Consumers' quantitative inflation perceptions and expectations – _provisional_ results from a joint study

Rodolfo Arioli, Colm Bates, Heinz Dieden, Aidan Meyler and Iskra Pavlova (ECB) Roberta Friz and Christian Gayer (DG-ECFIN)

Outline

1. **Motivation**

2. **The EC consumer survey**

3. **Empirical features of the dataset**

   - *Aggregate and national results*
   - *Inflation assessments across different groups*
   - *Distributional characteristics*
   - *Cross-checking qualitative and quantitative*
   - *Business cycle effects*

4. **Addressing bias and extracting more information**

5. **Next steps**

1. Motivation

- **Review/update/extend earlier studies (2010, 2006)**

- **Country, euro area and EU results**

- **Economic situation (post-crisis, low inflation environment)**

- **Large micro data set allows for numerous analytical aspects**

Qualitative questions

How do you think that consumer prices have developed over the last 12 months? They have:

[1] risen <u>a lot</u>

[2] risen <u>moderately</u>

[3] risen <u>slightly</u>

[4] stayed about the same

[5] fallen

[6] don't know

By comparison with the past 12 months, how do you expect that consumer prices will develop over the next 12 months? They will:
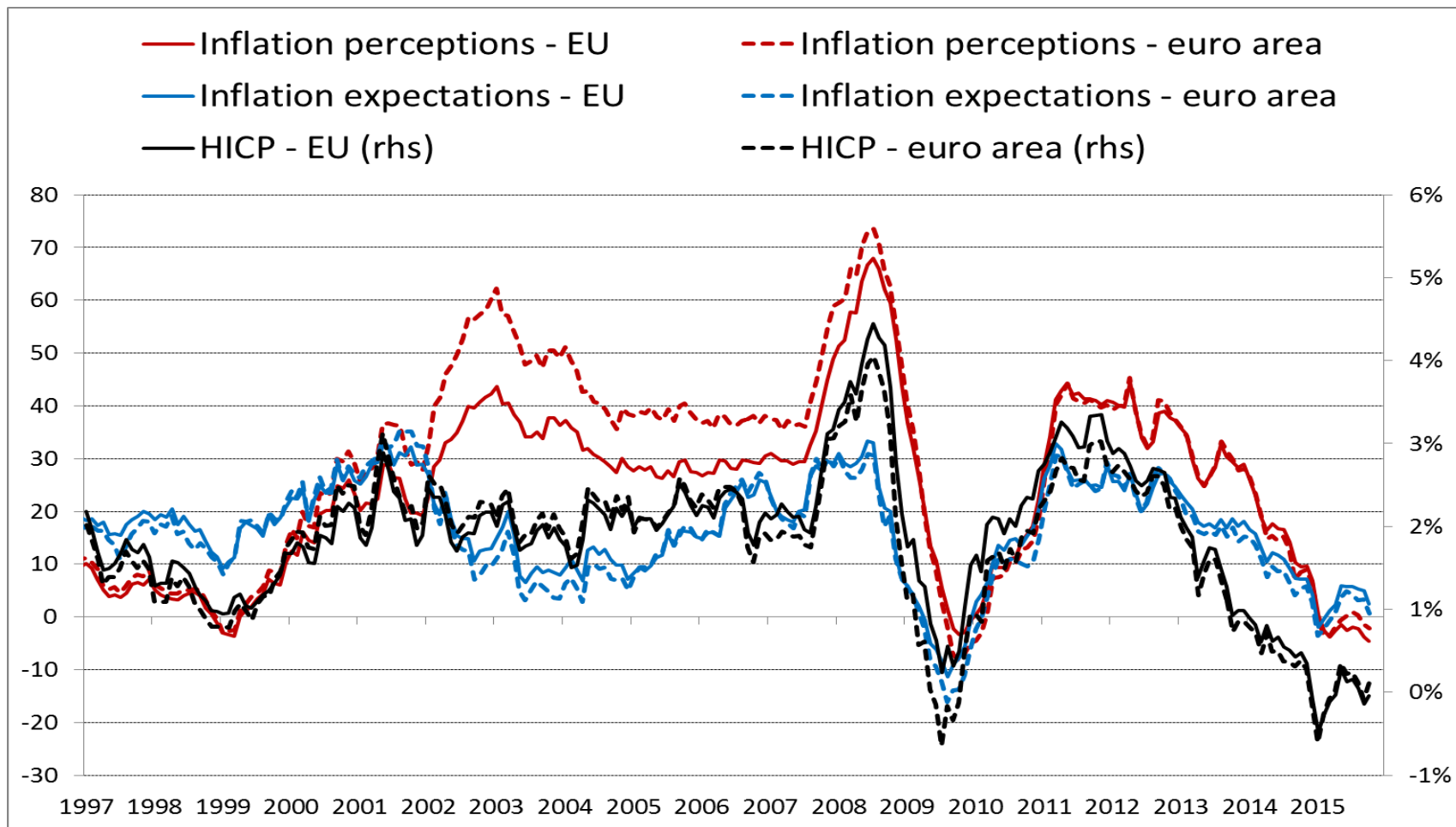
[1] increase more rapidly

[2] increase at the same rate

[3] increase at a slower rate

[4] stay about the same

[5] fall

[6] don't know

Qualitative questions (balances) and HICP (annual percentage changes)

Qualitative (balances) and quantitative (annual percentage changes) questions

EU   **Euro area**
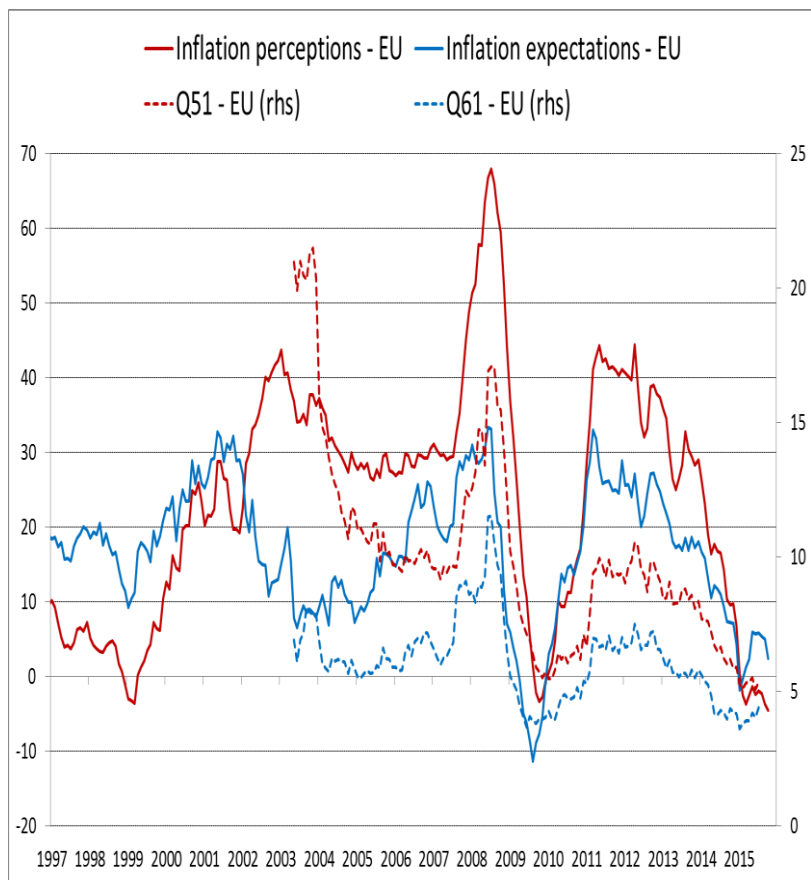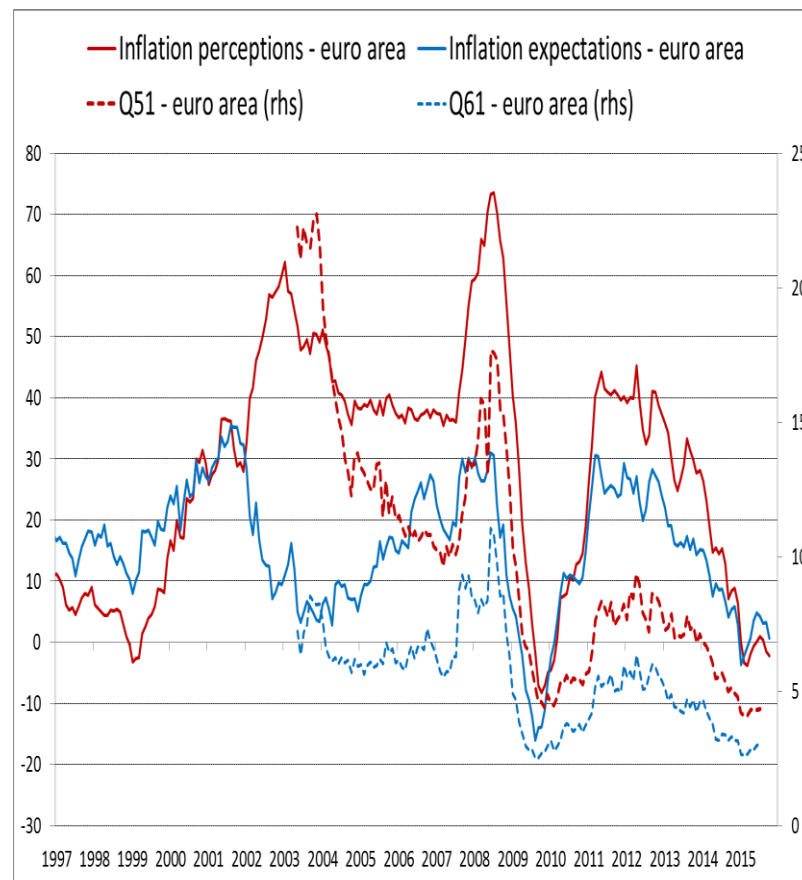
Two approaches for aggregating European totals:

- *Independent country distributions*
  - *means and standard deviations for the total sample and for socio-economic breakdowns*

- *EU/euro area distribution*
 - *higher moment statistics*
  - *trimming*

Quantitative inflation estimates:

- ***Descriptive results***

  - Overestimation and bias

  - Diversity (socio-demographics, national data)

  - Distribution, trimming, functional forms

  - Cross checking qualitative and quantitative

  - Business cycle effects

- **Broad co-movement of both quantified inflation perceptions and expectations with actual inflation**
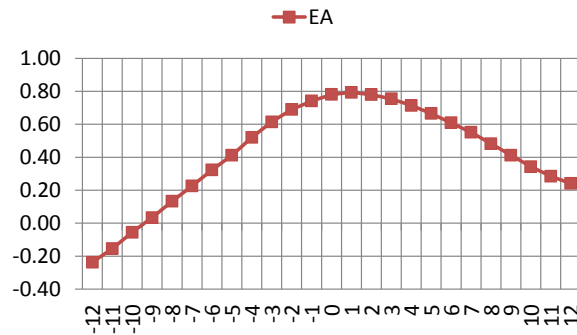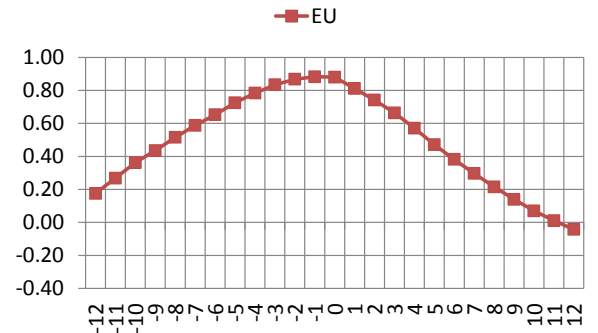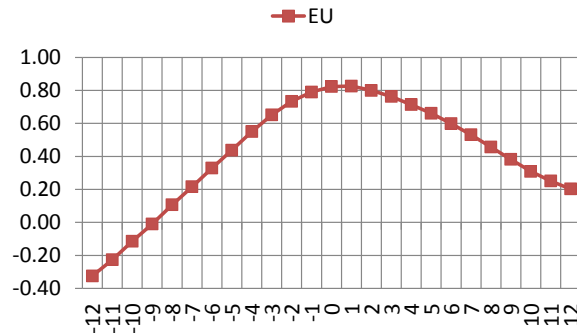
- **But systematic 'bias' remains a feature**
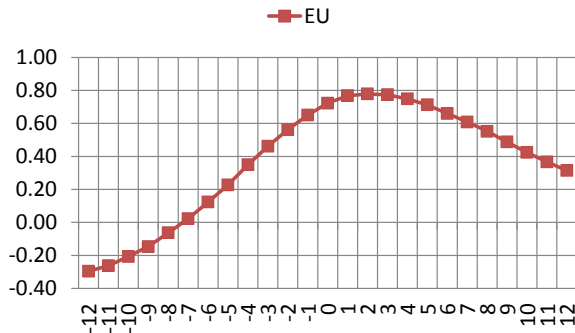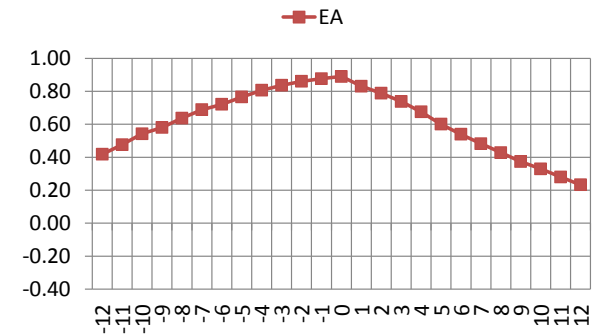

EU

EA

Perceived and actual inflation
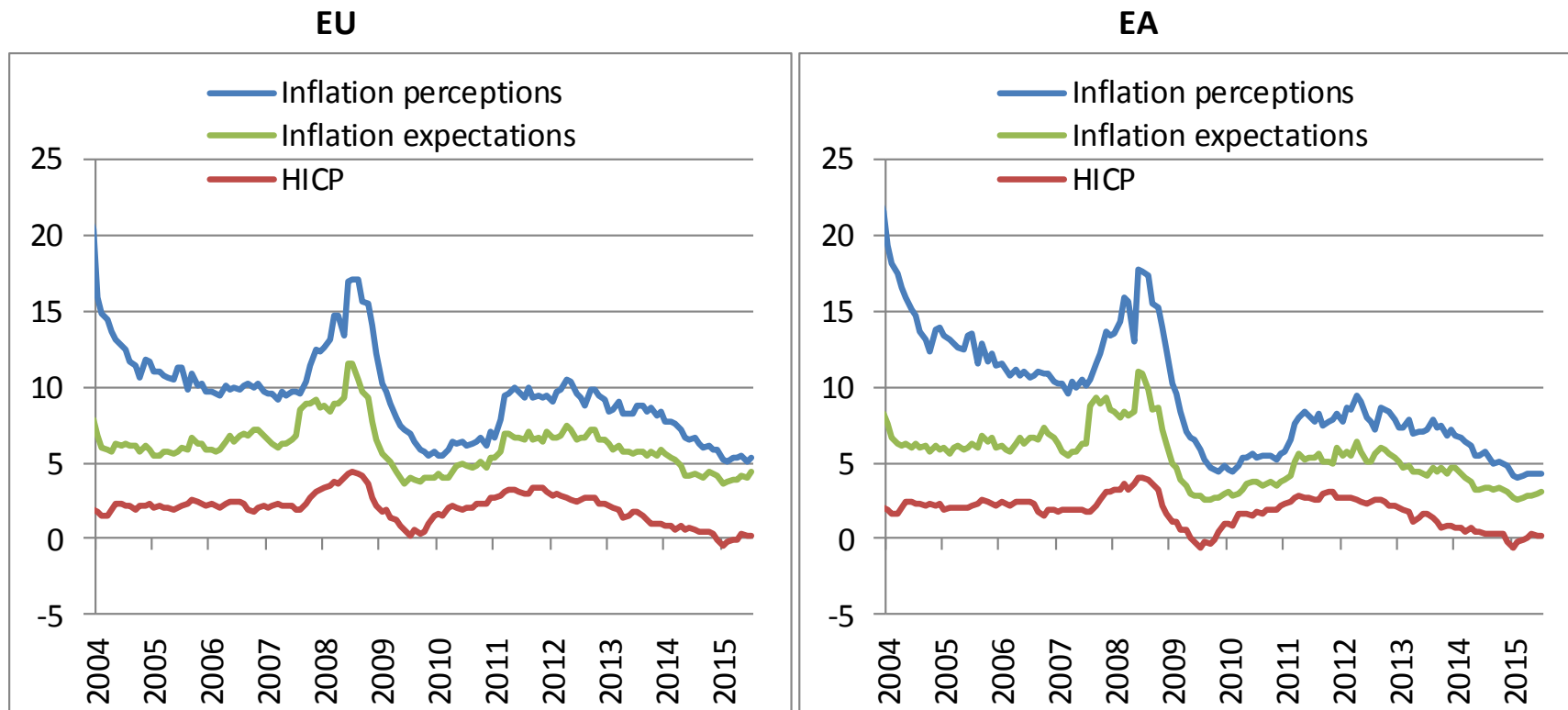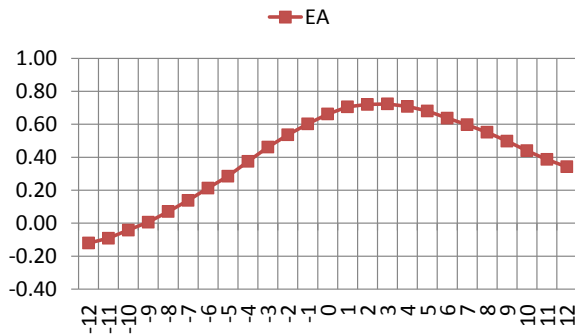
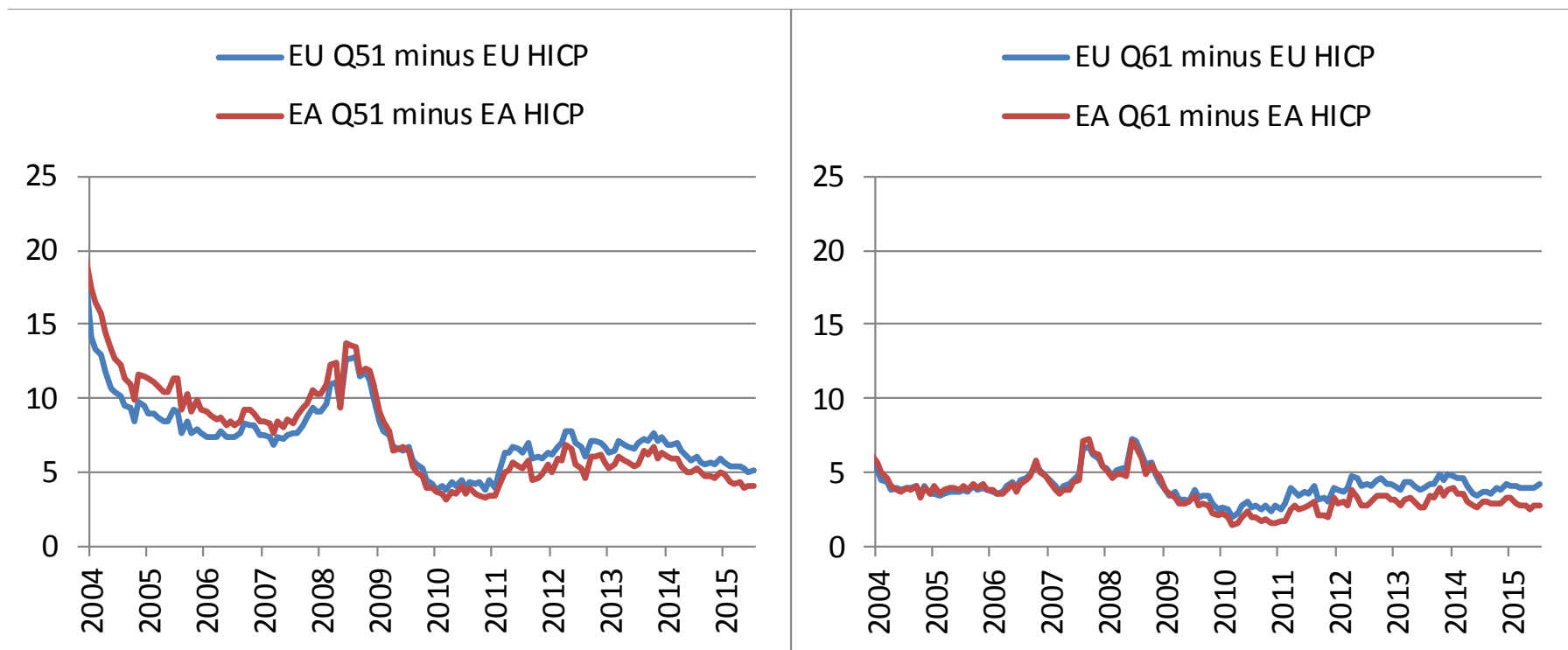**Expected and actual inflation**

Perceived and expected inflation

- Perceived inflation slightly (1-2 months) lags actual inflation
- Expected inflation a little more contemporaneous (0-1 months) with actual inflation – but clearly lags target outcome (12 months ahead)
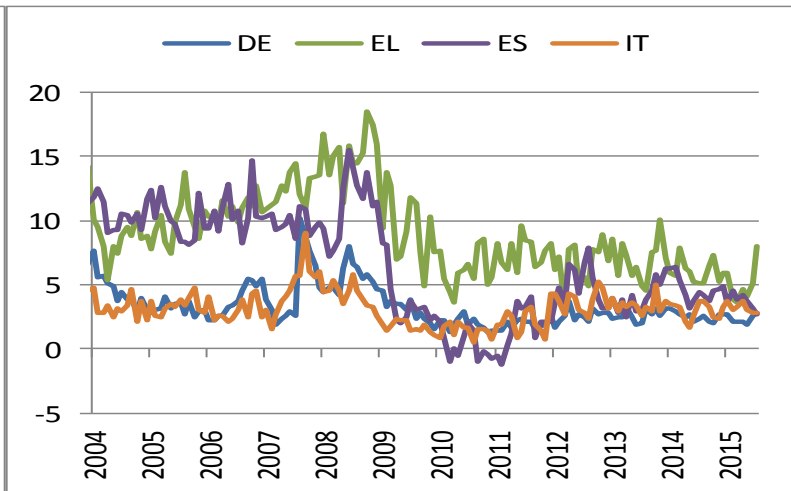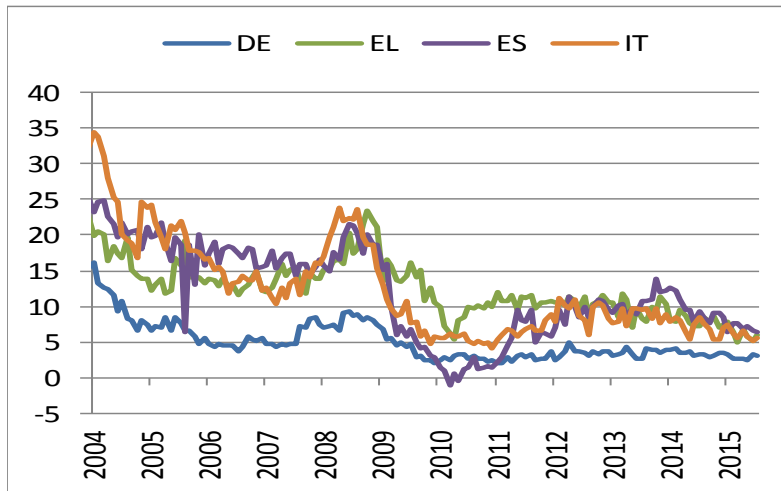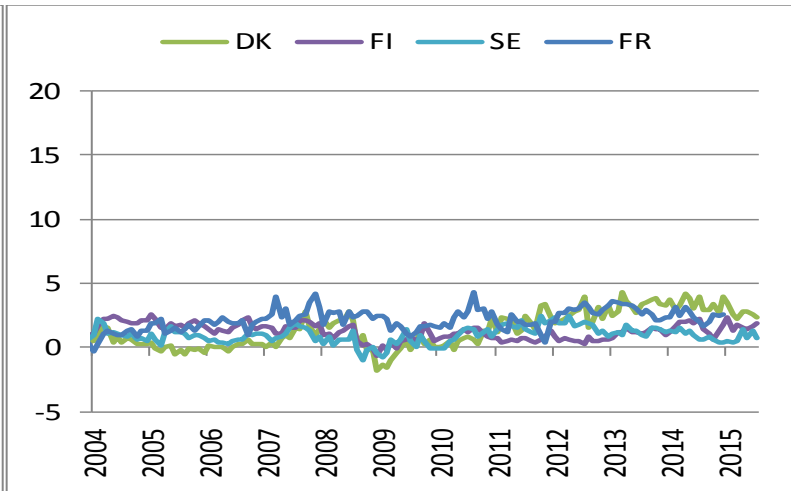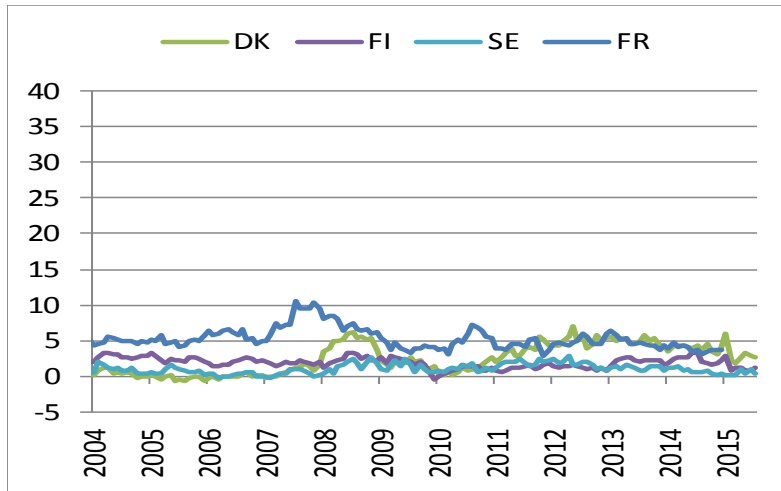- 'Kink' in correlation structure between perceived and expected inflation

- **Both for perceived and expected inflation but particularly the former**

Left chart legend:
- EU Q51 minus EU HICP
- EA Q51 minus EA HICP

Right chart legend:
- EU Q61 minus EU HICP
- EA Q61 minus EA HICP

- **Biases less for Nordic countries and FR, higher for IT, ES and EL (also DE post changeover)**
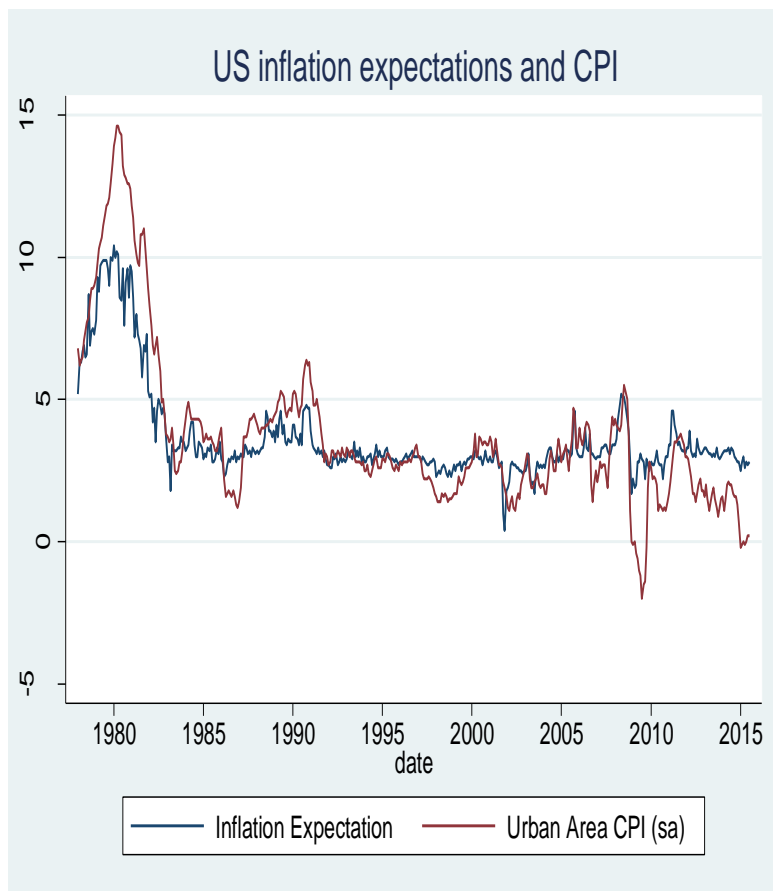
Survey design and bias
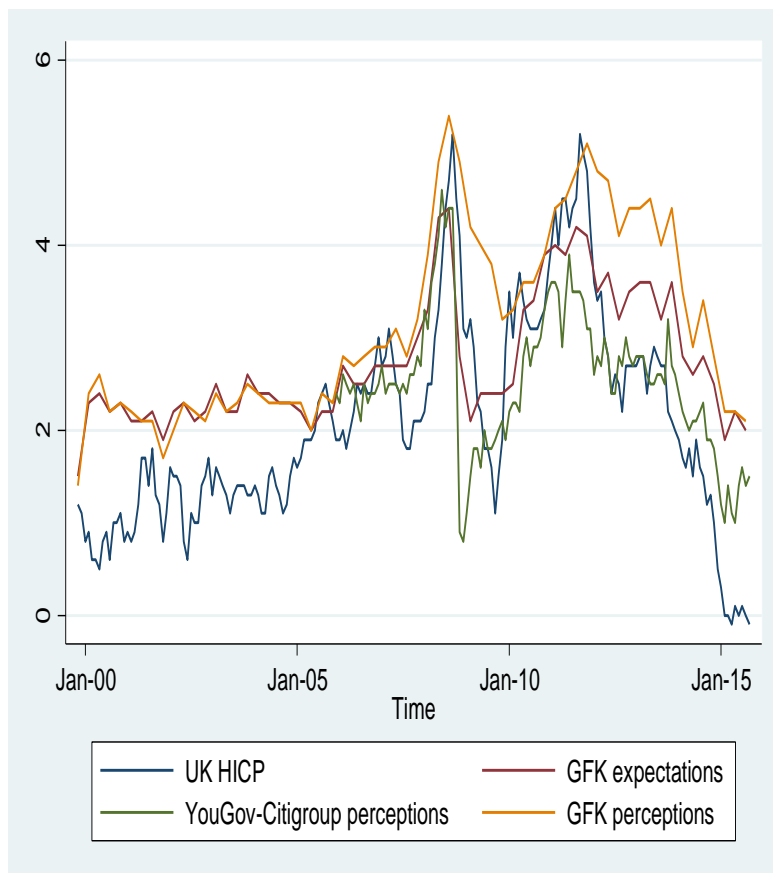
- UK surveys of perceptions and expectations have less bias

- GfK-BOE quarterly survey and You-Gov Citigroup monthly survey

- Questions focus the respondent on ranges

Survey design and bias

US inflation expectations and CPI

- US Michigan Survey long established and relative little bias

- The *Stay about the same* answers probed for meaning (levels or rates)

- Answers above 5% are probed

- *Don't know* answers are asked about "cents on the dollar"

- Sample relatively small c.a. 500 individuals per month

Different people, different inflation assessments?

- Opinions differ across different socio-demographic groups

- Men, older respondents tend to give lower (more accurate) answers with respect to their counterparts

- Inflation perceptions and expectation tend to decrease with level of income and education attainment
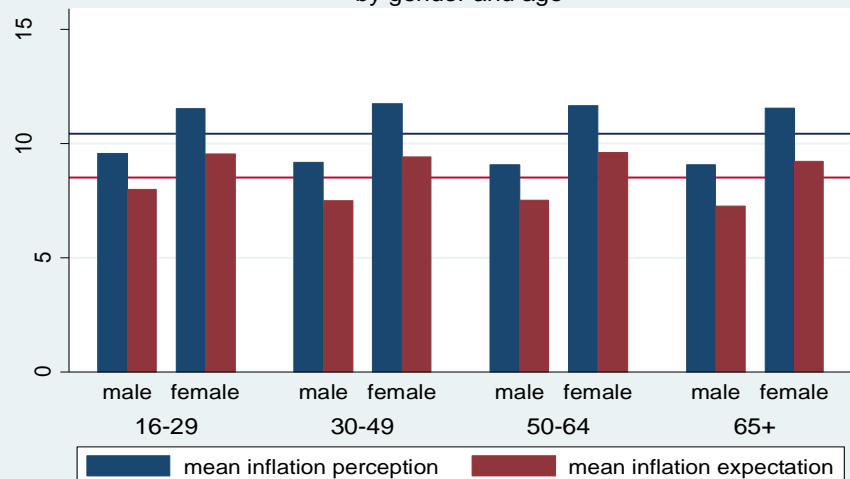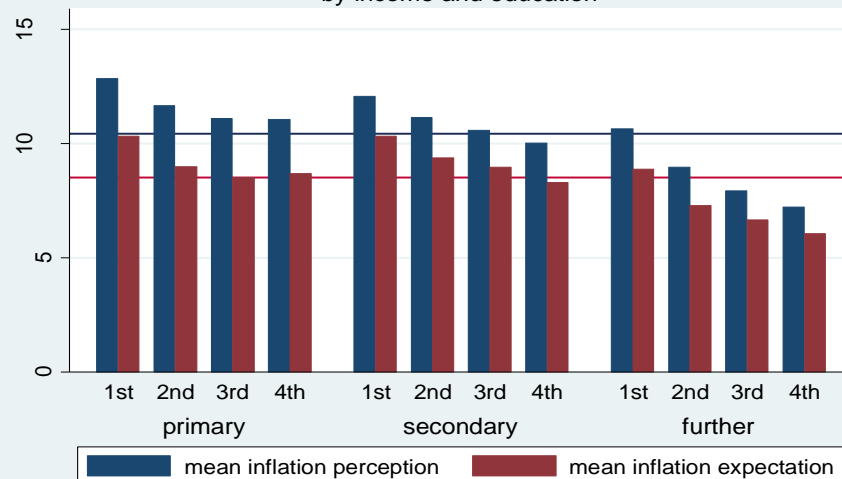
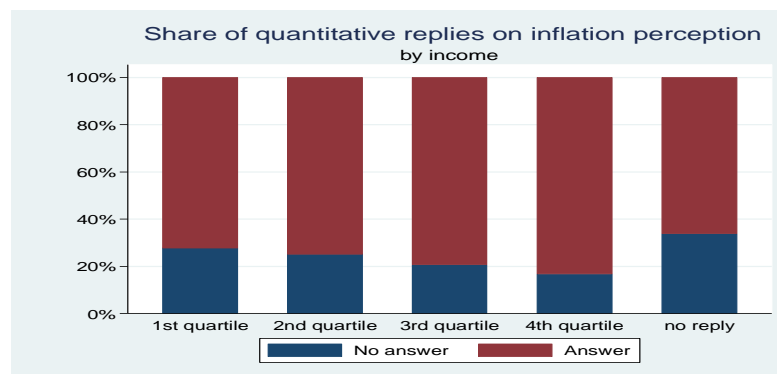## Different people, different inflation assessments?
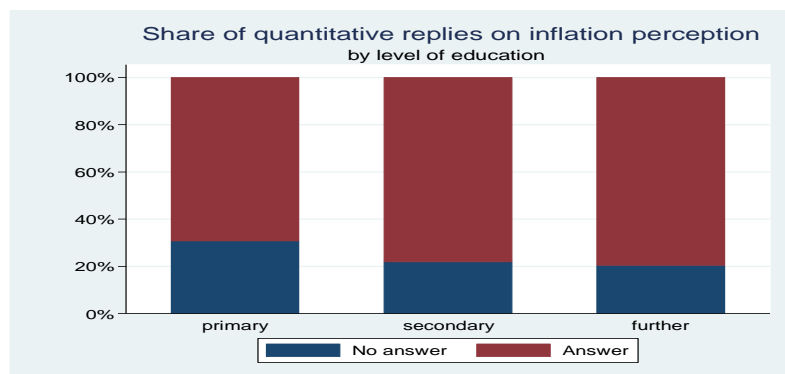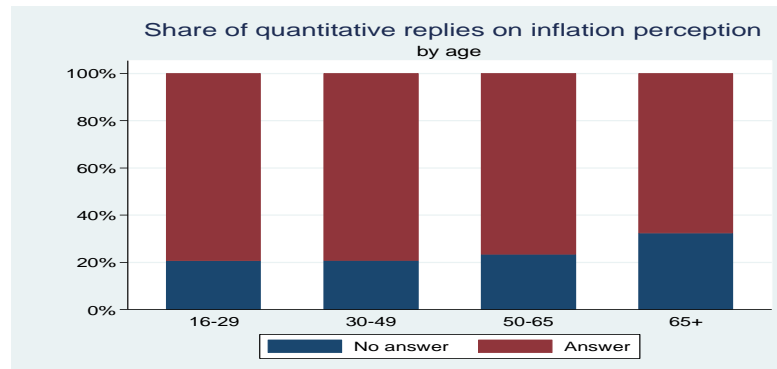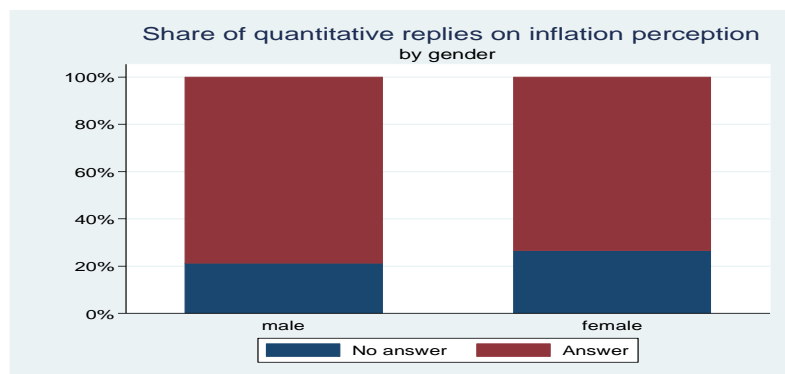
- The distribution of answers by men, high income earners and respondents with high level of education is less skewed and narrower
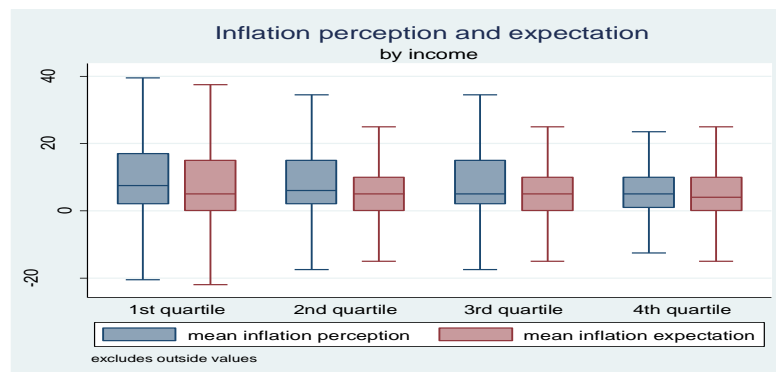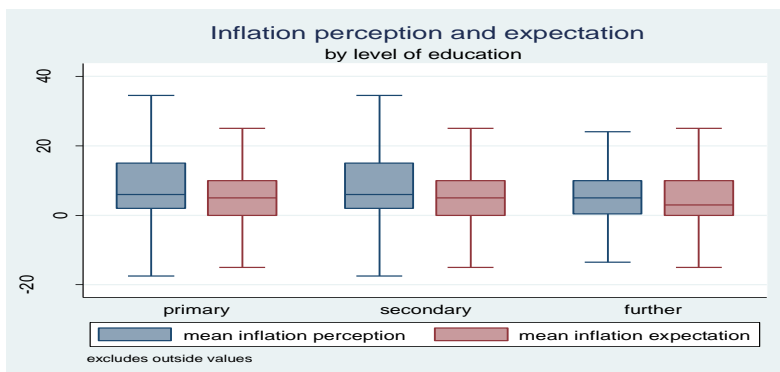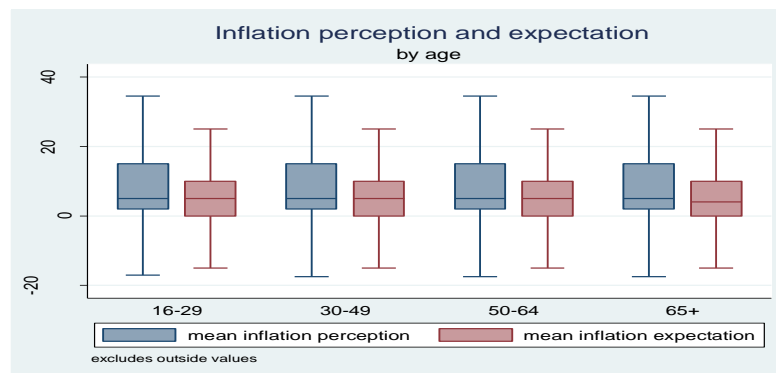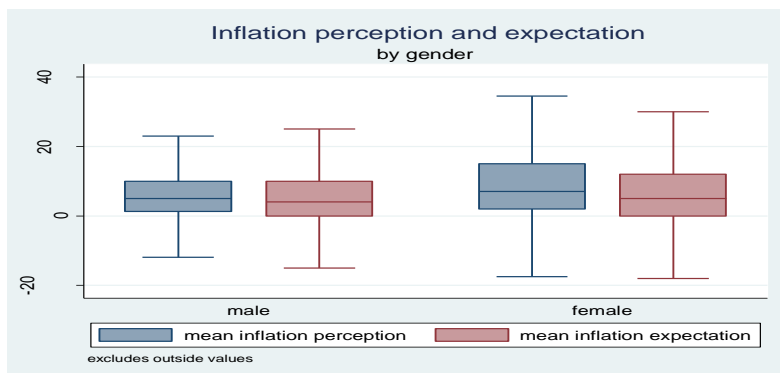
Different people, different inflation assessments?

- Women, older respondents, less educated people and those with lower income are less inclined to provide a quantitative answer

Share of quantitative replies on inflation perception by gender

Share of quantitative replies on inflation perception by age

Share of quantitative replies on inflation perception by level of education

Share of quantitative replies on inflation perception by income

- **Some extreme outliers – limited in number**

histogram q51a width(0.1) - quantitative perceptions
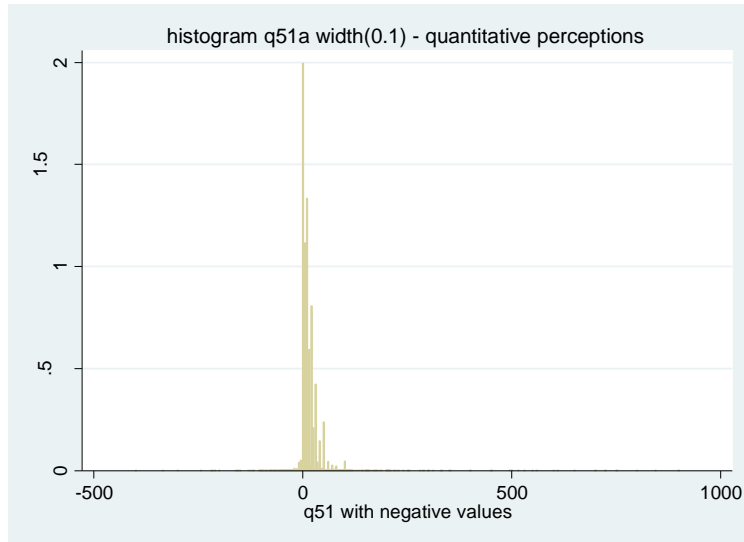
- ## Zooming in – 'truncated at 0; peaks @ 5, 10

histogram q51a width(0.1) - quantitative perceptions

histogram q51a ifq51a >=-20 & ifq51a <=60, width(0.1) - quantitative perceptions
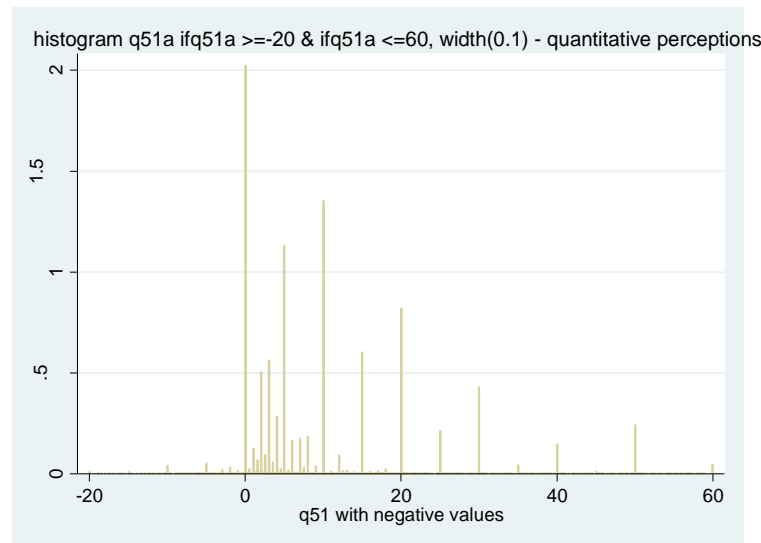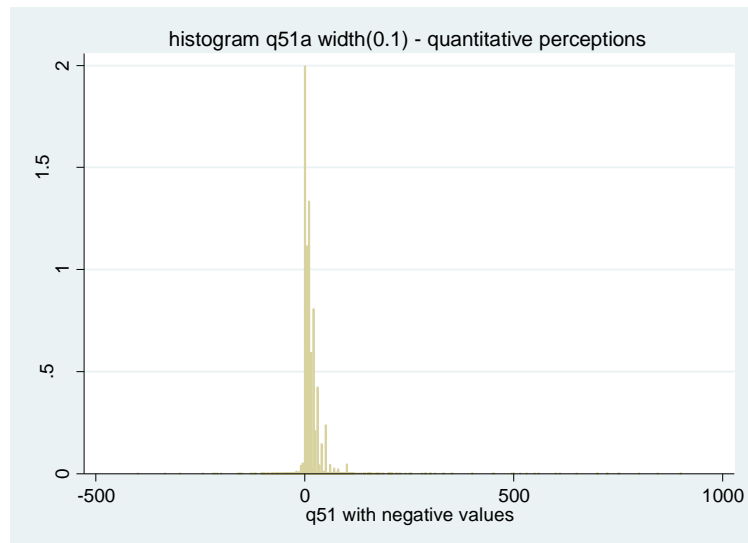
- **Zooming in * 2 – mini-peaks at 1, 2, 3…**

histogram q51a width(0.1) - quantitative perceptions

histogram q51a ifq51a >=-20 & ifq51a <=60, width(0.1) - quantitative perceptions

histogram q51a ifq51a >=-5 & ifq51a <=30, width(0.1) - quantitative perceptions
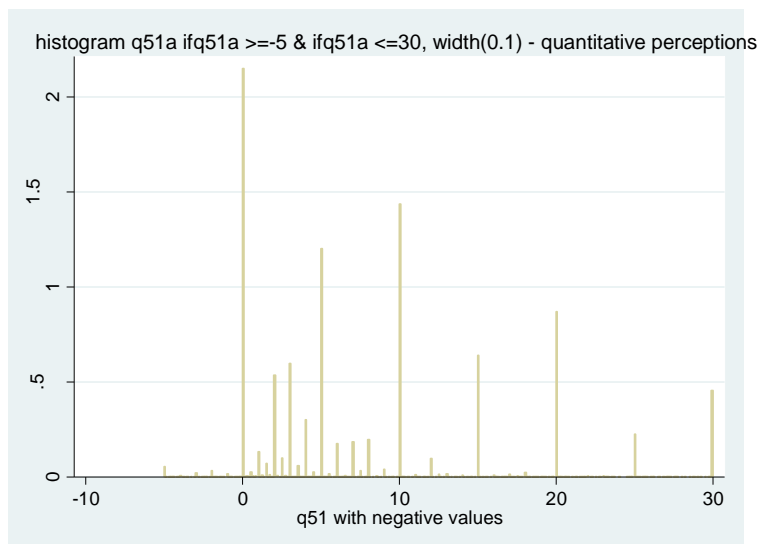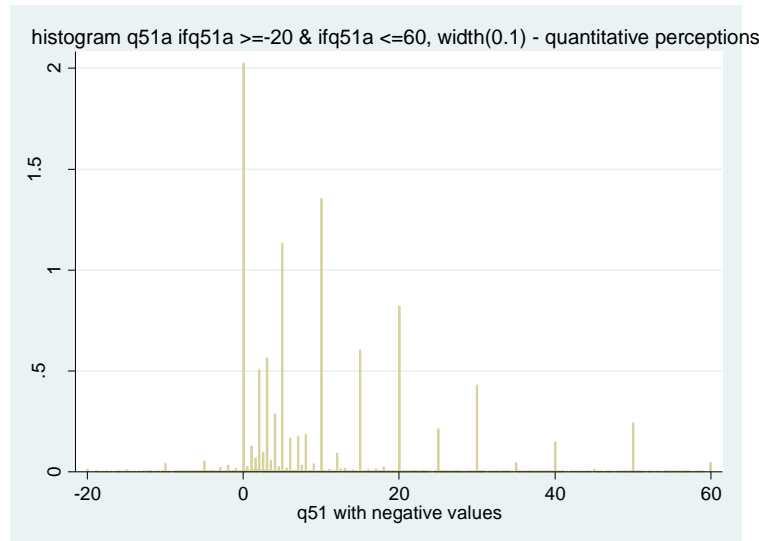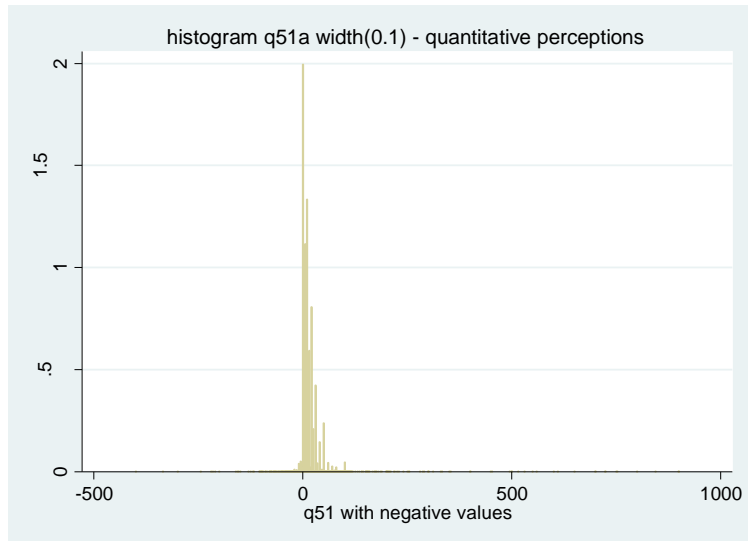
- ## Full zoom – 2 and 3 modal replies of mini peaks
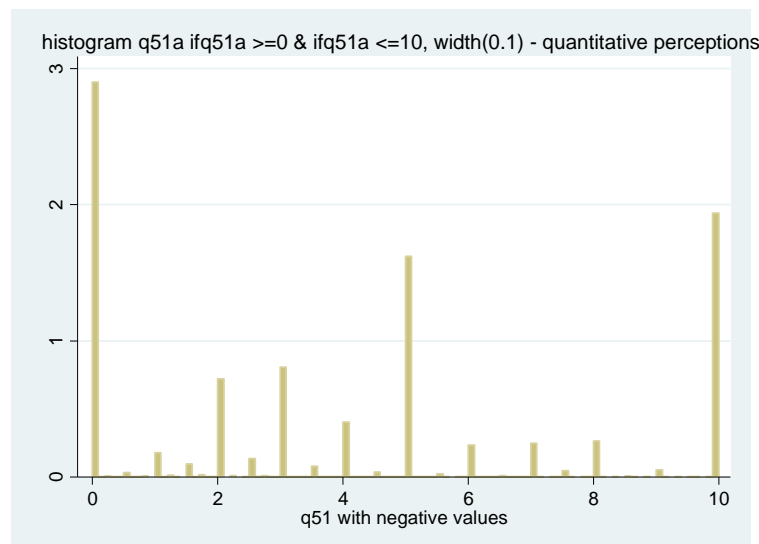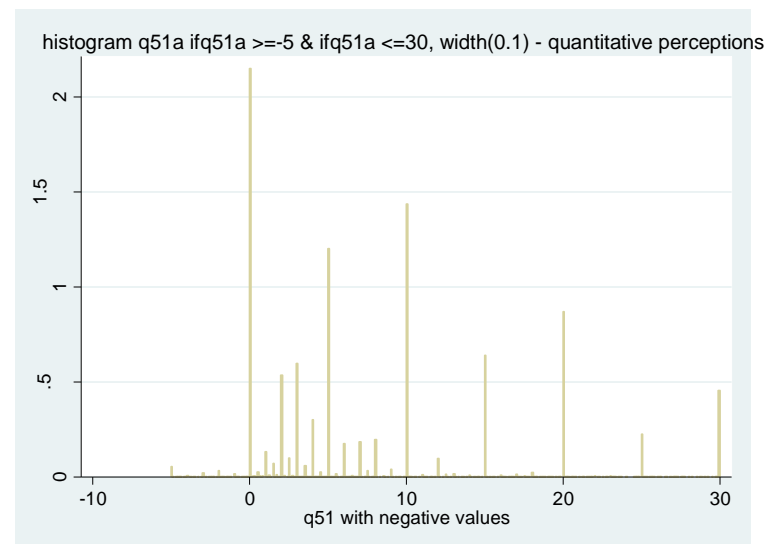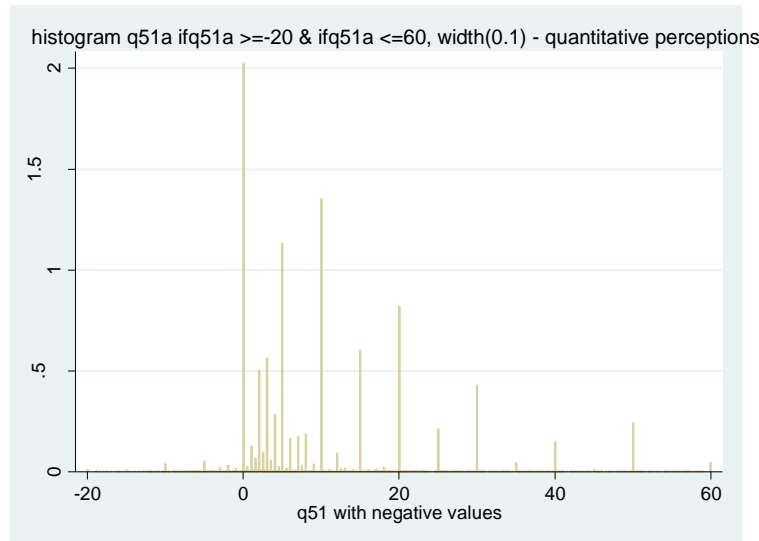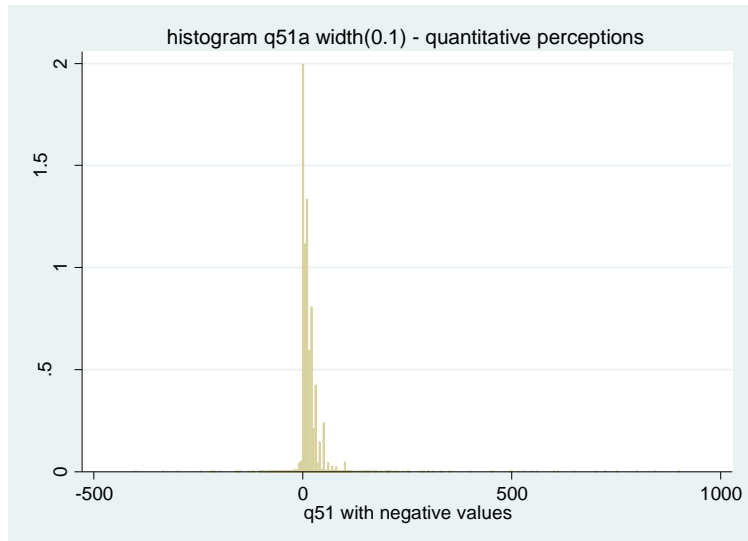
- **Median sometimes 'uninformative' owing to clustering**
- **Whilst minima and maxima are extreme, 10th and 90th percentiles are less so**
- **Standard deviation has declined over time (as has interquartile range)**
- **Skew and kurtosis are persistent features**
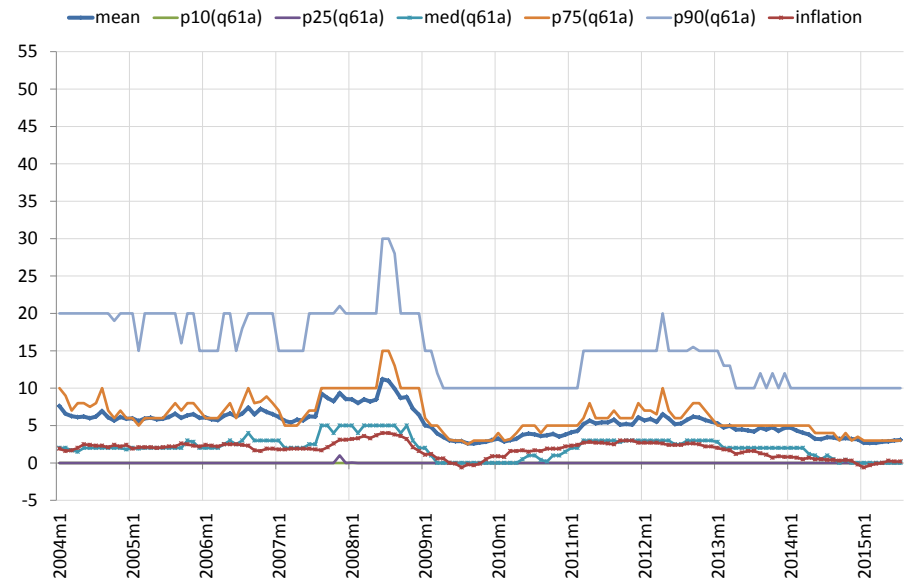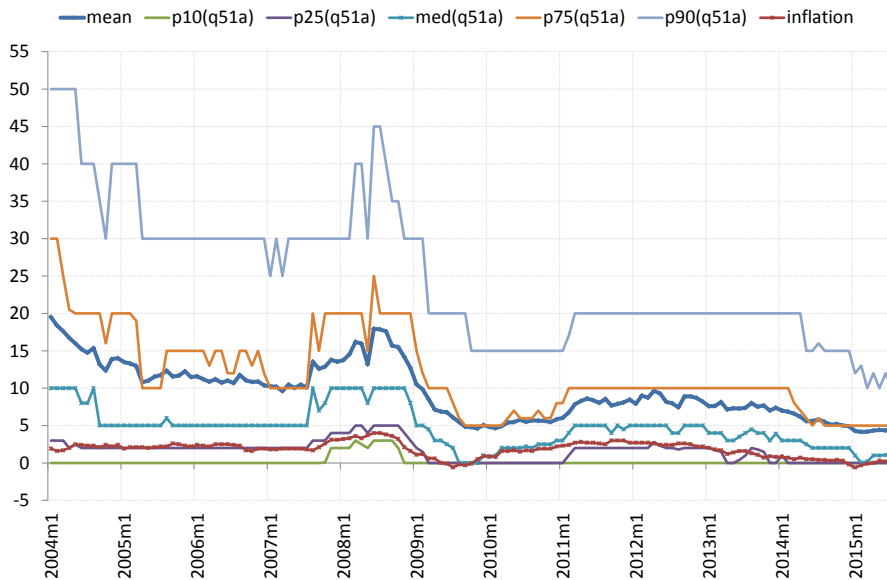
- **Although some features prevail (peaks @ 5, 10, etc., 'truncation at 0, etc.), there is a clear shift in distribution between June 2008 (HICP = 4.0%) and Jan 2015 (HICP = -0.6%)**

histogram q51a ifq51a >=-5 & ifq51a <=30, width(0.1) - quantitative perceptions

histogram q51a ifq51a >=-5 & ifq51a <=30, width(0.1) - quantitative perceptions
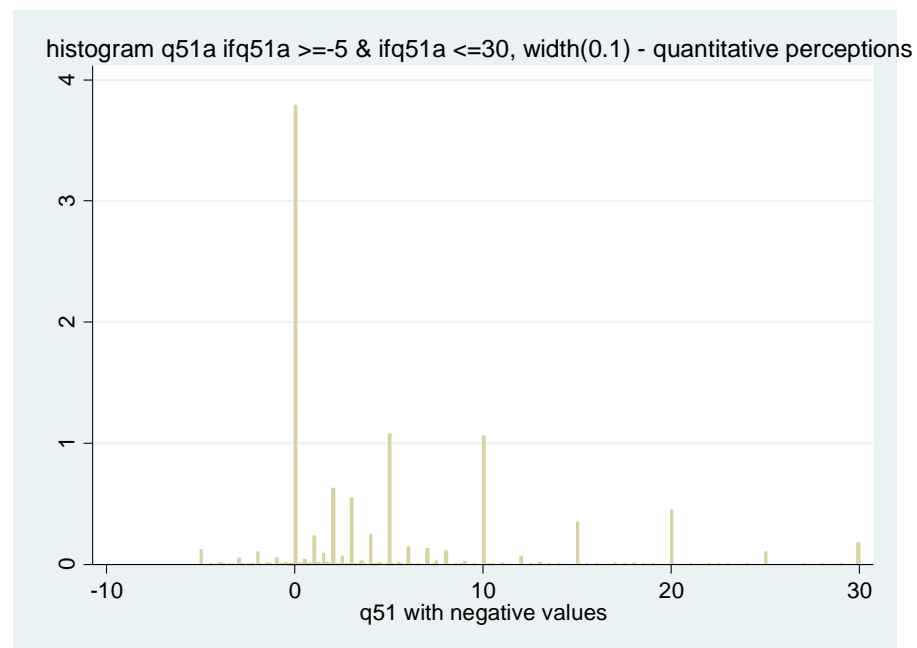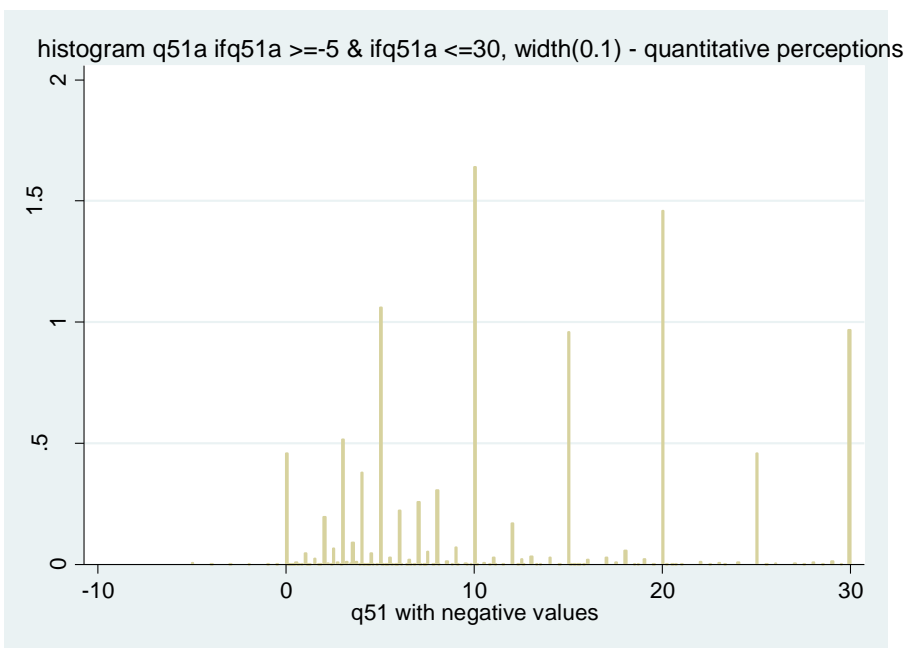
- **Another advantage of the quantified data is that it allows us to consider whether consumers' qualitative assessments are state/time dependent**
- **In aggregate they are internally consistent**
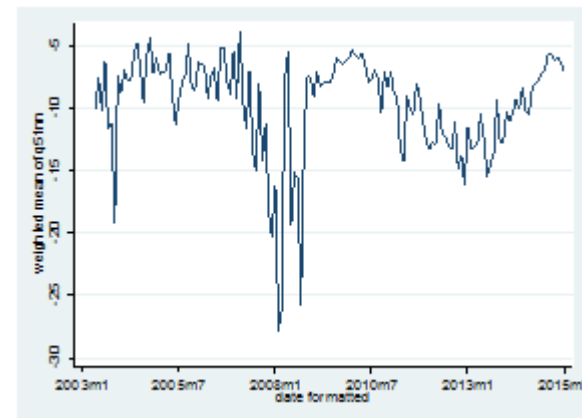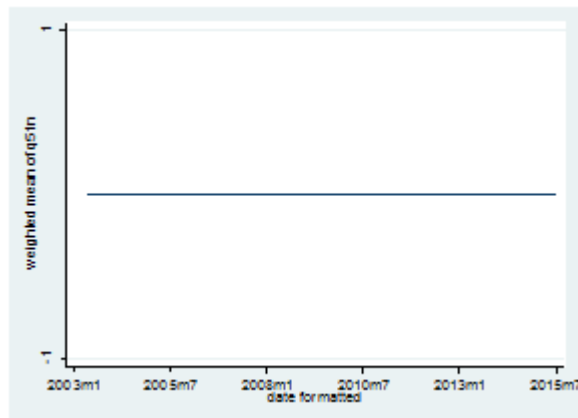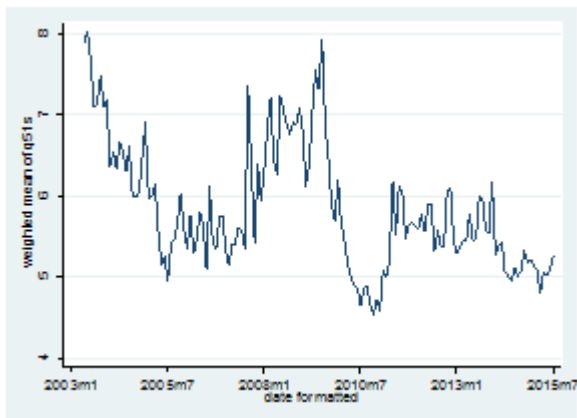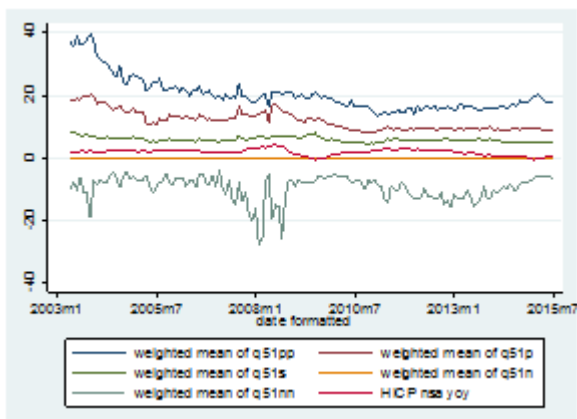
- **There is some overlap between respondents 'definitions' of 'a lot', 'moderately' and 'slightly'**
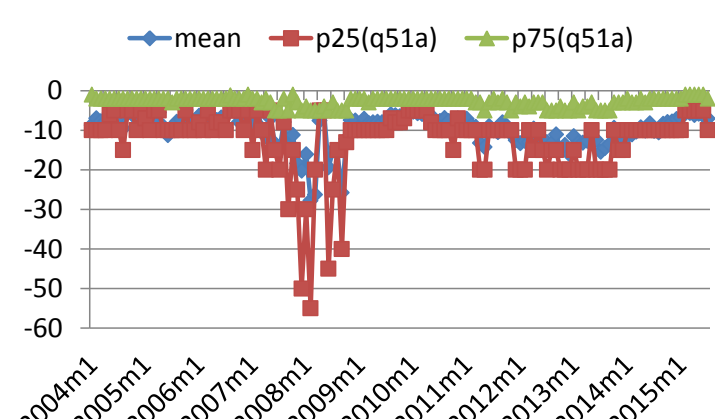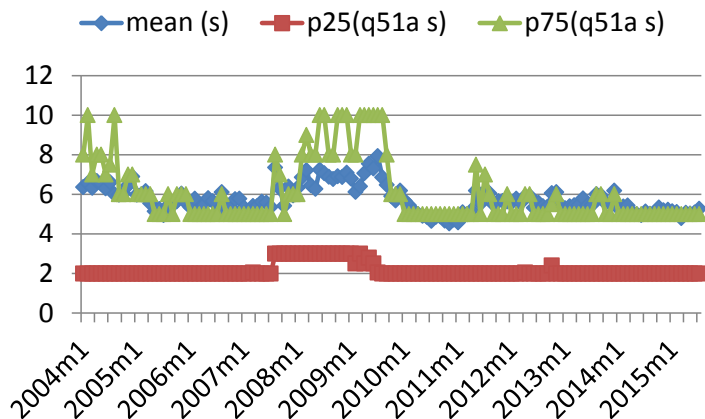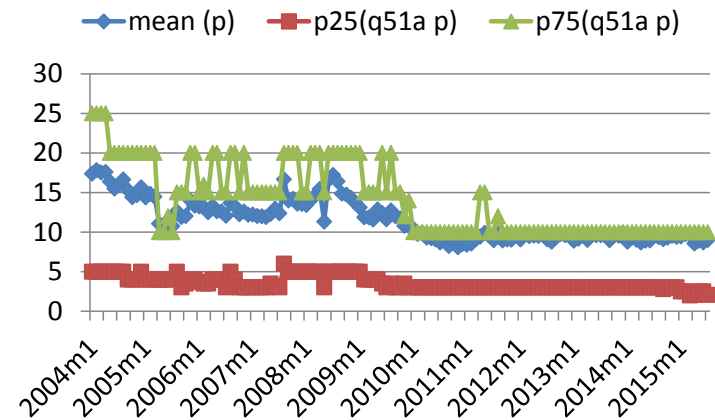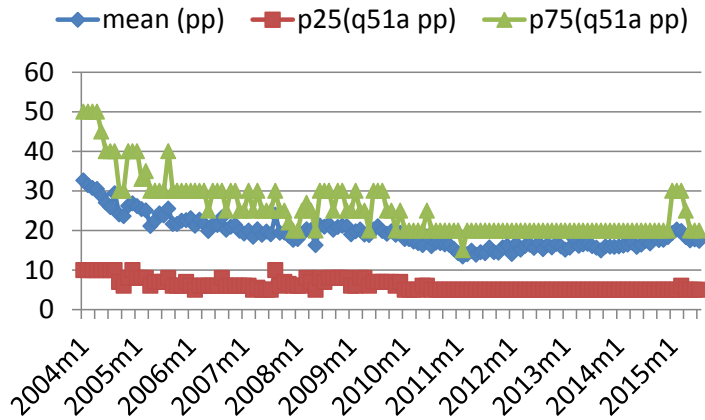
- **RTD – check how much owes to inter vs intra country**

- **Evolution of inflation perceptions not driven by changing definition of 'slightly', 'moderately', etc. but rather by changing assessments of inflation**
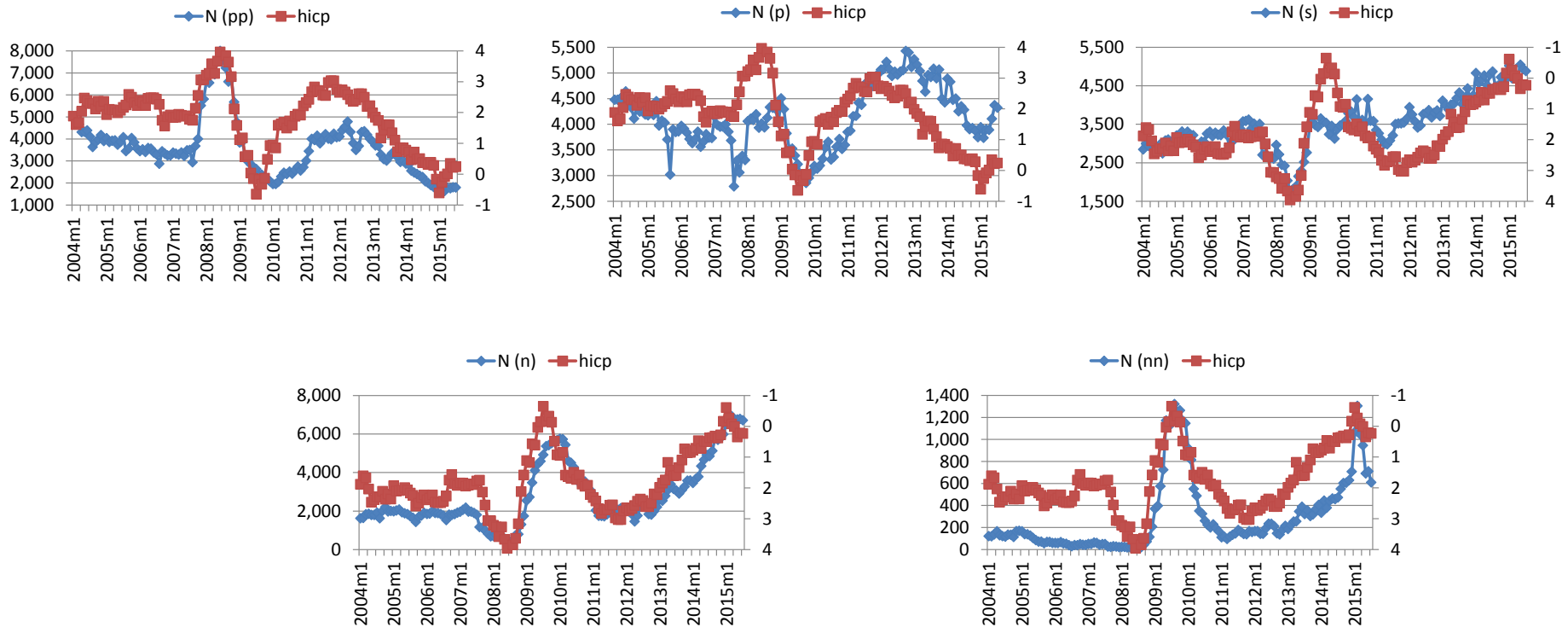
- *Note: pp denotes 'a lot', p ~ 'moderately'; s ~ 'slightly'; n ~ 'same'; nn ~ 'fallen'*
- *NB: HICP inflation scaling inverted for s, n and nn*

- **Consider whether inflation assessment is linked to business cycle**
- **Tentative evidence of limited effect – bias slightly higher during recession (causality?)**
- **Since 2009, bias fractionally higher with low inflation – owing to downward rigidity?**

Table 5 Consumers' quantitative estimates of inflation and HICP – euro area
(annual percentage changes; Jan 2004 – Jul 2015)

		Q51	Q61	HICP	difference Q51 - HICP	difference Q61 - HICP
2003:05 – 2007:12	expansion	12.4	6.5	2.2	10.3	4.3
2008:01 – 2009:06	recession	12.8	7.0	2.4	10.4	4.6
2009:07 – 2011:09	expansion	5.9	3.8	1.6	4.3	2.2
2011:10 – 2013:03	recession	8.1	5.4	2.5	5.6	3.0
2013:04 – Jul 2015		5.8	3.6	0.6	5.2	3.1

Table 6 Consumers' quantitative estimates of inflation and HICP – euro area
(annual percentage changes; Jan 2004 – Jul 2015)

		Q51	Q61	HICP	difference Q51 - HICP	difference Q61 - HICP
Jan 2004 - Feb 2009	above 1%	12.9	6.9	2.3	10.5	4.5
Mar 2009 - Feb 2010	below or equal 1%	5.6	2.9	0.2	5.3	2.7
Mar 2010 - Sep 2013	above 1%	7.2	4.8	2.2	5.0	2.6
Oct 2013 - Jul 2015	below or equal 1%	5.4	3.4	0.3	5.1	3.1

- **Some evidence that inflation assessment lags real economy, but much of this is driven by crisis period.**
- **However this is not so robust nor stable - since 2012 correlation has changed sign**

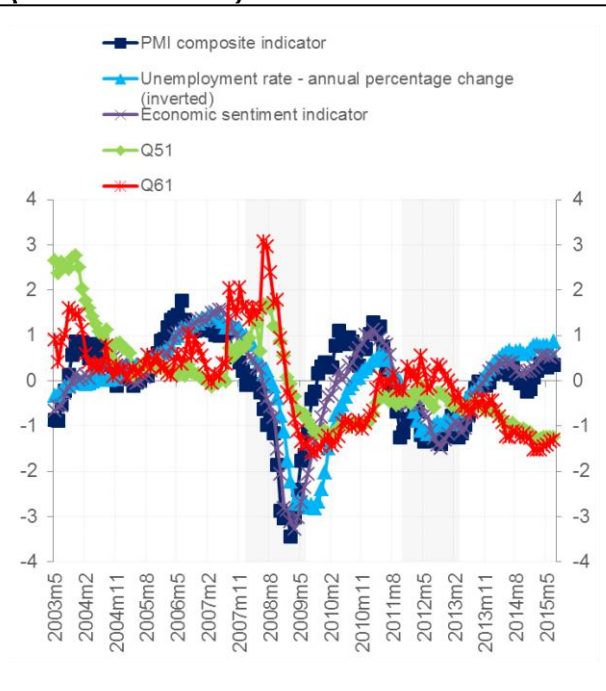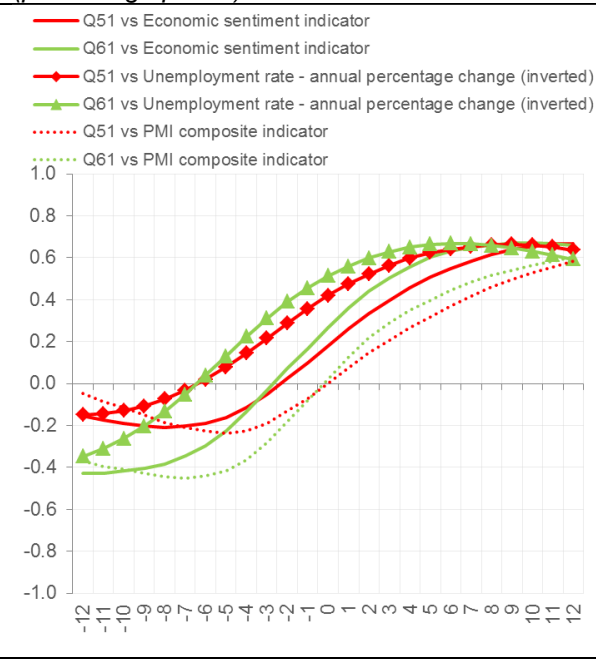Chart X.a: Economic indicators and quantitative surveys - Euro Area *(standard deviation)*

- PMI composite indicator
- Unemployment rate - annual percentage change (inverted)
- Economic sentiment indicator
- Q51
- Q61

Chart X2.a: Leading and lagging correlations – Euro Area *(percentage points)*

- Q51 vs Economic sentiment indicator
- Q61 vs Economic sentiment indicator
- Q51 vs Unemployment rate - annual percentage change (inverted)
- Q61 vs Unemployment rate - annual percentage change (inverted)
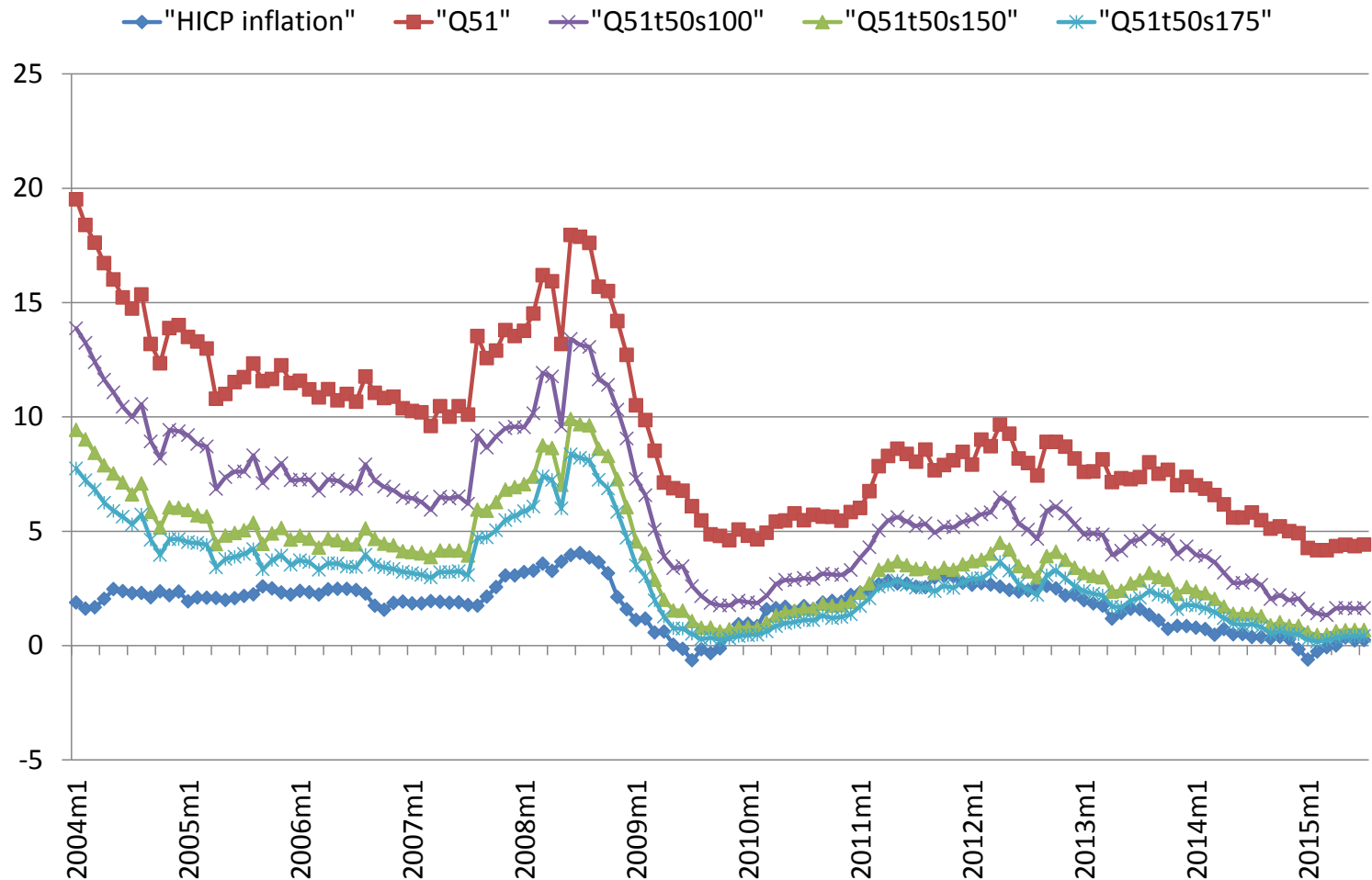- Q51 vs PMI composite indicator
- Q61 vs PMI composite indicator

- **Previous analyses (2006, 2010) also considered trimming**
- **A little (e.g. 10% or 32%) goes a long way…**
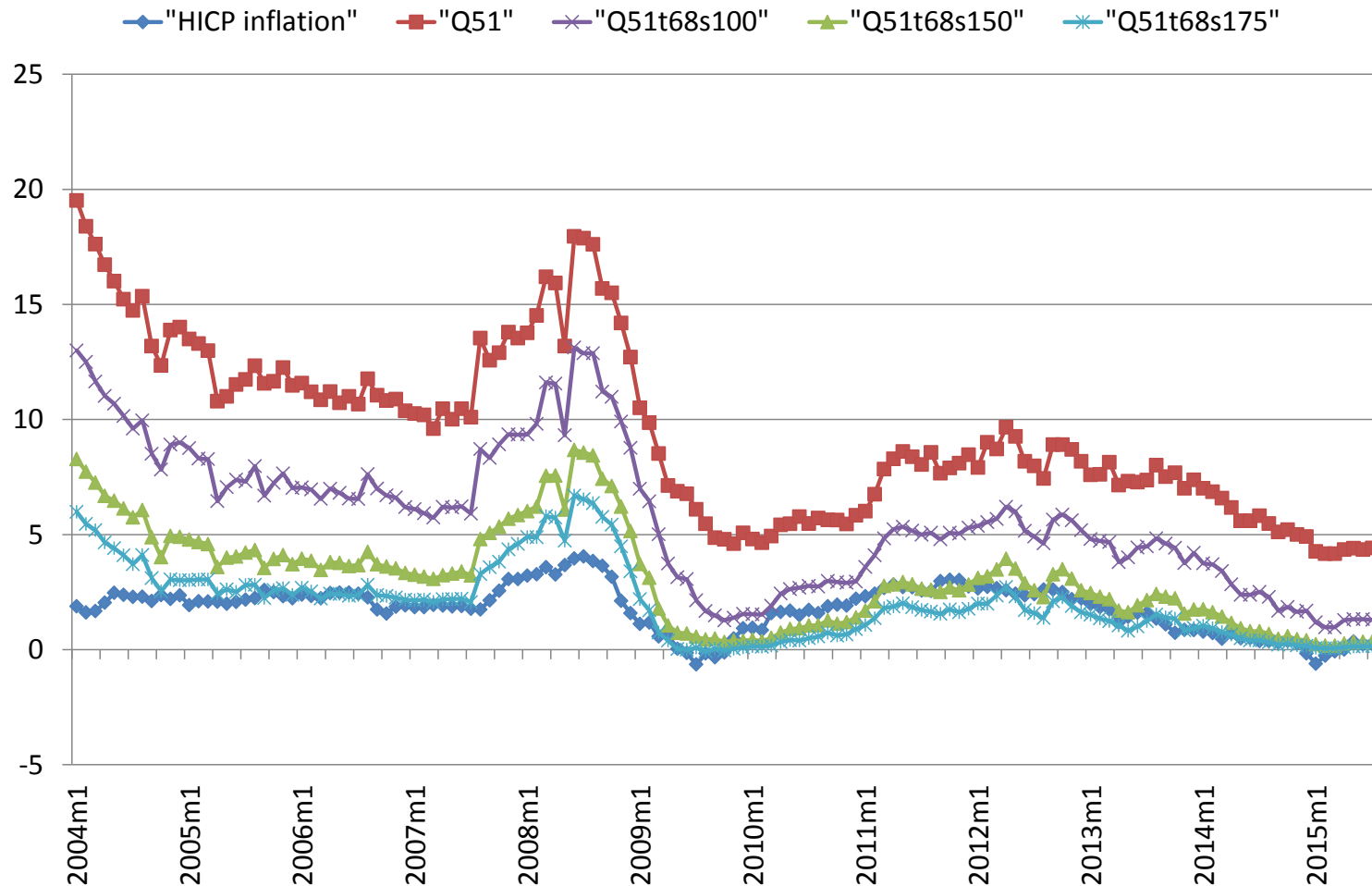- **Thereafter, diminishing returns to scale**
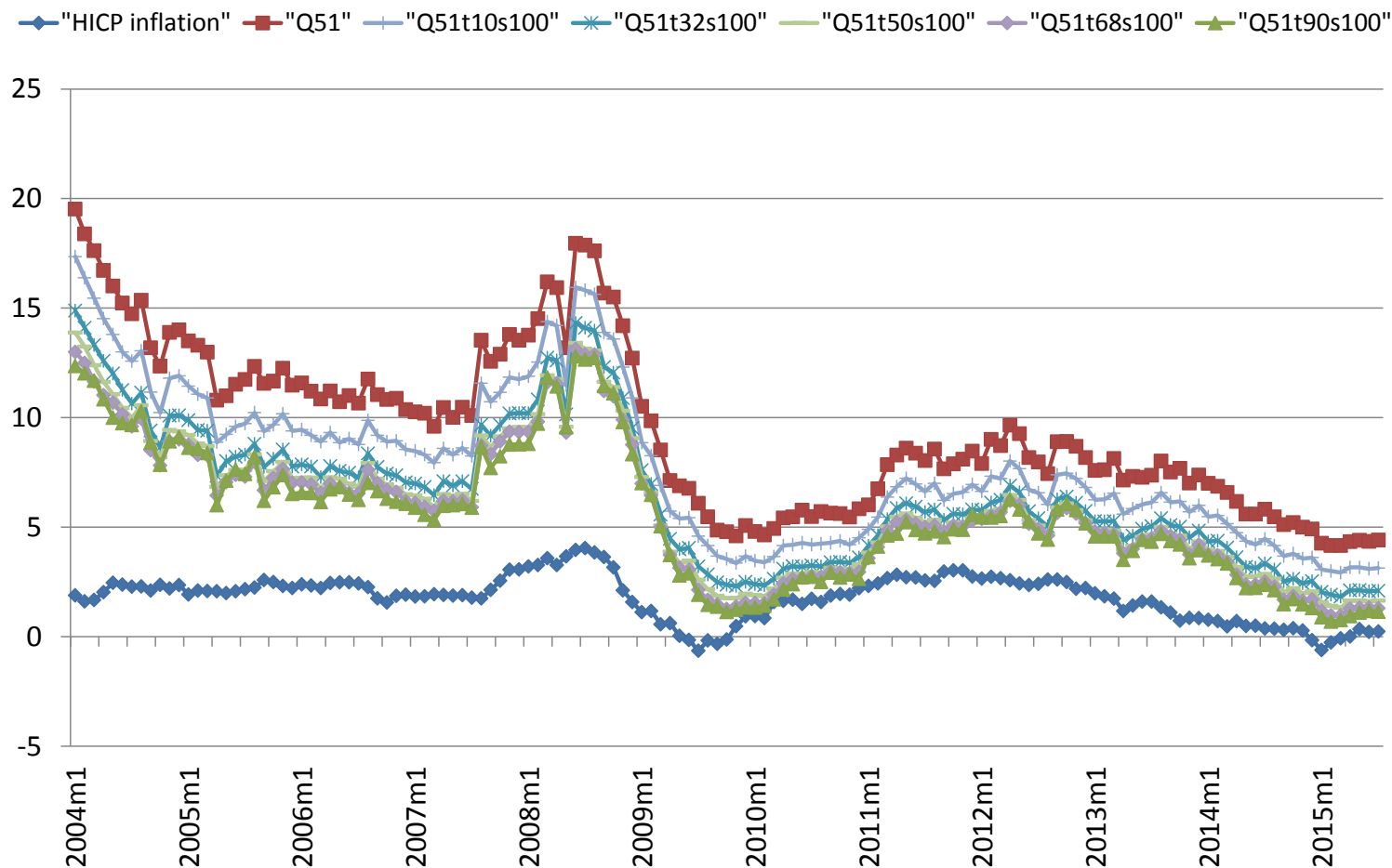
- **Previous analyses considered trimming but not asymmetric**
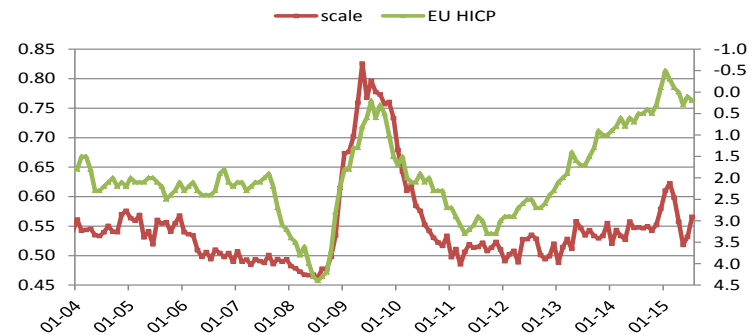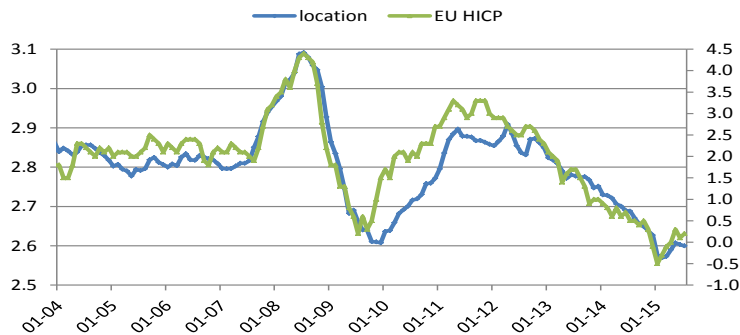- **Asymmetry reduces (eliminates) bias (post crisis period)**

- **Asymmetry reduces (eliminates) bias (post crisis period)**
- **But cannot handle pre- <u>and</u> post-crisis periods…**

- **Two features of data – 'truncation at zero' and long upper tail suggest log-normal distribution might fit well**
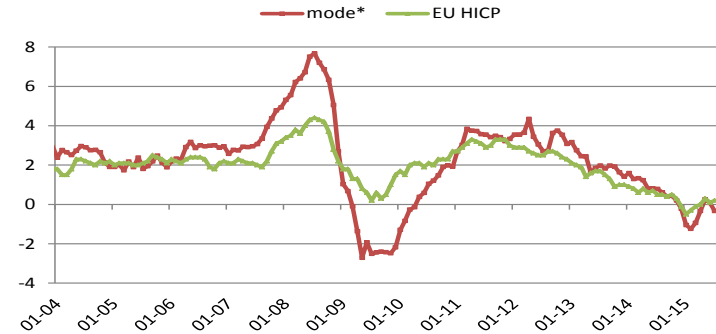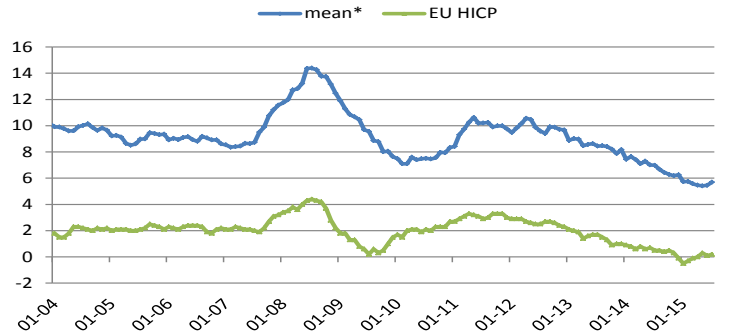
- **Log-normal distribution captures the mode/peak of replies and is closer to the actual outcome than the mean, which is excessively influenced by large positive outliers**

- **Binder (2015) using Michigan data argues that more uncertain respondents are more likely to report multiples of five**
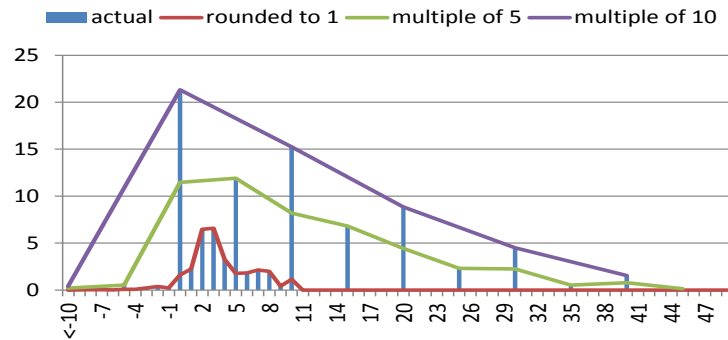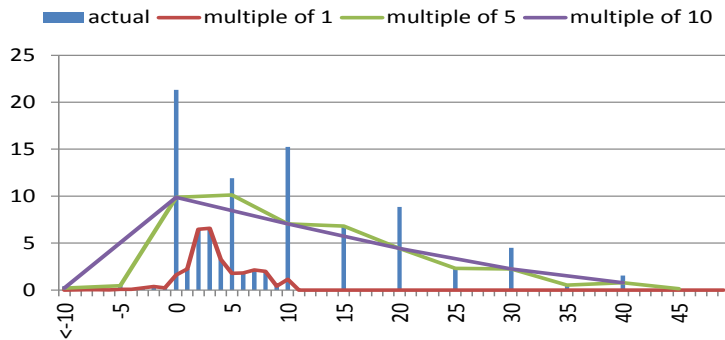
- **In EU case, actual distribution of responses can be replicated using mix of three – low, middle and high uncertainty – distributions**
- **Although yet to be fully implemented could enable information from full distribution to be exploited**

- **Updated results confirm earlier findings**
  - ➢ **Bias but broad co-movement with inflation**
  - ➢ **Dist. - upward skew and strongly kurtotic**
  - ➢ **Systematic (but limited) differences across groupings**

- **National differences remain – source?**

- **Impact of the crisis – seems relatively limited**

- **Controlling for distributional features, it may be possible to extract credible signal for policy makers**

- **Complete preliminary report**

- **Research agenda**

  - ➢ **Implement Binder (2015) approach**

  - ➢ **Exploit other ways to screen/cleanse the data – e.g. check consistency of replies with Philips Curve, à la Dräger/Lamla/Pfajfar (2013)**

  - ➢ **Consider link between inflation assessment and other survey variables (confidence, buying intentions, saving intentions, etc.)**

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