Ben McCallum: “Two versions of John Taylor’s Model of Nominal Price Adjustment”
Martin Eichenbaum, Nir Jaimovich and Sergio Rebelo: “New micro evidence on price rigidities”

Commentary
Frank Smets
European Central Bank

John Taylor’s contributions to monetary theory and policy A conference hosted by the Federal Reserve Bank of Dallas Dallas, 12-13 October 2007
Taylor’s (1999) Handbook of Macroeconomics chapter: “Staggered price and wage setting in macroeconomics” is undoubtedly the unifying theme of this session.

In this paper written at the end of the previous millennium, John takes stock of:

- the theoretical developments in macro models with staggered wage and price setting;
  - Also dealt with in McCallum’s paper
- And the empirical micro and macro evidence on wage and price rigidities.
  - Also dealt with in Eichenbaum et al.
In his Handbook chapter,
- John made the link between his research back in the 1980s and the new generation of optimising New Keynesian models.
- He also discussed some of the empirical shortcomings of these models in terms of generating enough output and inflation persistence.

In his paper, McCallum shows
- that the original Taylor specification can be derived from micro foundations with monopolistic competition, (similar to the original Calvo model).
- And that a calibrated version of this model can come close to generating the variance and persistence of inflation, the output gap and the interest rate.
• That the serial correlation can be matched is not very surprising; the debate was more on:
  – Whether one can get persistence beyond the horizon of the contract and whether the NNS model is able to deliver hump-shaped behaviour of output and inflation.
  – One of the contributions of Christiano et al (2005) is to show which additional frictions one needs to achieve this.

• The second version of the model with a smaller slope on the output gap is equivalent to having longer contracts.
  – It also is more consistent with Calvo pricing which contains longer contracts.
On the existing micro and macro evidence on nominal wage and price rigidities, John concludes:

1. While casual observation may suggest that wage rigidity is greater than price rigidity, the detailed studies do not provide evidence that one form of rigidity is more significant than the other: the studies suggest that price changes and wage changes have about the same average frequency – about one year”

2. There is a great deal of heterogeneity in wage and price setting. … some degree of heterogeneity will be required to describe reality accurately.

3. Neither price setting, nor wage setting is synchronised.

4. The frequency of wage and price changes depends on the average rate of inflation
• Last sentence of John’s handbook chapter calls for more research:

“Understanding these (staggered price and wage setting) models more thoroughly takes one well beyond macroeconomics into the heart of the price discovery and adjustment process in competitive and imperfectly competitive markets. Further research on the empirical robustness and microeconomic accuracy of staggered contracts models is thus both interesting and practically important”
Since then, research on the micro evidence of price setting has exploded:

- Bils and Klenow (1995);
- Eurosystem Inflation Persistence Network (IPN);
- Many other countries have followed (e.g. Brazil, Argentina);
- Steinsson and Nakamura, Kehoe and Midrigan, …
- Daniel Levy and co-authors;
- and now: Eichenbaum, Jaimovich and Rebelo.
• One year duration of price changes (or a bit less) is still a good macro benchmark:
  – IPN: Altissimo, Ehrmann and Smets (2006). Average duration is for the euro area is between 10 and 13 months.
  – Bils and Klenow (2005) did find much shorter average duration (4.3 months) for the US, but Nakamura and Steinsson (2006), correcting for sales, find 8 to 11 months.
  – Using weekly scanner data with a focus on food, furnishings and other goods, Eichenbaum, Jaimovich and Rebelo (forthcoming) find very high frequencies for raw prices, but about 3 quarters for reference prices. And this number excludes many sticky prices.
Should we change John’s conclusions?

- There is a lot of heterogeneity:

<table>
<thead>
<tr>
<th>Country</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>Belgium</td>
<td>31.5</td>
<td>19.1</td>
<td>81.6</td>
<td>5.9</td>
<td>3.0</td>
<td>17.6</td>
</tr>
<tr>
<td>Germany</td>
<td>25.2</td>
<td>8.9</td>
<td>91.4</td>
<td>5.4</td>
<td>4.3</td>
<td>13.5</td>
</tr>
<tr>
<td>Spain</td>
<td>50.9</td>
<td>17.7</td>
<td>n.a.</td>
<td>6.1</td>
<td>4.6</td>
<td>13.3</td>
</tr>
<tr>
<td>France</td>
<td>24.7</td>
<td>20.3</td>
<td>76.9</td>
<td>18.0</td>
<td>7.4</td>
<td>20.9</td>
</tr>
<tr>
<td>Italy</td>
<td>19.3</td>
<td>9.4</td>
<td>61.6</td>
<td>5.8</td>
<td>4.6</td>
<td>10.0</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>54.6</td>
<td>10.5</td>
<td>73.9</td>
<td>14.5</td>
<td>4.8</td>
<td>23.0</td>
</tr>
<tr>
<td>The Netherlands</td>
<td>30.8</td>
<td>17.3</td>
<td>72.6</td>
<td>14.2</td>
<td>7.9</td>
<td>16.2</td>
</tr>
<tr>
<td>Austria</td>
<td>55.3</td>
<td>24.5</td>
<td>15.9</td>
<td>14.3</td>
<td>13.6</td>
<td>21.1</td>
</tr>
<tr>
<td>Portugal</td>
<td>37.5</td>
<td>15.5</td>
<td>72.3</td>
<td>8.4</td>
<td>7.1</td>
<td>15.4</td>
</tr>
<tr>
<td>Finland</td>
<td>52.7</td>
<td>12.8</td>
<td>89.3</td>
<td>18.1</td>
<td>11.6</td>
<td>20.3</td>
</tr>
<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>15.1</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>
• Also true in Eichenbaum et al.

• This is important and suggests we may want to model various sectors with different degrees of price stickiness:
  – Sticky price sectors dominate in the macro picture;
  – Input-output structure becomes important.
Should we change John’s conclusions?

• Not much evidence of synchronisation:
  – Although if you look close enough, there is some evidence, for example:
    • Local markets in Italy do exhibit more evidence of synchronisation;
    • German manufacturers change prices when wages are changed;
    • Within stores price changes are likely to be synchronised. Also true in Eichenbaum et al’s data set?
  – But this probably does not matter for the macro picture
Should we change John’s conclusions?

• Price setting frequencies do increase with inflation.
• Example:
  – IPN: the probability of increasing a price increases with accumulated sectoral inflation.
  – Compare Brazil (3 months) with US or euro area (9 months till 1 year).
Should we change John’s conclusions?

- So, overall my answer is no.

- But,
  - in the micro price data there is little evidence of Taylor-type fixed-duration contracts;
  - durations are typically random (more in line with menu costs and Calvo).
Eichenbaum, Jaimovich and Rebelo

• Very careful and detailed empirical study of scanner data on weekly prices, quantities and importantly costs.
  – The latter has been mostly missing from the micro studies, but it is key for understanding the sources of infrequent price adjustments.

• Two main conclusions I have taken away:
  – It is meaningful to distinguish between reference prices and temporary deviations from those.
    • What matters for the macro-economy is probably the reference prices,
    • but it would be interesting to see to what extent deviations from reference prices respond to demand and macro-economic shocks.
Questions:

• Are these deviations always “sales” or downward deviations? What are the shares of positive versus negative deviations?

• How to interpret those deviations? Are they escape clauses? Are they designed to segment the market between more price-sensitive consumers and those who are not? Are they marketing devices to attract customers?

• Strong evidence for good-specific mark-up pricing:
  – But not one for one and mostly in the medium term.
  – The frequency and timing of the price changes is strongly associated with the frequency and timing of cost changes.
  – Question: when prices are reset, is there evidence of forward-looking-ness?
What about wages...

- There has been much less micro research on wages... or maybe macro-economists have not yet picked it up... Remember John’s first models focused on wage staggering.

- Why?
  - Dominance of New Keynesian models (King and Goodfriend, Rotemberg and Woodford, Clarida, Gali and Gertler, ...), but with Erceg, Henderson and Levin (2000) also staggered wage setting has come back “en vogue”.
  - Observed wages are typically negotiated in longer-term contracts and do not matter for the allocation of resources (e.g. Goodfriend and King, 2000). What matters is the wage of new hires, but those may be linked to the wages of the incumbents for, e.g., fairness reasons.
What about wages...

- IPN evidence suggests that sectors with sticky prices typically also have higher labour shares.
- Central bankers care a lot about wage inflation (e.g. second-round effects).
- A follow-up to the IPN, the Eurosystem’s Wage Dynamics Network (WDN) is looking into micro and macro evidence. Results will be presented next June.
• Obviously labour market institutions matter:
• Collective wage bargaining is still prevalent in many countries in Europe (Du Caju et al, 2007).
• Typical length of contracts is between 1 and 3 years.
What about the micro evidence...

- Closer look at France:
  - Average contract length: 1.5 years
  - However, actual base wages change more frequently (Heckel, Le Bihan and Monternes, 2007)
    - The mean spell duration is 2 quarters, with a high probability that wages change after four quarters (if they have not changed before); less heterogeneity.
    - A large degree of staggering, as in no quarter the frequency is lower than 20%, but high synchronisation within firms.
    - 39% of the trajectories can be characterised as one-year Taylor-contracts.
    - Predetermination is a significant feature and can explain the difference between average contract length and mean duration of a wage change.
Christiano, Eichenbaum and Evans (2006) argue that nominal wage stickiness is more important than nominal price stickiness to replicate the effects of monetary policy,

But using Bayesian methods, Smets and Wouters (2007) find equal probabilities of wage stickiness and price stickiness. See also Gertler, Sala and Trigari (2007).
The relative importance of nominal price versus wage rigidity can in principle also be gauged from the response of real wages to monetary policy shocks (e.g. Normandin, 2006).

• **Results:**
  – The real wage responds negatively to a tightening of monetary policy, suggesting that both price and wage rigidities are important.
  – But differences:
    • Across countries: Relatively high wage stickiness in France; less in Italy and Spain.
    • Across sectors: Relatively high wage stickiness in services; less in industry and construction
    • Over time: prices become more sticky, nominal wages respond more
And back to the macro evidence...

Relatively high wage stickiness in France; less in Italy and Spain.
France does appear to have a relatively large degree of downward real wage rigidity

Dickens et al (2007)
• Current labour market matching models suggest that what matters is the wage of the new employees (the extensive margin):
  – Is it as sticky as the wage of incumbents?
    • Pissarides says no.
    • Gertler et al say yes;
• The WDN will possibly provide an answer through its firm questionnaire:
  • Portugal (2007) finds that wages of newcomers are two to three times more responsive to unemployment than the wages of existing employees, but does not yet control for possibly different jobs.