



Global Investment Research

The Goldman Sachs Group, Inc.

Monitoring economic conditions in Europe

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Why monitor economic conditions?

- **‘Nowcast’ / short-term forecast**
 - Data release – *first / flash estimate vs. final release?*
 - Unobservable latent concept *e.g. instantaneous momentum in economics activity*
- **Understand drivers of ...**
 - Monetary policy decisions – *arguments in CB reaction function*
 - Asset price developments and prospects – *often as input to colleagues’ models*
- **Growth rates *vs.* levels**
- **Real *vs.* nominal**

Challenges in the data

- ‘Curse of dimensionality’
- Mixed frequency
- ‘Ragged edge’
- **Specific challenges in the European / Euro area context ...**
 - Relatively short time series – *Euro introduced in 1999*
 - Changing composition of Euro area
 - Bottom up (aggregating countries) vs. Top down (area-wide view)
 - Ensuring internal consistency – *accounting (e.g. intra vs. extra trade)*
– *economic (e.g. spillovers)*

Constructing a macro narrative

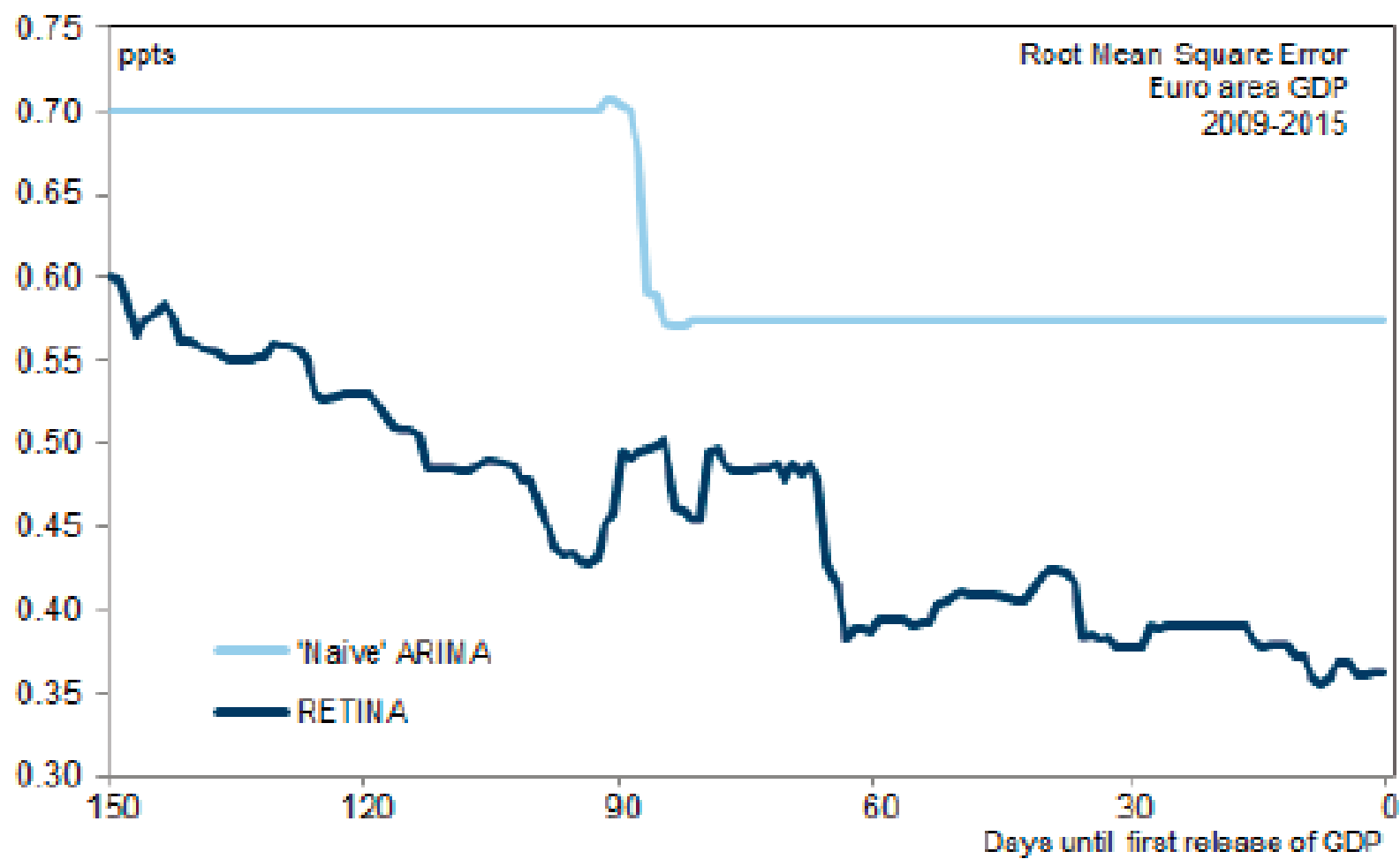
- **Develop a macroeconomic forecast out for several years ...**
 - Exogenous factors – *US economy, commodities, etc.*
 - Themes faced by European economy – *financial market segmentation*
 - *intra-EA real exchange rate adjustments*
 - *structural changes in EU (migration, etc.)*
 - Monetary and fiscal policy
 - Ready-reckoners and small country models
 - Consistency checks *e.g. trade consistency exercise*
 - DSGE models – *‘reverse engineering’ shock decomposition*
 - *focus on changes in shocks, use several models*

Tracking data against the narrative

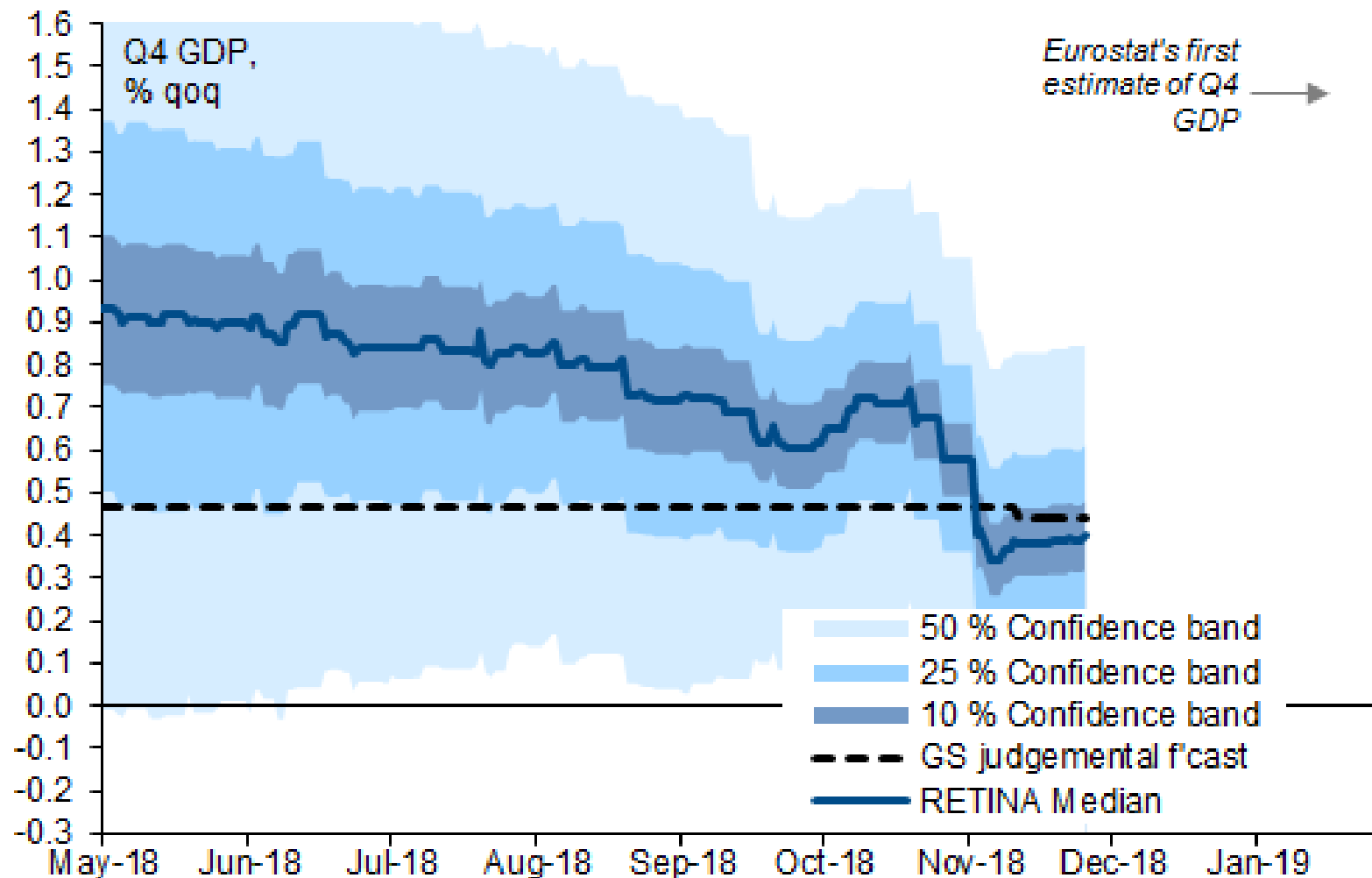
- **RETINA framework** – *REal Time INdicator of Activity*
 - Kalman filter
 - Bayesian
 - VAR – ‘shrinkage’ to address curse of dimensionality
 - supports more ‘structural’ interpretation (hard vs. soft; national idiosyncrasy)
 - Euro area-wide approach – include national time series
 - parallel RETINA-UK model
 - Focus on official macro data and established business surveys, selected on information criteria (Granger causal prior)
 - *Levels* – error correction
-

‘Validation’ of RETINA framework

RETINA consistently outperforms a naïve forecast for real GDP growth

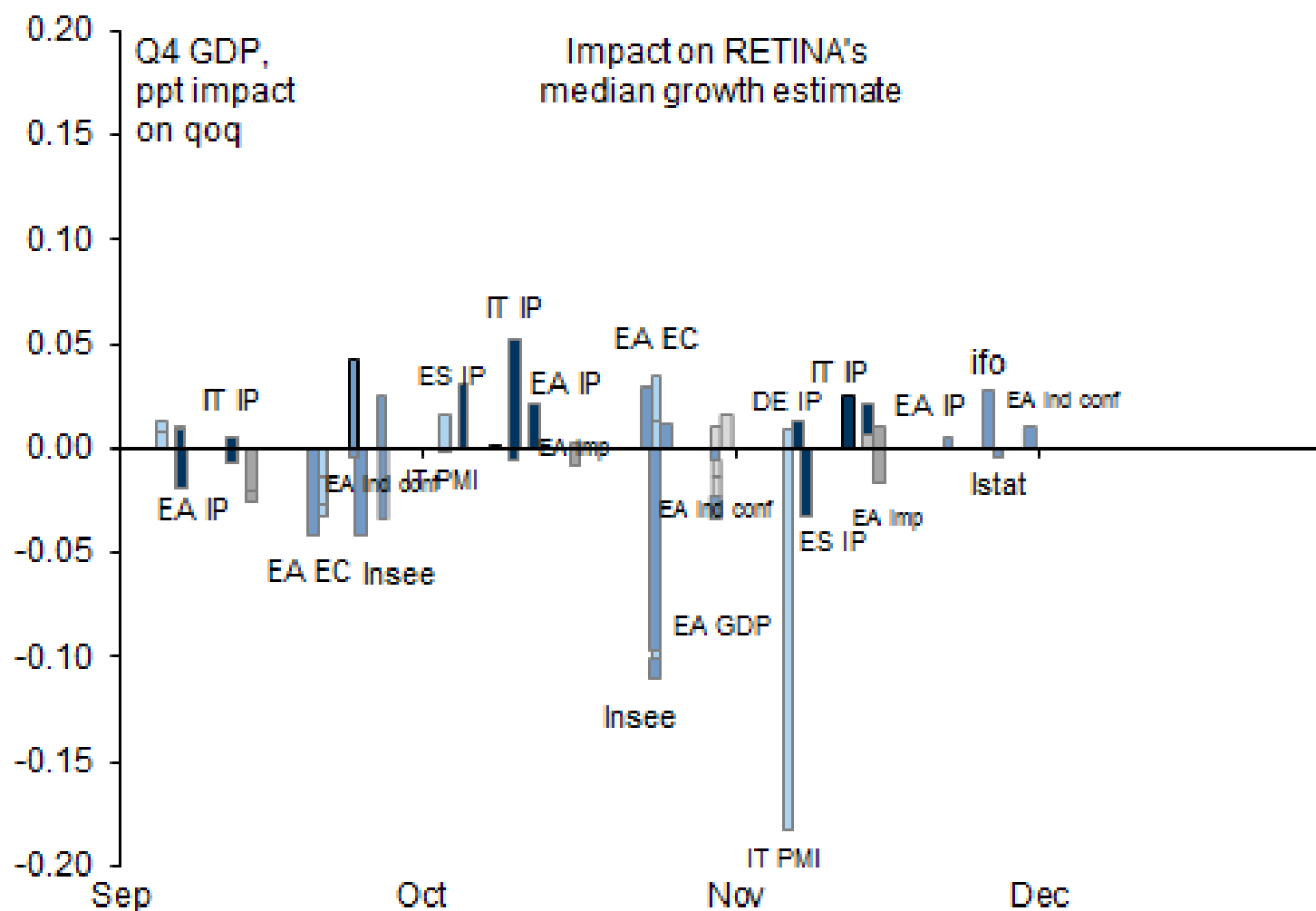


Output of RETINA framework – #1 Tracking



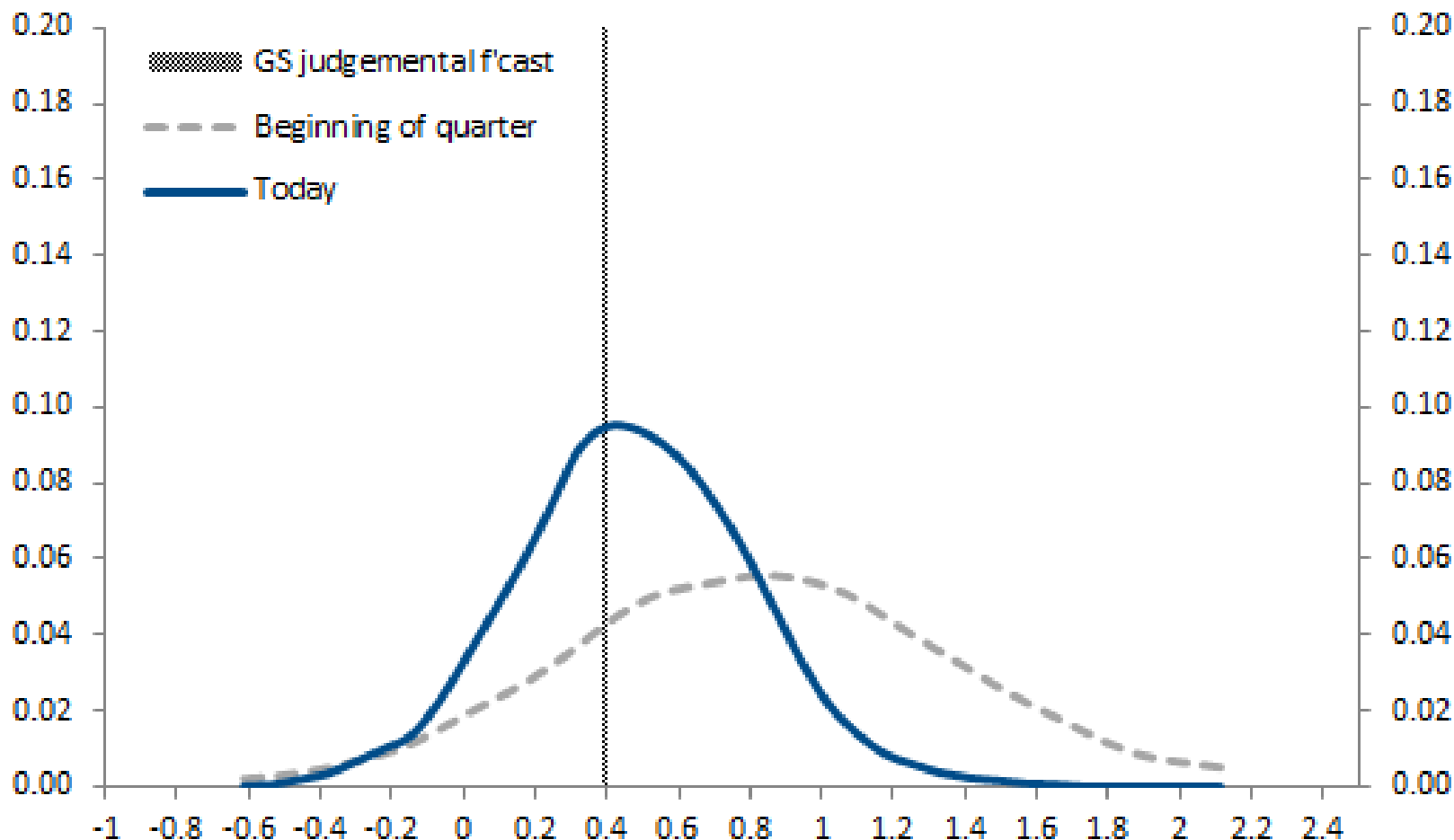
Source: Goldman Sachs Global Investment Research, chart refers to 29 November 2018

Output of RETINA framework – #2 Contributions



Source: Goldman Sachs Global Investment Research, chart refers to 29 November 2018

Output of RETINA framework – #3 Distributions



Source: Goldman Sachs Global Investment Research, chart refers to 29 November 2018

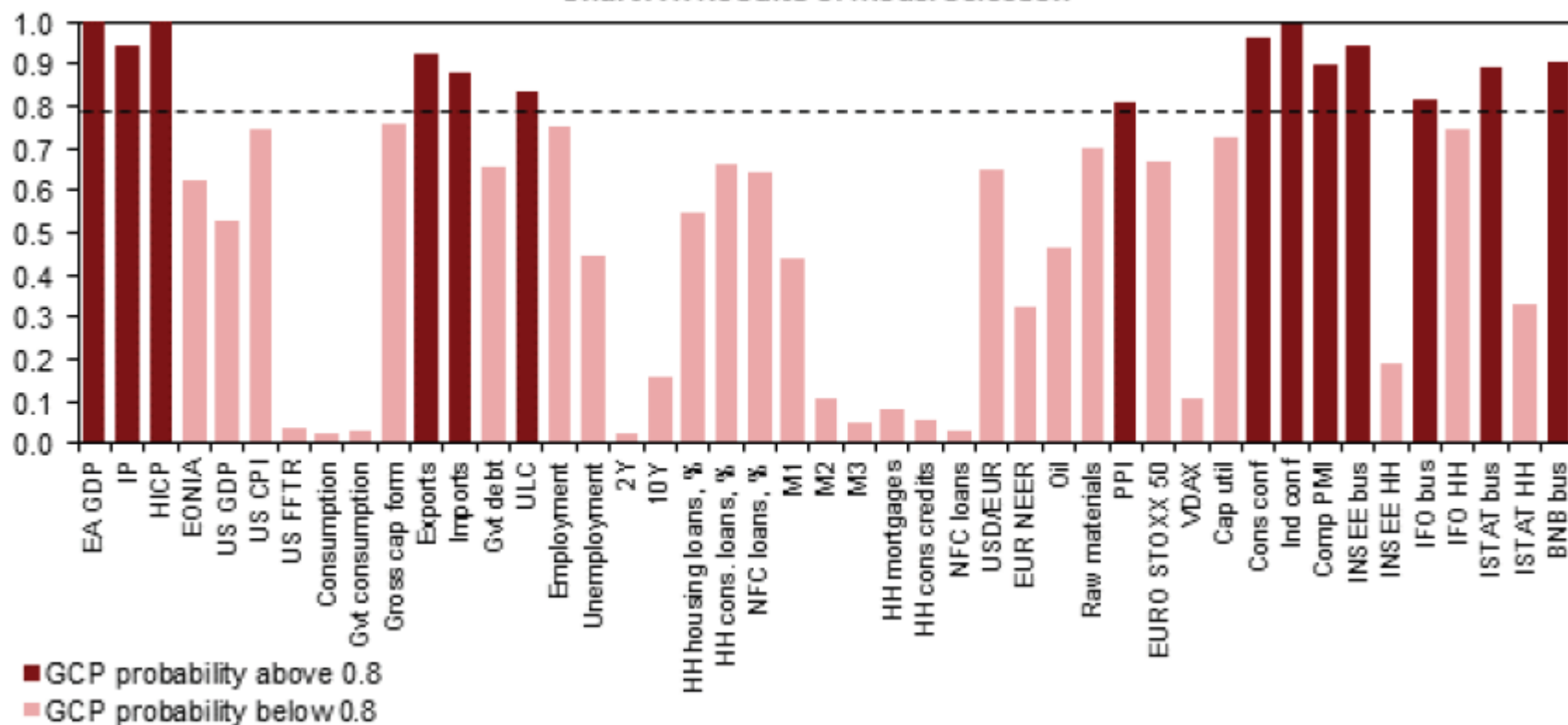
Much to do ...

- **Computational efficiency**
- **Validation** – *better treatment of real time issues*
- **Frequency of model selection / re-estimation**
- **Integration with nominal variables** – *short-term inflation outlook*

Annex

Selection of RETINA indicators

Chart A1: Results of model selection



Selection of RETINA indicators

Official data (quarterly)	Official data (monthly)	Survey data (monthly)
Euro area – GDP Germany – GDP France – GDP Italy – GDP Spain – GDP	Euro area – Industrial Production [^] Germany – Industrial Production France – Industrial Production Italy – Industrial Production Spain – Industrial Production Euro area – Exports Euro area – Imports	Euro area – PMI* Germany – PMI France – PMI Italy – PMI Spain – PMI Euro area – Consumer Confidence Euro area – Industrial Confidence Germany – Ifo~ France – INSEE Italy – ISTAT Belgium – BNB

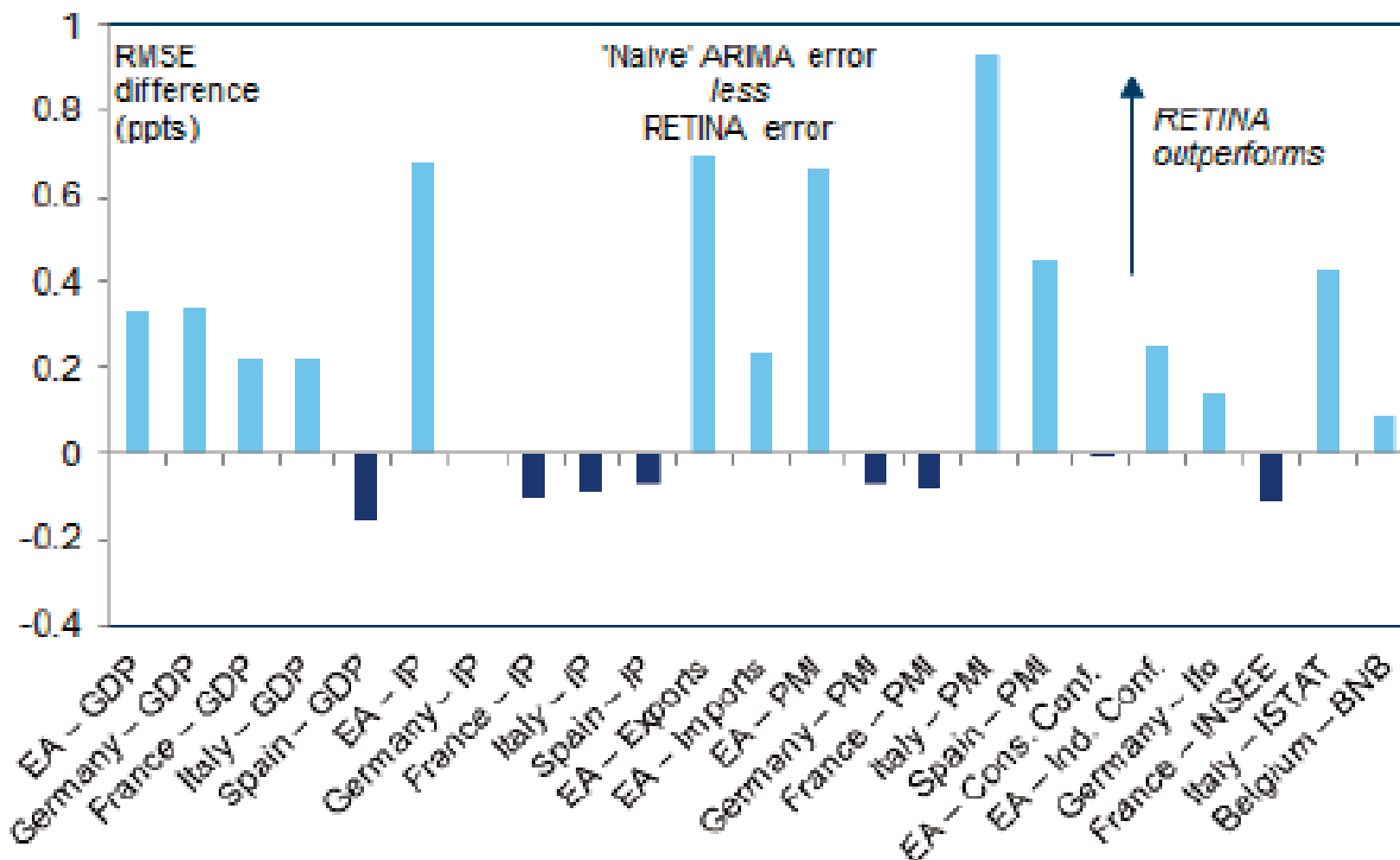
[^] Industrial Production = Headline IP excluding construction

* PMI = Composite PMI Output

~ Ifo / Insee / ISTAT / BNB = Headline Business Confidence

Meaningfulness of RETINA 'benchmark'

RETINA 'benchmarks' are not forecasts, but still outperform naïve view



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February 21, 2019

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