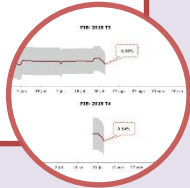# Nowcasting at AIReF

Meeting of the Network of EU IFIs

November 2018

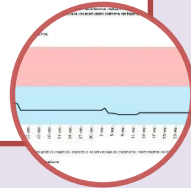# Nowcasting as a central analytical piece

Short-term economic outlook based on GDP projections and medium-term anchor
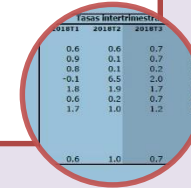
Forecasting

Interpretation of high-frequency signals along "surprise events"
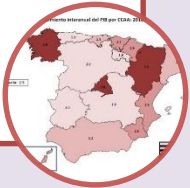
Real-time monitoring

Fully-fledged economic outlook including all demand-side components

Integrated vision

Estimation of regional GDP ensuring temporal and transversal consistency

Regional dimension

Communication challenges

Starting point of our projection exercise

GDP — Q+2 — T+3

Short-term Nowcasting

Medium-term Structural Models
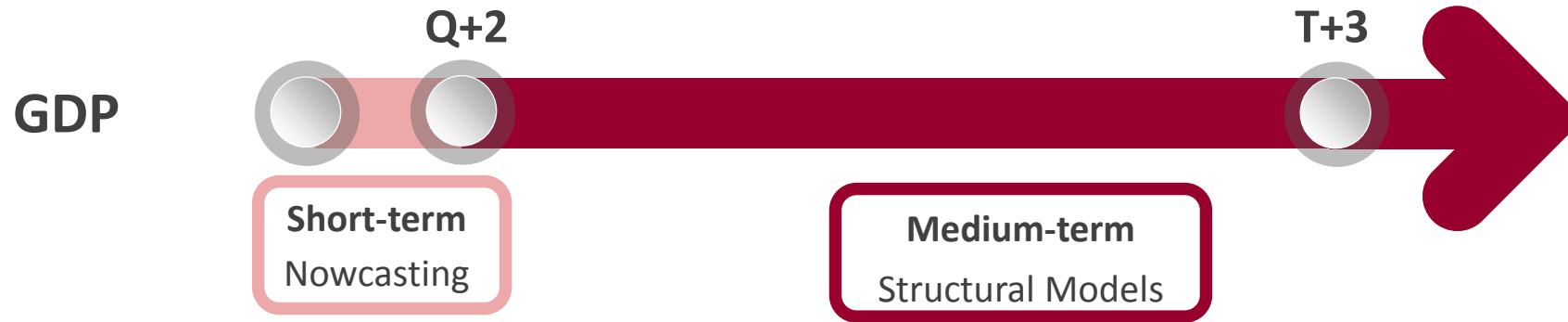
Dynamic Factor Model: why?

Common info about the cycle

SW (2002), G et al (2003)…

Extended use in institutions

Transparent

Replicable: public data

Use of high-frequency data

What variables?

Statistical selection process

Maximalist vs incrementalist approach

Parsimonious version

Add if correlation with GDP increases

AIReF

The final model is rather parsimonious

Initial selection: core	Release delay
Social security system: registered workers	t+1
Index of Industrial Production	t+35
Large companies. Deflated total sales	t+35
Employed Labor Force Survey (quarterly)	t+30
PMI services index for Spain	t-1

Extended version	
Imports of goods (volume)	t+50
Electric power consumption	t+1
Aparent consumption of cement	t+22
Credit to households and NFC (real)	t+35
Large companies. Deflated comp. of employees	t+35

Back

Real-time forecast at work: decision tree

Release of new indicator

How does it compare with the **model**?

No surprise ➜ GDP qoq forecast **is not revised**

Deviation/surpise: positive (negativa) if observation is larger (smaller) than forecast

Upward (downward) GDP revision accompanying positive (negative) surprises

Upward (downward) revisionof the indicators accompanying positive (negative) surprises
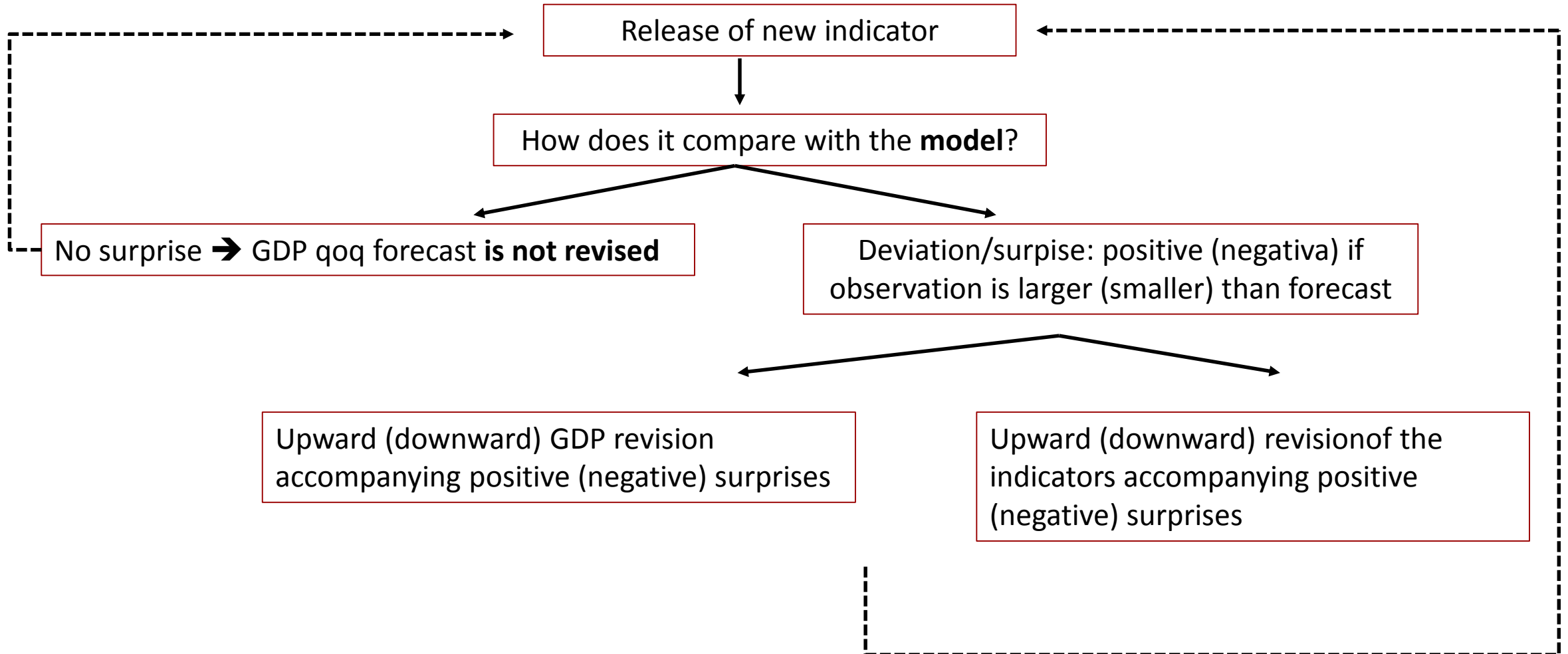
Real-time forecast at work: regular updates

2017Q4 Real time GDP forecast

Date	Indicator	Period	Forecast	Observation
01-aug	ELE	julio	3.0	1.0
01-ago	FIN	junio	-1.6	-2.5
02-ago	AFI	julio	3.7	3.6
22-ago	IMPB	junio	5.4	2.9
04-sep	AFI	agosto	3.5	3.4
05-sep	PMIS	agosto	57.2	56.0
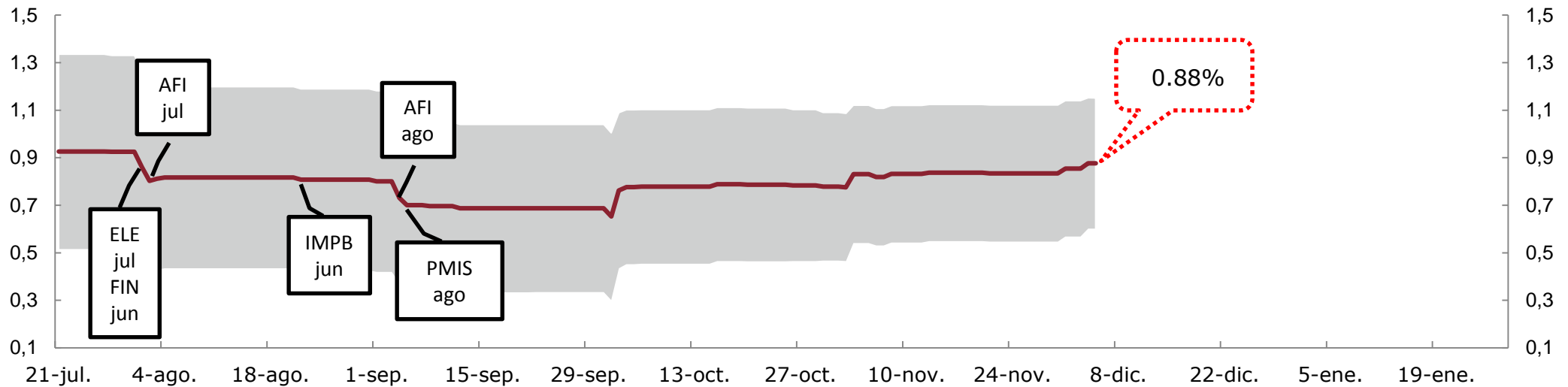
Real-time forecast at work: communication effort

- **Thermometer/Surprise index**: cummulated value of registered innovations

Date	Indicator	Period	Surprise
2-nov.	ELE	october	-
2-nov.	FIN	september	+
3-nov.	AFI	october	+
6-nov.	PMIS	october	-
8-nov.	IPI	september	+
13-nov	VGE	september	+
13-nov	RBT	september	+
21-nov	IMPB	september	-
1-dec.	ELE	november	+
1-dec.	FIN	october	+
4-dec.	AFI	november	+
5-dec.	PMIS	november	-
5-dec.	IPI	october	+
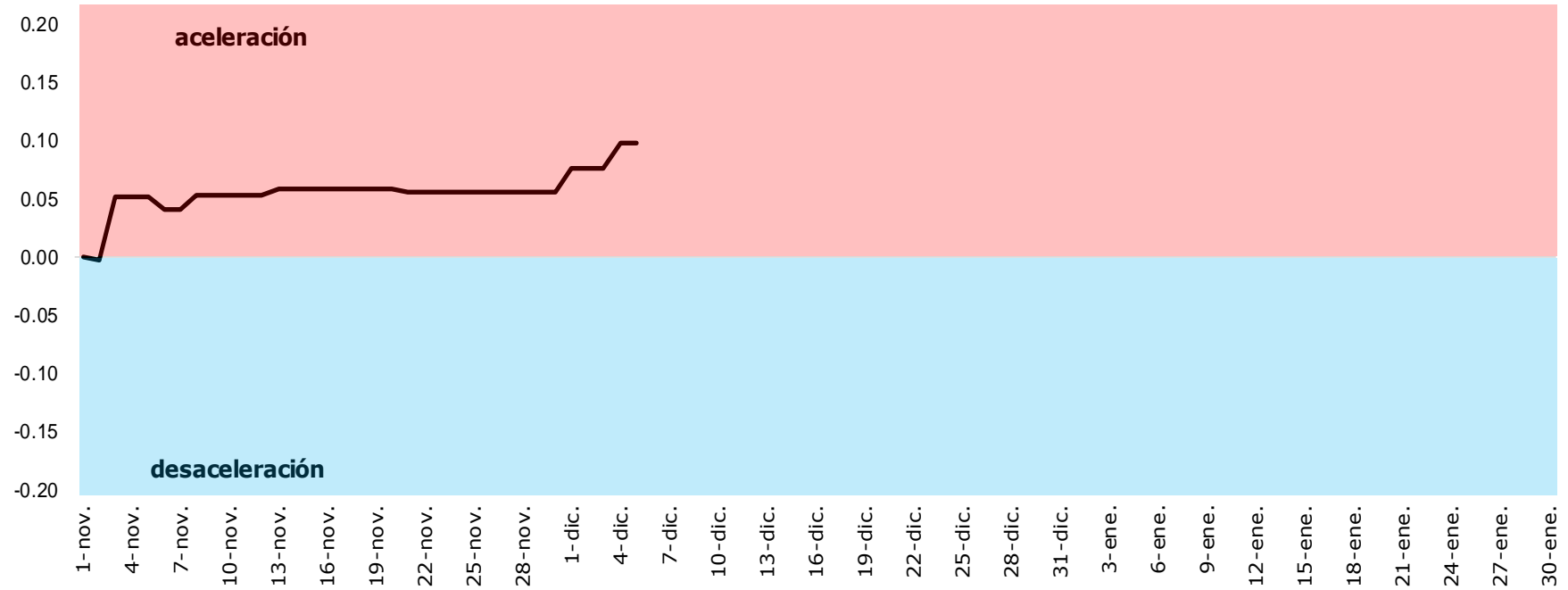
How to interpret the indicator?

➢ Counter at 0 at the beginning of the forecast period
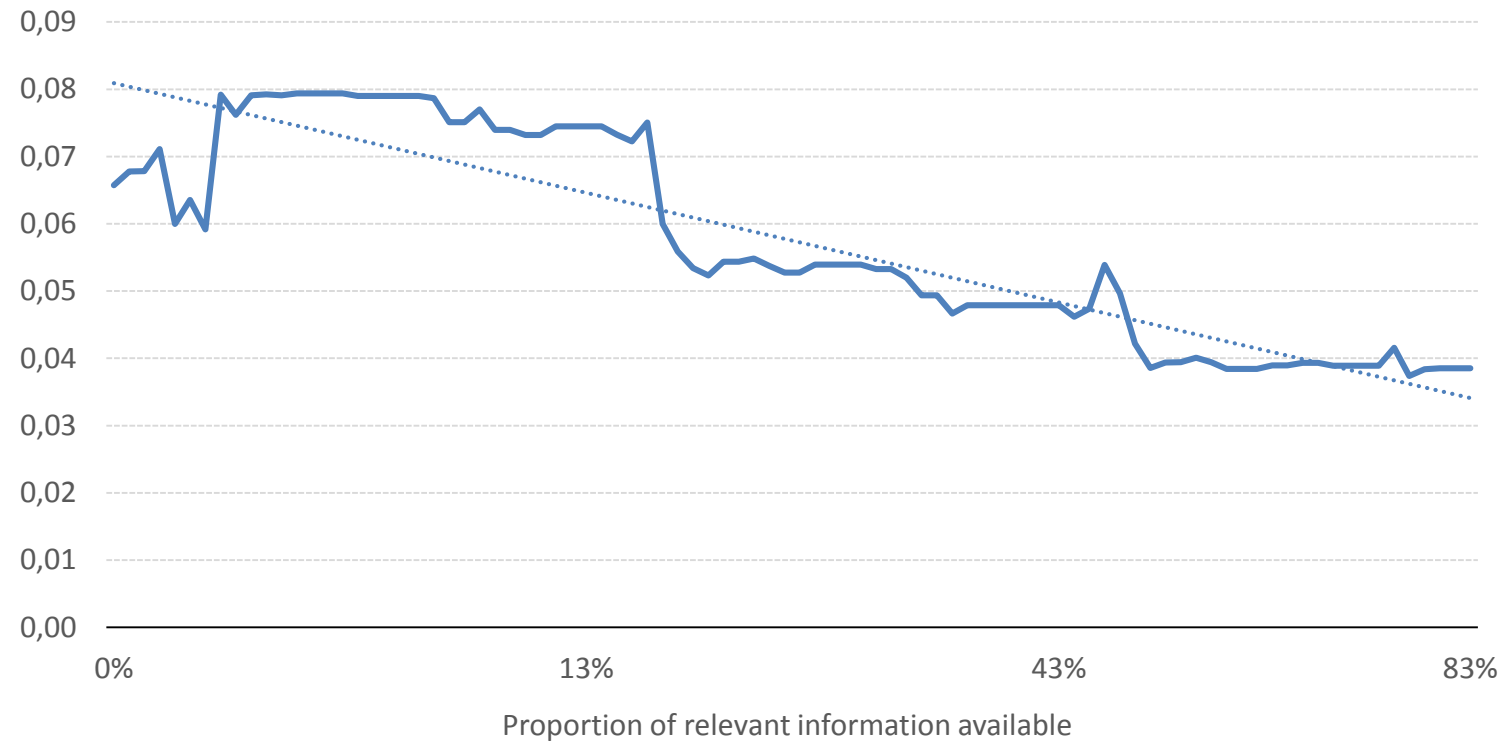
➢ Dynamics reflect cummulated innovations with respect to the initial forecast

➢ Mainly qualitative/tren interpretation

Real-time forecast at work: efficient use of information

Evaluation exercises: Good predictive power and shrinking forecast error

Average error (absolute value) throughout the forecast period

Proportion of relevant information available

Back

Integrated framework: demand-side approach

GDP

Q+2   T+3

Short-term Nowcasting

Medium-term Structural Models
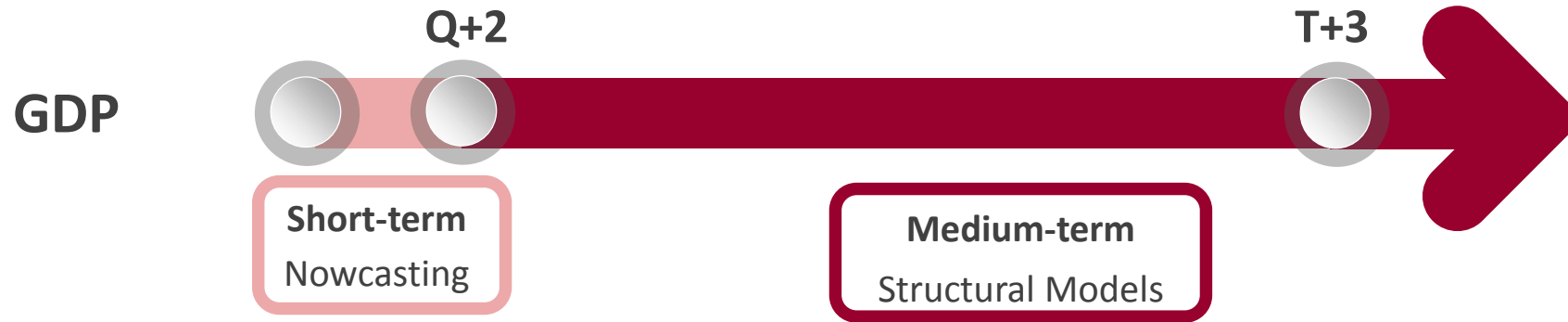
Build additional models

- Private consumption
- Public consumption
- Productive investment
- Construction investment
- Imports of Goods and services
- Exports of godos and services

Benchmarking to ensure consistency (Van der Ploeg, 1982)

- Larger adjustment the larger the s.e.
- Adjustment in line with correlation sign

AIReF

Integrated framework: demand-side approach
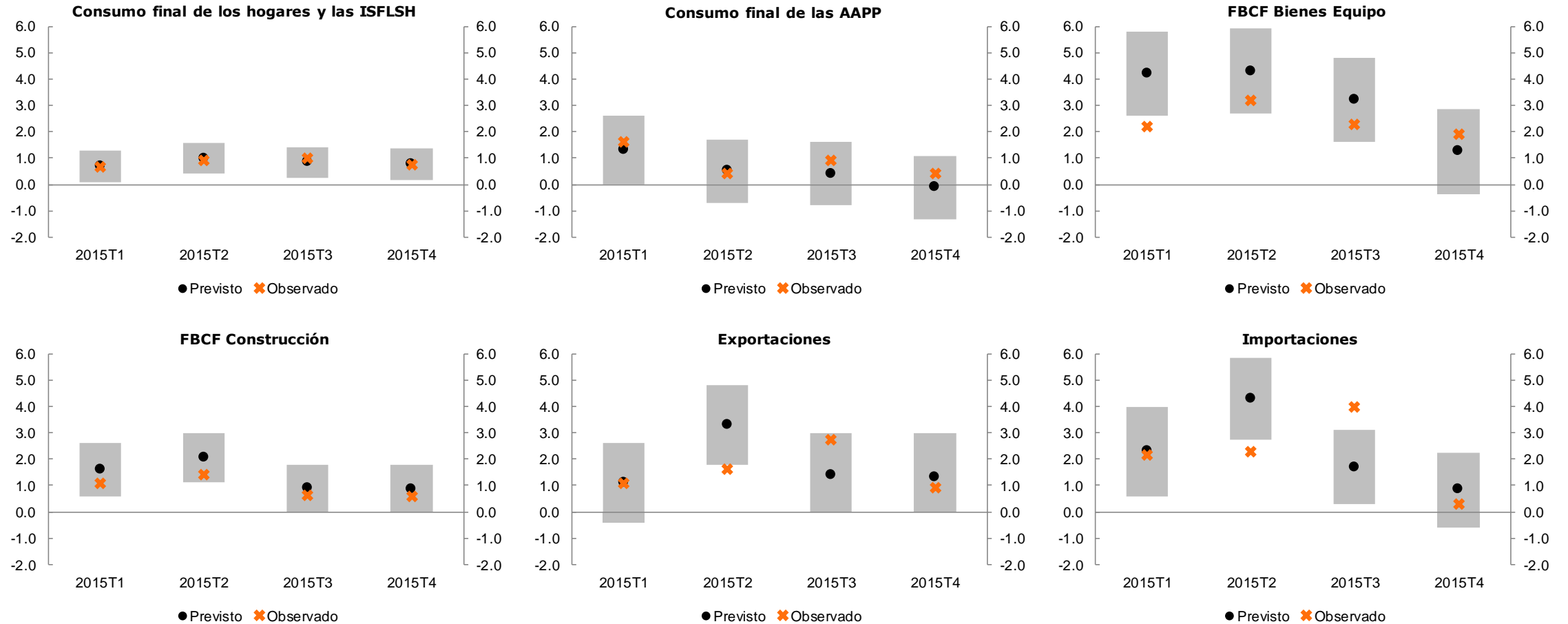
Real time forecast, Q4-2018, Q1-2019

Volumen datos CVEC	Tasas intertrimestrales				Tasas interanuales				
	2018T2	2018T3	2018T4	2019T1	2018T2	2018T3	2018T4	2019T1	2018
Producto interior bruto a precios de mercado	0.6	0.6	0.8	0.8	2.5	2.5	2.5	2.7	2.6
Gasto en consumo final de los hogares y las ISFLSH	0.1	0.6	0.7	0.7	2.3	2.0	2.3	2.1	2.4
Gasto en consumo final de las AAPP	0.1	0.8	0.5	0.4	1.9	2.1	2.3	1.9	2.2
FBCF. Bienes de equipo + activos cultivados	6.5	2.2	3.2	0.8	10.8	9.2	12.2	13.1	8.5
FBCF. Construcción + Resto FBCF	1.9	0.4	1.5	1.6	6.0	4.7	5.7	5.5	5.4
Exportaciones de bienes y servicios	0.2	-1.8	1.2	1.8	2.3	0.4	0.3	1.4	1.6
Importaciones de bienes y servicios	1.0	-1.2	1.9	1.9	5.2	2.0	3.3	3.5	3.8
Aportación Demanda Nacional					3.3	3.0	3.5	3.4	3.2
Aportación Demanda Externa					-0.8	-0.5	-1.0	-0.7	-0.6
EPA. Total ocupados	0.8	0.5	0.7	0.7	2.7	2.4	2.6	2.7	2.5

Fuente: AIReF, elaboración propia

Integrated framework: demand-side approach

Real time forecast, evaluation exercise

Consumo final de los hogares y las ISFLSH

Consumo final de las AAPP

FBCF Bienes Equipo

FBCF Construcción

Exportaciones

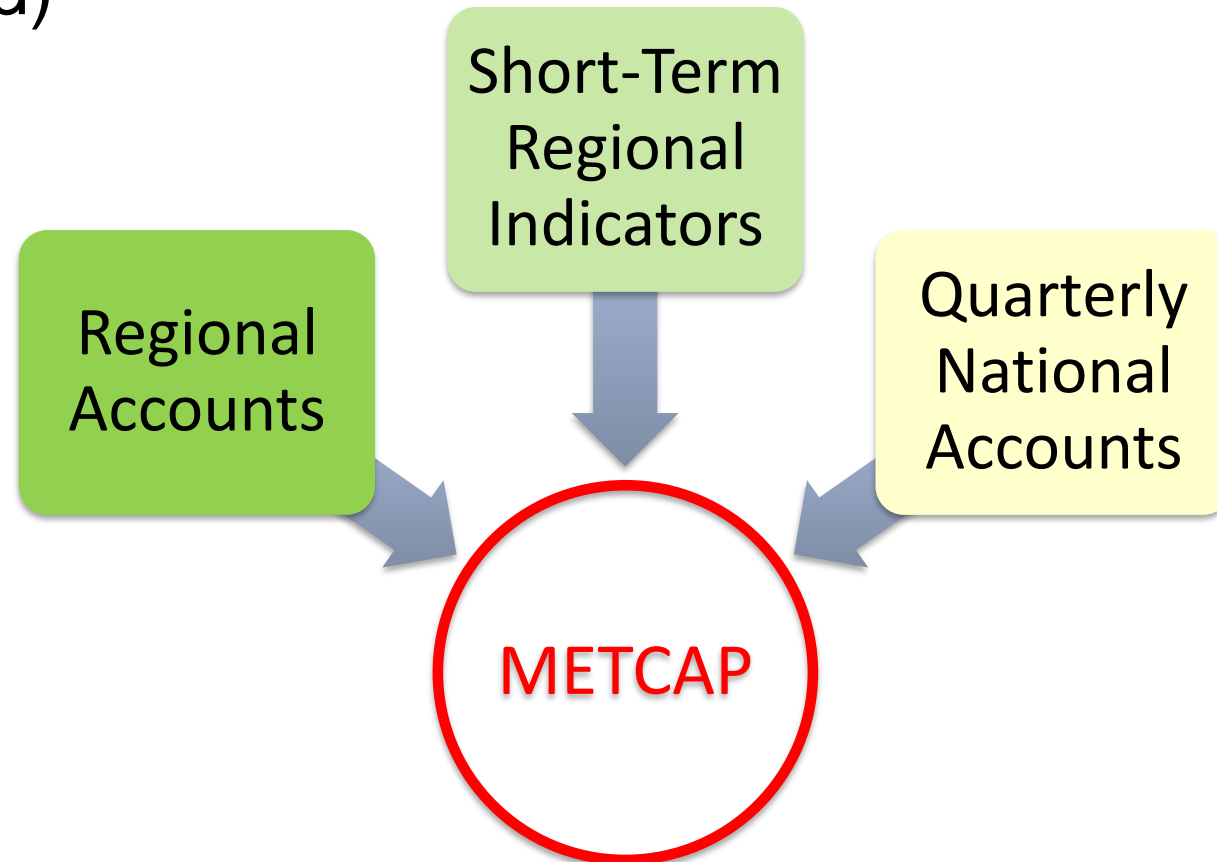**Importaciones**

● Previsto ✗ Observado

Back

Regional dimension: filling the gap

- Nowcasting and forecasting regional GDPs in Spain
- Regions = 18 (17 "Comunidades Autónomas" + 2 autonomous cities jointly considered)
- Data

  - GDP by CCAA
  - Annual estimate
  - Structural sources
  - Coherence between the CCAA and the National figures
  - Methodology SEC-2010

Regional Indicators

AFI: Social security system: registered workers.

IPI: Index of Industrial Production.

PER: Overnight stays in hotel establishments.

IAS: Services sector activity indicator.

ICM: Retail sales index.

IMP: Imports of goods.

VIS: New building permits: total area to build in housing.

HIP: Mortgages on housing.

CRE: Total Credit: public admin. and other resident sectors.

DEP: Deposits: public admin. and other resident sectors.

GAS: consumption of petroleum products

Regional dimension: filling the gap

Step 1
- Seasonal Adjustment of high-frequency indicators
- Generation of composite GDP trackers via DFM

Step 2
- Temporal disaggregation of annual regional GDP using the GDP trackers as interpolators

Step 3
- Incorporation of transversal constraint via national quarterly GDP via chain linking
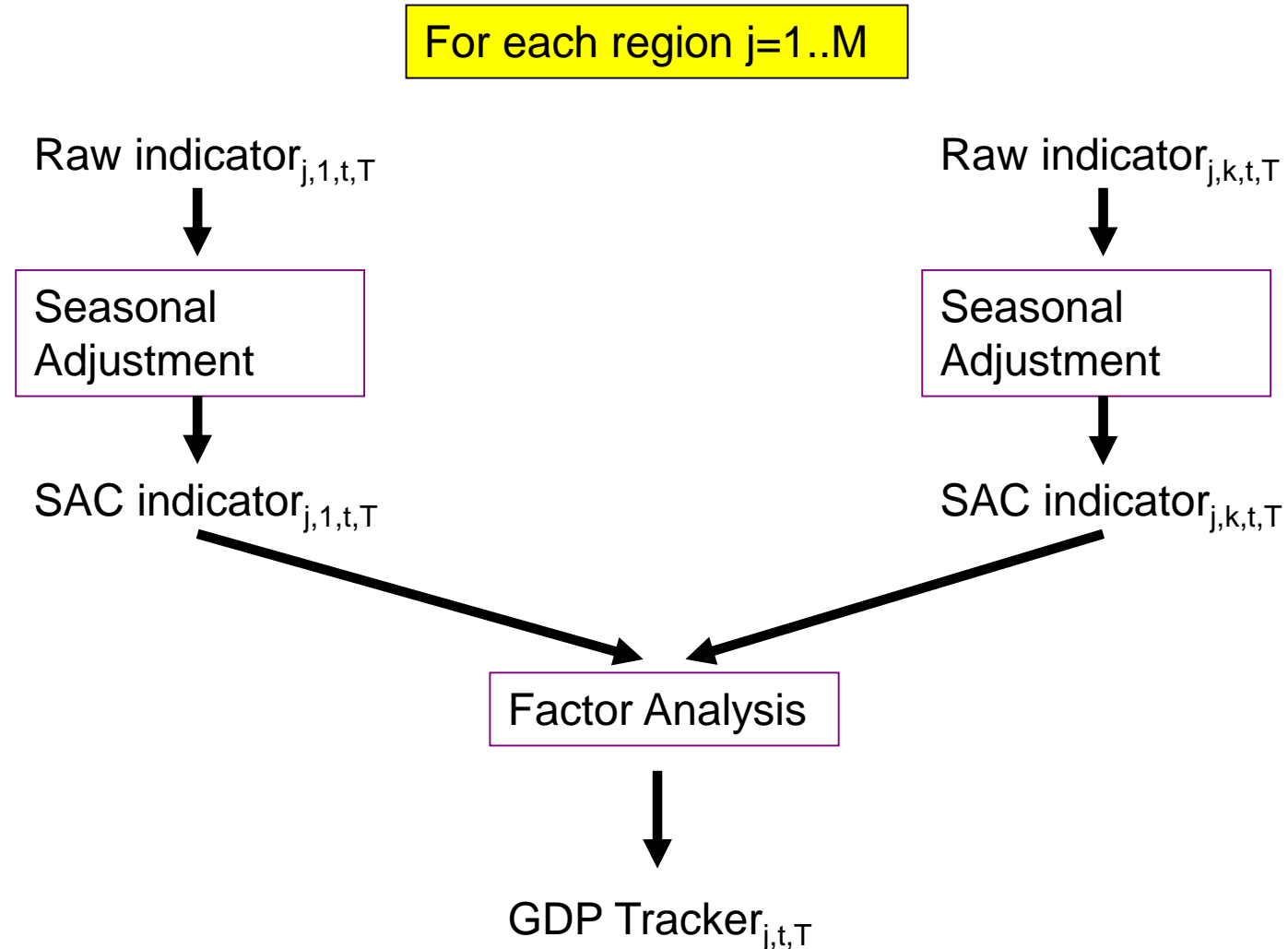
AIReF

Regional dimension: filling the gap

Step 1

For each region j=1..M

Raw indicator$_{j,1,t,T}$

Seasonal Adjustment

SAC indicator$_{j,1,t,T}$

Raw indicator$_{j,k,t,T}$

Seasonal Adjustment

SAC indicator$_{j,k,t,T}$

Factor Analysis

GDP Tracker$_{j,t,T}$

Regional dimension: filling the gap

Regional dimension: filling the gap

Step 3

Region 1: Step 2

Region M: Step 2

Preliminary $GDP_{1,t,T}$

National $GDP_{t,T}$

Preliminary $GDP_{M,t,T}$

BALANCING

$GDP_{1,T}$

$GDP_{M,T}$

$GDP_{1,t,T}$

$GDP_{M,t,T}$
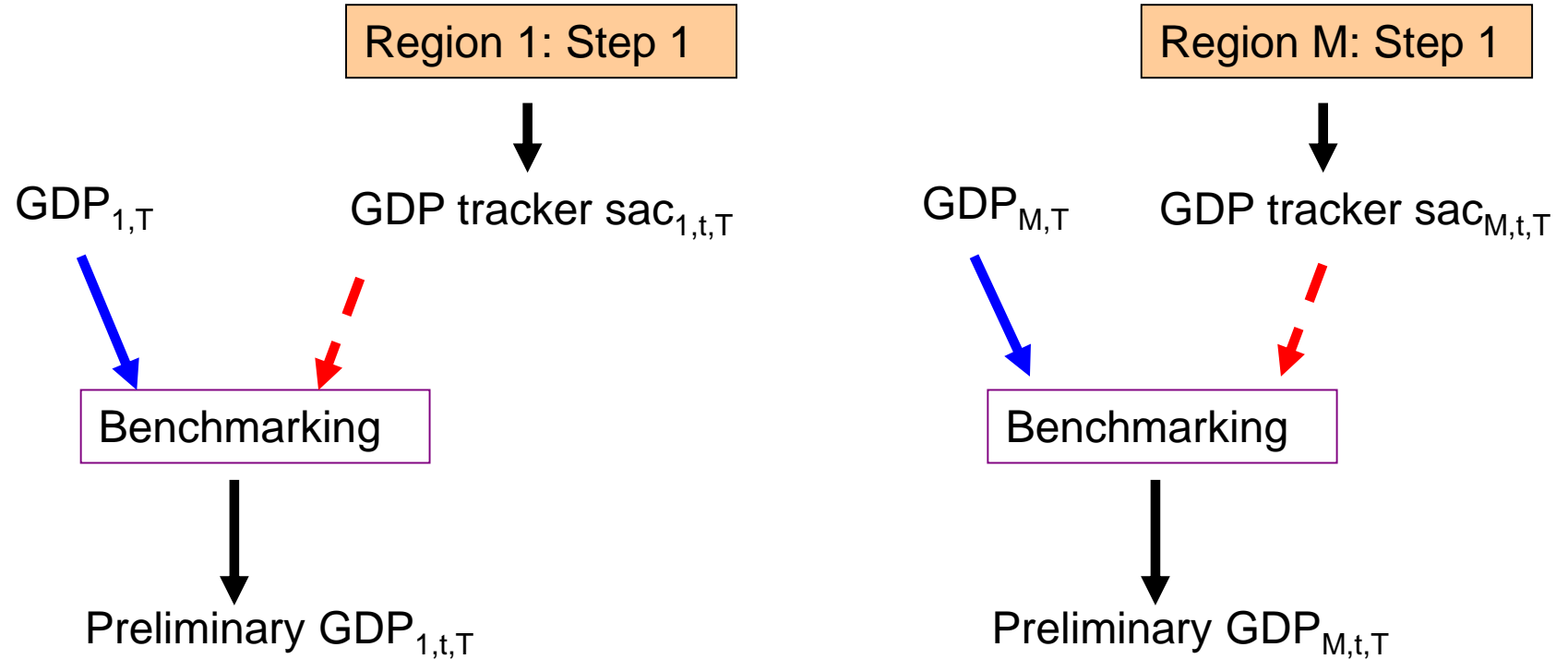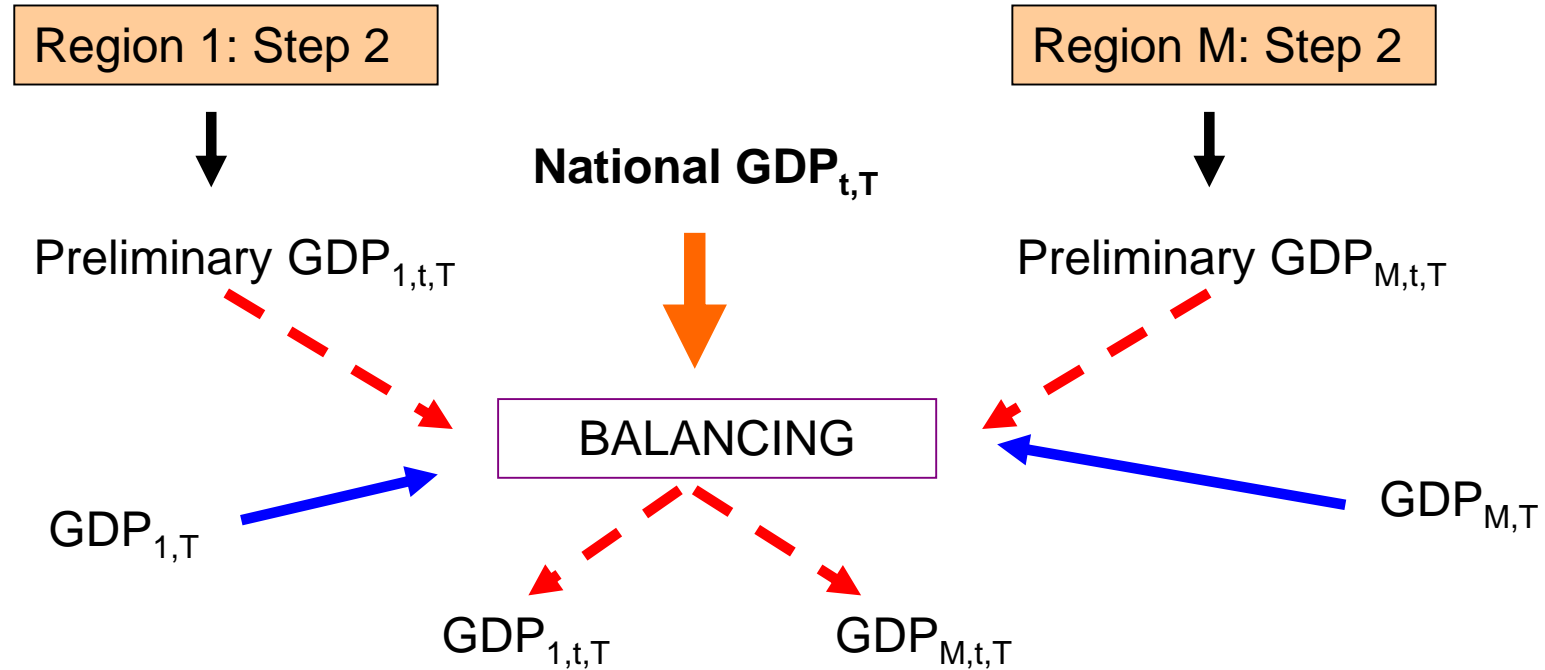
Temporal constraints

Cross section constraint

Regional dimension: filling the gap

Crecimiento interanual del PIB por CCAA: 2018 T3

España: 2.5

Menos de 2.2%
Entre el 2.2% y 2.4%
Entre el 2.5% y 2.7%
Más del 2.7%
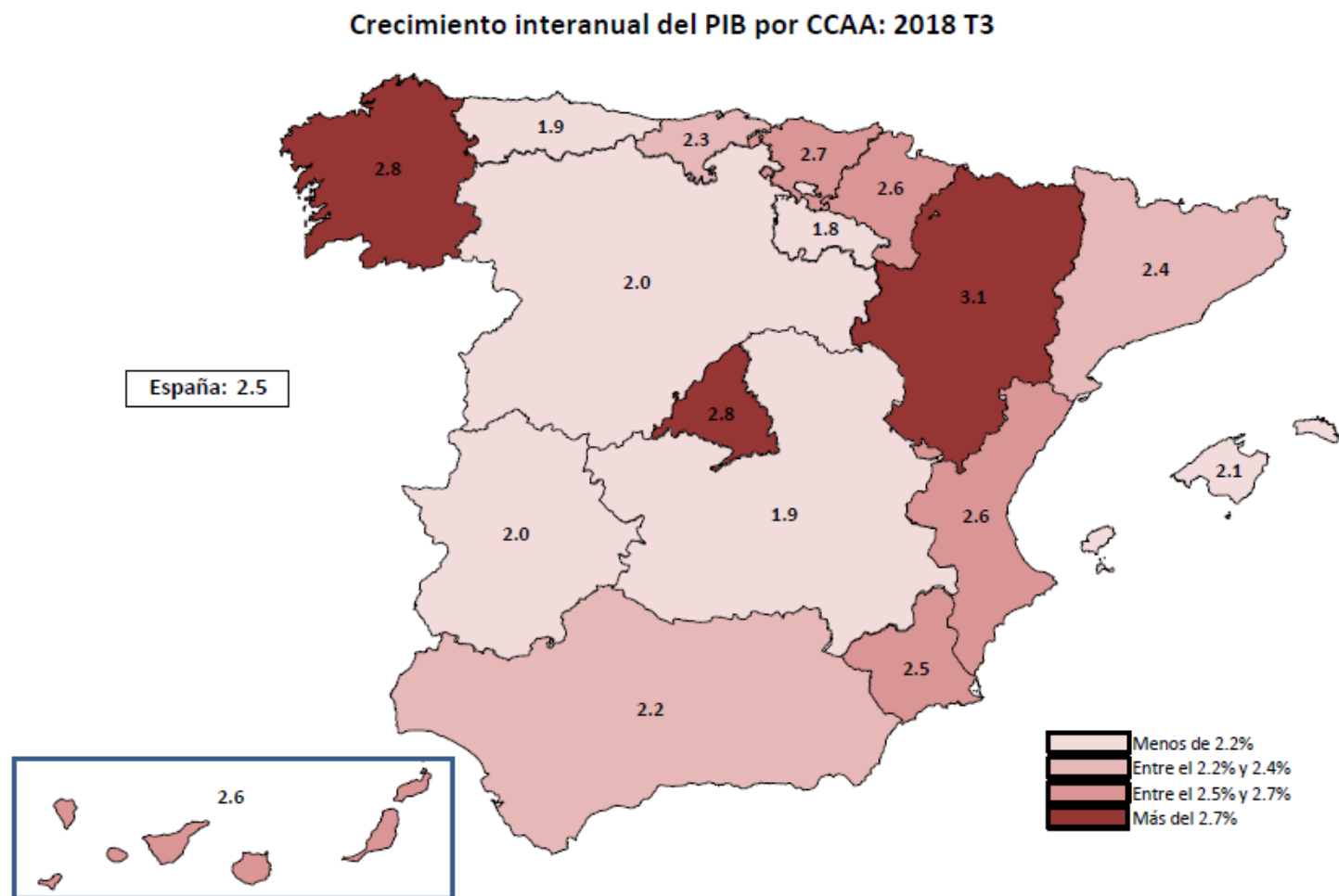
Regional dimension: additional applications

- **MIPred-CAT**: specific real-time forecast model por Cataluña

  How does it compare with METCAP and MIPred?

  - ➢ Lifting the cross-sectional constraint

  - ➢ Different selection of indicators

Real-time forecast Q4 2017, Cataluña

Annex

HOUSEHOLDS CONSUMPTION

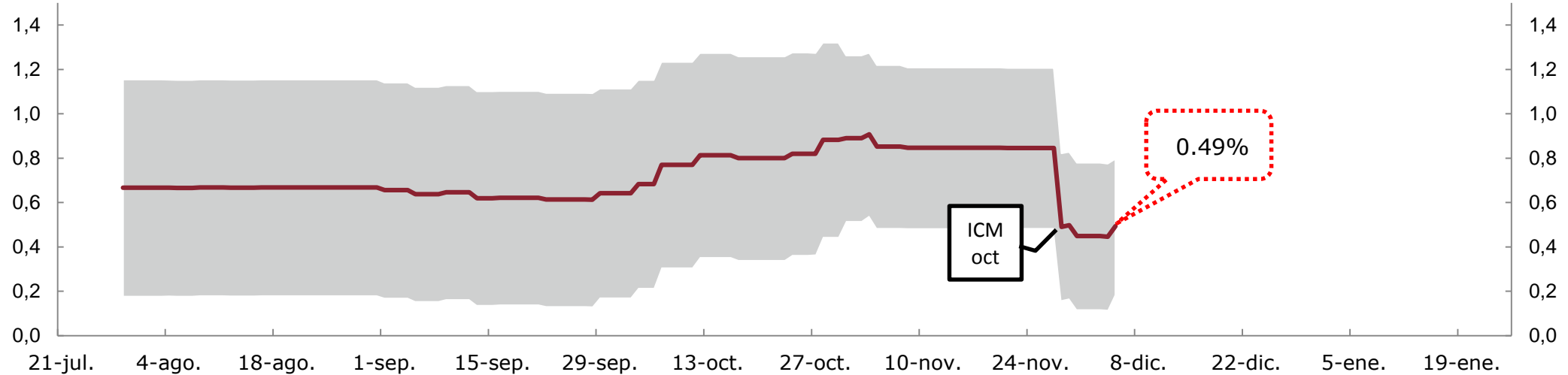|				
Index of Industrial Production: consumption goods	1990 m1	Volume index	National Statistical Institute	t+35
Real wage income indicator	1990 m1	Deflated value index	General Directorate Macro. Analysis	t+35
Retail trade index, deflated	1990 m1	Deflated value index	National Statistical Institute	t+27
Consumer confidence index	1990 m1	Index 1990-2008=100	European Commission	t-1
Imports of consumption goods deflated by the unit value index	1990 m1	Deflated value index	Tax State Agency/GDMA	t+50
Credit to households for consumption deflated by consumer price index	1990 m1	Deflated value index	Bank of Spain	t+35
Large companies sales. Consumption sales deflated	1990 m1	Deflated value index	Tax State Agency	t+35
Large companies sales. Number of recipients	1990 m1	Deflated value index	Tax State Agency	t+35

GOVERNMENT CONSUMPTION

Social security system: registered workers in public administration	1990 m1	Thousand people	Ministry of Labour	t+1
State nominal final consumption deflated	1990 m1	Deflated value index	General Audit Office	t+35
Withholding employment income of workers in the public administration deflated	1990 m1	Deflated value index	General Audit Office	t+35

Annex

FIXED CAPITAL INVESTMENT: EQUIPMENT

Index of Industrial Production: equipment	1990 m1	Volume index	National Statistical Institute	t+35
Cargo and bus registrations	1990 m1	Units	General Directorate of Traffic	t+1
Industrial Confidence Indicator: equipment	1990 m1	Percentage balances	Ministry of Industry, Energy and Tourism	t-1
Imports of capital goods at constant prices	1990 m1	Deflated value index	Tax State Agency/GDMA	t+50
Credit to resident companies deflated	1990 m1	Deflated value index	Bank of Spain	t+35
IBEX-35 Share price index	1990 m1	Index, Jan. 1994=100	Madrid Stock Exchange	t+1
Utilization of productive capacity	1990 q1	Percentage of utilization	Ministry of Industry, Energy and Tourism	t+35

FIXED CAPITAL INVESTMENT: CONSTRUCION

Social security system: registered workers in construction	1990 m1	Thousand people	Ministry of Labour	t+1
New building visas: total area to build	1990 m1	Buildable floorage (m2)	Ministry of Public Works	t+35
Number of housing transaction: new housing	1990 m1	Units	Ministry of Public Works	t+35
Apparent consumption of cement	1990 m1	Thousand tons	Cement Producers Association	t+22
Confidence index in construction sector	1990 m1	Percentage balances	Ministry of Industry, Energy and Tourism	t-1
Credit to households for housing acquisition and rehabilitation	1990 m1	Deflated value index	Bank of Spain	t+35
Large companies sales. Construction sales deflated	1990 m1	Deflated value index	Tax State Agency	t+35

Annex

EXPORTS OF GOODS AND SERVICES				
Total entry of tourist	1990 m1	Thousand people	Ministry of Industry, Energy and Tourism	t+23
Foreign orders. Total industry	1990 m1	Percentage balances	Ministry of Industry, Energy and Tourism	t+23
Total exports of goods at constant prices	1990 m1	Deflated value index	Tax State Agency/GDMA	t+35
Tourism revenues	1990 m1	Deflated value index	Ministry of Industry, Energy and Tourism	t+23
World trade in goods	1990 m1	Index	Central Planning Bureau (Netherlands)	t+30
PMI index. Industry	1990 m1	Index 1990-2008=100	Markit group	t-1
Large companies sales. Exports sales deflated	1990 m1	Deflated value index	Tax State Agency	t+35
IMPORTS OF GOODS AND SERVICES				
Index of Industrial Production	1990 m1	Volume index	National Statistical Institute	t+35
Total imports of goods at constant prices	1990 m1	Deflated value index	Tax State Agency/GDMA	t+35
Balance of payments. Tourism payments	1990 m1	Deflated value	Bank of Spain	t+60
World trade in goods	1990 m1	Index	Central Planning Bureau (Netherlands)	t+20
PMI index. Industry	1990 m1	Index 1990-2008=100	Markit group	t-1
Large companies sales. Imports sales deflated	1990 m1	Deflated value index	Tax State Agency	t+35