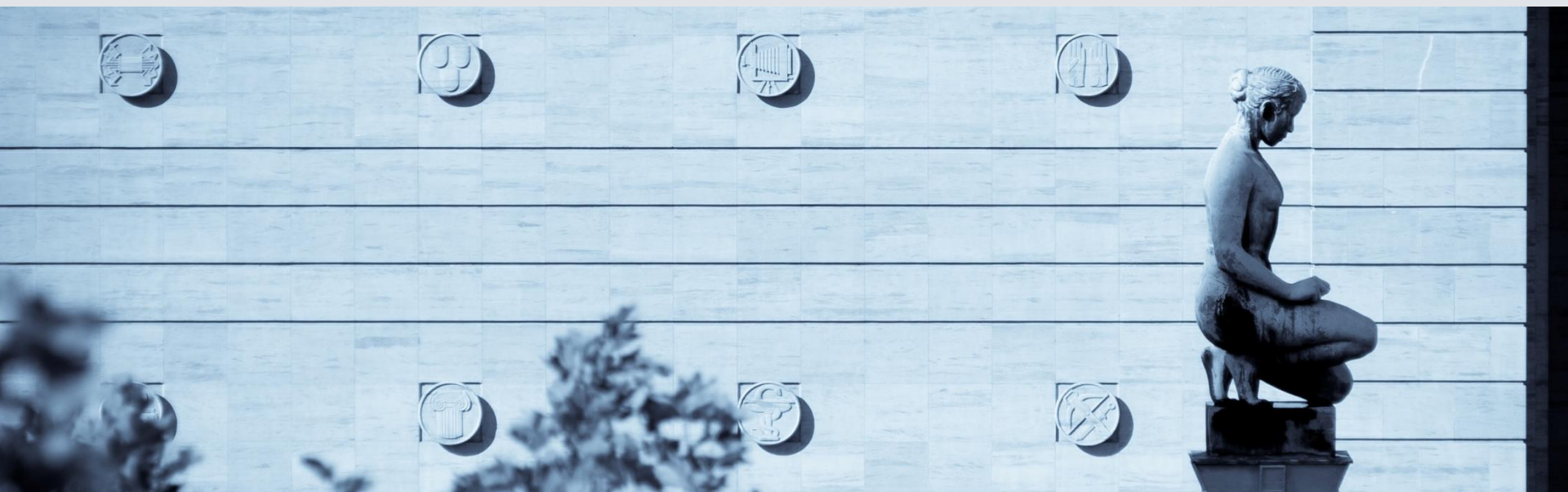


Nowcasting real economic activity in the euro area

Assessing the impact of qualitative surveys

NBP Workshop on Forecasting

Warsaw, 21 November 2016



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Outline of the presentation

1. Introduction

2. The analysis of news

- Mapping of news into forecasting updates for euro area growth
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Eurozone industrial production down Eurozone PMI disappoints, but retail sales climb

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LONDON: Economic growth across the 19-country eurozone in the first three months of the year was a greater than anticipated 0.3 percent in March.

Eurostat, the European Union's statistics agency, says Thursday that the growth was broad-based, with only energy production posting a decline.

The eurozone also posted a big 1.2 percent decline in February.

German exports drop sharply in July as industry stutters

All signs point to weaker Q2 growth for the eurozone

Eurozone economic sentiment improves for second month

Eurozone August business growth weaker

Eurostat, the European Union's statistics agency, says Thursday that the monthly fall was broad-based, with energy production posting an increase.

Goal of the paper

- Quantify the **real-time** impact of survey data on forecasts for GDP growth

	Retail Sales (DE)	Industrial Production (DE)	Industrial Production (EA)	Sentix	GDP (BE)	GDP (DE, EA)	Surveys Block (IFO, EC, Markit, NBB, ZEW)	...
April								
May								
June								
July								
August						?		
September								
October								
November						?		
December								



target variable, but only
published with a certain delay



Goal of the paper

- Quantify the real-time impact of survey data on forecasts for GDP growth

	Retail Sales (DE)	Industrial Production (DE)	Industrial Production (EA)	Sentix	GDP (BE)	GDP (DE, EA)	Surveys Block (IFO, EC, Markit, NBB, ZEW)	...
April					flash	flash		
May								
June								
July						?		
August	first estimate	first estimate	first estimate					
September								
October						?		
November								
December								

1. Data revisions



Goal of the paper

- Quantify the real-time impact of survey data on forecasts for GDP growth

	Retail Sales (DE)	Industrial Production (DE)	Industrial Production (EA)	Sentix	GDP (BE)	GDP (DE, EA)	Surveys Block (IFO, EC, Markit, NBB, ZEW)	...
April					flash	flash		
May								
June								
July						?		
August	first estimate	first estimate	first estimate					
September								
October						?		
November								
December								

1. Data revisions
2. Release schedule (ragged-edge)



Goal of the paper

- Quantify the real-time impact of survey data on forecasts for GDP growth

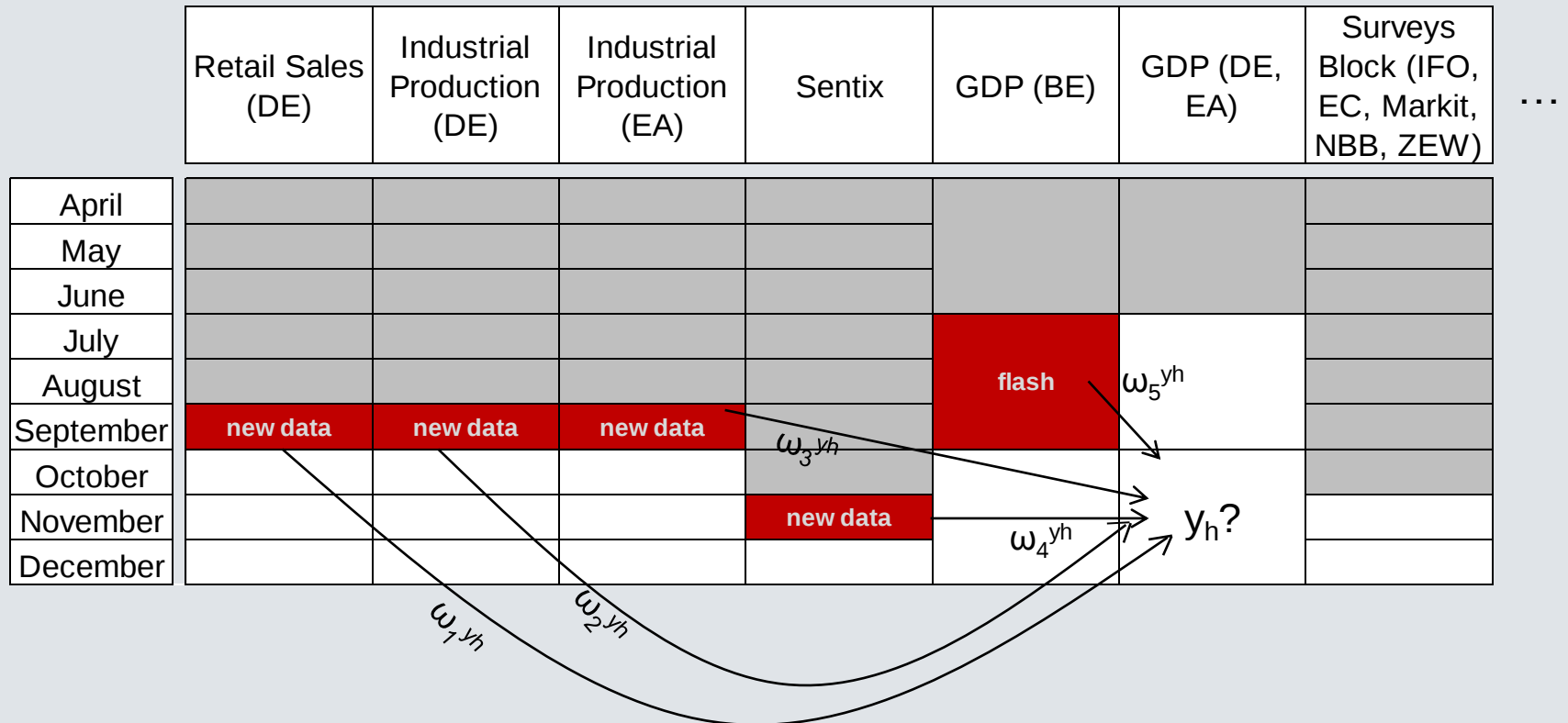
	Retail Sales (DE)	Industrial Production (DE)	Industrial Production (EA)	Sentix	GDP (BE)	GDP (DE, EA)	Surveys Block (IFO, EC, Markit, NBB, ZEW)	...
April								
May								
June								
July								
August					flash			
September	new data	new data	new data					
October								
November				new data		$y_h?$		
December								

1. Data revisions
2. Release schedule (ragged-edge), which **changes depending on when you update your series**



Goal of the paper: mapping of news into forecasting updates

- Quantify the real-time impact of survey data on forecasts for GDP growth



- Data releases incorporate news: **what is the weight of each piece of news in the forecasts of GDP?**



Literature

- ▶ Lots of research since Giannone, Reichlin and Small (GRS, 2008): Kalman filter methods to extract the signal from a potentially large information set and update it in real time.
- ▶ Still, many papers consider oversimplistic release schedules or pretend data revisions do not exist.
- ▶ To the best of our knowledge, we are the first ones to build time series composed of **press releases** *for all series* (different from the use of vintages; different from the approach by Kishor & Koenig, 2009)

IPI	1 Jan	1 Feb	1 Mar	1 Apr	1 May
2000Q1	100	101	99	99	99
2000Q2		103	102	102	102
2000Q3			106	105	106
2000Q4				108	106
2001Q1					110



Literature

- ▶ We follow the methodology of Bańbura and Modugno (2010) : ML estimation of a DFM à la GRS (2008) to formalize the process of nowcasting:
 - ✓ **decompose forecast revisions in terms of news** (sample dependent)
 - ✓ **assess the *expected* contribution of each piece of news at forecasting euro area GDP**
(depends on both the properties of the model and the release schedule)
- ▶ Implications for variable selection (Rünstler, 2016)
 - ✓ Is it possible to **use our weights as an alternative method for selecting an efficient set of predictors?**



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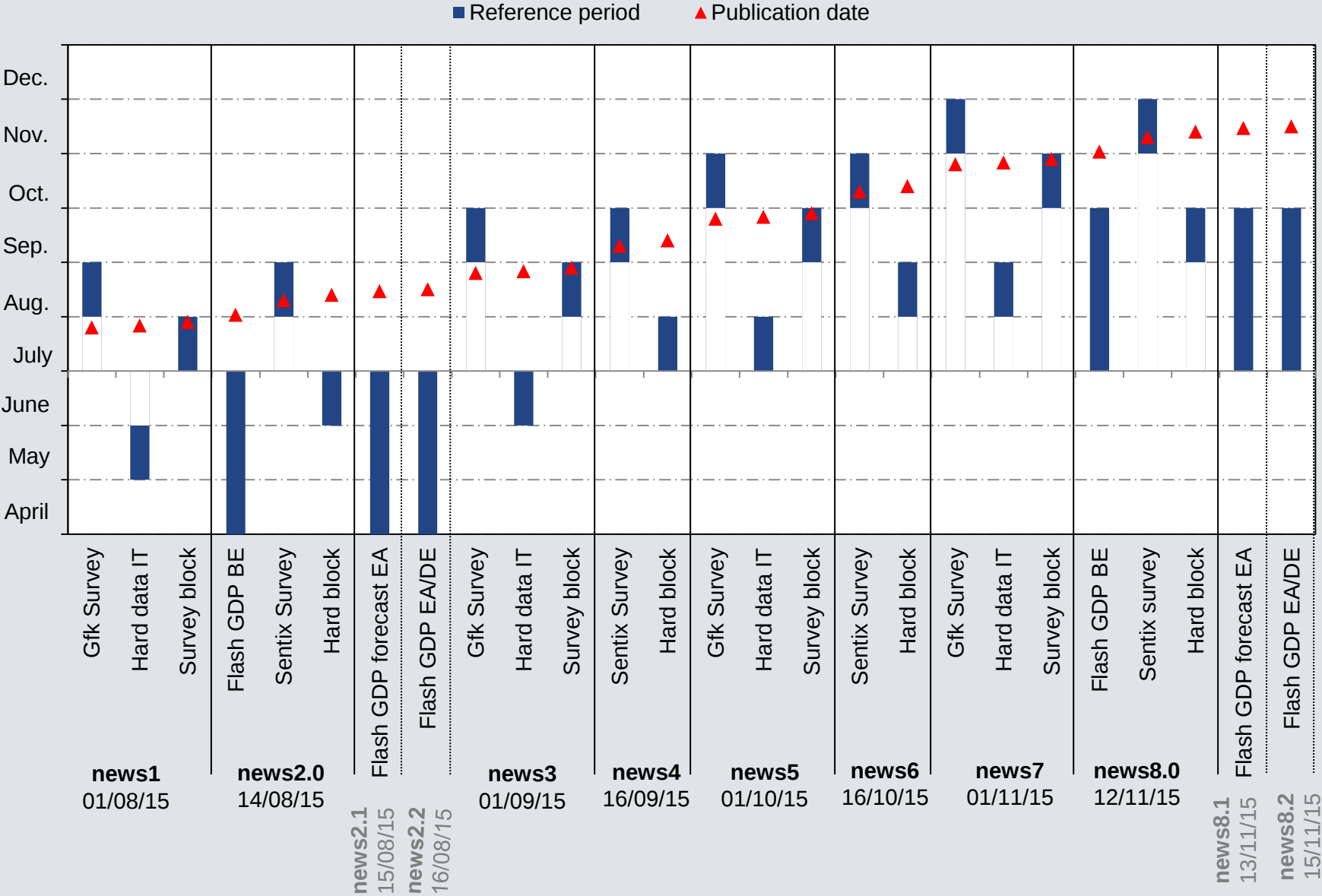
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Simple representation of the real-time dataflow



Mapping of news into forecasting updates

- ▶ **News** = actual (published) figure for variable y minus the expected value, conditional on the previous information set
- ▶ This definition implies that news cannot be read if we do not have a prior expectation
- ▶ The vector of news (I_{v+1}) can be large, specially if a given release incorporates historical data revisions

$$\underbrace{\mathcal{F}_{v+1}}_{\text{refreshed}} - \underbrace{\mathcal{F}_v}_{\text{archieved/old}} \equiv I_{v+1} = \begin{bmatrix} y_{(i,t)_1} - E[y_{(i,t)_1} | \mathcal{F}_v] \\ \vdots \\ y_{(i,t)_J} - E[y_{(i,t)_J} | \mathcal{F}_v] \end{bmatrix}$$

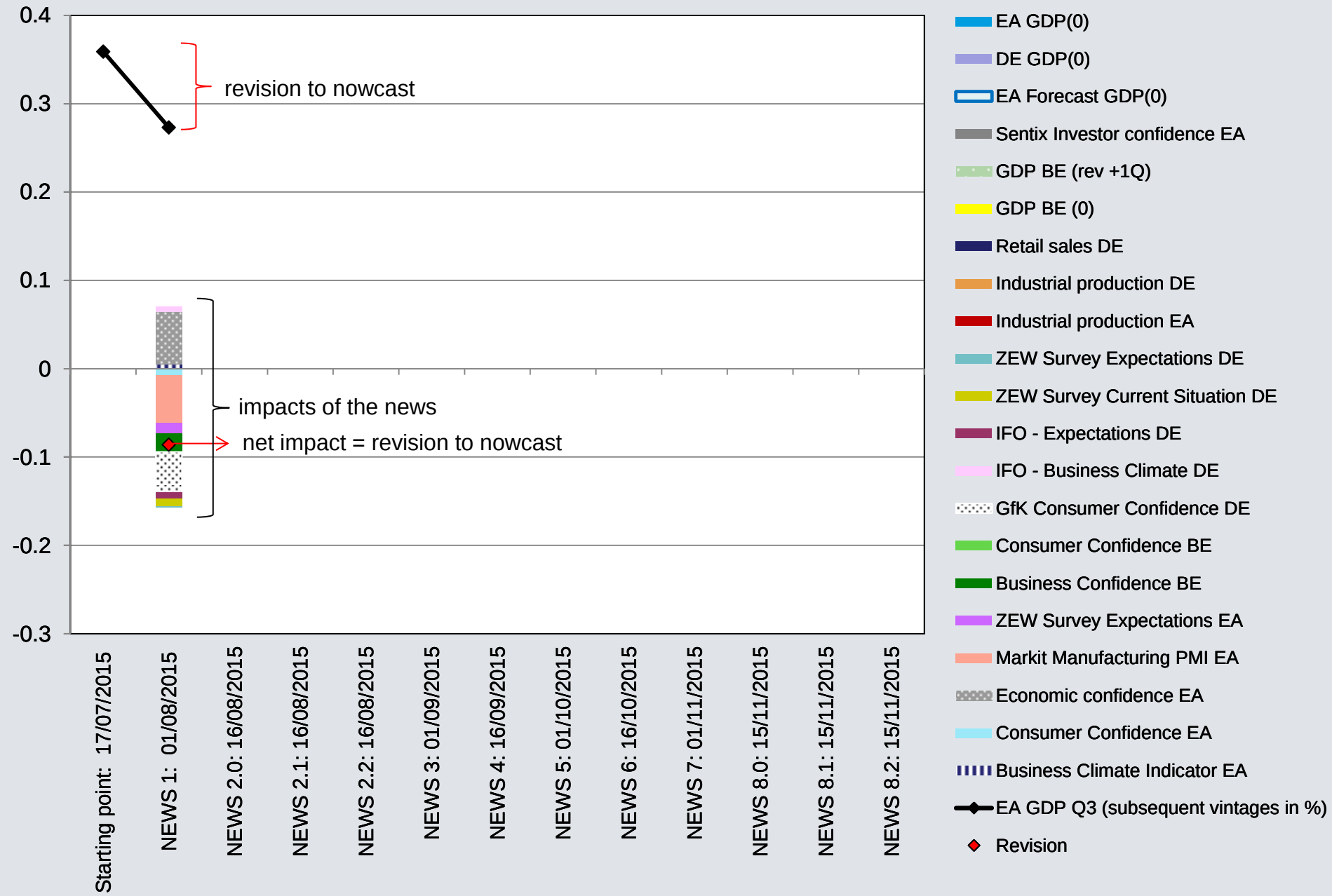


Quantifying the role of the news

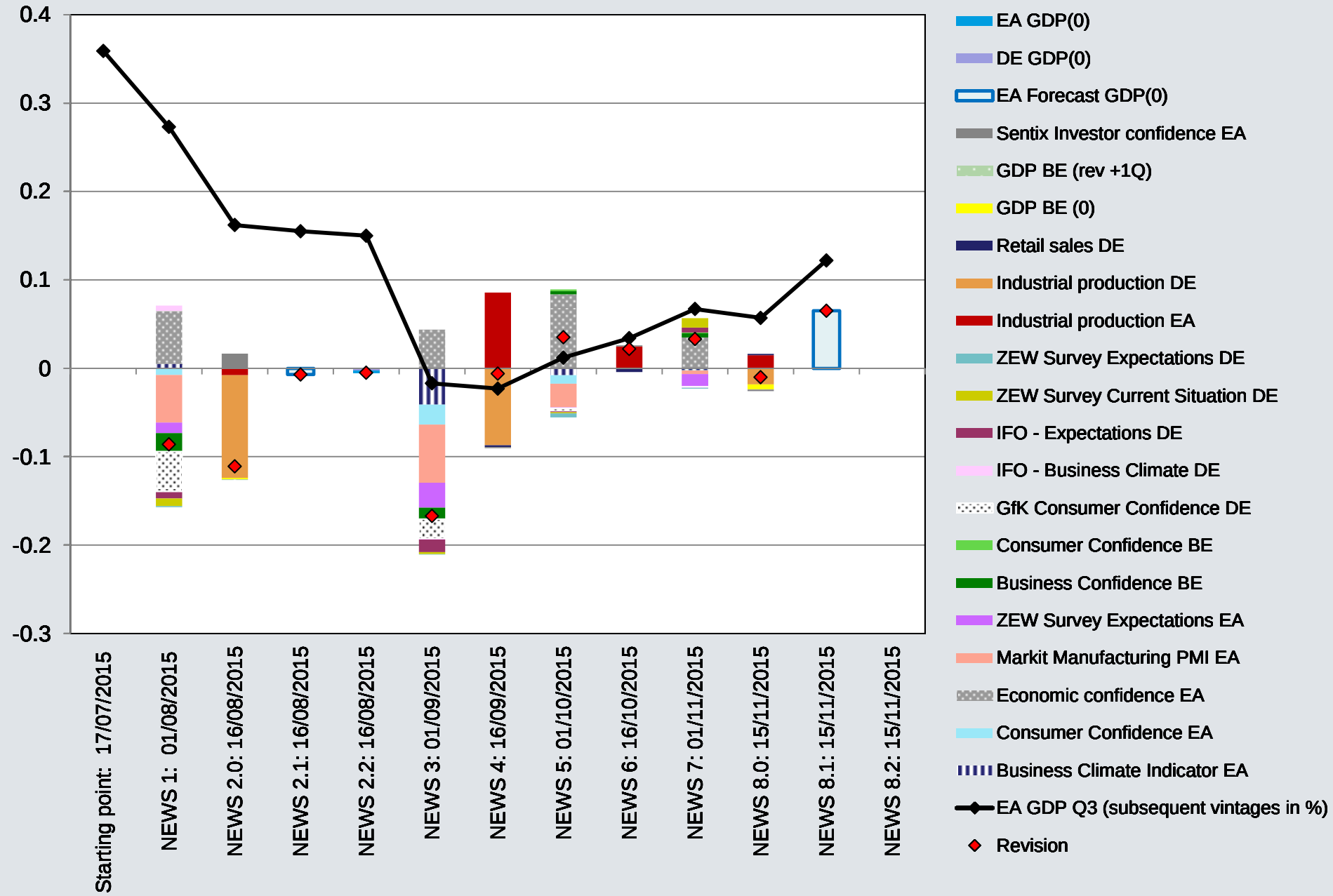
- When updating the nowcasts, the **weight** of the news depends on
- the **quality** of the indicator (i.e. the correlation of the factor with the innovations)
 - its **timeliness** (variables that come first will typically have a bigger weight)

$$E[y_{k,t} | \mathcal{F}_{refreshed}] - E[y_{k,t} | \mathcal{F}_{old}] = \sum_{j=1}^J w_j^{k,t} (y_{(i,t)_j} - E[y_{(i,t)_j} | \mathcal{F}_{old}])$$
$$[w_1^{k,t}, \dots, w_5^{k,t}] = \underbrace{E[y_{k,t} I'_{v+1}]}_{\text{quality}} E[I_{v+1} I'_{v+1}]^{-1}$$

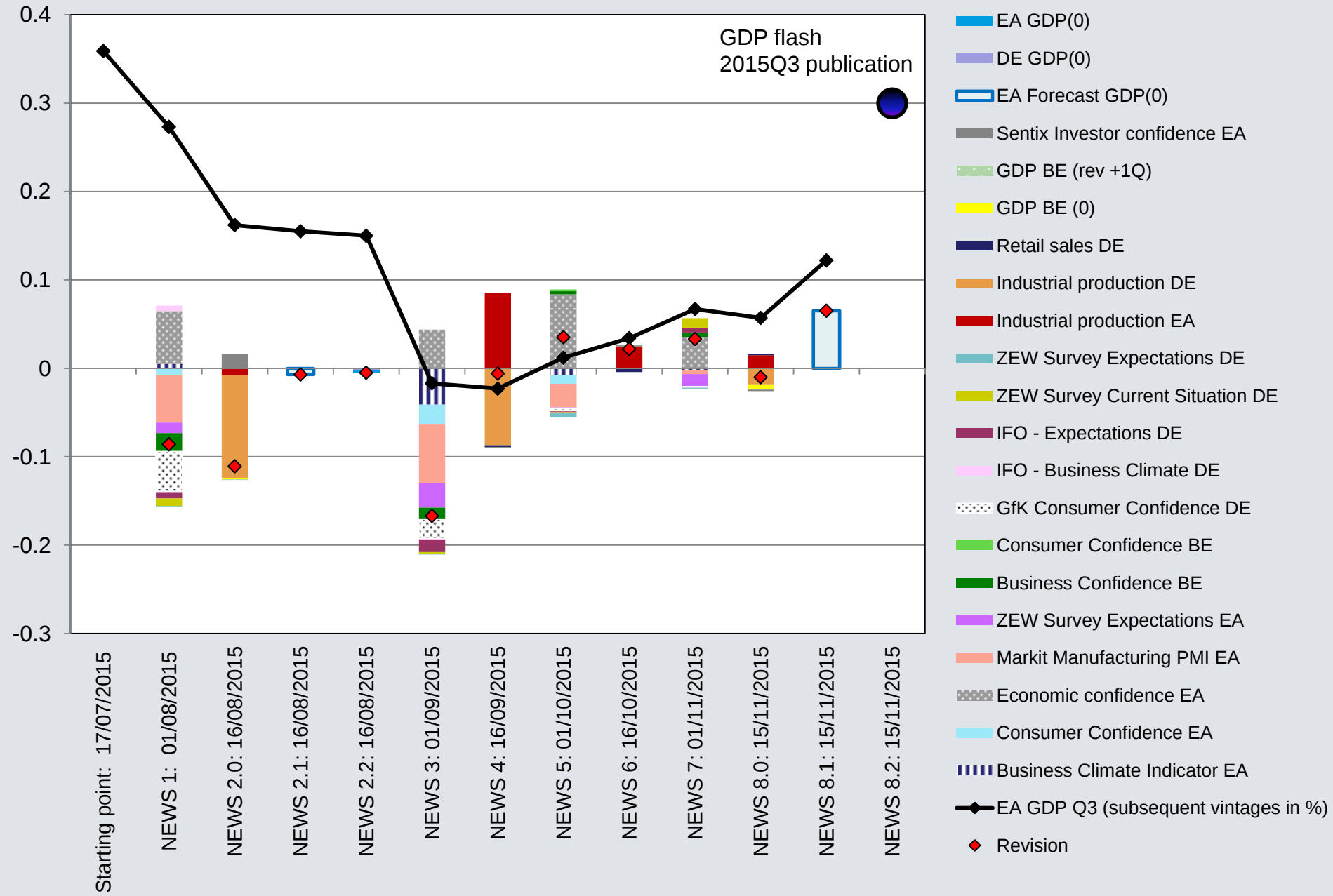
The process of updating nowcasts



The process of updating nowcasts



The process of updating nowcasts



Quantifying the role of the news

- ▶ When updating the nowcasts, the **weight** of the **news** depends on
 - the **quality** of the indicator (i.e. the correlation of the factor with the innovations)
 - its **timeliness** (variables that come first will typically have a bigger weight)

$$E[y_{k,t} | \mathcal{F}_{refreshed}] - E[y_{k,t} | \mathcal{F}_{old}] = \sum_{j=1}^J w_j^{k,t} (y_{(i,t)_j} - E[y_{(i,t)_j} | \mathcal{F}_{old}])$$
$$[w_1^{k,t}, \dots, w_5^{k,t}] = \underbrace{E[y_{k,t} I'_{v+1}]}_{\text{quality}} E[I_{v+1} I'_{v+1}]^{-1}$$

timeliness

- ▶ By multiplying the weights by the standard deviation of the news associated with each data release (instead of a given **realization of the news**), we obtain the **standard impact of news** :
 - this measure allows us to compare the average informative content of the different indicators when the object of interest is quarterly growth...
 - and hence, allows us to provide a ranking of indicators

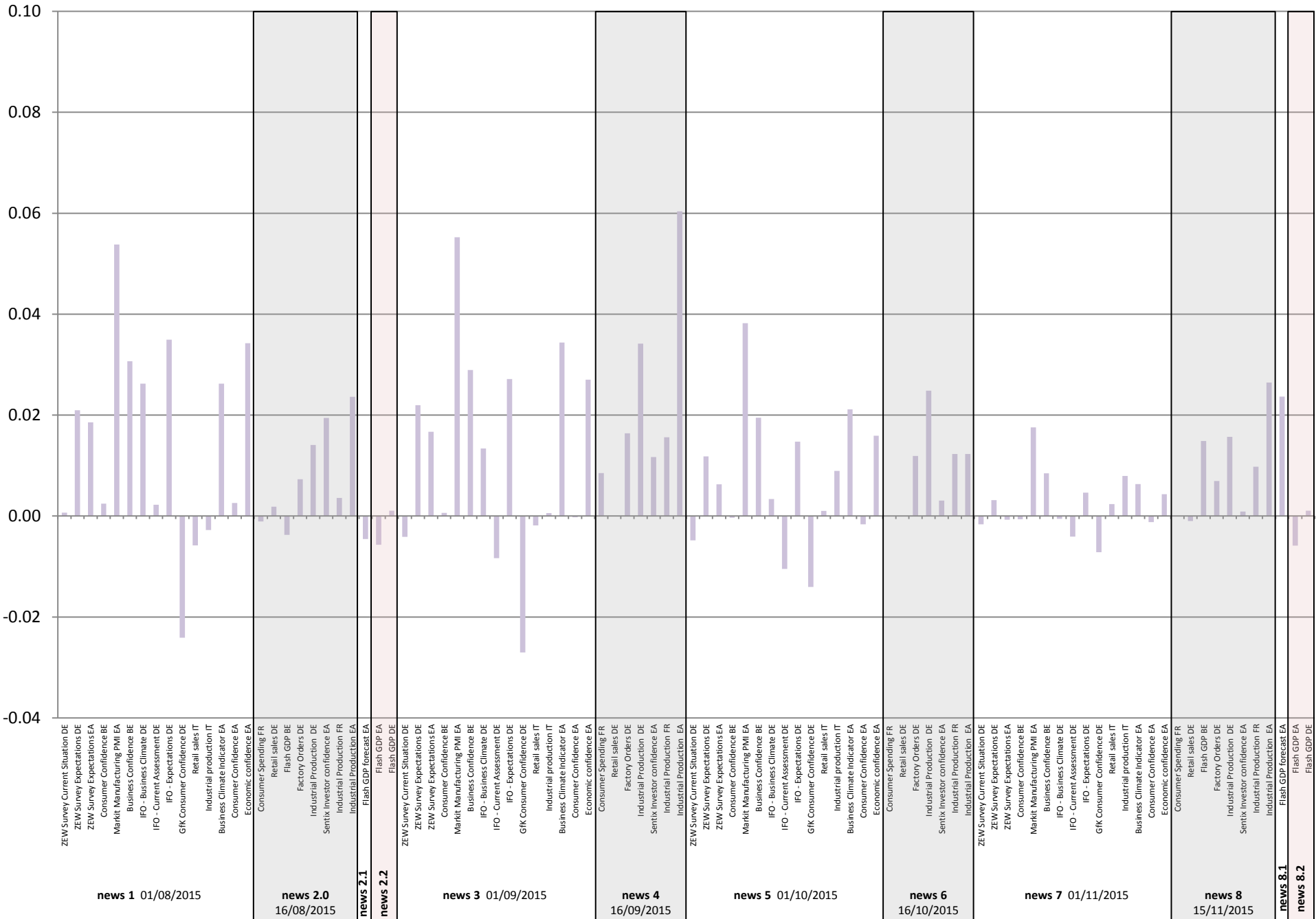


Empirical results

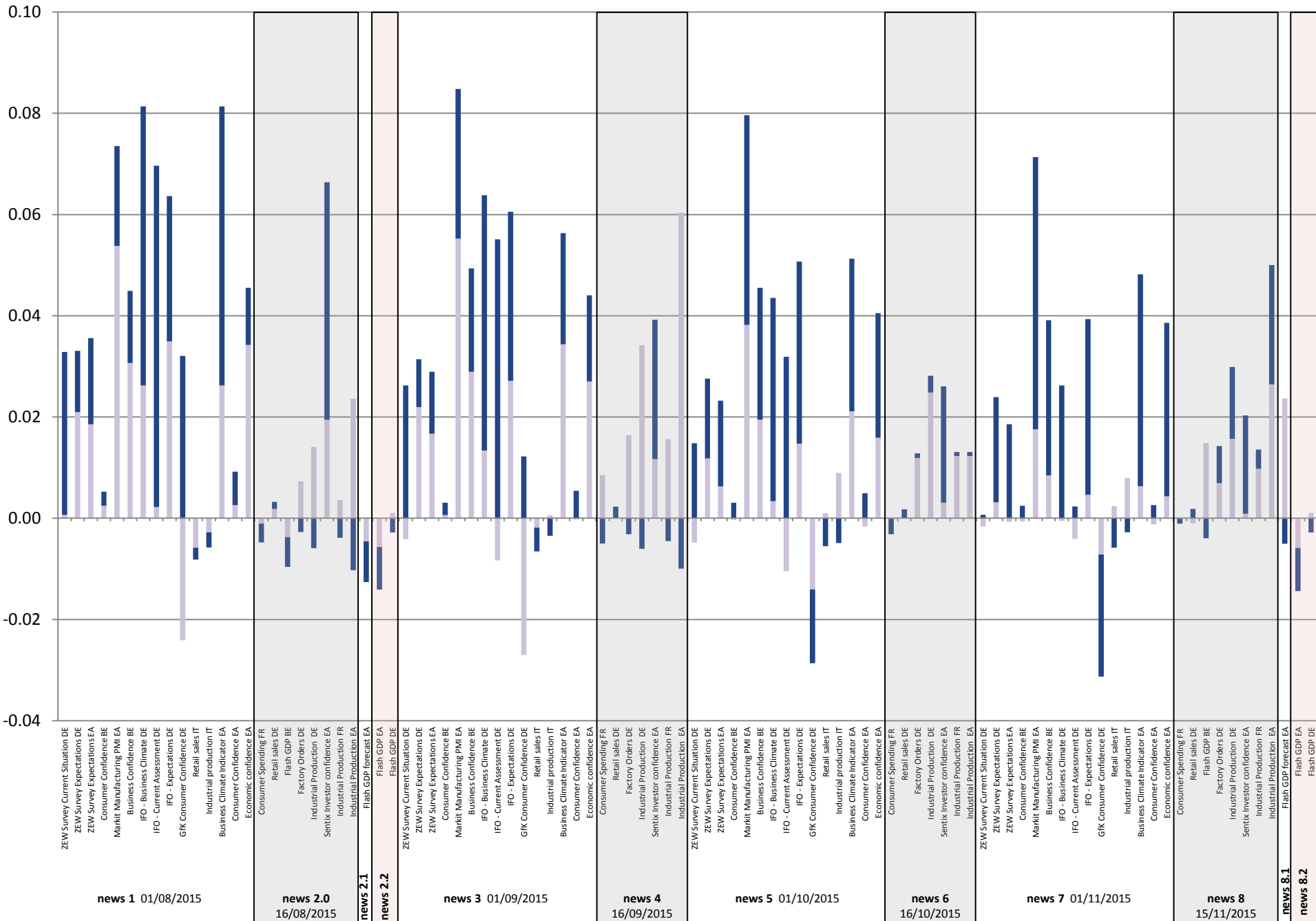
- ▶ Standard impact of macroeconomic releases in our real-time set-up (benchmark scenario)
 - Results are hard to read because of the complexity of the dataflow: [Figure 1](#) is just for illustration
 - Results can be generalized to other quarters as well, as long as the order of the data releases/blocks remains unchanged



Standard Impact on Q3



Standard Impact on Q3 Standard Impact on Q4



Ranking for euro area GDP flash, based on the standard impact in the benchmark case

- ▶ Cumulative impact of data releases over a whole semester



- ▶ Confirms the dominance of soft data, but **industrial production** in the euro area and Germany should not be neglected
- ▶ Notice relevance of **NBB survey** for EA growth prediction



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Counterfactual scenario's

Analysis	Objective	Details	Results
Benchmark	Impact on euro area flash GDP	Real-time dataflow	Slide 19-22
Scenario 1	Counterfactual impact on euro area flash GDP	Hard data published without any delay	Slide 25
Scenario 2	Counterfactual impact on euro area revised GDP of the pseudo real-time case	Hard data is fully revised but published as in real-time exercise	Slide 26
Scenario 3	Counterfactual impact of revised hard data on euro area revised GDP	Hard data is fully revised and published without any delay	Slide 27

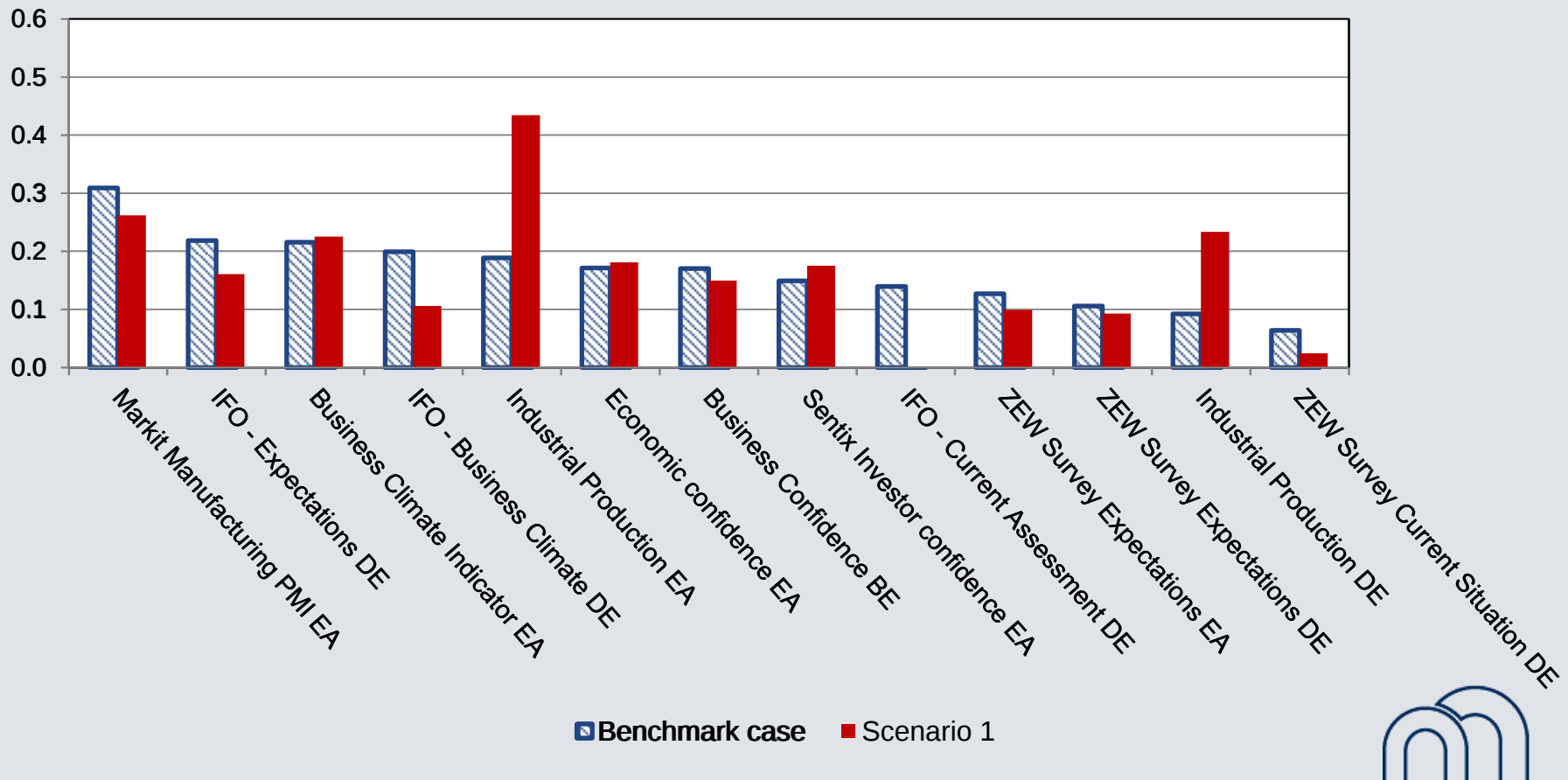
For other robustness scenario's (e.g. impact on German flash GDP), cf. paper



How does the impact change when we ignore the release schedule?

Scenario 1

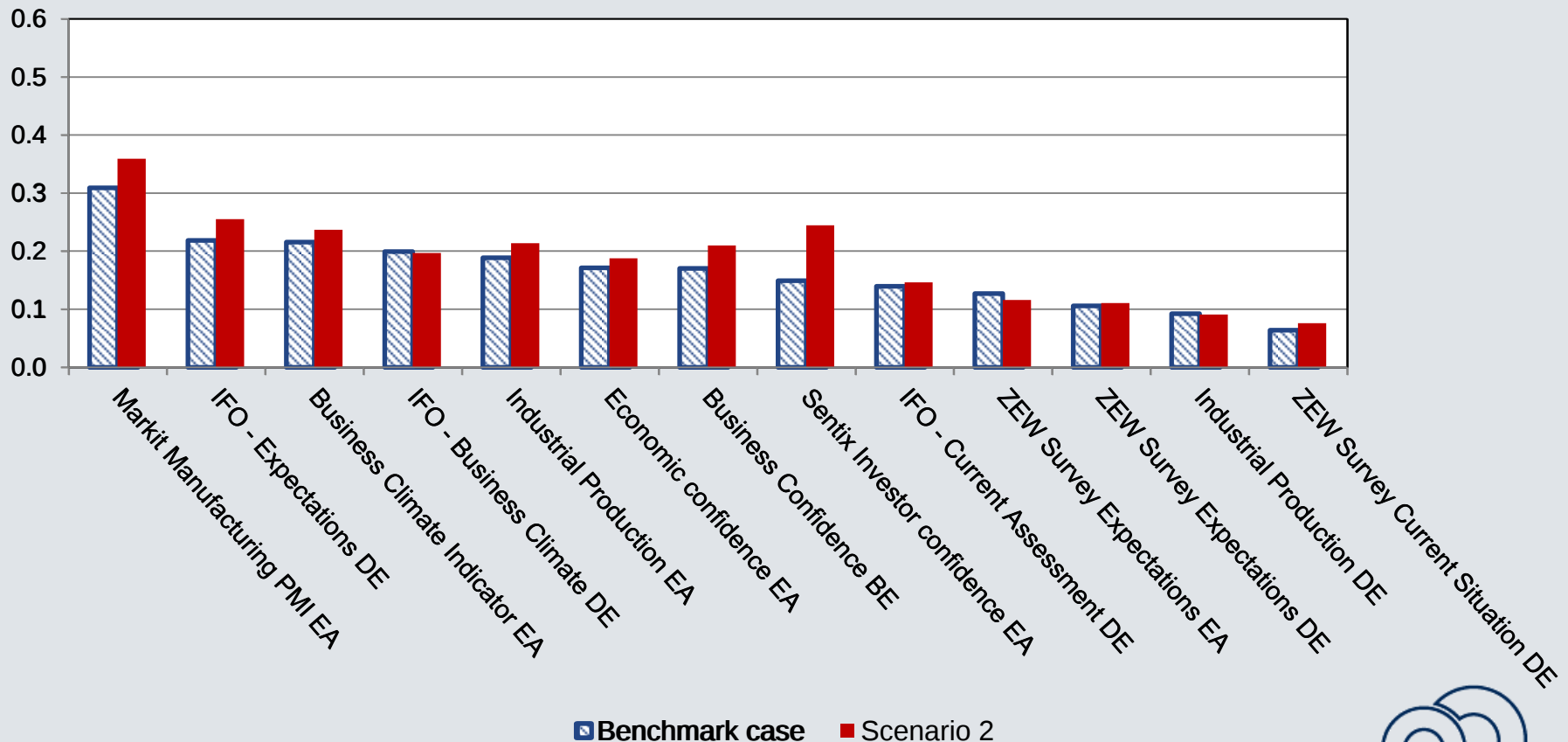
- ▶ Hard indicators are assumed to be published at the end of the reference month (i.e. **no publication delay**)



How does the impact change when we ignore the presence of data revisions?

Scenario 2

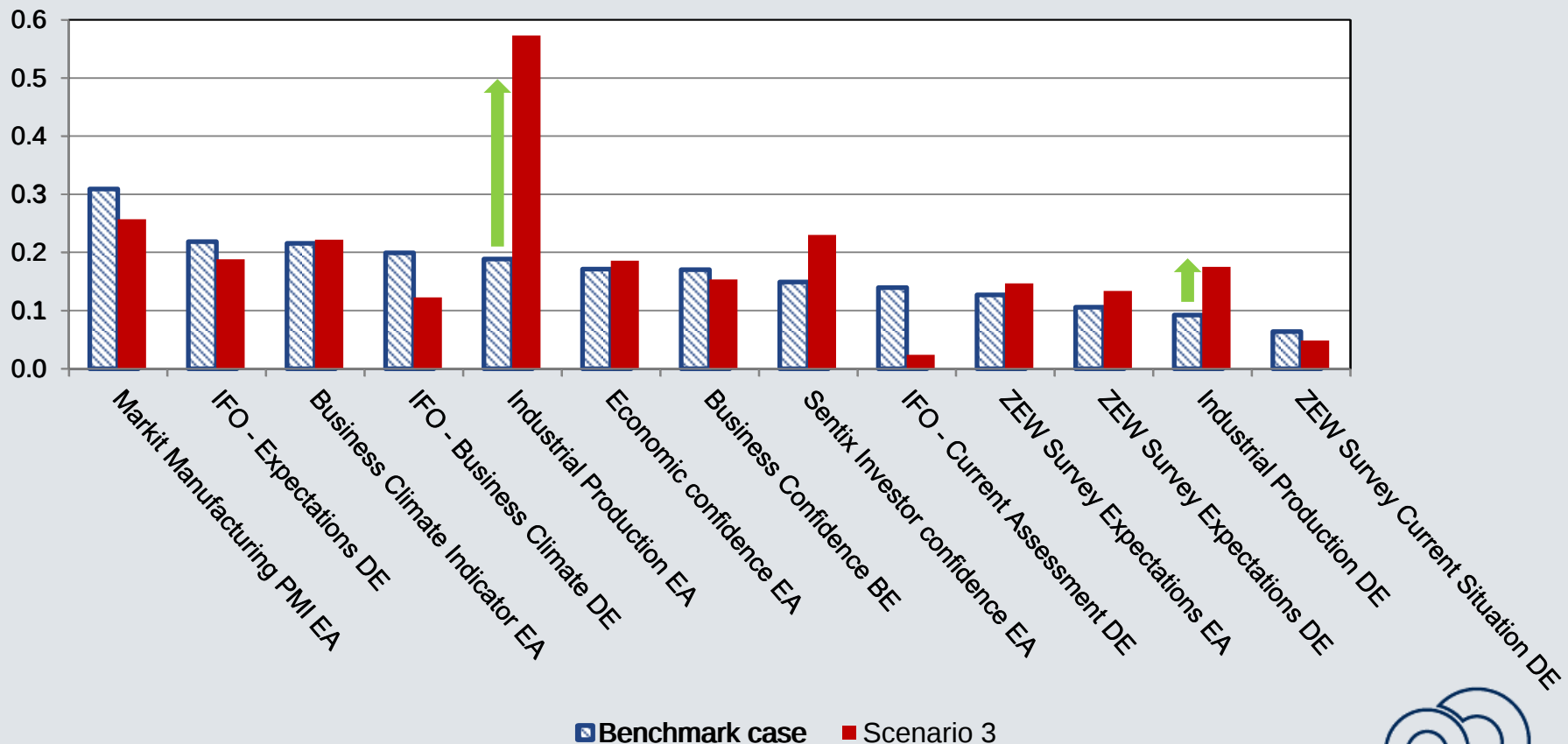
- ▶ Hard data are **revised**, but **treated as real-time** data (i.e their publication delay is the same as in the benchmark case)
- ▶ This represents the *pseudo real-time case*



How does the impact change when the data calendar changes and we ignore the presence of data revisions?

Scenario 3

- ▶ Month-on-month growth rates of **hard data** were replaced by the most recent data found via Thomson Reuters Datastream and **considered revised**
- ▶ Hard indicators are assumed to be published at the end of the reference month



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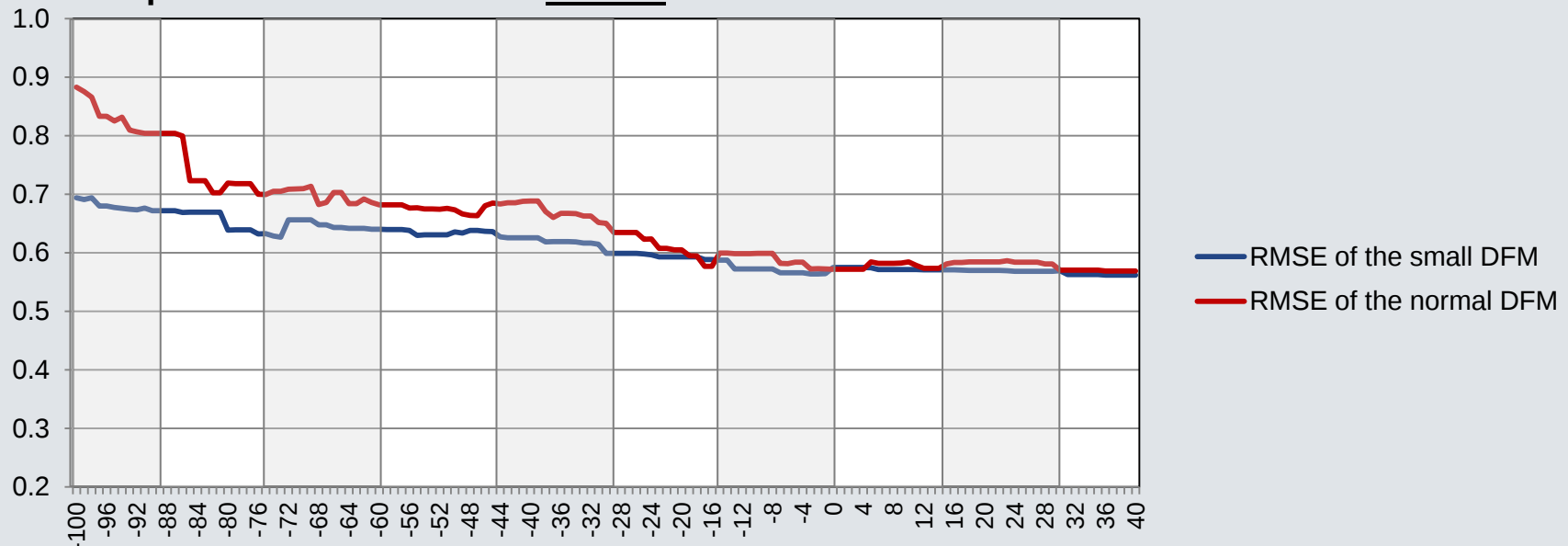


Could this ranking serve as a tool to select variables?

Yes...

- ▶ ... according to some recent studies, e.g. Rünstler (2016)
 - his analysis is performed in the pseudo real-time environment $\approx$ our scenario 2
 - we construct a “small” DFM, which contains only the best-ranked indicators from slide 42

Comparison of the RMSE for revised EA GDP of the normal DFM and the small DFM



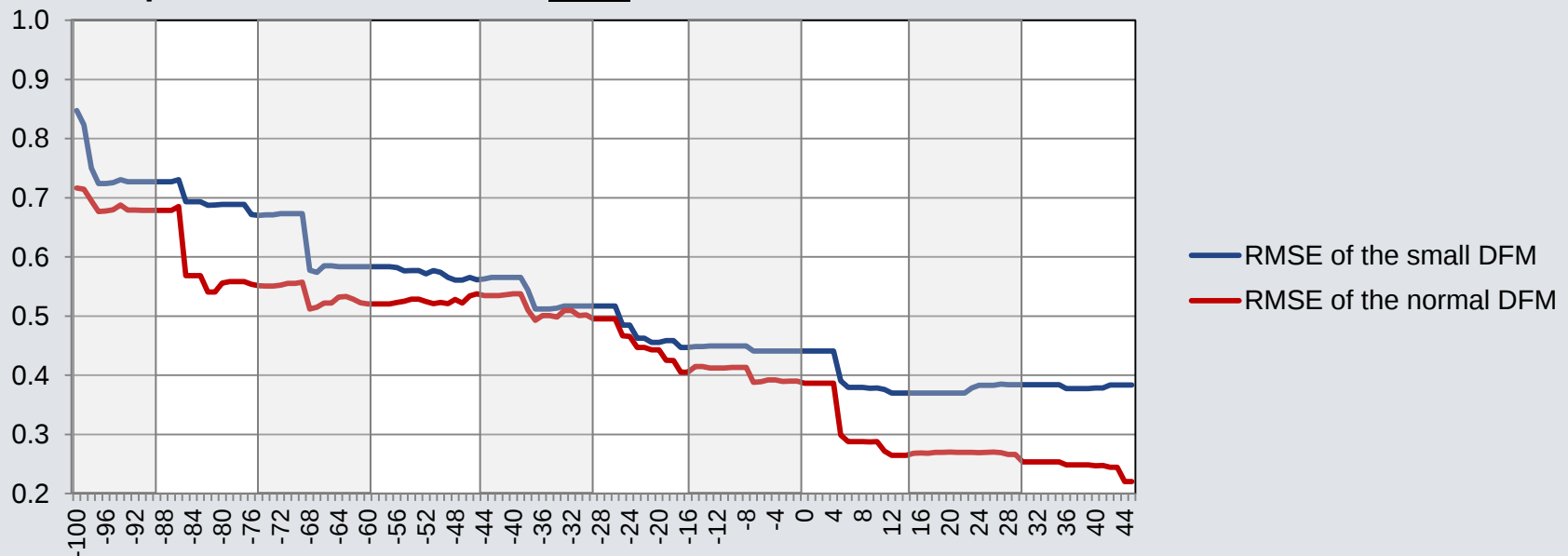
- our results seem to confirm Rünstler's finding



... but not in a genuine real-time environment

- ▶ If we go back to the benchmark case and construct a small model, the smaller model does not necessarily give better results
 - relying on a limited set of indicators (even those with the most informative content) proves to be somewhat more risky in a genuine real-time environment

Comparison of the RMSE for flash EA GDP of the normal DFM and the small DFM



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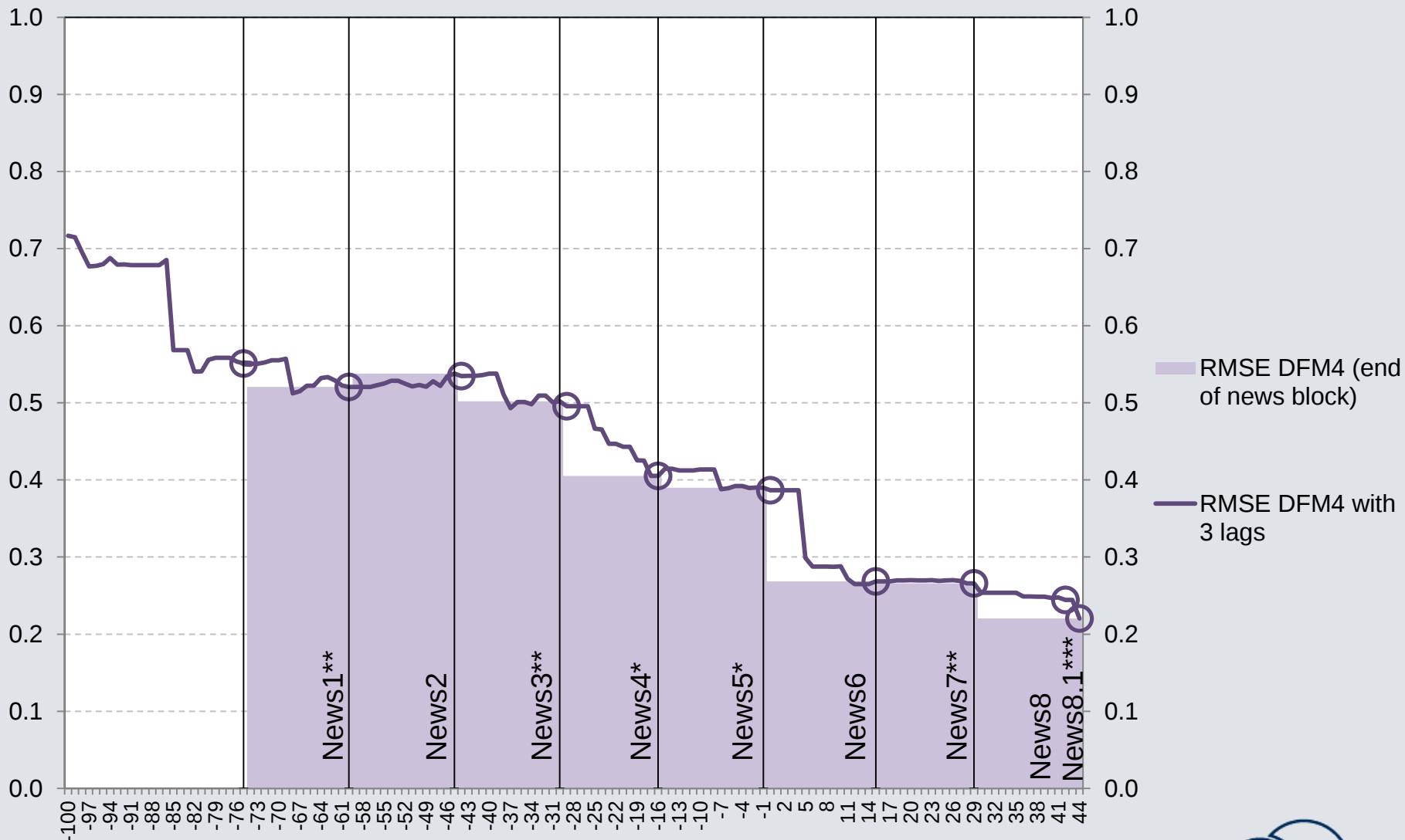
4. Variable selection

5. **Forecasting accuracy**

6. Concluding remarks



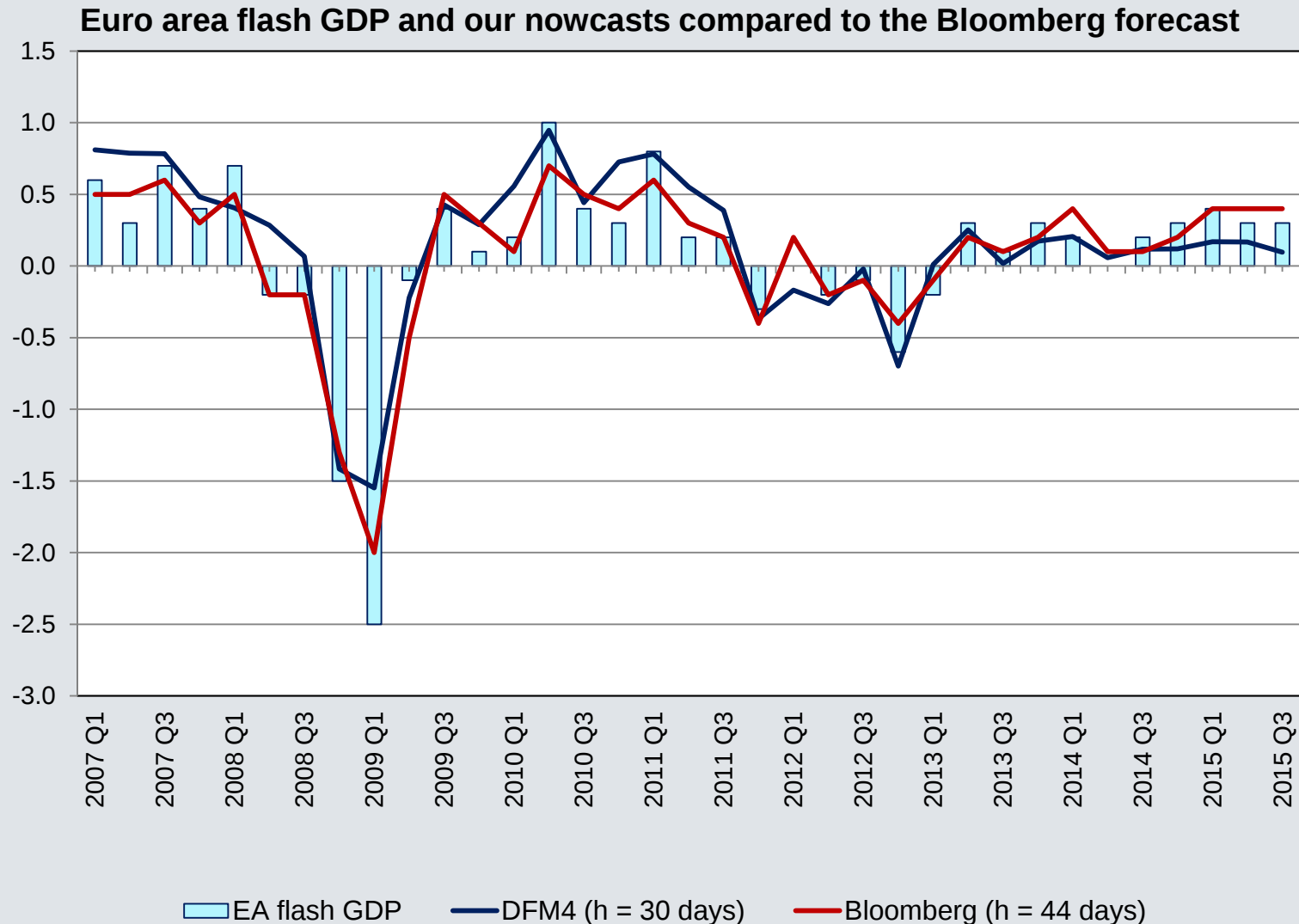
Which news blocks turned out to significantly improve the RMSE?



***, ** and * demonstrate significance at the 5%, 20% and 20% level respectively, using the fixed-smoothing (FS) asymptotics, as proposed by Coroneo and Iacone (2016). Evaluation sample: 2007Q1 – 2015Q1.



What about the performance of our model relative to others? Some visual investigation...



What about the performance of our model relative to others? Some formal investigation...

Models	Horizon	Relative RMSE	Encompassing test	
			DFM enc BM	BM enc DFM
DFM Now-Casting.com	0 days	1.31	0.43***	0.33**
DFM Now-Casting.com	44 days	0.70*	0.28***	0.56***
DFM PMI indicator	0 days	0.83	0.31**	0.68**
DFM Bloomberg	44 days	1.13	0.60***	0.37*

- ▶ Relative RMSE should be < 1
 - generally OK, although not statistically significant
- ▶ Null hypothesis of the encompassing test: one of the forecasts encompasses all the relevant information from the other
 - H_0 rejected in all cases: our DFM nowcast can be improved by combining it with the other benchmark... but also the other way around!

***, ** and * demonstrate significance at the 5%, 10% and 20% level respectively, using the fixed-smoothing (FS) asymptotics, as proposed by Coroneo and Iacono (2016). Evaluation sample: 2011Q3 – 2015Q1.



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Concluding remarks

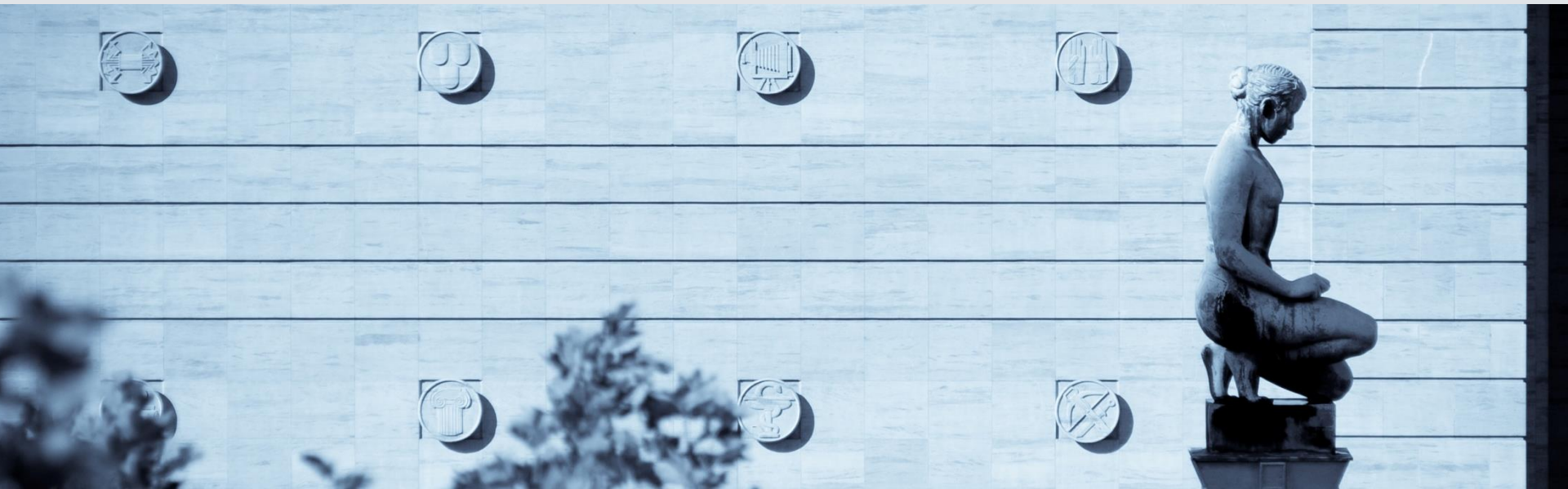
- ▶ Our paper demonstrates the importance of survey data for GDP nowcasts, EVEN IF hard data were available without any publication delay...
- ▶ ... and even for final GDP (which is supposedly constructed using information from hard data only)
- ▶ The paper highlights the importance of using real-time information. We show that the alternative pseudo real-time case delivers significantly different results and can lead to doubtful interpretations when it comes to (the benefit of) variable selection
- ▶ FYI: you can reproduce the results by using JDemetra+ software¹ and the nowcasting plugin

¹ JDemetra+ is free and open source software written in Java. Download it here: <https://github.com/jdemetra/jdemetra-app/releases/tag/v2.1.0-rc2>. The Nowcasting plugin should be downloaded here: <https://github.com/nbbird/jdemetra-nowcasting/releases>. After downloading it, go to the *Tools* option in JDemetra+ and select *plugins*. The software is portable and it could even be executed from a USB disc.

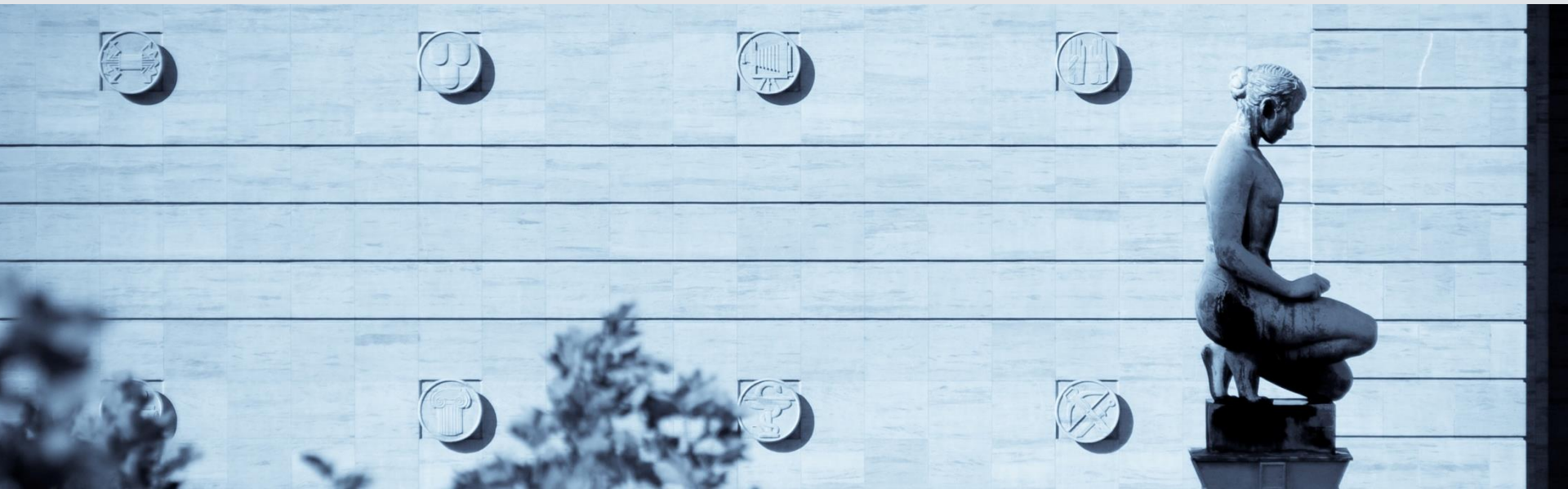


Thank you!

Any questions or comments?



Back-up slides



Statistical significance of each update based on fixed-smoothing asymptotics

Evaluation period: 2007.Q1 - 2015.Q1, T=25

Real-Time Updates	FS-Efficiency		FS-DM	FS-Encompassing (U)pdate vs (O)ld	
	bias	corr	RMSE	U enc O	O enc U
ARIMA	-0.27	0.50	-	-	-
DFM -90 (d)ays	-0.22	0.41	0.68	0.60	0.39
DFM -75 d	-0.19	0.47	0.55	-0.60	1.59
DFM -60 d	-0.12	0.55	0.52	0.26	0.51
DFM -45 d	-0.14	0.54	0.54	1.48	-0.54
DFM -30 d	-0.08	0.58	0.50	-0.20	1.07
DFM -15 d	-0.13	0.46	0.41	-0.65	1.59
DFM 0 d (end of quarter)	-0.06	0.45	0.38	-0.13	0.82
DFM +15 d	-0.09	-0.11	0.27	-0.02	1.01
DFM +30 d	-0.07	-0.08	0.26	-0.39	1.23
DFM +42 d	-0.10	-0.06	0.26	0.27	0.66
DFM +44 d	-0.06	-0.18	0.23	-0.17	1.03
BLOOM +44 d	-0.01	-0.20	0.17	0.23	0.69

Given the small size of our evaluation sample and the time-series correlation patterns, we determine significance at the 5% (dark grey), 10% and 20% (light grey) level using the fixed-smoothing (FS) asymptotics, as proposed by Coroneo and Iacone (2016).

