Comments on:
“Labour Market Dynamics in the Euro Area: A Model-Based Sensitivity Analysis”
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This Paper

◆ A serious attempt at providing a coherent macroeconometric model of the Euro zone.
◆ Attempts to understand the sensitivity of estimated labor market dynamics to:
  – Model mis-specification
  – Structural change
◆ Contains, literally, hundreds of results
◆ My task
  – Strip the model back to its simplest components
  – Highlight the most interesting results (Narrow the focus)
  – Critique the analysis
Area-Wide Model

◆ Classical long-run: Nominal variables are independent of real
◆ “Keynesian” short-run: Nominal values do not immediately adjust
◆ Time-varying NAIRU is imposed & exogenous
◆ Policy rules:
  – Fiscal: Tax rates respond to deficit-to-GDP ratio
  – Monetary: Taylor rule: \( i = \pi + \frac{1}{2} (\pi - \pi^*) + \frac{1}{2} (Y - Y^*) + r^* \)
  – Necessary for convergence? (Yes)
◆ 89 equations
  – 15 behavioral equations
  – Accounting identities and stock-flow relationships
  – Policy reaction functions
Structure of the Labor Market

- **Labor Supply**
  - Exogenous
  - Fixed and exogenous NAIRU

- **Labor Demand**
  - Cobb-Douglas Production Function

- **Disequilibrium Dynamics**
  - Wage adjusts to unemployment
Equilibrium unemployment is exogenous.
Labor Supply is exogenous.
“Effective Labor Supply”
\[ = (1 - \text{NAIRU}) \times \text{Trend Labor Force} \]
Is the NAIRU Exogenous?

Change in NAIRU from 1980 to 1990
\[ \text{Change in NAIRU} = -1.2 + 0.09 \times (\text{Ch inflation} \times \text{Benefit Duration}) + 0.08 \times \text{Length of disinfl-sq} \]

Disinflation and Equilibrium Unemployment

Source: Larry Ball (1996), “Disinflation and the NAIRU”

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Labor Demand

◆ ΔEmployment =
  + 0.70 * ΔTrend Labor Force
  - 0.25 * ΔWage
  + 0.18 * ΔOutput
  - 0.18 * Error Correction Term

◆ What is the error correction term?
  – Cobb-Douglas Production Function ties down the long run
    » Y=A+ βK+(1- β)L => \( L^{LR} = (Y-βK-A)/(1-β) \)
  – The ECM describes an equilibrium force that pushes employment toward levels that make this equation hold.
  – But, \( A \) is the Solow residual (smoothed)
    » An estimate that, by construction, makes this equation hold (on average in the medium-run)
    » Thus, the model does not estimate convergence of employment to a long-run, but statistical properties of the Solow residual and HP-filter.
Authors’ Interpretation: Re-equilibration

"Mandated Employment" = (\Delta Y - \beta \Delta K - \Delta A) / (1 - \beta)

Balanced growth: 
\Delta Y = 4\% \Delta K = 2\% 
\Delta A = 2\%

Hiring Freeze 
\Delta Y = 4\%, \Delta K = 2\%, 
\Delta A = 2\%

Error Correction 
\Delta Y = 4\% \Delta K = 2\% 
\Delta A = 2\%
Alternative Interpretation: (Mis)measurement

Employment, Capital Stock & Tech. Change

"Mandated Employment" = (ΔY - βΔK - ΔA)/(1 - β)

True "Mandated Employment"
Calculated using actual tech change

"Measured Mandated Employment"
Calculated using Solow residual rather than actual tech change

Actual Employment

Balanced growth:
ΔY = 4%, ΔK = 2%, ΔA = 2%

Hiring Freeze
ΔY = 4%, ΔK = 2%, ΔA = 2%

Error Correction
ΔY = 4%, ΔK = 2%, ΔA = 2%

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Narrow the Focus

- Describe the various model specifications considered
- Describe the experiments performed upon these models

- Critique:
  - What would be interesting experiments to perform?
  - Which cases are most interesting?
Cases Considered

- Base case: Standard “Area Wide Model”
- Flexible: Real wage term in the employment equation and Phillips curve term in wages are multiplied by 2
- Hysteresis: Wage responsiveness varies with unemployment
- Sophisticated wage-setting: Wage growth reflects model-consistent inflation expectations (not just inflation target)
- Taylor rules:
  - Standard: \( i = \pi + \frac{1}{2} (\pi - \pi^*) + \frac{1}{2} (Y - Y^*) + r^* \)
  - Forecast-based: \( i = E_t \pi_{t+4} + \frac{1}{2} (E_t \pi_{t+4} - \pi^*) + \frac{1}{2} (Y - Y^*) + r^* \)
  - Big Dove: \( i = \pi + 2 (\pi - \pi^*) + \frac{1}{8} (Y - Y^*) + r^* \)
  - Dove: \( i = \pi + 1 (\pi - \pi^*) + \frac{1}{4} (Y - Y^*) + r^* \)
  - Hawk: \( i = \pi + \frac{1}{4} (\pi - \pi^*) + 1 (Y - Y^*) + r^* \)
  - Big Hawk: \( i = \pi + \frac{1}{8} (\pi - \pi^*) + 2 (Y - Y^*) + r^* \)
  - Interest rate smoothing: \( i = 0.5 i_{t-1} + 0.5(\pi + \frac{1}{2} (\pi - \pi^*) + \frac{1}{2} (Y - Y^*) + r^*) \)
Why Consider Eight Cases?

◆ Model sensitivity:  
*What if we got the model wrong?*
  – Base case
  – “Flexible” labour market
  – “Hysteresis” (slow-adjusting) labor market
  – Model-consistent inflation expectations underpin wage negotiations

◆ But why test 5 variants on the Taylor Rule?
  – Surely the ECB knows its own reaction function!
    » Is this really part of the model the ECB should be uncertain about?
  – Alternative rationale: Search for optimal policy
    » But this is explicitly rejected by the authors
    » Need a welfare concept to analyze optimal policy
      - Currently missing
Deterministic Experiments

- Raise official interest rates 1% for 1 year
- Then revert to monetary policy rule
- Allow endogenous fiscal responses
Effects of raising interest rates 1% for a year

Charts 6: Temporary Shock to interest rates, different labour market configurations with the standard Taylor rule
Stochastic Experiments

- Start from deterministic steady-state
- Run the economy for 100 quarters with random draws from the empirical shock distribution each quarter
  - Shocks occur in all 14 estimated equations
  - Rules out monetary and exchange rate shocks
  - Observe
- Stop. No shocks occur for the next 75 years.
  - Observe
Stochastic Experiments (Fig 8)
Base Case: Labor Market Adjustment

\[ \Delta \text{Wage}_t = -0.0147 \log \left( \frac{U_{t-1}^*}{U_{t-1}} \right) + \ldots \text{stuff} \ldots \]

Wage Equation

![Wage Equation Graph](image-url)
Hysteresis Model

◆ The idea:
  “At extremes of unemployment, the labour-market adjustment process (the elasticity of wages wrt unemployment) might flatten considerably” (p.3)

◆ Possibility of unemployment traps

◆ Consistent with the view that only large shocks are persistent
  – Bianchi and Zoega
Sigmoid Function

\[ g(u) = \frac{1}{1 + e^{-ax}} \]

Chart Three: Sigmoid Transformation

Less responsive

More responsive
Actual Transformation: “Hysteresis Case”

\[
\Delta Wage_t = -0.0147 \times \log\left(\frac{U}{U^*}\right) \times \left(\frac{-1/2 + 3/4}{\frac{U-U^*}{U}} \right)
\]

◆ Useful properties:
  
  – Elasticity = estimated $\varepsilon$ when $U=U^*$
    
    » If unemployment = 9.1%  $\varepsilon = -0.0147$
  
  – For equilibrium unemployment, $U^*$=9.1%:
    
    » If unemployment = 11%,  $\varepsilon = -0.0137$
    
    » If unemployment = 7%,  $\varepsilon = -0.0155$
Actual Transformation: “Hysteresis Case”

\[ \Delta \text{Wage}_t = -0.0147 \times \log \left( \frac{U}{U^*} \right) \times \left( \frac{-1/2 + 3/4}{U - U^*} \right) \]

Wage Equation

Quarterly Change in Wages

Unemployment Rate

U* = 9.1%
Conclusions

◆ This large-scale macroeconometric model has great potential for policy analysis
  – Available online
  – But what is gained in complexity is lost in transparency
  – The labor side of the model must incorporate interesting labor market phenomena
    » Labor Supply
    » Equilibrium unemployment
    » Labor demand with a well-identified long run

◆ A useful sensitivity analysis for thinking about model mis-specification
  – But what are the most interesting experiments?

◆ Why not analyze optimal policy?
  – And the sensitivity of these conclusions to model mis-specification