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)
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


- Country, euro area and EU results

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

- Large micro data set allows for numerous analytical aspects
2. The EC Consumer survey

Qualitative questions

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

[1] risen a lot
[2] risen moderately
[3] risen slightly
[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
2. The EC Consumer survey

Qualitative questions (balances) and HICP (annual percentage changes)
2. The EC Consumer survey

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

EU

Euro area

[Graphs showing inflation perceptions and expectations for EU and 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
3. Empirical features

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
3.1 Aggregate results

- Broad co-movement of both quantified inflation perceptions and expectations with actual inflation
- But systematic ‘bias’ remains a feature
• 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
3.1 ‘Bias’ has varied over time

- Both for perceived and expected inflation but particularly the former

![Graph showing EU Q51 minus EU HICP and EA Q51 minus EA HICP](chart1)

![Graph showing EU Q61 minus EU HICP and EA Q61 minus EA HICP](chart2)
3.1 Differences across countries

- Biases less for Nordic countries and FR, higher for IT, ES and EL (also DE post changeover)
3.1 Empirical features (cont’d)

Survey design and bias

- UK surveys of perceptions and expectations have less bias
- GfK-BOE quarterly survey and YouGov-Citigroup monthly survey
- Questions focus the respondent on ranges
3.1 Empirical features (cont’d)

Survey design and bias

- 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
3.2 Different groups, different assessments

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

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**Mean inflation perception and expectation by gender and age**

- Male: 16-29, 30-49, 50-64, 65+
- Female: 16-29, 30-49, 50-64, 65+

**Mean inflation perception and expectation by income and education**

- Primary: 1st, 2nd, 3rd, 4th
- Secondary: 1st, 2nd, 3rd, 4th
- Further: 1st, 2nd, 3rd, 4th

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3.2 Different groups, different assessments

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.
3.2 Different groups, different assessments

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](image1)

![Share of quantitative replies on inflation perception by age](image2)

![Share of quantitative replies on inflation perception by level of education](image3)

![Share of quantitative replies on inflation perception by income](image4)
3.3 Distribution of replies - histogram

- Some extreme outliers – limited in number
3.3 Distribution of replies - histogram

- Zooming in – ‘truncated at 0; peaks @ 5, 10
3.3 Distribution of replies - histogram

- **Zooming in *2 – mini-peaks at 1, 2, 3...**

![Histogram q51a width(0.1) - quantitative perceptions](image1.png)

![Histogram q51a ifq51a >=-20 & ifq51a <=60, width(0.1) - quantitative perceptions](image2.png)

![Histogram q51a ifq51a >=-5 & ifq51a <=30, width(0.1) - quantitative perceptions](image3.png)
3.3 Distribution of replies - histogram

- Full zoom – 2 and 3 modal replies of mini peaks
3.3 Other features of distribution over time

- Median sometimes ‘uninformative’ owing to clustering
- Whilst minima and maxima are extreme, 10\textsuperscript{th} and 90\textsuperscript{th} percentiles are less so
- Standard deviation has declined over time (as has interquartile range)
- Skew and kurtosis are persistent features
3.3 But histogram not uninformative

- 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%)
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.
3.4 I say “slightly”, you say “moderately”?

- There is some overlap between respondents’ definitions of ‘a lot’, ‘moderately’ and ‘slightly’

- RTD – check how much owes to inter vs intra country
3.4 Changes driven by assessment not definition

- 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
3.5. Correlation with ‘real’ economy

- 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)

<table>
<thead>
<tr>
<th>Period</th>
<th>Q51</th>
<th>Q61</th>
<th>HICP</th>
<th>difference Q51 - HICP</th>
<th>difference Q61 - HICP</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003:05 – 2007:12</td>
<td>12.4</td>
<td>6.5</td>
<td>2.2</td>
<td>10.3</td>
<td>4.3</td>
</tr>
<tr>
<td>2008:01 – 2009:06</td>
<td>12.8</td>
<td>7.0</td>
<td>2.4</td>
<td>10.4</td>
<td>4.6</td>
</tr>
<tr>
<td>2009:07 – 2011:09</td>
<td>5.9</td>
<td>3.8</td>
<td>1.6</td>
<td>4.3</td>
<td>2.2</td>
</tr>
<tr>
<td>2011:10 – 2013:03</td>
<td>8.1</td>
<td>5.4</td>
<td>2.5</td>
<td>5.6</td>
<td>3.0</td>
</tr>
<tr>
<td>2013:04 – Jul 2015</td>
<td>5.8</td>
<td>3.6</td>
<td>0.6</td>
<td>5.2</td>
<td>3.1</td>
</tr>
</tbody>
</table>

Table 6 Consumers’ quantitative estimates of inflation and HICP – euro area
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</tr>
</thead>
<tbody>
<tr>
<td>Jan 2004 - Feb 2009</td>
<td>12.9</td>
<td>6.9</td>
<td>2.3</td>
<td>10.5</td>
<td>4.5</td>
</tr>
<tr>
<td>Mar 2009 - Feb 2010</td>
<td>5.6</td>
<td>2.9</td>
<td>0.2</td>
<td>5.3</td>
<td>2.7</td>
</tr>
<tr>
<td>Mar 2010 - Sep 2013</td>
<td>7.2</td>
<td>4.8</td>
<td>2.2</td>
<td>5.0</td>
<td>2.6</td>
</tr>
<tr>
<td>Oct 2013 - Jul 2015</td>
<td>5.4</td>
<td>3.4</td>
<td>0.3</td>
<td>5.1</td>
<td>3.1</td>
</tr>
</tbody>
</table>
3.5. Correlation with ‘real’ economy

- 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.
4.1 Signal extraction – trimming

- Previous analyses (2006, 2010) also considered trimming
- A little (e.g. 10% or 32%) goes a long way…
- Thereafter, diminishing returns to scale
4.1 Signal extraction – trimming with asymmetry

- Previous analyses considered trimming but not asymmetric.
- Asymmetry reduces (eliminates) bias (post crisis period).
4.1 Signal extraction – trimming with asymmetry

- Asymmetry reduces (eliminates) bias (post crisis period)
- But cannot handle pre- and post-crisis periods…
4.2 Signal extraction – log-normal distribution

- 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
4.3 Round Numbers Suggest Round Interpretation?

- 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.
5.1 First results and initial assessment

- 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
5.2 Next steps

- 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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