USING TWITTER DATA TO ANALYSE PUBLIC SENTIMENT ON FUEL SUBSIDY POLICY REFORM IN EL SALVADOR

WORLD BANK GROUP
Macroeconomics & Fiscal Management

GLOBAL PULSE

PARTNER: THE WORLD BANK
PROGRAMME AREA: ECONOMIC WELLBEING

SUMMARY

In 2011, El Salvador made policy reforms to a national subsidy on propane gas, causing widespread public disaffection and a series of strikes by distributor companies. The World Bank and Global Pulse collaborated on a research project analysing content and sentiment of tweets in order to better understand public opinion around the reforms. The study demonstrated that public opinion as expressed in social media could complement and potentially replace household survey data if none were available. While a decline in negative sentiment was observed around several issues, including the gas distributor strikes, household survey data from the same period showed an increase in positive sentiment on the reform. This discrepancy showed that analysing social media could help reveal unexpected impacts of issues and events related to policy. In the case of the fuel reform, the research findings showed that the distributor strikes might have contributed to changes in public perception more than previously acknowledged.

BACKGROUND

In April 2011, the Government of El Salvador removed a countrywide subsidy on liquid petroleum gas (LPG), the most common domestic cooking fuel. Instead of subsidizing prices at the point of sale, the new mechanism delivered an income transfer to eligible households, sparking the controversy. This policy reform resulted in a consumer price increase from $5.10 to $13.60 for a 25-pound bottle of LPG.

Although monthly income transfers were given to households with low electricity consumption of less than 200 Kwh per month, which was 94 per cent of the population, the reform was highly unpopular. Based on household surveys conducted by a national newspaper, in January 2011, only 30 percent of the population was in favor of the reform. This low satisfaction rate increased over the next eighteen months before stabilizing at 65 percent in favor in September 2013.

A 2014 study investigated public perceptions and social dynamics of the fuel subsidy reform, illuminating issues and concerns related to the reform such as political partisanship, the level of information reaching communities about the reform and trust in the government's commitment to deliver the subsidy (Calvo 2014). This background research prompted Global Pulse and the world bank to collaborate on a study to explore if social media data could provide similar or new insights on public opinion to potentially complement or substitute household survey data.

USING TWITTER DATA TO ANALYSE PUBLIC PERCEPTION OF REFORM IN EL SALVADOR

A comprehensive taxonomy of keywords related to the LPG subsidy reform was developed in order to filter Twitter for relevant content. Regional experts were consulted to ensure slang words and synonyms were incorporated into the taxonomy. The taxonomy was based on the five main topics of public concern reflected in the household survey data:

- **Lack of information:** Tweets that expressed confusion over the subsidy
- **Partisanship:** Tweets that mentioned a political party or ideology
- **Distrust of institutions:** Tweets about the lack of trust in government and gas distributors to carry out the subsidy
- **Personal economic impact:** Tweets about how the subsidy would affect the individual's household economy or livelihood
- **Other:** Tweets about the subsidy that did not fall into the other four categories, such as tweets about how the subsidy related to water or electricity

Each tweet was simplified following a normalization process, such as replacing plural words by singular versions (e.g. "reforms" became "reform"). The taxonomy was used to filter the normalized tweets from periods before, during and after the reform.

DATE	DISTRUST INSTITU-TIONS	LACK OF INFORM-ATION	PARTIS-ANSHIP	PERSONAL ECONOMIC IMPACT	OTHER
Jan 2011	24.2	12.1	20.2	10.5	45.2
Apr 2011	24.7	13.4	19.0	22.5	27.5
May 2011	21.1	5.0	13.5	18.0	44.4
Aug 2011	22.6	9.5	6.0	8.3	36.8
May 2012	10.1	5.0	14.4	5.0	28.8
Aug 2012	27.1	15.3	116.5	10.6	64.7
Sep 2013	10.1	5.8	5.8	2.2	58.0

Results of manually categorizing the tweets by domain experts. Numbers are perceptages of the total tweets. Columns do not add up to 100%, as some tweets were assigned to more than one category.

A subset of the filtered tweets was examined to assess relevance and refine the keywords. After three iterations, the final taxonomy provided a high signal-to-noise ratio, meaning a small proportion of tweets unrelated to the reform passed through the filter.

Tweets were filtered a second time to isolate content originating from El Salvador by using the locations publicly expressed in user

profiles. Once the analysis was completed, the household survey data that provided topics for categorising tweets was used as ground truth data to validate research findings.

INSIGHTS & OUTCOMES

This project proposed a methodology to automatically categorise each message depending on its topical content and sentiment (positive, neutral or negative). A small set of tweets was manually categorised to train the analytics engine to sort messages by content and sentiment. Then larger datasets could be analysed and sorted automatically.

Several different methods of categorising tweets were tested and evaluated. By visualising the volumes and sentiments of tweets across categories over time, several insights became evident:

- Central themes emerged in each category of the taxonomy. For example, the words 'leña' (firewood) and 'cocinar' (cook) were frequently associated to the tweets classified under the topic "lack of information," indicating how uncertainty about the consequences of the subsidy could led to use of firewood.
- In May 2011, sentiment about the reform categorised "personal economic impact" was negative. The household survey data from the same time period reflected a similar negative trend in public perception of the reform.
- The research findings suggested that the gas distributor strikes that took place shortly after the fuel reform influenced public perception more than previously acknowledged because of the growing negative view of the distributors.
- Messages expressed on Twitter were more critical of the subsidy reform than responses to the household survey.


The figure above shows the evolution in sentiment from January 2011 when the subsidy was passed to July 2013. Positive (green) and negative sentiment (red) gradually decreased, while neutral sentiment (yellow) increased over the time period.

CONCLUSIONS

The study showed the potential of analysing social media to better understand public opinion, as the sentiment observed could be compared with public opinion measured by household surveys.

In household surveys, sentiment evolved from negative to positive, showing increasing satisfaction with the policy reform from January 2011 to September 2013. However, the sentiment extracted from public tweets only showed a decline in negative sentiment and rise in neutral sentiment—but not an increase in positive sentiment.
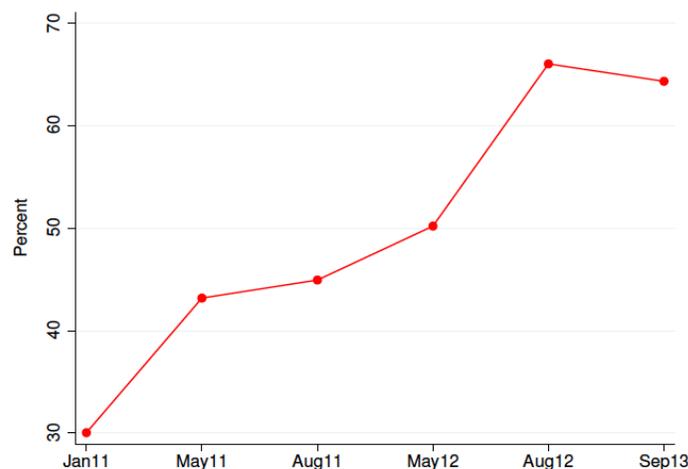
The figure above shows satisfaction rate over time based on household surveys conducted by La Prensa Grafica, the largest newspaper in El Salvador, with the y-axis representing the percentage of people expressing satisfaction. (Source: Calvo 2014)

There are possibilities for further research using, and combining, other sources of data such as news media, blogs and social networks. Additionally, the tweets extracted for analysis could be filtered by demographic variables identified through their content, for example, by the user's expressed gender or political affiliation.

IMPLICATIONS & RECOMMENDATIONS

- This research showed that analysis of social media could provide a useful complement to existing household survey data, and even potentially replace survey data if none were available in the context of wide policy reforms.
- It is recommended that further research be conducted to validate and assess the replicability of the method used in this project by analysing public opinion of other reforms.
- The study demonstrated that social media monitoring could be used to understand and provide real-time feedback about policy reform. Therefore it is recommended that policy makers consider the use of similar measurement tools in current evaluation and operational frameworks.

REFERENCES

O. Calvo, B. Cunha, and R. Trezzi. (2014) "When winners feel like losers." Technical Report. The World Bank Group.