Forward Guidance and Information Dissemination: A Natural Language Processing Approach

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Objectives

- Get **first dictionary** that can be used for Monetary Policy text analysis.
- Disentangling whether markets react to leaning about **current economic conditions** or **future bank actions**.

Motivation

- Current research evaluating effect of tone in Central Banks communications has made use of dictionaries not related to monetary policy.
- This projects aims at building the first monetary policy dictionary that can be used for analyzing **central bank communications** and their effects on the financial market
- We do so by performing a **data-mining exercise**: we utilizes intra-day financial data around the press conferences allowing causal analysis. See figure 1.
- We answer the questions: among all the phrases (grams) said in those press conferences, which ones did the market paid most attention to?
- We finally distinguish grams containing verbs to grams containing adjectives. Our hope is the former category captures learning about **future ECB actions**, the latter captures learning about the **current economic state**.
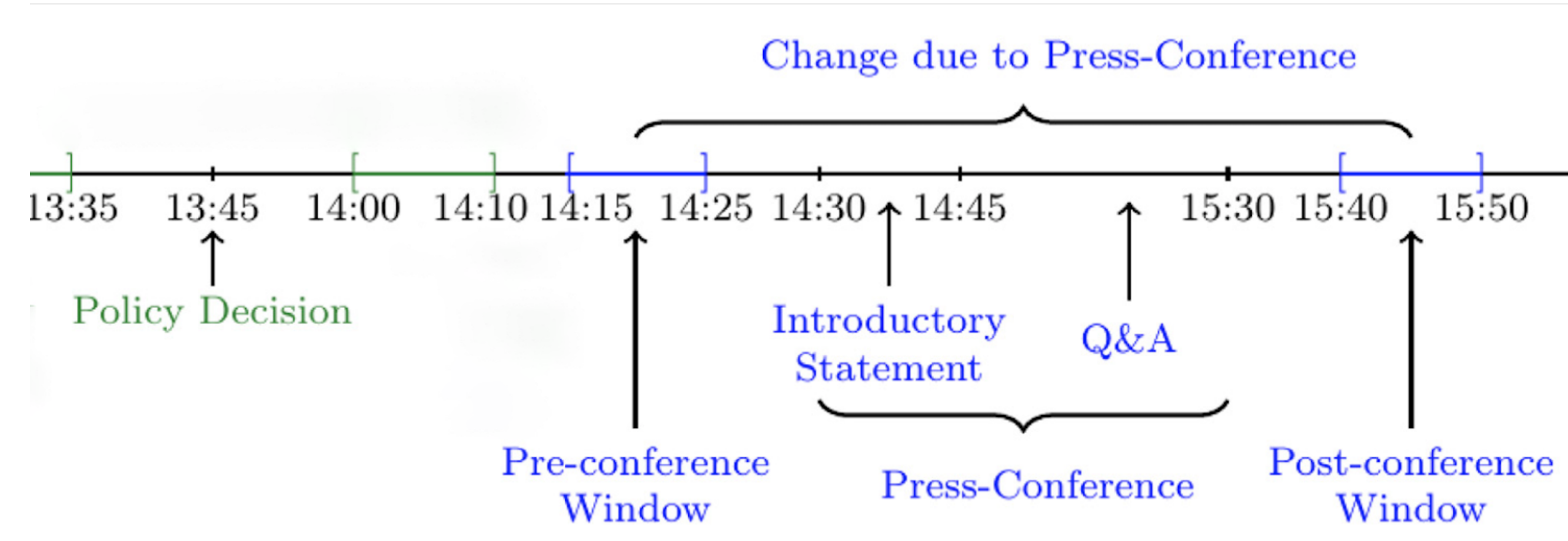

Figure 1: Policy Decision and Press Conference Timeline

Data

- All **ECB Press Conference (PC) Statements** from 1999 to the present (total of around 225). Scraped from ECB website.
- Intra-day data on **Eurostoxx**: change in the median quote in the 10 minutes interval before the PC to the median quote in the 10 minutes interval after. Data from [1]
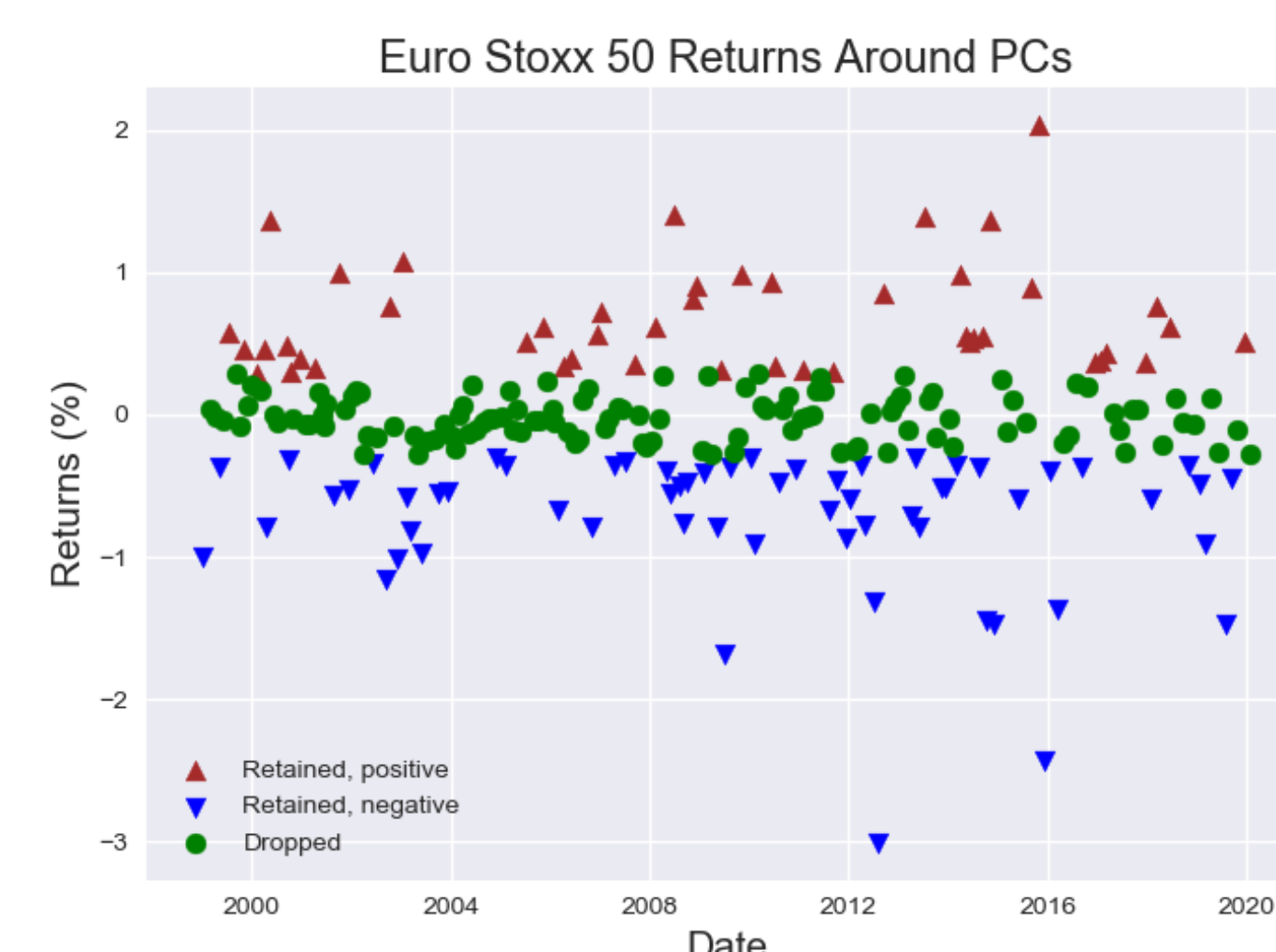

Figure 2: Eurostoxx Return Sample. Where we keep only those observations with returns .5 standard deviations away from 0.

Methodology

Our methodology follows Gentzkow Shapiro (2010) which uses *elected vote share* of congresspeople as a fitness metric for how polarizing the language they use is. Analogously we use *market return* as a fitness metric for how impactful the language of central bankers is.

The methodology is as follows:

1. Reduce the dimension of the set of grams by computing a chi-square for each phrase which determines how "extreme" the phrase is. This gives us a list of the 200 most impactful phrases.

2. Let r_t be the post-press conference market return for date t and f_{pt} be the frequency of phrase p for the press conference in date t. We run the following regression:

$$r_t = a_p + b_p f_{tp} + \varepsilon_{tp}$$

To obtain an estimate for the impact of phrases on market returns b_p. We then order the phrases by the absolute value of b_p for presentation of our dictionary.

Preliminary Result

Markets seem to be giving more weights to bigrams containing adjectives. These bigrams seem to be related to current economic conditions.

Top Bigrams

Gram	b
price_stabil	0.49343645
inflat_rate	-0.3704805
refinanc_oper	-0.2859948
short_term	-0.2456608
govern_council	0.23797909
first_quarter	-0.2246712
credit_growth	0.22089452
adjust_loan	-0.1800123
exchang_rate	0.1788473
pace_monetari	-0.1777724
remain_subdu	-0.1765679

Top Bigrams, adjectives VS verbs

verb	b	adjective	b
remain_price	-0.2273139	fiscal_area	-0.3592938
relate_area	-0.2022515	medium_inflation	-0.3508713
continue_purchases	0.18226496	medium_term	-0.3433675
expected_pressures	0.16011188	euro_tensions	-0.3397363
remain_term	-0.1590376	monetary_area	0.32373704
continue_asset	0.15296102	monetary_growth	0.32227875
expect_inflation	-0.1493221	economic_quarter	-0.3033471
continue_growth	0.14910096	nonfinancial_loans	-0.2779238
reflects_growth	-0.1483635	euro_conditions	-0.2657504
dampened_area	-0.1463622	strong_area	0.25924823
continue_policy	0.13944678	monetary_expansion	-0.2524374
continue_area	-0.1388888	monetary_stability	0.24004552
looking_recovery	-0.1383949	low_rates	-0.2297628
confirmed_inflation	-0.1360047	main_rate	-0.2237154

Conclusion

We build the first dictionary of monetary policy from ECB press conferences. This dictionary can be used to analyze ECB communication, e.g. ECB speeches. We try to disentangle whether the market reacts more to learning about current economic conditions or about future bank actions. As a first step, we try to do some by distinguishing between grams containing adjectives versus grams containing verbs. We find that grams containing adjectives seem to matter more.

Next Steps

- Experiment different financial measures, e.g. exchange rates.
- Finding a better proxy to disentagle current conditions versus future bank actions

References

[1] Carlo Altavilla, Luca Brugnolini, Refet S Gürkaynak, Roberto Motto, and Giuseppe Ragusa. Measuring euro area monetary policy. *Journal of Monetary Economics*, 108:162–179, 2019.

[2] Matthew Gentzkow and Jesse M. Shapiro. What drives media slant? evidence from u.s. daily newspapers. *Econometrica*, 78(1):35–71, 2010.

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