The Economic Impacts of COVID-19
Real-Time Evidence
From Private Sector Data

Introductory remarks by
Markus Brunnermeier

Raj Chetty (Harvard)
PAST AND FUTURE SPEAKERS

- **Last**
  - Ken Rogoff
  - "Sovereign debt and the Dollar"

- **Today**
  - Raj Chetty
  - "Tracking real time impact of COVID"

- **Next webinars**
  - Veronica Guerrieri
    - "Can supply shocks cause demand shortage"
  - Philip Lane
    - ECB’s Pandemic Emergency Purchase Program
DATA ANALYSIS IN MACROECONOMICS

- The evolution

Time series

ADD Cross-section

Past

Forecasting

Nowcasting

High frequency data

Do we need models when projecting into future after structural break?
CROSS SECTION: “ROOMBA EFFECT”

- **GE: “your spending is my income”**

- **Previous recession**, esp. GFC 2008:
  - HH response: **cut back on durable goods**
    - like cars, washing machines, ...
  - Policy response:
    - Cash for clunkers
    - Temporary VAT/sales tax reduction
      - Germany 2020, ...

- **This recession**:
  - **Substitute services for durables**, 
    - Like robots: Roomba instead of cleaning person
    - Permanent implications
TIME SERIES: FREQUENCY

- What’s the optimal frequency?
  - Weekly, daily, ... nano-second (high-frequency trading)
  - Consumption, payments, trading
    - Pricing of internet congestion vs. milk
    - Can you store good (how long)? Battery technology?
    - How volatile and how costly is volatility?

- How to aggregate over time?

- Does high frequency lead to more asymmetric info?
  - Akerlof’s Lemon’s problem
  - High-frequency trading
OTHER PRIVATE HIGH-FREQUENCY DATA STUDIES

- **Roberto Rigobon**’s daily online prices

- **Erik Hurst**: Cajner et al. 2020 (next Friday)
  [Administrative payroll data (ADP)]
  - unemployment

- **Cox et al. 2020** (forthcoming Brookings paper)
  (JP Morgan Institute)
  [8M credit card users + 4M savings/checking accounts]
  - Large spending drop (≈40%)
    - Not necessarily income effect – uncertainty?
  - “Liquid balances" have increased 35% (yoy)
    - For high and low income HHs
PRIVATE DATA REPORTS

- **BBVA**

**BBVA RESEARCH BIG DATA CONSUMPTION INDICES**
(Consumption by card, % YoY, 7D cumulative)

- **Luohan Academy** global pandemic tracker: Alibaba
  
  https://www.luohanacademy.com/PET
BIG DATA

- Economics of scale
  - Concave production function – “perfect forecast is upper bound”

- Economics of scope
  - One doesn’t need structure, use e.g. textual analysis,
  - machine learning more generally (black box approach)
POLL

1. Do you think private sector data will become more important than official data sources?
   a. Yes
   b. No

2. Machine learning analysis (with less focus on causality) will become more important than traditional econometric analysis/tools
   a. Yes
   b. No

3. Do you think non-structural data, like textual, analysis will dominate data analysis?
   a. Yes
   b. No
   c. Roughly equal weight
   d. It will be fully integrated
How Did COVID-19 and Stabilization Policies Affect Spending and Employment?

A New Real-Time Economic Tracker Based on Private Sector Data

Raj Chetty, Harvard
John N. Friedman, Brown
Nathaniel Hendren, Harvard
Michael Stepner, Univ. of Toronto
and the Opportunity Insights Team

June 17, 2020
Motivation: Measuring the Impacts of COVID-19

- How has COVID-19 affected the American economy and what policies can best mitigate its adverse impacts going forward?

- Macroeconomic policy decisions are typically based on data from surveys of households and businesses

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

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

- We build a real-time, publicly available economic tracker using transaction data from several private companies to measure economic activity by ZIP code by day.

- Study heterogeneity by income, geography, and industry to analyze:
  1. [Mechanisms] Why COVID-19 has led to unprecedented job losses
  2. [Policy Responses] Causal effects of major stabilization policies enacted to date.
Outline

1. Data

2. Impacts of COVID-19

3. Impacts of Stabilization Policies

4. Policy Implications
Data

Impacts of COVID-19

Impacts of Stabilization Policies

Policy Implications
Data Partners

Consumer Spending

Small Business Revenues

Employment

Job Postings

Education
Data sources are raw transactional data that reflect each business’s clients, not necessarily national population.

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
3. Index to January 2020 values and exclude small cells to protect privacy
4. Benchmark to national statistics to characterize what each dataset represents

Combine these series in a public platform (www.tracktherecovery.org) that eliminates need for researchers and policymakers to obtain specific contracts to use these data.
Impacts of COVID-19
National Accounts Data: Changes in GDP and its Components

Change from Q4 2019 to Q1 2020 ($bil)

Gross Domestic Product

- $247.3B (-5%)
National Accounts Data: Changes in GDP and its Components

Change from Q4 2019 to Q1 2020 ($bil)

- Gross Domestic Product: -$247.3B (-5%)
- Private Domestic Investment: -$89.6B
- Govt. Expend.: $7.3B
- Net Exports: $64.6B
- Personal Consumption Expend. (PCE): -$229.7B
Changes in Consumer Spending: National Accounts vs. Credit/Debit Card Data

Food Services in Affinity Solutions Purchase Data vs. Monthly Retail Trade Survey

Total Revenue (Indexed to 1 in January 2020)

Date

Affinity Solutions Purchase Data

Monthly Retail Trade Survey
Changes in Consumer Spending: National Accounts vs. Credit/Debit Card Data
Retail Services in Affinity Solutions Purchase Data vs. Monthly Retail Trade Survey

![Graph showing changes in consumer spending]

- **Total Revenue (Indexed to 1 in January 2020)**

  - **Affinity Solutions Purchase Data**
  - **Monthly Retail Trade Survey**

Impacts of COVID-19 on Consumer Spending

- Begin by disaggregating spending changes by household income
  - Who cut spending more – the rich or the poor?

- Impute income based on median household income in cardholder ZIP code
  - Matches estimates obtained from JPMorgan Chase individual-level income data as of April 15, 2020 [Farrell, Greig, Cox, Ganong, Noel 2020]
Consumer Spending by Income Quartile

Consumer Spending Per Day ($ Billions)

- 2019 Bottom Income Quartile
- 2019 Top Income Quartile
- 2020 Bottom Income Quartile
- 2020 Top Income Quartile

Jan 7, Jan 21, Feb 4, Feb 18, Mar 3, Mar 17, Mar 31, Apr 14, Apr 28, May 12, May 26, Jun 9

- $3.1 Billion (31%)
- $1.4 Billion (17%)
Consumer Spending by Income Quartile

- $3.1 Billion (31%)
- $1.4 Billion (17%)
- $1.0 Billion (23%)
- $0.13 Billion (3%)

2019 Bottom Income Quartile
2019 Top Income Quartile
2020 Bottom Income Quartile
2020 Top Income Quartile
Consumer Spending by Income Quartile

- $3.1 Billion (31%) for 2019 Top Income Quartile
- $1.0 Billion (23%) for 2020 Top Income Quartile
- $1.4 Billion (17%) for Top quartile accounts for more than half of aggregate spending reduction by June 9
- $0.13 Billion (3%) for 2019 Bottom Income Quartile
- $0.13 Billion (3%) for 2020 Bottom Income Quartile

Top quartile accounts for more than half of aggregate spending reduction by June 9.
Impacts of COVID-19 on Consumer Spending

- Next, disaggregate by sector

- Why did spending fall? Because of a reduction in purchasing power/expected income or health concerns about COVID-19?
Changes in Consumer Spending by Sector

In-person services (67%)

- Durable Goods
- Non-Durable Goods
- Remote Services
- Other in-person services
- Recreation
- Health Care
- Transportation
- Hotels & Food

Share of Decline
(Jan to Mar 25-Apr 14)
Changes in Consumer Spending by Sector

Share of Decline (Jan to Mar 25-Apr 14)

- Durable Goods
- Non-Durable Goods
- Remote Services
- Other in-person services
- Recreation
- Health Care
- Transportation
- Hotels & Food

In-person services (67%)

Share of Pre-COVID Spending

- Durable Goods
- Non-Durable Goods
- Remote Services
- Other in-person services
- Recreation
- Health Care
- Transportation
- Hotels & Food

In-person services (33%)
Changes in Consumer Spending by Sub-Category
Changes in Consumer Spending by Sector
COVID vs Great Recession

<table>
<thead>
<tr>
<th>Sector</th>
<th>Great Recession</th>
<th>COVID-19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Durables</td>
<td>58.6%</td>
<td>19.5%</td>
</tr>
<tr>
<td>Non-Durables</td>
<td>44.3%</td>
<td>13.3%</td>
</tr>
<tr>
<td>Services</td>
<td>-2.9%</td>
<td>67.2%</td>
</tr>
</tbody>
</table>
Impacts of COVID-19 on Consumer Spending

- Next, disaggregate by COVID incidence rates to examine effects of health concerns more directly
Consumer Spending Changes vs. COVID-19 Cases, by County

Change in Consumer Spending (%)
Relative to Pre-COVID 2020

County-level COVID-19 Cases Per 100,000 People (Log Scale)
Time Spent Outside Home vs. COVID-19 Cases, by County

Change in Mobility (%) Relative to Jan.

County-level COVID-19 Cases Per 100,000 People (Log Scale)

- Low Income Counties (Q1)
- High Income Counties (Q4)
Time Spent Outside Home vs. Median Income, by County

Change in Mobility (%) Relative to Jan.

County Median Household Income (2018)
Impacts of COVID-19 on Consumer Spending: Summary

- Consumer spending fell primarily because of health concerns rather than lost income.

- Income losses were relatively small for the rich (Cajner et al. 2020) and low-income households had lost income more than fully replaced by unemployment insurance (Ganong, Noel, Vavra 2020).

- In current policy environment, consumer spending reduction is not due to a lack of purchasing power, but rather a supply shock (firms unable to supply services without health risks).

- Now examine downstream impacts of this novel spending shock on businesses and employees.
Business Revenues
Impacts of COVID-19 on Businesses

- How did fall in consumer spending and business revenue affect business decisions: decision to remain open, employment, new job postings, etc.?

- To answer this question, use variation in size of spending shocks across ZIP codes

  - Spending fell primarily among high-income households for in-person services such as restaurants
  
  - Such services are mostly produced by small businesses that serve customers in their local area
  
  - Differences across ZIP codes in average household income → variation in size of spending shock that local businesses face

- Begin by analyzing impacts on small business revenue using data from Womply
Changes in Small Business Revenues from January to April by ZIP Code

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

San Francisco
Changes in Small Business Revenues vs. ZIP Code Characteristics

Median Income

<table>
<thead>
<tr>
<th>Change in Small Business Revenue (%) Relative to Jan.</th>
<th>Median Income in 2018 ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-60</td>
<td>25,000</td>
</tr>
<tr>
<td>-50</td>
<td>50,000</td>
</tr>
<tr>
<td>-40</td>
<td>75,000</td>
</tr>
<tr>
<td>-30</td>
<td>100,000</td>
</tr>
<tr>
<td>-20</td>
<td>125,000</td>
</tr>
</tbody>
</table>
Changes in Small Business Revenues vs. ZIP Code Characteristics

Population Density

Change in Small Business Revenue (%) Relative to Jan.

Population Density - Inhabitants per Square Mile (Log Scale)
Changes in Small Business Revenues vs. ZIP Code Characteristics

Median Two Bedroom Rent

Change in Small Business Revenue (%)
Relative to Jan.

Median Two Bedroom Monthly Rent in 2018 ($)
Changes in Small Business Revenues vs. ZIP Code Characteristics

Median Two Bedroom Rent: Non-Tradable vs. Teleworkable

-60

-50

-40

-30

-20

Change in Small Business Revenue (%) Relative to Jan.

500

1,000

1,500

2,000

2,500

Median Two Bedroom Monthly Rent in 2018 ($)

Food and Accommodation Services and Retail Trade

Finance and Professional Services
Impacts of COVID-19 on Businesses: Summary

- Impacts of COVID shock on business are highly heterogeneous across areas

- More than half of aggregate loss in small business revenues came from business located in the top-quartile of ZIP codes by rent; only 8% from bottom-quartile
Employment

Data

Impacts of COVID-19

Impacts of Stabilization Policies

Policy Implications
Impacts of COVID-19 on Employment

- How did loss in business revenues affect employees?

- Employment losses have been concentrated at the low end of the income distribution (Cajner et al. 2020)

- Analyze employment of low-wage workers primarily using data from Earnin, which closely tracks overall employment for bottom-quintile workers in other data sources
  - Similar results obtained using other data sources: Homebase, Intuit
Changes in Employment Rates by ZIP Code

New York
Changes in Employment Rates by ZIP Code
Chicago
Changes in Employment Rates by ZIP Code
San Francisco
Changes in Employment and Job Postings vs. Rent

Hours Worked at Small Businesses and ZIP Median Rent (Earnin)

Percent Decline in Hours Worked at Local Businesses vs. Two-Bedroom Rent 2018
Changes in Employment and Job Postings vs. Rent
Job Postings for Low-Education Workers and County Median Rent (Burning Glass)
Changes in Employment and Job Postings vs. Rent
Job Postings for Low-Education Workers and County Median Rent (Burning Glass)

Change from Jan/Feb to May 30
Change from Jan/Feb to Mar 25-April 14
Changes in Employment and Job Postings vs. Rent
Job Postings for High-Education Workers and County Median Rent (Burning Glass)
Geography of Unemployment in the Great Recession vs. COVID Recession

Great Recession 2007 to 2010 Emp. Loss

COVID Recession Feb to Apr 2020 Emp. Loss

COVID Recession Mar 15 to April 28, 2020 UI Claims

Quartile of County Median Income

Bottom  Top
Reduction in spending by the rich has led to loss of jobs for low-income individuals working in affluent areas

Evidence from Great Recession suggests that disparate job losses across regions can have persistent effects for nearly a decade because workers do not move to find jobs [Yagan 2019]

Job postings more depressed in affluent areas → early signs of a long road to recovery for low-income households in affluent counties in this recession
Impacts of Stabilization Policies
In rest of talk, examine what policies can mitigate impacts of pandemic, focusing in particular on employment of low-income workers

Focus on three major policies that target chain of events (consumer spending \(\rightarrow\) business revenue \(\rightarrow\) employment) at different points

1. State-ordered re-openings
2. Stimulus payments to households
3. Loans to small businesses
State-Ordered Reopenings
State-Ordered Reopenings

- Can executive orders restore economic activity?
- Compare trends in spending and employment in states that reopened earlier vs. later to assess
Causal Effects of Re-Openings on Economic Activity: Event Studies
Case Study on Business Re-Openings: Minnesota vs Wisconsin

- Minnesota Opening
- Wisconsin Opening
- Minnesota Closing
- Wisconsin Closing

Change in Consumer Spending relative to January 2020

February 2, February 16, March 1, March 15, March 29, April 12, April 26, May 10, May 24, June 7
Causal Effects of Re-Openings on Economic Activity: Event Studies

Re-Opened States vs. Control States: Consumer Spending

Diff-in-diff Estimate: +.505p.p. (s.e. = 3.036)
Causal Effects of Re-Openings on Economic Activity: Event Studies

Re-Opened States vs. Control States: Employment

Change in Employment among Low-Wage Workers relative to January 2020

Days Relative to Re-opening

Opening

Diff-in-diff Estimate: +.197p.p. (s.e. = 1.533)
State-Ordered Reopenings

- Key driver of reduction in spending is fear of virus itself, not restrictions imposed by government

- Limited capacity for governments to restore spending through re-openings, unless public interprets them as a credible signal of reduced health concerns
Stimulus Payments
Impacts of Stimulus Payments

- Coronavirus Aid, Relief, and Economic Security (CARES) Act made direct payments to nearly 160 million people, totaling $267 billion as of May 31, 2020
  - Larger payments for lower-income households
  - Vast majority of payments made exactly on April 15, 2020

- Was stimulus effective in increasing consumer spending and restoring employment?
  - Use high-frequency event studies, comparing spending for low vs. high income households, to answer this question
Impact of Stimulus Payments on Consumer Spending

Seasonally Adjusted Spending Changes by Income Quartile

<table>
<thead>
<tr>
<th>Month</th>
<th>Q1 ZCTA Income</th>
<th>Q4 ZCTA Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jan 21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feb 4</td>
<td></td>
<td></td>
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<tr>
<td>Feb 18</td>
<td></td>
<td></td>
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<tr>
<td>Mar 3</td>
<td></td>
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<tr>
<td>Mar 17</td>
<td></td>
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<tr>
<td>Mar 31</td>
<td></td>
<td></td>
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<tr>
<td>Apr 14</td>
<td></td>
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<tr>
<td>Apr 28</td>
<td></td>
<td></td>
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<tr>
<td>May 12</td>
<td></td>
<td></td>
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<tr>
<td>May 26</td>
<td></td>
<td></td>
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<tr>
<td>Jun 9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Q1 Apr 7-13: -28.1%
- Q1 Apr 15-21: -10.3%
- Q4 Apr 7-13: -36.3%
- Q4 Apr 15-21: -29.8%
Impact of Stimulus Payments on Consumer Spending

Regression Discontinuity Estimates for Bottom Income Quartile Households

RD Estimate: 0.26 (0.07)
Impact of Stimulus Payments on Consumer Spending
Regression Discontinuity Estimates for Highest Income Quartile Households


RD Estimate: 0.09 (0.04)
Impact of Stimulus Payments on Consumer Spending

Regression Discontinuity Estimates for Durable Goods


Apr 1  
Apr 8  
Apr 15  
Apr 22  
Apr 29

RD Estimate: 0.21 (0.06)
Regression Discontinuity Estimates for In-Person Services

Impact of Stimulus Payments on Consumer Spending

RD Estimate: 0.07 (0.04)
Impact of Stimulus Payments on Business Revenue
Regression Discontinuity Estimates for Lowest Rent Quartile ZIP Codes

RD Estimate: 0.21 (0.09)
Impact of Stimulus Payments on Business Revenue
Regression Discontinuity Estimates for Highest Rent Quartile ZIP Codes

Pct. Change in Revenue Relative to Jan.

RD Estimate: 0.04 (0.06)
Impact of Stimulus Payments on Business Revenue and Employee Hours

Revenue and Employment Changes Among Small Businesses, by ZIP Rent Quartile

Percent Decline (%)

Feb 22  Mar 7  Mar 21  Apr 4  Apr 18  May 2  May 16  May 30
Small Bus. Revenue - Rent Q1
Small Bus. Revenue - Rent Q4
Impact of Stimulus Payments on Business Revenue and Employee Hours

Revenue and Employment Changes Among Small Businesses, by ZIP Rent Quartile

<table>
<thead>
<tr>
<th>Date</th>
<th>Earnings at Small Bus. - Rent Q1</th>
<th>Small Bus. Revenue - Rent Q1</th>
<th>Earnings at Small Bus. - Rent Q4</th>
<th>Small Bus. Revenue - Rent Q4</th>
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<tbody>
<tr>
<td>Feb 22</td>
<td>0%</td>
<td>-60%</td>
<td>0%</td>
<td>-40%</td>
</tr>
<tr>
<td>Mar 7</td>
<td>-20%</td>
<td>-40%</td>
<td>-20%</td>
<td>-20%</td>
</tr>
<tr>
<td>Mar 21</td>
<td>-34.2%</td>
<td>-27.3%</td>
<td>-34.2%</td>
<td>-27.3%</td>
</tr>
<tr>
<td>Apr 4</td>
<td>-45.1%</td>
<td>-45.1%</td>
<td>-45.1%</td>
<td>-45.1%</td>
</tr>
<tr>
<td>Apr 18</td>
<td>-27.3%</td>
<td>-27.3%</td>
<td>-27.3%</td>
<td>-27.3%</td>
</tr>
<tr>
<td>May 2</td>
<td>-20%</td>
<td>-20%</td>
<td>-20%</td>
<td>-20%</td>
</tr>
<tr>
<td>May 16</td>
<td>-2.3%</td>
<td>-2.3%</td>
<td>-2.3%</td>
<td>-2.3%</td>
</tr>
<tr>
<td>May 30</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>
Impacts of Stimulus Payments

- Stimulus payments increased spending by low-income consumers substantially, consistent with Baker et al. (2020)

- But did not undo the initial spending reductions by returning money back to the businesses that lost the most revenue

- If workers' ability to switch jobs is constrained – e.g. because of job-specific skills or geographical constraints – impacts of stimulus on employment may be dampened
Loans to Small Businesses
Paycheck Protection Program

- CARES Act also provided $500 billion in loans to small businesses starting on April 3

- Loans were forgivable if payroll was not reduced significantly relative to pre-COVID levels

- Firms with fewer than 500 employees were eligible for these loans (with some exceptions)

- Compare trends in employment for firms with less than 500 employees vs. more than 500 employees around April 3 to identify causal effects of the program
Impact of Paycheck Protection Program on Hours Worked

Change in Hours Worked by Decile of Firm Size, All Industries Excl. Food Services

-3rd Decile: ~30 Employees
-4th Decile: ~40 Employees
-5th Decile: ~100 Employees
-6th Decile: ~1,300 Employees [Ineligible]
Impact of Paycheck Protection Program on Hours Worked

Change in Hours Worked vs. Decile of Firm Size, All Industries Excl. Food Services

<500 Employees: Eligible for PPP

Change in Earnings (%)

Median Firm Size in Decile
Impact of Paycheck Protection Program on Hours Worked
Change in Hours Worked by Firm Size and Employer ZCTA Rent Quartile

Change in Total Earnings vs. Feb. (%)
Paycheck Protection Program

- Paycheck Protection Program has had little impact on employment rates at small business to date

- Why have program impacts been modest despite substantial expenditure?
  - Businesses who took up loans may not have intended to lay off their workers to begin with
  - Ex: very high takeup rate among firms providing professional and scientific services despite low job losses in that sector
  - Consistent with evidence that loans flowed to areas with smaller employment losses in March [Granja, Makridis, Yannelis, Zwick 2020]
Long-Term Impacts
Long-Term Impacts

- We have focused primarily on short-term impacts of COVID crisis on spending and employment.

- But this shock may have lasting impacts going forward on inequality and social mobility.

- To illustrate, turn to data on educational progress on an online math platform used as part of school curriculum by 1,000,000 students in the U.S.
Effects of COVID on Educational Progress by Income Group

Math Lessons Completed on Zearn Platform

Top Income Quartile
Middle Income
Bottom Income Quartile

Effects of COVID on Educational Progress by Income Group
Policy Implications
Results suggest that there is limited capacity to restore consumer spending via traditional economic tools in the midst of the pandemic.

- Impacts of stimulus and loans to small businesses may be blunted when spending is constrained by health concerns.

- Long-term solution lies in addressing virus itself and public health efforts [Allen 2020, Romer 2020]
In the meantime, may be most fruitful to use economic policy to limit hardship among low-income workers who have lost their jobs

- Extending unemployment benefits and social safety net may be a more impactful use of scarce resources than stimulus checks to all households or loans to all businesses

- May be a role for place-based policies targeting recovery in hardest hit areas (e.g., low-income workers in affluent counties)

- Important to take potential long-term impacts on children into account, e.g. in decisions on when to re-open schools vs. businesses

Implications for Policy Going Forward
Broader lesson: private sector data can provide a new tool to support economic policy in the age of big data

- Can target aid more effectively
- And diagnose what the root causes of economic failure are rapidly

Tracker constructed here is a prototype for a system of “real time” national accounts, building on the vision of Kuznets (1941) in constructing current national accounts

- All data used to produce results shown here are freely downloadable at www.tracktherecovery.org
Changes in Employment Rates Over Time
All Industries

![Graph showing changes in employment rates over time for various industries and worker categories. The graph includes data from Feb 2020 to Jun 2020, with specific months labeled on the x-axis (Feb-12, Feb-26, Mar-11, Mar-25, Apr-8, Apr-22, May-6, May-20, Jun-3). The y-axis represents the change in employment, relative to Feb 2020, with values ranging from -70% to 0%. The graph compares CES - All Workers, ADP - All Workers, ADP - Low-Wage Workers, Earnin - Low-Wage Workers, All Firms, and HomeBase - Low-Wage Workers, Small Firms.]
Changes in Consumer Spending vs. Workplace Rent for Low-Income Households

Normalized Change (%)
in Hours Worked (Earnings)

Median Two Bedroom Monthly Rent in 2018 at the Workplace ($)

-60 -50 -40 -30 -20

600 800 1,000 1,200 1,400 1,600 1,800

Change in Hours Worked vs Workplace Rent among Low-Income Households
Small Business Revenue Changes vs. Local Income Distribution

Food Services and Accommodations
Womply Business Revenue vs. Poverty Share, Top 1% Share, and Gini by County

Gini Index

Change in Small Business Revenue (%) Relative to Jan.

Gini Index 2018
Changes in Wages, Hours Worked and Earnings Over Time

Change in Wages, Relative to Feb. 2020 (%)

Wage Rates
Hours Worked
Earnings
Changes in Wages, Hours Worked and Earnings Over Time

HomeBase

Change in Wages, Relative to Feb. 2020 (%)

Feb-12  Feb-26  Mar-11  Mar-25  Apr-8  Apr-22  May-6  May-20  Jun-3

Wage Rates  Hours Worked  Earnings
Changes in Total Employment by Firm Size

Percent Decline in Hours Worked at Local Bus.

Employer Size Decile
Unemployment Rates vs County Income in Four Recessions

1991 Recession

- Queens NY
- Santa Clara CA
- Bronx NY
- Montgomery MD
- Fresno CA

1991 Unemployment Rate

County Median Income in 1990
Unemployment Rates vs County Income in Four Recessions

2001 Recession

County Median Income in 2000

2001 Unemployment Rate

- Bronx NY
- Queens NY
- Fresno CA
- Santa Clara CA
- Montgomery MD
Unemployment Rates vs County Income in Four Recessions

2010 Recession

2010 Unemployment Rate vs County Median Income in 2006

- Fresno CA
- Bronx NY
- Santa Clara CA
- Montgomery MD
- Queens NY
Unemployment Rates vs County Income in Four Recessions

2020 Recession

2020 March 15th to May 2nd Unemployment Claims

County Median Income in 2014 to 2018

Queens NY
Santa Clara CA
Bronx NY
Montgomery MD
Fresno CA
Impact of Stimulus on the Composition of Consumer Spending

Composition of Spending

- January
  - Durable Goods: 23%
  - Non-Durable Goods: 32%
  - Remote Services: 21%
  - In-person Services: 18%

- Pre-Stimulus
  - Durable Goods: 29%
  - Non-Durable Goods: 29%
  - Remote Services: 24%
  - In-person Services: 18%

- Post-Stimulus
  - Durable Goods: 30%
  - Non-Durable Goods: 27%
  - Remote Services: 23%
  - In-person Services: 20%

Composition of Recovery

- January
  - Durable Goods: 44%
  - Non-Durable Goods: 19%
  - Remote Services: 19%
  - In-person Services: 18%