

The use of Big Data at BBVA Research

to better understand the society, the economy and the world

Structured Products & Digitalization in Private Banking

Geneva, Bloomberg Office January 2020



Index

- 01 Opportunities in the digital era. Big Data at BBVA Research
- 02 Geopolitics, Trade and Spill overs
- 03 Economic & Risk indicators in Real Time
- 04 Text Mining and Sentiment analysis

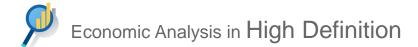


01

Opportunities in the digital era. Big Data at BBVA Research

New sources of data provide a better, "Real Time" and "High Definition" analysis for our clients...







The use of **Big Data** and **Data science** techniques allows us to quantify these trends.

... and also exploiting non traditional data to better understand political, social and geopolitical challenges



Geopolitical events



Political events and Social reaction



Natural disasters and epidemics

New data may end up changing the way in which we approach empirical questions and the tools they use to answer them.

Text as Numbers: a key source of information to enrich analysis



of the total amount of web pages on the internet is given textual or unstructured data



Text
mining to
extract meaning
from strings
of letters



The potential use of textual information and text sources improves the understanding of the social, economic and financial systems

It helps us to comprehend what drives agent's economic expectations, policy decisions, measures of uncertainty, ...

New framework in the digital era



Availability of new types of datasets (including text)



> Combination of historical data with real time data



Advanced data science techniques and algorithms



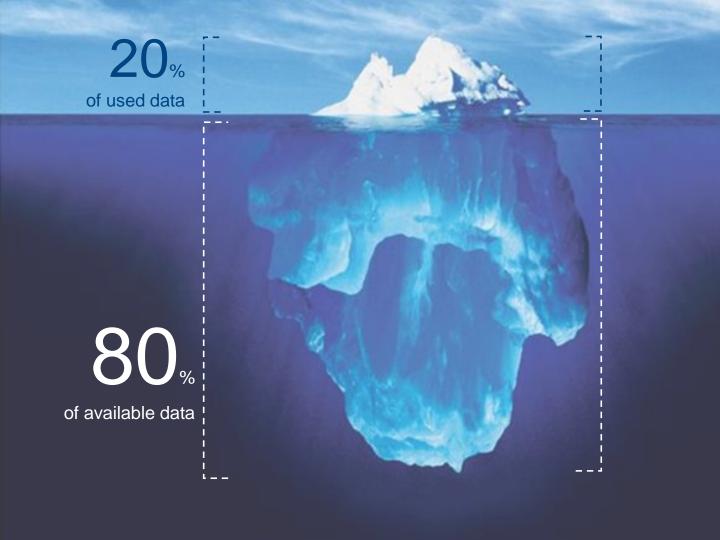
New answers to old questions



Better, faster infrastructure higher computational abilities



Especially useful in countries where lower data availability



Google Data Studio

Research

Our working process

BBVAGoogle DATIO I amazon REDSHIFT

Databases SaaS **Analysis Visualization GDELT BigQuery** Clean, Fuse, visualize **BBVA** data and Aggregate Google search transform and & analyze **Amazon** Web Redshift model the data the data GDELT BBVA Google BigQuery **G**Gephi CARTO

Technology provides us new opportunities to analyze massive data on real time and high definition coming from new sources

Massive Flows of New Data

On Real

High Definition

New Sources: Texts & Images

Political, Geopolitical Social Indexes (Political Index)



To elaborate Political, Social & geopolitical Indexes...

Geographical Analysis Housing Prices (sentiment on Housing Prices)



... analyze with high granularity the transmission of shocks...

Politics & Financial Networks (Political Netwoks)



...Build Networks to understand the interaction between agents...

Monetary & Stability tones by Central Banks (sentiment Analysis on Central Bank texts)



... Use Text as Numbers to interpret sentiment in policy docs...

Measuring Sentiments, Narratives on News (sentiment Analysis on Economy and Society News)



... disentangle "Information Bias" between what we read and reality

Mix Hard data & Sentiment & VAR models (Vulnerability and Risks Index Models)



... build hybrid models including hard and sentiment data to ...



02

News & Narratives:
News & Networks
for Economics,
Political and
Geopolitical analysis

News as a new source of information. What is GDELT?

Global Database on Events Location and Tone

Average tone =
$$\frac{\sum Positive \ words - \sum Negative \ words}{\sum Total \ words}$$



Global Content Analysis Measures (GCAM)

40 different **sentiment dictionaries** to capture more than **2300 emotions and dimensions** with a value score

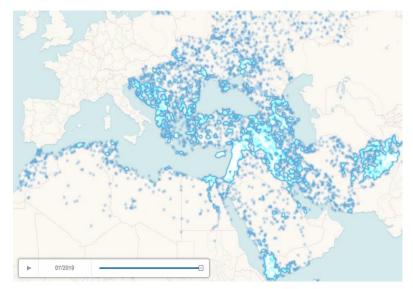
GDELT allow us Tracking Geopolitics on real time...

Is useful to identify the main hot spots and potential spillovers

CONFLICT INTENSITY MAP 2017-19

(NUMBER OF CONFLICTS/ TOTAL EVENTS)

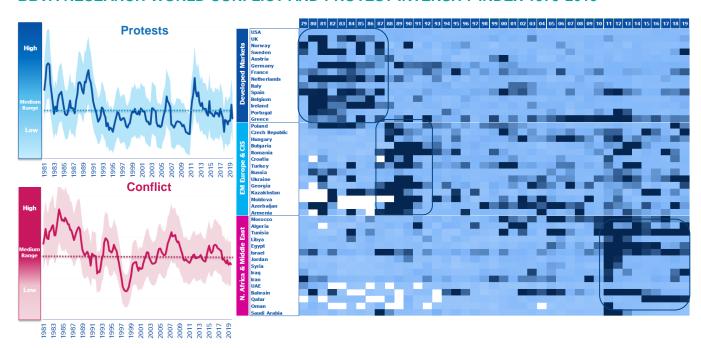






...and also from an historical perspective...

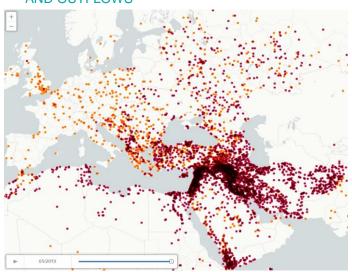
BBVA RESEARCH WORLD CONFLICT AND PROTEST INTENSITY INDEX 1979-2019



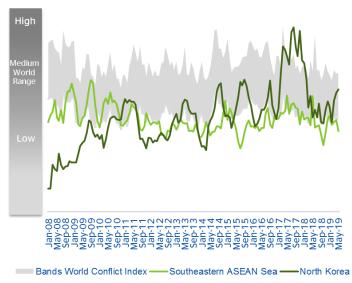
...to the current "hot" spots...

BBVA RESEARCH REFUGEES FLOWS MAP IN 2015-19

MEDIA CITATIONS ABOUT REFUGEES' INFLOWS AND OUTFLOWS



BBVA RESEARCH ASIA CONFLICT INTENSITY INDEX 2008-19



... in "high definition"

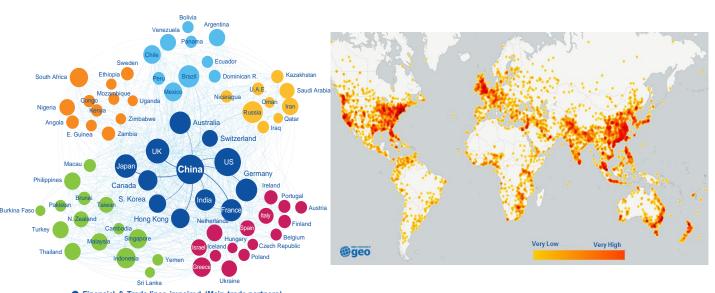
SOCIAL UNREST EVENTS ACROSS THE WORLD: CAIRO, ISTANBUL AND HONG KONG CASES

PROTEST EVENTS



Exploring spillover effects: from the China's links with the rest of the world...

CHINESE SLOWDOWN: THE COUNTRY NETWORK AND THE MEDIA PERCEPTION

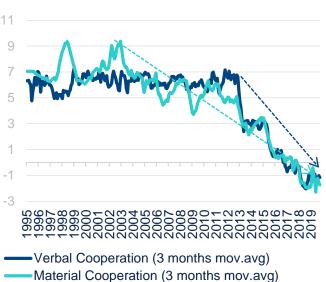


- Financial & Trade lines impaired (Main trade partners)
- Impact on commodity Exporters from Latam
- Conversation on Oil demand
- Activity Impact in Europe
- Activity Impact in EM Asia
- Impact on commodity Exporters from Africa

"Words" can be different from "Deeds" some times... like the world trade material evolution and its narrative

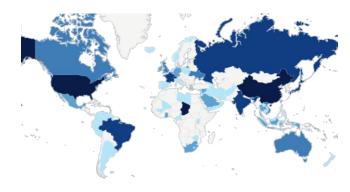
BBVA RESEARCH WORLD TRADE SUPPORT INDEX

(TONE & COVERAGE VERBAL COOPERATION AT WTO)



BRVA RESEARCH TRADE **SUPPORT INDEX 2008-17**

(VERBAL COOPERATION INDEX, IN DIFF 2017-2008)

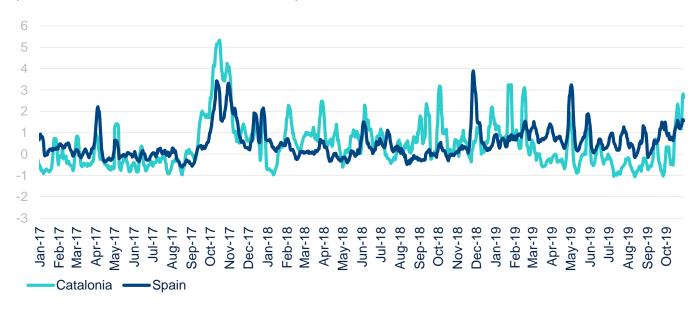


THE GLOBAL INCIDENCE OF **PROTECTIONISM** 2008-2015 (GLOBAL TRADE ALERT)



We can quantify events such as the Economic Policy Uncertainty Index in Spain based on news

BBVA RESEARCH ECONOMIC POLICY UNCERTAINTY INDEX: SPAIN AND CATALONIA (NORMALIZED DATA, MOVING AVERAGE 7 DAYS)

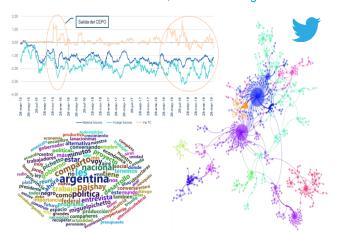


Economic Policy Uncertainty increased in Spain and Catalonia since 2015. General and Catalonian elections, Brexit, 1-O, ... are moving the series upwards.

Further products to track relevant political and geopolitical issues

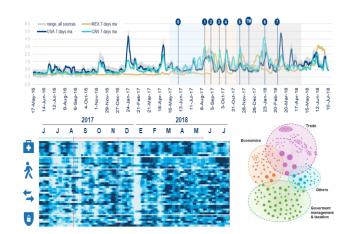
ELECTORAL PROCESSES

Using media, social networks and survey information to track elections in Colombia, Mexico and Argentina



TRADE NEGOTIATIONS: NAFTA

Using media, social networks and hard data to monitor the evolution of NAFTA negotiations deal



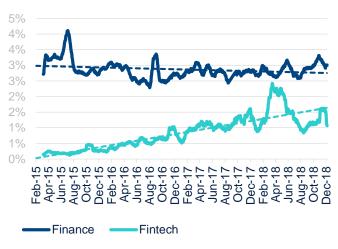




The Fintech Universe through the Eyes of the Media and Social Networks

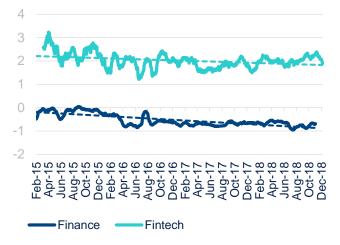
FINTECH AND FINANCE MEDIA COVERAGE OVER TIME 2015-2018

(MOV AVG 30 DAYS. RELATIVE RATIO WITH RESPECT TO TOTAL NEWS)



FINTECH AND FINANCE MEDIA SENTIMENT OVER TIME 2015-2018

(MOV AVG 30 DAYS)



Media coverage is calculated as the ratio between news related with Fintech&Data / Fintech&Digital Payments with respect to the total number of news in the same day. Media sentiment goes normally from -10 (negative perception) to 10 (positive perception), with 0 indicating neutral.

Media coverage of FinTech increased over time, catching up with that of Finance and with a persistent gap between the perception of both topics.

Fintech is a worldwide phenomenon with a broadly positive sentiment and over time and all over the world

MEDIA COVERAGE OF FINTECH BY COUNTRY DIFF 2018-17



FINTECH UNIVERSE IN TWITTER



MEDIA SENTIMENT OF FINTECH OVER TIME 2015-2018







03

Economics in Real Time and High Definition: Media and Google Trends

External databases: Google searches database



- Google Search provides several features beyond searching for words and are available since July 2007.
- The analysis of the frequency of search terms may indicate the evolution of economic, social and health trends.

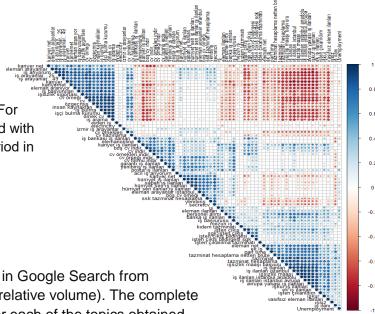
Example: a database with aggregate information about Google queries related to unemployment in Turkey has been developed



Google Correlate &Trends can help us to find terms related to employment searches in Turkey

Google Correlate

Finds the most correlated searching topics (100) for a given search term in interest across various regions, languages and time horizons. For the initial launch, we focused in terms correlated with 'unemployment' in Turkish during the whole period in Turkey (75 topics in total).



Google Trends

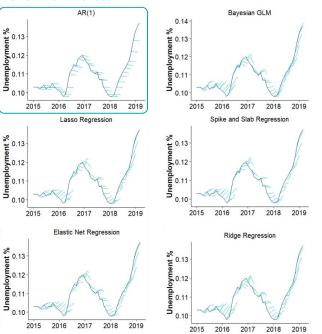
Analyzes the popularity of top search queries in Google Search from 2004 across various regions and languages (relative volume). The complete monthly search series have been extracted for each of the topics obtained with Google correlate in Turkey.

Providing extra information to nowcast unemployment. In the case of Turkey providing an advantage of 3 months

UNEMPLOYMENT OUT-OF-SAMPLE FORECASTS

(3M RECURSIVE OUT OF SAMPLE FORECASTS)

Benchmark to beat

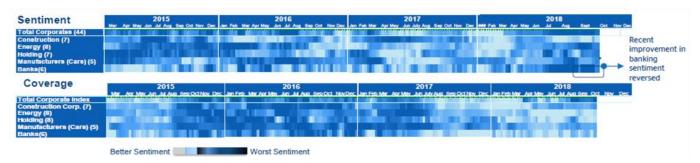


TURKEY: UNEMPLOYMENT RATE (SA) NOWCAST



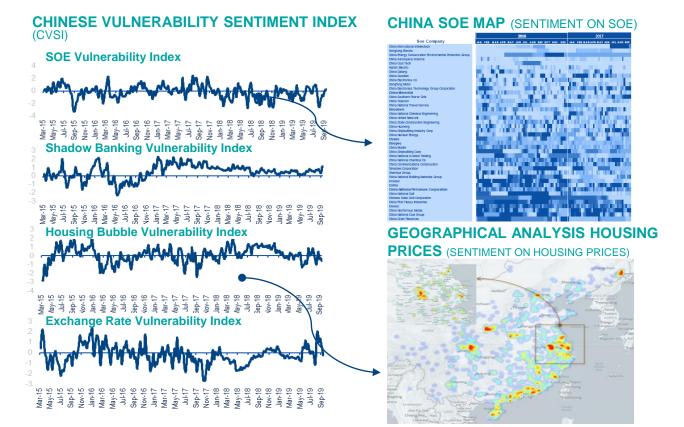
Corporate news Sentiment can provide us "Early Warning Signals" of corporate balance sheet health...

TURKEY: BBVA RESEARCH MEDIA SENTIMENT AND COVERAGE ON TURKISH CORPORATES





And we can develop hybrid Indicators (Hard Data & Sentiment Data) to disentangle risks in China





03

Economic & Risk indicators through Transactions, Google Searches & International News

Internal databases: working with aggregated and anonymized BBVA Data



710M card transactions from 1M PoS, made by 53M people, representing €43.000M

4 billion card transactions made by 14M people

1.500M card transactions from 1,1M PoS, made by 88M people, representing €41.000M

Retail trade sector dynamic leads the evolution of the aggregate consumption, which represents a high share of the GDP

SPANISH CASE: RETAIL SALES VS. CONSUMPTION EXPENDITURE OF HOUSEHOLDS

(%, YOY)



Retail sales

Consumption expenditure of households

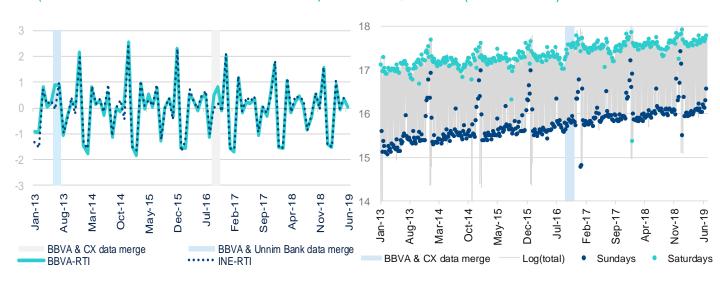
REPLICATING INE DATA TREATMENT AND METHODOLOGY USING TRANSACTIONAL DATA



Using BBVA data, we replicate national figures...

RETAIL TRADE INDICES: BBVA VS INE (STANDARDIZED MONTHLY GROWTH RATE)

AGGREGATE RETAIL TRADE - DAILY FREQUENCY (LOGARITHMS)



High granularity: Dynamics down to subnational level Multi Dimensional:

More detailed
socioeconomic features

Ultra High Frequency:

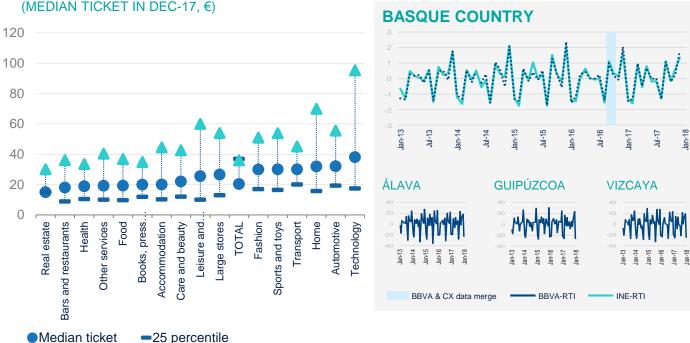
Dynamics up to
sub-monthly frequency

Bodas et al. (2018). Measuring retail trade through card's transaction data. Source: BBVA Research and BBVA Data & Analytics

... going to further. The retail sales by sector and provinces

BBVA RTI BY MERCHANT

(MEDIAN TICKET IN DEC-17, €)



Bodas et al. (2018). Measuring retail trade through card's transaction data. Source: BBVA Research and BBVA Data & Analytics



04

Text Mining and Sentiment analysis

External databases: web scrapping and NPL techniques

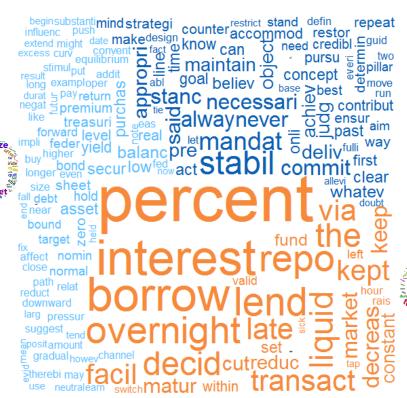
Text mining makes information extraction from huge volumes of data easier TEXT and structures the information MINING as important facts, key terms or persons.

Information **Pre-Processing** Sentiment **Transformation** And text parsing extraction and NPL analysis Documents Extract words Text filtering Analysis and Apply Machine learning sentiment Web pages Identify parts of Indexing to dictionaries speech quantify text in Topics extraction lists of term (LDA) Semantic Tokenization and counts analysis and multi-word tokens Clustering classification Create the Stopword Modelling (STM) Document-term Clustering Removal and DTM) matrix Stemming Weighting matrix Case-folding Factorization (SVD)

Analyzing the Central Bank of Turkey, European Central Bank and Federal Reserve

matur matur start

bound larg fix alsofed







The case of CBRT: First we identify the topics (world clouds)... a large room for the Researcher...

Global Flows

Activity

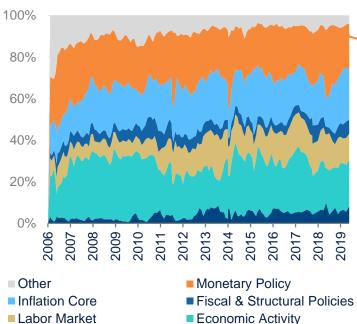
Inflation

Monetary Policy

```
attribut maintain lead nonalcohol february hand amid percentag
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    absent followmargin open
irigate transmise alread except confidence in a laread except conditions aura deficiel conditions aura de la condition de la c
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   fall fresh crose servic beverage
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        constant dealer unchang
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        binayprimari overnighthour
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   adjustcloth Sunprocess front
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            adjusticion surpriocese high lag group percent went country goours annual or decreas main suggest of the property of the prope
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    stockshort rates repo matur
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            competitiuli space slowdown albeit
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                decidleft borrow kept
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Sfourth Show recoveri line of
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    late percent decreas facil percent keep set
           rectant mechan mechan mechan folicies financiliquid flows financiliquid flows
   pursu reiat mechan o Financiliquid flows policies markets appetitum toncem shift fluctuat possible coupling sentiment inflow conomies here.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                fund via interest between
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            now moder slow incent of consum quarter read sever sharp throughout?
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       depreci consumveget slow
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    provid lendcommittee appli
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    market liquid window cut fatility
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           record exchang fellwell across season meatreach
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            throughout stronger overal simports revenues prove attribut
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    within transact follows
                           sentiment inflow portfolio economies hest protract accommod anothereract govern feed common another react government of the common another react government governmen
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   group' mea
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       pronounautomobiles permit similarly quarteronquarter
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  depresspressures
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ozatay interbaniegali/ethents reporeversi
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       e accumul
Emovements downward
great (No. 1) of containing the containing the containing of the containing the c
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               reporeyatal and trains correspond deposits and tranch reserves years rom edepositsparticip acend follows a labil latest month including moticip million ratio percentioned and trains and t
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  equip heavi julyaugustsignal
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           reporevers
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              machineri previousminer weaken
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       in deconstructions first moder weaken nometal commerci productinal home comparation of the comparation of th
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           movement is upward offset and in the cost note and 
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     xet subject deposit account regulation with used account regulation with used account regulation and account regulation account regulation and account regulatio
                                                                                                                                                                                                                                                                                                              current help
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ratios current subject deposit subject deposit
                                                                                                                                                                                          highlightline deficit
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               headlinhelp cours poseexert passthrough
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    passthrough Posexert & grant State of S
                                                                                                                                                                                                                                                                                  notwithstand
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  indusdure investments second vehicles
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       spread exhquarter modest reveal dampen periods participal and periods are periods and periods and periods and periods are periods and periods are periods and periods are
                                                                                                                                                                                          stepstate scenario
                                                                                                                                                                                  stabilinstrument resili
                                                                                                                           anoth lead O
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           possible corridoreas volatil rapid
                                                                                                                                                                                                                                                                                                                      volatil rapid ∄
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        offset moreoverfavor exchangtrend keep
                                                                                                                   inflow o capit toward
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            moreover favor exchangement such a special support and some such as a special support and 
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               third mild employ lead by suggest slitt driven unemploy datainvest slowerflat nonfarm weak halt
                                                                               at by financiuse need credit economiinterest flows wide market appetit macro follow market bollow follow market was appetit macro follow market bollow follow advanc conditions man recently road
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           growth construct dure
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       temployment gain pmi primarili slight amid improve upsurg trong improve upsurg forthcom seasonallyadjust
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           backdrop unprocess
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       behavior
```

Disentangling communication policy by topic

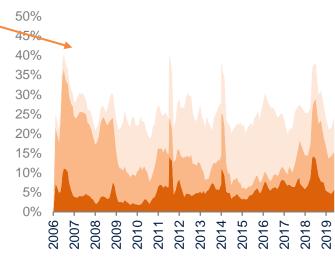
CENTRAL BANK OF TURKEY: EVOLUTION OF TOPICS



- -01-1-1-51-
- Global Flows
 - Source: BBVA Research

MONETARY POLICY TOPICS DISTRIBUTION

(% OF TOTAL)

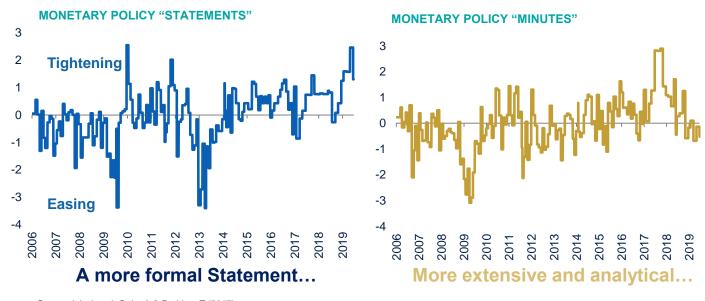


- Macroprudential Policy
- Monetary Policy
- Liquidity & FX Policy

Through Sentiment Analysis we can check "how" the central bank is talking and assessing the monetary policy stance...

CENTRAL BANK OF TURKEY: MONETARY POLICY SENTIMENT

(STANDARDIZED, ESTIMATED THROUGH BIG DATA LDA AND STM TECHNIQUES FROM MINUTES & STATEMENTS)



Source: Iglesias, J, Ortiz, A & Rodrigo, T (2017)

Source: BBVA Research

Understanding the Interconnectedness between Developed and Emerging Central Banks

MONETARY POLICY IN DEVELOPED ECONOMIES AND RESPONSE IN THE EMERGING MARKETS (NETWORKS)





Going one step further: we create our own dictionaries according to the Central Bank idiosyncratic narrative

Word2Vec methodology

Neural networks to learn word embedding and reconstruct linguistic contexts of words

Word vectors will be closed if they have similar meaning i.e. increase and rise will be closer Encodes semantic relationship among words by mapping vocabulary to vectors of numbers

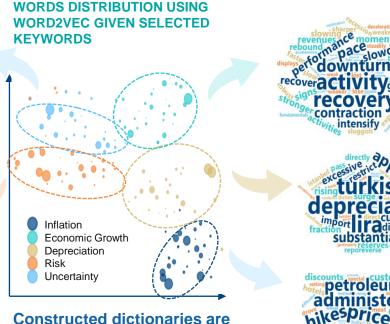
Allows to add and subtract words as though they are capturing the meaning of a word

i.e. King—Man + Woman = Queen

We create economic and risk dictionaries to deepen in Central Bank narrative analysis...







well differentiated between
them, given that the most
relevant words in each of them
are not common between
dictionaries

Exploring the main filling reports by the US companies to the SEC

QUARTERLY AND ANNUAL REPORTS









BBVA RESEARCH US SENTIMENT INDEX BASED ON US CORPORATE REPORTS AND US GDP

(STANDARDIZED, ESTIMATED THROUGH BIG DATA TECHNIQUES FROM 10Q & 10K REPORTS)



US Corporate Sentiment

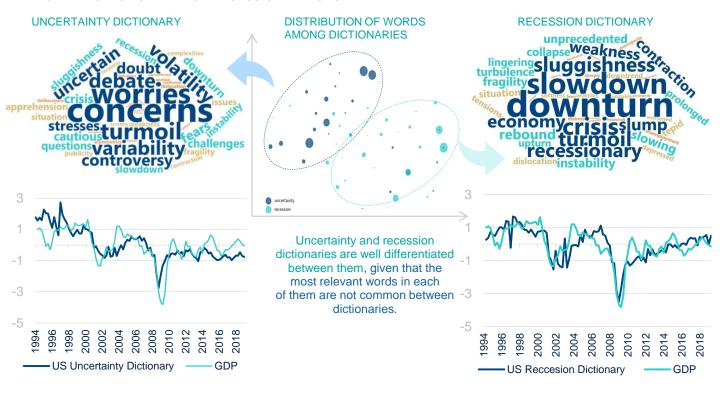
Finance Insurance Manufacturing Retail Trade Services Transportation Wholesale Trade

US Corporate Sentiment

2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 19

Focusing on risks and uncertainties, we can also deepen in the context where they are mentioned...

WORD2VEC DICTIONARY FOR RECESSION AND UNCERTAINTY



You can find us at:



www.bbvaresearch.com



BBVA Research / Tomasa Rodrigo



@BBVAResearch / @TomasaRodrigo







The use of Big Data at BBVA Research

to better understand the society, the economy and the world

Structured Products & Digitalization in Private Banking

Geneva, Bloomberg Office January 2020