Discussion of

An Estimated Monetary DSGE Model with Unemployment and Staggered Nominal Wage Bargaining

by Mark Gertler, Luca Sala, and Antonella Trigari

Michael Krause
Deutsche Bundesbank

International Conference:
“Frontiers in Monetary Theory and Policy”
Institute for Monetary and Economic Studies, Bank of Japan

May 28, 2008
This paper

- Part of the growing literature that integrates labor market frictions into the new Keynesian model for monetary policy analysis.
- Introduces Calvo-style nominal wage rigidity in the bargaining problem, rather than using ad-hoc real wage rigidities as in Hall (2005).
- Estimates the model to determine labor market parameters for which there is not much empirical guidance.
- Overall, the model does as well as the Smets and Wouters (2003) model in mimicking time series data and wage rigidity is shown to improve the fit of the model.
Praise

• The first paper to combine Calvo-style nominal wage rigidity with Nash bargaining framework: new and not easy

• The authors do a elegant job in disentangling the key driving forces in the wage equation, and extract new economic insights about wage setting (spillover effect from aggregate wage to firm-level wage).
Praise

- The first paper to combine Calvo-style nominal wage rigidity with Nash bargaining framework: new and not easy
- The authors do a elegant job in disentangling the key driving forces in the wage equation, and extract new economic insights about wage setting (spillover effect from aggregate wage to firm-level wage).
- Use a number of clever shortcuts that improve tractability: instantaneous hiring of workers, hiring cost function, two-sector structure that separates hiring and price setting decision (as in B-G-G).
- Large firms in the labor sector: new hires’ wages bound by firm-specific wage norm (as in Hall, 2005, and Krause-Lubik, 2007)
Praise

• The first paper to combine Calvo-style nominal wage rigidity with Nash bargaining framework: new and not easy

• The authors do a elegant job in disentangling the key driving forces in the wage equation, and extract new economic insights about wage setting (spillover effect from aggregate wage to firm-level wage).

• Use a number of clever shortcuts that improve tractability: instantaneous hiring of workers, hiring cost function, two-sector structure that separates hiring and price setting decision (as in B-G-G).

• Large firms in the labor sector: new hires’ wages bound by firm-specific wage norm (as in Hall, 2005, and Krause-Lubik, 2007)

• From central bankers’ perspective: useful to compare the model’s performance with the industry benchmark of Smets and Wouters.
Inspecting the mechanism

• Calvo-price setting yields familiar new Keynesian Phillips curve

\[ \pi_t = \gamma'_b \pi_{t-1} + \gamma'_f \beta E_t \pi_{t+1} + \varsigma \left( \hat{p}_t^w + \hat{\varepsilon}_t^p \right) \]

• \( \hat{p}_t^w \) is link to labor market.

• Variant of Mortensen and Pissarides model with GST timing

• Job creation condition

\[ \frac{\kappa}{q(\theta_t)} = p_t^w a_t - w_t + \rho E_t \beta_{t+1} \frac{\kappa}{q(\theta_{t+1})} \]

where \( a_t \) is productivity, and \( \theta_t = v_t / u_t \)
Inspecting the mechanism

- Calvo-price setting yields familiar new Keynesian Phillips curve
  \[ \pi_t = \gamma_b^p \pi_{t-1} + \gamma_f^p \beta E_t \pi_{t+1} + \varsigma (\hat{p}_t^w + \hat{\varepsilon}_t^p) \]

- \(\hat{p}_t^w\) is link to labor market.

- Variant of Mortensen and Pissarides model with GST timing

- Job creation condition
  \[ \frac{\kappa}{q(\theta_t)} = \hat{p}_t^w a_t - w_t + \rho E_t \beta_{t+1} \frac{\kappa}{q(\theta_{t+1})} \]
  where \(a_t\) is productivity, and \(\theta_t = v_t/u_t\)

- Wage equation in the standard model
  \[ w_t = \eta [\hat{p}_t^w a_t + \rho E_t \beta_{t+1} \theta_{t+1} \kappa] + (1 - \eta) b \]

- Here, the hiring cost is \(\kappa v_t\). In the paper, hiring cost is \((\kappa/2)v_{it}^2 q_t^2 / n_{it-1}\)
Inspecting the mechanism

- Insert wage into job creation condition

\[
\frac{\kappa}{q(\theta_t)} = (1 - \eta) [p^{w}_t a_t - b] + \rho E_t \beta_{t+1} \left[ \frac{\kappa}{q(\theta_{t+1})} - \eta \theta_{t+1} \kappa \right]
\]

- Linearized:

\[
\hat{\sigma} \hat{\theta}_t = \frac{q(\theta)}{\kappa} (1 - \eta) p^{w}_t \left[ \hat{p}^{w}_t + \hat{a}_t \right]
\]

\[
+ \rho \beta [1 - \eta s] E_t \hat{\beta}_{t+1}
\]

\[
+ \rho \beta (1 - \rho) [\sigma - \eta s] E_t \hat{\theta}_{t+1}
\]

- \(\sigma - \eta s\) is key; simple wage rigidity if \(\eta = 0\).
Inspecting the mechanism

• Insert wage into job creation condition

\[
\frac{\kappa}{q(\theta_t)} = (1 - \eta) \left[ a_t - b \right] + \rho E_t \beta_t \left[ \frac{\kappa}{q(\theta_{t+1})} - \eta \theta_{t+1} \kappa \right]
\]

• Linearized:

\[
\sigma \hat{\theta}_t = \frac{q(\theta)}{\kappa} (1 - \eta) p^w \left[ \hat{p}_t^w + \hat{a}_t \right]
\]
\[
+ \rho \beta [1 - \eta s] E_t \hat{\beta}_{t+1}
\]
\[
+ \rho \beta (1 - \rho) [\sigma - \eta s] E_t \theta_{t+1}
\]

• \( \sigma - \eta s \) is key; simple wage rigidity if \( \eta = 0 \).

• From steady-state job creation condition:

\[
\frac{q(\theta)}{\kappa} = \frac{1 - \rho \beta (1 - \eta s)}{1 - \eta} [p^w - b]^{-1}
\]

• Would be good to see \( \kappa \) and \( q \) as well. Share in \( y \)?
Comparing job creation conditions

- Mortensen-Pissarides again:
  \[ \frac{\kappa}{q_t} = p_t^w a_t - w_t + \rho E_t \beta_{t+1} \kappa / q_{t+1} \]
  where \( \kappa(v_t/u_t)^\sigma = \kappa / q(\theta_t) = \kappa / q_t \)

- GST:
  \[ \kappa \frac{v_i^i q_t}{n_{t-1}^i} = p_t^w a_t - w_t + E_t \beta_{t+1} \frac{\kappa}{2} \left( \frac{v_{t+1}^i q_{t+1}}{n_t^i} \right)^2 + \rho E_t \beta_{t+1} \kappa \frac{v_{t+1}^i q_{t+1}}{n_t^i} \]

- Model has very strong amplification even without wage rigidity
  - \( q_t \) falls with aggregate \( v_t \), so hiring costs fall in boom.
  - Expected hiring next period affects incentives twice

- How much does the hiring cost function matter?

- See autocorrelation functions...
Figure 2: Autocovariance function of GST model vs data
Volatility of unemployment in model with wage rigidity
Volatility of unemployment in model without wage rigidity
Volatility of unemployment

• Shimer: volatility of unemployment too low. Here: \((\text{Shimer})^{-1}\)

• The model seems to perform too well without wage rigidity

• Wage rigidity appears to \emph{reduce} labor market volatility

• Maybe clearer if using estimated GST model and set \(\lambda = 0\), rather than re-estimate.
Intensive margin: hours per worker

• Intensive margin of labor adjustment is absent in paper

• Authors argue that
  a) estimation showed that hours per worker not important
  b) volatility of hours per worker are unimportant in the data

• Point a) may be due to the excessive employment volatility generated by the hiring cost function

• Point b)...
Hours and Employment, Establishment Survey (red: hours per worker, blue: total hours, green: employment)
Hours and Employment, Household survey
<table>
<thead>
<tr>
<th></th>
<th>Standard Deviation (%)</th>
<th>Correlation (N,H)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Hours</td>
<td>Employment</td>
</tr>
<tr>
<td>Household survey</td>
<td>1.55</td>
<td>1.28</td>
</tr>
<tr>
<td>Establishment survey</td>
<td>1.19</td>
<td>0.74</td>
</tr>
</tbody>
</table>

- From Krause and Lubik (2008): hours per worker contribute at least 30%
- See also Cooper, Haltiwanger, Willis (2007): 30%
- Hours are an important margin of short-term adjustment. Europe?
Summary

- Very complex interactions in the model
- Would need to see more on
  - implied parameter values
  - the role of the hiring cost function
  - responses to all shocks in the model
  - behavior of labor market variables
- Why not estimate more/all labor market parameters?
Concluding remarks

• Real wage rigidity (indexing) is exogenous in all DSGE models used at central banks

• But it is key for trade-offs faced by central banks (Blanchard-Gali):
  – how does price setting respond to anticipated shocks (VAT)?
  – will there be ‘second-round’ effects after the oil price increases
  – may also play a role for firms that adjust their prices

• Modelling interaction between price setting and wage setting within the firm should deliver important results

• Risk sharing assumption: unemployment not costly for workers