Inflation persistence and price-setting behaviour in the euro area
A summary of the IPN evidence

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The usual disclaimer applies.
Introduction

• **Aim of this presentation**
  - **Summary of current knowledge on inflation persistence and price setting behaviour in the euro area**
  - **Based on the main findings of a collaborative Eurosystem research project: the Inflation Persistence Network (IPN)**

• **Objectives of the IPN:**
  - Investigate the degree of inflation persistence;
  - Study the patterns and determinants of price setting behavior, which underlie the dynamics of inflation
Introduction – aspects studied by the IPN

- Macro Time Series
- Micro-CPI Data
- Micro-PPI Data
- Firm-Level Surveys
- Structural Models of Inflation Dynamics

Synthesis of Results

AT  BE  FI  FR  DE  GR  IE  IT  LU  NL  PT  ES  EA
Introduction – Other IPN reading


• Fabiani, Loupias, Martins and Sabbatini (2007), “Pricing decisions in the euro area: How firms set prices and why?”, *Oxford University Press*


• *Journal of European Economic Association*, May 2006, pp.562-593
Overview

- Why study inflation persistence (IP)?
- Definition of IP
- Macro-evidence on the sources of IP
- Micro-evidence on price setting
- Policy conclusions
Inflation persistence – Why important?

• For monetary policy
  – A high degree of inflation persistence implies:
    • a larger sacrifice ratio
    • the possibility that inflation expectations become unanchored
  – Understanding the sources of inflation persistence:
    • Allows to build better macro-economic models and enables better forecasting of inflation

• For structural policies
  – Understanding the rigidities underlying inflation persistence is important for guiding structural reforms.
Overview

- Why study inflation persistence (IP)?
- **Definition of IP**
- **Macro-evidence on the sources of IP**
- **Macro-evidence on price setting**
- Policy conclusions
Definition of inflation persistence

- The tendency of inflation to converge slowly towards its long-run value following shocks
  - The long-run value is implied by the monetary policy regime
  - The definition refers to the persistence of the deviation from the long-run value following a shock
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Sources of persistence – NK Phillips curve

\[ \Delta p_t = \gamma \Delta p_{t-1} + (1 - \gamma) E_t \Delta p_{t+1} + \kappa (mc_t - p_t) + u_t \]

• Three main sources:
  
  – **Extrinsic persistence:** \( \kappa (mc_t - p_t) \)
    
    • Inflation inherits the persistence of its approximate determinants such as the real marginal cost due to, for example, wage rigidities. A key factor is the degree of price stickiness: \( \kappa \)
  
  – **Intrinsic persistence:** \( \gamma \Delta p_{t-1} \)
    
    • Temporary shocks lead to persistent inflation responses due to e.g. indexation or rule-of-thumb behaviour
  
  – **Expectations-driven persistence:** \( (1 - \gamma) E_t \Delta p_{t+1} \)
    
    • Incomplete information and learning may lead to persistence coming from inflation expectations
Sources of persistence: evidence

• Evidence based on estimation of the NKPC shows that forward-looking behaviour is often dominant …

• … furthermore, inflation expectations are well anchored
Sources of persistence: evidence

HICP inflation and inflation expectations in the euro area

Annual HICP inflation

One-year ahead inflation expectation
Aggregate inflation dynamics: conclusions

- Intrinsic inflation persistence low under the current regime
- Well-anchored inflation expectations: source of “good” inflation persistence.
- Hence, inflation persistence mostly extrinsic or driven by the persistence of determinants
- The importance of extrinsic persistence suggests having a closer look at price setting at the micro level …
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**Patterns of price adjustments (1)**

- **Prices change infrequently and less often than in the US:**

<table>
<thead>
<tr>
<th>Statistics</th>
<th>Euro area</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency</td>
<td>15.1</td>
<td>24.8</td>
</tr>
<tr>
<td>Average duration (months)</td>
<td>13.0</td>
<td>6.7</td>
</tr>
<tr>
<td>Median duration (months)</td>
<td>10.6</td>
<td>4.6</td>
</tr>
<tr>
<td>PPI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency</td>
<td>20.0</td>
<td>n.a.</td>
</tr>
<tr>
<td>Surveys</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency</td>
<td>15.9</td>
<td>20.8</td>
</tr>
<tr>
<td>Average duration (months)</td>
<td>10.8</td>
<td>8.3</td>
</tr>
<tr>
<td>New Keynesian Phillips Curve</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average duration (months)</td>
<td>13.5-19.2</td>
<td>7.2-8.4</td>
</tr>
</tbody>
</table>
Patterns of price adjustments (2)

- Large heterogeneity across and within sectors, more pronounced than across countries

- **Consumer prices**

<table>
<thead>
<tr>
<th></th>
<th>Unprocessed food</th>
<th>Processed food</th>
<th>Energy (oil)</th>
<th>Non-energy industrial</th>
<th>Services</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Euro Area</td>
<td>28.3</td>
<td>13.7</td>
<td>78.0</td>
<td>9.2</td>
<td>5.6</td>
<td>15.8</td>
</tr>
<tr>
<td>United States</td>
<td>47.7</td>
<td>27.1</td>
<td>74.1</td>
<td>22.4</td>
<td>15.0</td>
<td>24.8</td>
</tr>
</tbody>
</table>

- Most frequent price changes for unprocessed food and energy, least for services
Patterns of price adjustments (2)

- Large heterogeneity across and within sectors, more pronounced than across countries

- **Producer prices**

<table>
<thead>
<tr>
<th></th>
<th>Food</th>
<th>Non durable</th>
<th>Durable products</th>
<th>Intermediate products</th>
<th>Energy</th>
<th>Capital goods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>0.20</td>
<td>0.11</td>
<td>0.14</td>
<td>0.28</td>
<td>0.50</td>
<td>0.13</td>
</tr>
<tr>
<td>France</td>
<td>0.32</td>
<td>0.10</td>
<td>0.13</td>
<td>0.23</td>
<td>0.66</td>
<td>0.12</td>
</tr>
<tr>
<td>Germany</td>
<td>0.26</td>
<td>0.14</td>
<td>0.10</td>
<td>0.23</td>
<td>0.94</td>
<td>0.10</td>
</tr>
<tr>
<td>Italy</td>
<td>0.27</td>
<td>0.10</td>
<td>0.07</td>
<td>0.18</td>
<td>na</td>
<td>0.05</td>
</tr>
<tr>
<td>Portugal</td>
<td>0.21</td>
<td>0.05</td>
<td>0.18</td>
<td>0.12</td>
<td>0.66</td>
<td>na</td>
</tr>
<tr>
<td>Spain</td>
<td>0.25</td>
<td>0.10</td>
<td>0.13</td>
<td>0.29</td>
<td>0.39</td>
<td>0.09</td>
</tr>
<tr>
<td>Euro area</td>
<td>0.27</td>
<td>0.11</td>
<td>0.10</td>
<td>0.22</td>
<td>0.72</td>
<td>0.09</td>
</tr>
</tbody>
</table>

- Most frequent price changes for energy, least for durables and capital goods
Patterns of price adjustments (3)

- **Price changes are large relative to the prevailing inflation rate**

<table>
<thead>
<tr>
<th></th>
<th>Average increase</th>
<th>Average decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPI</td>
<td>8%</td>
<td>10%</td>
</tr>
<tr>
<td>PPI</td>
<td>5%</td>
<td>5%</td>
</tr>
</tbody>
</table>

- **Suggests that large firm-specific shocks are important**
**Patterns of price adjustments (4)**

- **Price decreases are common, except for services**

<table>
<thead>
<tr>
<th></th>
<th>Unprocessed food</th>
<th>Processed food</th>
<th>Energy (oil products)</th>
<th>Non-energy industrial goods</th>
<th>Services</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Share of price increases</td>
<td>54</td>
<td>54</td>
<td>54</td>
<td>57</td>
<td>80</td>
<td>58</td>
</tr>
<tr>
<td>Size of price increases</td>
<td>15</td>
<td>7</td>
<td>3</td>
<td>9</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Size of price decreases</td>
<td>16</td>
<td>8</td>
<td>2</td>
<td>11</td>
<td>9</td>
<td>10</td>
</tr>
</tbody>
</table>

- **Similar for producer prices**
Why do prices change infrequently?

Two possible reasons:
1. Costs change infrequently
2. Prices are sticky, even if the underlying fundamentals change.
Firm surveys confirm that:

- Mark-up pricing is the dominant pricing strategy
  - 54% in the euro area
- Moreover, relatively stable costs and cost-based pricing is reported as being an important reason (3rd in rank) for why prices change infrequently.

The latter could also explain why the frequency of price changes is less than of price reviews:

- The share of firms changing their prices less than quarterly (max 3 times a year) is 86%, compared to 57% of firms reviewing their prices with the same frequency.
Why do prices change infrequently? (1)

- This is confirmed by cross-sectional analysis which relates price stickiness to the variability of input prices:
  - Higher labour share implies lower frequency

![Frequency of price change and labour share](chart.png)

Spanish PPI data

- Adjusted frequency
- Adjusted labour share

coef = -0.67961959, (robust) se = 0.13749755, t = -4.94
Data demeaned and adjusted for remaining regressors
Why do prices change infrequently? (1)

• Similarly:
  – Higher share of raw material inputs implies higher frequency;
  – Prices of products at low stages of production change more frequently;
  – VAT increases affect price adjustment frequencies
Why do prices change infrequently? (2)

... but it is not the only story

- Survey evidence suggests that the most important reasons for firms not to change their prices even when the underlying determinants have changed are:
  - Implicit and explicit contracts with long-term customers (1st and 2nd rank); this is compatible with the prevalence of long-term relations with customers (70% versus 30% occasional);
  - The fact that competitors have not changed their prices, which suggests the presence of a co-ordination failure (4th rank).
Why do prices change infrequently? (2)

• Both reasons suggest imperfect competition is a crucial factor in explaining price stickiness.

• Greater competition implies larger frequency of price changes:
  – Consumer prices: Type of outlet matters; higher frequency in supermarkets, lower in corner shops
  – Producer prices: Import penetration matters; more open sectors change prices more frequently.
  – Survey evidence: firms in more competitive sectors change prices more frequently.
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Policy implications (1)

Response to a cost-push shock under different degrees of intrinsic Inflation persistence (Smets-Wouters)
Policy implications (2)  

Response to a cost-push shock under different degrees of price stickiness (Smets-Wouters)
Policy implications (3)

• Heterogeneity in the degree of price stickiness
  – Important to monitor the nature and the source of inflation shocks, as it helps improving inflation projections;
  – Literature suggests to target a price index that assigns a relatively larger weight to the more sticky sectors in order to avoid excessive adjustment of these sectors.
  – This suggests a more prominent role for indices such as the HICP excluding energy and food prices;
  – But there are important implementation issues: measurement, transparency and communication, accommodation of structural inefficiencies?
Policy implications (4)

• Large share of price changes are price decreases
  – Reduces the need for an inflation buffer to facilitate relative price adjustments, but...
  – ... price decreases are relatively rare in services, which have a large share in the HICP and the economy as a whole ...
  – ... one possible reason could be downward nominal wage rigidities!
Policy implications (5)

• Prices are more sticky than in the United States:
  – A full analysis of the underlying reasons is still outstanding, ...
  – ... but differences in the degree of competition in product and labour markets are a likely explanation

• In particular, the services sectors are characterised by a very high degree of nominal price rigidities and downward price stickiness
  – This may be related to more important role of administrative prices; less competition in many services sectors; and the greater importance of sluggish wage adjustment and downward wage rigidity.
Policy implications (5)

• **Structural reforms in services and labour markets that are geared at accelerating price and wage adjustments would:**
  
  – **Facilitate the stabilisation of inflation following cost-push shocks;**
  
  – **Accelerate necessary relative price adjustments across sectors and countries following asymmetric shocks, lowering the persistence of inflation differentials.**
Issues for further research

• There is a lot of food for thought in the findings of the IPN; 2 important priorities:
  – What drives the differences in price setting between the euro area and the United States
  – The role of wages and wage rigidities …
  • A new Eurosystem Research Network (Wage Dynamics Network) is up and running …