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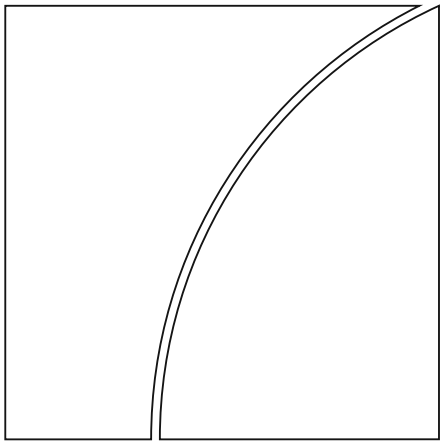

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by Ana Aguilar and Fernando Pérez-Cervantes

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Communication, Monetary Policy, and Financial Markets in Mexico*

Ana Aguilar
BIS

Fernando Pérez-Cervantes
ITAM†

Abstract

We determine if the communication of private banks to their clients with financial interests in Mexico changes or not after Mexico's Central Bank communicates its monetary policy decision (MPD) and also two weeks later, with the publication of the minutes of Mexico's Central Bank monetary policy decision (MMPD) between 2011 and 2019. We use unsupervised Natural Language Processing (NLP) techniques to turn the text that private banks send to their clients about the Mexican economy into vectors of topics. We find that every time, private banks cover a large diversity of topics and words before the MMPD with no evident consensus of topics, and that almost always the quantities of terms and topics are reduced and repeated by almost every bank after the MMPD indicating some surprise (notable exception: the *liftoff* in December 2015), and that the topics vary depending on the date of the MMPD. The fact that private banks discuss the same topics and write to their clients with sentences that contain the exact same words indicates that the private banks react to the MMPD, independent of their opinion about the Central Bank's statements. We also found weak evidence that a measure of the size of the changes in the private bank's communication with their clients is positively correlated to changes in the long-term yields but negatively correlated to the size of exchange rate movements.

JEL Classification: C6, E5, E6

Keywords: Natural Language Processing, Unsupervised Sentence Embedding, Central Bank Communication, Mexico

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†Department of Business Administration. Río Hondo 1, Ciudad de México 01080, Mexico

1 Introduction

There is an increasing amount of debate on the benefits and impact of the transparency and communications of central banks. All modern central banks have moved to a strategy that includes better communication tools, more transparency and accountability.[1] Associated with this trend, in the last few decades the literature has substantially increased. The recent development of intensive computational tools that can transform text into data, provides additional ways to analyse and corroborate the benefits of greater communication and central banks' sentiment. Textual analysis has become itself a source of information and feedback for central banks. In a survey paper, Blinder, Ehrmann, Fratzscher, De Haan, and Jansen (2008) state that the literature in this topic has two main strands. The first is how central banks' communication effect financial markets and secondly, the analysis of different banks' communications over time and across institutions. These strands can be measured qualitatively and quantitatively, using computational tools for text analysis.

Recent findings on measuring news in monetary announcements uses asset price reactions in majority of cases. There are two limitations - first, price setters in financial markets are traders who may not process information in the same way as overall public do. Second, movements in asset prices may not fully reflect the expectations formation process and what kinds of signals the public receive. Indeed, Ter Ellen, Larsen, and Thorsrud (2021) find that text analysis can partly capture information in monetary announcements which may not be fully summarized in asset prices.

In this paper, we focus on a particular aspect of the first strand and use an intermediate step approach to analyse how central bank communications affect financial markets. Textual analysis has focused on this process, looking to the behaviour of interest rates or asset prices

[1] See Filardo and Guinigundo (2008), Bholat, Hansen, Santos, and Schonhardt-Bailey (2015), and Kahveci and Odabaş (2016) for relatively recent surveys on international evidence for communication by Central Banks.

after a policy decision. We study the impact of central banks communications on economic and financial reports produced by economic analysts (EAs) from private banks (eg Bank of America, Barclays, HSBC). EAs often act as intermediaries between financial markets and investors and economic institutions, such as central banks or ministries of finance. EAs are central bank watchers, and they attempt to extract the authorities' intentions for future policy actions from their communications. This information is important since EAs are the most useful interlocutors with financial investors. EAs highlight in their financial reports the main messages of a monetary policy communication after its publication. This often translates into portfolio recommendations for their clients, for example, more dovish or hawkish readings from the central bank.

There is full circle since central banks follow carefully what EAs write about its communications to assess if the intended message was transmitted adequately to the financial markets and overall public. EAs are also interviewed frequently by the press and specialised journalist. Furthermore, in the case of Mexico, there have been cases when the central bank makes a decision that surprises EAs (and the markets), and some members of the board preach central bank watchers for not correctly expect what the central bank did. Central banks can look at financial variables to confirm if they were successful with the message. However, as mentioned, asset prices may not reflect fully all information from monetary announcements (see Ter Ellen, Larsen, and Thorsrud (2021)). Thus, EAs provide an additional source of information, since they explain directly if they understand the central bank's decision, if they agree with the central bank reading of the economic outlook and its forecasts, and if they correctly interpreted the signals about future policy intentions. In addition to that, EAs maintain a close and productive relationship with authorities. There is a close and frequent communication among them. This is through the visits from EAs and their clients (foreign investors mainly) with authorities to explain in an informal way the

central bank view of the economy and to answer direct questions from investors and asset managers. This communication channel is particularly important for emerging economies, which are recipients of large capital inflows and where less analysis and forecasts are made in comparison with advanced economies. Thus, studying the interpretation of EAs from central bank communications is a novel and complementary source of information for central banks and in general for the monetary policy communication literature.

For all these, it is relevant to analyse how EAs react to central bank communication. We quantitatively track the changes in what EAs write to their clients the day before Mexico's Central Bank (Banxico) publishes a piece of information and the 2-24 hours after. We focus on the monetary policy decision (MPD) and its minutes (MMPD) which for the case of Mexico, include an overall assessment of the economy. The MPD is known two weeks in advance of the publication of the MMPD, where the decision is announced and some rationale behind it, but not Banxico's overall assessment of the economy and the particular reasons for the decision. That is, analysts can speculate and at most predict the reasons for Banxico's decision and guess future policy actions, but they will not know for sure until the MMPD is published. In this paper, we check if the changes in messages sent by EAs to their clients before and after the MMPD, affect financial markets.

Monetary policy decisions affect financial markets and the expected monetary policy stance not only through the decision itself (increase, decrease, or no change in the reference rate) but also because the decision is an outcome variable of the Central Bank's overall assessment of the economy. This assessment is extensively covered in the minutes of the decision in Mexico, and it is subject to plenty of educated guesses by EAs.

If the true message from Banxico to the economy (published in the MMPD) is transmitted (or amplified) via the private banks' EA, we can use Natural Language Processing (NLP) techniques to measure the impact of this transmission mechanism. If communication has no

impact may be ineffective (i.e. what Banxico writes has no influence in financial markets). We can check if Banxico's message was not transmitted by the EAs, or if the message by EAs about what Banxico wrote did not influence financial markets. This could be, either because Banxico's assessment of the economy is in line with the educated guesses, meaning that the message was transmitted the day of the publication of the monetary policy decision, or because what private banks write does not affect financial markets.

We first assess the impact of the MMPD by checking whether the private banks' EAs that send reports to their clients with financial interest in Mexico discuss similar topics in the days prior and following the publication of the MMPD. Mexico's Central Bank is a good case to do such an analysis because its MMPD is very structured in 5 sections, namely (1) external outlook, (2) domestic financial markets and macroeconomic stance, (3) economic activity, (4) inflation outlook, and (5) monetary policy forward-looking final paragraph. Also, Mexico is the only country in the region that increased in 4.25 pp the reference interest rate after the great financial crises (GFC) and before the 2020-21 pandemic due to several external shocks that affected inflation. This means that all monetary policy, the Bank's communication, and the Bank's outreach have been systematically active since late 2015 to 2019 giving interesting variation to study. To the best of our knowledge, this is the first paper that has ever studied divergence or convergence of topics reported by EAs prior and after the MMPD in Mexico.

In addition, a central bank can move financial markets directly, affecting the short-term rate and other financial variables and the expectations of those variables. There are some clear advantages of a higher quality communication (but not necessarily more communication): first, central bank's communication increases the predictability and understanding of monetary policy authorities' actions. It increases the "signal-to-noise" ratio, enhancing the quality of the information set available for the markets, firms and households. Therefore, anyone could be able to make decisions of investment and consumption for longer horizons

and with more certainty. Second, good communication can enhance the transmission from short-term rates (controlled by the central bank) to longer ones, increasing the effectiveness of the monetary policy transmission mechanism. A greater proportion of the credit and financial transactions are referred to long-term rates, instead of short ones.

The literature has taken advantage of the computational capacity that nowadays allows researchers to use text analysis to study the central banks messages and their impact on the markets. The reports that EAs from many financial institutions make regarding the central banks (the treasury department and other public policies) have become a very important piece of information for the financial markets. In those reports, well trained economists scrutinise all Central Bank communication carefully. They have reports before and after important central bank communications. This paper relies on the assumption that the readers of these reports pay close attention to what is written there, these reports are an important source of information, and respond in the financial markets to the best of their abilities given the information.

Therefore, it is possible to study the impact of the central bank communication on the topics they discuss. Specifically, we try to assess if after a central bank monetary policy communication there is more congruence or commonality among EAs regarding the most important concerns for the central bank at the time of the decision. This is an intermediate channel of the impact of central bank's messages to financial markets since analysts' reports are in general a product for their clients. Based on their analysis and the interpretation of the Central Bank communications they make recommendations of portfolio positions in the fixed income market, the FX market, and equity market to their clients, institutional investors and fund and asset managers.

There is another line of research, focused in transforming the Central Bank communication into sentiment indicators and studying directly their effect on financial variables. To do so,

one must impose certain interpretation of the communication (e.g. labels of what is a *hawk* or a *dove* sentence or statement). We avoid that by keeping the computational text analysis as general and free of manual intervention –manual tagging or supervision of text– as possible, and focus instead on the impact of communication on the economic analysts. Also, scarcity of labeled data makes difficult to use supervised NLP models.

During the last decade, NLP saw a rise in popularity and many algorithms were developed, many tasks that were previously considered difficult are now easily solved by simple baseline methods. Many NLP models rely on computing continuous vector representations of words that reduce the dimensionality of a word dictionary. Simple methods such as Latent Semantic Analysis existed long ago, but recent algorithms outperformed them, in Mikolov, Sutskever, Chen, Corrado, and Dean (2013), for example, large quantities of raw text are fed into a language model, where words are represented by a vector. Using this vector representation, the Language Model attempts some task such as predicting words given their context. Once the model is fitted, the inferred word vectors encode information of the *words* themselves. In general, the representation of words as continuous vectors is called the Vector Space Model and word vectors are called word embeddings.

We use unsupervised sentence embeddings to measure semantic similarity of sentences and classify them in "topics" regarding what the MMPD and EAs write about. Even though the structure given by supervision would be desirable, as it restricts the complexity of NLP tasks, lack of supervision can also be desirable since there is no subjectivity implied in the model, this subjectivity would have been necessary for supervision, since a human *teacher* (of the model) needs to decide whether a statement is "hawkish" or "dovish", for example. Sentence embeddings can also be useful to explore and interpret what the main components and tones of a text corpus are. "Tone" in this setting ends up being what the computer found to be the way the analysts write about, but also the emphasis, repetition and composition of words

that are used accompanying the economic concepts. A deeper look in the segmentation of sentences computed by our algorithm found that it differentiates views and opinions from factual information without overlooking the themes being addressed, or analyst's references to Banxico's forecasts from the forecasts themselves, among other interesting dimensions. In this sense, our topics capture richer details about the narrative than previous work on CB communication that was restricted to a small number of general topics.

We compute changes in the overall narrative by looking at the distribution of topics in EAs reports and test whether these are correlated with changes in financial variables, our results suggest that EAs and financial variables react to Banxico's communication, thus, it adds relevant information to the markets. After the MMPD we observe more agreement or congruence around the topics EAs write, which indicates that Banxico's communication is considered a source of information by EAs.

This paper is organized as follows. Section 2 describes the Natural Language Processing (NLP) techniques used to read millions of paragraphs in Spanish, which then guide the computer to classify both Banxico's MMPD and the analysts sentences into vectors of information. It also describes the data used both for training the computer and to check the analysts' response to the MMPD. Sections 3, 4, 5, and 6 describe the results both of the techniques used in section 2 and with the financial data, and finally section 7 concludes and describes possible further research with the same techniques.

2 Data and Methodology

Our data consists on raw text of the analysts' reviews of Banxico's policy decisions and minutes between 2011 and 2019 and on the text of Banxico's minutes. There are 24 banks that review Banxico's minutes, and they issue four reports for every monetary policy decision: 1.

Before the announcement of the monetary policy decision, 2. After the communique of the monetary policy decision, 3. Before the release of the Minutes of the Meeting for the Policy Decision (MMPD) and 4. After the release of the MMPD. Each report has, on average, 16, 23, 12 and 24 sentences respectively. Not every bank sends their clients text about every minute, there are 10523 pre-decision, 22008 post-decision, 4380 pre-release and 16856 post-release sentences. We also use Banxico's minutes, which have in average 163 sentences for a total of 12879 sentences.

We now describe the Natural Language Processing (NLP) methods used to assess the effectiveness of Banco de México's communication between 2011 and 2019.

Learned word vectors have been found to accurately capture semantic structures. This gives them great representation power which is useful in many NLP tasks and thus they have been studied thoroughly. In this vector space, "near" words share similar meaning and satisfy some algebraic regularities. Common examples are relationships like the ones below:

$$\text{"king" - "queen"} \approx \text{"man" - "woman"} \tag{1}$$

$$\text{"brother" - "man" + "woman"} \approx \text{"sister"} \tag{2}$$

A strong advantage of language models is that no explicit supervision is needed. These models are fitted using only the relative position of words in a text corpus. This makes their bias dependent only on the selected text corpus and not on human tagging or classification. That is, we are not forcing the computer to find something for us (such as a "hawkish word") but let it decide whether or not to assign those types of words as to be close in meaning. Common algorithms, such as GloVe (see Pennington, Socher, and Manning (2014)) and Word2Vec (see Goldberg and Levy (2014)), generate vector representations of words through

their context, mapping words that have similar meanings close to each other in a vector space that resembles their actual semantic relationships which are not chosen by a human.

Composition of topics in a document can be modeled using Latent Dirichlet Allocation (see Blei, Ng, and Jordan (2003)), or using human classifications in vectors such as counting how many times the words "inflation" or "GDP" appear in a text.

For the Spanish language, we computed word embeddings using the popular algorithm GloVe, which is considered useful for capturing semantic information of words and is fairly simple. We fitted a custom GloVe model using a Spanish text corpus with approximately 800 million words, containing the Spanish version of Wikipedia, a sample of some years of around 200 Mexican news sites with a focus on economic, political and financial news, and diverse content regarding monetary policy, central banking and financial economics. We found that fitting our word embeddings with a suitable corpus such as this one was essential for obtaining good quality vectors in this domain.

Although some research has been conducted, there is no generally accepted rule for choosing the dimensionality of word embeddings other than considering that the broader the domain, the higher the dimension should be.[2] For regular models, vectors of dimension between 50 and 500 are common, although for very big models sometimes more than 1000 dimensions are used. For choosing the best embedding dimension, it has been found that, depending on the training corpus, dimensions that are lower than some threshold may restrict performance, while by increasing the upper bound the performance tends not to decrease much and the restrictions come in higher computational requirements. We thus use the common upper bound of 300 for our word vectors, considering that the training corpus is broad, and we do not want to restrict word vector expressiveness, while our model needs are not those of the biggest models reported.

[2]See Patel and Bhattacharyya (2017) and Das, Ghosh, Bhattacharya, Varma, and Bhandari (2019) for some examples.

The rest of the paper does three things, based on this methodology. We first make a qualitative assessment of how well does the algorithm work in text about the Mexican economy, given that they have a different structure than language in common domains in Spanish. Second, we describe how does the frequency of the topics detected by the algorithm change as information by the Bank of Mexico is revealed (for example, before vs. after the decision, before vs. after the minutes, and after the decision but before the minutes vs. after the decision and after the minutes). Last, and following standard literature, we will define the magnitude of the changes in the frequency of topics as the magnitude of surprises in the information revealed over time to study how does the magnitude of the surprises translate to changes in financial variables.

3 Results: Qualitative Assessment of the Financial Topics

Our GloVe model is fitted with 800 millions words in Spanish. Only a small fraction of them belong to sentences written in financial news articles, the minutes of the Central Bank's decision, or the analyst's texts to their clients. The majority of the text used to train our algorithm comes from Wikipedia articles discussing just about every topic in the Spanish language. A natural question to evaluate this algorithm is how well does it separate the financial topics, since we want to study financial texts. If every word in the analysts' texts is lumped in a single topic, e.g. a unique "financial topic" then there is no variation to study in our analysis. But if words are successfully and systematically separated into different topics with a natural interpretation and a natural separation, then we can use this variation to draw some conclusions about the words that Banxico uses, or the words that the analysts use. In this section, we study our word embeddings, that is, the 300-dimension vector that represent each word in Spanish. For simplicity, we illustrate the results with an example.

Take the following 11 words in Spanish: (1) Banxico, (2) inflación, (3) monetaria, (4) minuta, (5) economía, (6) consumo, (7) ingresos, (8) fiscal, (9) crecimiento, (10) Hacienda, and (11) haciendas. They, respectively, mean (1) Central Bank of Mexico, (2) inflation, (3) monetary, (4) minutes (and in Spanish, this word is not an homonym of the unit of time), (5) economy/economics (in Spanish, these words are homonyms), (6) consumption, (7) revenues/number of people entering somewhere (in Spanish, these words are homonyms, but in singular then there are at least 5 concepts for the word *ingreso*), (8) fiscal/prosecutor (in Spanish, these words are homonyms), (9) growth, (10) Ministry of Finance in Mexico/large colonial house (in Spanish, these words are homonyms), and (11) large colonial houses.

An educated reader will immediately notice that the first 10 words are "financial" words in the sense that if they appear in a sentence, then the sentence is most likely discussing something financial or about the economy, and, conversely, if it is known that a sentence is "financial" then the probability of seeing that word spikes (and the probability of many other words plummets). An even more educated reader will also notice that the first four words are not only financial, but could be easily classified as "Central Banking" words. Then as the list goes on, they slightly become more neutral (but still "financial") and then eventually become "Ministry of Finance" words. The 11th word is not a financial word, but it is the plural of the homonym of a financial word.

Figure 1 on the following page contains the cosine of the angle between the 300-dimension vectors of the 11 words. Take the formula of the cosine of the angle between two vectors in equation 3

$$\cos\left(\theta_{x,y}\right) = \frac{x \cdot y}{\|x\| \, \|y\|} \tag{3}$$

where x is a 300-dimension vector with a word, y is a 300-dimension vector with another

Pairs of Words	Banxico	inflación	monetaria	minuta	economía	consumo	ingresos	fiscal	crecimiento	Hacienda	haciendas
Banxico	1	0.582	0.617	0.529	0.22	0.13	0.17	0.251	0.243	0.203	0.009
inflación	0.582	1	0.669	0.344	0.356	0.278	0.322	0.3	0.432	0.113	-0.007
monetaria	0.617	0.669	1	0.394	0.415	0.156	0.227	0.411	0.291	0.164	0.031
minuta	0.529	0.344	0.394	1	0.066	0.089	0.112	0.184	0.039	0.17	-0.011
economía	0.22	0.356	0.415	0.066	1	0.353	0.412	0.32	0.476	0.364	0.152
consumo	0.13	0.278	0.156	0.089	0.353	1	0.37	0.177	0.376	0.135	0.021
ingresos	0.17	0.322	0.227	0.112	0.412	0.37	1	0.41	0.376	0.37	0.167
fiscal	0.251	0.3	0.411	0.184	0.32	0.177	0.41	1	0.19	0.488	0.014
crecimiento	0.243	0.432	0.291	0.039	0.476	0.376	0.376	0.19	1	0.093	0.063
Hacienda	0.203	0.113	0.164	0.17	0.364	0.135	0.37	0.488	0.093	1	0.481
haciendas	0.009	-0.007	0.031	-0.011	0.152	0.021	0.167	0.014	0.063	0.481	1

Figure 1: Cosine of the angle between 11 selected "financial" words

word, $\cdot$ is the dot-product operator, $\theta_{x,y}$ is the angle between x and y, and $\|x\|$, $\|y\|$ are the norms of vectors x and y. The larger the cosine, then the "more parallel" the vectors are (meaning the angle is smaller). As the cosine gets closer to the zero value, then the angle is larger and approaching 90 degrees (meaning that the vectors are closer to orthogonal, or linearly independent). Two words with a large cosine of the angle between them, in this context, imply they have very similar relative intensities in the 300 dimensions of the embedding. Two words with a small cosine of the angle between them imply that in whatever dimension some word is strong, then the other words is not, and vice versa. Two words with negative cosine imply that in whatever dimension some word is strong, then the other words is strong but with the opposite sign.

From this figure, it is noticeable that the "Central Bank" word pairs are more parallel than any other type of pair, and that the cosine is small between these words and the "Ministry of Finance" words. Notice that the "Ministry of Finance" words have small angles between them, and that *haciendas* is basically orthogonal to every word except ingresos (revenues) and Hacienda (which is the singular of haciendas). Also notice that words such as economy/economics and growth are not particularly linked to an entity such as the Central

Bank or the Ministry of Finance, but they are both strongly linked.

We did hundreds of such comparisons, with very similar conclusions: the algorithm captures the general meaning of financial and Central Banking words. We can say that, for the purposes of this paper, the computer became an *even more educated reader*. Now in the next section we check what does it find when we make it read all the minutes, and all the analysis by private banks over a period of 9 years, but instead of analyzing individual words, it works with phrases by "adding" all the words (vectors) in the same sentence.

4 Results: Words into Sentences, Sentences into Topics

Now that we know the computer can appropriately represent each word in a natural way, we need to look at word interactions by adding up the embeddings in the words of each sentence in a text.

In order to capture the compound meaning of multiple words in sentences, which in turn can translate into representing semantic content like sentiment features or topics, an option is to compute analogous sentence vector representations. When working in general domains, there exist great options for obtaining sentence embeddings, such as Google's Universal Sentence Encoder Cer, Yang, Kong, Hua, Limtiaco, John, Constant, Guajardo-Cespedes, Yuan, Tar, et al. (2018), BERT sentence embeddings Reimers and Gurevych (2019), and many more. But these algorithms fail to produce expressive vectors for specialized language such as the one we are concerned with, and would require huge amounts of text to perform better in new domains. Given the amount of data available, it is necessary to keep the model simple and focus on obtaining reasonable word embeddings for this domain.

Surprisingly, even simple models like word vector averaging usually obtain promising results, sometimes even outperforming complex models as Recurrent Neural Networks (see

Por su parte el documento senala que se estima un crecimiento inercial de los ingresos tributarios en linea con la actividad economica del pais
Ademas se espera que el endurecimiento de las condiciones fiscales se espera que el deficit fiscal caiga un digito digito del pib este ano afecte la actividad economica
El igae de julio de hoy proxy del pib mensual sorprendio en el lado negativo con una tasa de crecimiento interanual del digito podria estar senalando la tan esperada desaceleracion del consumo del sector privado ademas de la debil inversion privada y publica que compromete el pib presupuestario del proximo ano...
Creemos que el objetivo fiscal implicara un superavit primario de una magnitud importante probablemente un superavit primario del digito digito del pib
El dato del crecimiento del pib en el primer trimestre digito a a la menor tasa de crecimiento anual desde digito confirma las senales de debilidad de la actividad economica sobre todo en el sector industrial
Hemos comentado que una baja del pib petrolero de digito sumado al efecto negativo del recorte de gasto publico restaria aproximadamente digito puntos al crecimiento del pib lo cual consideramos podria compensarse por un crecimiento mas robusto de la economia de Estados Unidos
Los datos del pib del segundo trimestre mostraron que la economia habia acelerado su crecimiento
Sin embargo el bajo desempeno de la actividad economica desde el cierre del digito que se prolongo hasta los primeros meses del digito determina que la prevision apunte a un menor crecimiento del pib
Del lado positivo una actividad mas dinamica en los ee uu aunado al estimulo fiscal por parte del gobierno beneficiaran a la actividad economica este ano
Se preve que el crecimiento del pib se acelere a digito el proximo ano
Un miembro dijo que esto es coherente con un ritmo mas lento de crecimiento economico el deficit de la cuenta corriente probablemente disminuyo a fines de digito y la desaceleracion de los prestamos del sector privado
El estancamiento de la actividad economica
Los ingresos registran un crecimiento de digito anual real en donde se incluye el remanente de operacion trasferido por el banco de mexico mientras que el gasto neto presupuestal crecio solo digito
El digito restante es esencialmente solo para compensar los menores ingresos fiscales este ano como resultado de un crecimiento mas dÃ©bil

Note: the word "digito" represents any number including a year, a percentage, etc.
Figure 2: The nearest neighbors of "Se estima un crecimiento inercial de los ingresos fiscales con la actividad economica del país"

Wieting, Bansal, Gimpel, and Livescu (2015)). Depending on the method, sentence vectors have been shown to capture features such as sentiment and topic. For classifying a sentence into a sentiment or topic, a very simple model can yield very good results if used on top of these sentence vectors, however, we use a model that, in this context, misses sentiment features *on purpose*. We do not use this feature because we do not want to know if the banks agree or not with Banco de México's overall assessment of the economy. We just want to know what do the banks write about and use that information to make assessments about communication strategies.

For computing sentence vectors we use a simple method. We average word vectors in a sentence written either by Banxico or by analysts, and, using a Central Banking text corpus, remove the projection on the first k components of a principal components analysis (PCA)

decomposition of its sentences.[3] This method can outperform complex models in producing expressive sentence vectors for some tasks and is suitable for in-domain adaptation, in this case, the domain of bank analysis of Central Bank minutes, it is also simple and inexpensive to compute. As noted in Cer, Diab, Agirre, Lopez-Gazpio, and Specia (2017) sentence embeddings using this approach require us to tune a couple of hyper-parameters, α (which we set to 0.001) and k, the number of components to remove (5 in our case) we found them to obtain expressive sentence vectors, but our results are not very sensitive to these values.

Our sentence vectors capture well the semantics present in a sentence in the Central Banking domain, grouping together sentences that address the same topics. For example the nearest neighbors of "Se estima un crecimiento inercial de los ingresos fiscales con la actividad economica del pais", a sentence that was written by one of the banks in an undisclosed date, are in figure 2.[4] Readers of the Spanish language can immediately notice that ignoring on purpose word ordering information also misses the difference between good and bad outcomes regarding, in this case, economic growth and fiscal revenue, but can also immediately notice that, no matter the bank's sentiment about a topic, they all address the same topics. We found topics, independent of their sentiment, and without human intervention. Notice that coincidentally, the "farthest" sentences to the original, at the end of the table, are opinions by the banks on what authorities in Mexico (namely Banxico and the Ministry of Finance) are expected to do given the information provided. By fitting word embeddings with text relative to central banking and the Mexican economy, and fitting sentence embeddings using bank's reviews and Banxico's minutes, we obtained meaningful semantic representations that accurately capture all subjects ever mentioned in any review or minute. Sentences are well distributed along their main variation dimensions, making

[3] See Arora, Liang, and Ma (2016) for details on the creation of the vectors.

[4] The translation for this sentence is "It is estimated an inertial growth of fiscal revenue with the economic activity of the country"

easy to characterize the components of the narrative of both Banxico and analysts. As will be shown below, these components seem to group not only topics in an economic or monetary sense, but also the ways analysts and the Central Bank refer to them.

We now dedicate a couple of paragraphs to discuss technical considerations regarding the removal of the Principal Components. A common and natural question for any reader who is not familiar with these techniques is how is it possible that the algorithm does such a great job grouping topics that are covered by a Central Bank by being trained with text that very infrequently uses these words by just removing the PC of the "financial" texts. On the one hand, we have the issue that the writer of the sentence is expecting that a human with some knowledge of the topic is reading the sentence. Raw vectors would have made, for example, the concept "inflation", or "price index", to weigh a lot more in the similarity measures, and thus would have made more difficult to discriminate among the secondary topics that appear together with it, much in the same way one could expect that describing a function using its derivative can complicate what "positive" and "increasing" mean. On the other hand, we have the frequency as a deterrent. Sentences in a random Wikipedia article that discuss inflation and growth would have been lumped closer with sentences that discuss inflation and Europe. By removing the Principal Components we address the issues in both hands. On the one hand, we force the computer to magnify the differences in context implied by small differences in the frequency of word pairs, and on the other, we force the computer to put those sentences in different classifications (one being related to a monetary policy stance for the future and the other one being related to a description of past or current events), which is exactly what we want.

Once the sentence vectors have been obtained, it is easy to explore the relevant topics and analyst's ways to address them. We use the t-SNE algorithm for visualizing the sentences.[5]

[5]See Maaten and Hinton (2008) for details.

t-SNE is a nonlinear algorithm that maps high dimensional data into a low dimension space (usually 2 or 3 dimensions), such that near points in the original space are mapped to near points in the lower dimensional space with high probability (see figure 3 on the next page for a 2-dimensional representation of all the sentences written by Banxico or analysts during 9 years, between 2011 and 2019).

t-SNE projection is well suited for visualizing the structure of sentence vectors, this in turn helps us get an idea of how many topics are reasonable to expect and to manually interpret the topics the algorithm has identified; topics tend to group together in clusters that are visually identifiable, see 3 on the following page. In this low dimensional space, K-means clustering can easily be done and visually interpreted. The fact that a relatively high number of clusters are well defined is encouraging, as it suggests a rich segmentation of topics, we confirm this with a more comprehensive review of sentences. It should be noted that t-SNE doesn't work with out of sample cases, this means it is impossible to assign topics to unseen sentences using this approach. However, we restrict ourselves to analyze what has happened in this period and restrain from making forecasts on new statements.

This low dimensional representation is useful to interpret the main topics mentioned by analysts and to gain insight into how they address them, possibly enabling us to later make informed choices for supervision among a lower set of dimensions, not just "hawkishness" or "dovishness". For example, it might be useful to classify a sentence as whether the analysts confirmed their previous expectation on a certain topic or if their beliefs were changed, and also, to quickly build a training set aiming for the desired supervision. Later on in the paper we plot the output of the t-SNE for the sentences written by Banxico and by analysts in many different ways, and one such example is in figure 3.

In figure 3 it is possible to see a 2-dimensional projection of all sentences written by Banxico and by EAs between 2011 and 2019. Recall that each dot is a sentence in a 300-dimension

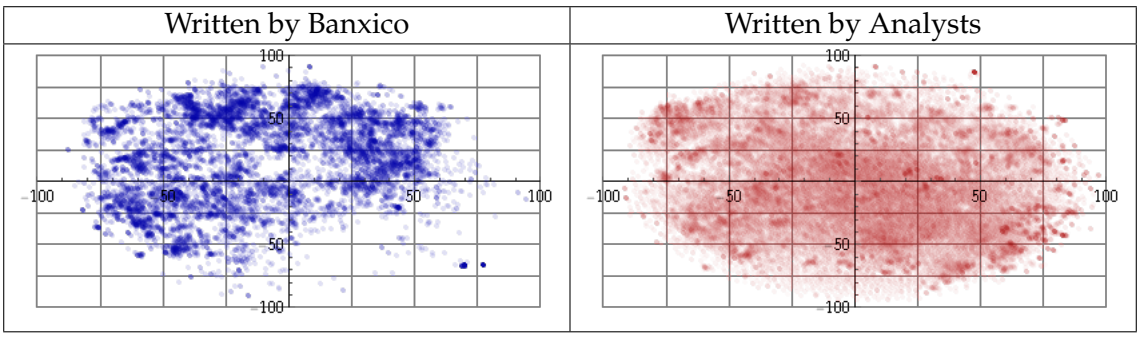


Figure 3: Two-dimensional representation of the relative frequency of all the subjects of all the sentences written by Banco de México and analysts that write to clients with interests in Mexico, 2011-2019

vector space but projected in 2 dimensions using the t-SNE method: a sentence is the average of its word vectors, then subtracted its 5 principal components of "financial" sentences.

If the entire 2-dimensional plane was representative of all text in Spanish subtracted its first 5 principal components, then it is visible that analysts discuss just about every subject contained in reviews or minutes, and that Banxico does not discuss certain subjects. More importantly, both for Banxico and the analysts, the topics seem to be clustered. Interestingly enough, EAs have their own clusters, some of which are opinions, forecasts and announcements of next CB actions, topics that, as expected, are never covered by Banxico's MMPD.

In this lower dimensional space, it is easier to group together sentences according to their meaning. We do that by grouping all the sentences of all the banks from 2011 to 2019 into 100 clusters using K-means. Here, a cluster does not necessarily mean a well defined topic but only a grouping of similar meaning sentences; nearby clusters could be attributed to the same topic, while sentences in a cluster could be grouped in different topics, depending on the reviewer. Once we have computed a cluster membership for every sentence, we use the probability distribution of sentences across topics to model the effects of the Central Bank communication by means of the persistence and emphasis on topics and tones in the general narrative of banks and in the Central Bank's minutes. Clustering could have been done

right after obtaining sentence embeddings, but that would have been a difficult task due to the high dimensionality of this space; distances between high dimensional vectors tend to concentrate around some value and hinder distance-based algorithms.

5 Results: Changes over time in Banxico's and in the Analysts' text

In this section, we do two things. First, we study how the frequency of each topic (cluster) changes over time. Second, we study how this change depends on what was the nature of the text.

5.1 Change in the Frequency of Topics

We decompose the elements of all the communication done by Banxico and EAs, by date and by bank. That is, we will date each dot of figure 3, attach it to the bank that wrote it, and see if we can find some patterns in the changes of the location of the dots. As it can be seen in figure 4 on the next page, Banxico is very consistent with the sentences they *don't* write. On the contrary, it seems that analysts still write just about everything, but the emphasis, or the clusters, vary by year. For example, take 2011, 2015, and 2018 as well as clusters 7, 9, 51, 68, and 96, pictured in figure 5.

In 2011, both Banxico and EAs used a lot of sentences from cluster 51 (see Appendix to find the location of all the clusters). This cluster contains sentences that discuss gasoline prices, oil prices, and in some cases even food prices, in the context of the exchange rate and the Mexican inflation. The reader will remember that 2011 was the year of the Middle East crisis, which spiked oil prices and reduced transportation routes all over the world. In 2015, the analysts used a lot of sentences from cluster 96. This cluster has explicit opinions about what the Bank of Mexico will do with respect to the Fed ("Taking into consideration the last

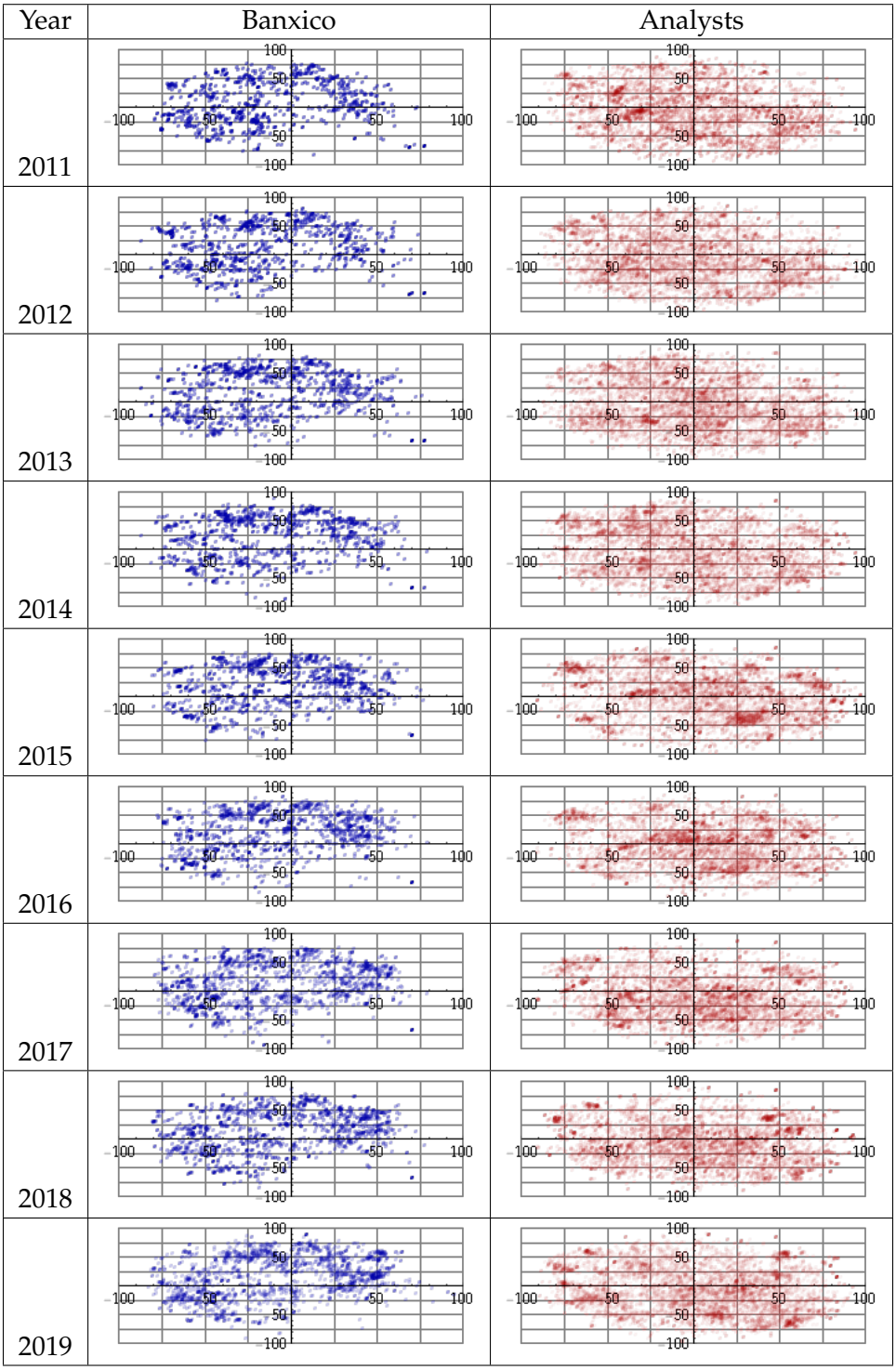


Figure 4: Two-dimensional representation of the relative frequency of all the subjects of all the sentences written by Banco de México and analysts that write to clients with interests in Mexico.

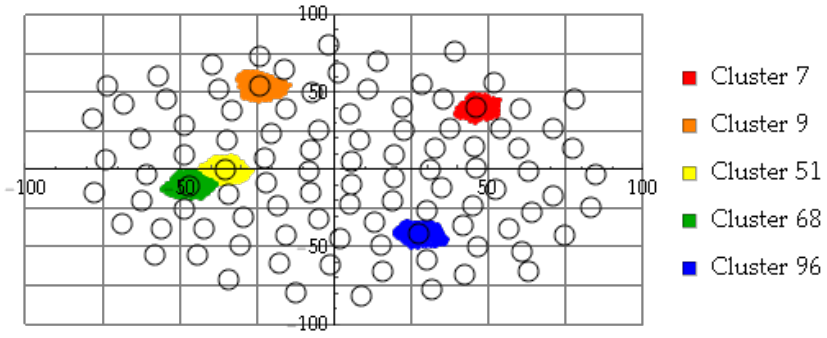


Figure 5: Location of all the sentences in clusters 7, 9, 51, 68, and 96. The disks represent the centroid of each of the 100 clusters found in the data.

communications by Banxico, we reiterate our opinion that Banxico will try to wait for the Fed and raise at the same time", "If the break-evens remain high, then Banxico can raise the rate in September, having also more information about the Fed", and many other examples, also listed in the Appendix).[6] Our algorithm found that Banxico did not write any sentence in this cluster in the whole 9-year period. This was, of course, the year of the *liftoff* by the Fed, which happened in December. In 2018, again Banxico and the EAs discuss heavily on one cluster, in this case, cluster 7. This cluster includes the sentences about negotiations, exchange rate, trade, tariffs, Canada, United States, and North America. This was the year of the final rounds of the new North American Free Trade Agreement.

On the other hand, every year, Banxico writes a lot of sentences from clusters 9 and 68. The former contains phrases such as "upward revision", "sustained growth", and similar concepts, while the latter contains phrases such as "increasing prices", "rising inflation", and similar. Meanwhile, the analysts do write sentences from that cluster, they do it much less frequently. Notice how cluster 51 and cluster 68 are similar in the sense that they discuss prices and inflation, but cluster 51 discusses the specific goods (price of oil, mostly), and cluster 68 talks about prices in general. It is exactly this type of classification we were looking for when doing the clusters, and the algorithm seems to do it very well. We allowed for 100

[6]Free translation done by the authors to "teniendo en cuenta las últimas comunicaciones de Banxico, reiteramos nuestra opinión de que Banxico tratará de esperar a la Fed y subir al mismo tiempo" and "si los break-evens se mantienen altos, Banxico podrÃa subir tasas en septiembre, teniendo también más información sobre la Fed", respectively

clusters to be chosen arbitrarily, but we believe that with some human intervention, the results can even become stronger, which could be a new dimension for further research. It is interesting to review the clusters found by the model as they segment topics and the ways of addressing them along the directions of most variance in the minutes and reviews. Most of the topics are well defined but sometimes in unexpected ways, for example, there is a topic about punctual forecasts about inflation and one about forecasts on inflation but with a strong argumentative narrative; there is a topic about the components of economic growth and one that reviews the Central Bank's perspective on these same components of growth. The granularity at which topics are defined depends on the number of clusters selected and on the number of principal components removed from sentence vectors.

5.2 Change in Economic Analysts' topics after Banxico communicated something

In this subsection, after seeing that the algorithm did a good job classifying sentences given the overall context of a specific year, we study if it does a good job by observing the change in topic coverage in short periods of time. According to standard literature, we will name the measure of the changes in the distribution of sentences across topics as a surprise.

We measure the surprise between distributions of sentences in 4 different moments in time. For a particular MPD we consider four moments, which in temporal order are:

1. Analyst reviews before the MPD
2. Analyst reviews after the MPD
3. Minutes of the monetary policy decision meeting (MMPD)
4. Analyst reviews after the release of the MMPD

In this setting, we can isolate the effect of the MPD announcement in the EAs narrative by looking at the surprises between reviews in moments 1 and 2. Similarly, we isolate the effect of the MMPD by the measuring surprises between moments 3 and 4.

Cluster (topic)	Prob Chg 2 - 4	Prob Chg 1 - 2	Freq in 2, 3 & 4	Freq in 2 & 4	% Chg in frequency	Topic Interpretation
19	-0.05	-0.02	24	24	0.00%	Inflation expectations
25	0.04	0.42	21	21	0.00%	Foreign outlook: developed countries
31	-0.32	-0.09	24	24	0.00%	Real economy: private consumption, industrial, investment
35	-0.20	0.56	30	30	0.00%	Output gap, growth and slackness
42	-0.03	0.08	22	22	0.00%	Drivers of financial flows into Mexico
49	0.72	0.78	28	29	3.45%	Risk balance on inflation: references to CB communication
20	-0.21	0.21	25	26	3.85%	Interpretation about inflation expectations
10	-0.72	0.11	23	24	4.17%	CB's forecasts for inflation
21	-0.20	0.67	34	36	5.56%	Labor market and its slackness
32	0.14	-0.47	21	23	8.70%	Growth forecasts: national and international
27	0.40	-0.09	20	22	9.09%	References to MPC and CB
0	-0.26	-0.53	29	33	12.12%	Views on inflation: core inflation, gasoline and agricultural
23	-0.89	1.69	27	31	12.90%	CB views on growth risks
51	-0.66	0.38	27	31	12.90%	Inflation: core inflation, gasoline and agricultural
48	0.23	0.91	18	21	14.29%	Discussion about inflation drivers
40	0.73	-0.35	21	25	16.00%	Inflation & rate forecasts: shocks, impact of expectations
12	-0.45	0.02	20	24	16.67%	Risks, forecasts and levels of indices: inflation
30	-0.42	0.35	25	32	21.88%	Risks, possible outcomes: growth, inflation, FX
46	-0.03	-1.44	21	27	22.22%	On the votes for the MPD
47	0.53	-0.36	19	25	24.00%	Drivers of voting in the MPD
6	0.73	-0.12	31	41	24.39%	MPC and its actions on inflation
14	0.74	-0.22	16	22	27.27%	Interpretations on possible scenarios
37	-0.85	0.96	18	25	28.00%	Components of growth
53	0.20	-0.60	26	37	29.73%	Arguments on forecasts
15	1.26	-0.04	23	33	30.30%	References to CB communication
28	0.37	-0.40	24	37	35.14%	Interpretations of forecasts on MPD
5	-0.44	0.03	15	24	37.50%	FX, inflation and volatility: interpretations
24	-0.10	-0.52	17	31	45.16%	CB actions on FX and financial markets
13	0.14	-0.64	14	27	48.15%	Forecasts, opinions and interpretations
3	-1.46	2.02	13	29	55.17%	Risk balances on inflation: short term
2	0.12	-0.20	9	25	64.00%	Future decisions of MPC; tone of its communication
26	-0.45	-0.16	14	41	65.85%	Analysts opinions
17	-0.80	-0.50	8	31	74.19%	FX levels
45	-0.08	-0.47	3	24	87.50%	Forecasts, opinions: rate changes
33	2.21	-0.29	2	24	91.67%	About the tone of CB communication
41	-0.13	0.10	1	27	96.30%	Analysts opinions on international outlook
8	-0.13	-0.37	0	32	100.00%	Announcements about MMPD
39	-0.46	0.04	0	30	100.00%	Rate forecasts

Table 1: Mean change of probability of each topic induced by MPD and MMPD (in percentage), and Frequency of each topic in the text written by analysts before and after the release of the MMPD (moments 1 & 2), and in both bank's reviews and the MMPD (moments 2, 3 & 4).

In table 1 we show our interpretation of some topics, together with their mean change of probability (in percentage) before and after the MMPD (column 2), and before and after the MPD (column 3). Column 5 shows the number of times that a topic was mentioned by at least two EAs both after the monetary policy decision and after the MMPD, and column 4 shows the number of times Banxico *also* wrote a sentence in this topic.

Note that the CB minutes don't make forecasts about future rate changes (topic 39), neither they issue opinions on these forecasts (topic 45). On the other hand, changes in comments about the tone of Banxico's communication (topic 33) are more likely to be induced by the

MMPD than by the MPD. Analogously, comments about the drivers of MPD voting (topic 47) are induced by the MMPD rather than by the MPD.

For measuring surprise among topics coverage, we assume that, at each moment in time each sentence is distributed $Categorical(p_i)$ across clusters, p is a vector with the cluster appearance probabilities across the 100 topics and i indexes every date and each of the four report types (moment). For example, if at date-moment i trade is a relevant topic in analysts' narrative, the entry corresponding to trade in vector p_i should be greater than when trade is not as important. All sentences in each date-moment are distributed $Multinomial(n, p_i)$. We estimate p with the observed topic frequencies in each moment and use the Hellinger distance to quantify changes in these distributions, we call this a measure of surprise. Hellinger distance between two discrete distributions P and Q is given by

$$H(P, Q) = \sqrt{\frac{1}{2}\sum_i (\sqrt{p_i} - \sqrt{q_i})^2} \tag{4}$$

Here, p_i and q_i are probabilities for cluster i of each of the two distributions P and Q. If the observed distribution of sentences in a given date-report is very different from another date-report distribution it should have a higher surprise. Hellinger distance is a metric bounded by 1 and straightforward to understand; it is bigger if the probability of each of the topics changes more. Even though there are many ways for measuring similarity between probability distributions, we chose this one for its simplicity, and because it is symmetric and satisfies the triangle inequality. Also, it has ideal qualities that we are looking for when we discuss a change of subject on a text. For example, if a subject that is largely discussed in the past (measure P) is no longer largely discussed in the present (measure Q), the Hellinger distance will show a larger change if only one subject that was not discussed in the past picks up the relative frequency than a subject that already was largely discussed. Transitively,

changes are smaller if several topics each receive a fraction of the relative frequency, but a change is considered larger the more subjects that were not discussed at all are discussed now.

Given what topics the EAs address and the characteristics of how they address them, there are topics that don't appear in some of the reports or in the Central Banks' minutes. For example, topics about the economic analyst's opinion on the Central Bank's views on growth, or EAs' forecasts for Mexican Government bonds will never appear in the minutes. When comparing distribution of topics covered in more than one type of reviews we simply don't consider the topics that usually don't appear in any of the implied reports.

We found that the surprise induced by the MMPD on analyst reviews is (almost always) greatly reduced if the initial EAs distribution is updated with the sentences in the minute, this suggests that the emphasis on topics covered by the minutes is absorbed by the EAs narrative. As a reference, we compute the surprises between analyst reviews and the uniform distribution to test whether the concentration of topics increases after the MPD and after the MPDD. Proximity to the uniform distribution (in which entropy is maximal) is interpreted as a low topic concentration, which suggests whether analysts don't agree in which topics are a priority for the CB and might have driven the MPD or that they write just about every topic. We found the concentration of topics to increase after the MMPD 58% of times, whereas the concentration of topics decreases 96% of the times after the MPD.

6 Results: Correlations with financial variables

In this section, we show that changes in the distribution of the topics are correlated with changes in financial variables. The main results are in table 3.

There, we regressed the measure of the surprise in the analysts' texts with changes observed

	20-year Bond		10-year Bond		USDMXN Abs Chg		USDMXN Chg	
	(1)†	(2)	(3)†	(4)	(5)†	(6)	(7)†	(8)
MMPD Surprise	0.342***	0.302***	0.251*	0.206*				
	(0.095)	(0.084)	(0.096)	(0.083)				
Days Since Inflation	−0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000
	(0.002)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
Inflation in Period	0.001	−0.005	0.024	0.020	0.001	0.001	0.000	0.002
	(0.018)	(0.018)	(0.018)	(0.017)	(0.002)	(0.002)	(0.003)	(0.003)
US Yield Curve Chg	0.121	0.139	0.257*	0.234*	0.012	0.019	−0.007	−0.004
	(0.108)	(0.098)	(0.108)	(0.096)	(0.013)	(0.012)	(0.021)	(0.021)
MPD Surprise					−0.013+	−0.012*	0.019+	0.017+
					(0.006)	(0.006)	(0.010)	(0.010)
Rate Spread Before					−0.002	−0.001	0.003	0.000
					(0.004)	(0.003)	(0.006)	(0.004)
Rate Spread After					−0.000	0.000	−0.001	0.000
					(0.004)	(0.003)	(0.006)	(0.004)
Intercept	−0.108	−0.074	−0.068	−0.042	0.030	0.012	−0.018	−0.010
Observations	63	63	63	63	64	64	64	64
R^2	0.422	0.271	0.343	0.199	0.314	0.183	0.326	0.082

Standard errors in parenthesis.
† Marked models include year fixed effects.
+ $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Table 2: Regression models linking surprise in EAs narrative induced by the MMPD with absolute change in government bond yields and surprise in EAs narrative induced by the MPD with percent change in USDMXN.

	20-year Bond		10-year Bond		2-year Bond		1-year Bond	
	(1)†	(2)	(3)†	(4)	(5)†	(6)	(7)†	(8)
MMPD Surprise	0.342***	0.302***	0.251*	0.206*	−0.028	0.015	−0.168	−0.077
	(0.095)	(0.084)	(0.096)	(0.083)	(0.057)	(0.051)	(0.103)	(0.091)
US Yield Curve Chg	0.121	0.139	0.257*	0.234*	−0.007	−0.017	0.014	0.091
	(0.108)	(0.098)	(0.108)	(0.096)	(0.068)	(0.071)	(0.059)	(0.105)
Days Since Inflation	−0.002	0.002	0.000	0.000	0.001	0.001	0.002	0.001
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Inflation in Period	0.001	−0.005	0.024	0.020	0.011	0.005	0.034	0.032
	(0.018)	(0.018)	(0.018)	(0.017)	(0.011)	(0.011)	(0.019)	(0.019)
Intercept	−0.0963	−0.0619	−0.085	−0.061	−0.033	−0.053	0.073	0.029
Observations	63	63	63	63	62	62	63	63
R^2	0.422	0.271	0.343	0.199	0.236	0.041	0.260	0.068

Standard errors in parenthesis.
† Marked models include year fixed effects.
+ $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Table 3: Regression models linking surprise in analysts narrative induced by the MMPD with absolute change in government bond yields.

the day of the publication of the relevant information by Banxico. For example, in the first column, we regressed the change in the Mexican 20-year bond yield the day of the publication of the minutes of the monetary policy decision to the measure of the change in the frequency of topics that analysts wrote about between the text associated to the publication of the monetary policy decision and the text associated to the publication of the minutes of the monetary policy decision. In theory, the only difference should be that now the EAs *know for sure* the reasons of the decision and before that they could only speculate. So, the idea is to correlate the movement in the yield can be associated to the change in that information, which in this paper is measured with the change in the frequency of topics. In that column, we controlled for the year (which in the last subsection was found to contain a lot of the variation in the topics) and still found that the larger the surprise, the larger the increase in the 20-year bond rate. Column 3 does the same for the 10-year yield, and we found the same pattern. In columns 5-8 we also found the measure of the change in the topics the day before and the day after the monetary policy decision, and found that, controlling for foreign and domestic yield curves, a large surprise does not induce a large movement in the exchange rate.

7 Conclusion and further research

After Banxico's communication, namely monetary policy statement, its corresponding minutes, or the Quarterly Inflation Report, we could expect to see some reaction from financial variables and EAs from financial institutions. This would be the case if the analysis and messages displayed by the Central Bank add some information to the markets. After studying the statements of economic analysts before and after the minutes for the monetary policy decisions, we observe more agreement and congruence around the topics concerning

the Central Bank. In other words, the explanation of the decision, the outlook of the economy, and the evaluation regarding the forecasts provided by the Central Bank in the minutes have an impact and a great influence in the analysts' own outlook, at least in the topics they consider relevant to write their clients about. This could mean that the Central Bank's messages make sense to the analysts and consider that they are a good source of information regarding the explanation of the current monetary policy decision and future policy actions, or at least they decide to echo through the same topics. It would be unfortunate for the Central Bank if after a communication, EAs or the press do not pay any attention to the authorities' messages and the dispersion or disagreement of the subjects covered by them remain the same as before the communication. Our study does not say anything about the agreement (or disagreement) of the economists regarding the Central Banks stance or outlook for the economy. However, the content in the analysts' reports constitutes their opinion of the outlook and the expectation of what the Central Bank will do regarding monetary policy in the future. EAs can be considered an intermediate channel on the communication process. Those reports are in general an important input for their clients. Based on their analysis and the interpretation of the Central Bank communications, analysts make recommendations of portfolio positions in the fixed income market, FX market, and equity market to their clients. Those clients are local and foreign investors, traders, and fund managers, among others. Firms also take these reports as an input for investment and overall planning decisions. Therefore, even simply echoing the Central Bank's outlook means that this information displayed by the Central Bank will have impact in the financial markets through this channel.

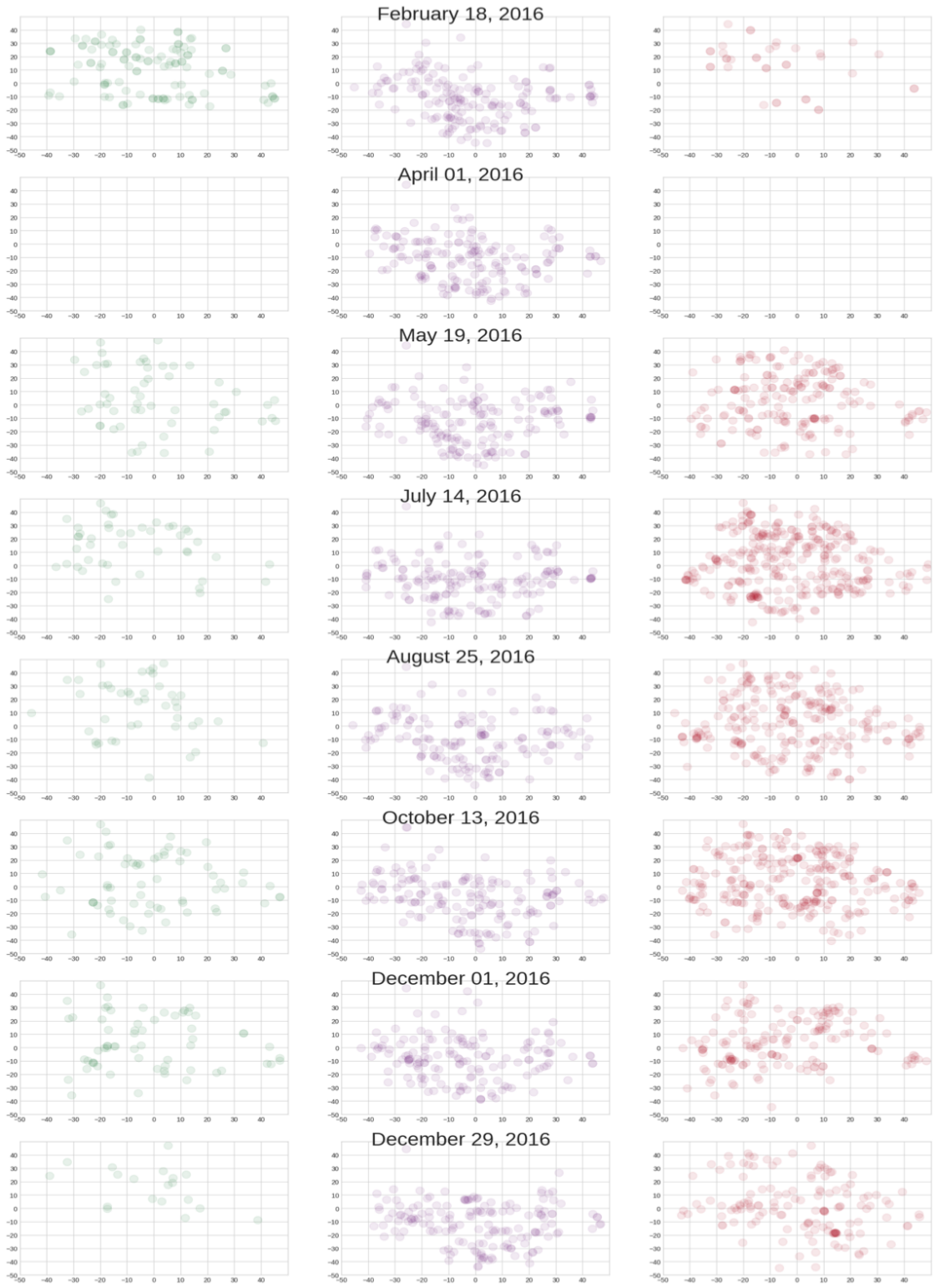
Future steps of this research could include analysing the qualitative content of the monetary policy statements and its evolution over time to revise how this information is interpreted by financial markets. A sentiment Index from Banco de México's communiques (hawkish

versus dovish) could also be constructed and used to evaluate whether it has a relationship with main variables in financial markets. In addition, it could be estimated if it includes information about the future path of the monetary policy rate in addition to the actual monetary policy decision. It could also be studied how the fixed income market (e.g. level and slope of the yield curve) responds to monetary policy statements and confirm if those communication instruments help to guide expectations regarding future monetary policy. Another interesting question could be if such an index has an impact only on short-term rates or also in long-term ones.

Note: left is before the MMPD, center is the minute sentences, and right is after.
Figure 6: The huge dominance of the Fed and the United States economy during 2015 is only seen after the MMPD, not before.

Note: left is before the MMPD, center is the minute sentences, and right is after.

Figure 7: Data for 2014



Note: left is before the MMPD, center is the minute sentences, and right is after.

Figure 8: Data for 2016

References

ARORA, S., Y. LIANG, AND T. MA (2016): "A simple but tough-to-beat baseline for sentence embeddings," *Princeton University MIMEO*.

BHOLAT, D., S. HANSEN, P. SANTOS, AND C. SCHONHARDT-BAILEY (2015): "Text mining for central banks," *Available at SSRN 2624811*.

BLEI, D. M., A. Y. NG, AND M. I. JORDAN (2003): "Latent dirichlet allocation," *Journal of machine Learning research*, 3(Jan), 993–1022.

BLINDER, A. S., M. EHRMANN, M. FRATZSCHER, J. DE HAAN, AND D.-J. JANSEN (2008): "Central bank communication and monetary policy: A survey of theory and evidence," *Journal of Economic Literature*, 46(4), 910–45.

CER, D., M. DIAB, E. AGIRRE, I. LOPEZ-GAZPIO, AND L. SPECIA (2017): "Semeval-2017 task 1: Semantic textual similarity-multilingual and cross-lingual focused evaluation," *arXiv preprint arXiv:1708.00055*.

CER, D., Y. YANG, S.-Y. KONG, N. HUA, N. LIMTIACO, R. S. JOHN, N. CONSTANT, M. GUAJARDO-CESPEDES, S. YUAN, C. TAR, ET AL. (2018): "Universal sentence encoder," *arXiv preprint arXiv:1803.11175*.

DAS, S., S. GHOSH, S. BHATTACHARYA, R. VARMA, AND D. BHANDARI (2019): "Critical Dimension of Word2Vec," in *2019 2nd International Conference on Innovations in Electronics, Signal Processing and Communication (IESC)*, pp. 202–206. IEEE.

FILARDO, A., AND D. GUINIGUNDO (2008): "Transparency and communication in monetary policy: a survey of Asian central banks," in *BSP-BIS High-Level Conference on Transparency and Communication in Monetary Policy, Manila*, vol. 1.

GOLDBERG, Y., AND O. LEVY (2014): "word2vec Explained: deriving Mikolov et al.'s negative-sampling word-embedding method," *arXiv preprint arXiv:1402.3722*.

KAHVECI, E., AND A. ODABAŞ (2016): "Central banks' communication strategy and content analysis of monetary policy statements: The case of Fed, ECB and CBRT," *Procedia-Social and Behavioral Sciences*, 235, 618–629.

MAATEN, L. V. D., AND G. HINTON (2008): "Visualizing data using t-SNE," *Journal of machine learning research*, 9(Nov), 2579–2605.

MIKOLOV, T., I. SUTSKEVER, K. CHEN, G. S. CORRADO, AND J. DEAN (2013): "Distributed representations of words and phrases and their compositionality," in *Advances in neural information processing systems*, pp. 3111–3119.

PATEL, K., AND P. BHATTACHARYYA (2017): "Towards lower bounds on number of dimensions for word embeddings," in *Proceedings of the Eighth International Joint Conference on Natural Language Processing (Volume 2: Short Papers)*, pp. 31–36.

PENNINGTON, J., R. SOCHER, AND C. MANNING (2014): "Glove: Global vectors for word representation," in *Proceedings of the 2014 conference on empirical methods in natural language processing (EMNLP)*, pp. 1532–1543.

REIMERS, N., AND I. GUREVYCH (2019): "Sentence-bert: Sentence embeddings using siamese bert-networks," *arXiv preprint arXiv:1908.10084*.

TER ELLEN, S., V. H. LARSEN, AND L. A. THORSRUD (2021): "Narrative monetary policy surprises and the media," *Journal of Money, Credit and Banking*.

WIETING, J., M. BANSAL, K. GIMPEL, AND K. LIVESCU (2015): "Towards universal paraphrastic sentence embeddings," *arXiv preprint arXiv:1511.08198*.

Appendix

Table 4 shows a random sample of sentences across some topics, we include as a reference the most common words occurring in each topic. Note that, if we focus only on these words, we lose details about the intended interpretation of the topic, for example whether the sentence is issued as an opinion or as facts, whether it is part of the CB communication or references it, etc.

Interpretation	Topic	Moment	Sentence
Views on inflation: core inflation, gasoline and agricultural gasolina precios-digito-inflacion efectos-precios	0	4	esto podria afectar la inflacion subyacente a traves de bienes y servicios intensivos en mano de obra
		2	y lo hizo incluso cuando la inflacion general esta comenzando a caer y los precios de la energia el gran impulsor de las subidas de precios en los ultimos meses tambien cayeron drasticamente en el ultimo mes
		2	esto sucedera debido a un efecto base favorable hubo aumentos de impuestos a principios de digito el plan del gobierno para establecer la inflacion del precio de la gasolina en digito a a a partir del proximo ano por debajo de las impresiones de dos digitos de este ano y por supuesto la postura de la politica monetaria
		2	creemos que el pass through de mayores precios en materias primas especialmente en comida se extendera mas alla de los primeros meses del ano
		3	uno detallo que a diferencia de lo ocurrido en digito y digito los precios de los energeticos han dejado de ser un factor determinante ante la nueva politica de precios del gobierno y la disminucion en los ultimos meses de los precios internacionales del petroleo
Future decisions of MPC; tone of its communication monetaria-postura banco-politica digito-politica banxico monetaria-politica	2	1	entonces considerando la tradicional renuencia de banxico a sorprender a los mercados confirmamos nuestro escenario donde no se anunciara un cambio en la tasa de fondeo este viernes
		1	la debilidad del mxn podria llevar a banxico a actuar pronto
		4	de hecho el pasaje de politica monetaria sugiere que no hay sesgo en la futura direccion de las decisiones de politica monetaria
		2	en consecuencia creemos que cualquier pronunciamiento de la curva local dependeria en gran medida de una combinacion de un gobierno amistoso de amlo y de una flexibilizacion de las desafiantes condiciones de los mercados emergentes que permitan a los mercados descontar una flexibilizacion de la postura monetaria durante los proximos trimestres
		4	esta es una evaluacion subjetiva que en nuestra opinion tambien significa que leer banxico y cb con ideas afines seguira siendo interesante
Risk balances on inflation: short term deteriorado balance-riesgos-crecimiento balance-inflacion-riesgos	3	2	los miembros del comite de politica monetaria destacaron que el balance de riesgos para la inflacion en el corto plazo se ha deteriorado principalmente debido a factores transitorios
		2	el comunicado senala que el balance de riesgos para el crecimiento ha mejorado en el margen
		2	mientras que el balance de riesgos inflacionarios no se modifico destacamos la introduccion de un nuevo riesgo a la baja
		2	tanto las perspectivas de inflacion a corto como a medio plazo se han deteriorado
		4	en resumen la mayoria estuvo de acuerdo con el deterioro del equilibrio de riesgos para el crecimiento

FX, inflation and volatility: interpretations central-banco digito crecimiento riesgos inflacion	5	1 2 4 2 3	esperamos que los directores logren mayor consenso la proxima semana enfatizando la importancia de mantener una postura alerta y flexible dado el balance esperado de riesgos para la inflacion al alza y el crecimiento hacia abajo parece que la reciente depreciacion del mxn y su posible impacto en la inflacion ha reducido la probabilidad de un recorte de tasas a pesar de los riesgos a la baja para el crecimiento economico sin embargo algo que parece mas claro en esta etapa es que el ciclo de ajuste podria ser mas corto de lo esperado originalmente dado el entorno de una inflacion mas baja un crecimiento mas suave y las acciones recientes en la politica economica que incluye consideraciones cambiarias y fiscales el resultado de digito a a fue mucho mejor de lo esperado digito pero el analisis inicial no muestra una recuperacion de base amplia adicionalmente uno de ellos argumento que el moderado ritmo de expansion de estas economias resulta de la combinacion de factores tanto ciclicos como estructurales asi como de un entorno externo complicado
MPC and its actions on inflation postura digito junta inflacion monetaria-politica	6	4 3 4 1 4	la mayoria de los miembros de la junta parecen estar preocupados por enviar una senal de que se puede implementar una relajacion de la situacion monetaria pronto en este contexto algunos miembros argumentaron que existe duda sobre los ajustes que deberan realizarse a la economia china dada la gran incertidumbre sobre la tasa de crecimiento de largo plazo a la que convergera y si dicha convergencia sera abrupta o gradual observamos que como se refleja en la declaracion del digito de diciembre la dinamica de precios sigue siendo la principal preocupacion para la politica monetaria en mexico la autoridad monetaria mexicana se mantendra en pausa un mes mas por lo que la atencion del mercado estara en el tono del comunicado que acompana a la decision mismo que anticipamos sera de neutral a hawkish aunque no lo suficiente como para pensar en una subida de tasas en el futuro cercano todos los directores compartieron que en el futuro el mpc debe monitorear cuidadosamente los determinantes impulsores de la inflacion para estar en condiciones de ajustar oportunamente la posicion monetaria para volverla mas o menos restrictiva ... un director llego a enfatizar la importancia de enviar la senal inequivoca ...
Announcements about MMPD monetaria-reunion minutas politica-reunion monetaria-digito-politica	8	2 4 4 4 4	la proxima reunion de politica monetaria tendra lugar el digito de diciembre las minutas estan fechadas con respecto al informe de inflacion publicado el digito de agosto y al discurso del gobernador carstens para presentarlo la proxima decision politica se anunciara el digito de agosto una vez mas luego de la decision del fomc el digito de julio el contenido de la minuta de banxico correspondiente a la reunion de junio confirma una postura dependiente de la fed lo que refuerza nuestro cambio de pronostico el banco central publico hoy las minutas de la reunion del comite de politica monetaria mpc del digito de octubre
CB's forecasts for inflation general-inflacion digito-debajo inflacion-debajo digito-inflacion-ano	10	1 3 3 2	por lo tanto pensamos que podrian bajar la tasa sabiendo que la inflacion seguira cediendo inclusive teniendo en cuenta que la inflacion subyacente esta por debajo de digito como ha sido el caso durante el ano la mayoria de los miembros preve que la inflacion general anual alcance su nivel maximo en los proximos meses para despues retomar una trayectoria descendente y uno anadio que se espera una trayectoria similar para la inflacion subyacente uno apunto que estas se encuentran dentro del rango de variabilidad y que se espera que se mantengan ahi pero todas ellas visiblemente por arriba de la meta permanente del digito anual

		1	respecto a la inflacion esperamos que se subraye que la tasa de variacion anual del inpc ha comenzado una trayectoria descendente congruente con la convergencia hacia el objetivo
Risks, forecasts and levels of indices: inflation banxico central-inflacion informe-inflacion general banco-inflacion digito-inflacion	12	1 3 1 3 1 2	mas recientemente en su ultimo informe trimestral de inflacion banxico reconocio dos cuestiones importantes i la convergencia de la inflacion tardara mas de hecho un miembro agrego que la inflacion en la mayoria de las economias avanzadas ya esta por debajo de su objetivo y que existen riesgos a la baja para la inflacion desde la ultima reunion de politica a fines de noviembre las noticias han sido abrumadoramente moderadas la inflacion ha caido por debajo del digito los salarios se han mantenido estables el peso se ha fortalecido y el crecimiento se ha desacelerado en cuanto a los pronosticos de inflacion la mayoria estimo que la inflacion general para el cierre de digito pudiera situarse por debajo del pronostico del informe trimestral julio septiembre digito el informe de inflacion de julio no cambio el panorama de la inflacion de manera material del banco sobre la inflacion general tiene la inflacion anual tocando fondo en el primer trimestre y luego aumentando a entre digito y digito ...
Forecasts, opinions and interpretations tasa-politica digito-inflacion tasa-inflacion banxico tasa-digito interes tasas	13	2 2 2 2 1	ademas sentimos que segun los propios calculos del banco central la tasa de interes de referencia ya se encontraba en territorio neutral y que ir mas alla de ella en esta etapa podria ser indebidamente restrictivo ... mas aun dado que las tasas reales serian bastante altas en medio de una brecha de produccion negativa cada vez mayor esto valida la orientacion prospectiva del banco central de que las tasas deberian permanecer en espera en el futuro previsible dado que las tasas nominales y reales ahora estan cerca de cero la politica fiscal se esta volviendo mas expansiva y la recuperacion conducira al ajuste gradual de la brecha de produccion negativa la depreciacion del mxn y los aumentos de las tasas de interes en la curva de rendimiento mexicana se moderaron luego de la ultima decision ... si bien la autoridad reconoce que la tasa anual de la inflacion ha repuntado a niveles mayores a lo previsto preferira esperar a las proximas quincenas para analizar si efectivamente las presiones se moderan y en algunos casos se revierten
Interpretations on possible scenarios riesgos monetaria politica mexico	14	1 4 3 4 3	finalmente esperamos un viaje accidentado para la discusion del t mec que tiende a ejercer presion sobre la moneda agregando volatilidad en los activos locales un miembro senalo que la flexibilizacion imprudente de la politica monetaria constituiria una fuente adicional de incertidumbre y podria tener el efecto contrario al previsto en primer lugar apunto que es incierto el nivel al que convergiran las tasas de interes de largo plazo en estados unidos y en general a nivel global banxico cree que el mxn se vendio debido a la prima de trump de este modo se solucionaria el problema de turbulencia financiera y la economia global se ubicaria entonces en una situacion de desaceleracion con la cual los mercados saben lidiar de manera ordenada
References to CB communication junta-inflacion digito-inflacion banco junta-miembros	15	4 2 2	las minutas de banxico referentes a la decision del pasado digito de marzo reflejaron un sesgo dovish destacando el efecto de la holgura en el mercado laboral y en la economia en general dentro de un probable escenario de baja inflacion a lo largo del ano de acuerdo con esto los directores tambien estan menos preocupados por el peso por otro lado el banco central sigue reconociendo en su parrafo de politica que debe estar atento a que los choques de precios recientes que han llevado a la inflacion general a superar la meta de las autoridades no conduzcan a una contaminacion de precios mas amplios en la economia

		2	el mensaje de banxico de que los riesgos de inflacion se inclinan al alza debido a los choques de oferta pero que las presiones por el lado de la demanda aun estan bien contenidas sigue estando de acuerdo con nuestra opinion
		2	en el ultimo parrafo del comunicado banxico enumera los factores en lo que creemos que es el orden de importancia
		3	un miembro de la junta agrego que una evaluacion de las expectativas sugiere que los analistas siguen considerando que los choques a la inflacion han sido estrictamente temporales
FX levels mxn-digito-usd digito-peso depreciacion banxico inflacion	17	2	en ese sentido eliminar el recorte podria ayudar al mxn ya que elimina la incertidumbre que parecia estar colgando sobre la moneda
		4	ademas se espera que la reciente apreciacion del peso de alrededor del digito este ano mitigue los efectos inflacionistas anteriores de la debilidad de la moneda anterior
		4	sin embargo si el usd mxn se estabiliza preferiblemente a niveles mas bajos como los mas cercanos a los digito mas bajos los digito mas altos que podrian ser mas consistentes con un tipo de cambio de equilibrio real a largo plazo habra espacio para recortes de tasas
		1	en una entrevista reciente de bloomberg el digito de agosto al responder a la pregunta de cuan dificil podria ser recortar la tasa de politica con el peso en los niveles actuales el gobernador del banco central agustin carstens dijo el peso se basa en un regimen de tipo de cambio flotante
		2	en la actualidad el mxn se cotiza aproximadamente un digito a bajo precio con respecto a su tipo de cambio real efectivo tcer promedio de digito anos y en el mediano plazo vemos espacio para que esto se corrija
Inflation expectations expectativas-digito-inflacion mediano expectativas-plazo-inflacion	19	1	banxico recorto drasticamente su pronostico de crecimiento del pib para digito y digito al tiempo que reitero que la inflacion se mantiene por debajo del punto central de la meta del digito y que las expectativas estan bien ancladas
		3	al respecto uno de los integrantes advirtio que no debe perderse de vista el aumento si bien ligero en las expectativas para el largo plazo ni el hecho de que se ubiquen en niveles por encima de la meta
		2	el comunicado del banco tambien menciono el hecho de que a pesar de la caida de la inflacion general solo las expectativas de inflacion de corto plazo se han visto afectadas las expectativas de mediano plazo no han cambiado y se mantienen mas cercanas al digito digito
		2	el mpc comento que dada la magnitud y simultaneidad de los choques que vienen impactando la inflacion y el alto nivel alcanzado por la inflacion recientemente el principal desafio que enfrenta el mpc es mantener ancladas las expectativas de inflacion de mediano y largo plazo y reforzar las tendencia descendente de la inflacion hacia la meta
		4	si bien la mayoria sostiene que las expectativas de inflacion se han reducido en el corto plazo y se mantienen ancladas en el corto plazo es notoria la preocupacion de que el impacto en la inflacion podria ser mas fuerte de lo previsto
Interpretation about inflation expectations tendencia general-subyacente-inflacion subyacente-inflacion-digito	20	3	otro destaco que si bien el componente subyacente ha mostrado rigidez ha comenzado a mostrar una fase descendente
		3	apuntaron que podrian presentarse menores presiones en el subindice no subyacente tal como ha sucedido con los energeticos ante una mayor debilidad economica mundial lo cual tambien contribuiria a reducir la inflacion subyacente
		4	inflacion la junta indico que la inflacion se recupero recientemente pero destaco que el componente no subyacente fue el principal impulsor
		3	la mayoria apunto que en gran parte de los casos la recuperacion ha venido acompanada de una inflacion bien comportada

		4	la reciente disminucion de la inflacion general fue reconocida por todos los directores que la vieron impulsada por la disminucion significativa de la tasa no subyacente y la mayoria senalo que la inflacion subyacente se mantuvo persistente en torno al digito digito
Labor market and its slackness laboral-mercado-holgura presiones-demanda economia-holgura	21	2 3 2 2 2	y no vemos presiones de demanda a la vista por su parte otro senalo que persiste el riesgo de que las condiciones de holgura se amplien la junta de gobierno resalto que considerando que la economia no presenta condiciones de holgura ello se podria reflejar en mayores presiones inflacionarias a pesar de la ausencia de presiones significativas sobre los precios desde el lado de la demanda no hay aparente holgura en el mercado laboral los formuladores de politicas aun creen que la holgura en el mercado laboral y la economia persiste y esperan que la inflacion se acerque a su objetivo del digito el proximo ano
CB views on growth risks balance-crecimiento balance-riesgos-baja crecimiento-riesgos-baja	23	2 2 3 2 4	balance de riesgos para el crecimiento global continua sesgado a la baja banxico destaca que se mantienen elevados los riesgos a la baja sobre la actividad domestica sin embargo considera que estos son menores en relacion a la reunion anterior todos los miembros de la junta de gobierno enfatizaron que ante la lenta recuperacion de la demanda interna que se espera continue durante los proximos meses se considera que siguen existiendo importantes riesgos a la baja para el crecimiento e incluso algunos senalaron que el balance de riesgos se ha deteriorado en pocas palabras los riesgos para el crecimiento estan fuertemente sesgados a la baja y la economia sufre vientos en contra tanto externos como internos finalmente la mayoria de los miembros de la junta declaro que el equilibrio de riesgos para el crecimiento esta sesgado a la baja
CB actions on FX and financial markets interes mxn banxico politica tasa inflacion	24	2 2 2 3 2	es cierto que la declaracion de abril tuvo una inclinacion muy moderada en el sentido de que el banco central anunciaba que si las condiciones financieras mundiales se estabilizaran estaria listo para recortar en un mundo de condiciones monetarias laxas pero para dar mas informacion sobre como vemos la funcion de reaccion de banxico vemos como condiciones necesarias para un alza un alza de la fed en septiembre y una depreciacion de al menos digito del mxn seguimos pensando que hay mas en camino y que el corte de hoy marca el comienzo de un ciclo de flexibilizacion necesario y muy retrasado uno opino que la contraccion se asocia a factores de oferta y a tasas de interes activas relativamente elevadas la ultima encuesta de banamex mostro un pronostico promedio de digito para la tasa de interes a un dia a fines de digito con opiniones del mercado bastante divididas sobre si el proximo movimiento de politica sera un recorte de tasas o un aumento de tasas
Foreign outlook: developed countries recuperacion miembros economica-actividad mayoria economia crecimiento unidos-estados	25	2 4 3 4 4	las perspectivas de crecimiento se han revisado a la baja debido principalmente al deterioro de las perspectivas economicas de ee uu en los mercados emergentes el pronostico de crecimiento se ha seguido revisando a la baja mientras que las condiciones financieras se han estabilizado recientemente en parte debido a la respuesta de las autoridades en algunos de estos paises algunos miembros anadieron que se ha observado una lenta expansion del comercio mundial y uno de ellos enfatizo el acrecentamiento de corrientes opuestas a la globalizacion en los estados unidos la actividad economica en el digito t digito fue menos dinamica de lo esperado debido principalmente a los factores transitorios asociados con el clima disruptivo en lo correspondiente al contexto internacional la evaluacion de la junta fue mas optimista sobre la evolucion economica y financiera reciente

		2	con respecto a la actividad economica global el mensaje se mantuvo pesimista al mencionarse que la desaceleracion persistio y las perspectivas de crecimiento se han revisado nuevamente a la baja
Analysts opinions referencia ciclo digito-tasas digito-ano tasa-digito banxico digito-pb	26	1 1 2 2 2 4	recientemente subrayamos un escenario donde esperamos un recorte de digito pb en algun punto durante la primera mitad de ano la curva forward de tiie esta fijando un precio de un recorte total de tasas de digito pb dentro del proximo ano con una pequena probabilidad dentro de los proximos digito meses aplanamiento en la curva de rendimientos despues de la decision de banxico de aumentar su tasa en digito pb acompanado de un comunicado con un sesgo hawkish con un mercado que descuenta con una modesta probabilidad implicita un incremento adicional los swaps de tasas de interes estan fijando tasas sin cambios en digito y digito pb de subidas de tasas en digito reiteramos asi nuestro pronostico de que el nivel actual de la tasa objetivo de digito representa el pico en el ciclo de apretamiento monetario de banxico aunque consideramos que es aun muy pronto para decir que no hay riesgo de incrementos adicionales los participantes del mercado estan valorando el digito de la probabilidad de un recorte de la tasa de digito pb en el digito s digito
References to MPC and CB estabilidad central digito mexico economia banco inflacion monetaria-politica	27	2 3 4 4 3 4	si la debilidad persiste no podemos descartar un cambio de politica la mayoria de los miembros recalco que un factor que posiblemente este afectando la cotizacion de la moneda nacional podria estar relacionado con las implicaciones que la caida en el precio del petroleo pudiera tener para la economia mexicana especificamente para las finanzas publicas y para pemex el espacio de maniobra para las politicas fiscales y monetarias es muy limitado por lo que cualquier ajuste adicional debe tomarse con precaucion tambien un miembro enfatizo que dada la persistencia de una situacion de elevada incertidumbre y riesgos al alza para la inflacion la politica monetaria deberia seguir enfatizando prudencia y fortalecer su credibilidad la mayoria de los integrantes coincidio que los riesgos derivados de la situacion en grecia no se han disipado en virtud de las dificultades para lograr un nivel de endeudamiento sostenible en ese pais a lo que uno agrego que esta situacion reactivo el riesgo de cola que implica la fragmentacion de la zona del euro y pone de manifiesto las debilidades estructurales de la zona por ello comento que llevar a cabo un ajuste fiscal adicional no solo puede evitar una reduccion en la calificacion crediticia sino que podria impulsar una mejoria en este indicador al sorprender favorablemente al mercado e incluso ayudar a sentar las bases correctas para cualquier negociacion con el nuevo gobierno estadounidense
Interpretations of forecasts on MPD banxico-inflacion interes tasas politica tasa-inflacion tasa-digito digito-inflacion	28	1 3 2 4 3	el reporte de inflacion publicado esta manana sorprendio al mercado de manera positiva situacion que ha afianzado la perspectiva de algunos participantes de que banxico podria bajar la tasa de referencia en el corto plazo por ello comento que la tasa de interes real en nuestro pais es actualmente la mas alta dentro del conjunto de digito paises emergentes analizados esta es una llamada fuera de consenso como una operacion tactica vemos cierto valor en recibir tasas swap a digito anos dado que estan por encima del digito y los minutos fueron menos agresivos de lo esperado por el mercado un integrante considero que un ajuste de la tasa de interes de referencia de digito puntos base es insuficiente para reconocer los avances que se han logrado en materia macroeconomica y la mitigacion de riesgos en los ultimos meses y que significaria ir detras de la curva ya anticipada por el mercado

		1	la inflacion general apunta a un promedio de digito durante el digito t digito que es considerablemente menor a la proyeccion de banxico para este periodo de digito
Risks, possible outcomes: growth, inflation, FX brecha plazo-corto precios plazo-inflacion digito economia crecimiento riesgos-inflacion	30	3 2 3 2 2 1	de manera relacionada tambien sostuvo que es probable que durante el ano en curso el deficit de la cuenta corriente se ubique en alrededor de digito puntos del pib en parte debido al incremento en los rfsp aun tomando en cuenta que parece haber un grado considerable de equivalencia ricardiana en mexico naturalmente hay una diferencia clave sin embargo cuando se trata de la evaluacion de los riesgos de inflacion en el futuro la afirmacion de que algunos de los riesgos al alza para la inflacion identificados por el banco central han comenzado a materializarse es clave uno menciono que estados unidos transita por un ciclo atipico ya que registra la tasa de desempleo mas baja desde hace mas de digito anos y presenta una inflacion inferior a la meta con la expectativa de que esta converja a su objetivo de manera gradual en los proximos anos el mpc parece mas comodo con el impacto hasta ahora o su ausencia de la depreciacion anterior del mxn y los riesgos cambiarios en general banxico modifico a la baja su perspectiva de inflacion al cierre del digito si tomamos en cuenta que los consejeros han expresado que el traspaso ha disminuido significativamente en los ultimos anos y que el peso esta claramente subvaluado existe una alta probabilidad de recortes de tasas mas en el sombrio entorno de crecimiento que prevemos
Real economy: private consumption, industrial, investment produccion-industrial desaceleracion economica crecimiento demanda actividad economia sector exportaciones	31	1 2 4 4 3 3	y la economia aun no se ha desacelerado hay un menor dinamismo de las exportaciones de manufacturas que a su vez a resultado en un impacto en las actividades del sector de servicios relacionadas con el comercio exterior destaca tambien la evolucion favorable de las exportaciones en particular hacia el mercado de eua entre los principales factores que han frenado la economia destacan la debilidad de la demanda externa el rezago en la ejecucion del gasto publico y la contraccion en el sector de la construccion respecto de la demanda externa la mayoria senalo que las exportaciones manufactureras perdieron dinamismo y que se vieron afectadas por las huelgas en el sector automotriz en estados unidos si bien uno considero que las exportaciones continuaron con una tendencia positiva en cuanto a la demanda externa la mayoria indico que las exportaciones manufactureras perdieron dinamismo si bien algunos senalaron que las manufacturas automotrices con destino a estados unidos contrarrestaron parcialmente la caida
Growth forecasts: national and international economica economico economia-crecimiento global inflacion-crecimiento digito-crecimiento riesgos actividad	32	3 3 4 4 1 2	uno de los integrantes menciono que el consenso de los analistas espera una recuperacion gradual de la actividad economica mundial si bien otro agrego que las previsiones de crecimiento a nivel global para un miembro reflexiono sobre algunas de las condiciones de largo plazo que podrian estar moderando el crecimiento economico mundial y que posiblemente han estado conduciendo a menor inflacion y menores tasas de interes a nivel global otro recalco que este es un choque al ingreso permanente o al crecimiento potencial el digito restante es esencialmente solo para compensar los menores ingresos fiscales este ano como resultado de un crecimiento mas debil algunos miembros agregaron tres riesgos potenciales que podrian impactar negativamente en la actividad economica en el futuro digito disminuciones adicionales en los precios del petroleo digito una mayor caida en la produccion de petroleo y digito la persistencia de manifestaciones sociales en el pais el banco central ha mostrado poca urgencia para iniciar la normalizacion de las tasas dada la holgura que todavia prevalece en la economia y los pocos riesgos inflacionarios por el lado de la demanda el impacto del recorte en el crecimiento tambien es dificil de evaluar

Table 4: Random sample of sentences, our interpretation of the topic and its most frequent words, its cluster, and the moment in which the sentence was issued

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