# Discussion of Adämmer, Prüser and Schüssler, 2023, "Forecasting macroeconomic tail risk in real time: Do textual data add value?"

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*Views expressed are those of the author and do not necessarily reflect the position of De Nederlandsche Bank.

# Discussion Adämmer et al. (2023), Forecasting tail risk in real time

## Main idea paper

- Explore benefits of **textual predictors** for monthly **tail risk** forecasts of employment, industrial production, inflation and consumer sentiment in real-time;
- Textual predictors: **correlated topic model** estimated on English news articles;
- Analyze impact of textual predictors in **linear** and **non-linear** models;
- **Linear models**: linear Bayesian quantile regressions with three shrinkage priors (Ridge, Horseshoe & Lasso) | **Non-linear models**: Bayesian Gaussian process regressions and Quantile regression forests.

## Main insight

- Non-linear models have higher now- and forecasting accuracy in **tails** of distribution than linear models;
- News topics can increase forecasting accuracy, especially in the **left tail** of the distribution.

## Four main comments

- 1. Timing **real-time** analysis, 2. Use of **survey** indicators, 3. high **volatility** and forecasting accuracy, 4. **dynamic** topic models.

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## Comment 1: Robustness to shift in timing real-time exercise

- Current version of paper compares real-time forecasting accuracy on **last business day of the month**, based on FRED-MD database;
- **100 monthly indicators** from FRED-MD in paper | **21 financial** indicators, **80 news** topic proportions;
- News topics & financial indicators known at end-of month, macro-economic indicators have one month **publication delay**;
- Therefore, outcome forecasting horse-race **only valid for end-of-month comparison** of forecasting accuracy;
- What happens to relative forecasting accuracy of the textual predictors if you **shift by a week**, two weeks, three weeks (see e.g Bańbura et al., 2013 and Knotek and Zaman, 2022)?
    - Knotek and Zaman (2022) nowcasts for monthly inflation rate on $1^{st}$, $8^{th}$, $15^{th}$, last day and $15^{th}$ of following month.
    - Main takeaway: smaller publication lags increase forecasting accuracy.

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## Comment 1: Robustness to shift in timing real-time exercise (cont.)

- Though experiment: shift data availability from end-of-April 2023 to mid-May 2023 using publication calendar of the series included in FRED-MD;

**Example: shift two weeks in time, % of variables with same delay as news topics**

| | April 2023 | Mid-May 2023 |
|---|---|---|
| Financial indicators (%) | 21 | 21 |
| Macro-economic indicators (%) | 0 | **54** |
| Same delay as news-topics (%) | 21 | **75** |

- Larger nr. of indicators with identical publication delay will (probably) **decrease** value-added textual predictors.

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## Comment 2: Include more survey indicators

- Only one **survey indicator** included in real-time database ("Michigan Consumer Sentiment, headline")
- Survey indicators are a **"fierce" competitor** to news-based data (e.g. Bańbura et al., 2013) because of short(er) publication delays;
- **Long list of possible survey indicators** in the US; e.g manufacturing PMI (flash: -6 days), ISM services (flash: -6 days), Philadelphia Fed non-manufacturing business outlook survey (-7 days);
- Value added news-indicators **decreases** when survey information is added (e.g Ellingsen, Larsen and Thorsrud, 2022 and van Dijk en de Winter, 2023)
- Larger nr. of indicators with identical publication delay will (probably) **decrease** value-added news-topics

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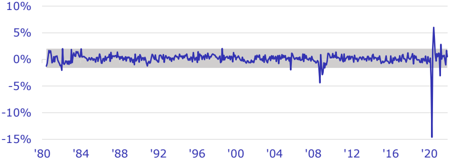
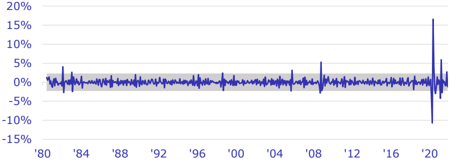
## Comment 3: High volatility and forecasting accuracy

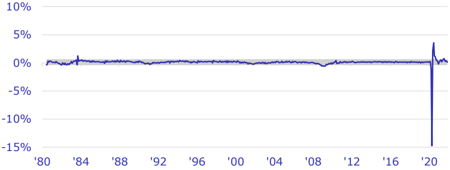
**Industrial production**



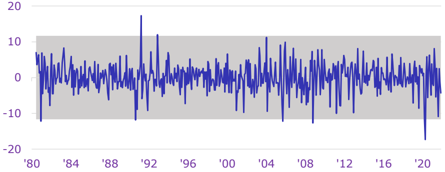

**Inflation**




**Employment**




**Consumer sentiment**




Source: FRED-MD, vintage 2021-12.
Shaded areas: mean + 3*(standard deviation) over periode 1980-06 until 2008-08.

## Comment 3: High volatility and forecasting accuracy

- **When** do indicator based models outperform quantile AR?
  - **Relatively** good forecasting performance of indicator-models vs. simple benchmark models in large part driven by crisis-periods (e.g. Jansen et al, 2018). Hard to beat simple benchmark in tranquil period;
  - Current version paper: Quantile score (QS) are averaged over complete sample; unclear what moves QS over times;
  - Suggestion: Analyze **cumulative QS** over time (see e.g. Welch and Goyal, 2008 and Borup and Schütte , 2020) or exclude crisis-period from QS;

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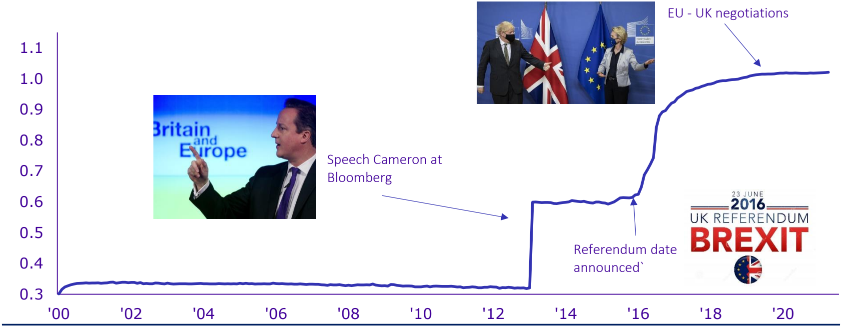
## Comment 4: Dynamic word-topic distributions

- **Fixed** word-topic distribution estimated over the period 1980M6 – 1999M9 and is **not updated** over the evaluation period;
- Does not take into account large change in topic content & word use since 1999: e.g. **Brexit**, **ECB**, **euro**;
- Probability of new words and words gaining popularity after 1999 are **under**represented in word-topic distributions;
- Topic-document proportions will be **strongly** influenced, might decrease forecasting accuracy news-topics;
- Suggestion: **Dynamic** topic model (Blei et al, 2006) or **time-varying** topic model (van Dijk and de Winter, 2023);

# Discussion Adämmer et al. (2023), Forecasting tail risk in real time

## Comment 4: Dynamic word-topic distributions (cont.)

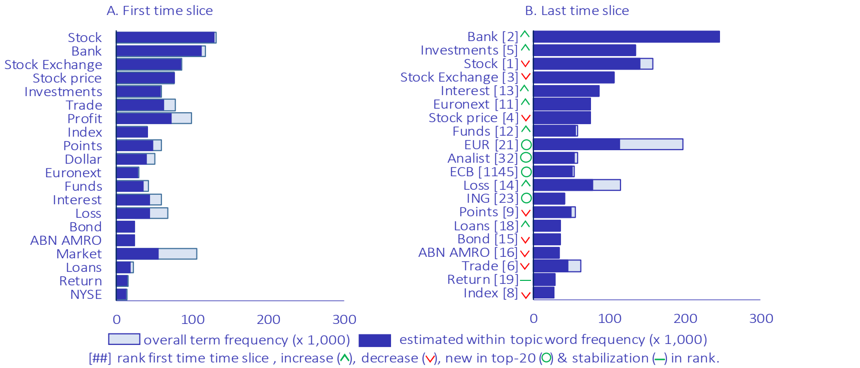
Example: time variation in "Brexit", within topic "Economics" (van Dijk and de Winter, 2023)




Higher score is more relevant, lambda = 0.6

## Comment 4: Dynamic word-topic distributions (cont.)

Example: time variation within topic “Financial Markets” (van Dijk and de Winter, 2023)



## Wrap-up

- **Very nice paper** combining **state-of-the art** Bayesian techniques and topic modelling techniques that stimulated further thinking on **tail-risk** now- and forecasting;

# Thank you!

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## Other comments

- **Alternative for Bayesian shrinkage**: Extract **factors** from FRED-MD in tail risk framework (Plagborg-Møller et al., 2020);
- **Real-time analysis**: which vintages are used for the dependent variable exactly: first release, final release? Might matter (a lot), see e.g. Croushore (2011)
- **Robustness test** for to number of **lags** in models (currently 12), **structural breaks** in volatility (e.g. in inflation) and compare forecasting accuracy of correlated topic model to **plain-vanilla LDA**, test for the "optimal" **number of topics** in topic model;
- **Diebold Mariano** to determine if linear model(s) are statistically more accurate than non-linear models | Currently: all tests against quantile AR(1);
- **Check** publication lags in database, for some variables two months or more (e.g. business inventories, real personal income, non-revolving credit), and check for **changes in publication lags** over time;

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## References

Bańbura, M., Giannone D., Modugno, M. and L. Reichlin (2013) Now-casting and the real-time data flow. In: Elliot, G. and A. Timmerman, *Handbook of Economic Forecasting*, 2, 195–237. link.

Blei, D. M. and J. D. Lafferty (2006) Dynamic topic models, *Proceedings of the 23rd International Conference on Machine Learning*, 113–120. link.

Borup, D. and E.C.M. Schütte (2020) In search of a job: Forecasting employment growth using Google Trends, *Journal of Business & Economic Statistics*, 40(1), 186–200. link.

Croushore, D. (2011) Frontiers of real-time data analysis, *Journal of Economic Literature*, 49, 72–100. link.

Dijk, D.W. van and J.M. de Winter (2023) Nowcasting GDP using tone-adjusted time varying news topics: Evidence from the financial press, Working Paper nr. 766. link.

Ellingsen, J., Larsen, V. H., and L.A. Thorsrud (2022) News media versus FRED-MD for macroeconomic forecasting, *Journal of Applied Econometrics*, 37, 63–81. link.

Jansen, W.J.J. and J.M. de Winter (2018) Combining model-based near-term GDP forecasts and judgmental forecasts: A real-time exercise for the G7 countries, *Oxford Bulletin of Economics and Statistics*, 80(6), 1213–1242. link.

Knotek, E.S. and S. Zaman (2022) Real-time density nowcasts of US inflation: A model combination approach, *International Journal of Forecasting*, forthcoming. link.

Plagborg-Møller, M., Reichlin, L., Ricco, G. and T. Hasenzagl (2020) When is growth at risk?, *Brookings Papers on Economic Activity*, Spring, 167–229. link.

Welch, I. and Goyal, A. (2008) A comprehensive look at the empirical performance of equity premium prediction, *The Review of Financial Studies*, 21, 1455–1508. link.