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Final Project Proposal
How European Central Bank
communication effects on yield curves?

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Abstract

The research aims to analyze the response of yield curves against ECB's monthly communication for the period of last five years. The analysis is executed during the pre-Covid19 (2017–2019) and Covid19 (2019–2021) periods. The data published by ECB regarding Euro area government bonds yield of 3-month, 1-year, 2-year, 5-year, and 10-year maturity are aggregated. In addition, all official speeches which are weekly released by ECB are collected as well. By applying natural language processing techniques, text mining and sentimental analysis in particular, the collection of speeches are converted into a monthly time series. After that, in order to observe the yield curves' reaction to communication of ECB, we will execute Impulse response analysis by employ VAR model. The result is being defined..

1 Objective

The research aims to analyze the response of yield curves against ECB's monthly communication for the period of 2017-2021.

2 Dataset

ECB Communication All speeches attached the date released are collected from Jan, 2017 to May,2021

Yield Five time series which are 3-month maturity, 1-year maturity, 2-year maturity, 5-year maturity, and 10-year maturity government bonds of Euro area are aggregated for the same preriod of 2017-2021.

3 Method

3.1 Natural Language Processing

Topic extraction Latent Dirichlet Allocation (LDA) will be applied on the speeches dataset in order to extracting 15 main topics. LDA is an approach used in topic modeling based on probabilistic vectors of words, which indicate their relevance to the text corpus. Top representative words will be listed out to be determined their topic. Only certain sentences corresponding to those macroeconomics-relating topics are selected for the next step of sentimental analysis.

Sentimental analysis As the result of LDA analysis, our data in this stage includes macroeconomics-topic-relating sentences of each month.In the speech-collection of each month, sentences are split into single words. These words are lately refined by crossing a funnel from which either positive or negative tag will be assigned to them. Finally, speech-collection of each month will be converted from text to a numerical value, which is calculated by the formula:

$$es_i = \frac{n_{positive} - n_{negative}}{n_words}$$

In which, es_i is the economic situation index, i.e. ECB's communication index in i^{th}month; $n_{positive}$ is the total number of positive words; $n_{negative}$ is the total number of negative words; and n_{words} is the total number of considered words from speeches of that certain month.
All to all, all speeches of each month are converted into a month time series.

3.2 Vector Auto Regression

4 Result

4.1 Natural Language Processing

Topic extraction The key words, aka tokens, in the economic topics are presented as following word clouds, in which:

- Topic 6: A topic mentioned about unemployment issue.
- Topic 8: A topic which is focusing on disinflation.
- Topic 12 A topic concerning the risk of creditor and headwind to the crisis.
- Topic 10: Another topic about the risks of firms.
- Topic 13: The last topic covering theory of the Economist Jackson, inflationary and revolution.

Sentimental analysis to be defined ..

4.2 Vector Auto Regression

to be defined ....

Main References

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Data Source

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