Digital payments and economic activity (*)

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Banca d’Italia

Retail Payment Instruments and Services
CURRENCY, CIRCULATION AND RETAIL PAYMENTS

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(*) The views expressed are those of the authors and do not involve the responsibility of the Bank.
Digital payment data in Bank of Italy

- Search for innovative information to **improve the ability especially**
  - Nowcasting macro-indicators
  - Evaluating economic uncertainty
  - Measuring statistics (i.e., retail trade; tourism)
  - Monitor payment innovation and users’ behaviour

- **Payment System (big)Data can** show **suitable and timely features**
  to track the short-term evolution of the economic activity and
  the consumer behaviour
Literature

Payment system & Macro-indicators: nowcasting/ forecasting/ measuring

*Forecasting:* Esteves (2009); Carlsen and Storgaard (2010); Rodrigues and Esteves (2010); Bagnall et al. (2016); Galbraith and Tkacz (2007)(2017)(2018); Aprigliano et al. (2017); Duarte et al. (2017); Verbaan et al. 2017.

*Measuring:* Bodas et al. 2018.; Carvalho et al. (2020); Bouniey et al. (2020)

Economic policy uncertainty

Bloom, Bond and Van Reenen (2007); Galbraith and Tkacz 2009; Bloom (2009); Baker, Bloom and Davis (2016); Bachmann and Bayer (2013); Bachmann, Elstner and Sims (2013); Ardizzi et al. (2019).

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Payments trace economic transactions: \(MV = PY = PAYMENTS\)

- Methodology: instruments, side, granularity, sources, treatment
Payment system in Italy

Market of goods and services (Payments of PA, business and households)

Banks and other payment service providers

- international cards
- giro-payments
- domestic debit cards

Monetary and Financial Market
i.e. interbank liquidity, government bonds, derivatives, monetary policy operations

Financial institutions, Securities settlement systems, Central counterparties, large value interbank payment systems.

Negotiation level

Payment services

Post-trading level

- Clearing
- Settlement

International Card clearing

Banca d’Italia (BI-Comp)

STEP2-T

TARGET2 – Banca d’Italia

Technical Infrastructure/processing services (SIA, Nexi, ICCREA, CABI)
T2 and Bi-comp payment flows in Italy
POS purchases at daily frequency

- Daily POS purchases from BI-comp system:

- Caveat: strong seasonal patterns and calendar effects.
High seasonality of card payments (volumes of transactions by minute – Issuing side)

Bank of Italy, card processing data (sample)
High seasonality of card payments
(volumes of transactions by minute)

David Bouniey, Youssouf Camaraz and John W. Galbraith (2020):
Covid19 and evidence from French transaction data
Seasonality of daily payment data

Seasonality is a salient feature on payments

- Standard techniques:
  - **Dummies** (i.e., *day, month, year, calendar holidays, etc.*)
  - **Trend variations and ma** (i.e., Carvalho et al. 2020)

- Advanced techniques:
  - **TBATS** (De Livera et al 2011)
  - **Prophet** (Taylor and Lethman 2017)
Nowcasting
This paper “Using payment system data to forecast economic activity” (Aprigliano, Ardizzi, Monteforte, 2019, IJCB):

• Describes the payment system data. A picture for Italy

• Provides empirical evidence on the correlation between payment data and economic activity

• Evaluate the ability of the payment data to forecast GDP
  • Selection of targeted predictors LASSO
  • MIDAS dynamic factor model with Kalman smoothing

• Proves the contribution of the payment data to track the short-term evolution of the GDP
Payment data and macroeconomic aggregates

BI-Comp (dashed red line) and T2-retail (bold red line) flows compared with macroeconomic aggregates (blue line); y-o-y percentage changes
Uncertainty
The paper in one chart

- Bloomberg
- Twitter
- (Factiva)
- Using Big-data techniques from text-mining

- EPU
- Fraud/Cyber risk news

Debit Card Payments

- POS
- ATM
- Daily frequency
- Strong seasonal patterns

- Local projections

Temporary decrease in consumption and impact on the choice of cash vs digital payments. Precautionary channel?

In Ardizzi, Emiliozzi, Marcucci, Monteforte 2019 we build daily impulse response functions of POS transactions (BI-COMP) to Economic Policy Uncertainty (with Local projections, see Jordà AER 2005)
In *Ardizzi, Emiliozzi, Marcucci, Monteforte 2019* we build daily impulse response functions of POS transactions (BI-COMP) to Economic Policy Uncertainty (with Local projections, see Jordà AER 2005)
Measuring & Monitoring
Bank of Italy, proximity payments; BICOMP+other sources data
Innovative Payments in Italy - Card Processing Data

% E-commerce Issuing market share, seven days moving average,
% Contactless Acquiring market share on physical payments, seven days moving average

(1) Seven days moving average on transaction value
(2) Italian Covid Positive Cases on secondary axis

Source: Bank of Italy
Covid-19

Debit cards (BI-COMP system)
(trend variation and share, %)

Cash-Card ratio (i.e. $\frac{ATM}{POS}$) measures the consumers’ preference for cash (Ardizzi et al., 2014). It is countercyclical, consistently with literature on cash demand (Stix, 2004).

Bank of Italy, BICOMP data
## Covid-19

\[
\log(Y_{d,t}) = \beta_{\text{post-DPCM}} + \gamma_d + \gamma_t + \varepsilon_{d,t}
\]

<table>
<thead>
<tr>
<th></th>
<th>(1) Log (medio POS)</th>
<th>(2) Log (medio ATM)</th>
<th>(3) Log (cashcard)</th>
<th>(4) Log (total value ATM)</th>
<th>(5) Log (total value POS)</th>
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<tr>
<td>Post-DPCM 8/3</td>
<td>0.118*** (0.010)</td>
<td>0.153*** (0.009)</td>
<td>-0.022*** (0.008)</td>
<td>-0.498*** (0.094)</td>
<td>-0.443*** (0.093)</td>
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<tr>
<td>Constant</td>
<td>4.045*** (0.005)</td>
<td>5.012*** (0.005)</td>
<td>0.491*** (0.005)</td>
<td>18.591*** (0.069)</td>
<td>19.306*** (0.071)</td>
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Fixed effects

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<td>day, year</td>
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<td>Observations</td>
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Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Dataset BICOMP: daily transactions 1 Jan-5 May 2020; d=day; t=year

For the model specification, see: Bounie et al. 2020 «Consumers' Mobility, Expenditure and Online-Offline Substitution Response to COVID-19”, draft paper.
A joint Bank of Italy-Istat WG was set up to produce FTD indicators and test their adoption in nowcasting or forecasting macroeconomic aggregates in addition to traditional series.

It resulted in the production of monthly and daily time series extracted from two inter-exchange (clearance system) and settlement systems BI-COMP and TARGET2 retail.

Bank of Italy, using FTD microdata coming from both BICOMP card data and data from a major private card operator, after a long phase of data munging to cleaning it up, derived monthly and daily time series on shares of MCC, e-commerce, etc.
Conclusions

- **Digital payment flows**
  - track the short-term evolution of the economic activity also when traditional surveys are missing
  - stand out among other business cycle indicators
  - evidence on the correlation between payment data and economic uncertainty indicators

- **Policy implications:**
  - Statistical offices/Eurostat and central banks are exploring the “power” of big data payments;
  - New database sources on payments (i.e. from card processors)
  - Increasing digitalization of retail payment ecosystem and diffusion of electronic money and crypto currencies will lead to more research/analysis on the relationships between payments, innovation and the macro economy.

Bank of Italy, digital payments and fintech: news
Thanks!