The Impact of the COVID-19 Pandemic on Consumption
Learning from High Frequency Transaction Data

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VoxChina Covid-19 Focum, April 19, 2020
COVID-19 and the Economy

• As of April 17, > 2 million infections and > 150K deaths in 210 countries

• Stringent public health measures

• Severe economic impact
  – Supply
  – Demand

• Gigantic stimulus packages, often > 10% of country’s GDP
  – More likely to follow
Assessing the Economic Impact

• Magnitude and nature

• Challenging
  – Ongoing
  – Unprecedented

• Goal: provide early facts on the economic impact of COVID-19
  – China experience
  – 12 weeks after the outbreak (Jan 23, 2020 to April 14, 2020)
Objective

• Focus on consumption
  – ~42% of China’s GDP in the most recent decade

• Two questions
  – How large and persistent is the consumption impact?
  – How does consumption respond to the epidemic severity?

• Inform us about the aggregate demand implications
  – Due to distancing and mobility restrictions (inability to consume)
  – Due to COVID-19-induced uncertainty and anxiety (unwillingness to consume)
Data

• Universe of all *offline* spending transactions from China UnionPay Merchant Service Corporation (China UMS)
  – Covers bank card transactions (POS machines)
  – Covers QR transactions via Alipay and WeChat pay (UnionPay’s QR scanners)

• UnionPay: one of China’s largest payment service providers
  – 2019: 30% of China’s total offline retail consumption

• Offline consumption in China
  – 2019: 76% of total retail consumption
  – Offline retailers matter for employment
Sample and Methodology

• Consumption aggregated at the city-day level

• 214 cities, > 1 million urban population
  – 92% of China’s GDP and 90% of China’s urban population

• Sample period
  – January 1, 2020 to April 14, 2020
  – January 12, 2019 to April 26, 2019 (control period)

• Difference-in-differences
  – Event date: Wuhan lockdown (January 23, 2020) and the corresponding lunar calendar date in 2019
  – City, distance-to-CNY (event date), day of week fixed effects
  – Standard errors are clustered at the city level
# The Average Effect

<table>
<thead>
<tr>
<th>treat\post</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>-0.32***</td>
<td>-0.15***</td>
<td>-0.29***</td>
<td>-0.35***</td>
<td>-0.64***</td>
<td>-0.59***</td>
</tr>
<tr>
<td>Observations</td>
<td>44,940</td>
<td>44,940</td>
<td>44,940</td>
<td>44,940</td>
<td>44,940</td>
<td>44,940</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.57</td>
<td>0.44</td>
<td>0.66</td>
<td>0.34</td>
<td>0.63</td>
<td>0.65</td>
</tr>
</tbody>
</table>

| Daily necessities | -0.15*** | (0.03) | -0.29*** | (0.01) | -0.35*** | (0.02) | -0.64*** | (0.02) | -0.59*** | (0.01) |
| Discretionary items | -0.29*** | (0.01) | -0.35*** | (0.02) | -0.64*** | (0.02) | -0.59*** | (0.01) |
Aggregate Impact

- Dollar effect: 18.57 million per city per day
- Back of the envelope
  - 14.72 billion RMB per day (=18.57 million \times 214/(0.9\times0.3))
  - 1.22 trillion during the twelve-week post-outbreak period
  - 1.2% of China’s 2019 GDP
- Online spending response
  - Based on online service provider, ChinaPay (about 5% market share)
  - Decrease by 13% during the same period
- Total consumption down by 27%
Cross City Variation

\[ y = -0.22 - 0.03x, \quad R^2 = 0.23 \]
Geographical Pattern
Interpretation

• Strong correlation with exposure to COVID-19
• Due to physical constraints
  – Dining & entertainment and travel-related spending especially hard hit
• Direct impact of COVID-19
  – Huge uncertainty regarding the pandemic trajectory
• Exploit within-city day-to-day changes in epidemic severity
  – Infected cases, stress on hospital capacity, total death toll
  – Mobility restrictions (or macro conditions) do not vary at such high frequency
## Within-City Variation in Epidemic Severity

<table>
<thead>
<tr>
<th></th>
<th>Spending amt/pre-period average</th>
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<tbody>
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<td>(1)</td>
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<td>(0.02)</td>
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<tr>
<td><code>treat*post*log(1+deaths)</code></td>
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<tr>
<td>Constant</td>
<td>0.81***</td>
<td>0.81***</td>
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<tr>
<td></td>
<td>(0.00)</td>
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Consumption Impact Over Time

[Graph showing percentage change in daily spending and total COVID-19 cases over time.]

ASIA’S GLOBAL BUSINESS SCHOOL
Consumption Recovery: By Category
Consumption Recovery: By Category

**Dining & Entertainment**

- Percentage change in daily spending
- Total # COVID-19 cases (in thousands)
- Weeks since Wuhan lockdown (Jan. 23)

**Travel-related**

- Percentage change in daily spending
- Total # COVID-19 cases (in thousands)
- Weeks since Wuhan lockdown (Jan. 23)
Consumption Dynamics Across Cities

Event period [0,27]

Event period [28, 55]

Event period [56, 82]
Wuhan
Four Municipalities

- **Beijing**
- **Shanghai**
- **Shenzhen**
- **Guangzhou**
Key Takeaways

• Immediate and severe consumption impact
  – Over 1.2% of China’s 2019 GDP
  – Wuhan’s offline consumption down by 70%
  – Service and retail (durable goods especially) affected the most

• Strong negative sensitivity to the epidemic severity
  – More than what can be explained by mobility restrictions
  – Consumption recovery appears to trace the virus containment progress
  – Effective public health interventions crucial for reinvigorating the economy
    • Significant economic value through lessened negative consumption impact and faster recovery
    • Cities with zero COVID-19 deaths on average had 4.5% smaller consumption decrease in the first post-outbreak month and 4.6% greater consumption recovery in the second month