
IFC-Bank of Italy Workshop on “Machine learning in central banking”

19-22 October 2021, Rome / virtual event

Data science opportunities with non-cash transactional payments¹

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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.



EUROPEAN CENTRAL BANK

EUROSYSTEM

Data science opportunities with non-cash transactional payments

IFC & Bank of Italy

Workshop on

“Data Science in Central Banking”

22/10/2021



Per Nymand-Andersen

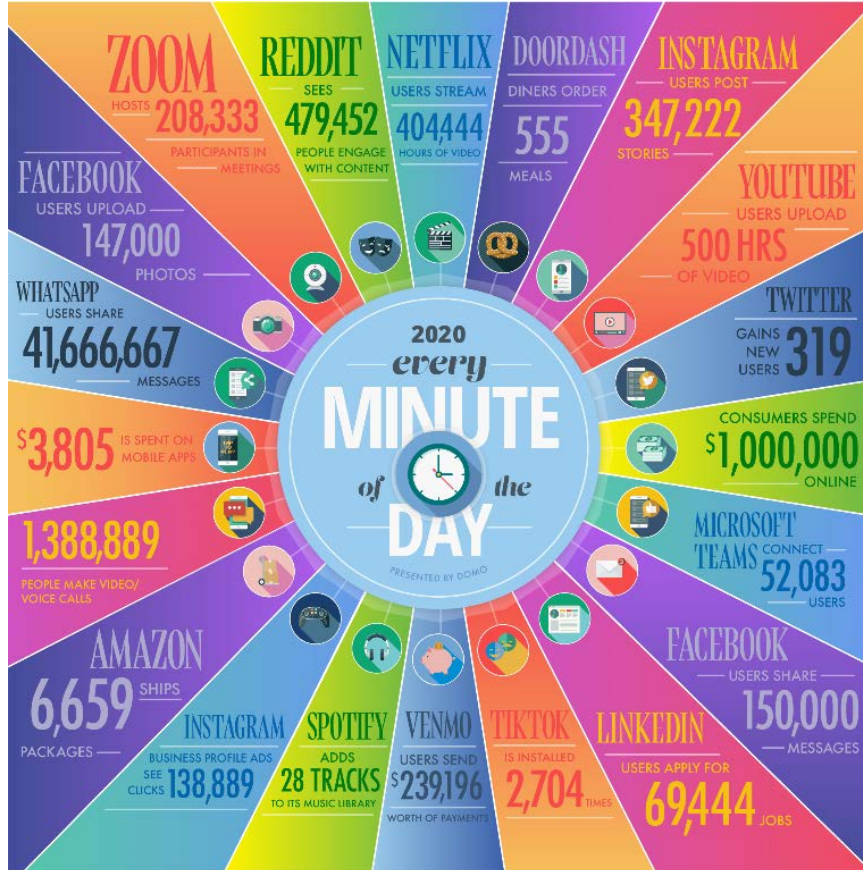
European Central Bank

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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

Fintech – A paradigm of borderless records

Digital transformation in finance and economics



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



- Kickstarter & Indiegogo
- Lending & financing
- Peer to peer lending
- Robo advisors



- Alibaba,
- Ant Finance
- Ant Fortune
- Zhima scores
- Alipay
- Credit pay

Data Science lab



Systematic acquire, Structure, Process,

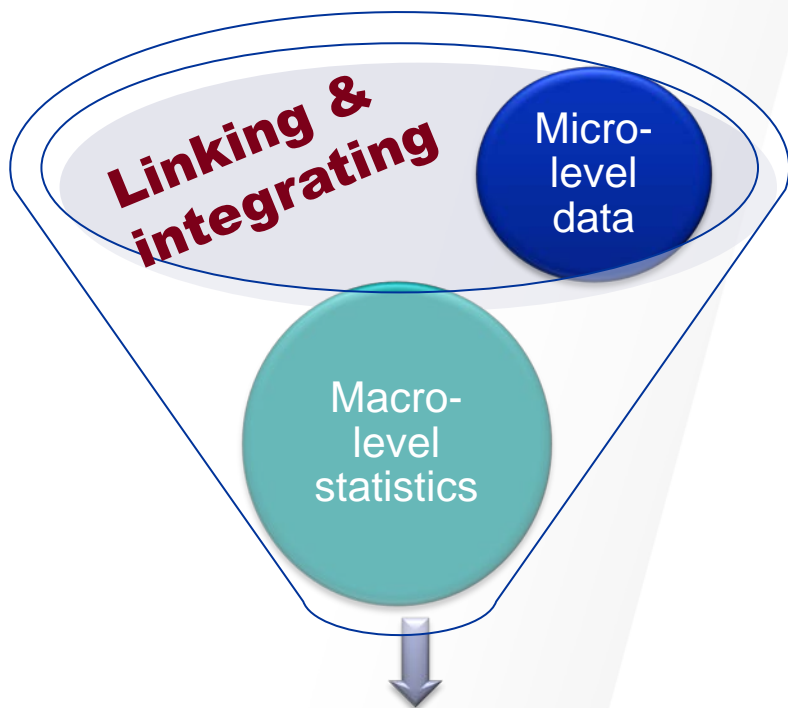


Statistical algorithm, pattern detections, Machine learning, AI



Linking insights for new services & competitive advantages

The paradigm shift following the financial crisis



Data science analytics

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

Data Science Analytics – Engage with your data

Advanced analytics – 30 experimental pilots

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mtsmarkets

Prices,
volumes



euro area yield curves (Government bonds & all euro area updated daily)



Taxonomy of
search terms



Now casting macro-economics indicators
Households' consumption expenditures,
leading indicators of economic activities



Consumer
transactions



Now casting macro-economics indicators
households' expenditure for consumption



Dow Jones
newswires



Now casting economic activities

Prisma

Prices of
goods



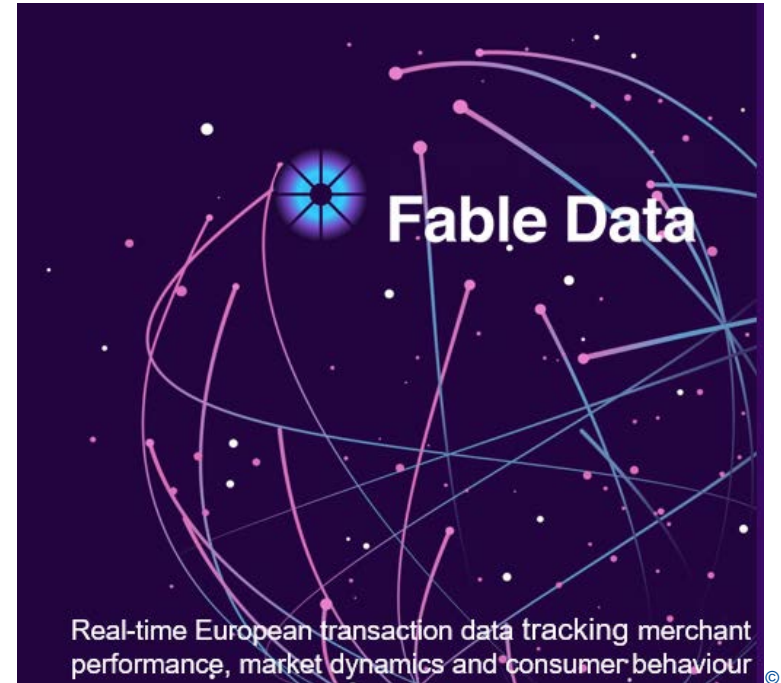
Volatility and resilience analysis

Case studies

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



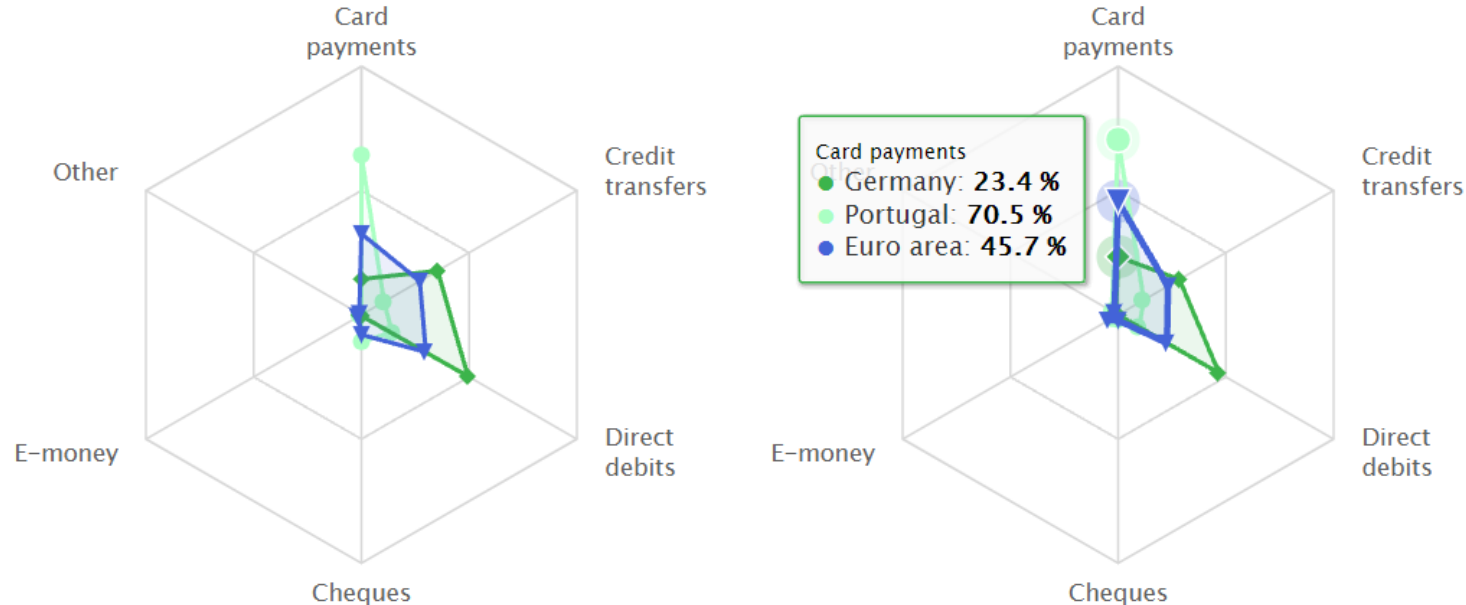
Picture: conns.com



Non-cash transactional payments

Euro area card payments double in a decade

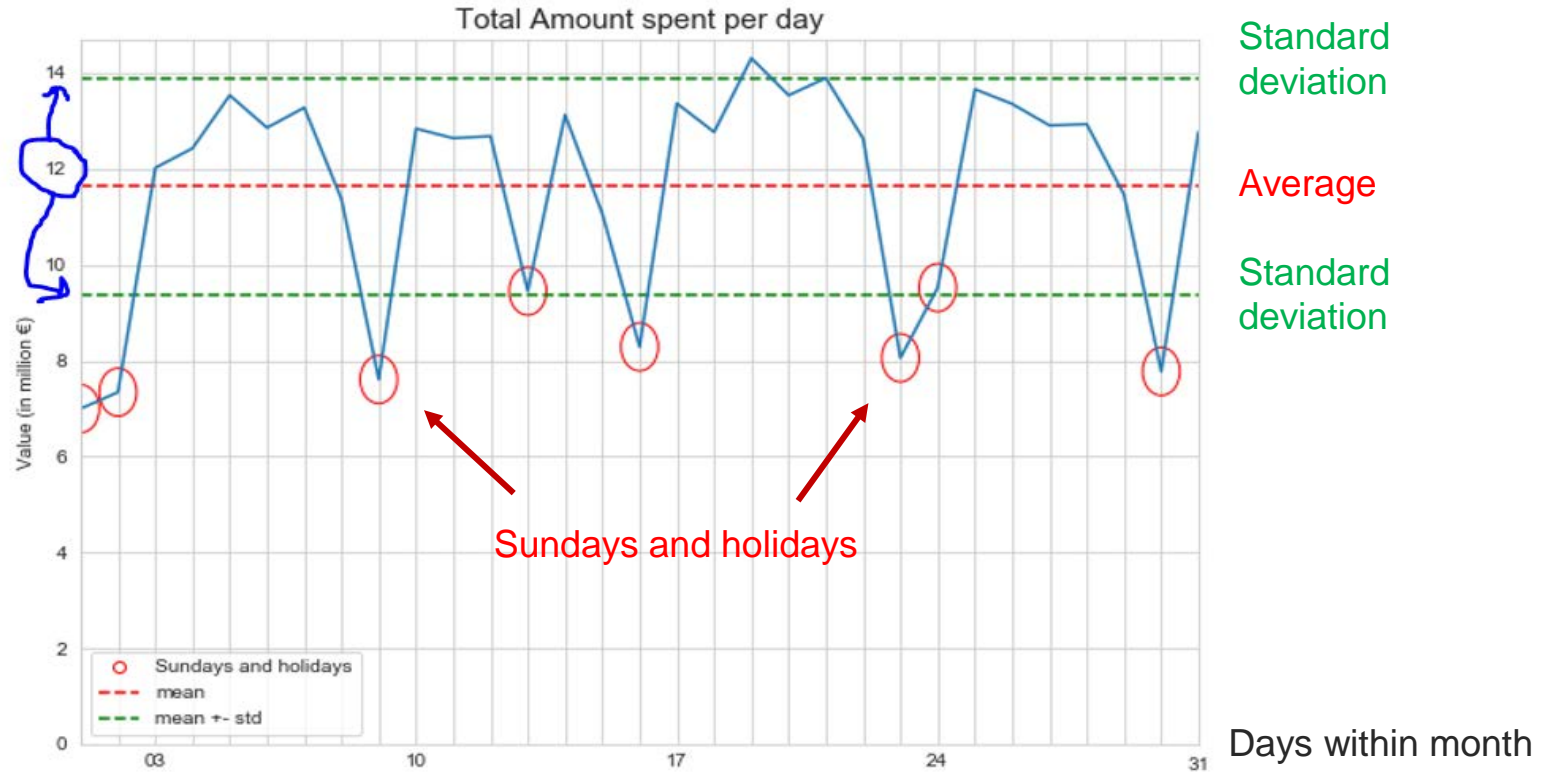
Share of total number of non-cash payments per payment method



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

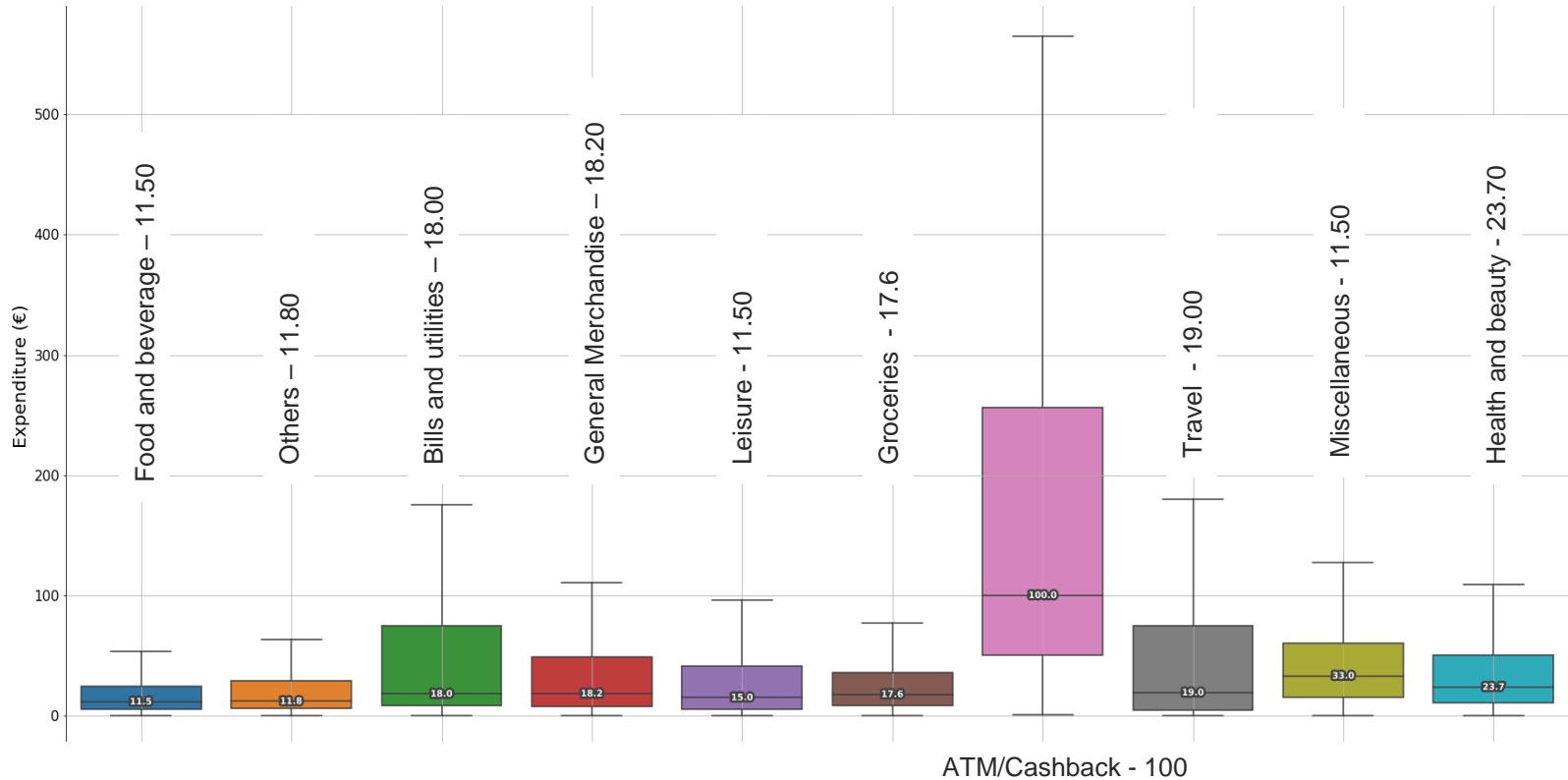
Fable data sample: May 2021 - credit card transactions (1 million observations)



This is work in progress and suggestions are welcome !

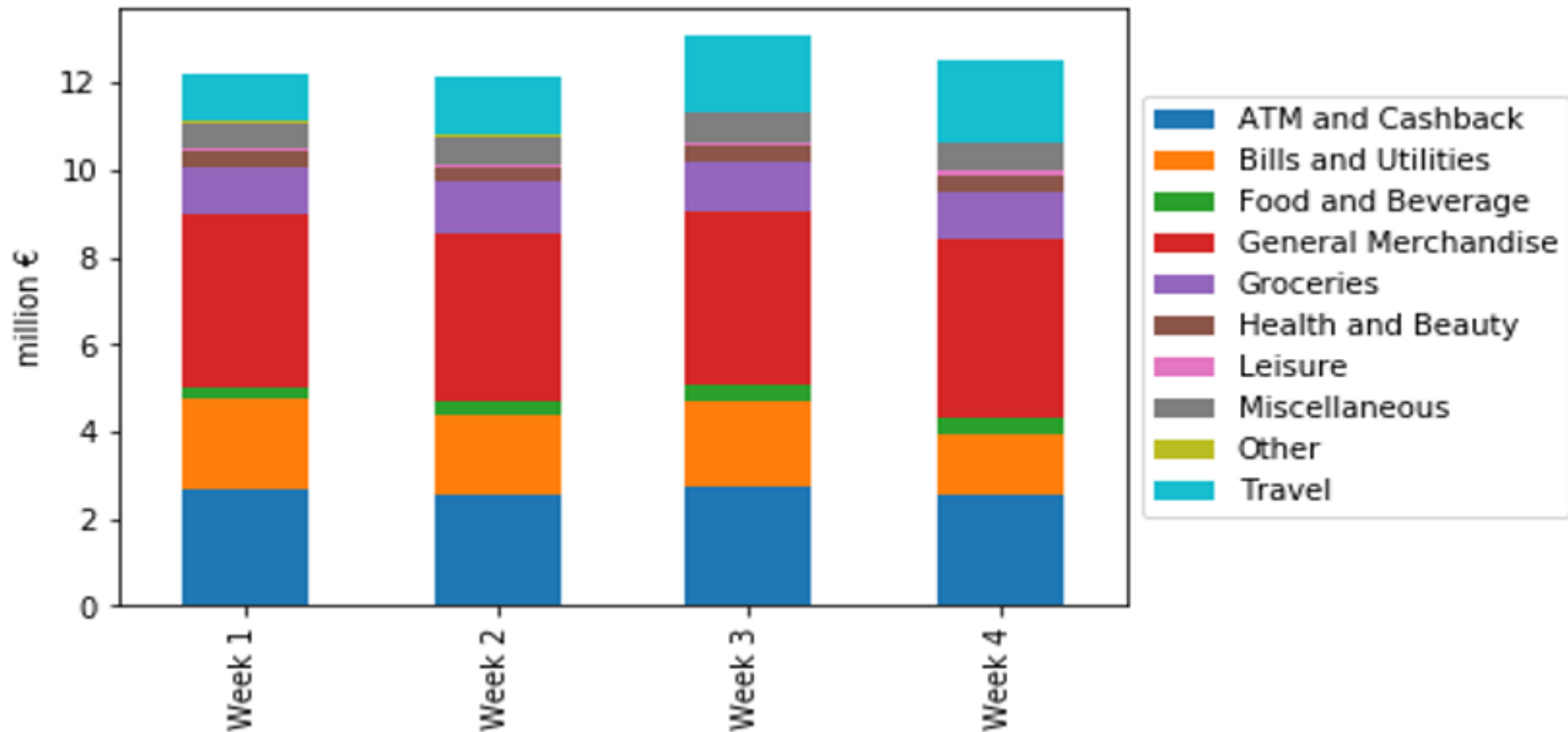
Non-cash transactional payments

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



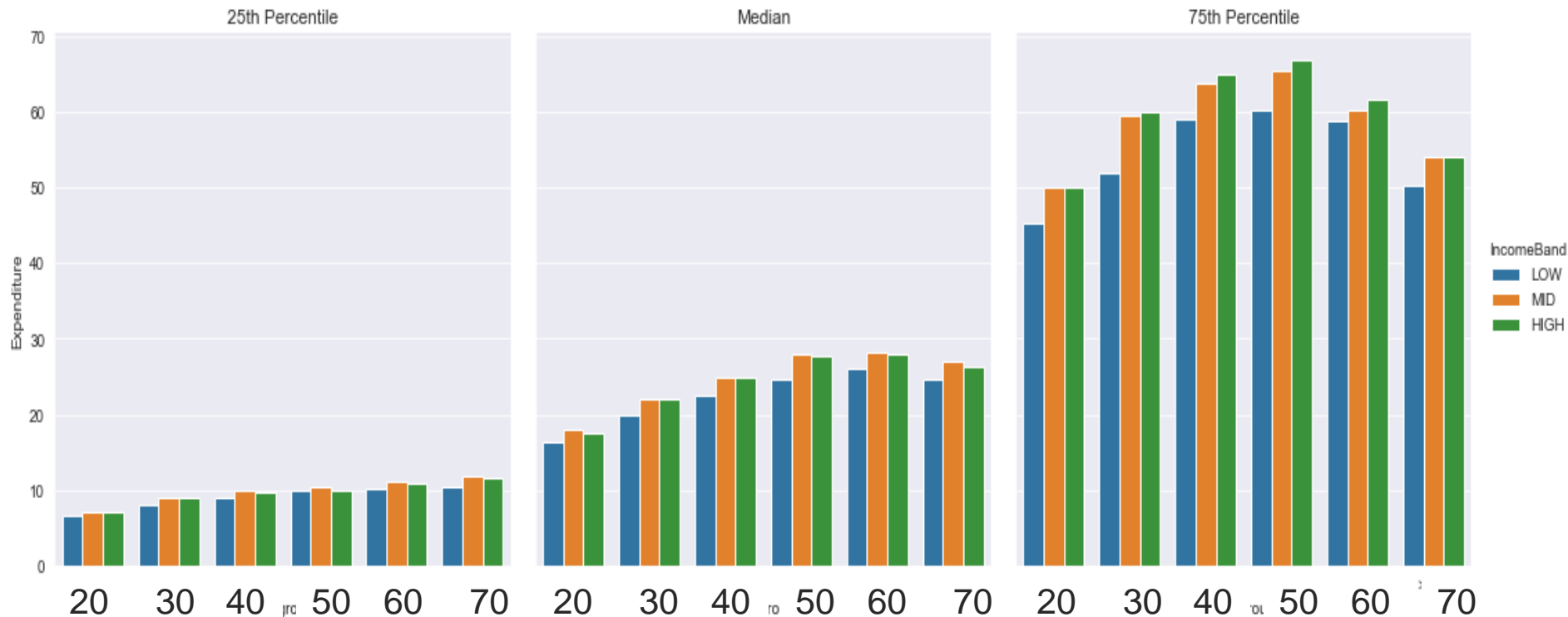
Non-cash transactional payments

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



EURO AREA STATISTICS



ENGLISH

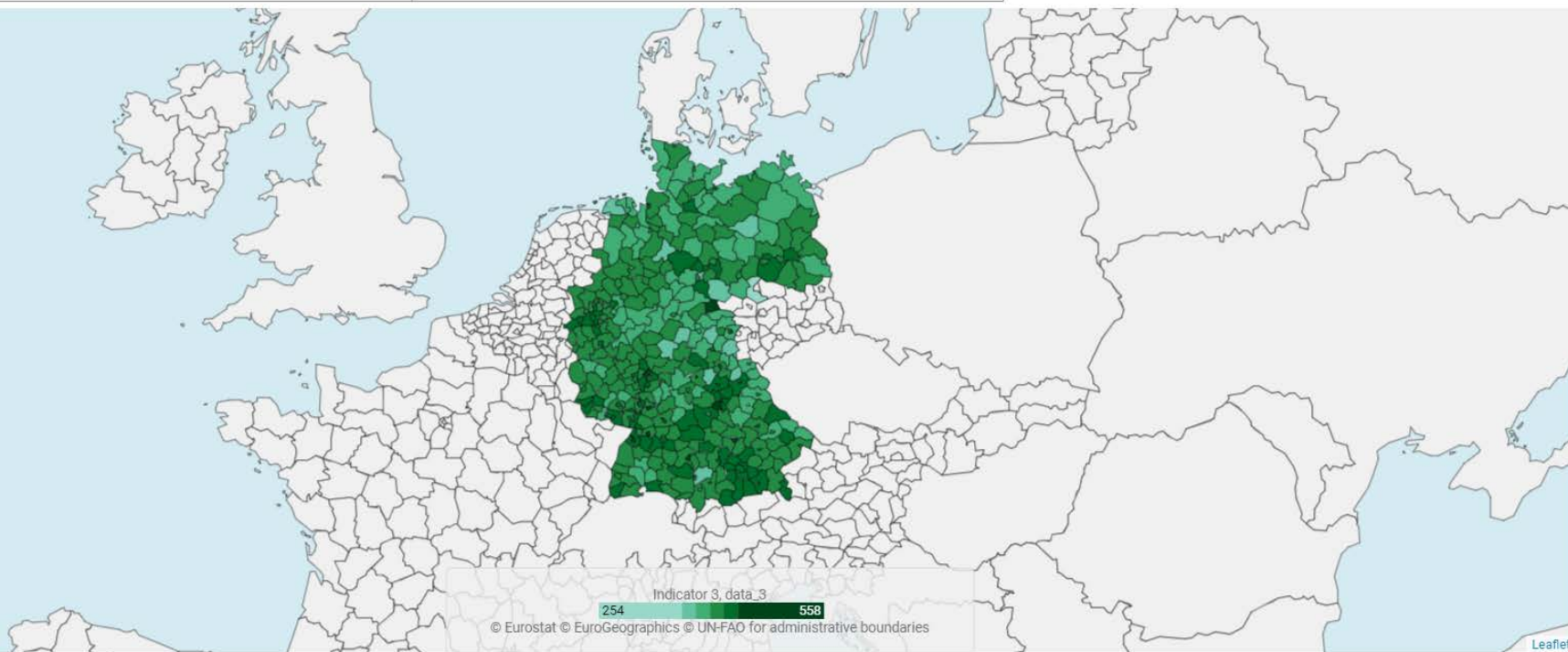
Demo zoom in on regional distributional expenditure (average, total, perhabitant)

test-nuts-3

First tab

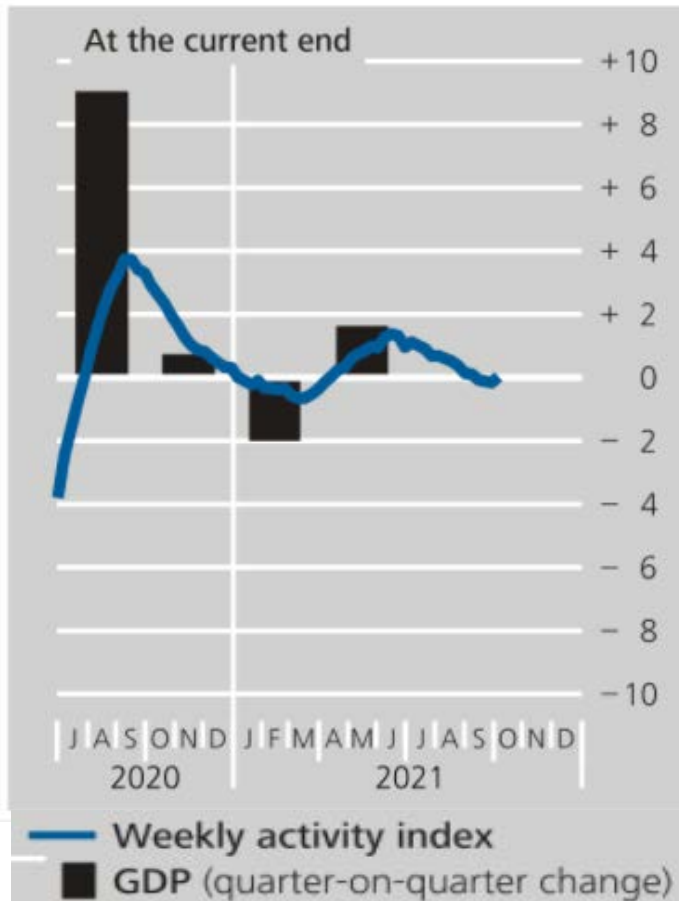
Second tab

Third tab



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

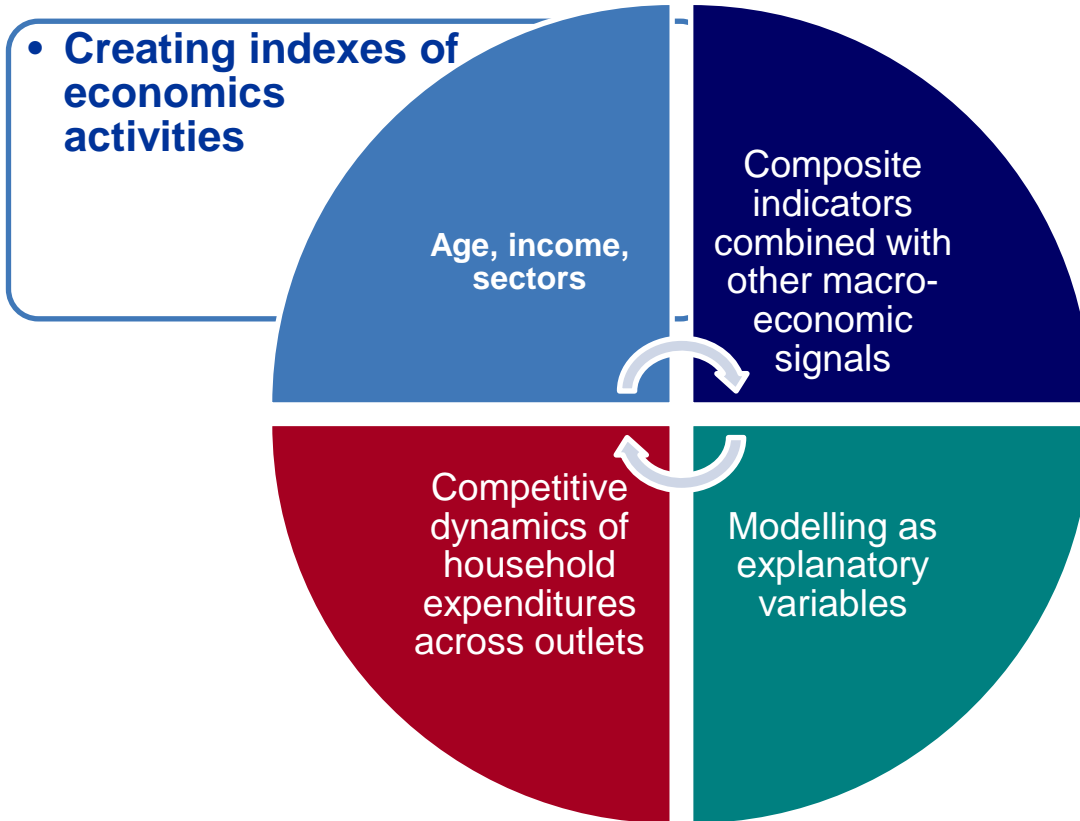
- Credit card data & Google search data, consumer confidence, electricity consumptions, toll index (trucks)....

Source: Eraslan, S. and T. Götz (2020),

An unconventional weekly economic activity index for Germany, Deutsche Bundesbank Technical Paper, 02/2020.

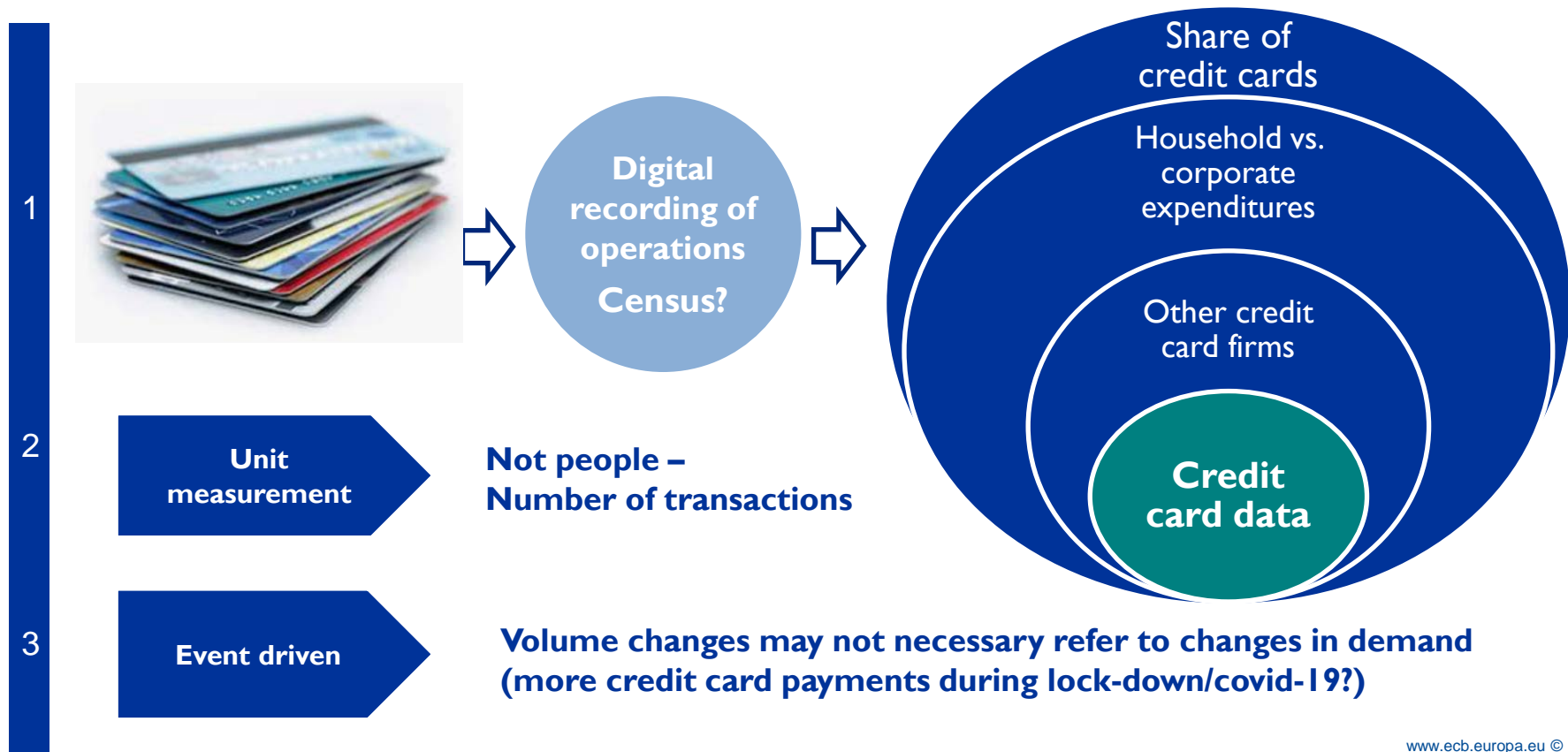
Data science tools to answer research questions!

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



Data Science analytics – Engage with your data !

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



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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*Fact-check your talk
before you walk*



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