European Commission

Directorate General Economic and Financial Affairs

Can managers' selling price expectations predict short-term developments in HICP inflation?

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Unit A3 - Economic situation, forecasts, business and consumer surveys

Outline

1. Introduction
2. The data
3. The Econometric analysis
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Introduction

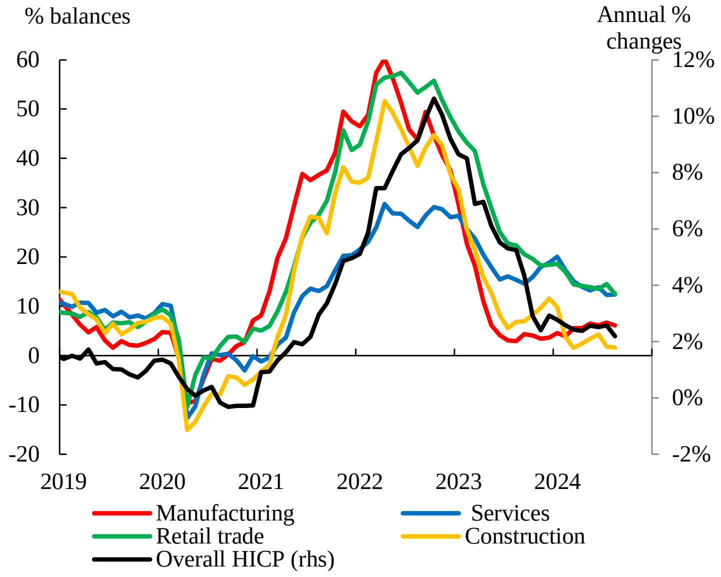
Motivation: on several occasions we used managers Selling Price Expectations (SPE) to foreseen future developments of consumer prices:

- In 2021, when producer prices were rising rapidly since the beginning of the year, SPE were useful to understand whether price pressures would eventually feed more strongly or persistently into consumer prices.
- At the beginning of 2023, HICP was still very high, the question was to what extent would recent declines in energy and food commodity prices pass through to retail prices, at what speed, or would countervailing forces – mainly from wages and possibly mark ups – result in more inflationary pressures?

Introduction

However, all these analyses have highlighted that the relationship (correlation) between SPE and consumer prices (as measured by the HICP) is not stable over time. Generally, the highest correlation is reached with HICP in year-on-year percentage changes, but in periods of very high inflation, 3-months-on-3-months percentage changes were also highly correlated. Also, some sectors (sub-sectors) have more lead properties than others…

Selling price expectations and overall HICP inflation



Introduction

We wanted to construct a composite indicator that would summarize the selling price expectations across the four sectors…

However

Given the complexity of the relationship between selling price expectations and HICP inflation, it has become clear that a simple composite indicator was insufficient and that a systematic econometric framework was needed to nowcast/forecast the HICP.

Together with Christos Axioglou, Fiona Morice and Przemyslaw Wozniak

Using the full dataset of Business selling price expectations, the analysis aims to identify the models with the highest predictive power for HICP inflation.

The data

Monthly question on prices in business surveys

How do you expect your selling prices to change over the next 3 months? They will:

+ increase

= remain unchanged

- decrease

calculation of **P** (= % of positive answers) &
N (= % of negative answers)

Balance B (in %age points):
B = P – N

The analysis includes

- data from all 68 sectors/subsectors for which Selling Price Expectations (SPE) are available in manufacturing, services, retail trade and construction.
- 12 lags of each of the 68 SPE series, allowing for the possibility that different sectors may impact prices at various time horizons.

Euro-area HICP inflation was forecasted in terms of:

✓ Annual rate of change of the price series (neither seasonally nor calendar adjusted)

✓ Momentum in price change: 3m-o-3m change in the seasonally and calendar-adjusted series

✓ The dependent variable was expressed in two ways: as a headline index representing the overall HICP, and separately for each of the four major components (food, industrial goods, energy, and services), which were later aggregated to form the headline HICP using standard weights.

Econometric analysis

Developing a forecasting model using SPEs as (sole) inputs

- Build a pure ‘survey’ based forecast – an ‘optimal’ weighting of SPE data.
- Relevant research questions:
  - What is the best model in capturing the information contained in SPE?
  - Do SPEs forecast annual inflation or momentum inflation more accurately?
  - How does the accuracy of inflation forecasts change across different time horizons?
  - Which sectors/subsectors' SPEs appear to be most relevant in forecasting inflation?
  - What is the accuracy of SPEs in forecasting individual components of the HICP?

Several alternative models are formulated…

- Each with a distinct combination of predictors, and their out-of-sample performance in forecasting inflation is compared.
- Following the literature on forecasting with large sets of predictors, two approaches are adopted to formulating these models in a simple regression context:
  - a first approach selects specific variables from the set of predictors,
  - the second one estimates factors, which are specific combinations of predictors (as extracted by the Scaled Principal Component Analysis (SPCA) and Partial Least Squares (PLS) models), using basic factor analysis.
- All models are estimated using elastic net regression , which allows mitigating the impact of high correlation among predictors and implicitly selecting the most relevant ones.

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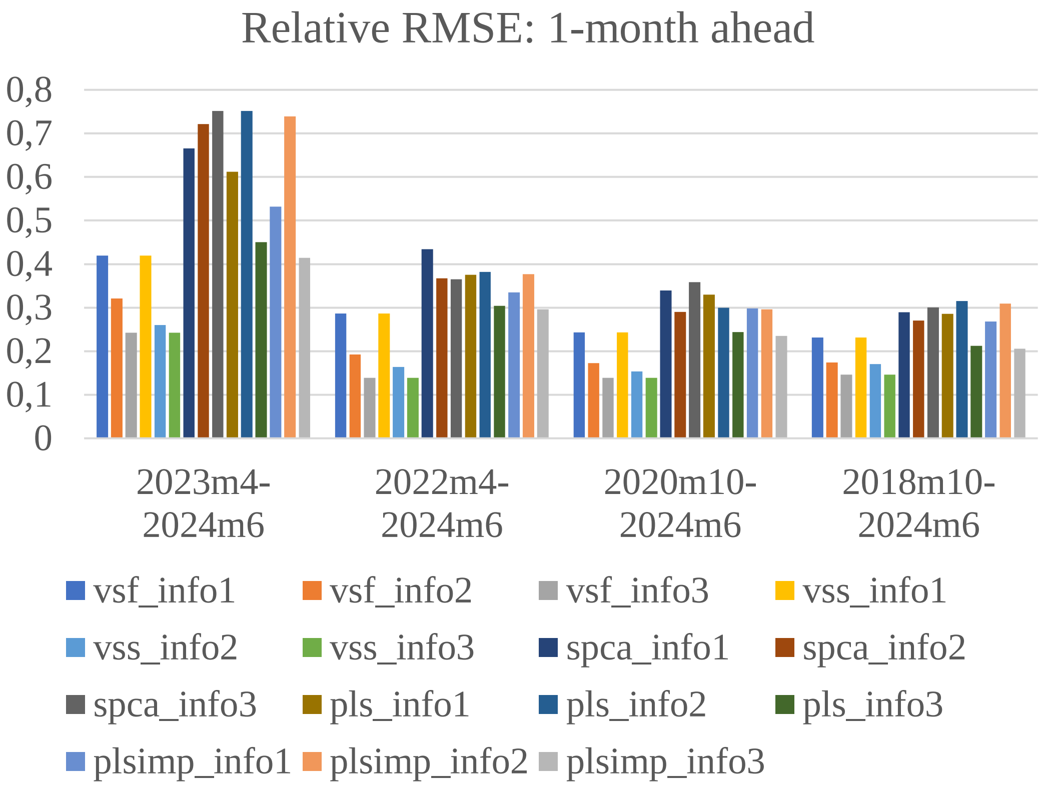
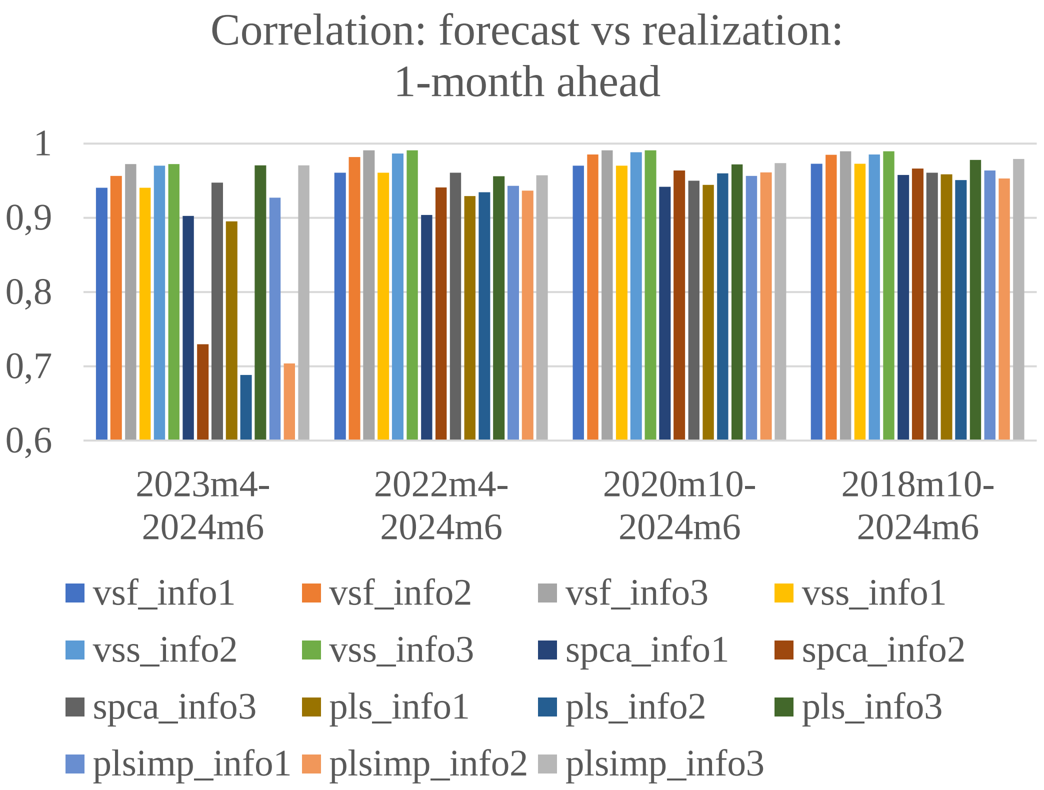
Several alternative models are formulated…

- In essence, the selected models comprise linear regression models with regularized coefficients, optimized for out-of-sample performance .
- Recognising the observed problem of instability of the postulated relationships, the model performance is evaluated using rolling window cross-validation , with windows of different lengths within the period January 2010 – September 2024 and lagging the SPE data by as much as 12 months.
- In addition, three distinct information sets are explored to forecast inflation at period t + h, namely h months ahead SPE data from:
    - the latest month (information set 1),
    - from the four latest months (information set 2), and
    - from all twelve past months (information set 3).

The results

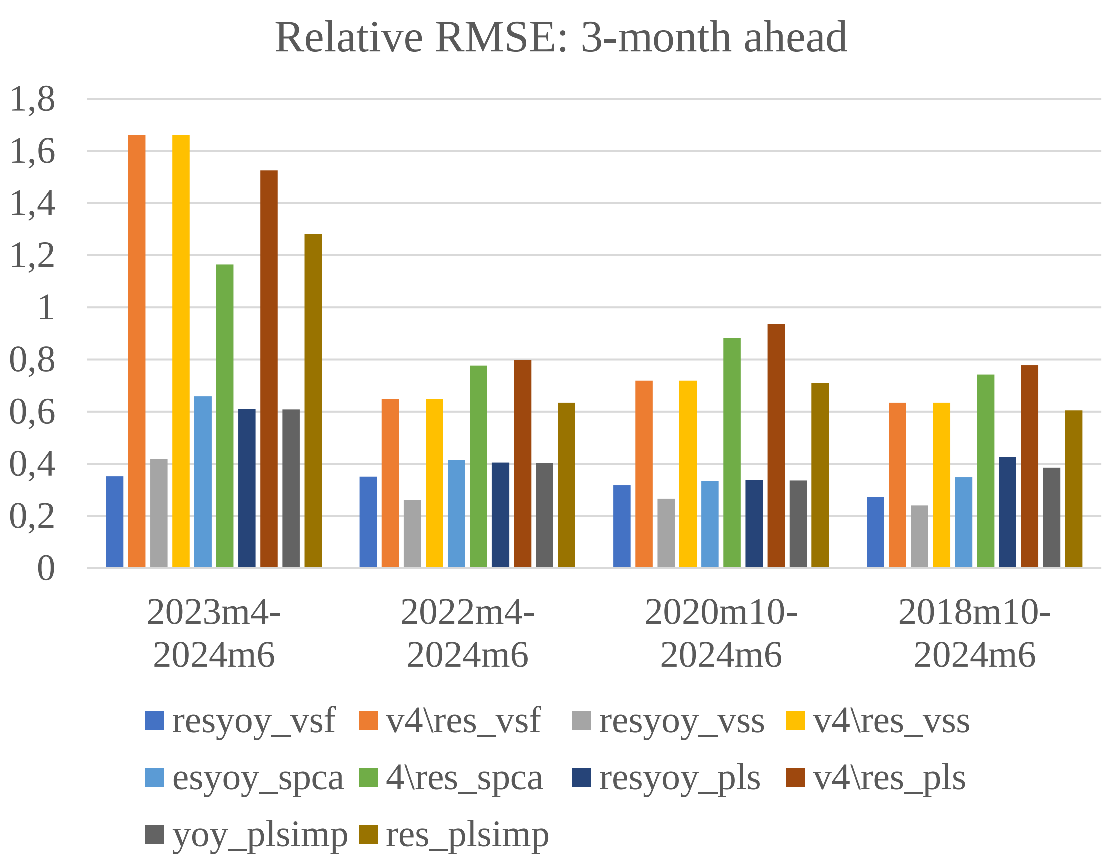
What is the best model in capturing the information contained in SPE?

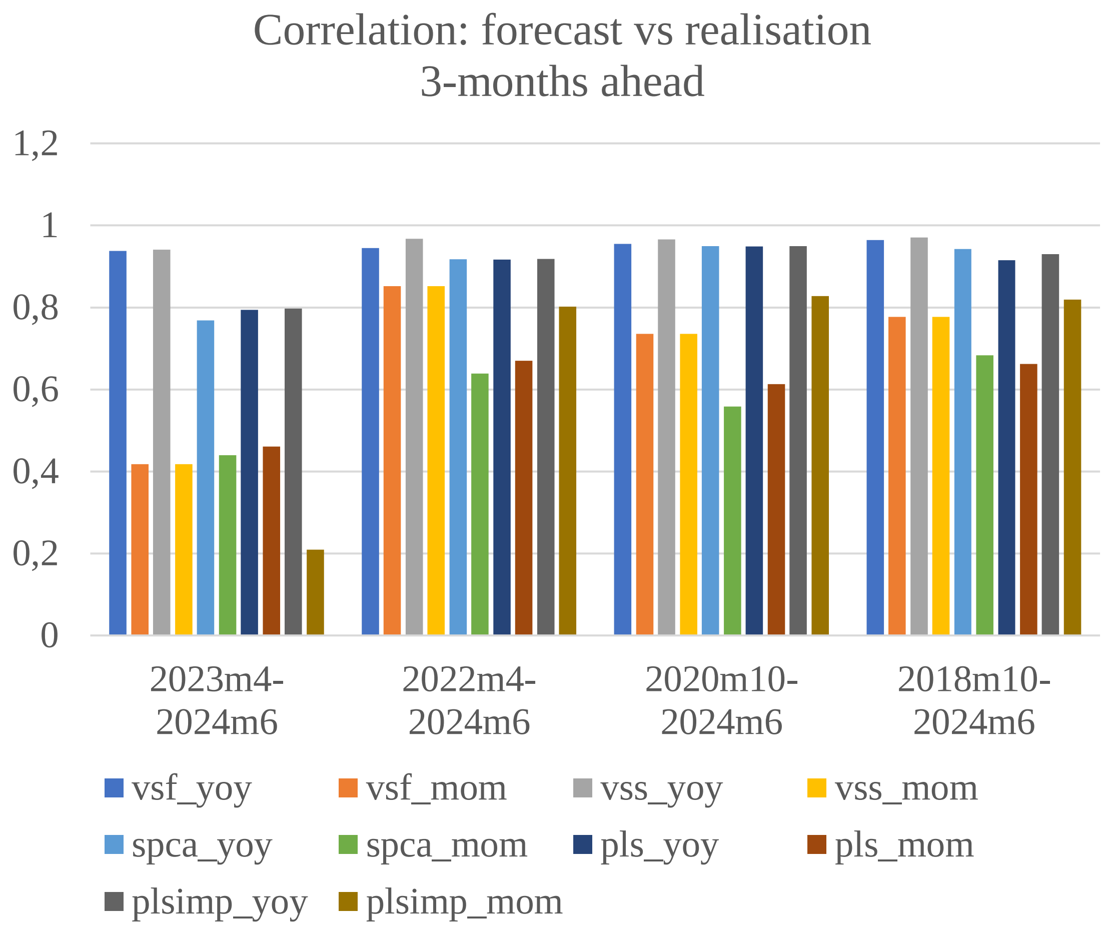




- Info 1: $\{\Omega_t\}$, Ω_t: All SPE indicators and transformations (factors), at time t
- Info 2: $\{\Omega_t , \Omega_{t-1} , \Omega_{t-2} , \Omega_{t-3} \}$ (3-months ahead formulation of the survey question)
- Info 3: $\{\Omega_t , \Omega_{t-1} , \Omega_{t-2} , \Omega_{t-3} , .., , \Omega_{t-12}\}$ (higher order lags)

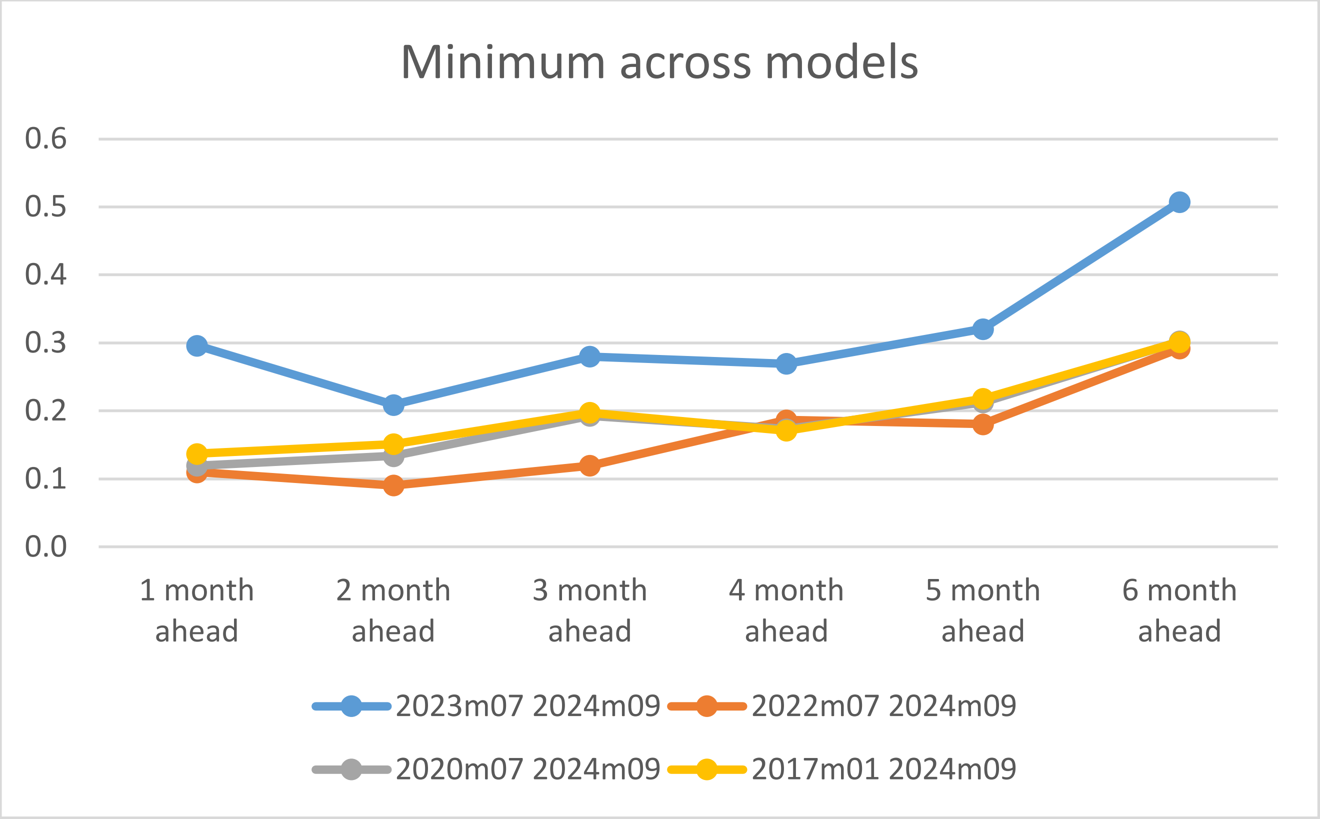
Do SPEs forecast annual inflation or momentum inflation more accurately?





How does the accuracy of inflation forecasts change across different time horizons?

- Relative RMSE



SPEs on which sub-sectors correlate more with inflation?

- Variable selection model (most accurate, info set 3)

	Industry																									
lags	v1	v2	v4	v5	v6	v7	v8	v9	v11	v12	v13	v15	v16	v17	v18	v19	v20	v21	v22	v23	v24	v25	v26	v27	v30	v31
1																							1			
2																										
3	1			1	1															1				1	1	
4						1		1												1					2	
5			1								1									1	1					
6	1	1	3		1							1								3						
7								1	1			1														
8		1						1	2						1		1			1			1			
9		1										1	1							1						
10																				1	1					
11									1											4		1				
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13		1					1					1														
14		2										2														
15		2									1							1								
16																		1								
17									1		1							1			1					
18																		1								

	Services																						Retail							Building		
lags	v32	v34	v36	v37	v39	v41	v42	v43	v44	v45	v46	v47	v48	v49	v50	v51	v52	v53	v54	v55	v56	v58	v59	v60	v61	v62	v63	v64	v65	v66	v67	v68
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Manufacture of textile

other manufacturing

Warehousing and support activities for transportation

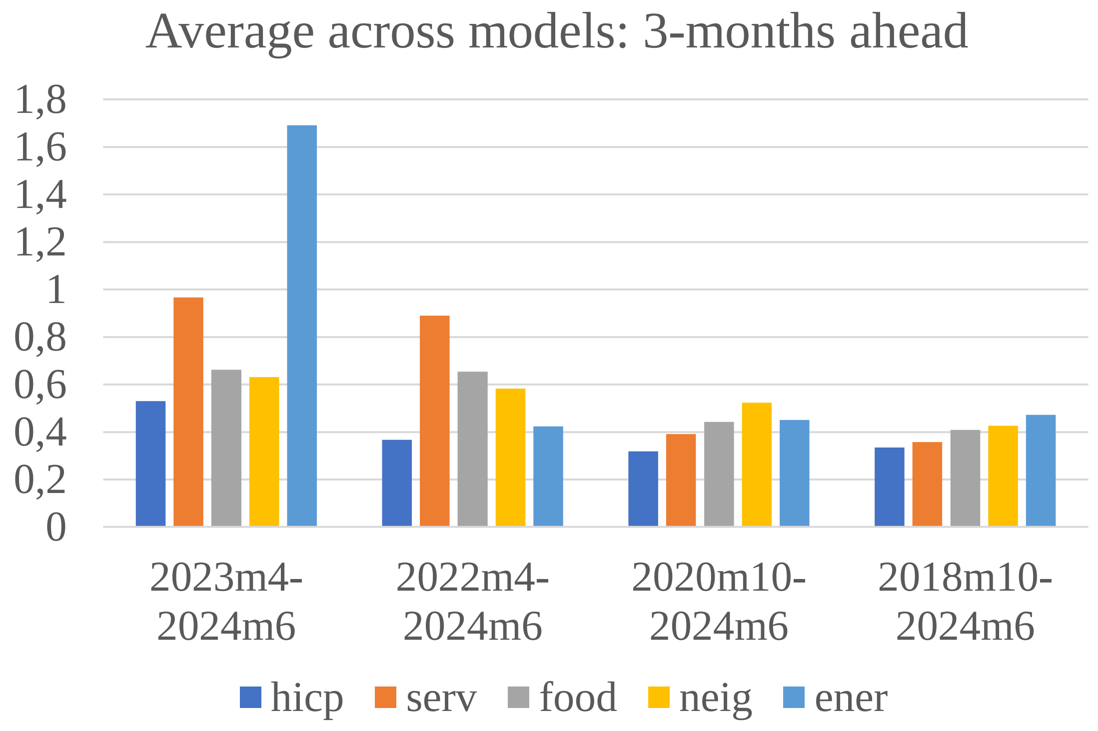
Legal and accounting activities

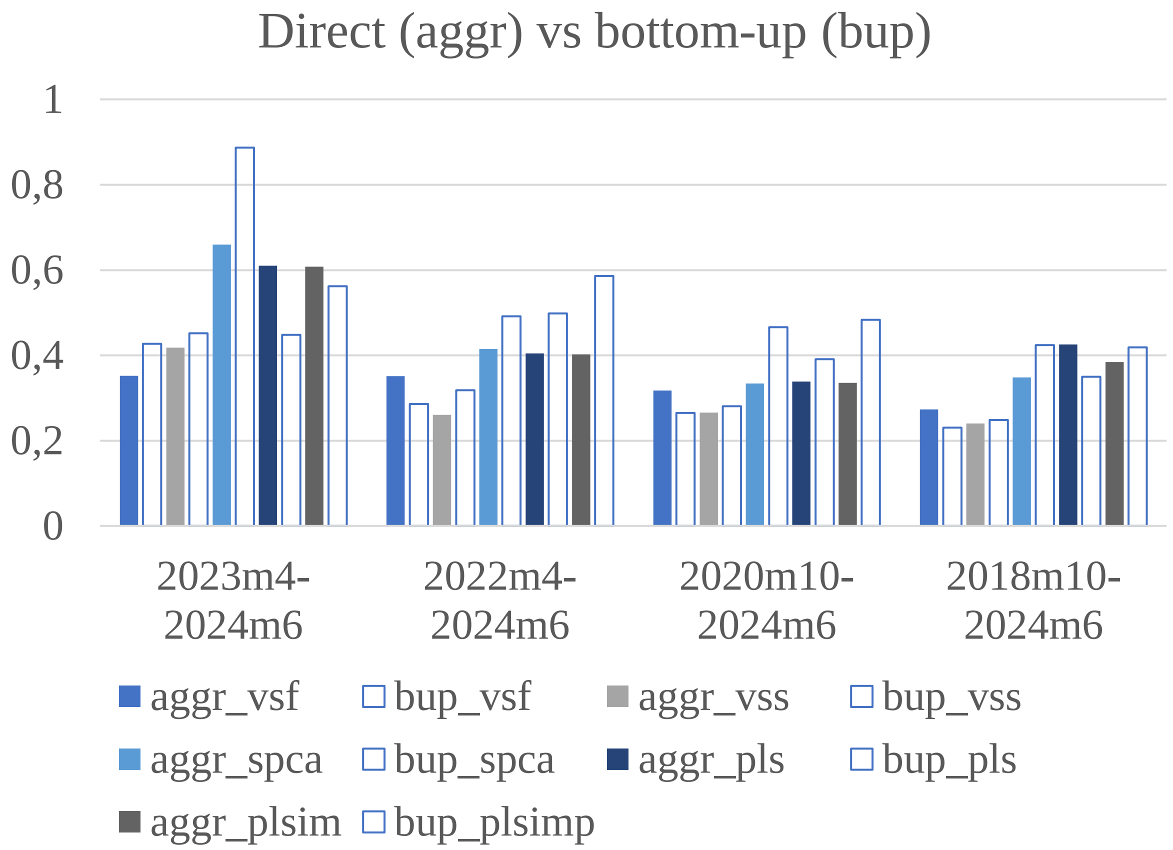
All retail except motor vehicles

Specialised construction activities

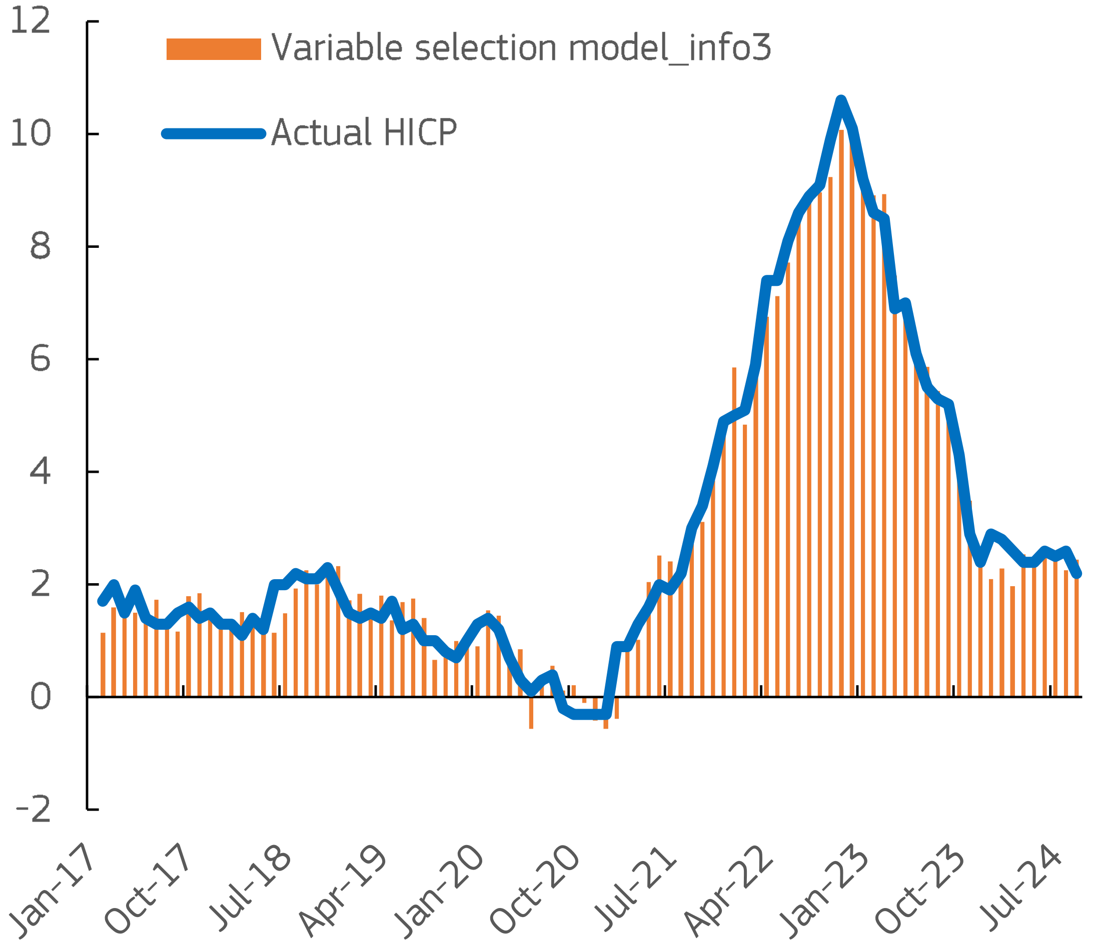
What is the SPE accuracy in forecasting individual HICP components?

- Relative RMSE, 3 months ahead forecasts (info set 1)

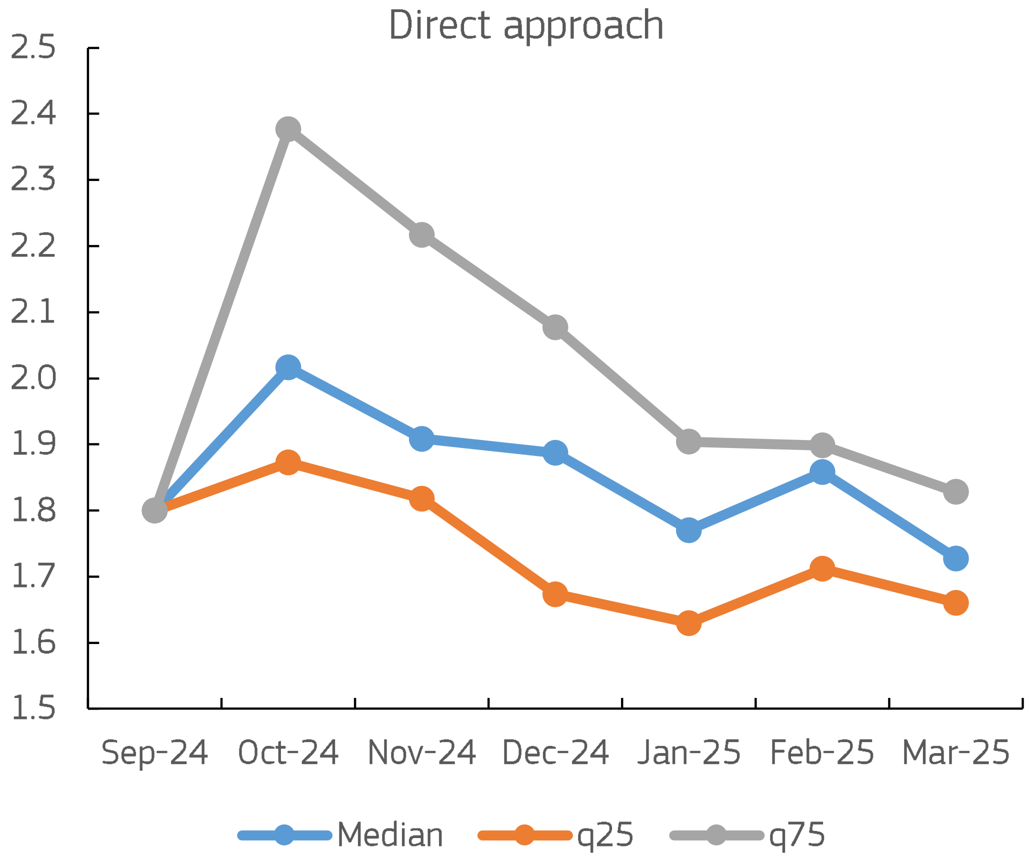


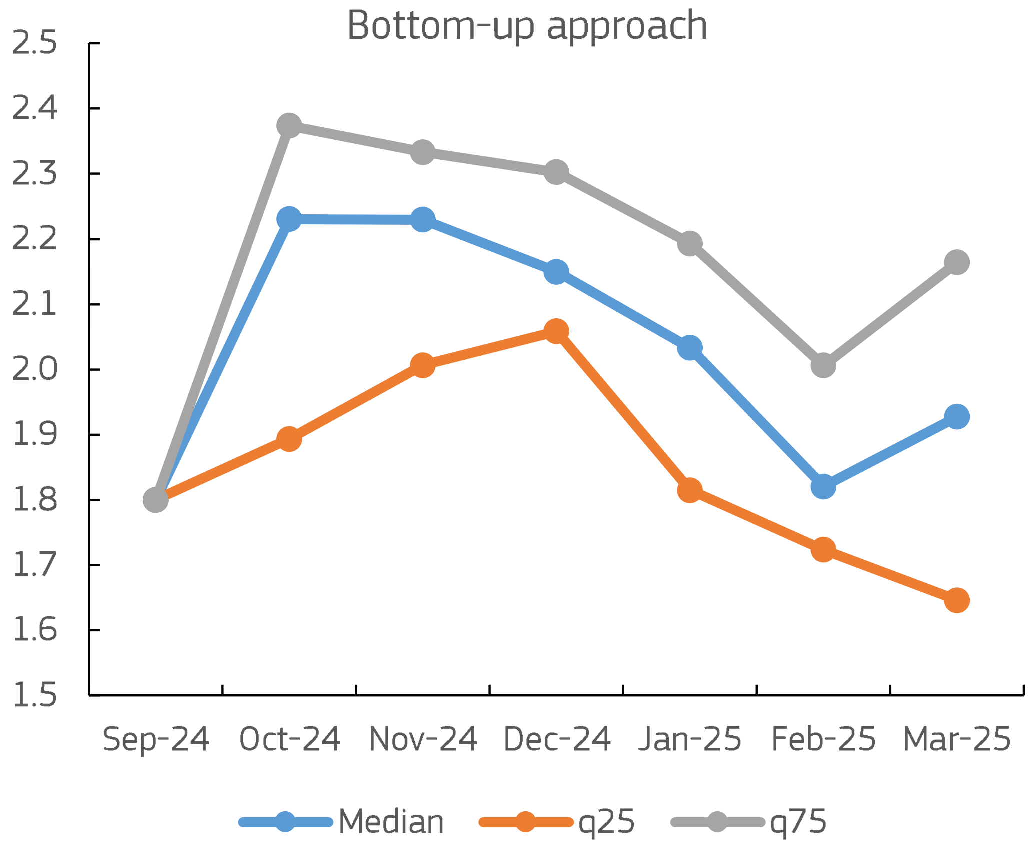


One-month ahead forecast with the minimum RMSE models versus actual HICP inflation (year-on-year % changes)



What are the inflation forecasts for the next six months?





Summary results

- What is the best model in capturing the information contained in SPE? *Variables selection with high lag order.*
- Do SPEs forecast annual inflation or momentum inflation more accurately? *Annual inflation*
- How does the accuracy of inflation forecasts change across different time horizons? *Some improvements in 2-months ahead for best models, especially for the most recent periods*
- Which sectors/subsectors' SPEs appear to be most relevant in forecasting inflation? *In all sectors of the economy, SPE appear to have forecast ability*
- What is the accuracy of SPEs in forecasting individual components of the HICP?
  - *Individual components being predicted less accurately than aggregate HICP*
  - *However, bottom-up forecast at similar accuracy with aggregate/direct HICP forecast (due to pooling)*
- Forecasts for euro-area HICP inflation for the next six months (i.e. October 2024 to March 2025):
  - *Following the 1.8% estimated in September 2024, our models point to a temporary increase in October 2024 to 2% or above. Thereafter the forecast shows a mild downward trajectory up to January 2025 and a stabilisation at levels below 2% at the end of the forecast horizon.*

Further research

- Enrich SPE information sets with additional transformations (square terms, interactions)
- Challenge SPE-models against more informative models
- Expand analysis with purely out of sample forecast assessment (i.e. including regularization parameter)
- Use alternative forecast performance assessment metrics (turning point analysis)

Thank you for your attention!