

Flow of conjunctural information and forecast of euro area economic activity

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Release lags of GDP:

- flash estimate: 45 days after the end of the reference quarter
- first estimates of GDP growth and components: 65 days after the reference quarter
- second estimates: 105 days after the reference quarter

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Our analyses:

- use the flow of conjunctural information in the most efficient way
⇒ bridging monthly information
- individual nowcast & forecast 1 quarter ahead for the pool of series
- forecast pooling - weighting individual forecasts
- bottom-up vs. direct approach

- data sample 1985:1 - 2008:2
- GDP and GDP components (cons., invest., exports, imports, inventories)
- large monthly information set (118 series) and different subsets of data for each component:
 - *block 1*: surveys (assessment, expectation), financial data (earnings, exchange rates, interest rates)
 - *block 2*: loans and monetary aggregates
 - *block 3*: industrial production, employment
- stationary data
- conversion from monthly to quarterly data \Rightarrow 3 different values for $x_{i,t}$

Individual forecasts

Estimation

individual estimation equation:

$$y_{t+h} = \theta + \alpha_1 \cdot y_{t-1} + \alpha_2 \cdot y_{t-2} + \beta_0 x_{i,t} + \beta_1 x_{3,t-1} + \varepsilon_t$$

- estimation sample 1993:4 - 2003:4
- no forecasts for the indicators

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- estimation sample 1993:4 - 2003:4
- no forecasts for the indicators
- further constraints:
 - no lags for the indicator in case of hard data (i.e. $\beta_1 = 0$ and $\beta_2 = 0$).
 - sign of relationship
 - best equation is selected using the AIC criteria
 - significant F-statistic
 - $R^2 > 25\% - 10\% \cdot h$

⇒ three equations for each monthly indicator

Individual forecasts

The data release - sequencing information

matching individual forecasts with different publication dates for the data

⇒ sequencing of forecast rounds

Forecast round	Release date	Block 1	Block 2	Block 3
1	End of month 1	B1month 1		
2	End of month 2	B1month 1 and 2	B2month 1	
3	Middle of month 3	-	-	B3month 1
4	End of month 3	B1full quarter	B2month 1 and 2	-
5	Middle of month 4	-	-	B3month 1 and 2
6	End of month 5	-	B2full quarter	-

Model averaging - Pooling forecasts

Numbers of forecast retained

	Forecast round (nowcast)					
	1	2	3	4	5	6
Real GDP	43	52	65	78	78	82
Private consumption	37	47	60	74	73	77
Investment	18	21	21	20	21	18
Total exports	16	21	30	35	37	38
Total imports	41	48	61	67	67	70

Model averaging - Pooling forecasts

Methods of model averaging

- Bates and Granger (1969)
- weights represent the contribution of each variable (and of each block, respectively) to the pooled forecast
- pooling the forecasts:

$$\hat{y}_{t,t+h} = \sum_{i=1}^n \omega_{i,h} f_{i,t,t+h} \quad \text{with} \quad \sum_{i=1}^n \omega_{i,h} = 1$$

$$\text{Min } \omega' \Omega \omega \quad \text{with} \quad \mathbf{1}'_n \omega = 1$$

- Whats the best weighting scheme?

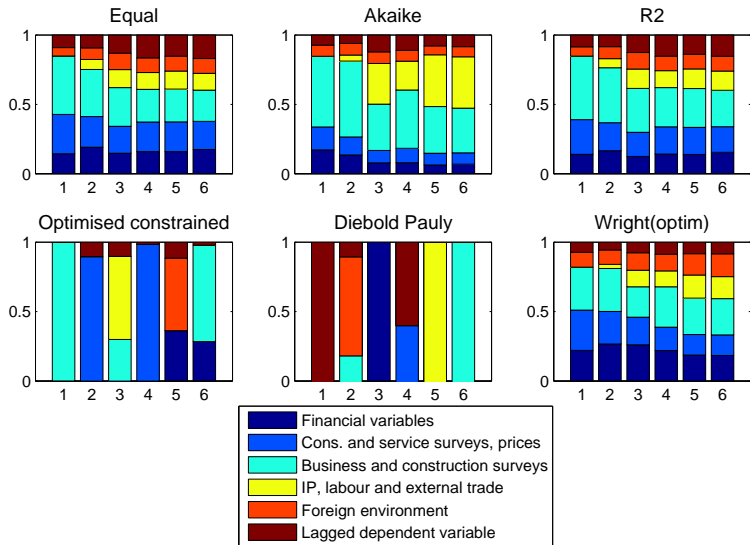
Model averaging - Pooling forecasts

Weights of model averaging

- 1 Equal weights
 - Stock and Watson (2004, 2006), Marcellino (2006)
- 2 AIC weights
 - Atkinson (1980), Swanson and Zeng (2001), Kapetanios et al (2008)
- 3 R^2 weights
 - Kitchen and Monaco (2003)
- 4 Variance-covariance approach and optimised constrained weights
 - Jagannathan and Ma (2003)
- 5 Bayesian weights
 - Min and Zellner (1993)
we apply to cases:
 - Diebold and Pauly (1990)
 - Wright (2003)

Model averaging - Pooling forecasts

Weights allocated to each block: GDP - direct approach



Relative performance of weighting schemes

Criteria

- out-of-sample forecast period 2004:1 - 2008:2
- *relative squared forecast error* (compared to unconditional mean \bar{y})

$$RSFE = \frac{\sum_{t=t_0}^{t_0+18} (\hat{y}_t(\omega, x) - y_t)^2}{\sum_{t=t_0}^{t_0+18} (y_t - \bar{y})^2}$$

- conclusion from the results for *correlation* between the forecast and the observation are similar

Relative performance of weighting schemes (RSFE)

Nowcast vs. forecast

	Forecast round (nowcast)					
	1	2	3	4	5	6
Equal	49.0	50.6	52.0	52.2	49.7	51.2
Akaike	42.5	43.0	37.7	35.7	30.9	31.3
R^2	46.8	47.7	48.8	48.0	45.6	47.2
Optim. constraint	56.9	45.0	77.7	130.3	47.4	114.2
Wright opt.	43.5	41.4	37.4	34.0	30.8	30.7
Wright (20)	104.7	62.9	61.8	72.8	70.5	70.5
Wright (2)	77.6	60.3	47.7	50.0	52.0	51.7

Conclusion

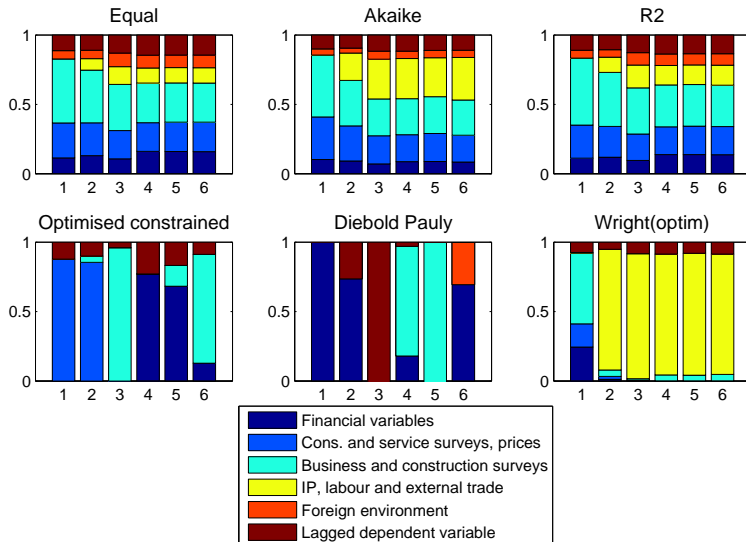
- adding more information results in substantial changes in the weight
- forecast performance varies from one component to another
⇒ for GDP:
 - AIC weights are the best in the 1st forecast sequence and optimal Wright weights in the other forecast sequences
 - releases of monthly indicators result in an improvement of the forecast
- for the one-quarter ahead forecast the RSFE deteriorates,
⇒ for GDP: AIC weights are still the best
- direct approach performs better than the bottom-up approach for the nowcast

End

Thanks for your attention

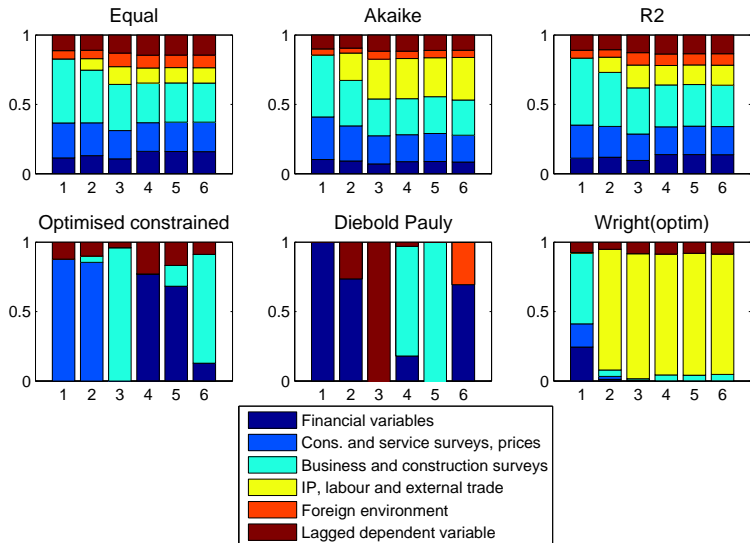
Appendix

Weights allocated to each block: Investment



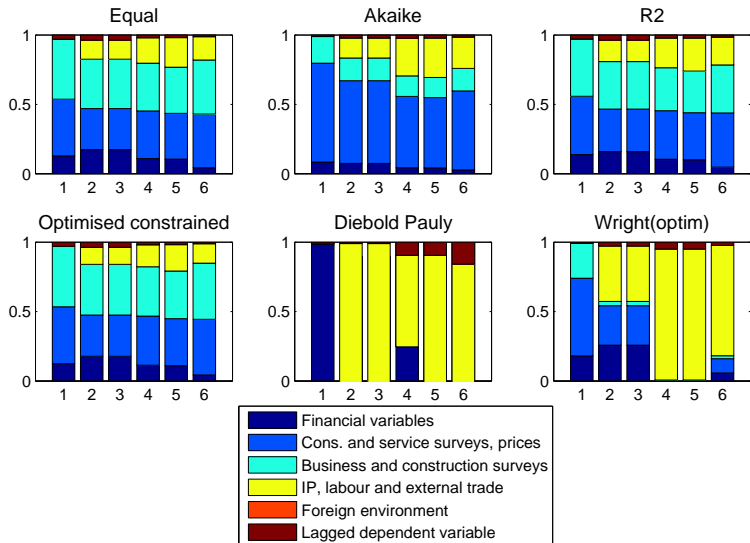
Appendix

Weights allocated to each block: Investment



Appendix

Weights allocated to each block: Private Consumption



Appendix

Weights allocated to each block: Exports

