Conselho das Finanças Públicas
Portuguese Public Finance Council

Macroeconomic Nowcasting

Nuno Gonçalves
*ngoncalves@cfp.pt*

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➢ The main objective is to produce medium-term macroeconomic projections, identifying macroeconomic imbalances and anchor the fiscal projections.

➢ Three types of macro models:

- medium term (5 years): quarterly structural macroeconometric model (PMF)

- Short term (2 years): VAR/BVAR models for real GDP and CPI

- Present (2 quarters): Bridge models and MIxed DAta Sampling (MIDAS) models for real GDP and components

CFP models
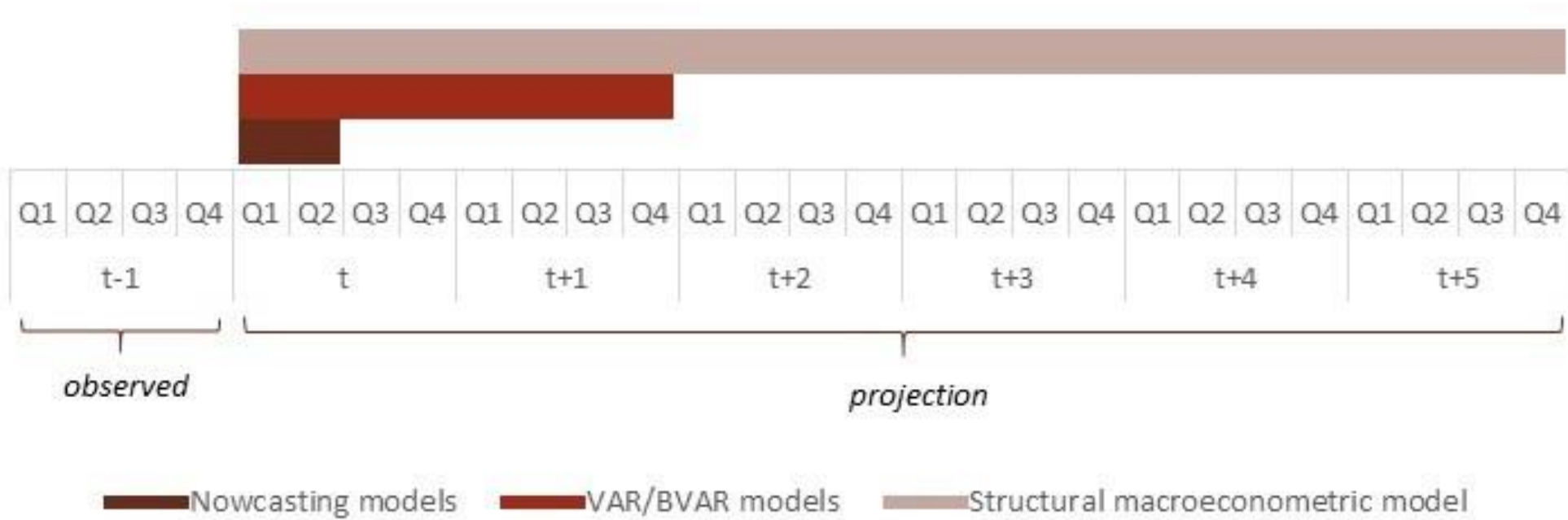
➢ Monitoring current economic conditions in real time

➢ Continuously updated nowcast of GDP growth (monthly) – watch out for turning points!

➢ Accuracy of macroeconomic projections heavily rely on starting conditions

➢ Real time perception of economic conditions to support a real time perception of the public finance fundamentals

Macroeconomic Nowcasting: Output

Real GDP y-o-y growth rate (%) and confidence intervals
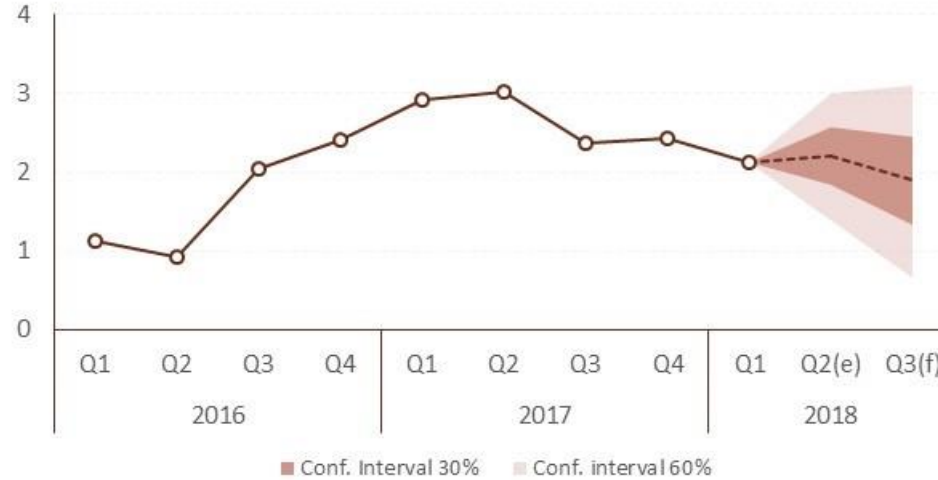
Developments in estimates for real GDP and main components y-o-y growth rates (2018Q2, %)
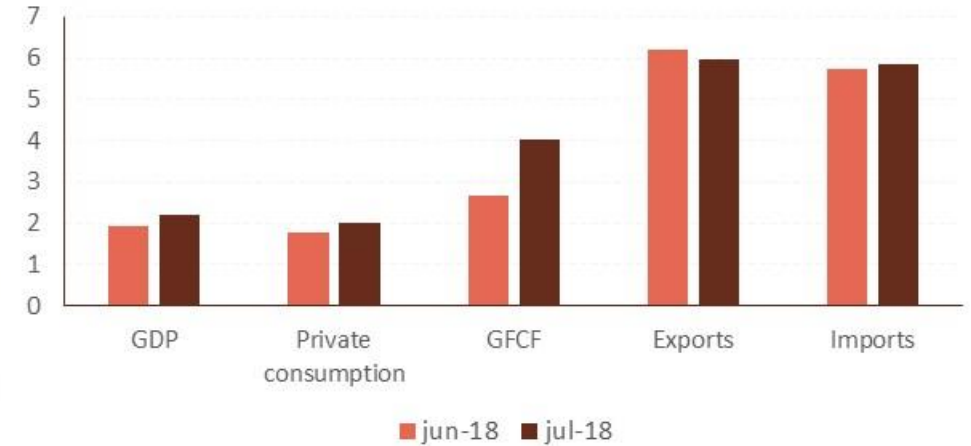
Output from July 2018
CFP's nowcasting exercise

	2017				2018		
	Q1	Q2	Q3	Q4	Q1	Q2(e)	Q3(f)
GDP	2.9	3.0	2.4	2.4	2.1	2.2	1.9
Private consumption	2.4	2.0	2.6	2.0	2.1	2.0	1.8
Public consumption	-0.4	-0.7	0.2	0.2	0.3	0.8	0.8
Investment	7.4	10.1	10.3	6.4	6.7	4.5	3.3
GFCF	9.7	11.4	10.0	5.9	5.1	4.0	3.7
Exports	10.1	8.1	6.2	7.3	4.7	6.0	4.9
Imports	9.0	7.3	8.4	7.1	5.4	5.8	4.7

Note: (e) - estimate; (f) - forecast.

➢ Two distinct type of models are used:

- 2 bridge models

$$y_t = \alpha + \sum_{j=1}^{J} \theta_j y_{t-j} + \sum_{m=1}^{M} \sum_{k=0}^{K} \beta_{m,k} x_{m,t-k} + \varepsilon_t$$
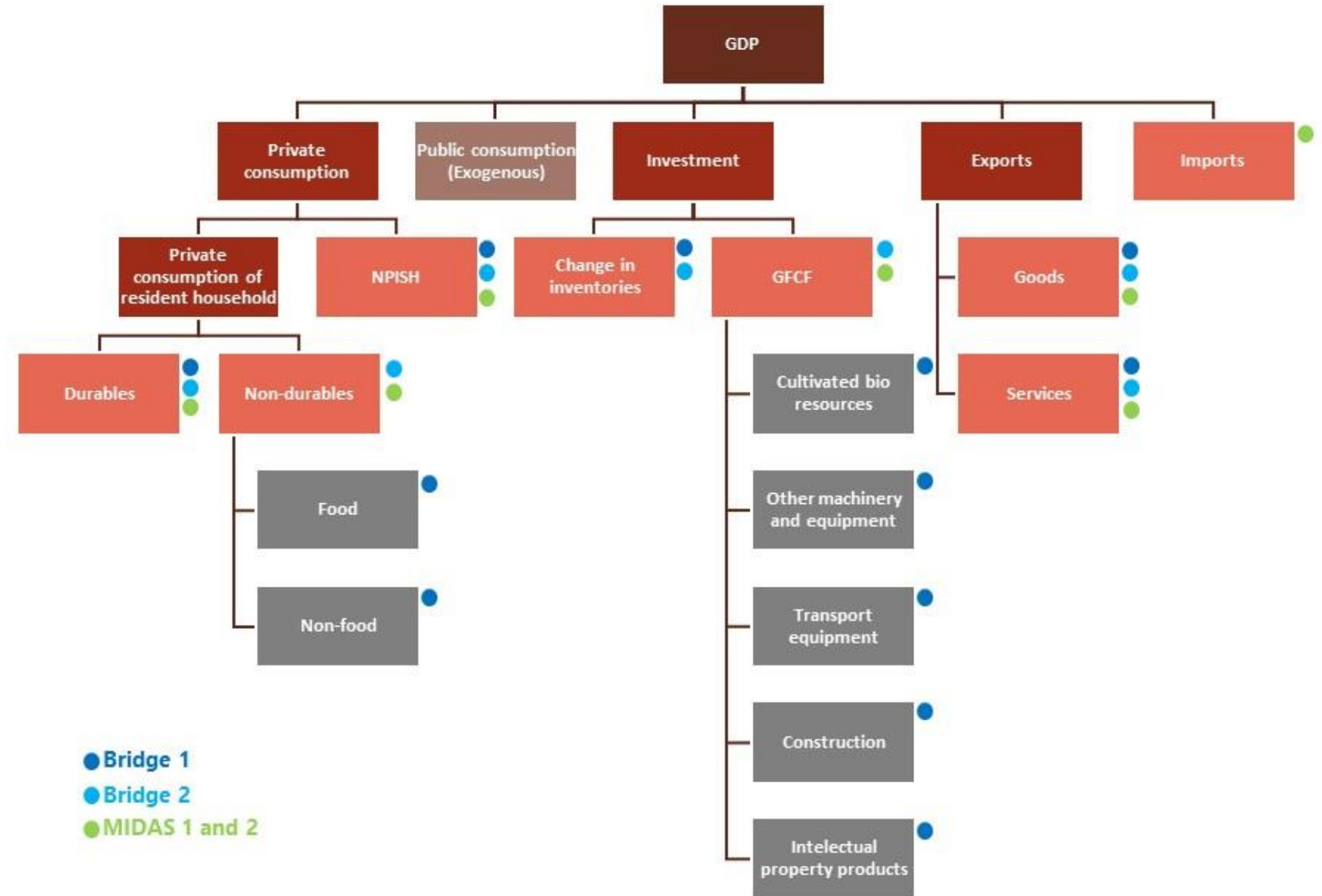
- 2 MIDAS models

$$y_{t+h} = \beta_0 + \lambda y_t + \sum_{m=1}^{M} \sum_{k=0}^{K} \beta_{m,n} B(k;\theta) L^{k/n} x_t^{(n)} + \varepsilon_{t+h}$$

Schumacher, C. (2016). "A comparison of MIDAS and bridge equations." *International Journal of Forecasting, 32*(2), 257-270.

➤ Bottom-up approach to obtain GDP

➤ Forecast year-on-year growth rates to reduce volatility and seasonal patterns

➢ Information set of 27 quarterly time series (including quarterly national accounts) and 57 monthly indicators, example:

Economic Indicator	Frequency	1st observation
Consumers confidence indicator	Quarterly	1997q4
ATM Cash Withdrawals	Monthly	2000m09
Index of turnover in retail trade	Monthly	1991m01
Sales of passengers vehicules (incluing 4*4)	Monthly	2000m01
Loans granted to households - consumption and other purposes	Monthly	1979m12
Sales of commercial vehicles	Monthly	2000m01
Construction indicator - Permits issued	Monthly	2007m01
Sales of cement	Monthly	1982m01
Industrial confidence indicators - Climate indicator	Monthly	1985m01
GFCF Machinery and Equipment indicator	Monthly	1996m03
Nights (No.) in hotel establishments	Monthly	1964m01
Euro Area Economic Sentiment Index	Monthly	1985m01
Foreign trade: Exports of goods	Monthly	1993m01
Foreign trade: Imports of goods	Monthly	1993m01

➤ The near term developments of short-run indicators are forecasted (if necessary) using an ARIMA model:
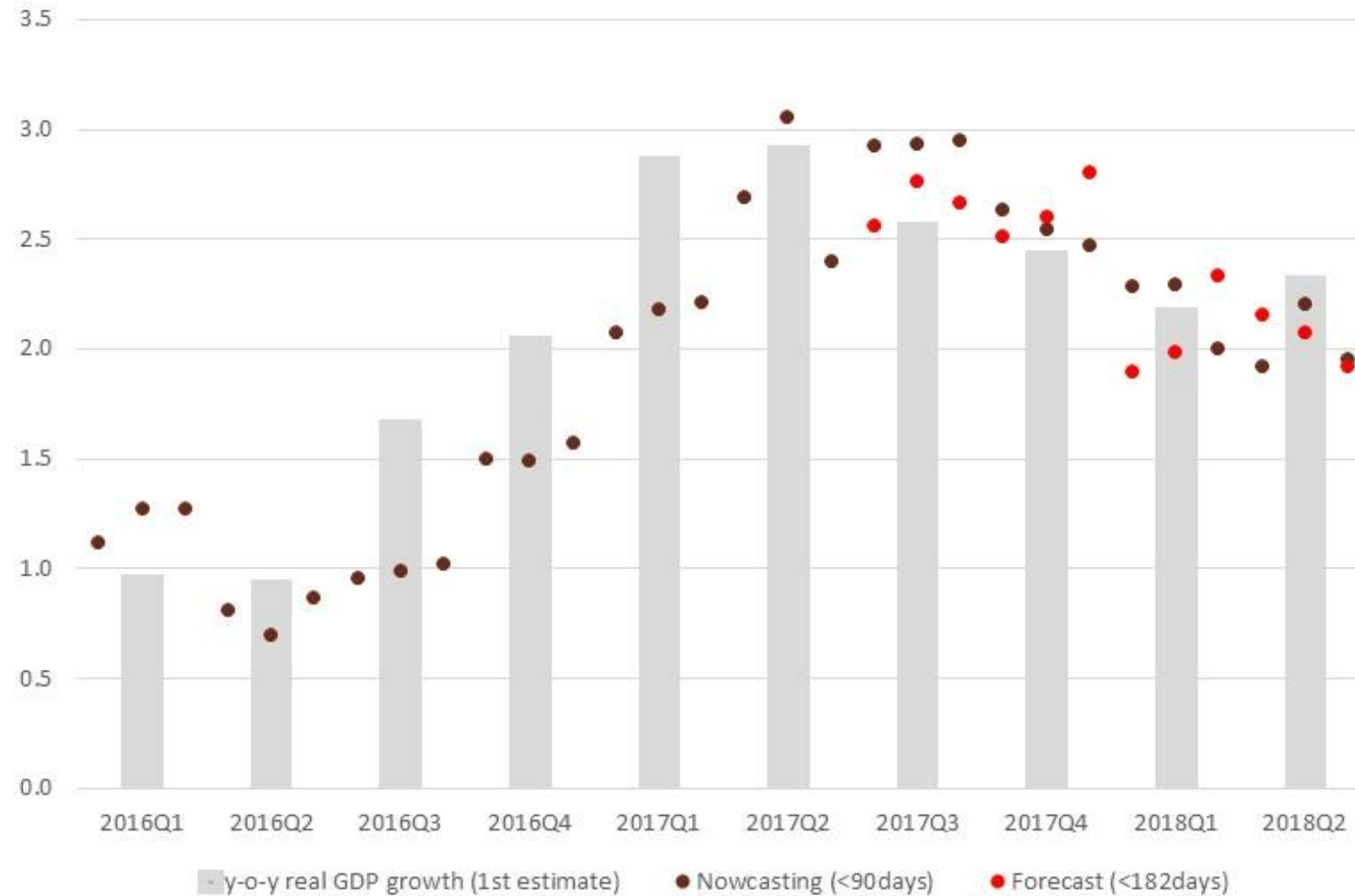
$$\phi(B)(1 - B)^d X_t = \theta(B) Z_t$$

➤ Bootstrap is used to compute confidence intervals

➤ A combination of forecasts is used – It basically consists of weighting the different forecasts based on the past performance of each model

$$\omega_m = \frac{RMSE_m^{-1}}{\sum_{m=1}^{4} RMSE_m^{-1}}$$

Aiofl i, M., Capistran C. and Timmermann, A. (2010). "Forecast Combinations," in Forecast Handbook, M. Clements and D. Hendry (editors). Oxford, Oxford University Press.

Macroeconomic Nowcasting: Performance

		Nowcasting			
	GDP	Private consumption	GFCF	Exports	Imports
Mean Squared Errors					
Bridge 1	0.213	0.177	4.067	4.906	2.501
Bridge 2	0.225	0.291	4.633	3.825	4.179
MiDaS 1	0.985	0.266	13.103	2.102	3.370
MiDaS 2	0.232	0.112	7.529	2.972	2.714

		Forecasting			
	GDP	Private consumption	GFCF	Exports	Imports
Mean Squared Errors					
Bridge 1	0.347	0.324	9.332	4.820	4.567
Bridge 2	0.315	0.498	9.696	6.913	5.172
MiDaS 1	2.378	0.513	12.520	2.367	7.284
MiDaS 2	0.305	0.107	11.340	5.344	3.259
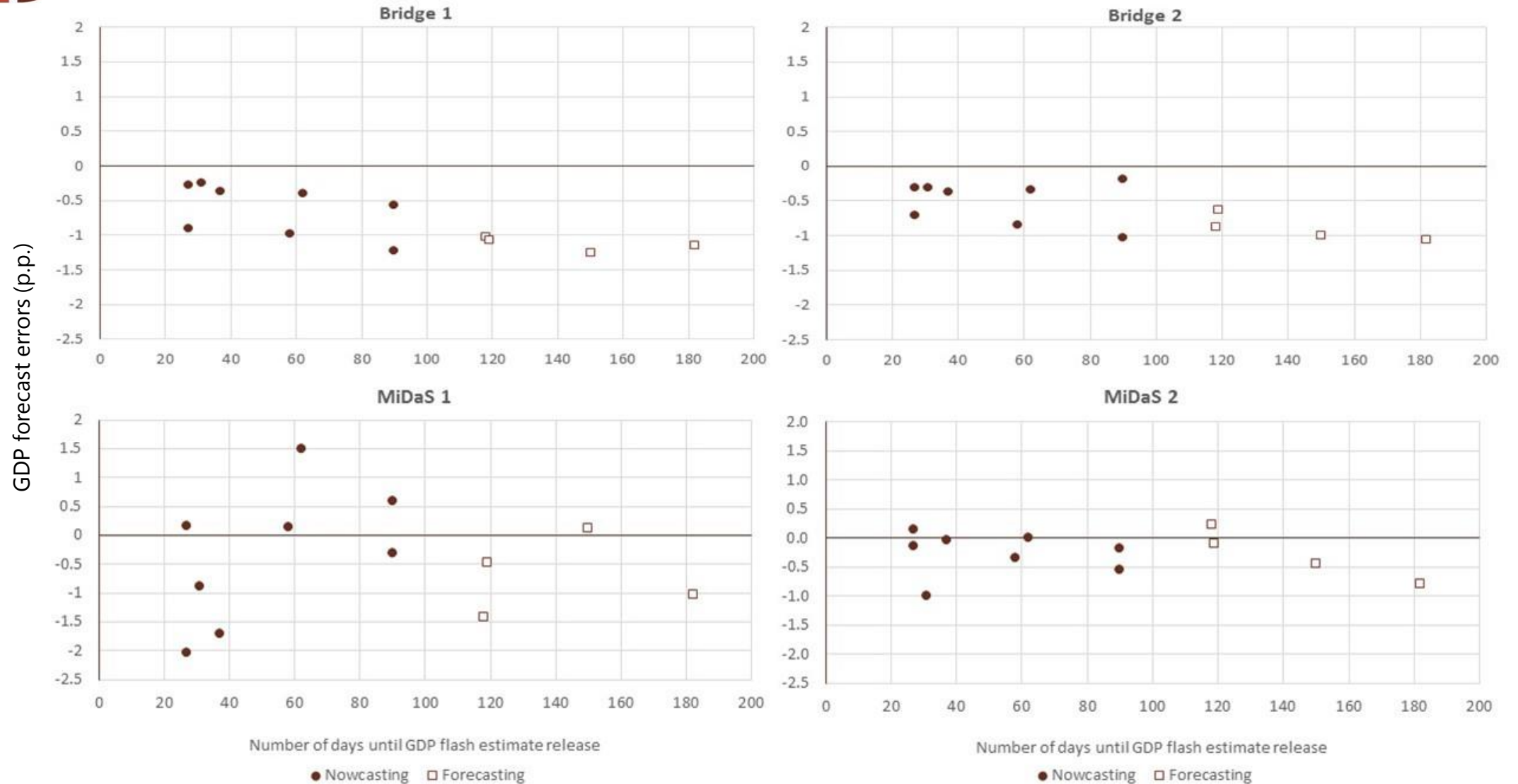
➢ The short-term forecasting approach is always evolving through the search for additional economic indicators and the development of alternative forecasting models

➢ Particularly useful in CFP's mid-term projection exercise (September)

➢ Forecasting fiscal revenue: better to use a forecast of the economic base or economic indicators do a better job?

➢ Work in progress – apply the same methodology to fiscal revenue:
  – 1 bridge model
  – 3 MIDAS models

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