Tracking the COVID-19 Crisis with High Resolution Transaction Data

Vasco M. Carvalho\textsuperscript{1}, Juan Garcia\textsuperscript{2}, Stephen Hansen\textsuperscript{3} Alvaro Ortiz\textsuperscript{2} \\
Tomasa Rodrigo \textsuperscript{2} Jose Rodriguez Mora \textsuperscript{4} Jose Ruiz \textsuperscript{2}

\textsuperscript{1}University of Cambridge, Alan Turing Institute & CEPR \\
\textsuperscript{2}BBVA Research \\
\textsuperscript{3}Imperial College \textsuperscript{4}University of Edinburgh
Introduction

- Accurate, real-time information on the state of the economy can be used to better inform private actions and evidence-based public policy.
  - More so in times of crisis.

- Yet, compilation of key economic statistics - National Accounts, Censuses - is a slow (and costly) process
  - Surveys are possible, but sparse and specialized

- This scarcity of economic data is all the more perplexing in a world awash with "naturally occurring data".

- Data held by commercial banks is potentially very fruitful
  - Rich, plentiful, granular, and directly connected to economic behavior,
  - Enabling real-time tracking of economic activity.
Research Questions

- Can transaction data provide insights into the unfolding of an economic crisis - in Spain - in real time?
  - What is the decline in consumption following a lockdown?
  - How large is the reallocation of expenditure?
  - How large is substitution towards online expenditures?
  - Are these patterns uniform across space?

- Part of a larger ongoing collaboration to construct:
  - High frequency/high geographic resolution National Accounts
  - Mapping economy-wide supply chains from firm-to-firm transaction data
Background on Data

- Data consists of:
  - Universe of transactions at BBVA-operated Point of Sales (PoS) +
  - Universe of transactions by BBVA-issued credit and debit cards

- Large, tagged dataset:
  - 1.4 Billion Transactions
  - 2.2 Million Merchants (PoS) + 90 Million National Cards.
  - Geo-tagged + Sector of Expenditure + Online/Offline Breakdown

- Highly correlated with National Accounts Consumption data:
  - Correlation of Quarterly Aggregate of BBVA data vs. National Accounts NonDurable Household Consumption is >86%

Note: 15th of March, General Lockdown Imposed
Growth rate across categories of time use by Google services’ users in Spain. Computed by Google from location metadata generated by individual users and aggregated to a Spain-wide growth rates by location category. Source, Google Mobility Reports (2020).
Year on Year growth rate of daily number of transactions settled with Spain-issued debit or credit cards. Blue line: Raw data. Orange line: seven day, centered moving average of raw data.
Aggregate Consumption Expenditures

Online vs. Offline

COVID-19 and Substitution into Online Expenditure

Seven day moving average of daily market share of online transactions by nationally-issued cards.

Lockdown Announced
The evolution of market shares for broad expenditure categories. Categories are stacked top to bottom in order of pre-crisis shares. The red dash indicates the announcement of the lockdown. Shares are expressed as a seven-day moving average.
Local Dynamics: Zip Codes in Madrid

Heat Map of Difference in average Y-o-Y growth rate of expenditures before March 9th, and after March 13th. Darker color indicates a larger fall after the implementation of the lockdown.
Take Home Points

- +40% Decline in Expenditures: coinciding with lockdown.
- Doubling of Online Market Share: will it persist post-crisis?
- Large Reallocation of Expenditures: some merchant categories disappear altogether, will merchants come back?
- Some Spatial Inequality: Poorer districts and districts with more cases affected the most.

Ongoing work:
- Cross Country Data (US, Mexico, Turkey, Argentina...)
- Inequality across Households (Age, Income, Occupation, Savings, Debt)
- Inequality across Firms (Size, Age, Sector, Liquidity, Investment, Savings)
- Track (slow + heterogeneous) recovery as lockdown scales back