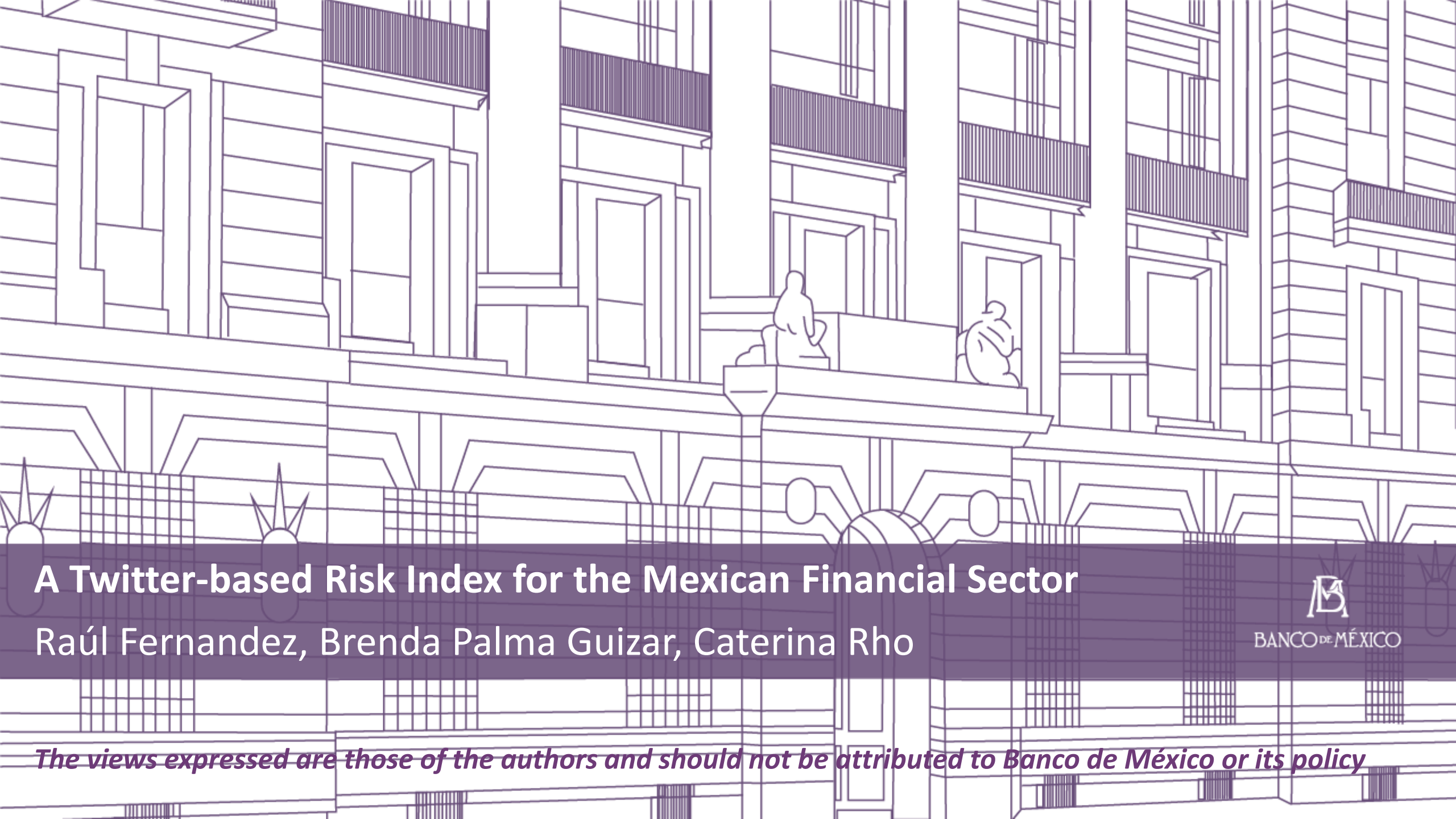


A Twitter-based Risk Index for the Mexican Financial Sector

Raúl Fernandez, Brenda Palma Guizar, Caterina Rho

BANCO DE MÉXICO

The views expressed are those of the authors and should not be attributed to Banco de México or its policy

Motivation

- Financial stability analysis became even more pressing after the Great Crisis. New data and new tools were explored to help inform financial stability policies.

- Research showed that consumer sentiment and investor sentiment may affect economic activity and financial markets, proving to be useful if incorporated in financial stability analysis or systemic risk indicators.

- Economic sentiment may affect economic activity according to two mechanisms:
  - The “animal spirits” hypothesis, where consumers and business sentiment can drive economic activity (Blanchard, 1993; Benhabib and Spiegel, 2017; Shapiro et al., 2018).
  - Sentiment may be purely informational, containing news about the future states of the economy held by the public but not yet observed in hard data (Barsky and Sims, 2012).
  - The jury is still out on the drivers of the correlation between sentiment and economic activity, but to the extent it does exist it can be exploited for forecasting purposes.

- In this context, big data techniques found a novel application in analyzing “soft information”, like sentiment, to monitor financial risk (Nyman et al., 2018), systemic risk (Borovkova et al., 2017), uncertainty (Baker et al., 2016).

Aim of this paper

- Main contribution: build a financial market risk index based on the sentiment of tweets and news about the main commercial banks in Mexico.
- This is the first Twitter-based financial risk index built for the Mexican economy.

- Banco de Mexico builds a Financial Market Stress Index, but it does not include metrics of sentiment.

- A Twitter sentiment risk index may be used as a complementary indicator of financial risk in addition to the information brought by traditional quantitative indicators.
  - It may capture new information, that it is not explicitly shown by quantitative indicators.
  - It is a timely source of information on financial risk, since it may be updated at a higher frequency than other existing indicators (daily vs weekly or monthly).

Methodology

- The underpinning of our risk index is the analysis of sentiment of Twitter messages, that we extract from the entire timeline of Twitter. Our data sample is obtained by extracting tweets written only in Spanish, containing the words “banco”, “banca”, “bancario”, and the names of the main Mexican commercial banks.

- With Latent Dirichlet Allocation (LDA) we explore the general topics present in our sample of Tweets, finding that our index is able to capture sources of potential financial risk that are not traditionally included in financial stress indicators.

- We use a voting rule to build a sentiment classifier merging three different classifiers:
  - A dictionary approach (Correa et al., 2017, Bruno et al. 2018).
  - A Support Vector Machine (Tellez et al., 2017).
  - A neural network with transfer learning (Howard and Ruder, 2018).

- We use local projections (Jordà, 2005) to test if our Sentiment Index affects Mexican financial risk, measured by the Financial Market stress index (Banco de Mexico, 2013). We also test if the Sentiment Index affects some specific market variables that we use as proxies of different kind of risks that can affect financial markets.

Results

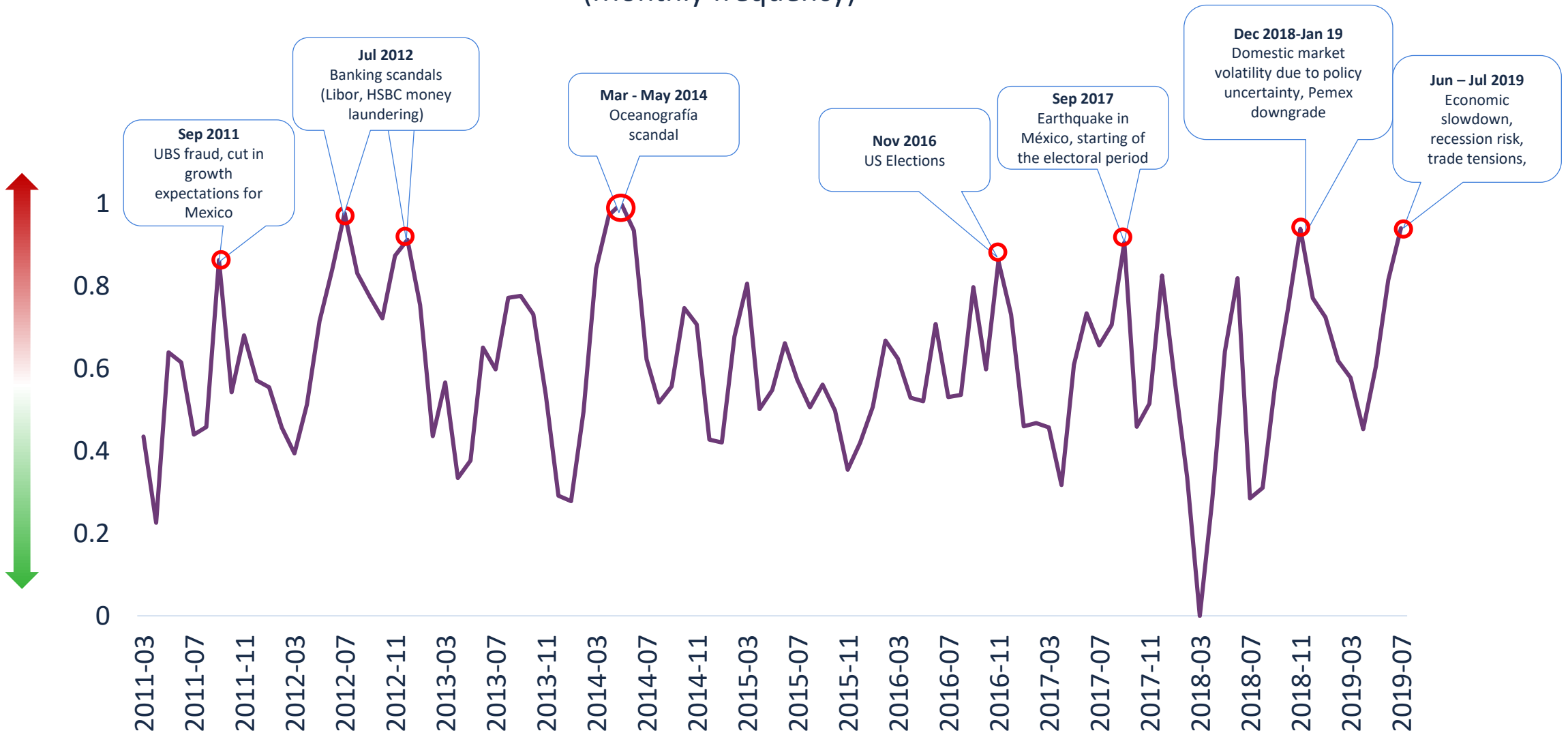
- Our results show that our Sentiment Index is correlated with financial market stress, signaling relevant peaks in financial stress in the last 10 years.
  - Our index may be of value for monitoring the changes in risk-taking due to more negative or more positive sentiment in financial markets.

- We distinguish two components of our Sentiment Index, a non-reputational one, more correlated with existing indicators of market stress, and a reputational one, that highlights specific periods of domestic stress due to financial frauds and money laundering scandals.

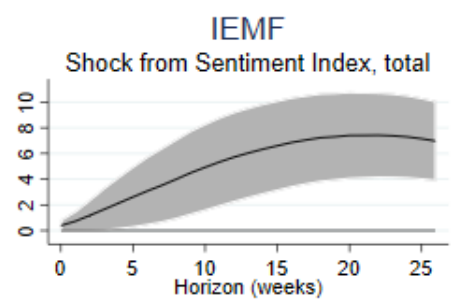
- We find that an increase in negative sentiment index increases financial stress and some of its components, such as country risk, risk of credit institutions, stock market risk and foreign exchange risk.
  - In particular, a one-standard deviation shock significantly increases exchange rate volatility and stock market volatility in the first 10 weeks after the shock. There is also a significant increase in country risk as measured by the EMBI+ for Mexico.
  - The banking sector, proxied by the beta of financial institutions, also reacts with an increase to a shock in the Sentiment Index, although the reaction is not significant in the short run.

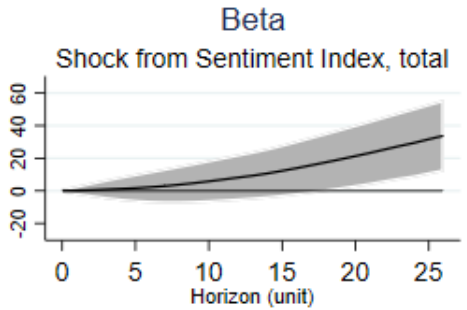
Results: sentiment index

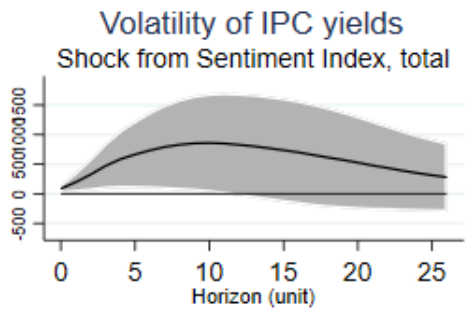
(Monthly frequency)

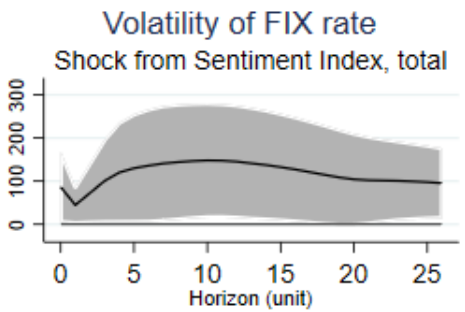


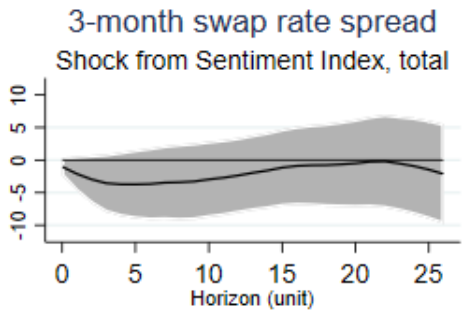
Results: local projections

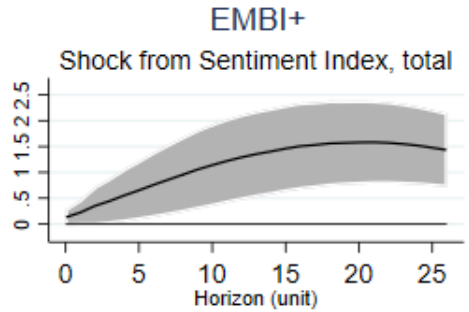


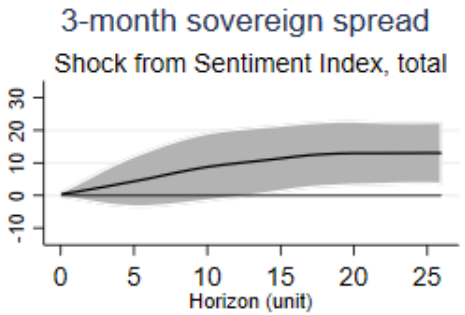












Conclusion

- In this paper we build a Sentiment index for the Mexican financial sector based on Twitter messages and we compare it with existing indicator of financial stress, testing its correlation and its predictive power.

- Our results show that our Sentiment Index is correlated with financial market stress, signaling relevant peaks in financial stress in the last 10 years.

- A shock in the Sentiment Index that increase negative sentiment is correlated with an increase of financial market risk, as measured by the IEMF, an increase of risk for credit institutions, higher volatility of the exchange rate and stock market prices, and higher country risk.