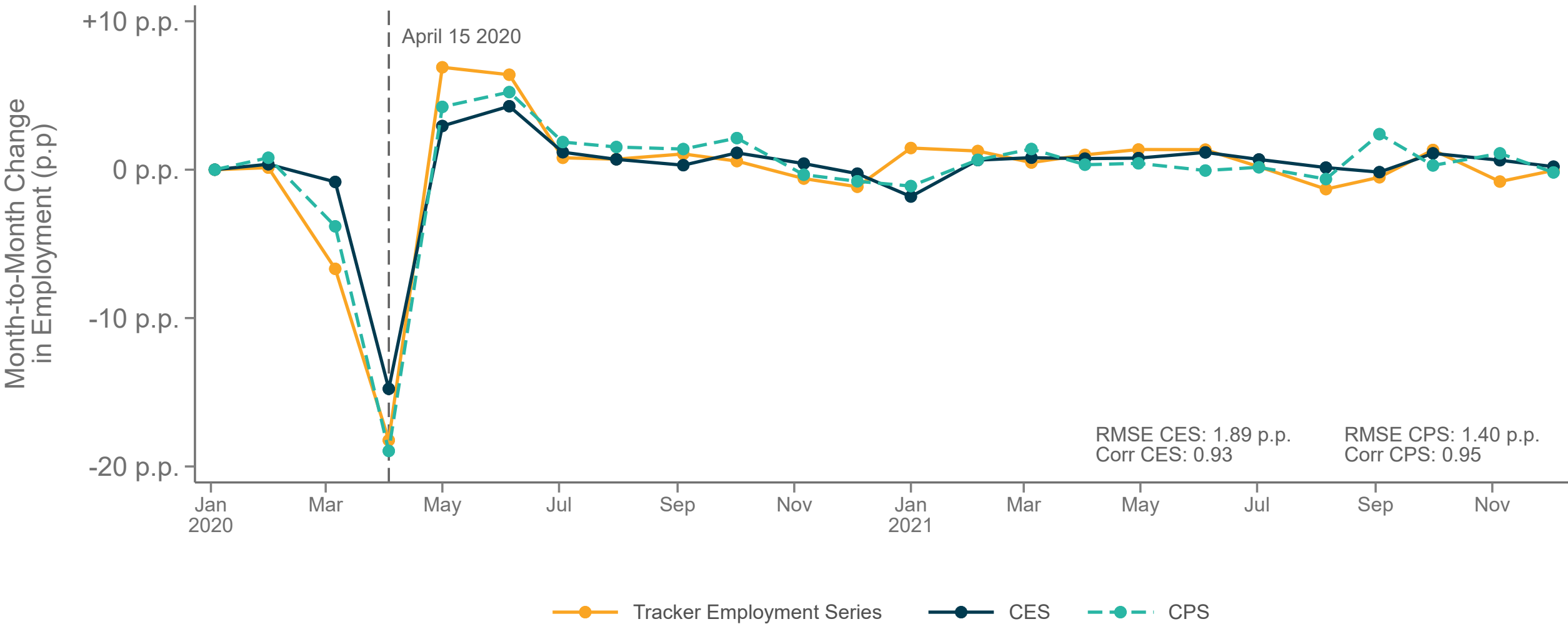
Job Postings for Low-Education Workers vs. Median Rent, by County



Job Postings for High-Education Workers vs. Median Rent, by County

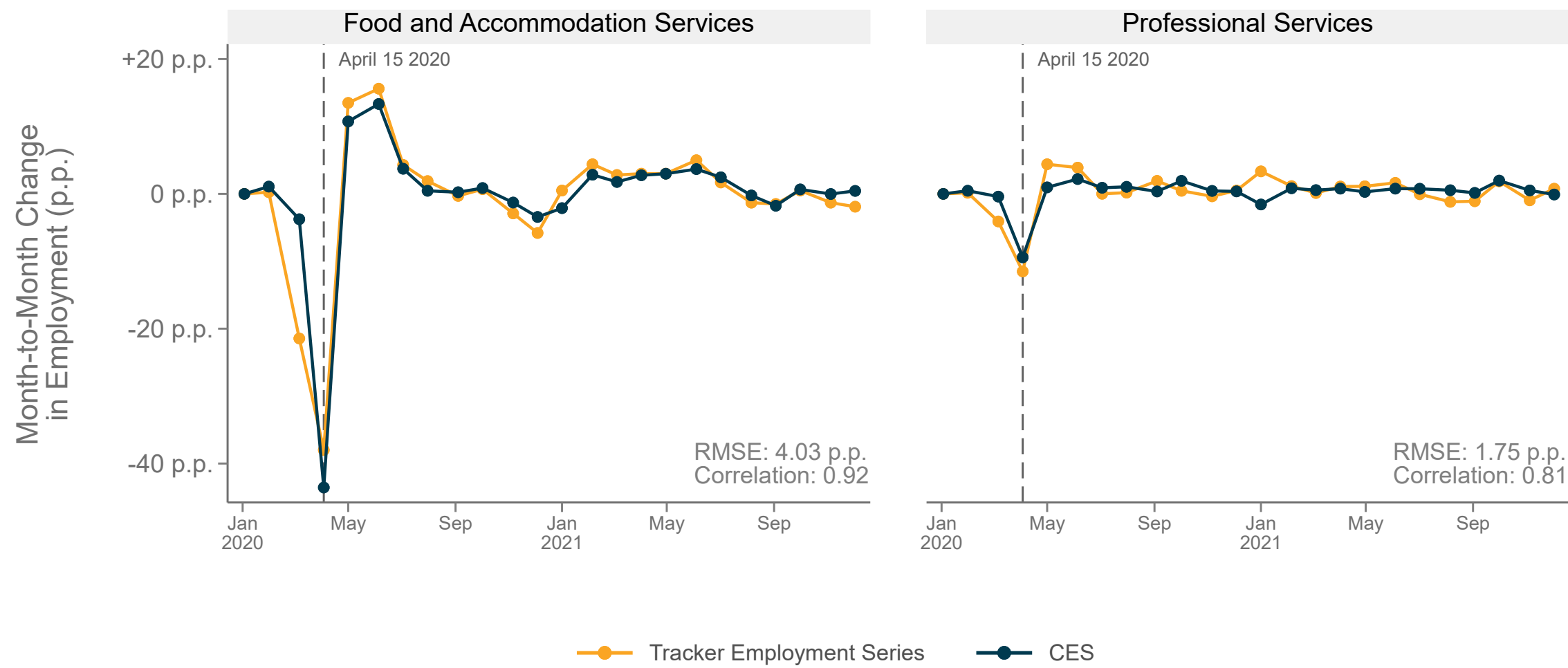


Changes in Employment Rates Over Time

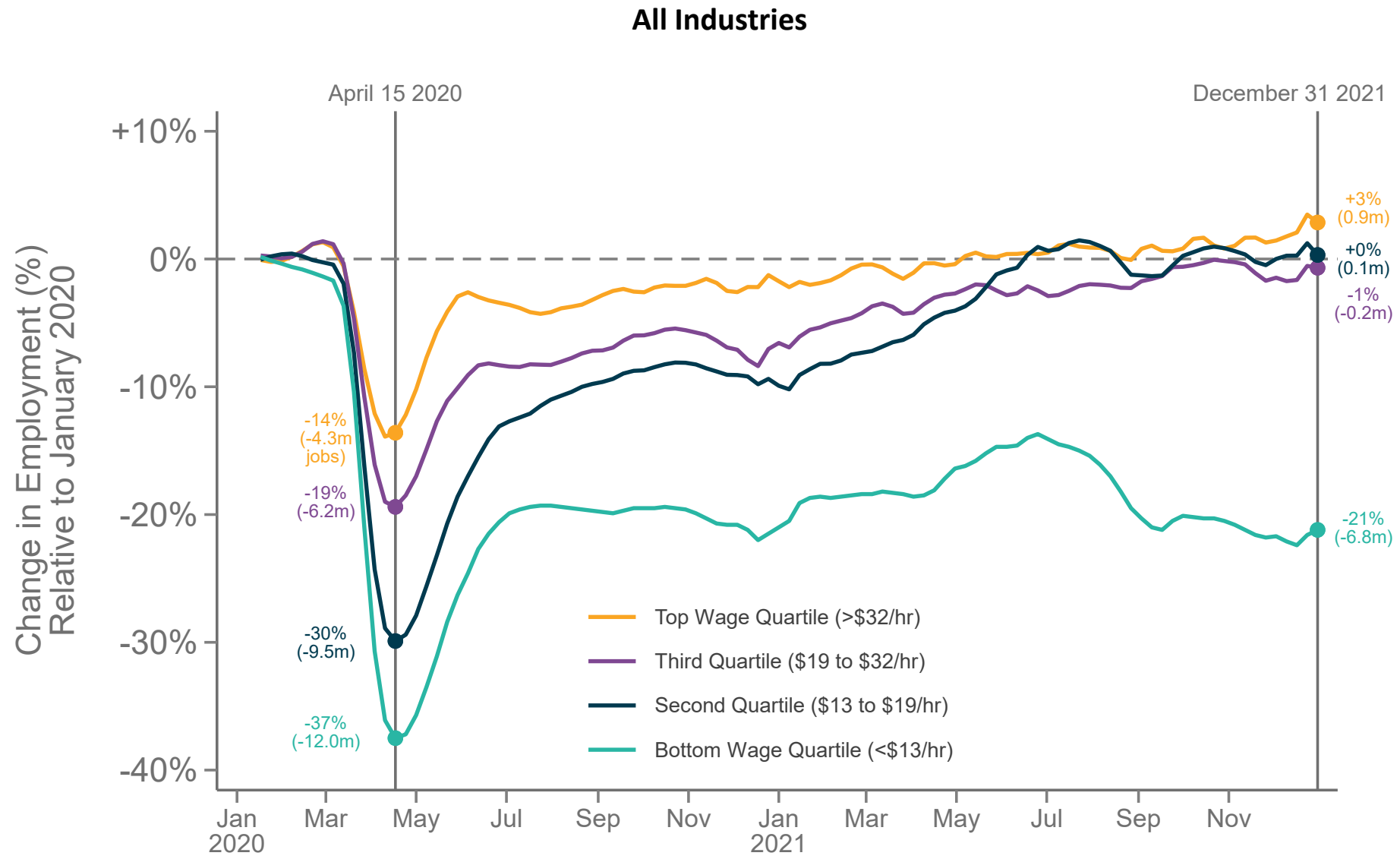


Changes in Employment Rates Over Time

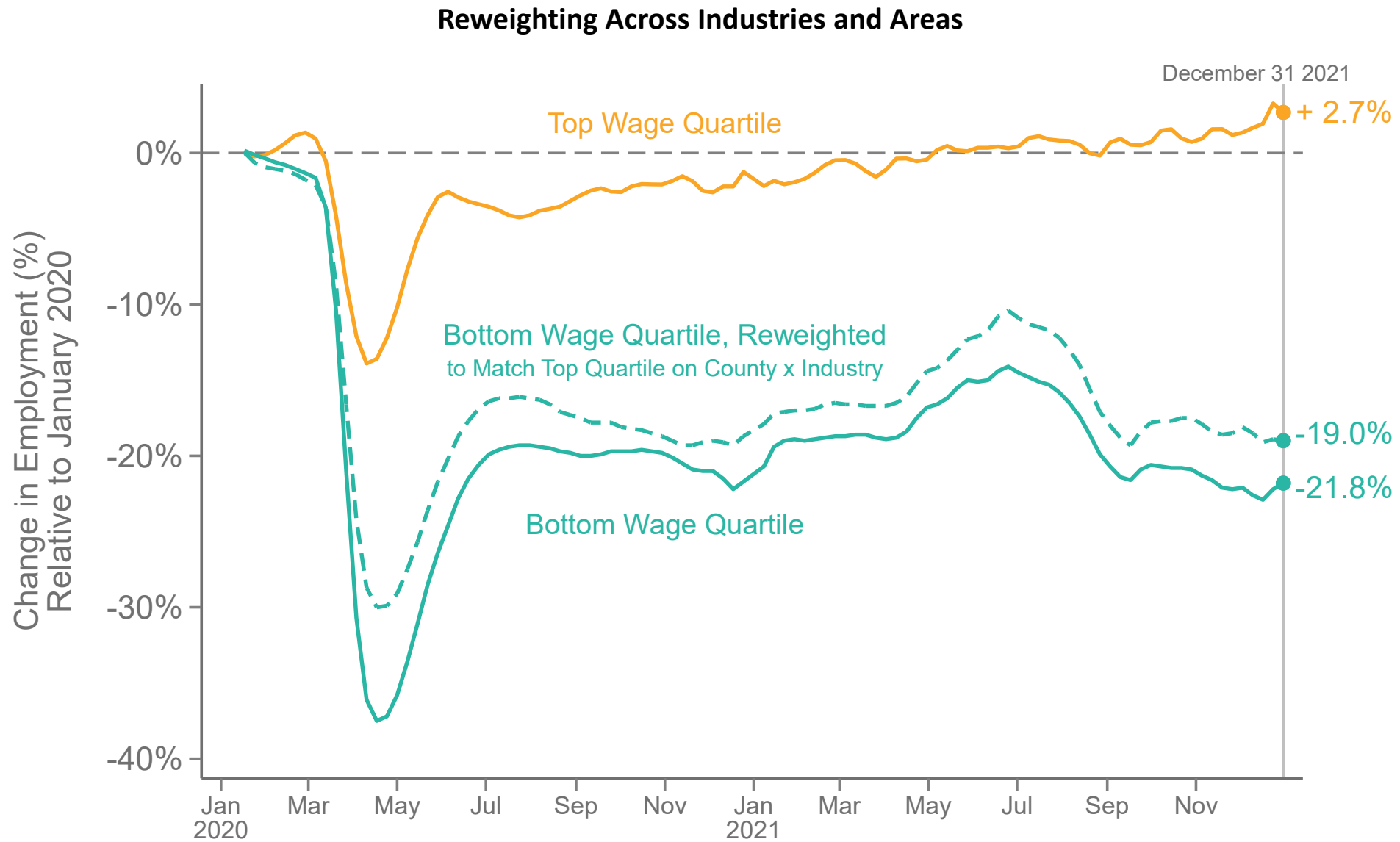
Accommodation and Food Services vs. Professional Services



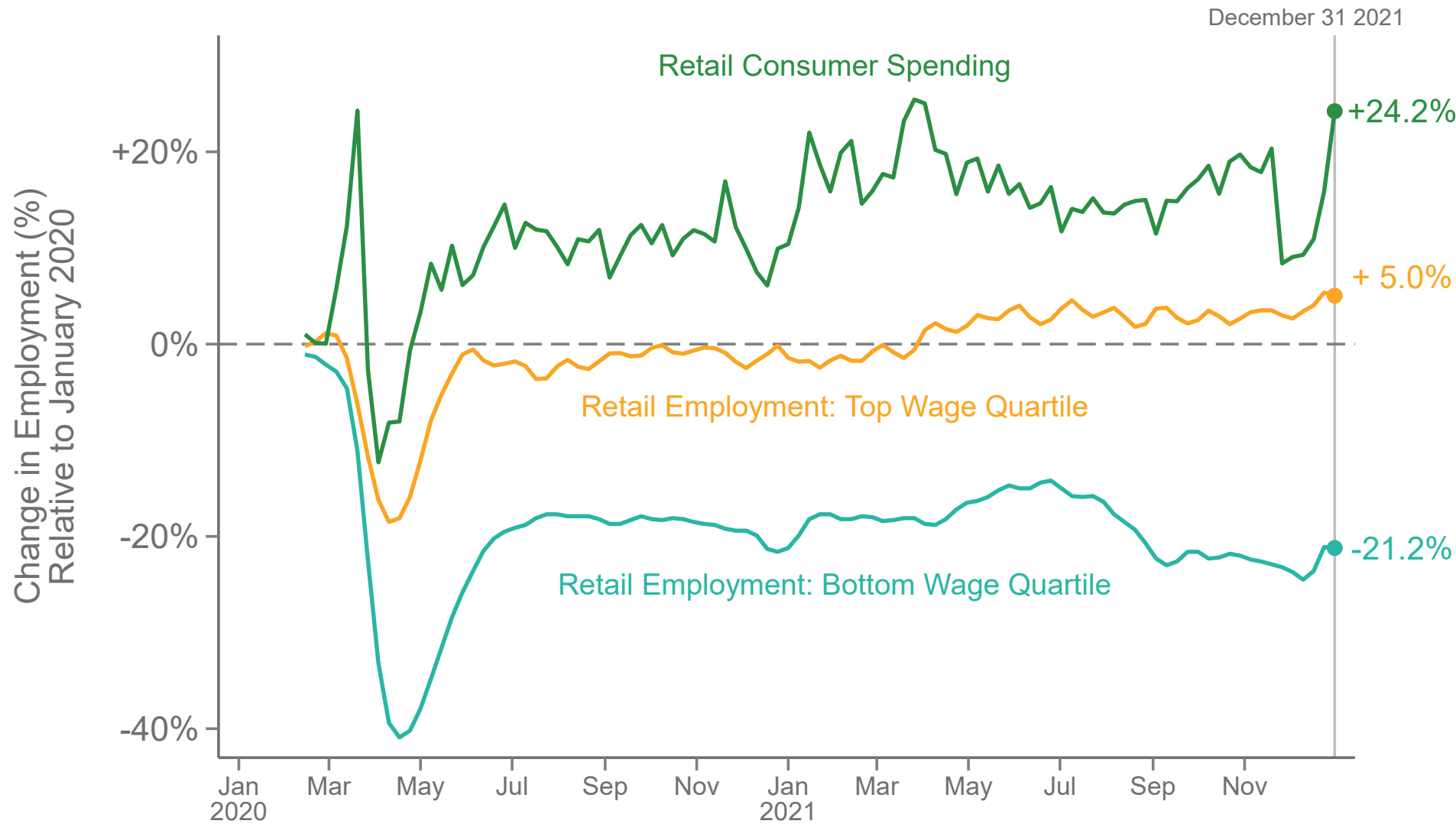
Changes in Employment by Wage Quartile



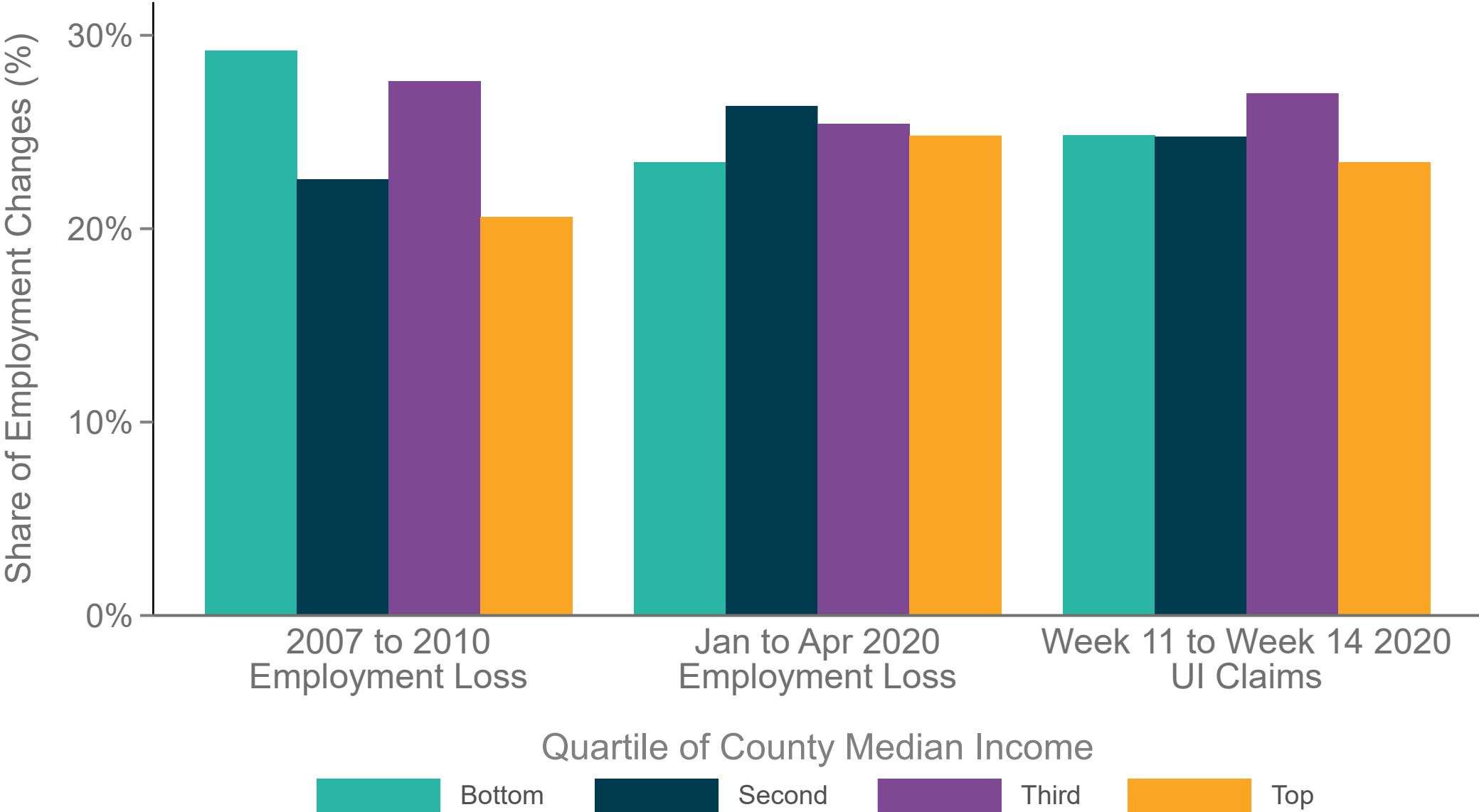
Changes in Employment by Wage Quartile



Changes in Employment by Wage Quartile and Consumer Spending, Retail Trade

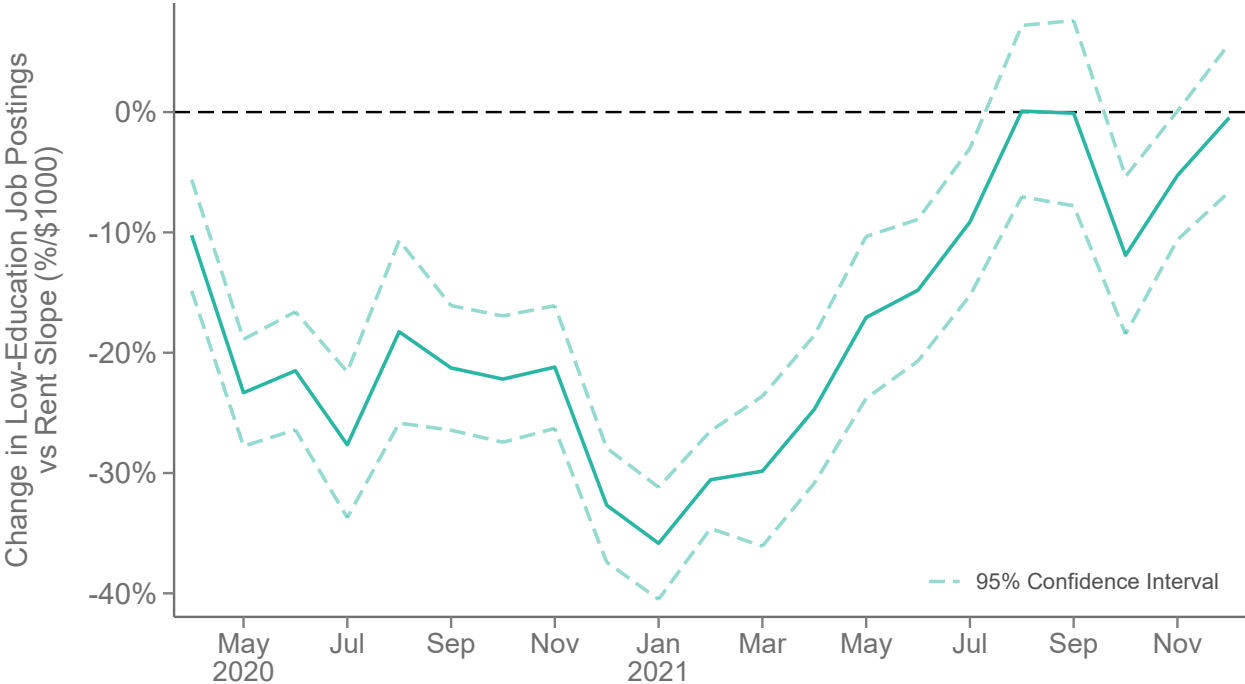


Geography of Employment Losses in the Great Recession vs. COVID Recession

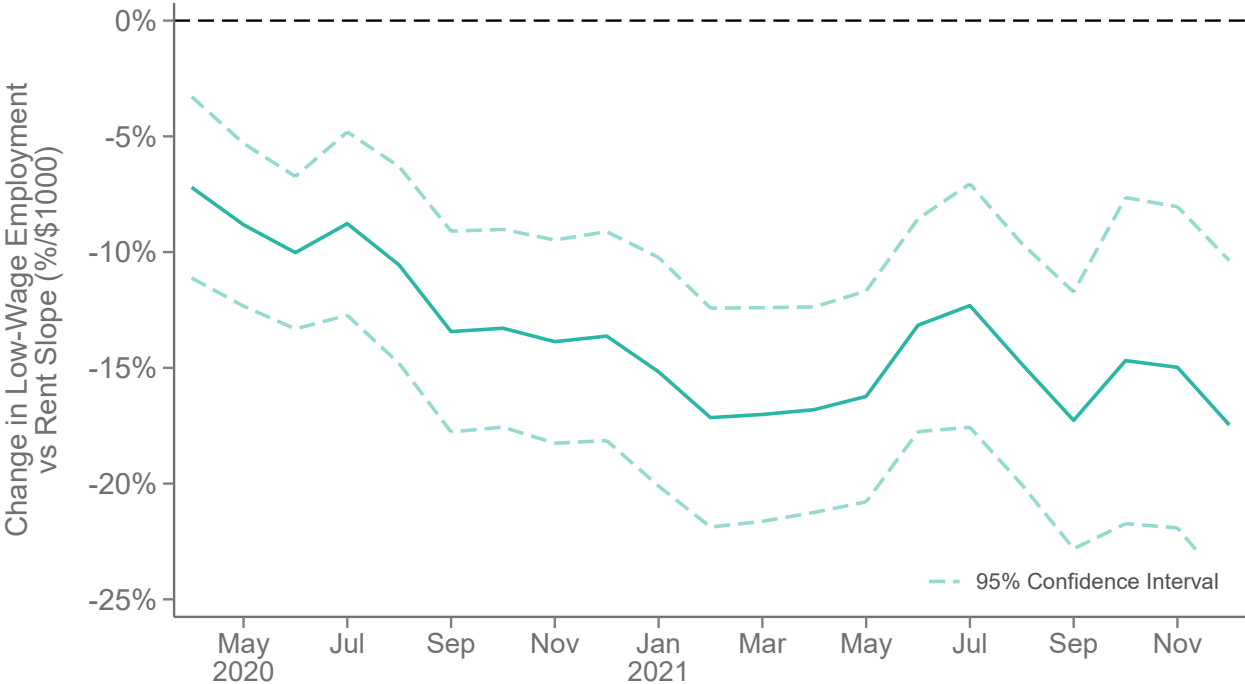


Low-Education Job Postings and Low-Wage Employment vs. Rent, by County

Low-Education Job Postings vs. Median Rent,
by County

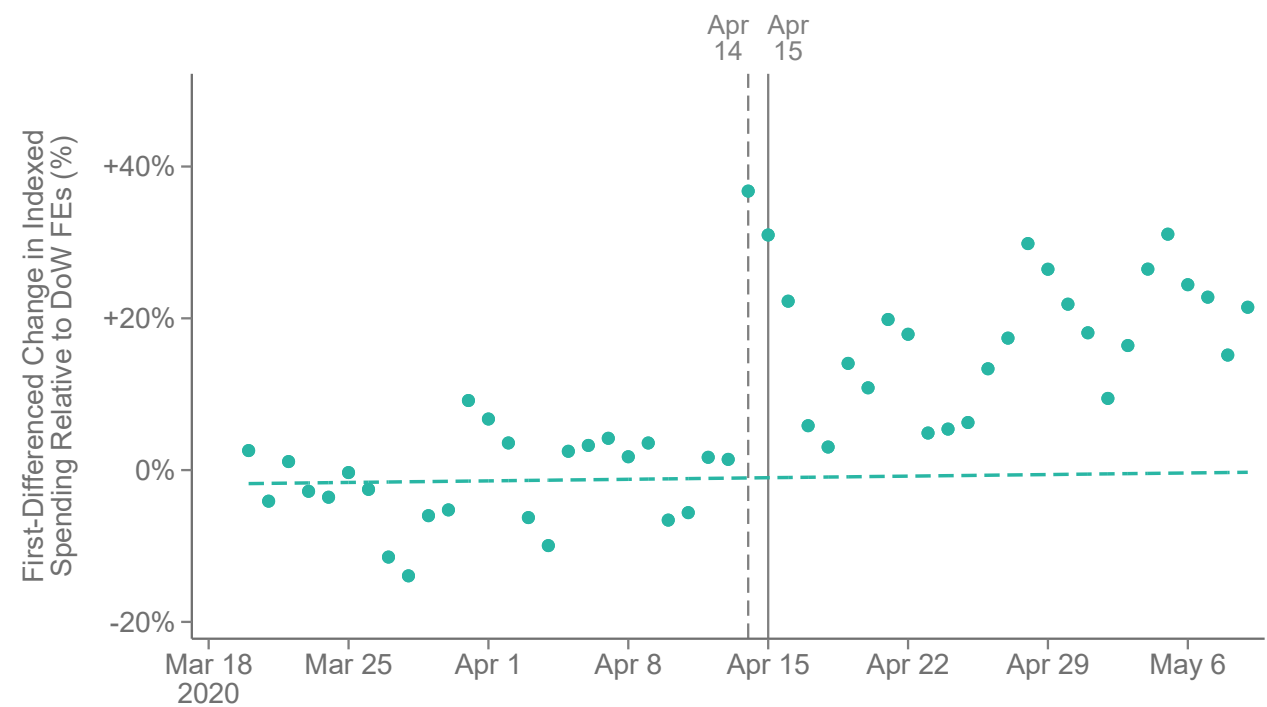


Low-Wage Employment vs. Median Rent,
by County

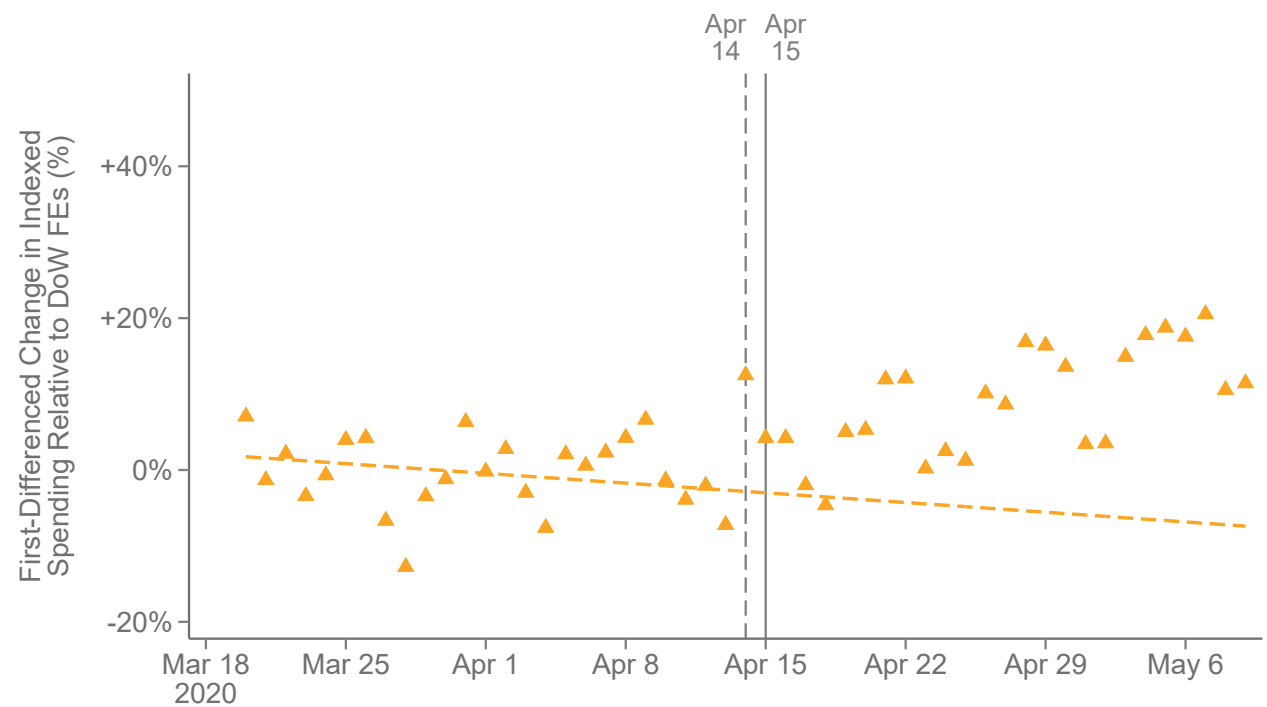


Effects of Stimulus Payments on Card Spending

April 2020 Stimulus, Low-Income ZIPs

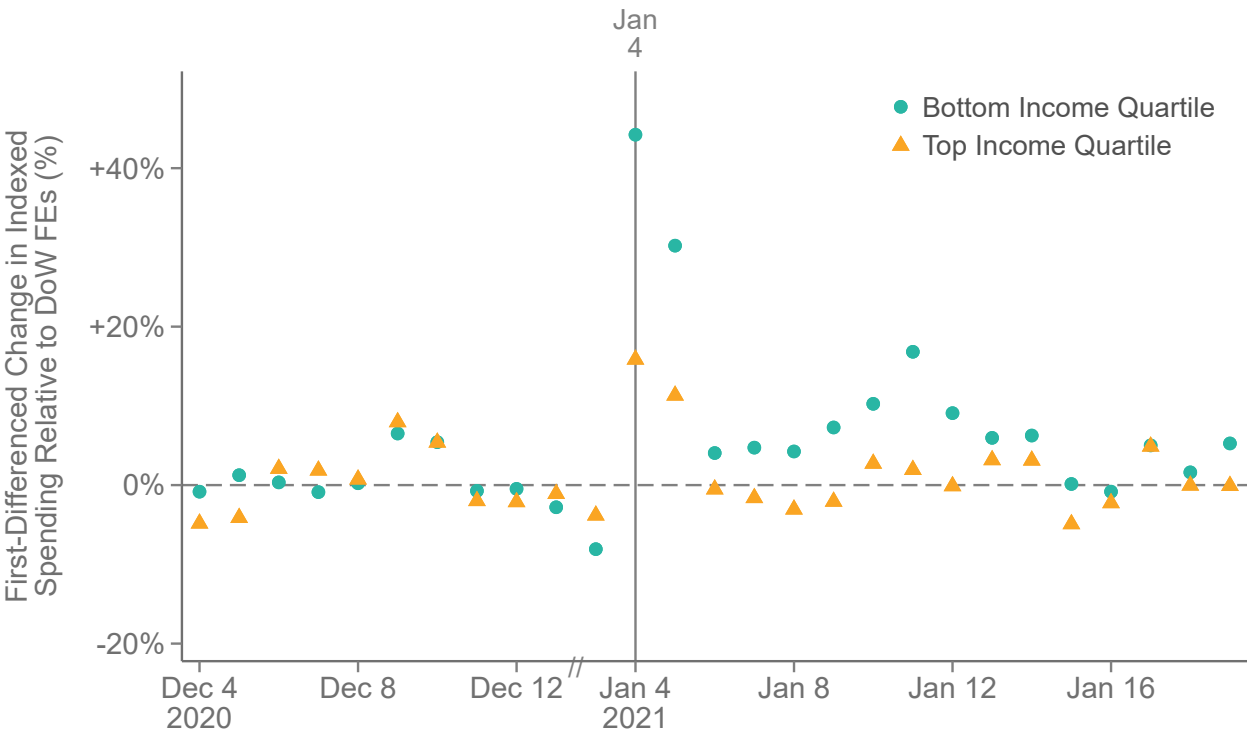


April 2020 Stimulus, High-Income ZIPs

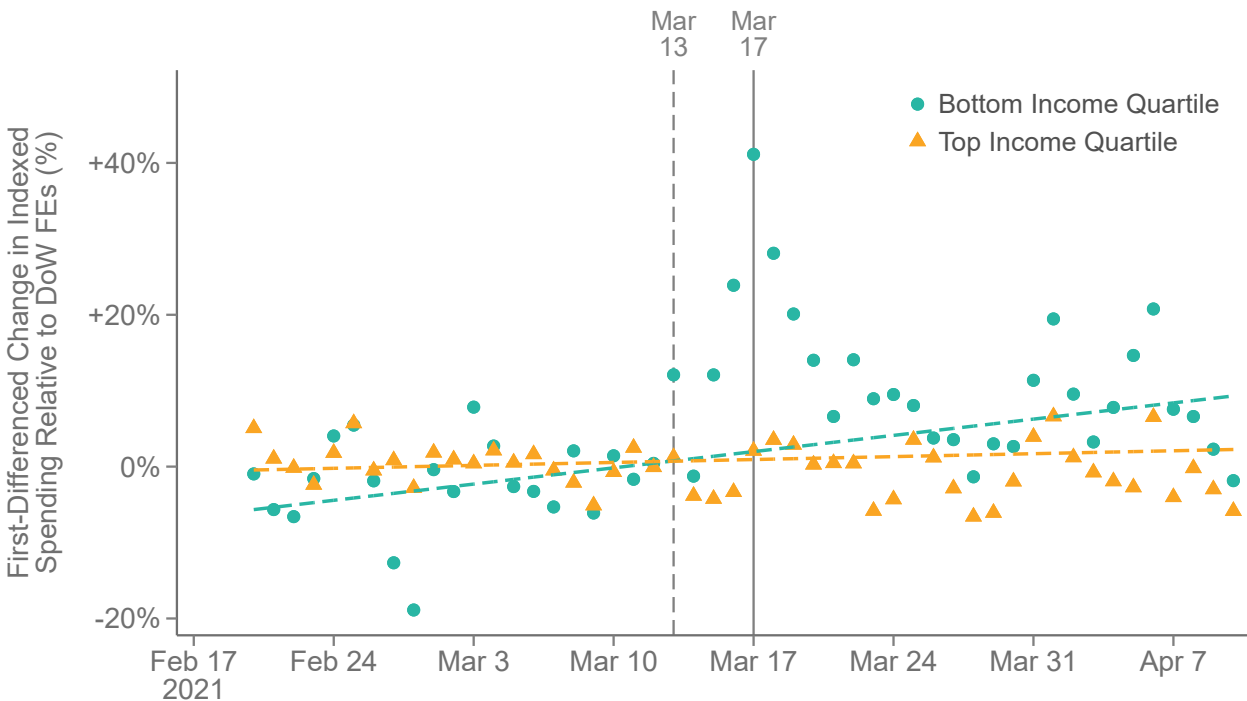


Effects of Stimulus Payments on Card Spending

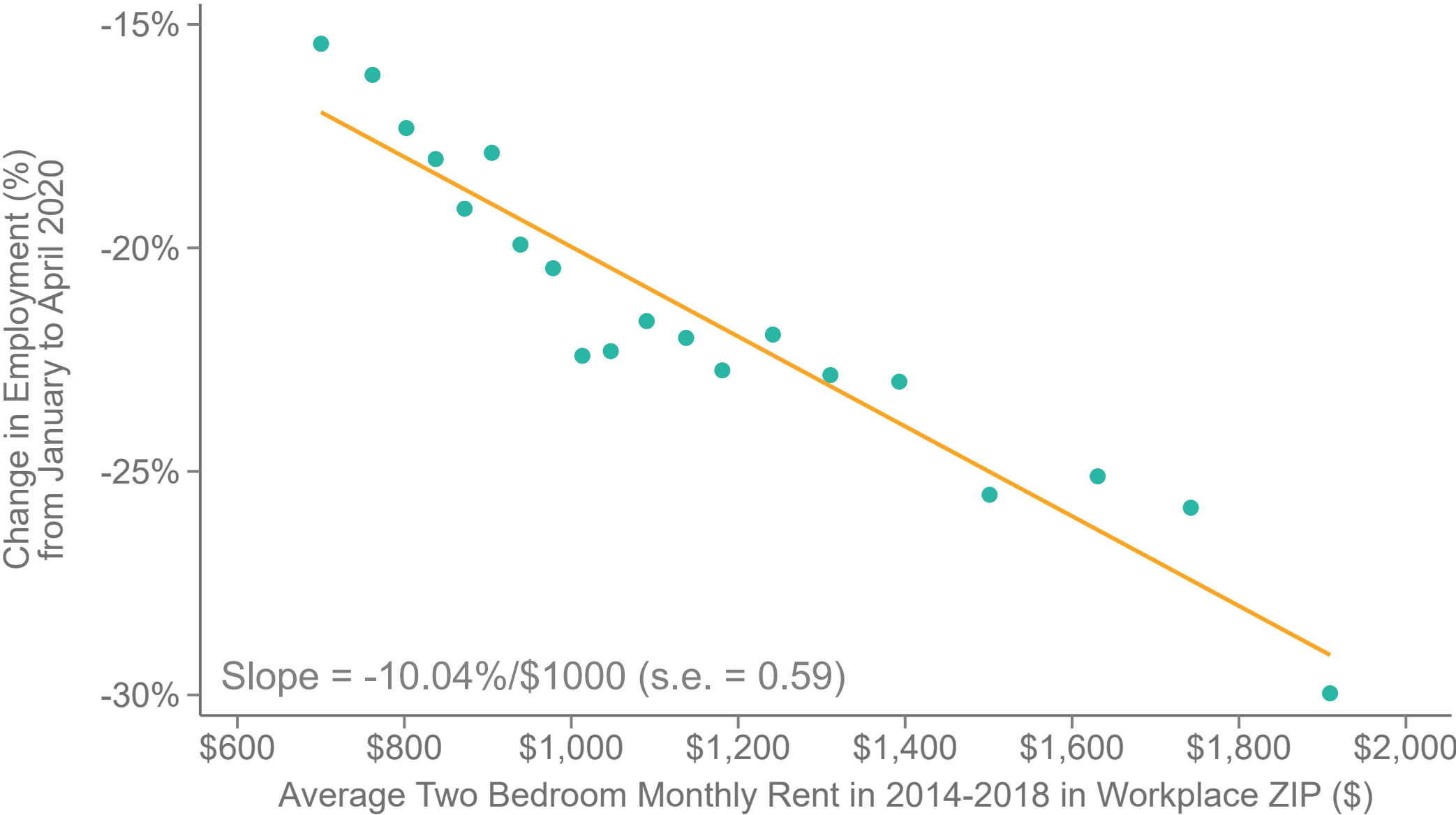
January 2021 Stimulus



March 2021 Stimulus



Low-Wage Employment vs. Workplace Rent, by ZIP



Effects of COVID-19 on Educational Progress by Income Group

