Drivers of measured, perceived and expected inflation in Germany

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* This presentation represents the author’s personal opinions and does not necessarily reflect the views of the Deutsche Bundesbank or its staff.
Structure of the presentation

1. Perceived inflation

2. Measured inflation

3. Expected inflation

“Inflation is like toothpaste. Once it’s out, you can hardly get it back in again.”
(Karl Otto Pöhl, President of the Deutsche Bundesbank 1 Jan 1980 – 31 Jul 1991)
1. Perceived inflation
Consumer surveys (I)

– The only available direct indicators of the **actual inflation perception of households** are the responses to the **monthly consumer survey of the European Commission**.

– It asks whether – **for their assessment** – the **consumer prices in the last twelve months** have...
  
  • ...risen a lot (PP),
  • ...risen moderately (P),
  • ...risen slightly (E),
  • ...stayed about the same (M) or
  • ...fallen (MM).

– From this information, **weighted balances** are then formed according to the formula $B = (PP + \frac{1}{2}P) - (\frac{1}{2}M + MM)$. 
"How do you think that consumer prices have developed over the last 12 months?"

euro area

as a percentage of responses

Source: Joint Harmonised EU Consumer Survey.
Deutsche Bundesbank
Balance of EU Consumer Survey and HICP inflation rate for the euro area (changing composition)

Source: European Commission.
Deutsche Bundesbank
1. Perceived inflation
Consumer surveys (II)

− According to these balances perceived inflation and the actual rate of inflation moved broadly in line.

− However, in 2002 a prolonged impact of the euro cash changeover on the weighted balances came to light in several countries.

− In addition, country differences in the inflation perceptions cannot be fully explained by inflation differentials in the euro area.

− Hence, there is some kind of a structural “level” effect at play in Member States (here: euro area 12, fixed composition, excluding Luxembourg).
  • Highest perceptions in Belgium and Greece,
  • lowest in Finland.
1. Perceived inflation
Consumer surveys (III)

– The results of the EU consumer survey are further broken down by the following socio-demographic criteria:
  • by occupation status of respondent,
  • by occupation of respondent,
  • by education of respondent,
  • by age of respondent,
  • by sex of respondent and
  • by income of the household.

– Moreover, micro data for Germany (by GfK) allow a detailed analysis of the causal relationships between the socio-demographic criteria on the one hand and the perception of inflation on the other.

– The focus is particularly on the household income.
Deviations from the overall balance of the EU Consumer Survey by occupation of respondent (euro area)
in percentage points

Source: European Commission.
Deutsche Bundesbank
Deviations from the overall balance of the EU Consumer Survey by education of respondent (euro area)
in percentage points

Source: European Commission.
Deutsche Bundesbank
Deviations from the overall balance of the EU Consumer Survey by age of respondent (euro area)

in percentage points

Source: European Commission.
Deutsche Bundesbank
Deviations from the overall balance of the EU Consumer Survey by sex of respondent (euro area)

in percentage points

Source: European Commission.
Deutsche Bundesbank
Deviation from the overall balance of the EU Consumer Survey by income of the household (Euro area)

in percentage points

-12 +12
-10 +8
-8 +4
-6 +0
-4 -4
-2 -8
0 -12

1997 98 99 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 2015

Source: European Commission.
Deutsche Bundesbank
1. Perceived inflation
Consumer surveys (IV)

– Occupation status:
  • **Unemployed** show the highest inflation perceptions.

– Occupation:
  • **Self-employed and professionals** have the lowest inflation perceptions.

– Education:
  • Lower inflation perception with **higher levels of education**.

– Age:
  • **Rising inflation perception** with age.

– Sex:
  • **Women** have higher inflation perceptions than men.

– Household income:
  • The richer a household, the **lower the inflation perception**.
Changes in inflation perception at a 0.1 percentage point increase (Germany)

in percentage points

balance
risen moderately
risen a lot
stayed about the same
risen slightly
fallen

up to 750 euro | 750 to 1,000 euro | 1,000 to 1,250 euro | 1,250 to 1,500 euro | 1,500 to 2,000 euro | 2,000 to 2,500 euro | 2,500 to 3,000 euro | 3,000 to 3,500 euro | 3,500 to 4,000 euro | over 4,000 euro | overall

Household net income
2. Measured inflation (I)

– The most important source for the weighting scheme of the German CPI is the “EVS”, the sample survey of household income and expenditure.

– Participants keep a household book for three months, containing all kinds of expenditures on all categories of private consumption.

– In an initial household interview the socio-demographic information about every household member is established.

– To compensate for the heterogeneity of household types with respect to the number of household members, equivalence scales are used to form net equivalence income deciles.

– Micro data from household books are used to calculate commodity weights for each of these income groups in order to derive specific price indices.

– Finally, it should be noted that, generally, consumption habits differ between income groups by more than just the weighting scheme.
<table>
<thead>
<tr>
<th>Decile</th>
<th>Number of households</th>
<th>Net income in euro</th>
<th>Equivalence income in euro</th>
<th>Consumption expenditure in euro</th>
<th>Equivalence number</th>
<th>Consumption ratio in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2,579</td>
<td>821</td>
<td>664</td>
<td>1,054</td>
<td>1.23</td>
<td>128</td>
</tr>
<tr>
<td>2</td>
<td>2,998</td>
<td>1,281</td>
<td>948</td>
<td>1,319</td>
<td>1.35</td>
<td>103</td>
</tr>
<tr>
<td>3</td>
<td>3,416</td>
<td>1,656</td>
<td>1,171</td>
<td>1,663</td>
<td>1.41</td>
<td>100</td>
</tr>
<tr>
<td>4</td>
<td>3,815</td>
<td>2,038</td>
<td>1,376</td>
<td>1,958</td>
<td>1.48</td>
<td>96</td>
</tr>
<tr>
<td>5</td>
<td>4,183</td>
<td>2,394</td>
<td>1,582</td>
<td>2,144</td>
<td>1.51</td>
<td>90</td>
</tr>
<tr>
<td>6</td>
<td>4,541</td>
<td>2,712</td>
<td>1,795</td>
<td>2,373</td>
<td>1.51</td>
<td>88</td>
</tr>
<tr>
<td>7</td>
<td>5,005</td>
<td>3,156</td>
<td>2,043</td>
<td>2,636</td>
<td>1.54</td>
<td>84</td>
</tr>
<tr>
<td>8</td>
<td>5,687</td>
<td>3,701</td>
<td>2,377</td>
<td>2,916</td>
<td>1.56</td>
<td>79</td>
</tr>
<tr>
<td>9</td>
<td>6,210</td>
<td>4,590</td>
<td>2,924</td>
<td>3,333</td>
<td>1.57</td>
<td>73</td>
</tr>
<tr>
<td>10</td>
<td>5,654</td>
<td>6,878</td>
<td>4,659</td>
<td>4,132</td>
<td>1.49</td>
<td>60</td>
</tr>
<tr>
<td>Ø</td>
<td>44,088</td>
<td>2,923</td>
<td>1,954</td>
<td>2,353</td>
<td>1.47</td>
<td>80</td>
</tr>
</tbody>
</table>

Gini coefficients

|        | 34.82 | 33.00 | 23.77 |
Lorenz curves of private consumption expenditures, net equivalence income, and net household income (Germany)

cumulative share of consumption and income, respectively, in %

- purple: consumption expenditures
- green: equivalence income
- red: net income

cumulative share of households in %

line of equality

Deutsche Bundesbank
Development of the consumer price index by net equivalence income decile

Germany

2010 = 100, log scale

Deutsche Bundesbank

Jens Mehrhoff, Deutsche Bundesbank, Statistics Department
Joint UNECE/ILO Meeting of the Group of Experts on Consumer Price Indices
Geneva, 2-4 May 2016
Page 22
Year-on-year change in the consumer price index excluding food and energy

Germany

in %
Development of the consumer price index excluding food and energy

Germany

2010 = 100, log scale

Deutsche Bundesbank
2. Measured inflation (II)

- The EVS is dominated by low and middle-income households. However, the major share of the CPI weight is assigned to middle and high-income households.
  - The top ten per cent of the income distribution contribute 17½% to the expenditure weight.
  - The bottom ten per cent of the households, in contrast, make up only 4½%.

- As for the weights, the largest differences are found for the two most important divisions, i.e. “housing, water, electricity, gas and other fuels” and “transport” but in opposite directions so that their changes balance out.

- It appears that inflation rates diverge somewhat between poor and rich households starting in 2013.

- But these differences can be attributed entirely to special effects in food and energy products.
3. Expected inflation (I)

– The monthly consumer survey of the European Commission also asks for the inflation expectations.

– “In comparison with the past 12 months, how do you expect that consumer prices will develop in the next 12 months? They will…”
  
  • …increase more rapidly (PP),
  • …increase at the same rate (P),
  • …increase at a slower rate (E),
  • …stay about the same (M) or
  • …fall (MM).

– We could claim that there is a significant relationship between the inflation perceptions and the expectations.

  • Wald $\chi^2(25) = 21,696^{***}$. 
Predicted probability that the expected consumer prices will…

<table>
<thead>
<tr>
<th>Inflation perception</th>
<th>Risen a lot</th>
<th>Risen moderately</th>
<th>Risen slightly</th>
<th>Stayed about the same</th>
<th>Fallen</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>…increase more rapidly</td>
<td>20.76%</td>
<td>20.74%</td>
<td>12.04%</td>
<td>0.63%</td>
<td>0.36%</td>
<td>15.19%</td>
</tr>
<tr>
<td>…increase at the same rate</td>
<td>54.19%</td>
<td>54.19%</td>
<td>48.94%</td>
<td>6.14%</td>
<td>3.60%</td>
<td>45.63%</td>
</tr>
<tr>
<td>…increase at a slower rate</td>
<td>12.34%</td>
<td>12.35%</td>
<td>17.22%</td>
<td>7.52%</td>
<td>4.69%</td>
<td>13.15%</td>
</tr>
<tr>
<td>…stay about the same</td>
<td>12.66%</td>
<td>12.67%</td>
<td>21.70%</td>
<td>83.55%</td>
<td>87.62%</td>
<td>25.65%</td>
</tr>
<tr>
<td>…fall</td>
<td>0.05%</td>
<td>0.05%</td>
<td>0.10%</td>
<td>2.15%</td>
<td>3.73%</td>
<td>0.37%</td>
</tr>
</tbody>
</table>

Pseudo $R^2 = 0.1180.$
Balance of inflation expectations and ten-year inflation forecast for Germany

Sources: Joint Harmonised EU Consumer Survey and Consensus Forecast.
Deutsche Bundesbank
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What is inflation? (I)

- In a **market economy**, prices for goods and services can always change. Some prices rise; some prices fall. One speaks of **inflation** if there is a **broad increase in the prices** of goods and services, **not** just of **individual items**. As a result, you can **buy less for €1**. Expressed the other way around, a **euro** is **worth less** than it was before.

- When calculating the **average increase in prices**, the prices of products we **spend more** on – such as electricity – are given a **greater weight** than the prices of products we spend less on – for example, sugar or postage stamps.

- Every household has **different spending habits**: some have a car and eat meat, others travel solely by public transport or are vegetarian. The **average spending habits** of all households together determine how much **weight** the different products and services have in the **measurement** of inflation.

- For measuring inflation, **all goods and services** that **households** consume are taken into account, including everyday items, durable goods and services.
What is inflation? (II)

– In the euro area, consumer price inflation is measured by the “Harmonised Index of Consumer Prices”, often referred to by its acronym of “HICP”. The term “harmonised” denotes the fact that all the countries in the European Union follow the same methodology. This ensures that the data for one country can be compared with the data for another.

– The main task of the ECB is to maintain price stability. This it defines as an annual HICP inflation rate of below, but close to, 2% over the medium term.

– Before the euro became our common currency, each country measured inflation using its own national methods and procedures. The introduction of the euro made it necessary to have a means of measuring inflation for the entire euro area, without gaps or overlaps and in a way comparable across countries. The HICP, supported by a set of legally binding standards, does precisely this.
Perceived inflation
Academic studies (I)

– Consumer surveys often show that people “feel” inflation to be higher than the actual price indices indicate. So what forms people’s perceptions of inflation?
Perceived inflation
Academic studies (II)

– Price rises catch our attention more than stable or declining prices.

  • *Increases* in prices also stay in our *memory* for longer. We tend to notice *stable or declining prices* less, although these prices also *count* when calculating the *average inflation rate*.

– We notice frequent, out-of-pocket purchases more.

  • In recent years, the prices of some goods and services we buy frequently have increased above average. Examples of these are *petrol, bread and bus tickets*. We often pay *too much attention* to changes in the prices of these items when thinking about inflation. This may mean we end up *overestimating* the *actual rate of inflation*. 
Year-on-year change of frequent out-of-pocket purchases (FROOPP) prices in the euro area (changing composition)

Source: Eurostat.
Deutsche Bundesbank
Perceived inflation
Academic studies (III)

We notice infrequent purchases and direct debits less.

- A **substantial amount** of our **household budget** is spent on goods and services that we buy less frequently. Examples are **cars and holidays**.

- There are also items we often pay for by **automatic bank transfer** (direct debits and standing orders), such as **rented housing and telephone bills**. We tend to **notice** these expenditures and changes in **their prices less** when thinking about inflation.
Perceived inflation
Academic studies (IV)

– “Personal” inflation.

• The Harmonised Index of Consumer Prices (HICP) is based on an average basket of goods and services. This average basket is representative for all households. However, households that experience an above-average inflation may be more acutely aware of this than those that benefit from a below-average inflation.

• Example: if petrol prices increase much more than the prices of other goods and services, people who use a car frequently may “feel” a rate of inflation that exceeds the HICP because their personal expenditure on petrol is higher than average. By contrast, those who use a car rarely or not at all will experience a lower “personal” rate of inflation.
### Personal Inflation Calculator

100 = price level on an annual average 2010

#### Consumer price index, overall

Set your own consumption habits

<table>
<thead>
<tr>
<th>Item</th>
<th>Average</th>
<th>Your value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net rent</td>
<td>21.0%</td>
<td>21.0%</td>
</tr>
<tr>
<td>Gas</td>
<td>1.4%</td>
<td>1.4%</td>
</tr>
<tr>
<td>Heating oil</td>
<td>1.1%</td>
<td>1.1%</td>
</tr>
<tr>
<td>Electricity</td>
<td>2.6%</td>
<td>2.6%</td>
</tr>
<tr>
<td>Tobacco</td>
<td>2.1%</td>
<td>2.1%</td>
</tr>
<tr>
<td>Health care</td>
<td>4.4%</td>
<td>4.4%</td>
</tr>
<tr>
<td>Fuels</td>
<td>3.8%</td>
<td>3.8%</td>
</tr>
<tr>
<td>Public transport</td>
<td>2.3%</td>
<td>2.3%</td>
</tr>
<tr>
<td>Restaurants, cafés, street sale and the like</td>
<td>3.0%</td>
<td>3.0%</td>
</tr>
<tr>
<td>Food</td>
<td>9.1%</td>
<td>9.1%</td>
</tr>
<tr>
<td>Clothing and footwear</td>
<td>4.5%</td>
<td>4.5%</td>
</tr>
<tr>
<td>Electrical appliances</td>
<td>2.7%</td>
<td>2.7%</td>
</tr>
<tr>
<td>Package holidays</td>
<td>2.7%</td>
<td>2.7%</td>
</tr>
<tr>
<td>Telecommunication services</td>
<td>2.6%</td>
<td>2.6%</td>
</tr>
<tr>
<td>All other items</td>
<td>36.7%</td>
<td>36.7%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Move the cursor over the graph to see the months.
Perceived inflation
Academic studies (V)

Inflation rates are annual, but our memory goes back further.

• The HICP is usually reported as an annual growth rate. This means that the general price level for a particular period of time – say, May 2016 – is compared with the same period one year earlier – namely May 2015. When forming their perceptions, people may think back to prices several years ago. Over a long period of time prices tend to rise substantially, even with a low annual rate of inflation. For example, if the annual rate of change of the HICP is 2%, after 10 years the general price level will have increased by over 20%.
Perceived inflation
Academic studies (VI)

– Price changes versus quality changes.

• We often consider changes in a product’s price tag as inflation. But sometimes the quality of the product changes at the same time. The HICP deals with this by subtracting the change that is due to quality.

• Example: car prices may have gone up but new models often include, as standard, features that were previously sold as optional extras (for example, satellite navigation systems, air conditioning and airbags). In such cases, the price increase is due partly to an increase in quality and not only to inflation. If car prices went up, say, 5% on average but quality increases accounted for 1%, then the HICP would reflect a 4% increase for this product.