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POLITICS AND INFORMATIONAL EFFICIENCY: BRAZILIAN TERM STRUCTURE

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Dissertação submetida ao Programa de Pós-Graduação em Economia da Faculdade de Ciências Econômicas da UFRGS, como requisito parcial para obtenção do título de Mestre em Economia, modalidade profissional, área de concentração: Economia do Desenvolvimento.

Orientador: Prof. Dr. Nelson Seixas dos Santos

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RESUMO

A política econômica, como afeta o estado da economia, tem um grande impacto nos retornos de ativos financeiros. A continuidade ou mudança na política econômica, entretanto, não ocorre sem contexto, sendo sempre resultado do contínuo processo político do dia a dia. Nesse contexto, o problema abordado nesta pesquisa é se a política diária afeta a dinâmica da estrutura a termo das taxas de juros. Utilizamos a técnica de web-scraping para coletar notícias políticas dos principais portais de notícias brasileiros. Consideramos a estrutura a termo da taxa de depósitos interbancários de um dia, que está intimamente relacionada à política monetária brasileira, e estimamos a estrutura a termo com dados sobre a taxa de juros atual e seus contratos futuros. Por fim, testamos se o volume diário de notícias políticas causa volatilidade na estrutura a termo das taxas de juros. Descobrimos que a política afeta a estrutura a termo das taxas de juros. Para vencimentos específicos e com defasagens limitadas, nossos resultados mostram causalidade significativa entre notícias políticas e a estrutura a termo. As principais implicações de nossas descobertas estão relacionadas ao gerenciamento de risco em carteiras de investimento. A política do dia a dia mostra-se uma valiosa fonte de informação para a previsão do risco da estrutura a termo, e assim os dados sobre os eventos do processo político contínuo podem ser adicionados ao conjunto de informações utilizadas pelos investidores no processo de gestão de carteiras.

Palavras-chave: Mercados Eficientes. Política. Estrutura a Termo. Taxas de Juros. Ciência de Dados.

ABSTRACT

Economic policy, as it affects the state of the economy, has a major impact on financial returns. The continuation or change in economic policy, however, does not occur without context, and is always a result of the continuous day-to-day political process. In this context, the problem we address in this research is whether daily politics affects the dynamics of the term structure of interest rates. We use web-scraping to collect political news from major Brazilian news portals. We consider the term structure of the one day inter-bank deposits rate, which is closely related to Brazilian monetary policy, and we estimate the term structure with data on the actual interest rate and its future contracts. We finally test whether the daily volume of political news causes volatility in the term structure. We find that politics does affects the term structure of interest rates. For specific maturities and with limited lags, our results show significant causality between political news and the term structure. The major implications of our findings relate to the management of risk in investment portfolios. Day-to-day politics is found to be a valuable source of information for the prediction of term structure risk, and thus the data on events of the continuous political process may be added to the set of information used by investors in the portfolio management process.

Keywords: Efficient Markets. Politics. Interest Rates.

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1 INTRODUCTION

The semi-strong market efficiency as defined in (FAMA, 1970) states all information about future prices is embedded in actual market prices so that publicly available news should not serve as a predictor of market prices. This means prices absorb information immediately, leaving aside any arbitrage opportunity.

That result is particularly interesting to the economic policy since it guarantees its effects will take place as soon as possible. Economic policy though isn't the only policy made by governments, and other policies may as well affect the economy. Actually, any policy whatsoever may impact financial returns since the latter are affected by the state of the economy as supposed by any asset pricing model like, for instance, (MERTON, 1973), (JR, 1978) or (HARRISON; KREPS, 1979). Moreover, models like (KYDLAND; PRESCOTT, 1982) suggest it takes time for the impact of economic measures to fully reflect on real variables, and it may be the case that financial returns also respond to policies with a delay.

In democratic countries, there is an alternation of power between different political parties, and each one will defend a different economic policy. Elections, then, are events that define economic policy expectations. Uncertainty about the outcome of an election may raise uncertainty about economic policy, and as a consequence market volatility may increase. This behavior is actually reported in (LI; BORN, 2006), (GOODELL; VäHä-MAA, 2013) and (SMALES, 2015).

Moreover, day-to-day political events also affect the various policies of a government - including the economic ones - since they define the division of power between the different parties of the legislative power and even between the different branches of government. These events are generally of less importance than elections, and we should therefore expect from them a lesser impact on the financial markets than the one we observe on elections. This expectation is confirmed in (MARQUES; SANTOS, 2016), which reports that stocks respond to few political events while the interest rate responds to none, and (PAULSEN, 2019), which reports that exchange coupon responds to few political events.

Among financial assets, 'sovereign bonds are the asset most directly associated with government policy' (MCMENAMIN; BREEN; MUñOZ-PORTILLO, 2016, p.3). Thus it can be expected that political events will change the expectations for government policy and consequently also bonds' prices, affecting the term structure of interest rates.

Furthermore, these events may influence market volatility as an increase in trading volume occurs while investors 'rebalance their portfolios in light of the news' (SMALES, 2013).

In that scenario, the term structure of interest rates seems to be of paramount importance in the assessment of the effects of politics in the financial markets, since it captures each day the whole dynamics of the cost of money for years to come. The term structure of interest rates is thus the framework we will use to measure what we want to, that is, how long does it take for political events to affect forward interest rates if it affects at all? More specifically, we will test the following hypothesis: does the volume of political news in Brazilian newspapers causes volatility - in the sense of (GRANGER, 1969) - in the term structure of the inter-bank deposits interest rate?

We apply web-scraping in the main Brazilian news portals to collect information on political news articles, with which we calculate the daily volume of published articles on politics. Only open-access news portals are considered. The term structure of interest rates is built with the (VASICEK, 1977) model, using data on the interbank deposits rate and its future contracts. The (BOLLERSLEV, 1986) model is used to estimate the volatility of various maturities of the term structure. Finally, we test if the volume of political news causes - in the sense of (GRANGER, 1969) - volatility in the term structure. The sample period was defined by the availability of data, and ranges from January 2019 to October 2020.

This paper contributes to the literature in the following ways. First, we shed light on the interconnections between politics and financial assets in Brazil, where the structure and power of government differ from the countries generally considered in the literature. Second, we focus on political events in general, even the ones that have taken place when the party in power is not changing - unlike previous research which mainly focus on specific events of arguably great importance, such as elections. Third, we analyze the impact of politics in the whole term structure - which gives information on the value of money for years to come - and thus reveals market expectations for that same period, which ranges from a single day to several years into the future. Finally, we test not only the existence but also the timing of the impact of political information, therefore we shed light on the process of absorption of information by the financial markets.

The organization of the paper goes as follows. Section (2) presents the theory of market efficiency about the behavior of market prices. Section (3) reviews the literature on market efficiency in the case of political information. Section (4) explains the procedure we follow to answer the question we posed. Section (5) shows the results we find and

compares them with the literature we disclosed. Finally, section (6) closes the paper and gives a hint about the continuation of the research.

2 THEORY OF MARKET EFFICIENCY

Market efficiency is the most influential theory of the asset pricing literature since it was popularized in (FAMA, 1970). Other theories developed since were presented as an alternative to the market efficiency theory and their struggle was to account for the market anomalies, namely empirical findings which are considered counter-evidence to market efficiency.

(MALKIEL, 1987, p. 1) defines market efficiency as follows:

'the market is said to be efficient with respect to some information set, Φ , if security prices would be unaffected by revealing that information to all participants. Moreover, efficiency with respect to an information set, Φ , implies that it is impossible to make economic profits by trading on the basis of Φ .

Formally, following (FAMA, 1970), the theory states

$$E[p_{j,t+1}|\Phi_t] = (1 + E[r_{j,t+1}|\Phi_t])p_{j,t}$$
(2.1)

where $p_{j,t}$ is the price of asset j at time t, Φ_t if the information set at time t, and $r_{j,t}$ is the net return of asset j at time t.

The three classical categories for the information set, as posed by (FAMA, 1970) are: weak form, where Φ is past prices; semi-strong form, where Φ is all publicly available information (including past prices); strong form, where Φ is all information, including private (and all publicly available information).

One can ask if hypothetical trading based on a specific Φ would earn economic profits as a test for market efficiency related to Φ . Nevertheless, this requires a specific model that "specifies the nature of market equilibrium when prices 'fully reflect' available information" (FAMA, 1970, p. 414).

In this approach, one must first choose Φ , then specify a model of "normal" returns, and finally compute the abnormal returns as the difference between the return on a security and its normal return, using Φ ((CAMPBELL; LO; MACKINLAY, 1997))."If the abnormal security return is unforecastable, [...] then the hypothesis of market efficiency is not rejected" (CAMPBELL; LO; MACKINLAY, 1997, p. 22).

As (FAMA, 1991, p. 1575), referring to (FAMA, 1970), states "market efficiency per se is not testable". Anomalous evidence can refer to efficiency or asset pricing mod-

eling, the split being ambiguous in accordance with (ROLL, 1977).

(FAMA, 1970) concludes weak-form tests are strongly in support of the market efficiency hypothesis, and semi-strong-form tests also support the hypothesis. Two decades later, (FAMA, 1991) concludes controversy about market efficiency lies mostly on return predictability tests.

3 POLITICAL INFORMATION AND THE MARKET

The research on the direct relationship between political information and financial markets has focused mainly on election-related event studies, eventually involving other types of political events with great repercussions in public discussion. In this section, we discuss some findings of that research and of our own recent research on the topic - where we considered day-to-day political information.

As of the periods leading to elections, (LI; BORN, 2006), (GOODELL; VäHä-MAA, 2013), and (SMALES, 2015) report that political uncertainty - the uncertainty about the outcome of an election - drives up market uncertainty. (LI; BORN, 2006) and (SMALES, 2015) use public polls data to measure political uncertainty, and (GOODELL; VäHäMAA, 2013) use the prices of contracts in which the payoff is based on the election outcome. Additionally, (SMALES, 2015) reports that the probability of the current ruling party remaining in power drives down market uncertainty.

As of the election outcomes, (EICHLER; PLAGA, 2020) report a positive impact on the cumulative abnormal returns of sovereign bonds in the case of alternation of power when the government showed a low primary fiscal balance during the mandate of the current ruling party. This result holds only for emerging markets though, as they found no evidence of the previous behavior when developed countries were considered.

Considering not only elections but also global summits, (KELLY; PÁSTOR; VERONESI, 2016) report that political uncertainty is priced in the options market. When testing the predictions of a theoretical model of government policy choice, they find that the protection given by options is more valuable when major political events happen during their lifetime, this being increased as the economy is weaker and as political uncertainty is higher.

When day-to-day political events are considered, as they were in (MARQUES; SANTOS, 2016) and (PAULSEN, 2019), results show little to no impact of politics on the financial markets. Both papers relate moments of abnormal volatility in financial assets to political events reported in the news, although they consider different financial assets. (MARQUES; SANTOS, 2016) report no impact of political events in the bond market, and rare impacts in the stock market. (PAULSEN, 2019) considers the exchange coupon, and reports results similar to the ones on the stock market in the previous paper, which means the existence of impact from political events is rare.

4 EMPIRICAL STRATEGY

The hypothesis we test in this study is whether the arrival of political information causes volatility in the term structure of interest rates. The hypothesis is tested specifically for the case of Brazil.

The political information we consider are Brazilian news articles on the subject of politics, and we calculate the total daily volume of this news. The information about the bond market that we consider is the daily value of the one-day inter-bank deposit rate, and the daily value of futures contracts that have the one-day inter-bank deposit rate as the underlying asset. We use this information in order to estimate the daily volatility for each maturity of the yield curve. First, we build the term structure of interest rates according to the (VASICEK, 1977) model, then we estimate the volatility process for the prices of each maturity with the (BOLLERSLEV, 1986) model. In order to evaluate the impact of the political information on the term structure of interest rates, we apply (GRANGER, 1969) causality tests on the total daily volume of news and the daily volatility for each maturity of the yield curve.

Each of those steps is carried out using the programming language described in (LANGA, 2022). Python was chosen as it provides numerous mature libraries which can be used to execute, with minimal effort, each step of the empirical strategy. Also, as it is one of the most popular programming languages right now, the community is large and welcoming, making possible an efficient development process as information is also found with minimal effort.

The execution of each method required the use of specific packages, which we will mention as we follow the empirical strategy. Two packages were used thorough the strategy: (MCKINNEY, 2010), with which we managed and described the data; (HUNTER, 2007), with which we generated all plots. When there was a need to process date and time data taking weekends and holidays into consideration, we used the (BORD, 2022) package.

The section goes as follows. Subsection 4.1 describes the institutional environment in Brazil, with a focus on the national financial system. The two subsections that follow discuss both the data on political information (Subsection 4.2) and on interest rates (Subsection 4.3). The final subsections discuss the financial and econometric models, Subsection 4.4 discusses the (VASICEK, 1977) model while Subsection 4.5 discusses the (BOLLERSLEV, 1986) model.

4.1 Institutional Environment

First, we shall describe the institutional environment of Brazil, which defines not only the nature of the political system but also the nature of the monetary and financial systems, which ultimately define the nature of the generating process of all financial variables. As a consequence, understanding the institutional environment is of paramount importance for the understanding of our data.

Brazilian institutions are designed as a typical western democratic state ruled by civil law - (BRASIL, 1988) (Constitution of the Federative Republic of Brazil of 1988). Accordingly, Brazilian Financial System was instituted in (BRASIL, 1964) (Law No. 4595, of December 31, 1964), which established the National Monetary Council as the major normative institution and the Central Bank as the major executive institution. The Monetary Council defines - monetary and exchange - policy guidelines, which are executed by the Central Bank - that has the monopoly of currency and executes its policies through operations with public debt securities (issued by the National Treasury). Recently, the Central Bank was made independent from the Ministry of Economy - (BRASIL, 2021) (Complementary Law No. 179, of February 24, 2021) - our sample period lies before this event however. The Securities and Exchange Commission of Brazil was established in Brasil (1976) (Law No. 6.385, of December 7, 1976), and disciplines and supervises the transferable securities market. The only securities exchange in Brazil, B3, acts in all branches of the transferable securities market.

Besides, the so-called Economic Tripod, which is a set of rules that determines specific regimes for fiscal, monetary and exchange policies, was established in 1999 in (BRASIL, 1999) (Decree No. 3088, of June 21, 1999). The monetary policy would follow an inflation targeting regime. The target for the inflation rate would be defined by the Monetary Council, the target for the short-term interest rate would be defined - every 45 days - by the Monetary Policy Committee, and the Central Bank would pursue that interest rate.

4.2 Political Information

The political information we are going to consider is that disseminated through news articles coming from open-access online news portals with national coverage. The decision to use open-access online news portals was made considering the availability of the data, and we chose to include only news portals with national coverage since we consider the national term structure of interest rates. The information we extract from the data on political news is the daily volume of news articles.

We collect data from news portals via web scraping, using Python package (ZYTE; CONTRIBUTORS, 2022) to scrape static we pages, and a combination of Python packages (SELENIUM PROJECT, 2022) and (RICHARDSON, 2007) to scrape dynamic we pages. The data we collected about each article was only its main information (date and time, title, and link).

At first, the news portals considered were G1, Estado de Minas, Universo Onine (UOL) and iG. From this sample, we chose the portals which had at least 2 years of data. The portals 'G1' and 'Estado de Minas' remained. To calculate the daily volume of news, we considered, for each date in which the spot and futures markets opened, all news from the closing time of the markets at the previous date until the closing time of the markets at the current date.

The volume of news for each portal is shown in Figure 4.1, and the total daily volume of news from both portals is shown in Figure 4.2. Descriptive statistics are shown in Table 4.1.



Figure 4.1: News Volume for Each Portal

As we see in Figure 4.1 the daily volume of news of each portal varies from dayto-day, but remains close to its mean thorough the sample. This behavior is also exhibited by the total news volume from both portals, as we see in Figure 4.2. As Table 4.1 shows, 'Estado de Minas' has an overall greater volume of news and variance in the daily volume than 'G1'.





	G1	Estado de Minas	Total
Mean	26.194861	42.171306	68.366167
Standard Deviation	8.992995	19.047394	25.090411
Minimum	3	4	11
Maximum	58	153	211

 Table 4.1: Descriptive Statistics on News Volume

4.3 Interest Rates

The interest rate considered in this study is the one-day interbank deposits rate (DI rate). We use daily data on both the DI rate and the futures contracts that have the DI rate

as the underlying asset. We choose this specific interest rate as it is backed by public titles and defined by competition across banks as they lend from and borrow to each other with the intention of not closing with negative cash. This rate also is the asset behind a lot of post-fixed income contracts.

The spot rate was collected from the Time Series Management System of the Central Bank of Brazil. The System is an open-access source of data for many Brazilian economic variables. The prices of futures contracts were collected from ECONOMAT-ICA, a paid service that our university subscribes to and makes available to its academic community.

In Figure 4.3 we show the DI spot rate data, and in Figure 4.4 we show prices of futures contracts for six equally spaced dates during the same time period. Table 4.2 contains descriptive statistics on the DI spot rate.





Mean	4.657222	
Standard Deviation	1.656743	
Minimum	1.9	

6.4

Maximum

Table 4.2: Descriptive Statistics of the DI Rate

As we can see in Figure 4.3, in the sample period the DI rate was non-increasing, actually it decreased after almost every meeting of the Monetary Policy Committee. In this period, inflation was also decreasing. The year 2019 showed an increase in GDP, whereas the year 2020 - the first year of economic restrictions motivated by the COVID-19 pandemic - showed a great decrease in GDP.

The sample period matches the beginning of the presidency of President Jair Messias Bolsonaro from the Social Liberal Party, the first elected president who was not from the Labour Party since 2002 - although the impeachment of President Dilma Rousseff in 2016 caused her vice president, Michel Temer from the Brazilian Democratic Movement Party, to occupy the presidency for the last two years of the mandate of their badge.

Figure 4.4: Price of Future Contracts



As briefly shown in Figure 4.4, the Brazilian term structure was mostly upwardsloping during the sample period. The term structure varied greatly in level nevertheless, following the behavior of the spot rate. The difference between the short and long maturities was also great on occasions, as on June 25, 2020, when the difference between the shortest and longest maturity was above 5 percentage points.

4.4 Term Structure Model

In this study we consider the (VASICEK, 1977) model of the term structure of interest rates. We chose this model as it has a few assumptions, one being the efficiency of the financial markets, and is widely used both in academia and in the financial industry.

The Vasicek model is a one-factor continuous affine model based on an arbitrage argument. Three assumptions are made:

- the spot rate follows a diffusion process,
- the price of a discount bond depends only on the spot rate over its term,
- the market is efficient.

From these assumptions, it follows that the spot rate is the only state variable of the term structure and the only source of risk. Adding two more assumptions - the market price of risk is a constant and the spot rate follows an Ornstein-Uhlenbeck process - we arrive at a specific case of the model, which will be the one considered in this research, and which main results are the following:

the spot rate follows the process

$$dr = \alpha(\gamma - r)dt + \rho dz \tag{4.1}$$

where r is the spot rate and z is a Wiener process, and the term structure takes the form

$$R(t,T) = R(\infty) + (r(r) - R(\infty))\frac{1}{\alpha T}(1 - e^{-\alpha T}) + \frac{\rho^2}{4\alpha^3 T}(1 - e^{-\alpha T})^2$$
(4.2)

where

$$R(\infty) = \gamma + \frac{p\rho}{\alpha} - \frac{1}{2}\frac{p^2}{\alpha^2}$$
(4.3)

where R(t,T) is the internal rate of return at time t on a bond with maturity date

T = t + s.

We build the term structure from the spot rate and futures contracts data. For each date, we adjust the (VASICEK, 1977) model to the spot and futures data of that date, from which we extract a continuous term structure. We chose specific maturities for which we calculate the value of the term structure at each date so we have data on the daily interest rate for each maturity.

We use the (VIRTANEN et al., 2020) library to adjust the Vasicek model to the data. We calculate the interest rates for all daily maturities from 0 days to 8 years. The term structure is shown in Figure 4.5 and in Table 4.3 the descriptive statistics for 6 different maturities as shown.

Figure 4.5: Term Structure



Maturity	0.004	1.587	3.171	4.754	6.337	7.921
Mean	4.653178	5.265556	5.922419	6.607123	7.285843	7.845636
Std. Dev.	1.653271	1.365466	1.205820	1.151001	1.145621	1.136792
Minimum	1.902698	3.009608	2.448617	2.156445	1.996108	1.897540
Maximum	6.402318	7.305787	8.140233	8.855964	9.887988	10.034740

 Table 4.3: Descriptive Statistics on Term Structure

As previously indicated by the DI rate and future contracts data, the term structure was mostly upward sloping during the sample period, also the shortest maturities showed a clear downward trend.

4.5 Volatility Model

We measure the spot rate volatility with the (BOLLERSLEV, 1986) model, namely the Generalized AutoRegressive Conditional Heteroskedasticity (GARCH) model. We chose this model as it was created specifically for economic time series and is widely used in academia and in the financial industry - as is the case of the (VASICEK, 1977) model.

The GARCH model is a parametric model, where the conditional variance is specified as a linear function of lagged sample and conditional variances. The model is given by the following equations:

$$\varepsilon_t | \psi_{t-1} N(0, h_t) \tag{4.4}$$

and

$$h_{t} = \alpha_{0} + \sum_{i=1}^{q} \alpha_{i} \varepsilon_{t-i}^{2} + \sum_{i=1}^{p} \beta_{i} h_{t-1}$$
(4.5)

where ε_t is the real-valued discrete time process and ψ_t is the information set of all information through time t.

The conditional volatility from the GARCH model was estimated with the (SHEP-PARD, 2022) library. All volatility series are shown in Figure 4.6, and the descriptive statistics for 6 different maturities are shown in Table 4.4.

Figure 4.6: Term Structure Volatility



 Table 4.4: Descriptive Statistics on the Volatility of the Term Structure

Maturity	0.004	1.587	3.171	4.754	6.337	7.921
Mean	1.470860	1.232396	1.117300	1.113322	1.078002	0.954672
Std. Dev.	0.791553	0.714202	0.818483	0.925470	0.611128	0.671146
Minimum	0.039481	0.039095	0.226883	0.266817	0.582090	0.244832
Maximum	2.492270	2.337352	2.726379	3.049969	3.386658	4.697934

5 RESULTS AND DISCUSSION

We measure causality between the volume of political news and the volatility of the term structure with the (GRANGER, 1969) test. Granger causality is estimated with the (SEABOLD; PERKTOLD, 2010) library. We test causality for all maturities of the term structure, using lags from 1 to 40. This range is sufficient to account for the Monetary Policy Committee's (COPOM) meetings to define the target for the Index Rate of the Special Settlement and Custody System (SELIC), which occur every one and a half month. The p-value of each test is shown in Figure 5.1.



Figure 5.1: News Volume Causality on Term Structure Volatility

As we see above, there are regions where the existence of causality cannot be rejected. At the shortest maturities, from a day until about a month, this happens from the 4th lag until the 40th. In regards to the shorter lags, this happens at the first 2 lags

for maturities close to 1 year. This is also the case from about 2 years to about 4 years of maturity, from the 5th lag to the 40th lag.

Our results show that the impact of political news is not immediate, and they actually last for weeks. That suggests that the market adapts slowly to political information, and the market is thus not efficient in regard to this type of information. Moreover, there is a significant impact in the short to mid-term maturities, which suggests that the political information released today may impact the economy and the financial markets mostly only a couple of years into the future.

In regards to the literature on elections, as (LI; BORN, 2006), (GOODELL; VäHä-MAA, 2013), (SMALES, 2015) and (EICHLER; PLAGA, 2020), our results show that political information impacts market uncertainty not only in the election periods but in an ongoing manner. While elections are arguably the event that most changes investors' expectations, day-to-day politics also have this effect.

Previously, (MARQUES; SANTOS, 2016) found little to no effect of the day-today politics on the financial markets, results which were found also in (PAULSEN, 2019). These studies have not used data on derivatives, however, and, especially in the case of the inter-bank rate, the current value of the variable is much more influenced by the current economic policy than by the expectation of future economic policies. In our case, as we use data on the whole term structure of interest rates, we are able to measure market expectations clearly, and thus find the impact of political information on the financial markets.

6 CONCLUDING REMARKS

This research sheds light on the relationship between political information and financial markets. More specifically, we test when the release of political information affects the volatility of the term structure if it does at all. Since our approach is new - not only do we use data on the whole term structure and daily political news, but we test for the existence and timing of causality between them - the methods we chose to use are all very well-established and widely used in academia and in the financial industry.

As shown in Section 5, our results show that for specific maturities of the term structure and for specific lags - mainly the short-to-medium term maturities and lags greater than 5 days - there is causality between political information and the term structure indeed. That is, not only daily political information does affect the term structure of interest rates, but the latter responds to the first in a delayed manner.

The results mean the market is not efficient in regards to this set of information, as prices take time to absorb the release of new information in news articles. Furthermore, this means there is an opportunity to make economic profit with political information, as it is useful information for the prediction of term structure volatility, a variable closely related to the prices of many derivatives.

Although politics is of great importance in the economy, and a broad field of study in economics, it seems the academic literature is missing the importance of day-today political information in regard to market returns. Our results show that the overall, continuous political process is a meaningful source of information about the future paths the economy can follow, as market returns are directly related to investors' expectations about the future of the economy.

A political event may mean instantaneous change in government policy, but can also be informative about a policy change that may happen only in the future. Also, a policy change may be the result of many political events which build up to the change. That is, political information may change expectations about future government policy without changing the expectations for current policy. Our results, as they encompass the whole term structure of interest rates, shed light on this fact, as most causality between political information and term structure volatility lies in the short-to-medium term maturities.

Investors may use political information for the sake of economic profit, but politicians can also benefit from the knowledge of how the information generated by their activity affects the financial markets. The results of government policy are, to a great extent, dependent on how investors understand, evaluate and react to a given policy.

As for future research, it would be very informative to see tests using high-frequency data. In a world where high-frequency trading is increasing, and where a great portion of trades are made by high-frequency trading algorithms, the discovery of new sources of information for high-frequency trading strategies is of great use for investors who search for economic profit and risk control.

Moreover, the growing field of natural language processing may be of great use in the process of extracting information from political news. In this study, we do not consider the textual content of the political news we collected. This textual content is, however, a possible source of useful information for trading. Techniques like sentiment analysis can be used to address this question.

At last, the sole information on the relationship between a set of information and market prices is not enough to make an economic profit. Taking this into consideration, future research could also engage with the problem of creating profitable trading strategies which benefit from daily political information.

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