European Commission

Directorate-General for Economic and Financial Affairs

Survey data and uncertainty - Which measure to capture disagreement in expectations?

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Outline

- Introduction
- Overview of uncertainty measures
- Measuring uncertainty based on 'dispersion'
- Limitations of the measure and remedies
- Do we really measure 'dispersion' of expectations? – a test

Introduction

- Increasing interest in measuring uncertainty since the 2008 crisis
- When decisions are costly to revert: 'wait-and-see' approach, postponement of action

➢ Economic uncertainty has a negative impact on economic activity, depressing

  - hiring
  - investment
  - consumption

However: difficult to measure!

Overview of uncertainty measures

- Different uncertainty measures based on :
  - Stock market volatility
  - Dispersion in forecasts by professional forecasters
  - Prevalence of terms such as 'economic uncertainty' in the media (EPU indicator (Baker et al. (2010/13))
- Relatively new approaches using surveys:
  - Expectation errors of survey participants
  - 'Disagreement'/'dispersion' in responses

Uncertainty measure based on 'dispersion'

Underlying idea:
growing divergence of economic agents' expectations → higher uncertainty about the future course of the economy

→ take e.g. cross-sectional **standard deviation** of individual survey responses, where 'increase' is quantified by +1, 'decrease' by -1 and 'equal' by 0.

Uncertainty measure based on 'dispersion'

This cross-sectional standard deviation is equivalent to:

$$U = \sqrt{(p_+ + p_- - (p_+ - p_-)^2)},$$

where e.g. p_+ is the share of 'increase' responses to a survey question (at time t)

Uncertainty index (U) [Bachmann et al. (2010)]

Other disagreement measure using survey data

(Theil's) Entropy:

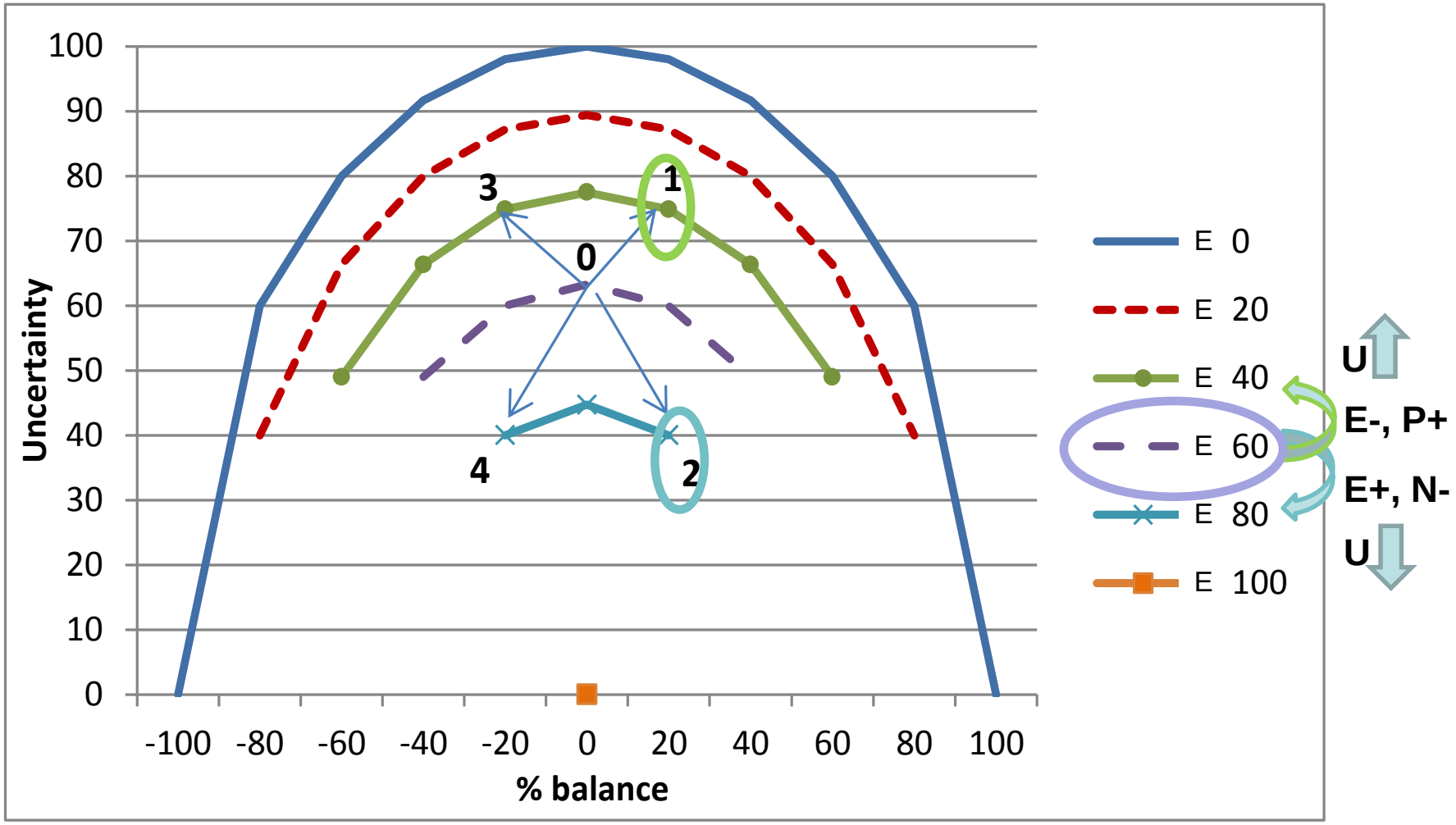
$$U_T = -\sum_{i=1}^{n} p_i * \log(p_i) \quad (n=3 \text{ or } 6 \text{ categories})$$

Drawback: no sense of 'cognitive distance' between the categories

(50% POS and 50% NEG is equivalent to 50% POS and 50% 'unchanged')

Limitations of the uncertainty measure

Uncertainty (based on different 'equal' shares)



→ Dispersion in survey data appears useful to illustrate uncertainty among managers and consumers in times of crisis.

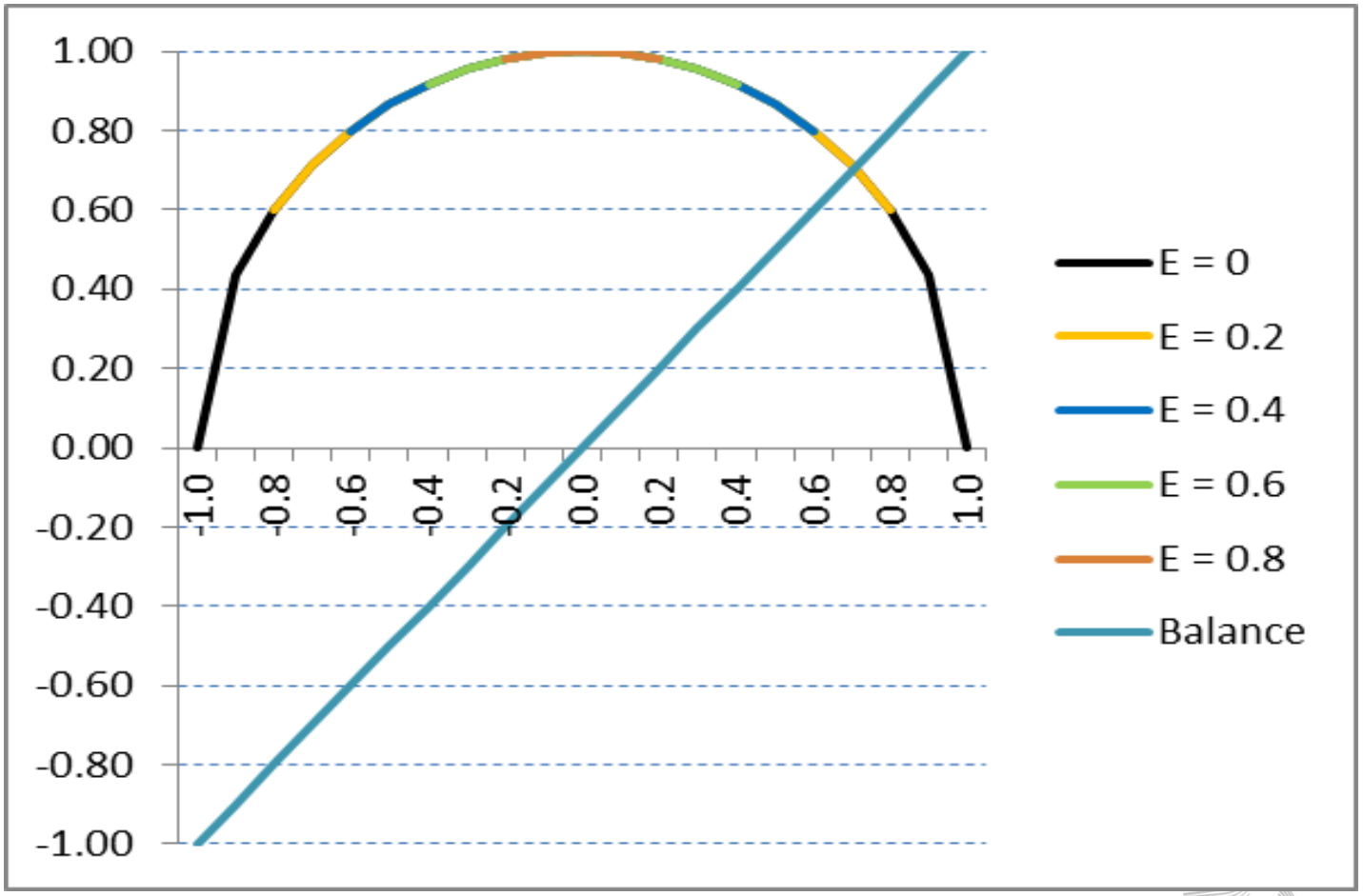
However: interpretation of the measure is not straightforward – difficult to separate two main forces explaining the changes:

- (1) the rising or falling dominance of 'increase' over 'decrease'-replies (or vice versa) and
- (2) the increasing or decreasing share of 'equal' replies

Remedies?

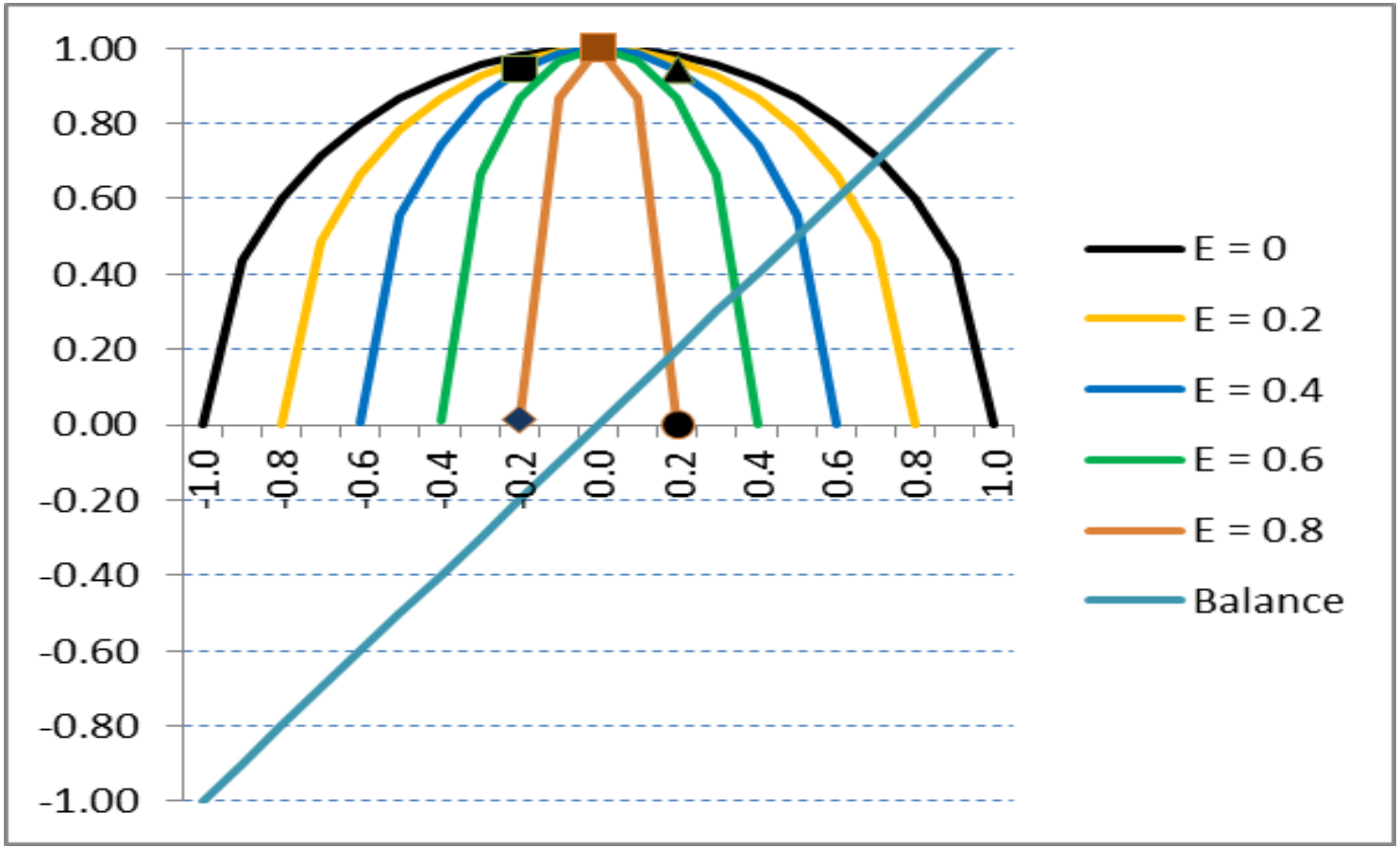
'Corrected Uncertainty' I

Share of "unchanged" replies is equally split between positive and negative answers

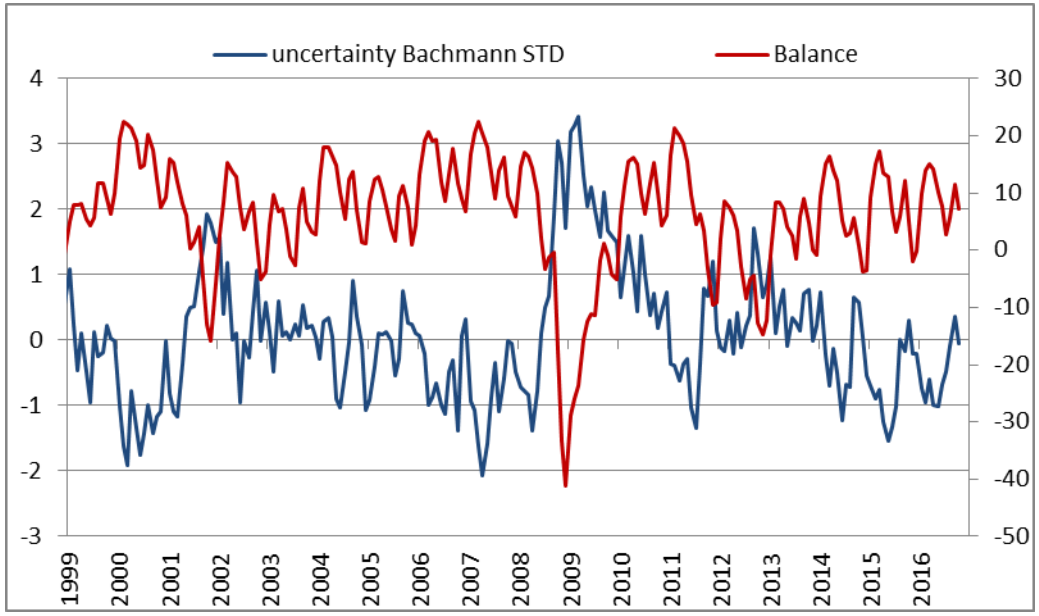


'Corrected Uncertainty' II

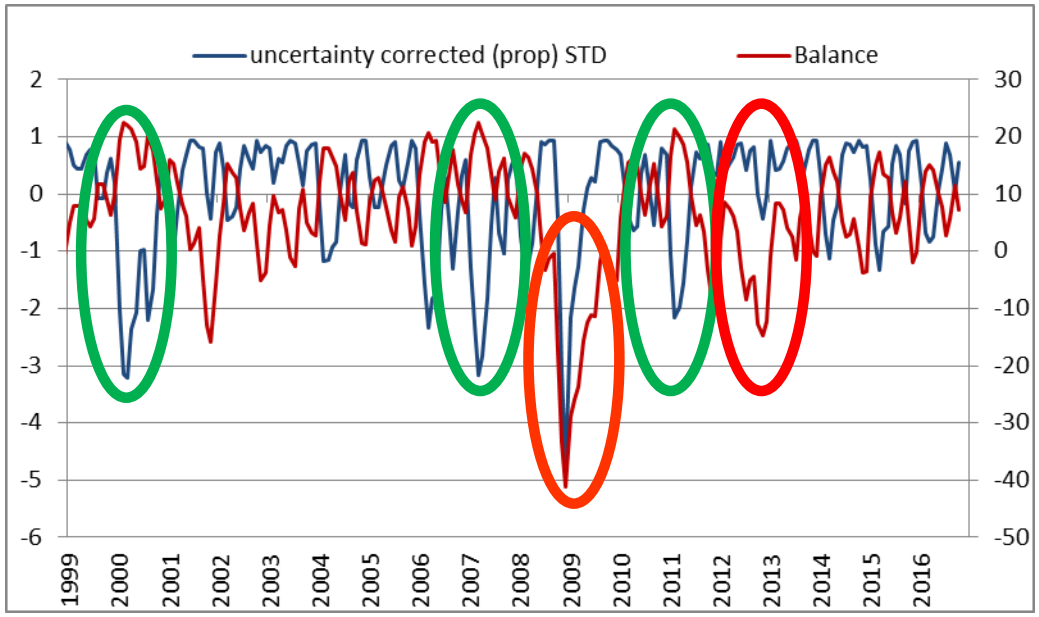
Share of "unchanged" replies is distributed proportionally between positive and negative answers



→ There are ways to cope with the issue of the impact of the 'unchanged/equal' category, resulting in a symmetric measure



- Countercyclical
- Not symmetric (low in good periods, high in bad periods)

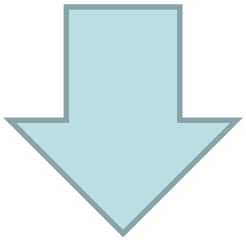


- Symmetric (low in good AND bad periods)

More fundamental questions

There are still doubts about:

1. The appropriateness of operationalising uncertainty as dispersion
2. The suitability of the formulas used to measure dispersion in expectations



Inspired by the work by Mokinski/Sheng/Yang (2015), we used an unique dataset on quantitative consumer price expectations to investigate question 2

Do we really measure dispersion? – a test

Do the disagreement measures using *qualitative* survey responses approximate the conventional measure of dispersion in statistics, i.e. *the* ***standard deviation*** *of a set of continuous data values*?

Exploit the fact that EU consumer survey contains questions on both qualitative and quantitative price expectations

Unique data set

Consumer survey: "Q6: “By comparison with the past 12 months, how do you expect that consumer prices will develop over the next 12 months? They will:

[++] increase more rapidly; [+] increase at the same rate;
[=] increase at a slower rate;
[-] stay about the same; [--] fall; [DN] don’t know.”

Q61 - By how many percent do you expect consumer prices to go up/down in the next 12 months? (Please give a single figure estimate):

Consumer prices will increase by……,…% / decrease by……,…%.

Disagreement measures using survey data

1. 'Bachmann measure':

$$U_B = \sqrt{(p_+ + p_- - (p_+ - p_-)^2)},$$

2. (Theil's) Entropy:

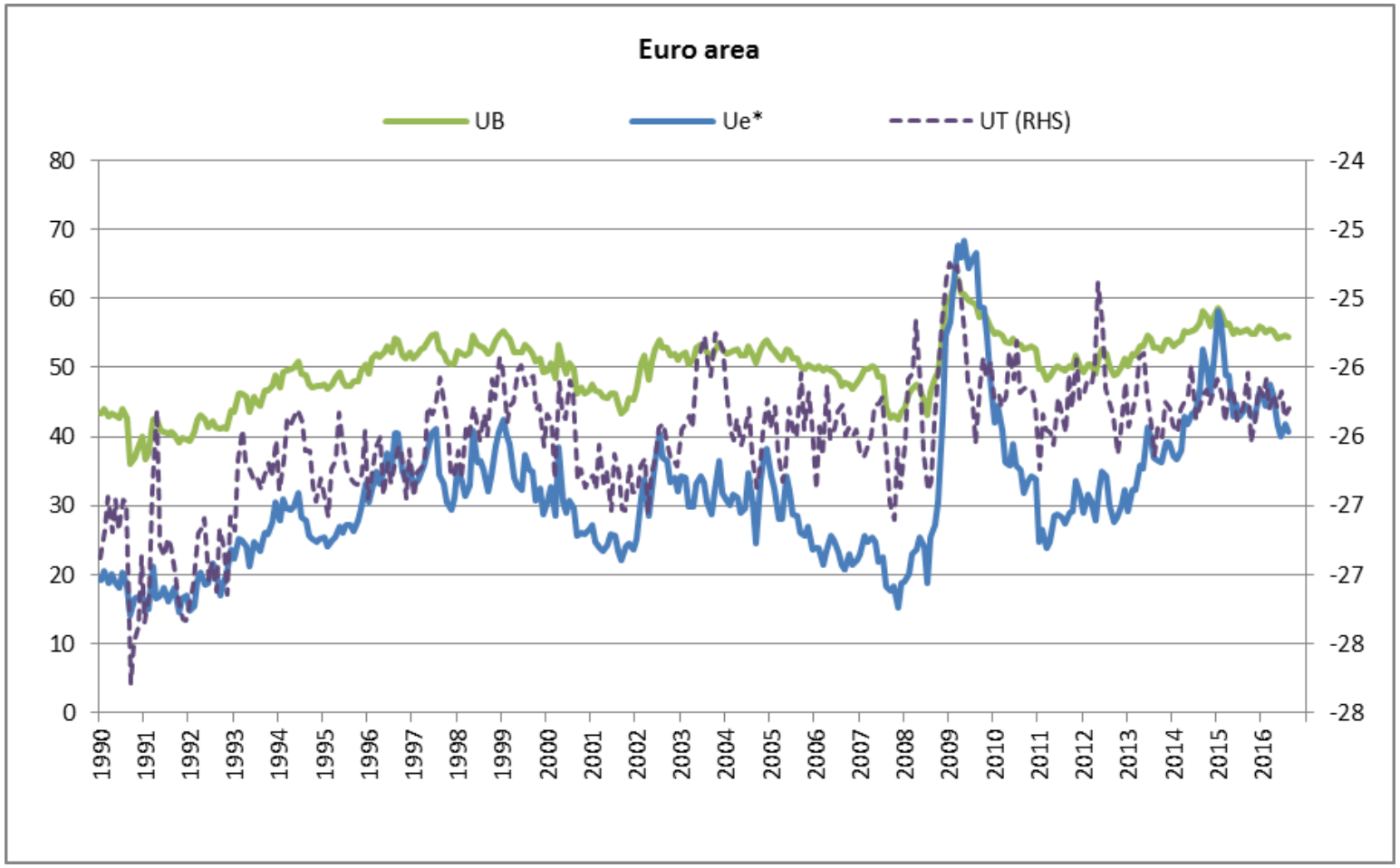
$U_T = -\sum_{i=1}^{n} p_i * \log(p_i)$ *(n=3 or 6 categories)*

3. 'Corrected Bachmann measure':

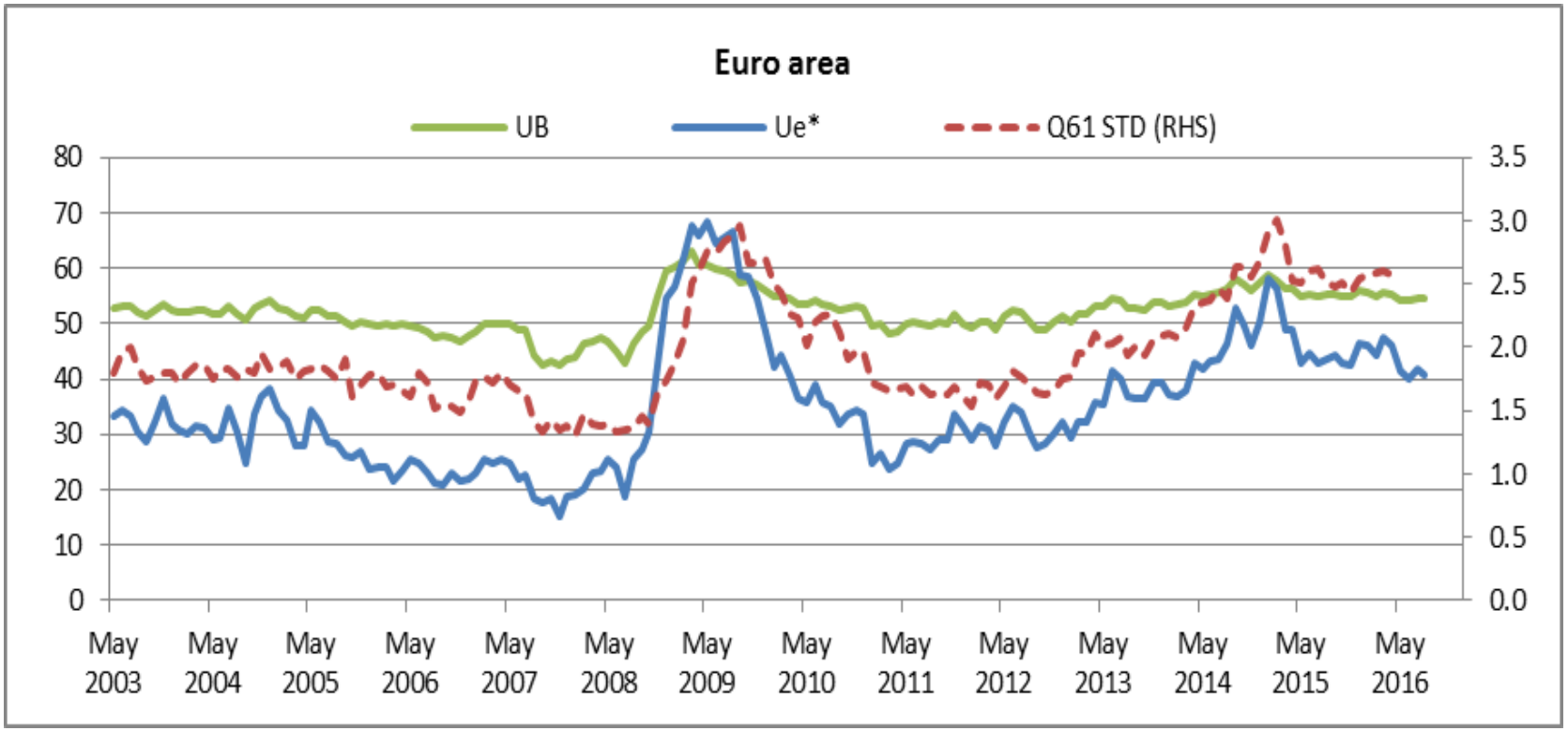
$$U_e^* = = \sqrt{(p_+^* + p_-^* - (p_+^* - p_-^*)^2)}$$

with $p_+^* = p_+ + 0.5 * p_=$ *and* $p_-^* = p_- + 0.5 * p_=$

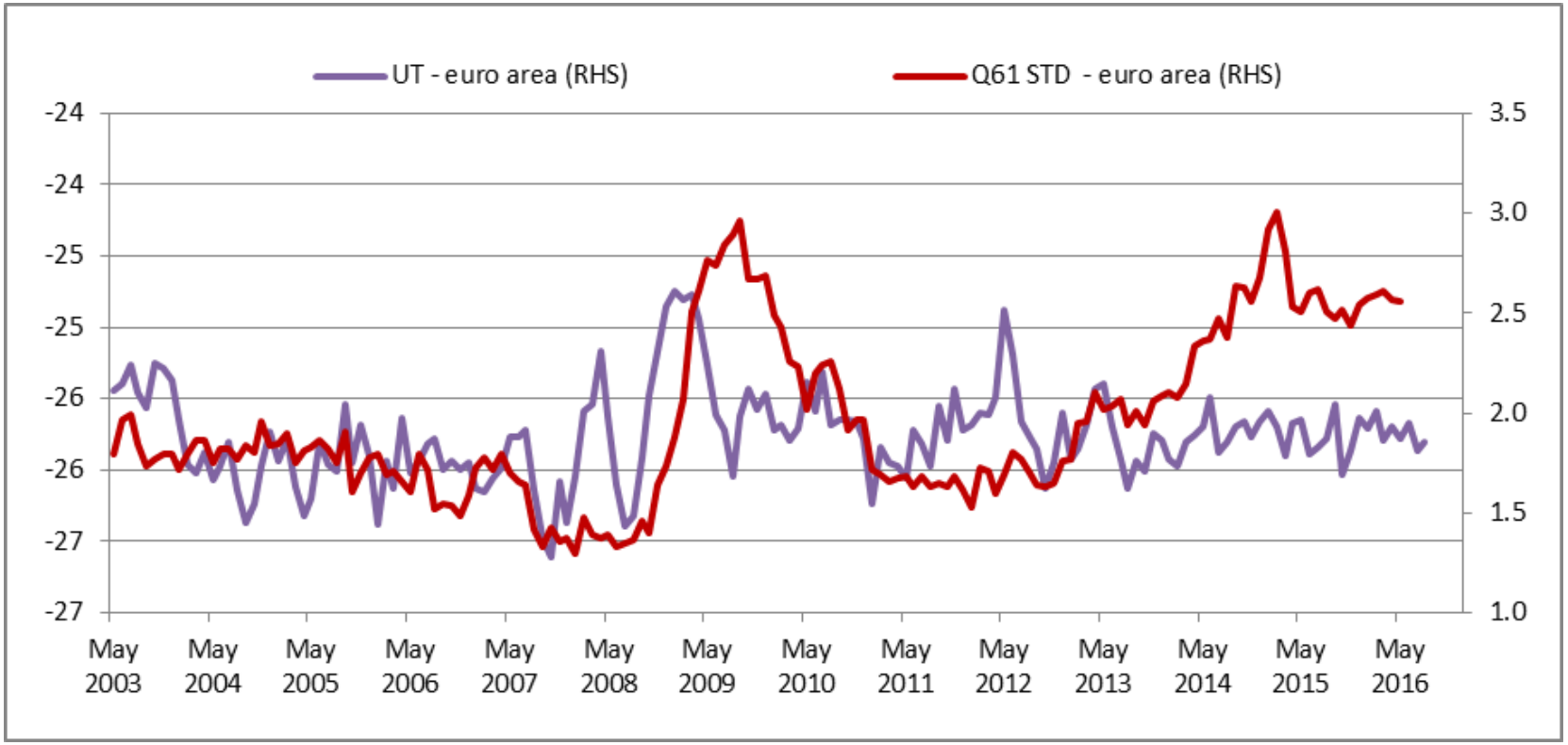
Uncertainty measures applied to qualitative price expectations ('increase, unchanged, fall')



U_B and U_e* versus the standard deviation of individual replies to Q61 (*quantitative* price expectations)



U_T versus the standard deviation of individual replies to Q61 (*quantitative* price expectations)

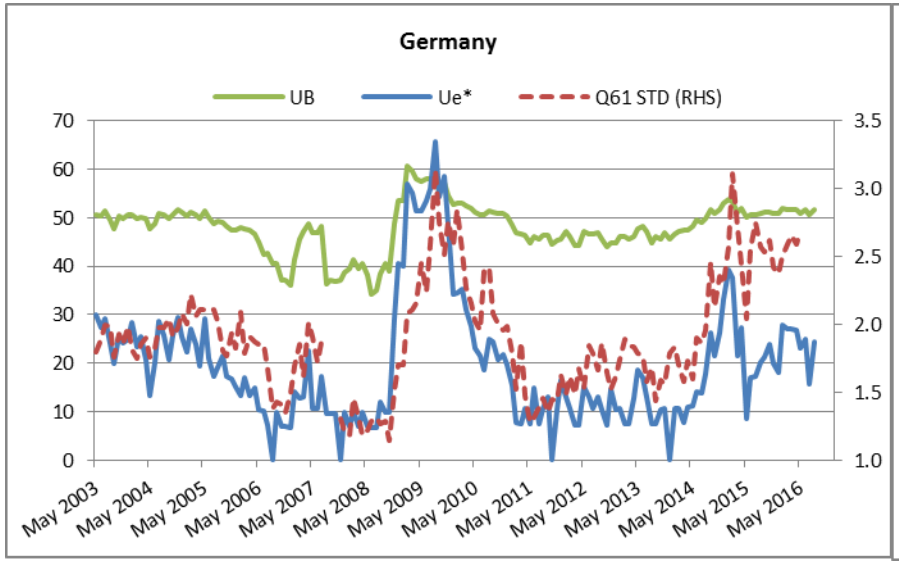


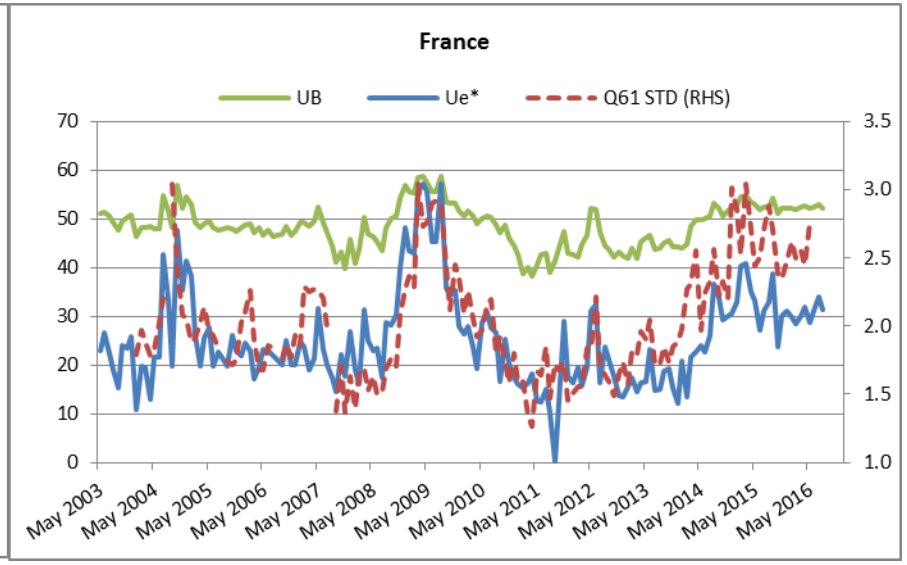
Correlations (U versus the standard deviation of Q61):

	U_B	U_e*	U_T
Euro area	0.85	0.87	0.27
EU	0.82	0.79	0.49

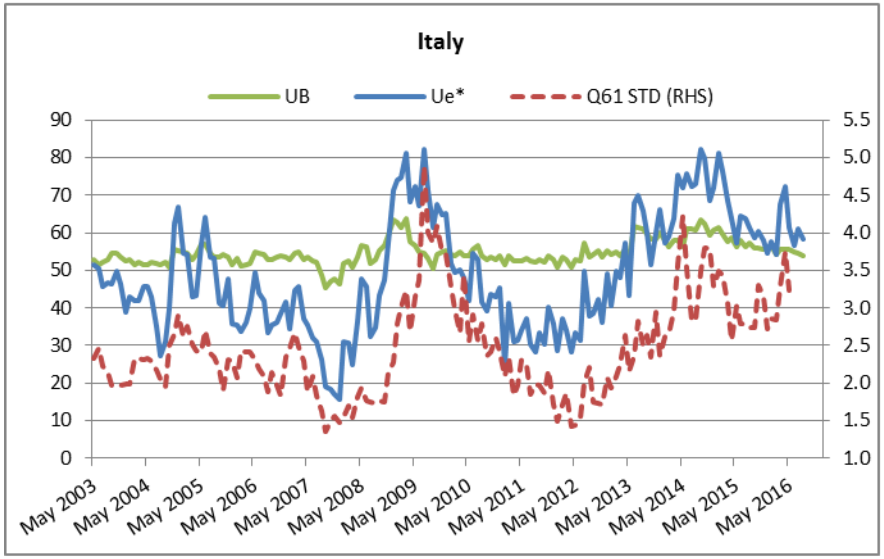
→ **U_B and U_e* (but less U_T) closely reflect the standard deviation of consumers' quantitative inflation expectations**

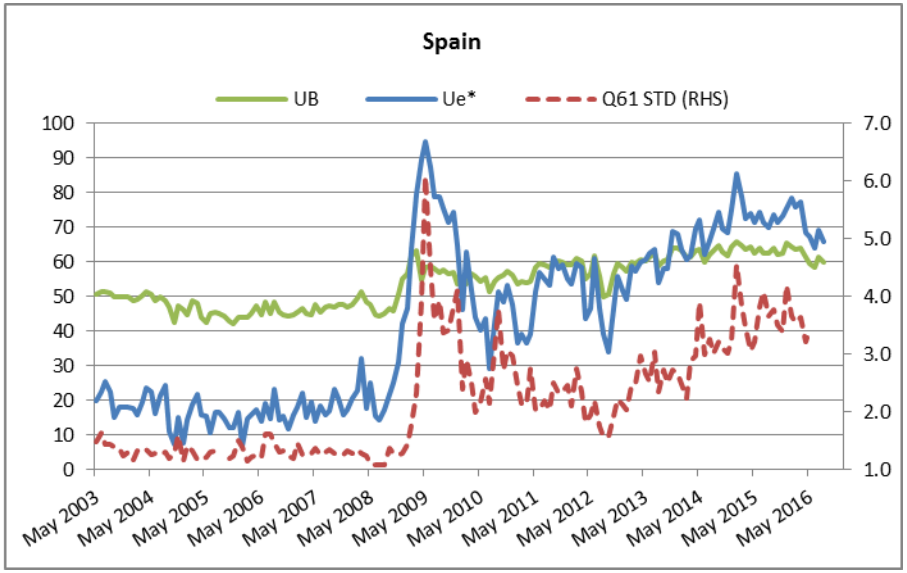
Country results I



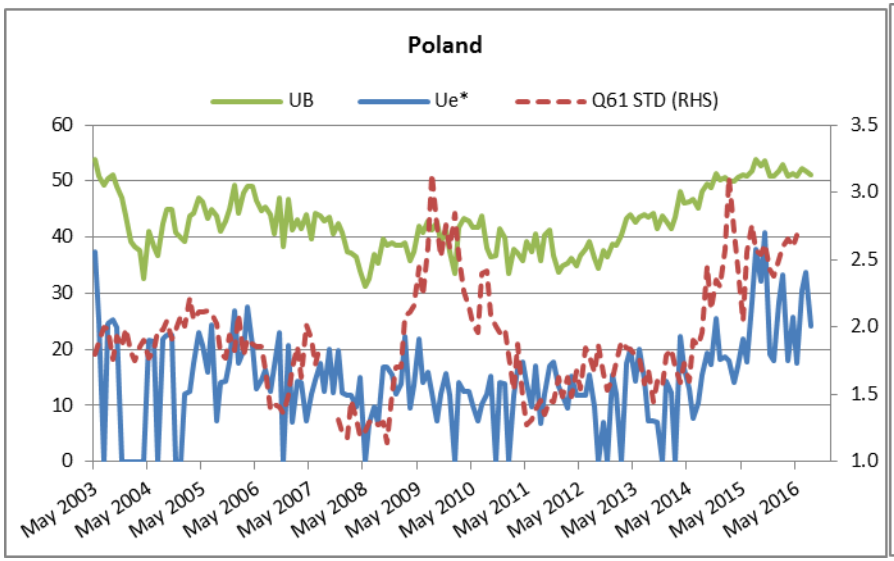


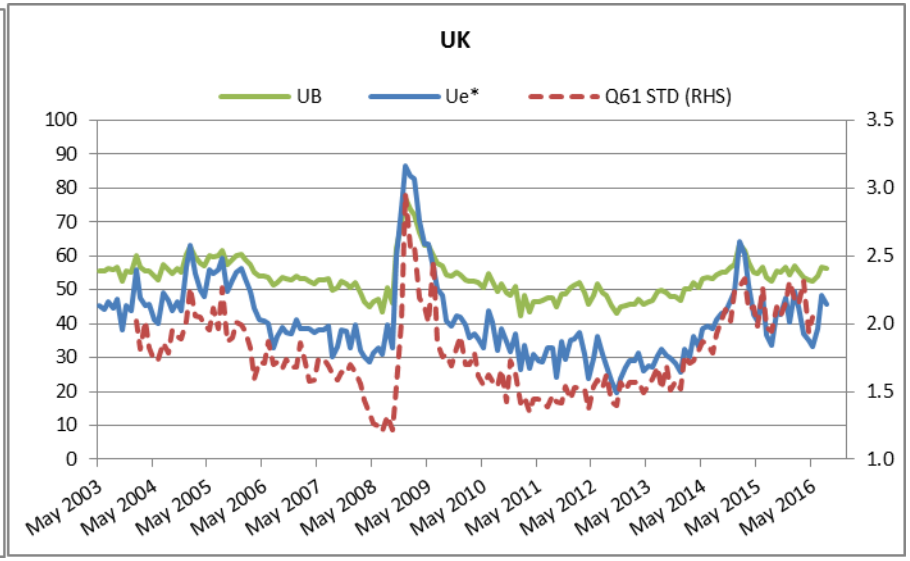
Country results II





Country results III

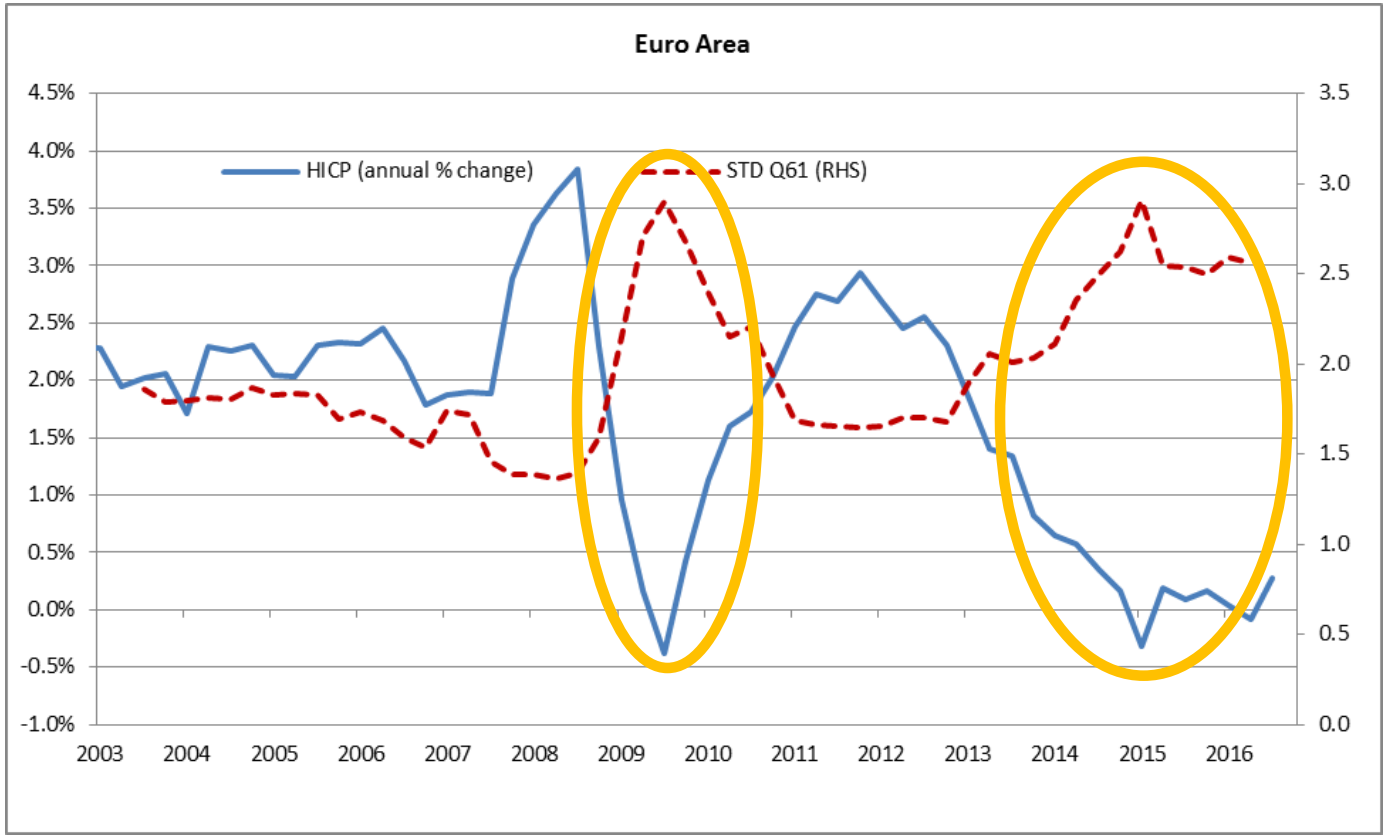




Correlations

	U_B	U_e*	U_T
DE	0.77	0.68	0.51
FR	0.64	0.52	0.43
IT	0.51	0.82	-0.44
ES	0.79	0.91	-0.29
PL	0.80	0.47	0.79
UK	0.85	0.80	0.61

HICP inflation versus stdev of Q61



→ comparison between HICP inflation and dispersion measure suggests that the latter correctly indicates periods of uncertainty:

It increases when HICP gets very low/deviates too much from the "below, but close to 2%" ECB target.

Conclusions

- Highest correlation (with the normalised standard deviation of question Q61) reached using the Bachmann formula U_B
- Good results also obtained with the U_{e^*}
- This is valid at EU and euro area level and for most of the largest EU Member States
- Normalised standard deviation of Q61 seems to correctly indicate uncertainty phases
- Also uncertainty measures using *qualitative* data should be suitable indicators

Thank you!