Nowcasting real economic activity in the euro area
Assessing the impact of qualitative surveys

NBP Workshop on Forecasting
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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
   - Empirical results of the benchmark case

3. How does the impact change when…
   - we ignore the release schedule?
   - we ignore the presence of data revisions?

4. Variable selection

5. Forecasting accuracy

6. Concluding remarks
Eurozone industrial production down
Eurozone PMI disappoints, but retail sales climb

LONDON: Economic growth across the 19-country eurozone in the second quarter of 2022 was lower than anticipated, the European Union's statistical agency Eurostat said Thursday.

German exports dropped 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
## Goal of the paper

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

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**Target variable, but only published with a certain delay**
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1. Data revisions
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1. Data revisions
2. Release schedule (ragged-edge)
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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

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► 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 & Koening, 2009)

<table>
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We follow the methodology of Banbura 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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1. Introduction

2. The analysis of news
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4. Variable selection

5. Forecasting accuracy

6. Concluding remarks
Simple representation of the real-time dataflow

- **Reference period**
- **Publication date**

- **Gfk Survey**
- **Hard data IT**
- **Survey block**

**Flash GDP BE**
**Sentix Survey**
**Hard block**

**Flash GDP forecast EA**
**Survey block**

**Flash GDP EA/DE**

**Reference period**

**Publication date**

- **July**
- **Aug.**
- **Sep.**
- **Oct.**
- **Nov.**
- **Dec.**

**news1**
01/08/15

**news2.0**
14/08/15

**news3**
01/09/15

**news4**
16/09/15

**news5**
01/10/15

**news6**
16/10/15

**news7**
01/11/15

**news8.0**
12/11/15

**news8.1**
13/11/15

**news8.2**
15/11/15
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

\[
\hat{F}_{v+1}^{\text{refreshed}} - \hat{F}_{v}^{\text{archived/old}} \equiv I_{v+1} = \begin{bmatrix}
Y(i,t)_{1} - \text{E}[Y(i,t)_{1} | F_{v}] \\
\ldots \\
Y(i,t)_{J} - \text{E}[Y(i,t)_{J} | F_{v}]
\end{bmatrix}
\]
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)

\[
E[y_{k,t} \mid \mathcal{F}_{refreshed}] - E[y_{k,t} \mid \mathcal{F}_{old}] = \sum_{j=1}^{J} \left( w_{j}^{k,t} \left( y_{(i,t)} - E[y_{(i,t)} \mid \mathcal{F}_{old}] \right) \right)
\]

\[
[w_{1}^{k,t}, \ldots, w_{5}^{k,t}] = E[y_{k,t} \mathcal{I}_{v+1}'] E[I_{v+1} I_{v+1}']^{-1}
\]

\texttt{quality} \hspace{2cm} \texttt{timeliness}
The process of updating nowcasts

Revision to nowcast

Impacts of the news

Net impact = revision to nowcast

Starting point: 17/07/2015

NEWS 1: 01/08/2015
NEWS 2.0: 16/08/2015
NEWS 2.1: 16/08/2015
NEWS 2.2: 16/08/2015
NEWS 3: 01/09/2015
NEWS 4: 16/09/2015
NEWS 5: 01/10/2015
NEWS 6: 16/10/2015
NEWS 7: 01/11/2015
NEWS 8.0: 15/11/2015
NEWS 8.1: 15/11/2015
NEWS 8.2: 15/11/2015
The process of updating nowcasts

- EA GDP Q3 (subsequent vintages in %)
- DE GDP(0)
- EA Forecast GDP(0)
- Sentix Investor confidence EA
- GDP BE (rev +1Q)
- GDP BE (0)
- Retail sales DE
- Industrial production DE
- Industrial production EA
- ZEW Survey Expectations DE
- ZEW Survey Current Situation DE
- IFO - Expectations DE
- IFO - Business Climate DE
- GfK Consumer Confidence DE
- Consumer Confidence BE
- Business Confidence BE
- Markit Manufacturing PMI EA
- Economic confidence EA
- Consumer Confidence EA
- Sentix Investor confidence EA
- EA GDP(0)
- DE GDP(0)

Starting point: 17/07/2015
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NEWS 8.2: 15/11/2015

Revision
The process of updating nowcasts

GDP flash
2015Q3 publication

Starting point: 17/07/2015

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Revision
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)

\[
E[y_{k,t} | F_{refreshed}] - E[y_{k,t} | F_{old}] = \sum_{j=1}^{J} \left( w_{j,k,t}^{k,t} \right) (y_{(i,t)j} - E[y_{(i,t)j} | F_{old}])
\]

\[
[w_{1}^{k,t}, \ldots, w_{5}^{k,t}] = \frac{E[y_{k,t} I_{v+1}']}{E[I_{v+1} I_{v+1}']}^{-1}
\]

► 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
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

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

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**)

![Graph showing impact change for different indicators. Benchmark case and Scenario 1 are compared.](image)
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 ≈ 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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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…

Euro area flash GDP and our nowcasts compared to the Bloomberg forecast
What about the performance of our model relative to others? Some formal investigation…

<table>
<thead>
<tr>
<th>Models</th>
<th>Horizon</th>
<th>Relative RMSE</th>
<th>Encompassing test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>DFM enc BM</td>
</tr>
<tr>
<td>DFM Now-Casting.com</td>
<td>0 days</td>
<td>1.31</td>
<td>0.43***</td>
</tr>
<tr>
<td>DFM Now-Casting.com</td>
<td>44 days</td>
<td>0.70*</td>
<td>0.28***</td>
</tr>
<tr>
<td>DFM PMI indicator</td>
<td>0 days</td>
<td>0.83</td>
<td>0.31**</td>
</tr>
<tr>
<td>DFM Bloomberg</td>
<td>44 days</td>
<td>1.13</td>
<td>0.60***</td>
</tr>
</tbody>
</table>

► 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 Iacone (2016). Evaluation sample: 2011Q3 – 2015Q1.
Outline of the presentation

1. Introduction

2. The analysis of news
   • Mapping of news into forecasting updates for euro area growth
   • Empirical results of the benchmark case

3. How does the impact change when…
   • we ignore the release schedule?
   • we ignore the presence of data revisions?

4. Variable selection

5. Forecasting accuracy

6. Concluding remarks
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+ software\(^1\) and the nowcasting plugin

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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](https://github.com/jdemetra/jdemetra-app/releases/tag/v2.1.0-rc2).

The Nowcasting plugin should be downloaded here: [https://github.com/nbbrd/jdemetra-nowcasting/releases](https://github.com/nbbrd/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

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).