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

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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

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
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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](http://www.tracktherecovery.org)
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: 5.03 p.p., Correlation: 0.93

Retail

- RMSE: 3.19 p.p., Correlation: 0.92

Month-on-Month Change in Consumer Spending (%)
Impacts of COVID-19
Spending

Data
Impacts of COVID-19
Impact of Stimulus Policies
Conclusion & Next Steps
Consumer Spending by Income Quartile

Top Income Quartile
- $3.0 Billion
  (41% of Agg. Decline)

Bottom Income Quartile
- $0.9 Billion
  (12% of Agg. Decline)

April 15 2020

Jan 2020 Spending

Credit and Debit Card Spending Per Day ($ Billions)
Consumer Spending by Income Quartile

Top Income Quartile

Bottom Income Quartile

Credit and Debit Card Spending Per Day ($ Billions)

Jan 2020 Spending

Aug 15 2020

-$0.1 Billion

+$0.6 Billion
Consumer Spending by Income Quartile

Credit and Debit Card Spending Per Day ($ Billions)

Top Income Quartile

- January 2020 Spending: +$0.8 Billion

Bottom Income Quartile

- January 2020 Spending: +$0.8 Billion
Change in Consumer Spending by Sector

- **Remote Services** (28%)
- **Non-Durable Goods** (57%)
- **Durable Goods** (0%)
- **Other In-Person Services** (75%)
- **Health Care** (50%)
- **Transportation** (25%)
- **Hotels & Food** (100%)

Share of Pre-COVID Spending vs. Share of Decline (Jan to Mar 25-Apr 14)
Change in Consumer Spending by Sector

- **In-Person Services (57%)**
  - Durable Goods
  - Non-Durable Goods
  - Remote Services
  - Other In-Person Services
    - Recreation
    - Health Care
    - Transportation
    - Hotels & Food

- **In-Person Services (28%)**
  - Durable Goods
  - Non-Durable Goods
  - Remote Services
  - Other In-Person Services
    - Recreation
    - Health Care
    - Transportation
    - Hotels & Food
Business Revenues
Changes in Small Business Revenues vs. Rent, by ZIP Code
From January to April 2020

Change in Small Business Revenue
Relative to January

Slope = -16.71%/1000 (s.e. = 0.90)
Changes in Low-Skill Job Postings vs. Rent, by County
From January to July 2020

Change in Low-Skill Job Postings Relative to January

Slope = -27.65%/$1000 (s.e. = 3.09)
Employment
Employment Changes by Wage Quartile

- April 15 2020
  - Top Wage Quartile: -14% (-4.3m jobs)
  - Bottom Wage Quartile: -39% (-12.3m jobs)
Employment Changes by Wage Quartile

- Top Wage Quartile: -4% (-1.2m jobs)
- Bottom Wage Quartile: -19% (-6.2m)

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

Change in Employment
Relative to January 2020

Slope = -6.82%/\$1000 (s.e. = 1.17)
Employment Changes by Wage Quartile

- 61% (12.0 p.p.) of decline unexplained
- 39% (7.7 p.p.) of decline explained by wage growth

Change in Employment (%) Relative to January 2020

Jan 2020, Mar, May, July, Sep, Nov, Jan 2021, Mar, May, July, Sep, Nov
Changes in Low-Skill Job Postings vs. Rent, by County

July 2020

Slope = -27.65%/$1000 (s.e. = 3.09)
Changes in Low-Skill Job Postings vs. Rent, by County

**July 2020**

Slope = -27.65%/ $1000 (s.e. = 3.09)

**December 2021**

Slope = -0.46%/ $1000 (s.e. = 3.14)
Changes in Bottom-Wage-Quartile Employment vs. Rent, by County

July 2020

Change in Low-Wage Employment, from January 2020 to July 2020

-30% <= Change in Low-Wage Employment (%) <= 0
Slope = -6.82%/1000 (s.e. = 1.17)

Median Two Bedroom Monthly Rent in 2014-2018 ($) vs. Change in Low-Wage Employment

December 2021

Change in Low-Wage Employment, from January 2020 to December 2021

-30% <= Change in Low-Wage Employment (%) <= 0
Slope = -16.51%/1000 (s.e. = 3.58)

Median Two Bedroom Monthly Rent in 2014-2018 ($) vs. Change in Low-Wage Employment
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

- **April 15, 2020**: $1,200
- **January 4, 2021**: $600
- **March 17, 2021**: $1,400
Impact of First Stimulus Payments on Consumer Spending in April 2020
Bottom Income Quartile Households

Total Spending Jumps by **31%** on April 15, 2020
Effect of the COVID Stimulus Bills on Spending, by Income Group

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

Income Quartile

Q1: $442
Q2: $565
Q3: $640
Q4: $732
Effect of the COVID Stimulus Bills on Spending, by Income Group

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

Income Quartile

Q1
Q2
Q3
Q4

April 2020 impacts
January 2021 impacts

$442
$565
$640
$732

$187
$211
$171
$35

$0
$200
$400
$600
$800
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 pushed the president to target aid to lower-income families only.

The New York Times

February 1, 2021

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

Household Income

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

$1400

$150,000

$200,000

$0
March 2021
Stimulus
Actual Policy

Stimulus Payments by Income Level
Couple with No Children

Household Income

$0
$75,000
$160,000
$200,000

$1400

$20 billion reallocated
Effect of the COVID Stimulus Bills on Spending (per $1,200 check), by Income Group

Estimated 1-Month Spending Impact Per $1200 of Stimulus

- **Bottom Quartile**: April 2020 (CARES Act) - $442, March 2021 (American Rescue Plan Act) - $187
- **Second Quartile**: January 2021 (COVID-Related Tax Relief Act) - $211, March 2021 (American Rescue Plan Act) - $272
- **Third Quartile**: April 2020 (CARES Act) - $640, March 2021 (American Rescue Plan Act) - $171
- **Top Quartile**: April 2020 (CARES Act) - $732, March 2021 (American Rescue Plan Act) - $35
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

Slope = -12.82/$1000 (s.e. = 1.85)
Changes in Bottom-Income-Quartile Spending vs. Workplace Rent, by ZIP Code

April 2020

Slope = $-12.82$/$1000$ (s.e. = 1.85)

October 2020

Slope = $0.69$/$1000$ (s.e. = 3.45)
Evolution of Bottom-Income-Quartile Spending in High-Rent ZIP codes
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?
Consumer Spending in National Accounts vs. Credit and Debit Card Data

Change in Real GDP from Q1 2020 to Q2 2020 (in trillions of chained 2012 dollars)

- $1.61T (-29.9%)

- $0.53T

+ $0.06T

+ $0.06T

- $1.20T

- $0.90T

Gross Domestic Product

Private Domestic Investment

Government Expenditures

Net Exports

Personal Consumption Expenditures (PCE)

Credit Card Spending in PCE
Spending Changes by Sector: COVID vs Great Recession

- **Durables**:
  - Great Recession: 61.0%
  - COVID-19: 17.5%

- **Non-Durables**:
  - Great Recession: 46.0%
  - COVID-19: 11.6%

- **Services**:
  - Great Recession: -7.0%
  - COVID-19: 71.0%
Association Between COVID-19 Incidence, Spending, and Mobility

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

- **Low-Income Counties (Q1)**
  - Slope = -2.67 (s.e. = 0.69)
- **High-Income Counties (Q4)**
  - Slope = -0.94 (s.e. = 0.66)

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

- **Low-Income Counties (Q1)**
  - Slope = -2.45 (s.e. = 0.34)
- **High-Income Counties (Q4)**
  - Slope = -1.65 (s.e. = 0.23)
Changes in Small Business Revenues vs. ZIP Code Characteristics

Median Income, by ZIP

Population Density, by ZIP

Change in Small-Business Revenue from January to April 2020

Median Household Income in 2014-2018 ($)

Population Density: Inhabitants per Square Mile in 2014-2018 (Log Scale)

Slope = -0.15%/$1000 (s.e. = 0.01)

Slope = -3.81% (s.e. = 0.31)
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

Slope = -10.24%/1000 (s.e. = 2.36)

Slope = -0.12%/1000 (s.e. = 1.61)
Changes in Employment Rates Over Time

Month-to-Month Change in Employment (p.p.)

Tracker Employment Series
CES
CPS

RMSE CES: 1.89 p.p.
Corr CES: 0.93

Corr CPS: 0.96
Changes in Employment Rates Over Time
Accommodation and Food Services vs. Professional Services

Food and Accommodation Services

- Correlation: 0.92

Professional Services

- Correlation: 0.81

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

Retail Consumer Spending

Retail Employment: Top Wage Quartile

Retail Employment: Bottom Wage Quartile
Geography of Employment Losses in the Great Recession vs. COVID Recession

![Bar chart showing the share of employment changes by quartile of county median income for the Great Recession and COVID Recession. The chart compares employment loss from 2007 to 2010, January to April 2020, and Week 11 to Week 14 2020. The bars are color-coded: Bottom, Second, Third, and Top.]
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

Slope = -10.04%/$1000 (s.e. = 0.59)
Effects of COVID-19 on Educational Progress by Income Group