

Economic Stability and Measurement

New techniques for gathering and analyzing information for monitoring financial and price stability

Roberto Rigobon

MIT Sloan, NBER

Agenda

- Changes in
 - Consumer engagement
 - Data generation
- Economic Measurement
 - Problems
 - Pillars of new measurements

Changes in Consumer Engagement

- The way consumers interact in virtual world
 - Information and Price comparison
 - Loyalty (lack of)
 - Personal goods and services (nano-services)
 - Information Sharing

Two very large changes in pricing behavior...

- Traditional
 - Product Attribute based
 - Value on Price obfuscation
 - Brick and Mortar stores
- Platform
 - Robo-Pricing pricing
 - Value on Data Organization
 - Amazon, Walmart, and Wayfair
 - Typically advertise a pricing strategy
- Quantum Prices
 - Price Clustering pricing
 - Value on Price Discrimination
 - Zara, H&M, Apple, and Ikea
 - Typically advertise prices

Paradigm in the organization of the data

- Start of Surveys?

- 1400 BC Egypt middle kingdom

- The Egyptians first used it to accurately divide land into plots for the purpose of taxation.

- 120 BC

- Greeks standardized procedures for conducting surveys.

- 1 AC

- Herod survey in Judea – First evil and questionably manipulated survey of population

- Very useful Paradigm

- Geography

- Socio-Economic Conditions

Netflix?

- Instead of approximating preferences, lets measure preferences



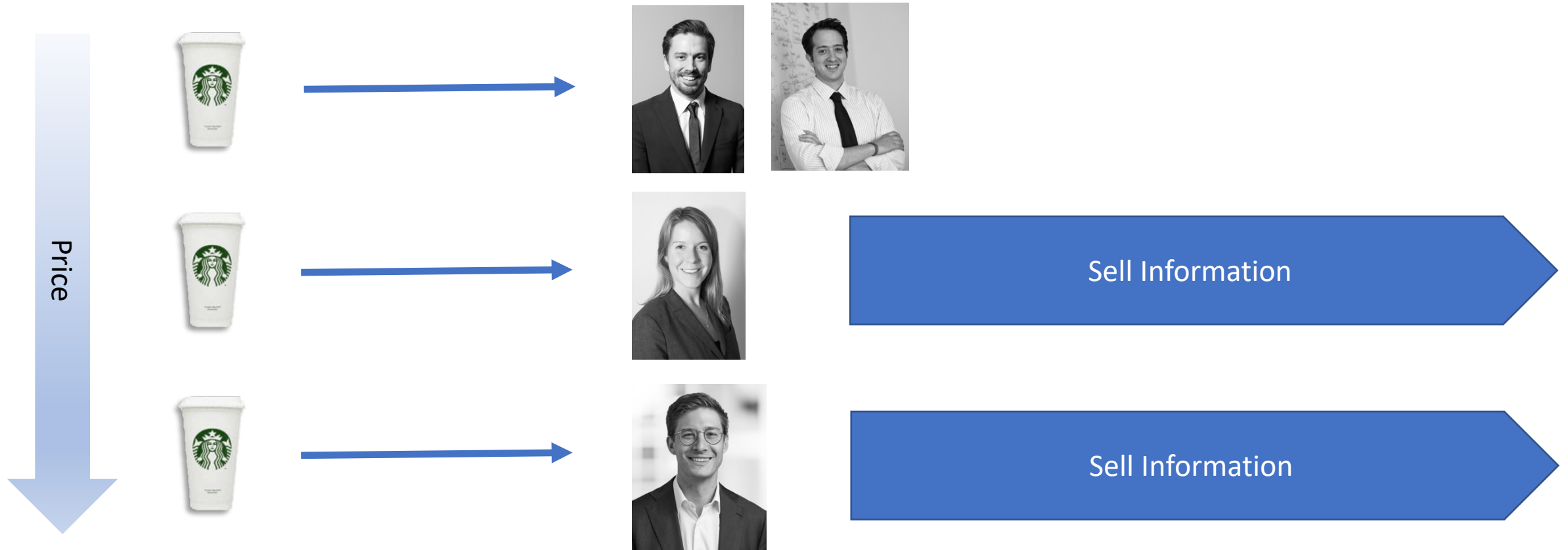
- People that like these movies might be very different in terms of geography and economic conditions

Netflix: Change in preferences



Bundle Products

- Sell the Soda to whom?

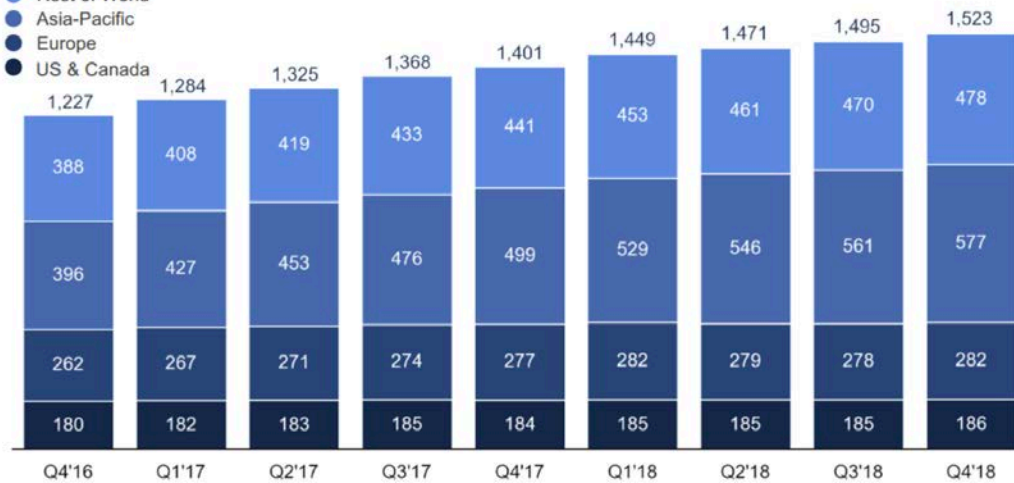


Facebook

Daily Active Users (DAUs)

In Millions

- Rest of World
- Asia-Pacific
- Europe
- US & Canada



DAUs / MAUs

Quarter	Q4'16	Q1'17	Q2'17	Q3'17	Q4'17	Q1'18	Q2'18	Q3'18	Q4'18
DAUs / MAUs	66%	66%	66%	66%	66%	66%	66%	66%	66%

Advertising Revenue by User Geography

In Millions

- Rest of World
- Asia-Pacific
- Europe
- US & Canada

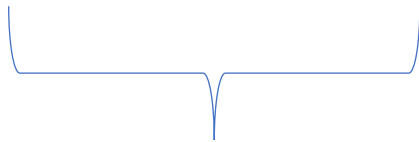


Revenue by user geography is geographically apportioned based on our estimation of the geographic location of our users when they perform a revenue-generating activity. This allocation differs from our revenue disaggregated by geography disclosure in our condensed consolidated financial statements where revenue is disaggregated by geography based on the billing address of our customer.

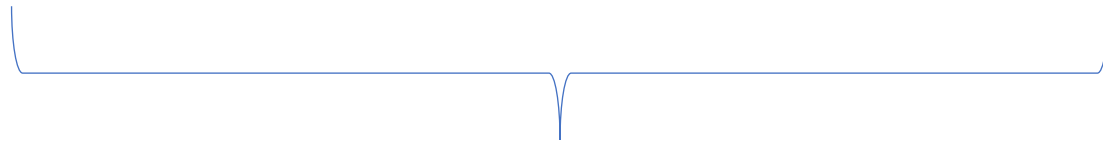
facebook

Facebook Profits

- Profits from:



Inflation depends
on these prices



Inflation does not
include the value
of information

All goods, services and measures are affected

FOOD FOR THOUGHT

No Cash Needed At This Cafe. Students Pay The Tab With Their Personal Data

September 29, 2018 · 7:37 AM ET

CHAIEL SCHAFFEL

FROM The Public's Radio 89.3FM



At Shiru Cafe in Providence, R.I., students "pay" for coffee, but not with money.

Chaiel Schaffel / Rhode Island Public Radio

Inflation?

GDP?

Productivity?

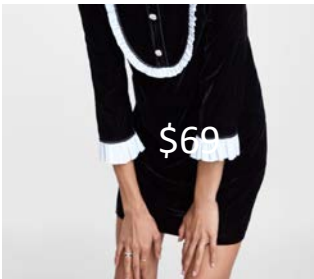
Quantum Prices

Diego Aparicio
Roberto Rigobon

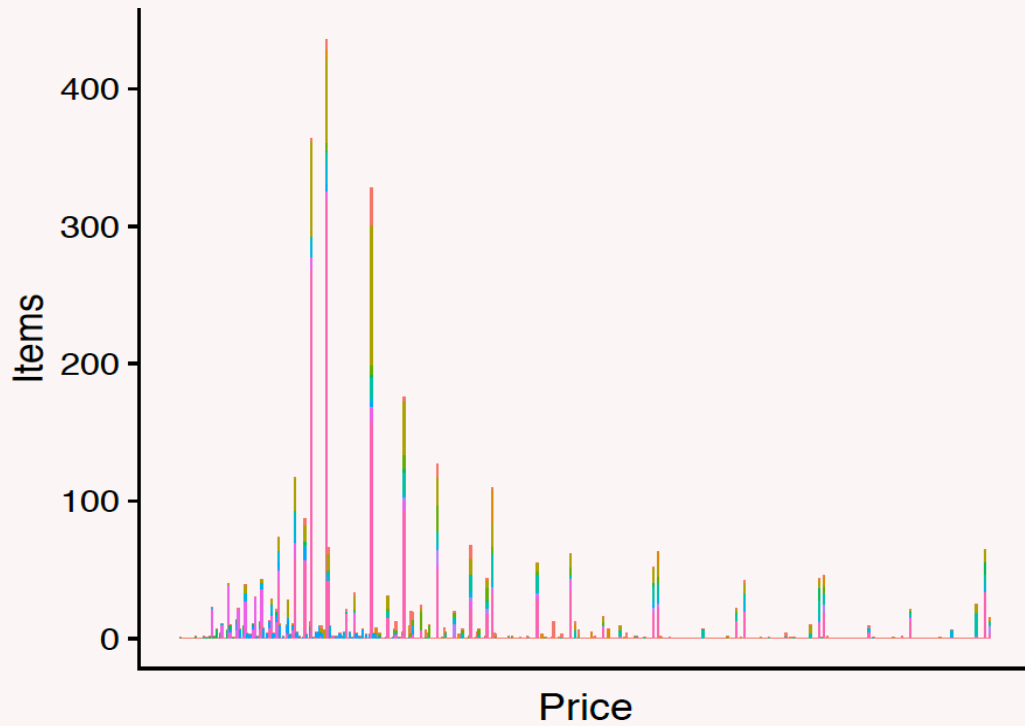
UNIQLO



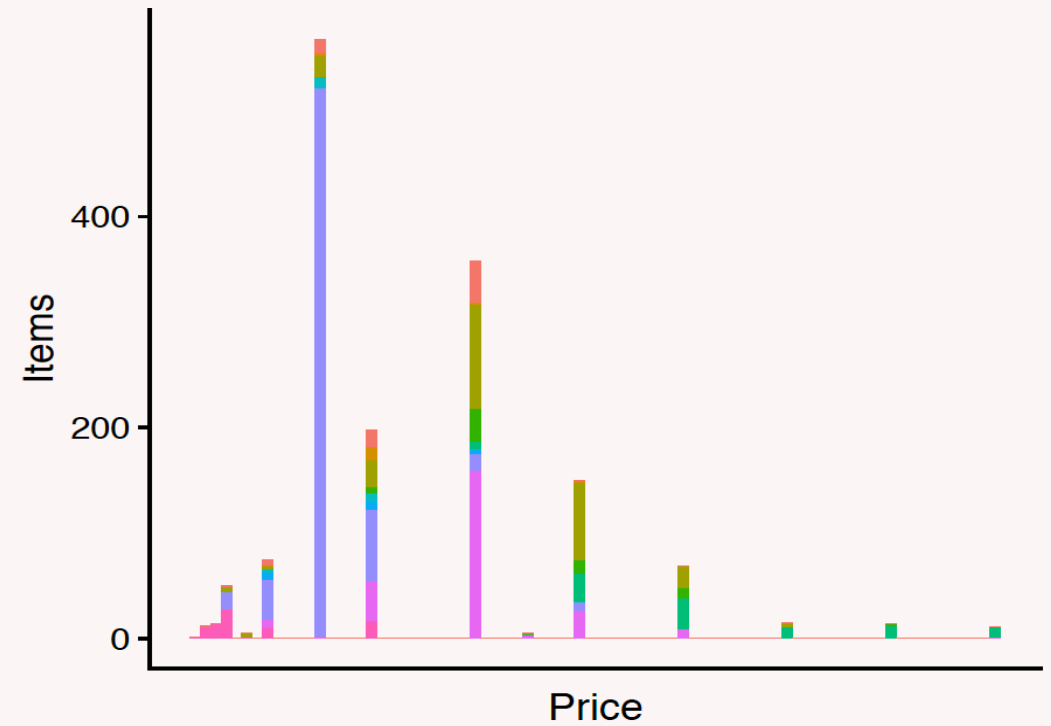
ZARA



Price Clustering

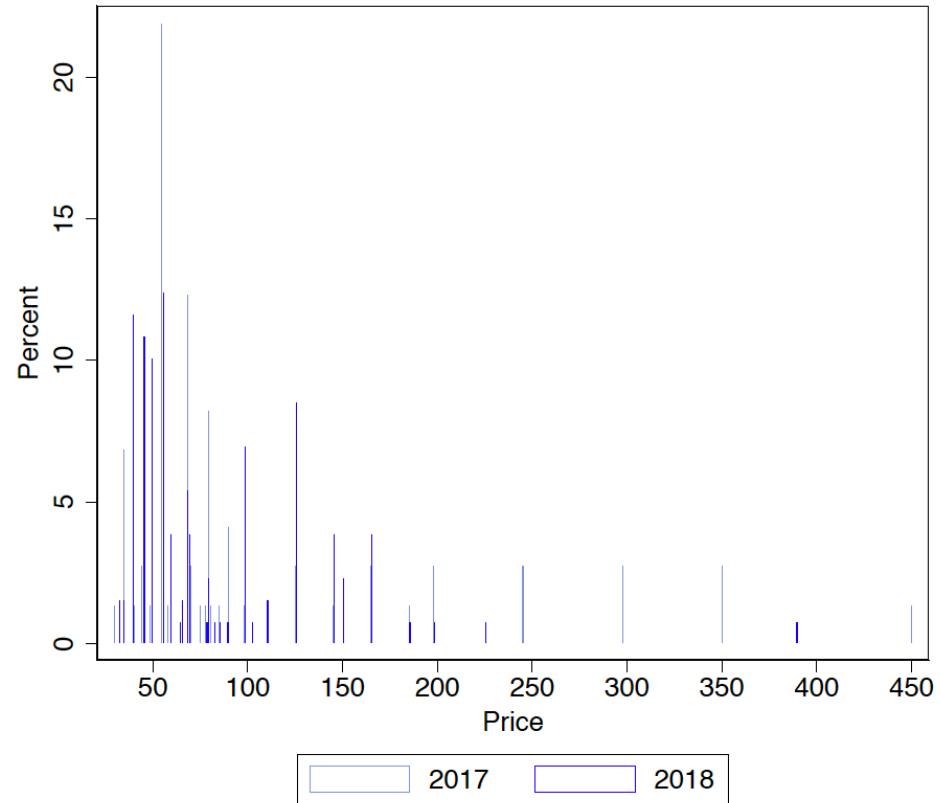


Ralph Lauren

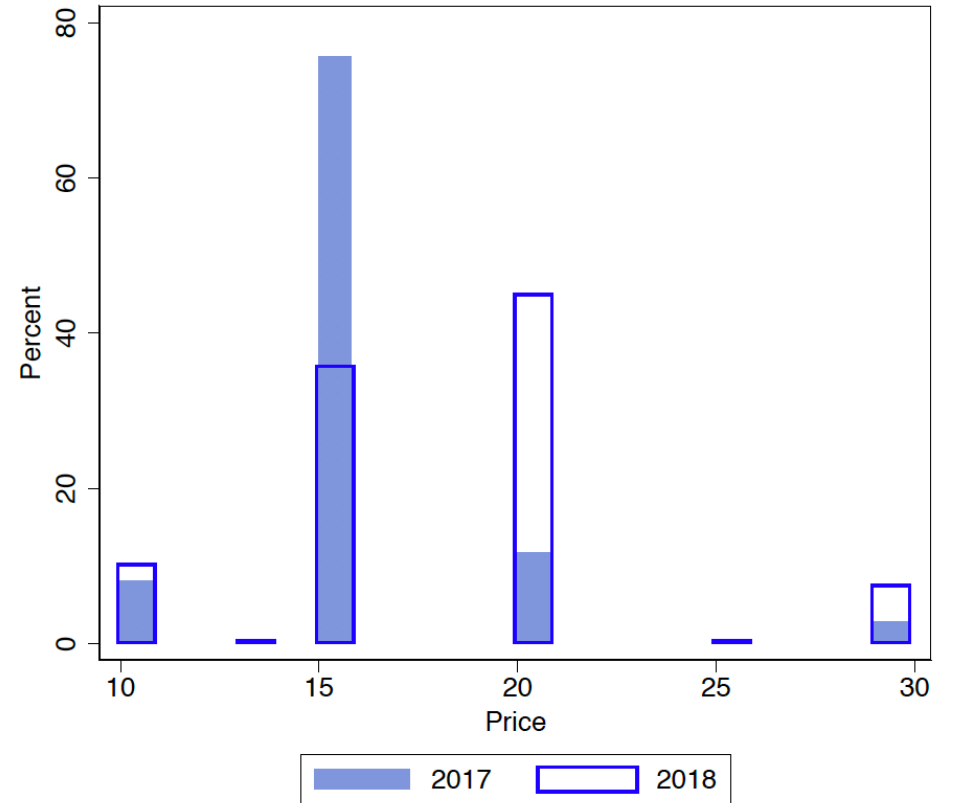


Uniqlo

Inflation Dynamics



Ralph Lauren



Uniqlo

Data generation processes and Data gathering

- New sources of data
 - Digital documentation of transactions with a service or manufacturing process
 - Credit card transaction, retail sales scanner data
 - Data from social network communication
 - Facebook, Twitter, Instagram
 - Data transmitted from software agents within mobile devices
 - GPS
 - Data from the internet of things
 - e-commerce: Web pages, price aggregators
 - Utility meter data, sensor data for traffic, air, water, soil quality
 - Biometric data
 - DNA
 - Human communication digital data
 - Emails, blogs, text
 - Digital video data

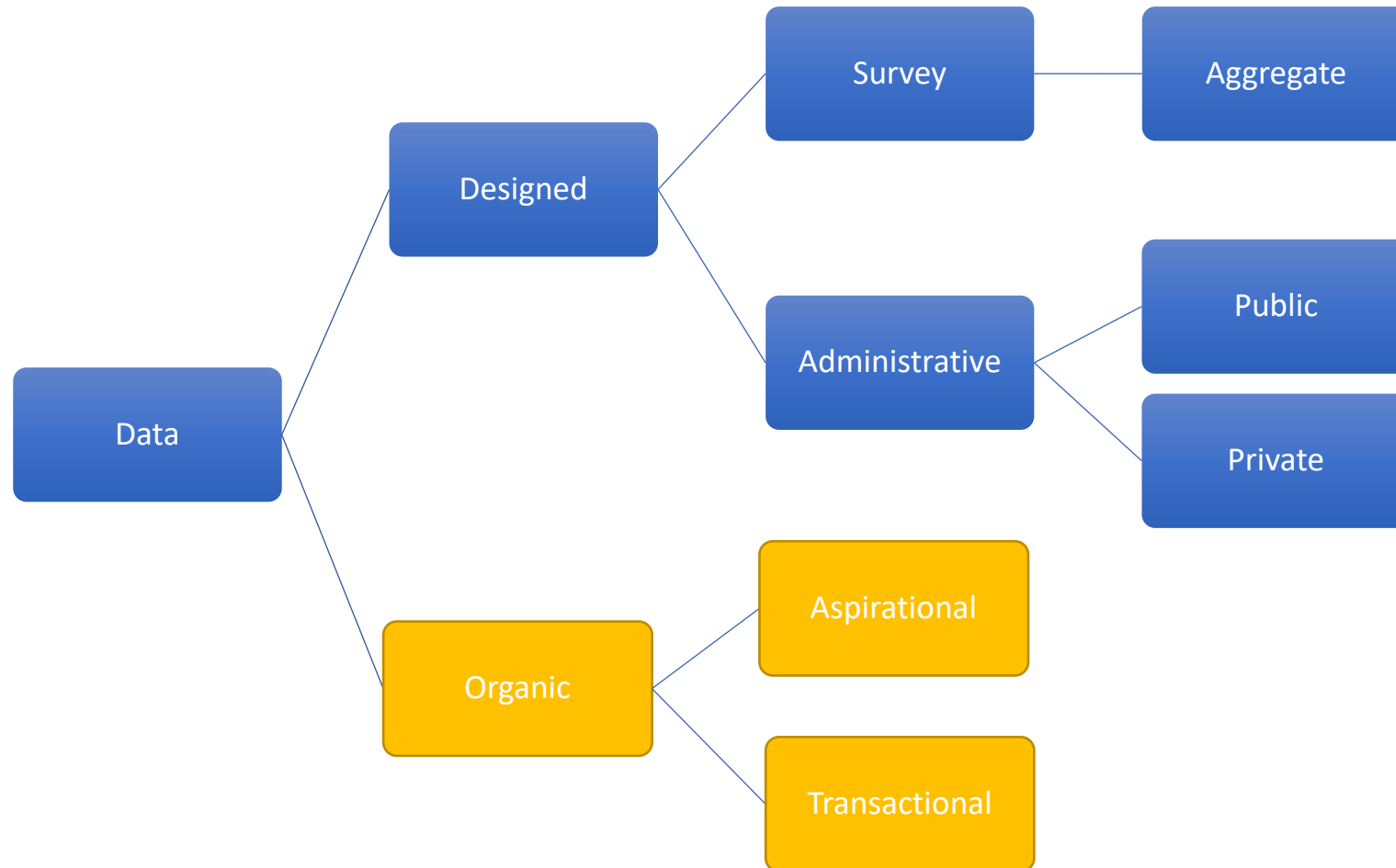
Evolution in Data Sources

	Surveys	Administrative	Big Data
Objective	Predetermined Question	Internal Performance Evaluation	<ul style="list-style-type: none"> Activity Documentation Individual Characterization Blending
Data	<ul style="list-style-type: none"> Targeted Data Structured 	<ul style="list-style-type: none"> Non-targeted Structured 	<ul style="list-style-type: none"> Non-targeted Non-structured
Relevance	Representative	Somewhat Representative	Not Representative
Curation	Well studied	Well studied	Not clear
Cost	Extremely Costly	Costly	Cheap
Privacy	Protected in the design	Sensitivity embedded in the data itself	Sensitivity from the inferences that can be made from the data
Intrusiveness	Extremely intrusive	Intrusive	Non-intrusive

Design

Organic

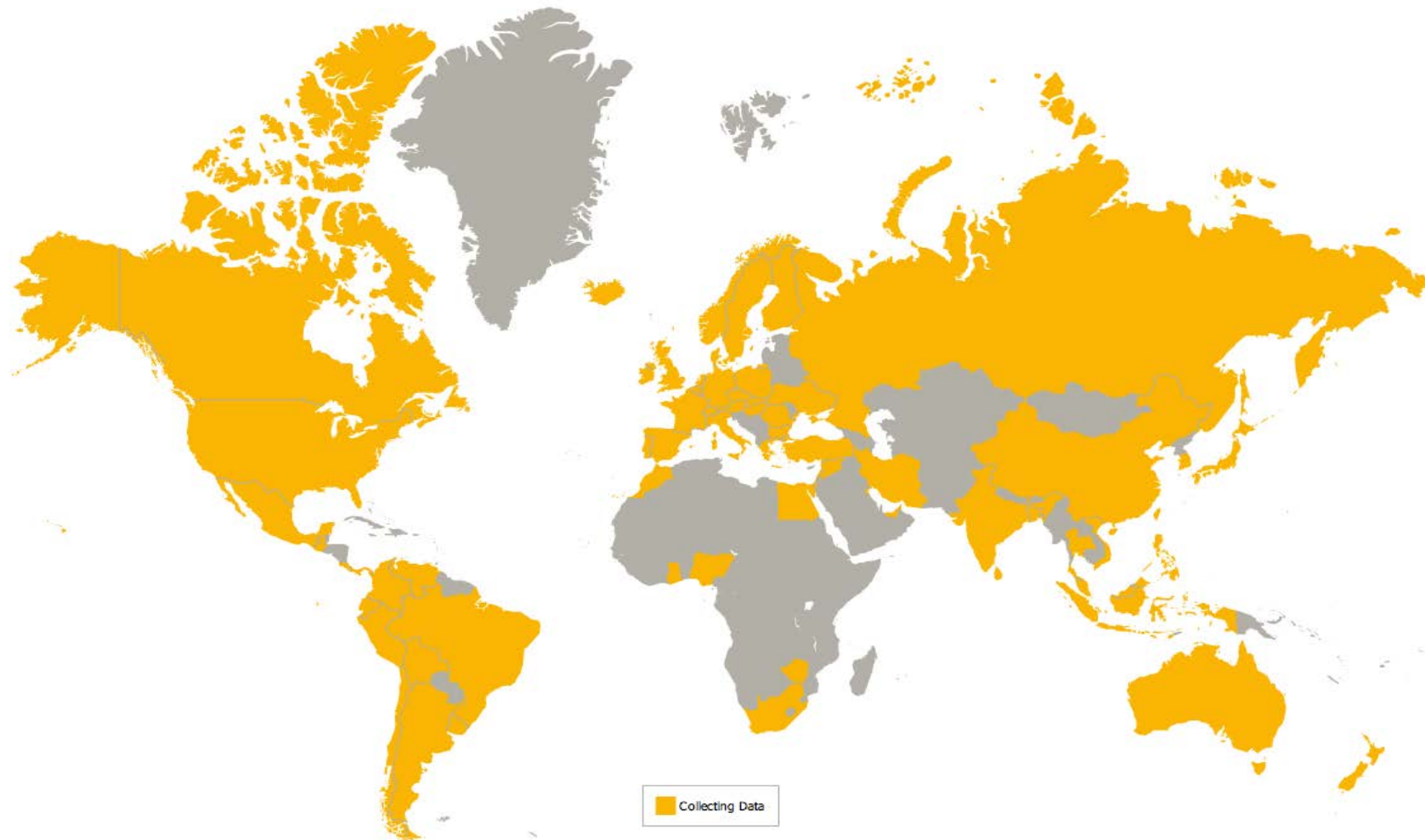
Different Types of Data



Billion Prices Project

Everything with Alberto Cavallo

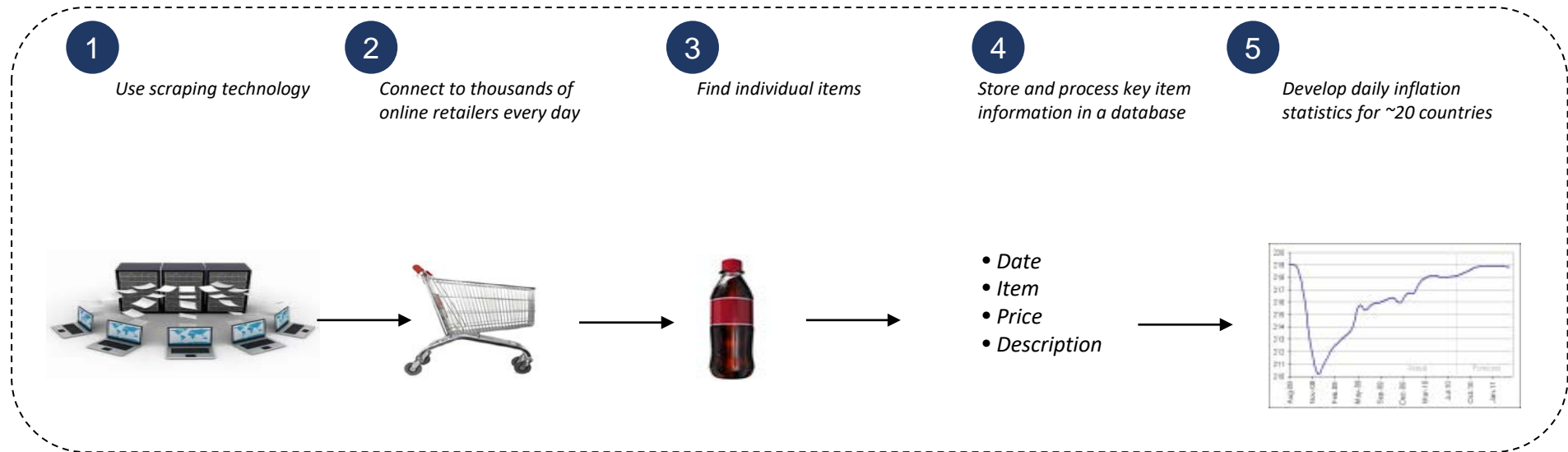
BPP: Countries covered



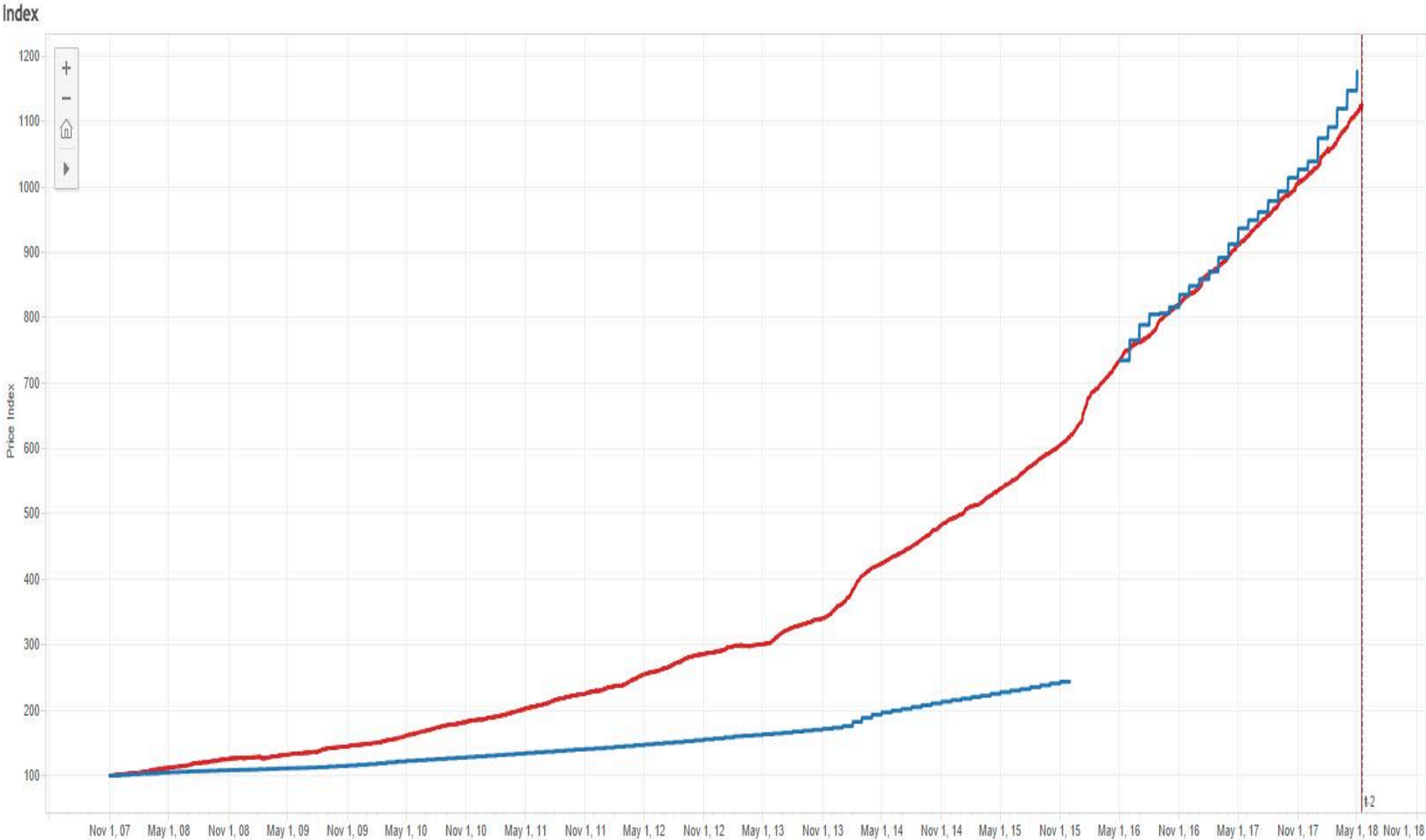
Billion Prices Project

Online Information and Indexes

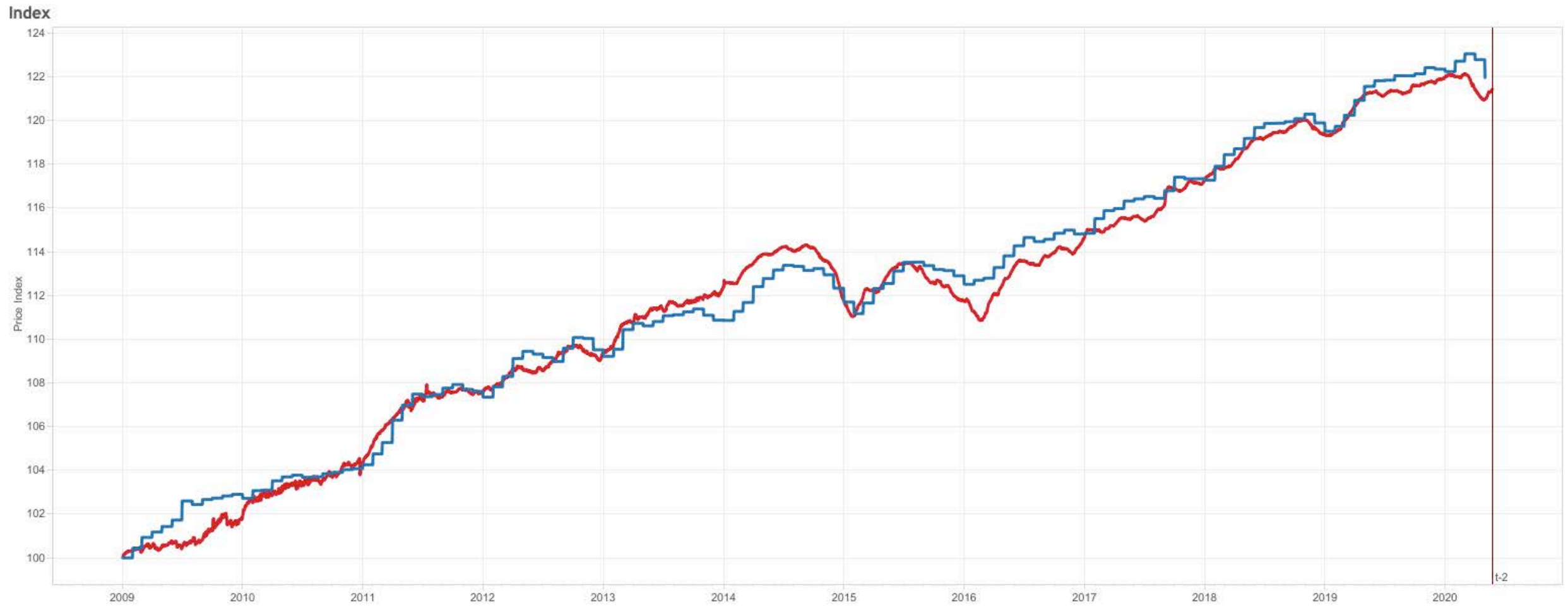
Our Approach to Daily Inflation Statistics



Argentina



USA

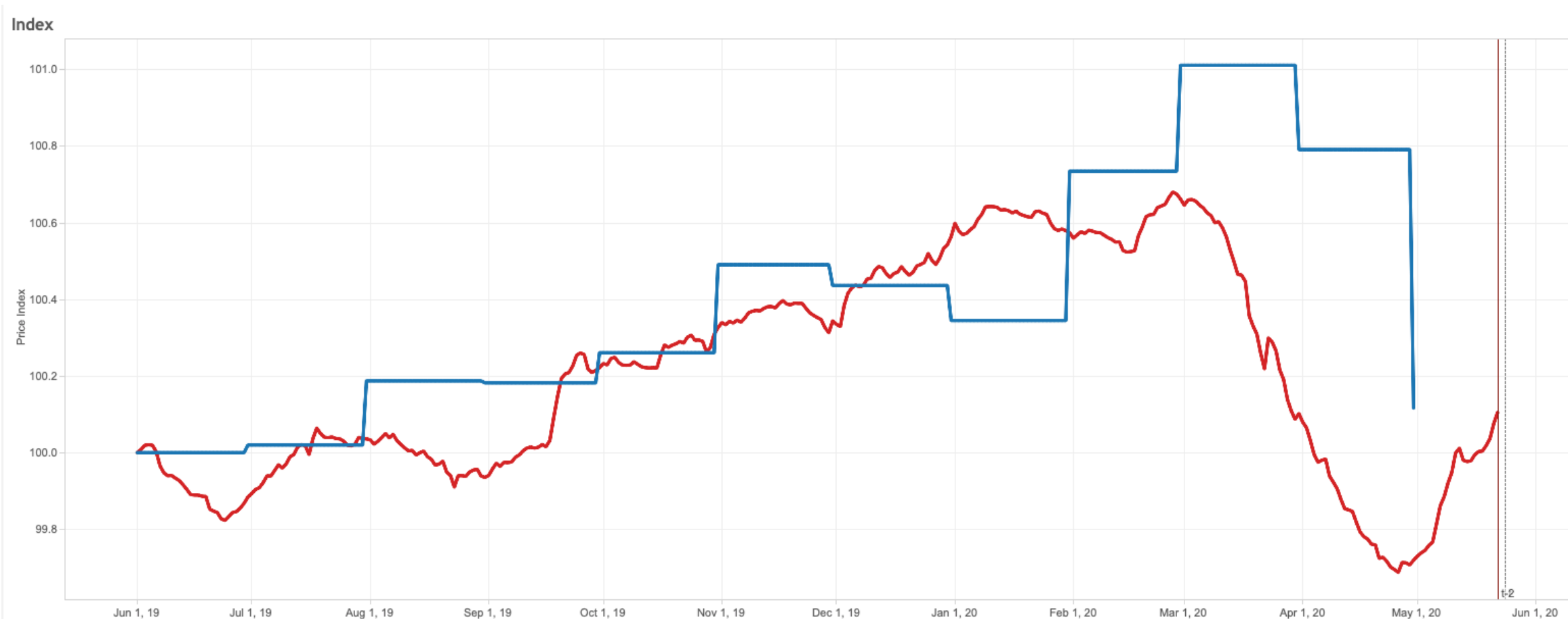


Making Sense of COVID-19's economic cost

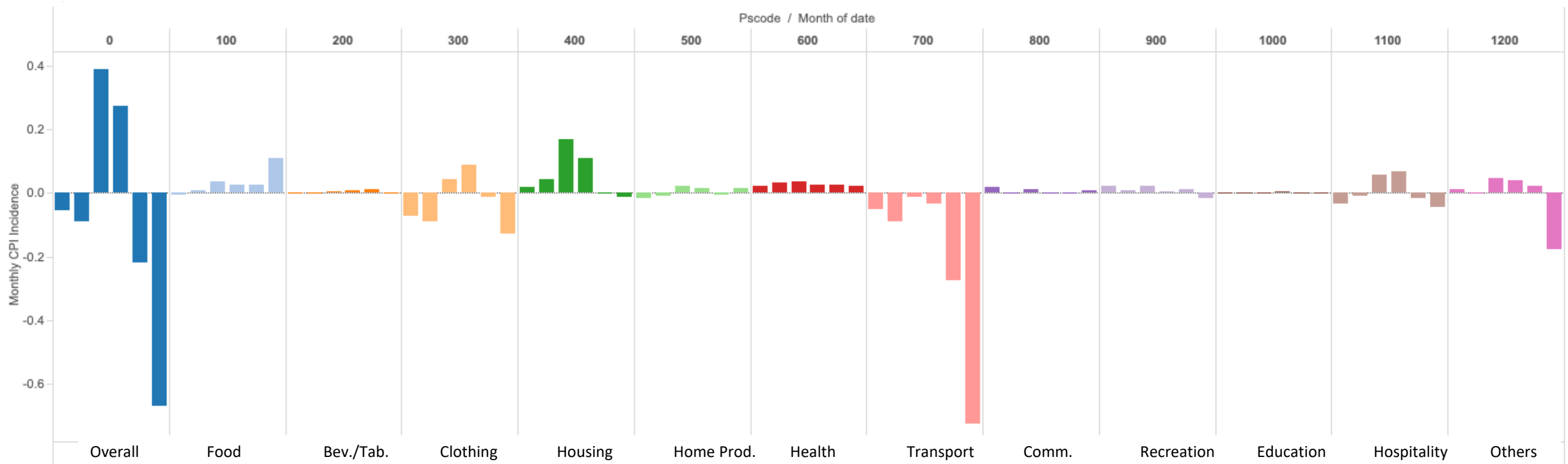
- Impact on
 - Unemployment
 - Wages
 - GDP
 - Inflation
- Massive changes in consumption and production patterns.
 - Are we ready to measure those correctly?
 - How long will the supply shock effects last?

Making Sense of COVID-19's economic cost

- Inflation



Massive changes in relative prices



What is the actual inflation?

- Expenditures share that have gone up
 - Food
 - Housing
 - Home entertainment
 - Home electronic equipment
- Expenditures that have gone down
 - Travel and Hospitality
 - Transportation
 - Entertainment (out of home)

Making decisions

- This is about inflation!
 - One of the best statistics we produce
- Can you imagine our level of ignorance regarding
 - GDP?
 - or household stress?
 - or discrimination and inequality?
 - or the number of people diagnosed with COVID?

Pillars of modern measures

1. Continuous Measurement of process
 - Timely measures
2. Non-intrusive
 - Can't rely on surveys – needs electronic forms of data collection
3. Open source
 - Many could adopt the methodologies
4. Privacy protecting
 - Violations of privacy can be significantly harmful, especially when estimating hidden behavior that is morally questionable
5. Imperfect Measurement
 - To guarantee the previous 4 characteristics the measures need to be noisy.