

4 Big Data to track geopolitical and social events

The increasing role of geopolitics and its interconnectedness across the globe have become key elements in the policy agenda in 2015

Geostrategic analysis plays a crucial role in understanding our increasingly interconnected world, and it is becoming an additional and key element in the policy-making agenda. The world is changing and the balance of power with it. The global economy's centre of gravity is moving to the Asia-Pacific region (it will concentrate around 75% of the increase in GDP in the next ten years). The traditional post-Cold-War unipolar US dominance is being increasingly tested and multipolarity and multilateralism are both increasing their weights. New actors will arise and will start to make new demands. Moreover, social, political and economic systems are becoming increasingly interconnected with the new technologies facilitating the spread of social dynamics. Technological progress has led to a seismic change in our societies and economies where the number, size and types of social networks are growing and will continue to do so, triggering the ways and the speed in which risks propagate, transcending borders and sectors.

For all these reasons, **we have developed a set of new tools to track and quantify the key geopolitical trends and their interconnections in the global economy.** Using an innovative Big Data set on social, political and geopolitical events (GDEL³), we have designed several reports to track the current world geopolitical situation and to better understand the behaviour and driving forces of global-scale social systems.

Quantifying social trends using Big Data...

The Global Database of Events, Language and Tone (**GDEL³**) **Project is a real-time global open database³ of human society according to the world's news media, reaching deep into local events, reactions and emotions of every part of the world in near-real time.** All this information is freely available to research, analyse, visualise and even forecast human society according to global news coverage. It also includes a comprehensive and high-resolution catalogue of geo-referenced socio-political events from 1979 to the present. The GDEL Project monitors every accessible print, broadcast, and online news report around the globe every 15 minutes in over 100 languages. Information is processed using a vast pipeline of algorithms to identify hundreds of categories of events (from protests to appeals for peace), thousands of emotions (from anxiety to happiness), millions of narrative themes (from women's rights to clean water access), as well as locations, people, organisations and other indicators.

To work with this huge database and extract the particular information we are looking for, we use **Google BigQuery, a cloud-based analytics database** build on GDEL (among other databases), which uses Google's infrastructure **to enable interactive SQL queries against multi-petabyte datasets** and archives with tens of trillions of rows.

The exploitation of data from GDEL through Google BigQuery has allowed us to release several reports by means of Big Data Analysis⁴ (Geo World Report with monthly geo updates, Geo Mena Report and global hot topics), which illustrate our geo-strategic analysis in a visual and comprehensive way in an attempt to understand the social, political and geostrategic trends in parallel with the dynamics of the global economy. Below we show some examples.

3: Further information can be found on the webpage <http://www.gdelproject.org/> and in the paper Leetaru, K. and Schrodt, P., 2013. Global Database of Events, Language, and Tone (GDEL).

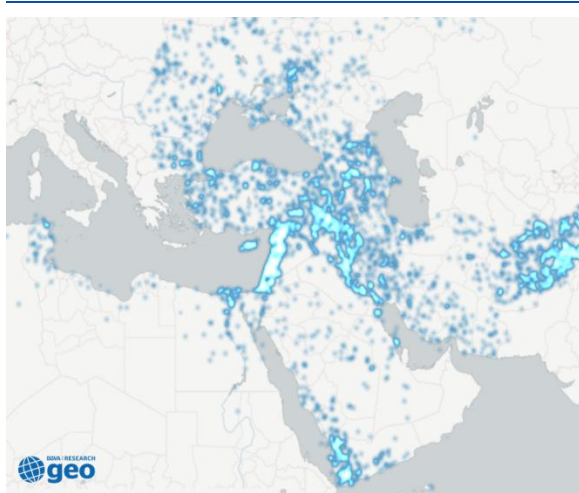
4: See our geostrategic analysis in the following link: <https://www.bbva-research.com/en/category/themes/geostrategy/>.

...enriches our geostrategic analysis with sophisticated tools

The geopolitical panorama in 2105 is dominating the world agenda and posing tough challenges for the entire world. The Syrian civil war, the expansion of ISIS in the Middle East and North Africa (as well as its recent attacks in Paris), the proxy war in Yemen, the instability in Afghanistan, the power vacuum in some African countries, the Ukraine-Russia conflict and, to a lesser extent, the territorial maritime disputes in the South China Sea are threatening the world's stability and security with important spill-overs to the remaining countries. One significant and direct consequence in Europe of the Syrian war is the refugee crisis that we are facing nowadays, which became an internal political crisis threatening European unity, its identity and the Schengen Agreement. All these events are illustrated in Figure 1, where we show our **geo-referenced conflict intensity index** for the Middle East, Eastern Europe and North Africa⁵. This index captures all observations in the media related with conflict events⁶, such as armed attacks, destruction of property, assassinations, insurgencies, civil war, armed clashes, etc. The index is calculated as the ratio of observations related to conflicts per day in each country, divided by the total number of all events recorded in GDELT during the same period and in the same location. These ratios are interpreted as real-time intensity or diffusion indices, showing the behaviour of this instability variable over time, and making them comparable among countries. In order to correct for the exponential rise in media coverage over time and the imperfect nature of computer processing of the news, we normalise events to a reference point in time. Figure 2 represents a map illustrating **the current European refugee crisis, tracing the geo-referenced inflows and outflows of refugees across Europe, the Middle East and North Africa in 2015**⁷ and offering critical insights into the scale and geographical distribution of this humanitarian crisis and its potential to trigger instability and unrest in some areas such as the Balkans and Eastern Europe.

Figure 1

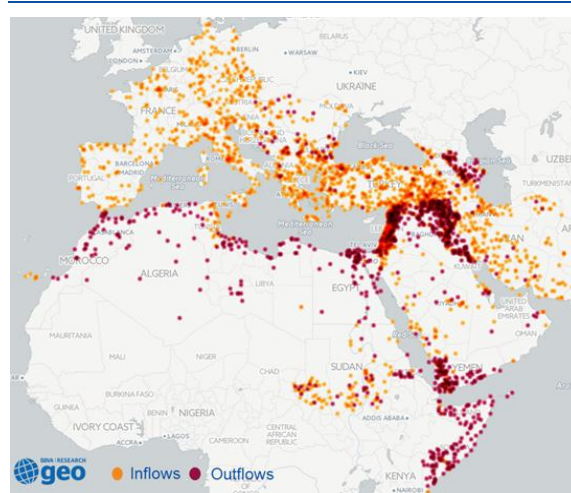
BBVA Conflict Heat-map (Jan to Nov 15) (Number of conflicts/total events)



Source: BBVA Research and www.gdelt.org

Figure 2

BBVA Refugee Flows Map (Jan to Nov 15) (Media coverage of refugees' inflows and outflows)



Source: BBVA Research and www.gdelt.org

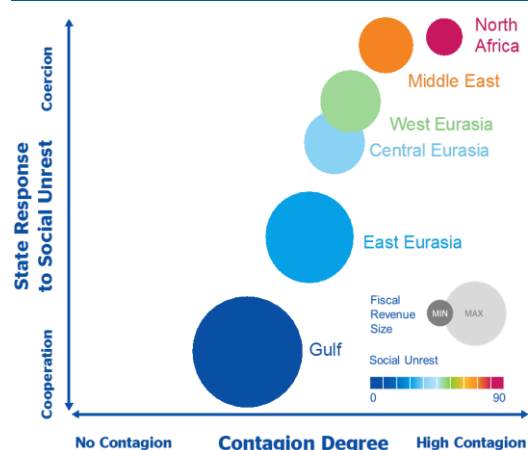
5: See the evolution of conflict in a dynamic way in the following link: <https://www.bbva.com/en/publicaciones/geo-world-conflict-social-unrest-october-update/>.

6: Conflicts events match with categories 18 to 20 according to the Conflict and Mediation Event Observations (CAMEO) taxonomy. Further information at: <http://data.gdeltproject.org/documentation/CAMEO.Manual.1.1b3.pdf>.

7: This analysis has been cited in top referenced blogs such as Forbes (see it at <http://www.forbes.com/sites/kalevleetau/2015/10/05/mapping-the-global-flow-of-refugees-through-news-coverage/>) and O'Reilly (https://www.oreilly.com/ideas/analyzing-the-worlds_news_exploring_the_gdelt_project_through_google_bigquery).

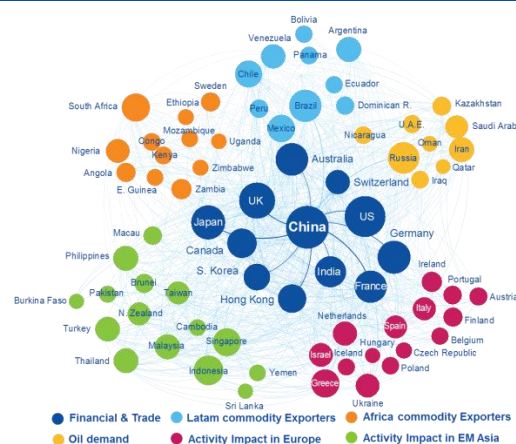
Figure 3 shows a **deeper analysis, modelling social unrest dynamics**. We use Big Data to do an **empirical assessment of social unrest dynamics in the Eurasian countries**⁸, building up several real-time indices of social unrest escalation by social agents, divided into several stages consistent with the Unrest Lifecycle Theory (vindication, protest and conflict) and alternative measures of state response (repression and cooperation). Our results show that Eurasia is a fairly volatile region in which shock generation and inertia are related. Social reactivity is also relevant, but it is stronger at the initial stages of unrest while it decays as the intensity of shocks increases. Repressive state response is a fact but it also decays in intensity as the conflict escalates along the unrest cycle, falling even into an accommodative mode due to the state's limited enforcing ability. We compare the results with the MENA region. It suggests that Eurasia carries similar though milder dynamics in all terms: volatility and reactivity of social unrest, state response and enforcing inability and contagion.

Figure 3
Modelling social unrest dynamics: fiscal revenues, state response and social unrest



Source: BBVA Research and www.gdelt.org

Figure 4
China slowdown: concerns and contagion (Media coverage of China slowdown network)



Source: BBVA Research and www.gdelt.org

Figure 4 shows a **network diagram of how countries are mentioned in context with one another in coverage of China's economic slowdown**. This visualisation was done by extracting all the mentions of each country in the context of the Chinese slowdown and it was then plotted by using modularity, PageRank and Force Atlas 2 layout algorithms. Each country is displayed as a node and the thickness of the line drawn between any pair of countries indicates the frequency with which those two countries are mentioned together in news coverage about this issue. Countries mentioned more frequently together are displayed closer to each other in the network. Moreover, the modularity technique finds the natural clusters within the network where countries that are mentioned more often with each other than with the others. This visualisation offers a proxy of how countries are contextualised with respect to China's stagnation, their interconnectedness and how risks will promulgate.

Summing up, **the use of Big Data offers tremendous opportunities for research. We have exploited it to enrich our analysis and to incorporate in our models non-linear behaviour and feedback effects of human interaction** which have important links to the economy, and which enable us to improve our study and forecasts. Our sophisticated analysis of global media discussed above provides powerful insights about our hot topics analysis across the world, assessing their global impacts and enabling us to construct fragility indices and early warning systems.

⁸: This analysis has been cited in top referenced blogs such as Forbes (see it at <http://www.forbes.com/sites/kalevleetaru/2015/11/10/visualizing-russian-sanctions-and-chinas-economic-slowdown-through-massive-news-mining/>).

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