

Tracking the COVID-19 Crisis with High-Resolution Transaction Data

Big Things Data & AI Conference

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INTRODUCTION

Transaction data to measure consumption in real time and high definition

Financial data



Individual to firm transactions

Credit and debit cards + Point of Sales (PoS)

Reassuring data management process



Data
Ingestion



Data
Quality



Data
Representativity

Measuring National Accounts in Real Time & High Definition



Use of **card spending** for **nowcasting aggregate consumption** and making **granular economic analysis**



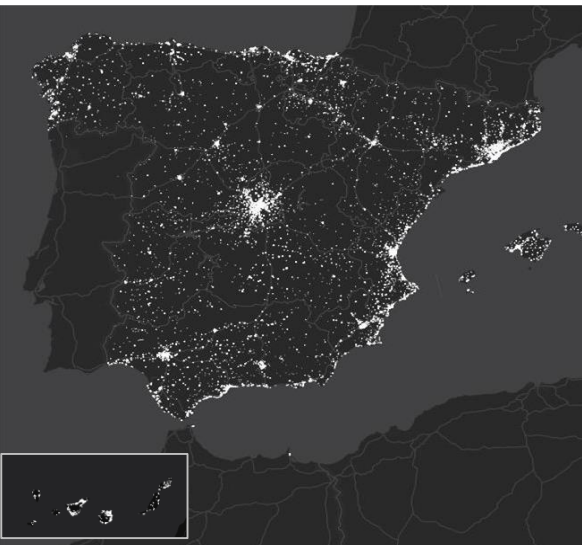
Expenditure adjustments during the **Covid-19 pandemic**: the case of Spain

The background of the image is a stylized representation of the Earth, showing continents and oceans in shades of blue and green. Overlaid on this is a complex network of glowing blue lines and dots, resembling a global communication or data network. The lines connect various points across the globe, and some points are highlighted with brighter, more intense blue light. The overall effect is one of high-tech, global connectivity and data flow.

**Monitoring
card
spending
in
Real Time
and
High
Definition**

THE DATA

Transaction data from several countries where BBVA operates



Spain

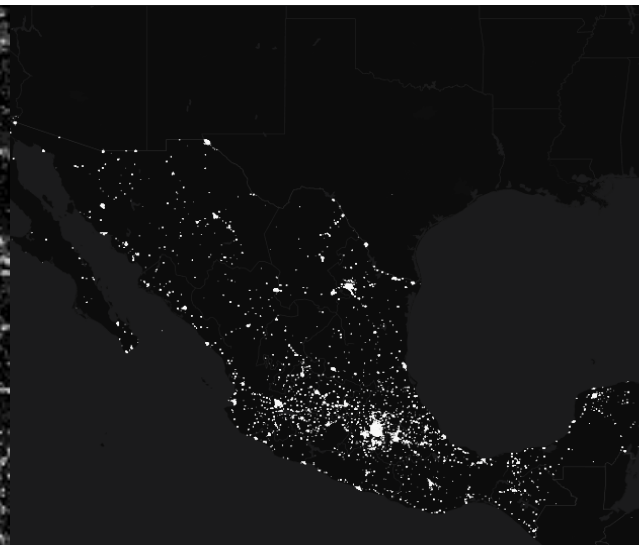
2.1 Billion
transactions



International data

Argentina, Colombia, Peru, Mexico, Southern US and Turkey

3.8 Billions transactions



THE DATA

Transaction sample statistics for the Spanish data

Universe of transactions by BBVA - issued credit and debit cards and at BBVA - operated PoS

Jan 1st 2019 - 29th of June 2020

	2019	2020
Number of Transactions	1.4 Billion	0.7 Billion
% Offline	92	95
Transaction Values		
5th Percentile	1.6€	1.9€
25th Percentile	8.5€	8.4€
50th Percentile	19.8€	19.3€
75th Percentile	45.4€	44.0€
95th Percentile	191.2€	176.6€
Number of Points of Sale	2 Million	1.6 Million
% Offline	70	65
BBVA Cardholders	6.3 Million	5.9 Million

■ Geographical detail – postal code

■ Consumption categories (76)

■ Cardholders:

- home address postal code
- education level
- age

■ International data:

- Argentina, Colombia, Peru, Mexico, Southern United States and Turkey

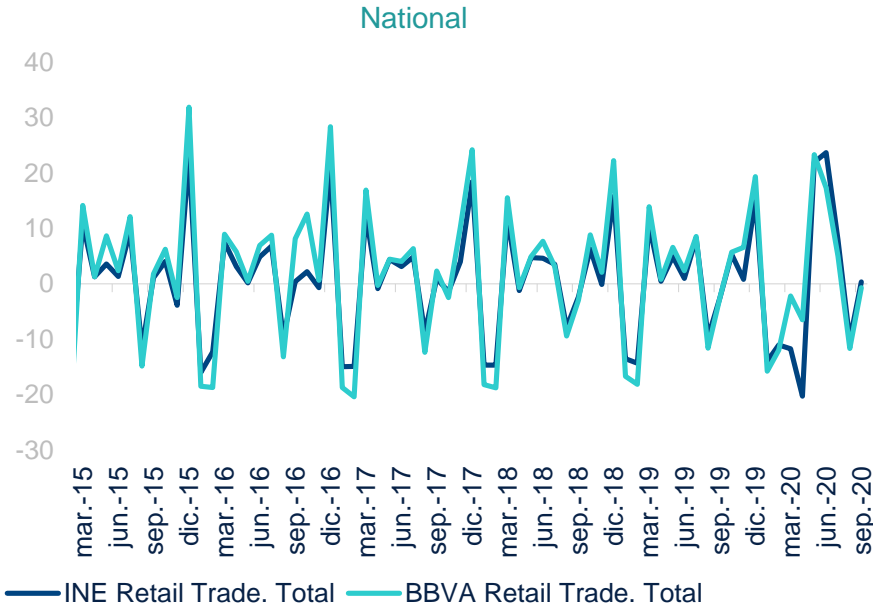
3.8 Bn transactions

DATA BACKTESTING

Transaction data mimics the official data evolution: the Spanish case

Retail Trade Indices Comparison: BBVA vs INE

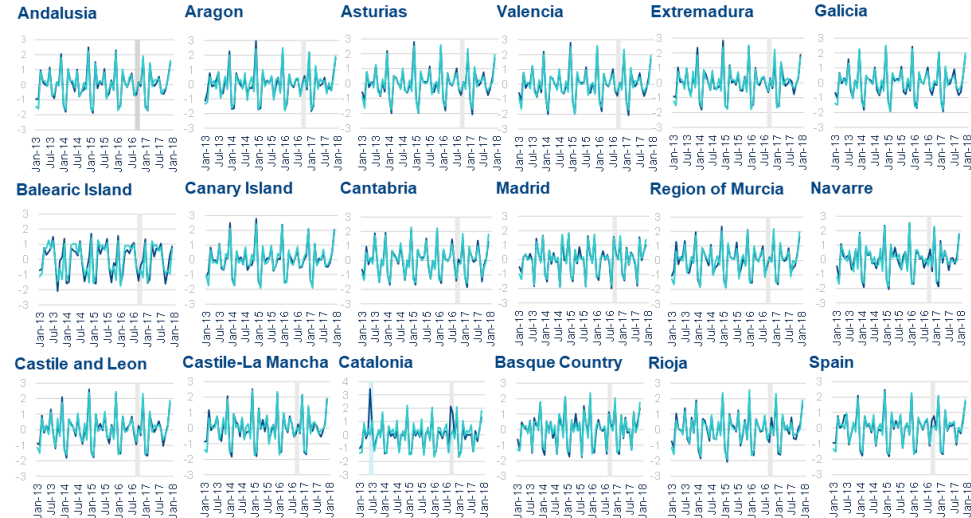
(% , monthly growth rate)



By distribution class



By region

See [Bodas et al \(2019\)](#) for further detail

THE DATA

Card spending indicators in real time and high definition

Data may be analyzed between 1-3 months ahead than the official figures

Publication calendar for consumption according to the National Institutes of Statistics by country



Data has more granular detail on household spending than the official figures

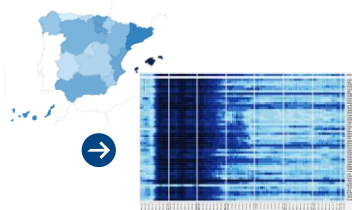
Category

Transport, Food, Restaurants, Hotels,...



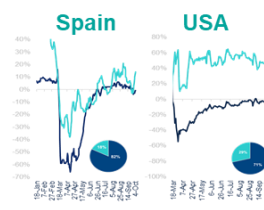
Geography

Regions, cities and even postal codes



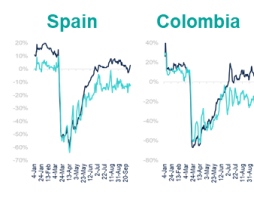
Online / Offline

Performance of online vs face-to-face purchases



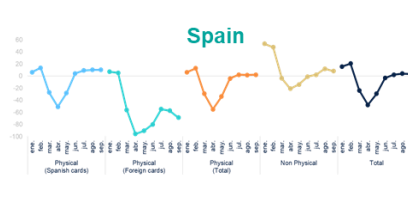
Card / Cash

Card purchases vs ATMs withdrawals



Nationality

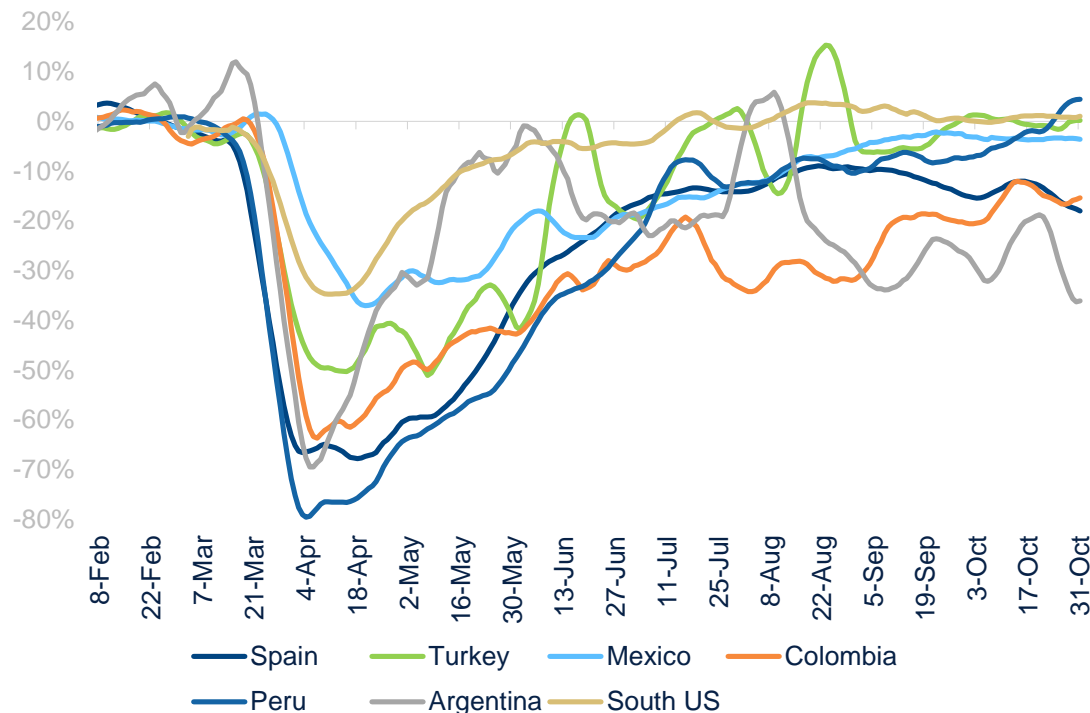
National cards vs foreign cards



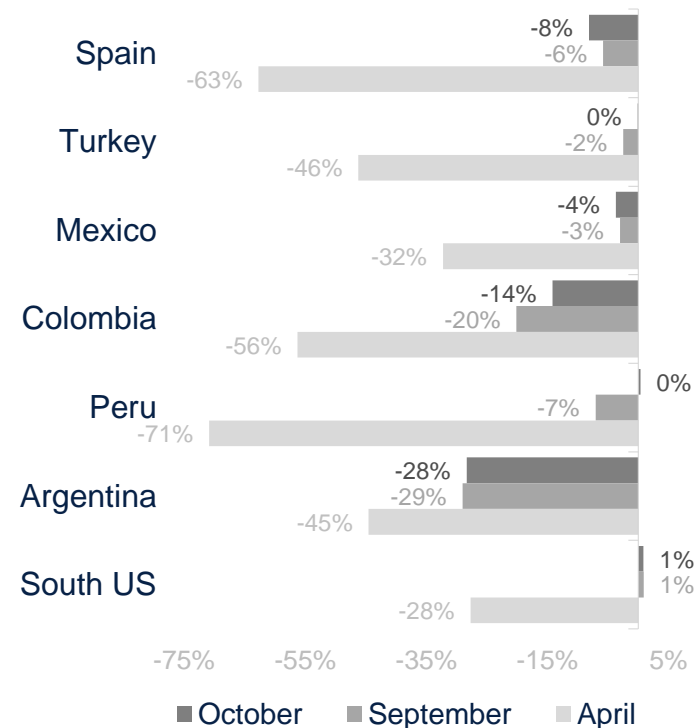
RESULTS: Tracking the COVID-19 Crisis in Real Time

A Global Expenditure Contraction and the Recovery

Cross country evolution of daily expenditure growth (YoY, in deviation from pre-March 8th mean growth, 14-day moving average)



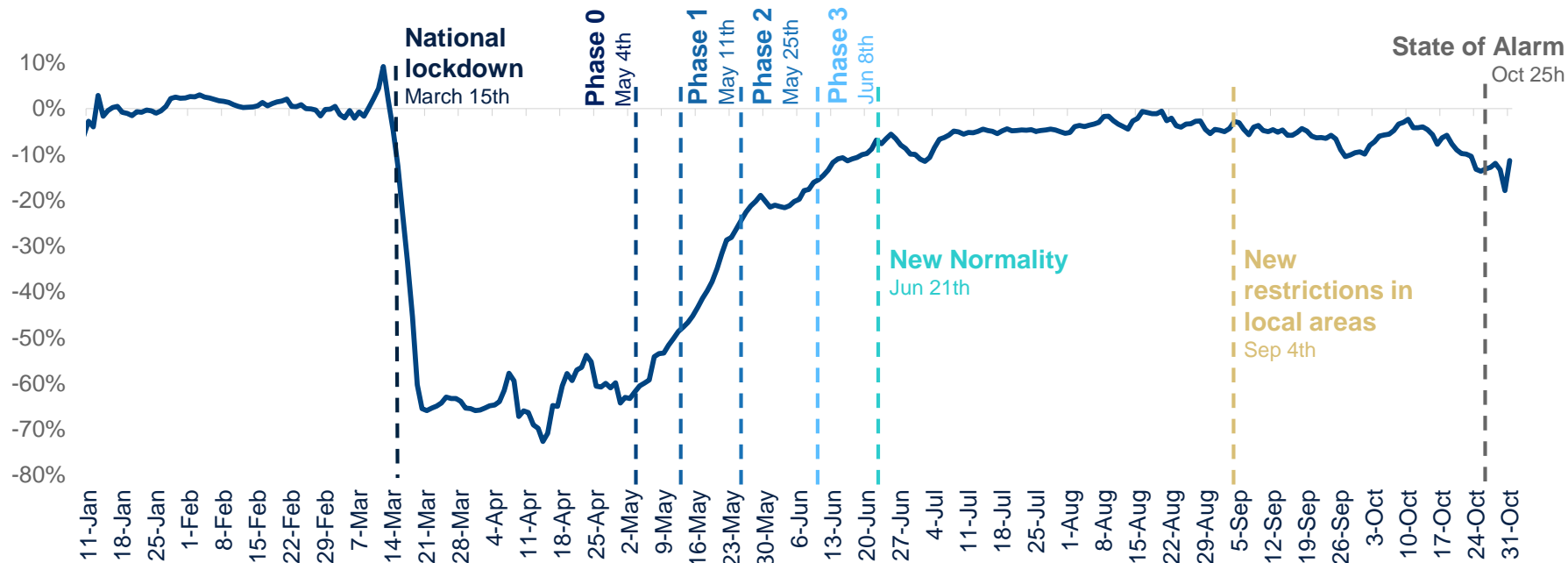
Cross country monthly expenditure growth (YoY, in deviation from pre-March 8th mean growth)



RESULTS: Tracking the COVID-19 Crisis in Real Time

In and Out of Lockdown: evidence for Spain

Evolution of daily Spanish expenditure growth (YoY, in deviation from pre-March 8th mean growth, 7-day moving average)



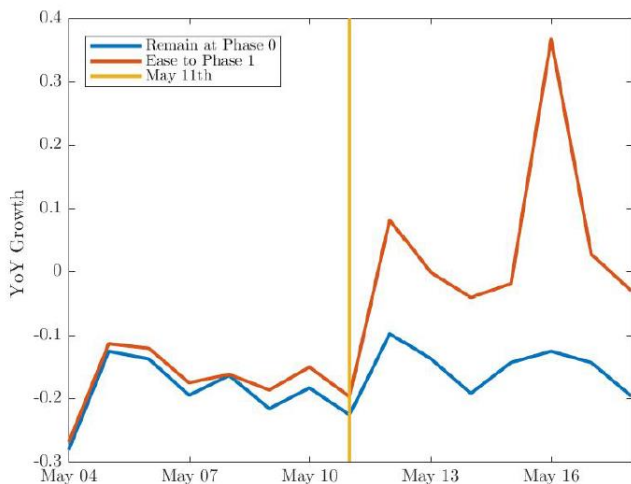
RESULTS: Tracking the COVID-19 Crisis in Real Time

Province-level Variation in Timing + Extent of Easing

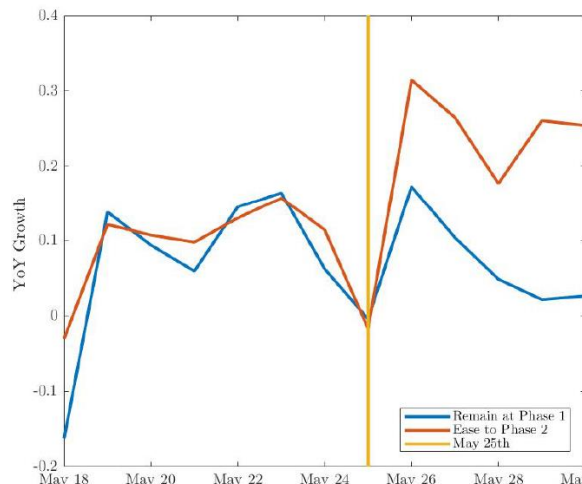
Evolution of daily Spanish expenditure growth by provinces: lockdown relaxation – switchers vs stayers

(average YoY expenditure growth for the provinces which eased into Phase 1/2/3 plotting it against the average for those provinces that stayed in the more restrictive Phase, centered around lockdown easing announcement days)

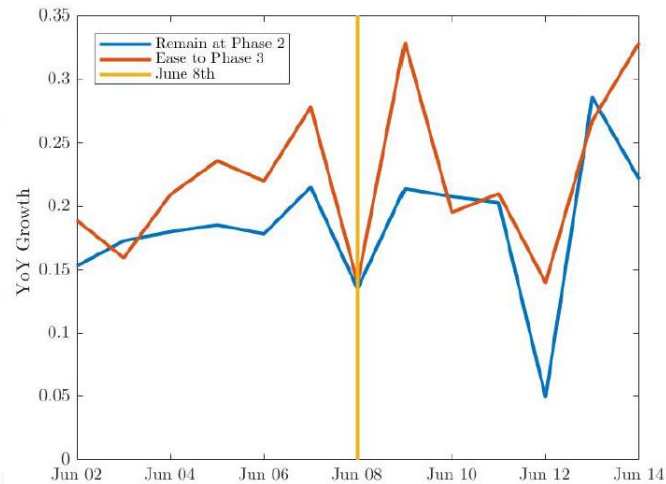
Phase 1



Phase 2



Phase 3



Extensive margin/size dependent shutdowns more damaging than capacity restrictions
(conditional on being open)

RESULTS: BBVA card data as a consumption survey- Household spending and income

Reallocation of Consumption During COVID-19: spending by income

Categories more positively and negatively correlated with average income across Madrid postal codes

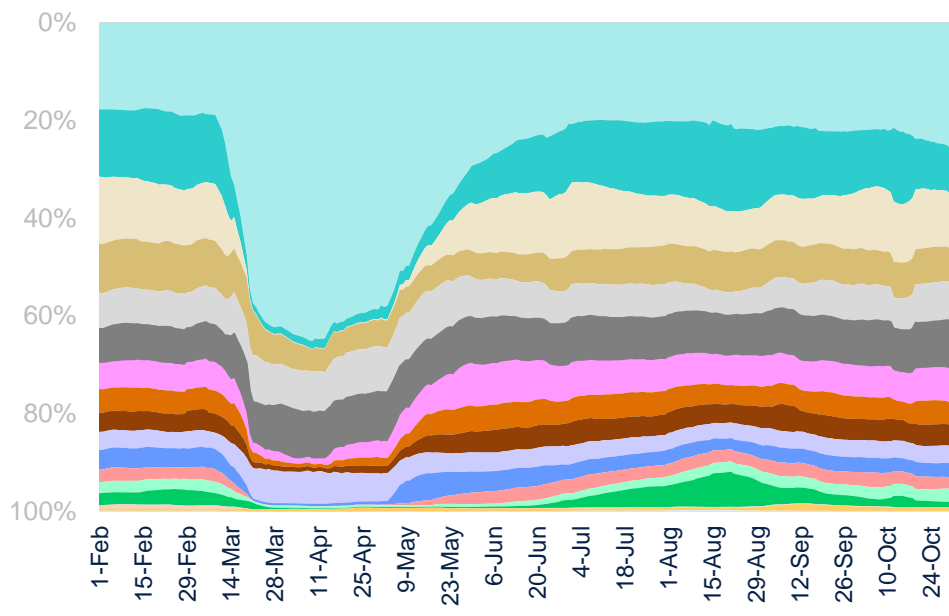
(In red, categories restricted during the lockdown)

High-Income Categories		Low-Income Categories	
Category	Corr. with Income	Category	Corr. with Income
Taxi	0.67	Gas Stations	-0.48
Sports	0.62	Supermarkets	-0.35
Beauty & Hairdressers	0.58	Car Technical Inspection	-0.35
Restaurants	0.58	Telephony	-0.26
Parking	0.53	DIY: Small Retail	-0.25
Fashion: Small Retail	0.42	Insurance	-0.25
Mid- & Long-Distance Trains	0.41	Tobacco	-0.23
Pharmacy	0.40	Auto Sales/Repair/Parts	-0.23
Travel Agency: Physical Location	0.38	Veterinary	-0.22
Bars & Coffee Shops	0.37	Miscellaneous	-0.18

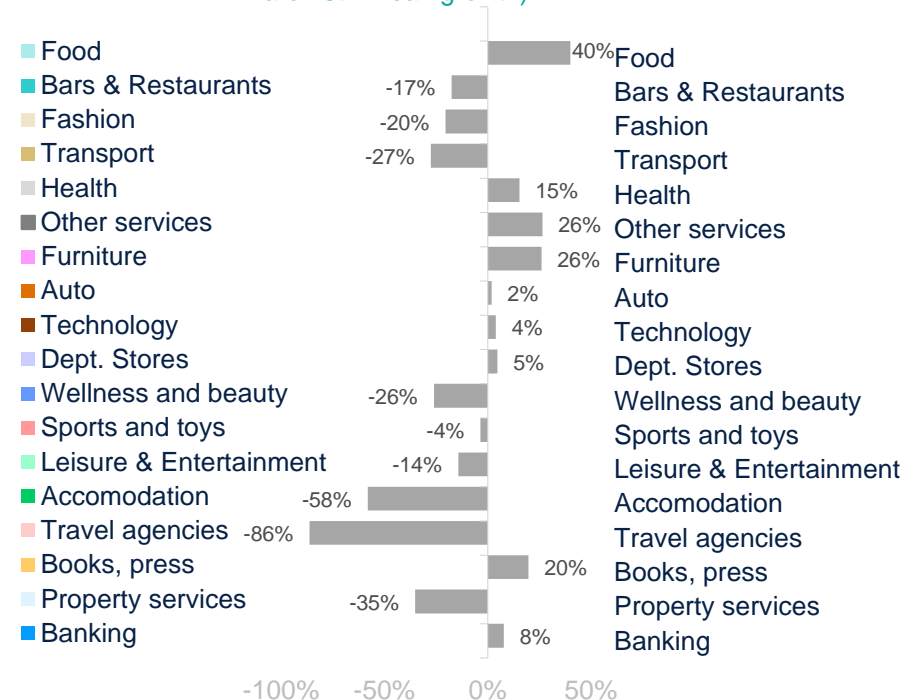
RESULTS: BBVA card data as a consumption survey- Composition of Consumption in the Lockdown

Reallocation of Consumption During COVID-19: categories

Evolution of market shares of offline spending by consumption categories
(% of total)



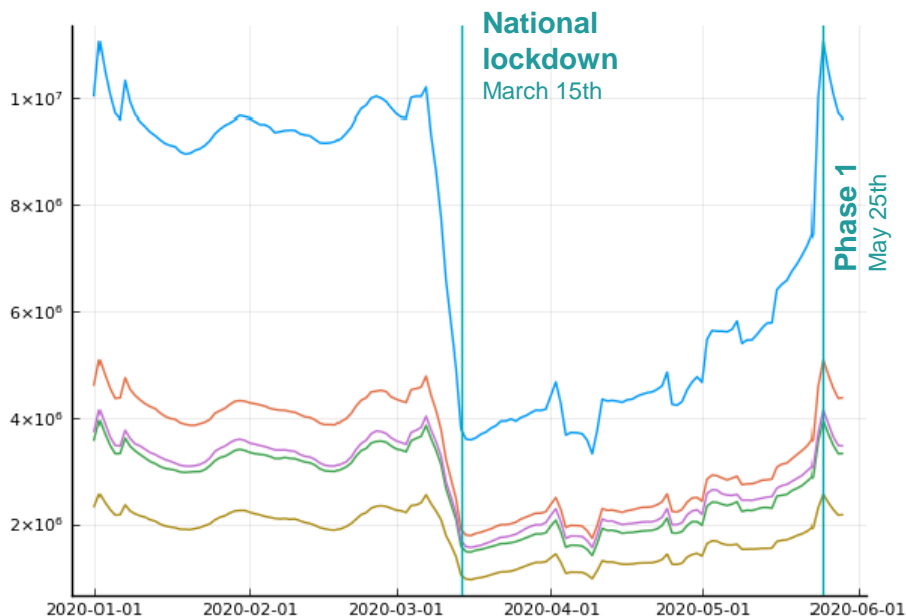
Cross sector October monthly Spanish expenditure growth (YoY, in deviation from pre-March 8th mean growth)



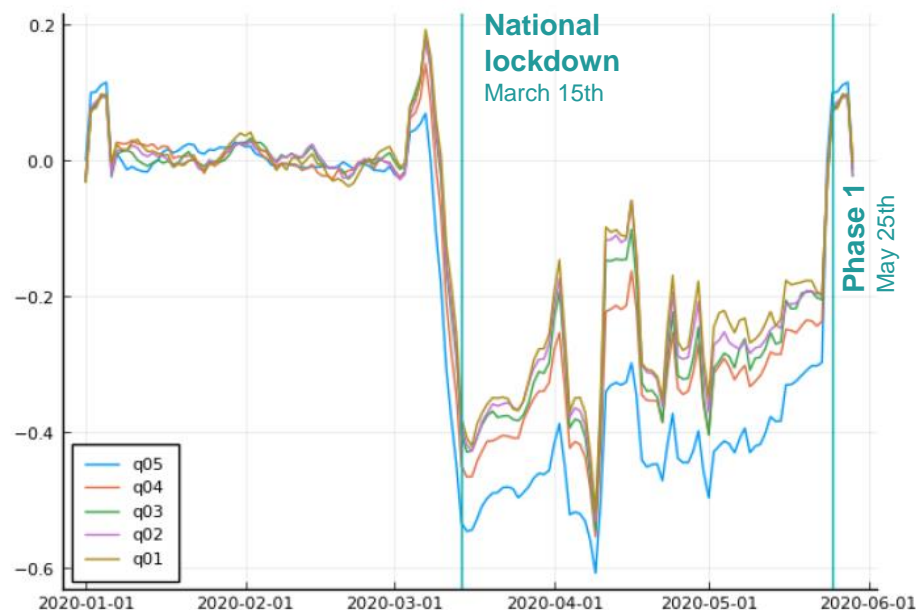
RESULTS: BBVA card data as a consumption survey- Composition of Consumption in the Lockdown

Reallocation of Consumption During COVID-19: Madrid postal codes

Evolution of daily Spanish expenditure growth in Madrid's postal codes (by postal code average income -in quintiles according to their average income per capita in 2017-, 7-day moving average)



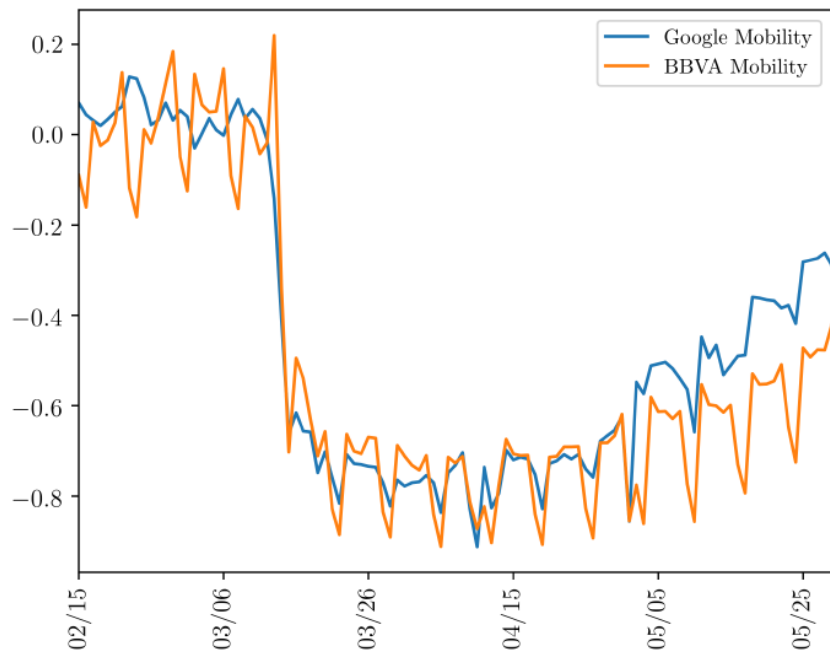
Evolution of daily Spanish expenditure growth in Madrid's postal codes (by postal code average income -in quintiles according to their average income per capita in 2017-.YoY, in deviation from pre-March 8th mean growth, 7-day moving average)



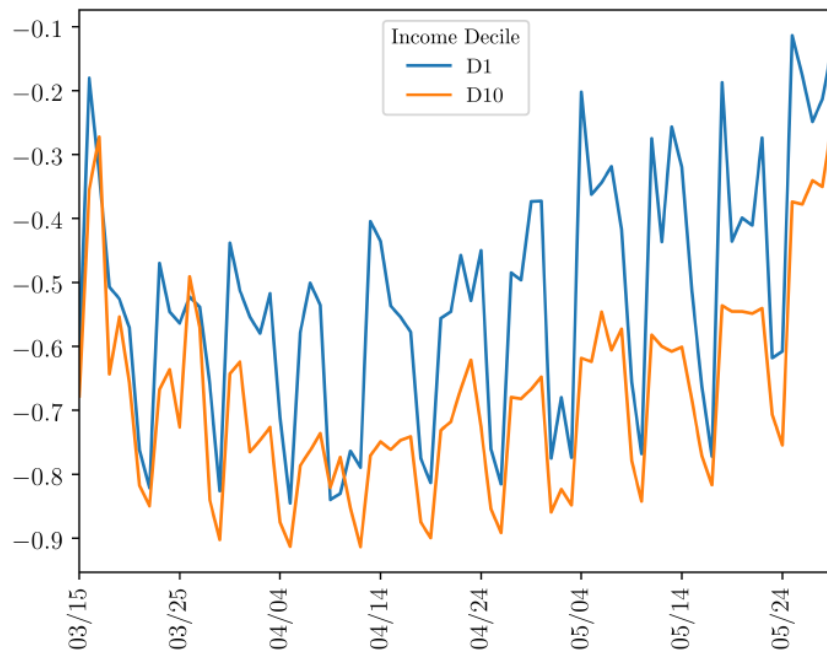
RESULTS: Transaction data as a Real Time Mobility Proxy

Card spending on transportation tracks mobility during lockdown very closely

BBVA card data spending on transportation subcategories vs Google Mobility data for Spain
(percent change)



Evolution of daily Spanish expenditure in transport in Madrid's postal codes by income decile
(percent change)



RESULTS: The infection cost of mobility

Urban Transport, Income and Disease Incidence

Daily Covid-19 incidence within postal code.

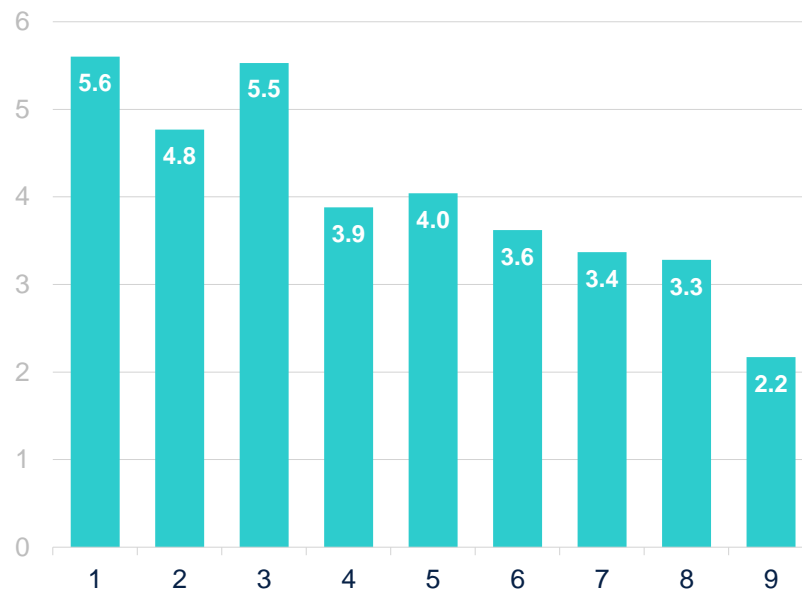
Estimated coefficients of disease model

(Standard errors in parentheses)

Daily COVID-19 incidence within Postal Code

	(1)
Lagged spending on urban transport	0.5729*** (0.008120)
lockdown	1.590*** (0.01792)
Lagged daily incidence	0.02644*** (0.0001981)
Postal Code F.E.	Y
N	26784

Percent reduction of cases in counterfactual exercise by income decile*

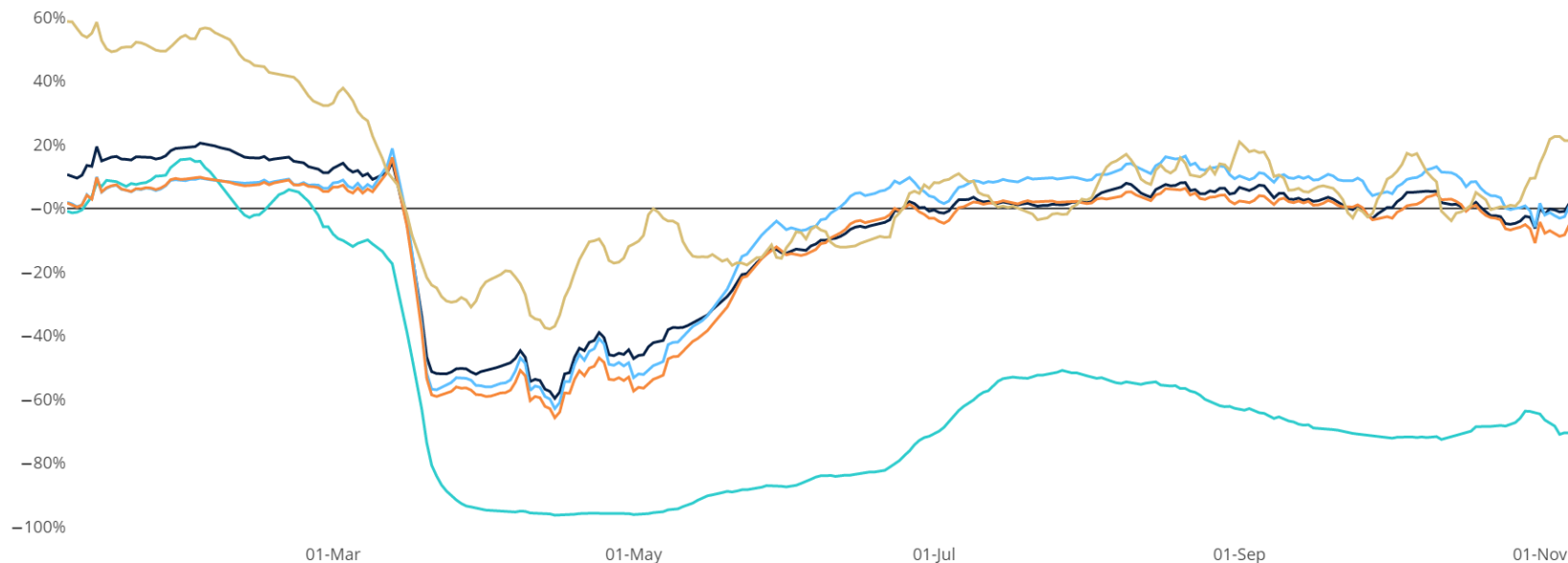


*: Counterfactual exercise in which we impose the mobility patterns of the highest-income decile of Madrid postal codes on all postal codes during lockdown. in percentage of the total cases

RESULTS: Data granularity

The impact of Covid-19 on foreign spending was much higher than on national expenditure

Spain: total average weekly expenditure by nationality and POS type (% YoY, 7D cumulative)



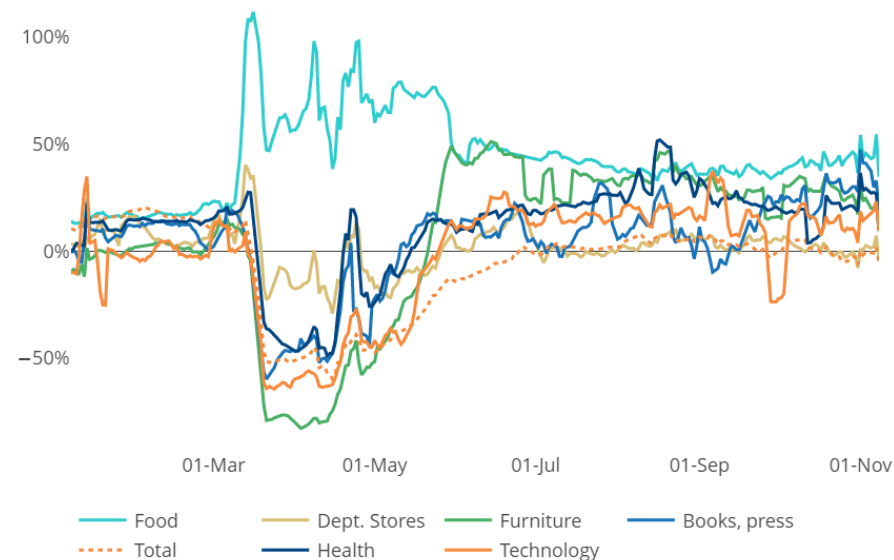
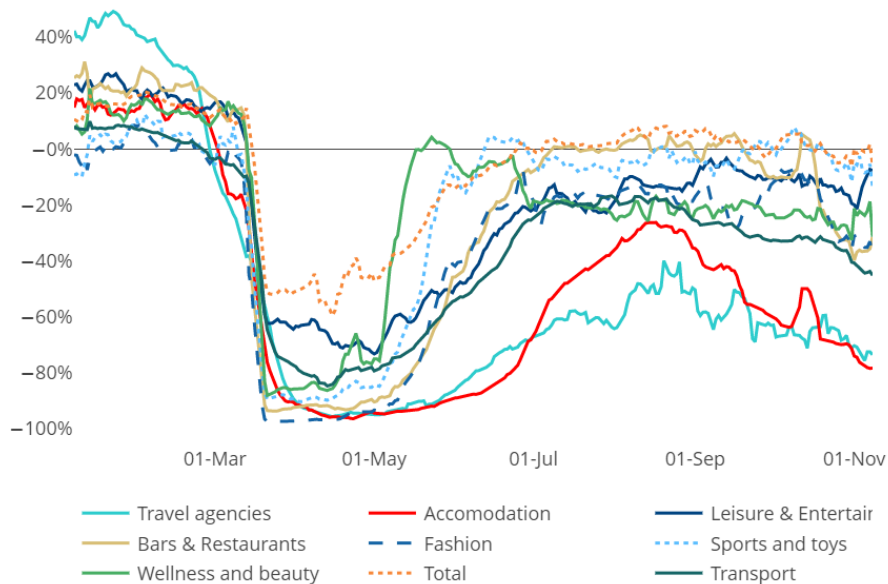
Non physical data includes online purchases, as well as purchases done by call, mobile phone using apps, by postal code or online suscriptions.

Source: BBVA Research

RESULTS: Data granularity

Tourism related sectors are the most affected ones, while others like food, health or furnitures are growing more than last year

Spain: total average weekly expenditure by sector
(% YoY, 7D cumulative)

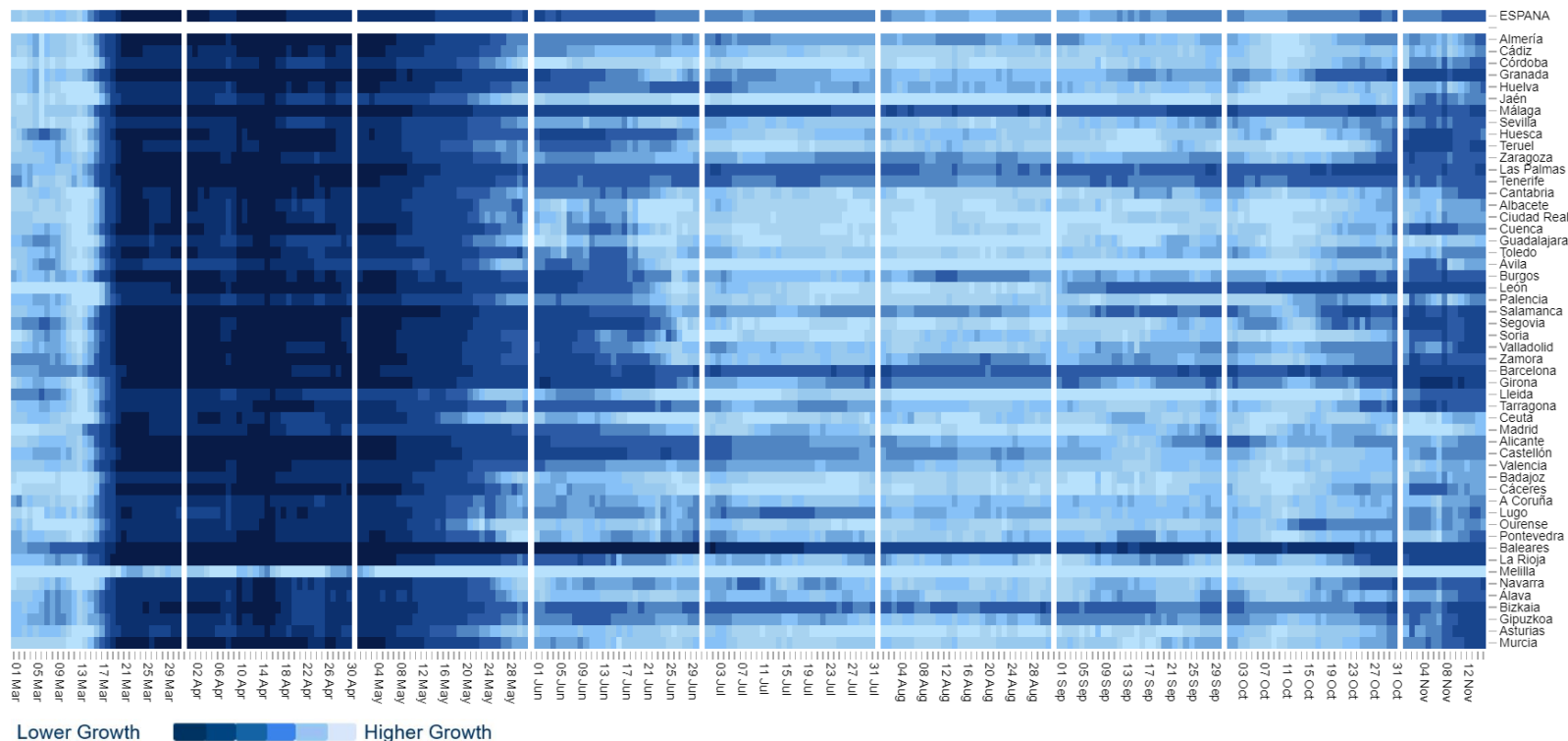


RESULTS: Data granularity

The new Covid-19 outbreak impact is different from the March/April one

Spain: total average weekly expenditure by province

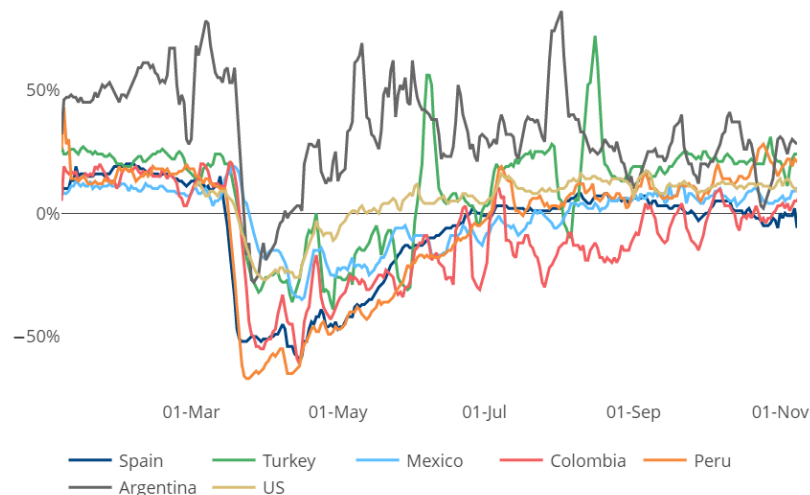
(Considering national and foreign cards and physical and online purchases. % YoY, 7D cumulative)



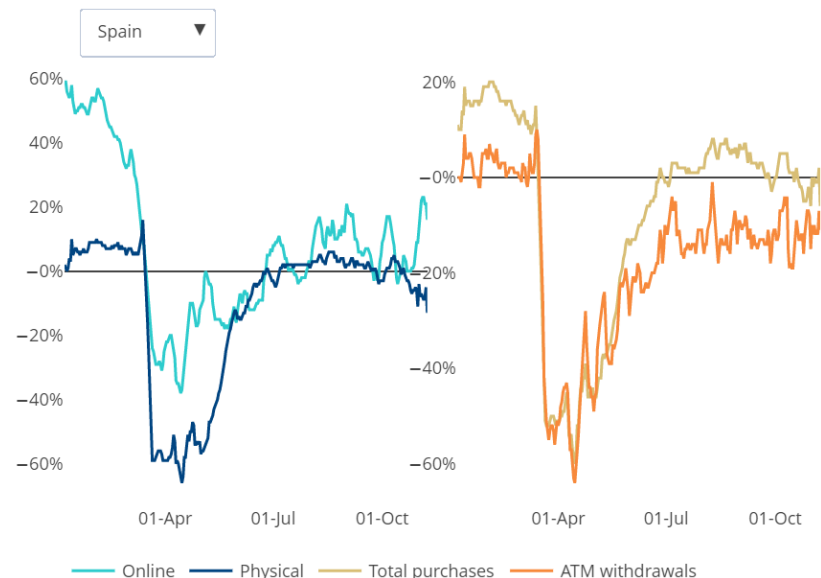
RESULTS: Data granularity

Data by country could be found in our website with interactive graphs and freely available upon request

BIG DATA COSUMPTION INDICES: TOTAL CARD COSUMPTION BY COUNTRY
(% year over year, 7D cumulative)



BIG DATA CONSUMPTION INDICES: CARD CONSUMPTION BY SECTOR INTER COUNTRIES
(% year over year, 7D cumulative)



US is proxied by US Sunbelt. Spending at BBVA POS by BBVA and non-BBVA customers plus spending by BBVA customers at non-BBVA Reference for the methodology can be found in the publication "Tracking the COVID-19 Crisis with High-Resolution Transaction Data" and POS. This data considers final expenditures, so not intermediate consumption is included. Therefore, the correspondence with national the weekly publications "The COVID-19 impact on Consumption in Real Time and High Definition". accounts household consumption is not fully equivalent. Reference for the methodology can be found in the publication "Tracking the COVID-19 Crisis with High-Resolution Transaction Data" and the weekly publications "The COVID-19 impact on Consumption in Real Time and High Definition".

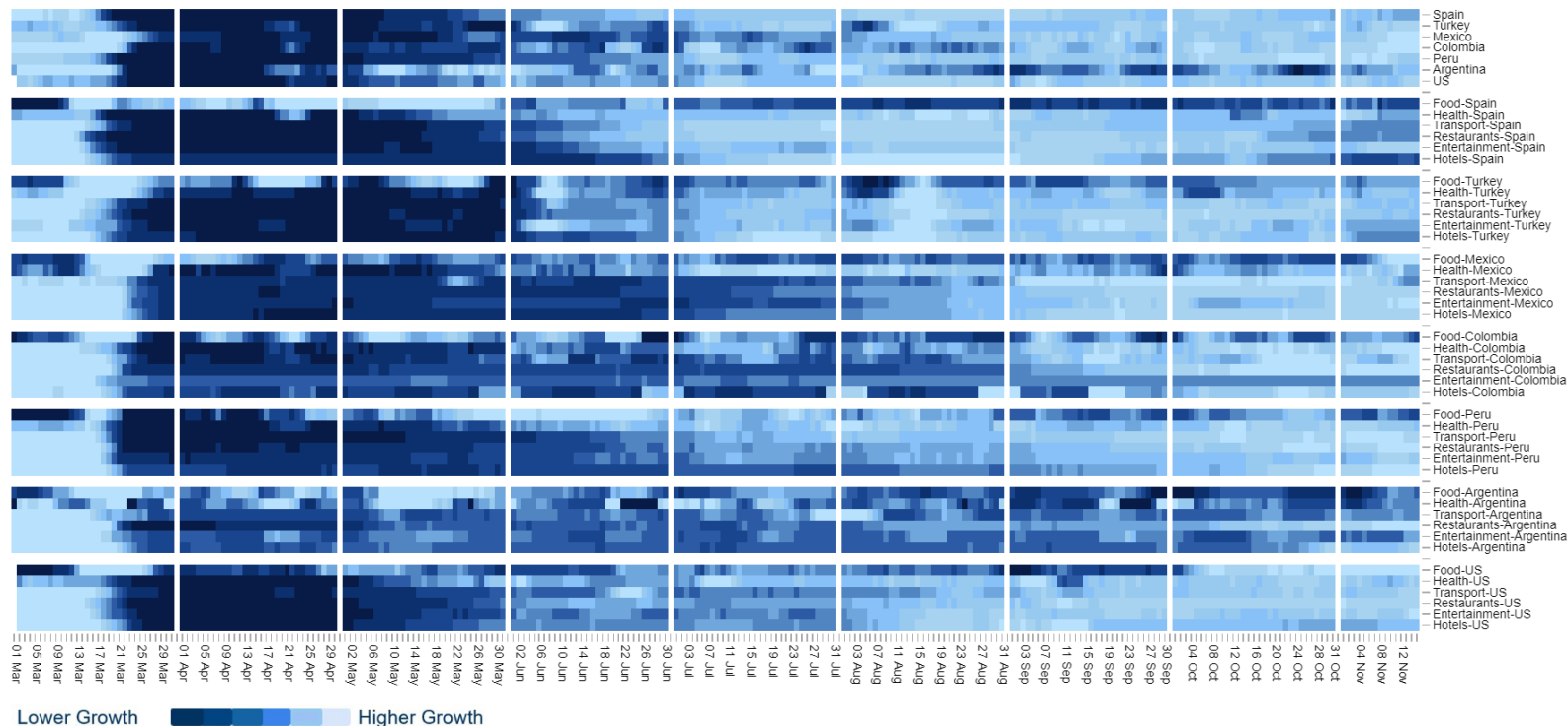
Daily indicators are provided on our website with weekly updates

See [Carvalho et al \(2020\)](#) for further detail

RESULTS: Data granularity

Consumption dynamics showed the recovery during the summer in most of the countries

(% YoY, 7D cumulative)



*Proxied by USA Sunbelt. Source: BBVA Research.

Series are coloured according to the history of each series since March 20 until the end of the series. The darker blue represents the lower 90th percentile and the lighter one represents the upper 10th percentile.

RESULTS

Main takeaways

Transaction data can be used to assess economic conditions, capturing relevant patterns in spending in near-real time and high-definition



Transaction data has proved to be useful to **track the economy** and exploit **time series**, **cross-sectional** and **geographical** dimensions.

Useful data for policy-makers and researchers **specially in a middle-income and developing countries**



Tracking the COVID-19 crisis

Expenditure adjustments during the pandemic.

Sharp decline in expenditure as a response to the **lockdown**

Fast recovery during the progressive **easing** (V shape)

Large **reallocation** across expenditure **categories** and **income groups**



Detailed transaction data on **transportation and commuting spending** can be used to explain **disease incidence** at the local level – **Madrid postal codes**

Differential mobility (to work) induced unequal **disease outcomes** across income groups

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www.bbvarresearch.com



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Thank you!

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