Data science opportunities with non-cash transactional payments

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1 This presentation was prepared for the Workshop. The views expressed are those of the authors and do not necessarily reflect the views of the Bank of Italy, the BIS, the IFC or the central banks and other institutions represented at the event.
Data science opportunities with non-cash transactional payments

IFC & Bank of Italy
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Overview

1. Fintech & data science - Data never sleeps

2. Data science pilots - Data mania versus phobia

3. Discovery - Partnership - insights for tool-kits
J. Powell (July 29, 2020): “Non-standard, high frequency data has become a very important thing”

Pandemic triggering (daily, weekly)

- Increase in use of digital platforms (online shopping, social media, music and film streaming, booking & trading platforms)
- Digital data economy – tracking
  - Consumer’s spending & savings
  - Credit and debit cards
  - Booking platforms (restaurants, air, housing)

A borderless market for digital data

European Data Strategy

- Data service act – Governance
- Cloud services
- Artificial Intelligence
- Machine readable digital formats
- Identifiers (entities, instruments, transactions)
- General regulation on data protection
- Public, academia, Private data exploration for knowledge

Source: 2020: What Happens In An Internet Minute, Lori Lewis, domo.com
Digital transformation in finance and economics

Fintech – A paradigm of borderless records

- E-trading
- Clearing & Payment systems
- Credit cards
- Mobile pay
- Price scans
- S-media

Digital data
- DLT, Block chain
- Crypto-currency
- Digital assets
- S-contracts
- Token trading
- Supply chain management
- Ecosystem management

Data Science lab
- Systematic acquire, Structure, Process,
- Statistical algorithm, pattern detections, Machine learning, AI
- Linking insights for new services & competitive advantages

Source: Data Science in Economics and Finance for Decision Makers, Riskbooks.com 2021, Per Nymand-Andersen
The paradigm shift following the financial crisis

Micro-level statistics
- Security-by-security issuance/price
- Holdings of individual securities
- Interbank lending and holdings
- Banks individual loans to corporates
- Identifiers of Financial Institutions
- Individual bank supervisory data

Macro-level statistics
- Linking to sector analysis
- Securities issues & Banks interest rates
- Government finance & financial accounts

Linking & integrating Micro-level data

Macro-level statistics

Data science analytics
Advanced analytics – 30 experimental pilots

**mtsmarkets**
- Prices, volumes
  - euro area yield curves (Government bonds & all euro area updated daily)

**Google**
- Taxonomy of search terms
  - Now casting macro-economics indicators
    - Households’ consumption expenditures, leading indicators of economic activities

**Fable Data**
- Consumer transactions
  - Now casting macro-economics indicators
    - Households’ expenditure for consumption

**FACTIVA**
- Dow Jones newswires
  - Now casting economic activities

**Prisma**
- Prices of goods
  - Volatility and resilience analysis
Case studies

None-cash consumer spending using credit card transactions partnership with alternative data sources

Real-time European transaction data tracking merchant performance, market dynamics and consumer behaviour
Today, Europeans are most likely to reach for a card when they want to make a payment without using cash. While the number of card transactions in the euro area has more than doubled in the last decade, the average value of each transaction has fallen.
Non-cash transactional payments

Fable data sample: May 2021 - credit card transactions (1 million observations)

This is work in progress and suggestions are welcome!
Non-cash transactional payments

Average/high/low expenditures/transaction in sector classification (Fable categories)

- Food and beverage: €11.50
- Others: €11.80
- Bills and utilities: €18.00
- General Merchandise: €18.20
- Leisure: €11.50
- Groceries: €17.60
- Travel: €19.00
- Health and beauty: €23.70
- Miscellaneous: €11.50
- ATM/Cashback: £100

Expenditure (€)
Non-cash transactional payments

Average daily spending per week per sector in May 2021
Non-cash transactional payments

Expenditure by age and income group (high, medium, low)
25th – median – 75th percentile
Non-cash transactional payments

Demo zoom in on regional distributional expenditure (average, total, perhabitant)
Data science tools to answer research questions!

Timely Weekly Activities Index (WAI) calculated by Deutsche Bundesbank

The WAI is a weekly index designed to measure real economic activity in Germany in a timely manner.

Similar to the index published by the Federal Reserve Bank of New York (Lewis et al., 2020).

Based on a 10 high-frequency alternative data sources available covering various economic sectors:

- Credit card data & Google search data, consumer confidence, electricity consumptions, toll index (trucks)....

Data science tools to answer research questions!

Time series analysis of household expenditures for monetary policy, financial stability, system risks analysis, banking supervision,

- Creating indexes of economics activities

  Age, income, sectors

  Composite indicators combined with other macro-economic signals

  Competitive dynamics of household expenditures across outlets

  Modelling as explanatory variables
One **misperception** of big data is that we **do not need** to worry about **sample bias and representativeness**, as large volumes of information supersede standard sampling theory, since big data provide census-type information.

- **Digital recording of operations Census?**
- **Unit measurement**
- **Event driven**

**Data Science analytics – Engage with your data!**

- **Share of credit cards**
- **Household vs. corporate expenditures**
- **Other credit card firms**
- **Credit card data**

**Not people – Number of transactions**

Volume changes may not necessary refer to changes in demand (more credit card payments during lock-down/covid-19?)
Data Science and partnerships

Three takeaways

Progress lies in experimenting
Amara’s law

Valuable source for economic activities
Data Science labs

Moving from experimenting to tool-kits
Leveraging on Fintech partnerships for excellence
Questions and (hopefully) answers

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