
NEW KEYNESIAN MODELS WITH UNEMPLOYMENT

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- ❑ **Outburst of NK models with labor search sector**

- ❑ **Walsh (2003 *RED*)**
- ❑ **Krause and Lubik (2007 *JME*)**
- ❑ **Christoffel and Kuester (2008 *JME*)**
- ❑ **Thomas (2008 *JME*)**
- ❑ **Sveen and Weinke (2008 *JME*)**
- ❑ **Gertler, Sala, and Trigari (2008 *JMCB*)**
- ❑ **Sala, Soderstrom, and Trigari (2008 *JME*)**
- ❑ **Faia (2009 *JME*)**
- ❑ **Trigari (2009 *JMCB*)**
- ❑ ...

**Lots of simulation-based
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 - ❑ **Seems apriori desirable to have a model that jointly speaks to monetary policy issues and labor-market/unemployment issues...**
 - ❑ **Positively?**
 - ❑ **Normatively?**
 - ❑ **Blanchard and Gali (2010), Ravenna and Walsh (2011)**
 - ❑ **Attempt to provide unified positive and normative framework and analytical insights**
- Lots of simulation-based quantitative results!

MAIN RESULTS OF BG 2010 AND RW 2011

- Analytical derivation of a (log-linear) NK Phillips curve relating **inflation and** (some measure of) **unemployment**
 - RW 2011: unemployment **gaps** (relative to efficient fluctuations)
 - BG 2010: unemployment **levels**
 - Actually not an issue in BG given their assumption of isoelastic hh utility → EFFICIENT u_e is always constant

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 - ❑ **(Rather than relation between inflation and a proxy for unemployment (e.g., mc))**

- ❑ **Labor-market outcomes summarized by market tightness θ**
 - ❑ **Tightness appear directly in central bank loss function (standard NK linear-quadratic approach)**
 - ❑ **A basic feature of search models that survives in NK model**
 - ❑ **(Can see an implication already: Hosios efficiency condition likely important for monetary policy...)**

MAIN RESULTS OF BG 2010 AND RW 2011

- Search and matching frictions **themselves** do **not** break “divine coincidence”
 - “Divine coincidence” of Blanchard and Gali, 2007 *JMCB*
 - Absent “cost-push shocks,” stabilizing inflation in the face of business cycle shocks achieves output stabilization
 - i.e., **no tradeoff** for monetary policy in stabilizing inflation fluctuations vs. stabilizing output fluctuations

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- ❑ Also need some inefficiency in the wage-setting process
 - ❑ *More specifically*
 - ❑ *Need some inefficiency in the equilibrium determination of θ*
 - ❑ *A friction in wage determination is sufficient to disrupt efficient θ*

 - ❑ **RW 2011**
 - ❑ “Flexible” Nash bargaining....
 - ❑ ...but shocks to bargaining power, so Hosios condition NOT always satisfied

 - ❑ **BG 2010: Nash bargaining, but *real* wage rigidity**
 - ❑ Bargaining intervals admit ANY wage *path* that lies within surplus bound
 - ❑ (Idea also underlies optimal (Ramsey) policy results of Arseneau and Chugh (2008 *JME*), with *nominal* wage rigidity)

- ❑ **(Observation: if CSE is relevant, none of this matters for optimal policy....)**

BASIC SETUPS OF BG 2010 AND RW 2011

- ❑ **RW 2011**
 - ❑ **A “complete” search and matching model**

- ❑ **BG 2010 – some simplifications (shortcuts?...) on basic matching model**
 - ❑ **Eliminate vacancies from model**
 - ❑ **Formally, normalize matching probability for a vacancy to unity in every period**
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- ❑ **A “hiring cost” function**
 - ❑ **Cost per hire (not really cost per vacancy...) $z_t B \theta_t^\alpha$**
 - ❑ Shifted by aggregate TFP z_t
 - ❑ Convex in labor market tightness θ^α
 - ❑ **Standard search and matching model also gives “convex hiring cost”**

$$\frac{\gamma}{k^f(\theta_t)} = \gamma \theta^\alpha$$

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$$\frac{\gamma}{k^f(\theta_t)} = \gamma \theta^\alpha$$
- ❑ **But appearance of θ^α is an equilibrium phenomenon in S&M model**
- ❑ **Not a feature of an atomistic firm’s problem**
- ❑ **Does not seem to be what Pissarides (2009 *Econometrica*) has in mind regarding $mc \neq ac$**

A NORMATIVE ANALYSIS

- ❑ **Main objectives**
 - ❑ **Provide analytical insight on central bank objectives in presence of sticky prices and labor-search-and-matching frictions**
 - ❑ **Evaluate “standard” monetary policy rules in context of mis-specified objectives**
 - ❑ **Compare with existing literature**
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- ❑ **Main results**
 - ❑ **A NK Phillips Curve explicitly relating inflation and unemployment**
 - ❑ **Current and future**
 - ❑ **Central bank should seek to minimize function of**
 - ❑ **Inflation gaps**
 - ❑ **Goods-market quantity gaps**
 - ❑ **Labor-market tightness gaps**
- } Standard NK
- $$L_t = \pi_t^2 + \lambda_0 \tilde{c}_t^2 + \lambda_1 \tilde{\theta}_t^2$$
- ❑ **Stochastic bargaining power acts as cost-push shock**

SKETCH OF MODEL

- ❑ **Representative household**
 - ❑ **Continuum $[0,1]$ of members, each either employed or unemployed and searching**
 - ❑ **No labor force participation margin**
 - ❑ **Full consumption insurance (standard since Andolfatto (1996) and Merz (1995))**

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- ❑ **Unemployed individuals engaged in “home production”**
 - ❑ Simple technology: each unemployed individual produces w^u goods
 - ❑ Aggregate home goods produced: $(1-n_t)w^u$
 - ❑ Total consumption: $C_t = C_t^m + (1-n_t)w^u$

 - ❑ Observations
 - ❑ w^u is NOT time varying – **does this matter? (Guess: would be akin to the bargaining shocks introduced later)**
 - ❑ Not a structural model of home production ala Greenwood, Rogerson, Wright (1995)

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- ❑ **Standard Dixit-Stiglitz-Calvo sticky price structure**

- ❑ **Nash bargaining with stochastic bargaining power**
- ❑ **“Instantaneous hiring” timing: $n_t = (1-\rho)n_{t-1} + m(u_{\bar{v}} v_t)$**

PRIVATE SECTOR EQUILIBRIUM

- **Expectations-augmented Phillips Curve**

$$\pi_t = \beta E_t \pi_{t+1} - \delta \hat{\mu}_t$$

Function of Calvo adjustment parameter and β

- (Framed in terms of markup μ rather than mc , but a simply a detail...negative relation between markup and marginal cost)
- Looks completely standard

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□ From labor-search block of model (i.e., job-creation condition, LOM for employment, Nash wage solution)

$$\hat{\mu}_t = z_t - \mu \left(a_1 \hat{\theta}_t - \beta a_2 E_t \hat{\theta}_{t+1} - \beta a_3 \hat{r}_t + B \hat{b}_t \right)$$

- Movements in markup (i.e., marginal costs) linked to
 - Movements in contemporaneous and future labor market tightness
 - Shifts in Nash bargaining power
 - Movements in real interest rate – due to job-creation condition
 - Fluctuations in technology – standard

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- Linking the two (along with central bank objective function...next) shows
 - Fluctuations in bargaining power act as cost-push shock
 - But fluctuations in market tightness do NOT act as cost-push shock

OPTIMAL POLICY ANALYSIS

□ Second-order approximation of representative household utility

$$E_t \sum_{t=0}^{\infty} \beta^t u(c_t) \approx \frac{u(\bar{c})}{1-\beta} - \frac{\varepsilon}{2\delta} u_c(\bar{c}) \bar{c} \sum_{t=0}^{\infty} \beta^t L_t$$

MANY steps of algebra as in Rotemberg and Woodford (1997)!....

with loss function given by

$$L_t = \pi_t^2 + \lambda_0 \tilde{c}_t^2 + \lambda_1 \tilde{\theta}_t^2$$

Approximation around zero-inflation steady state

□ Observations

- Gaps defined relative to efficient path of economy
 - Rather than with respect to steady state
- Consumption gaps, rather than output gaps
 - Vacancy posting costs a source of final absorption

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□ Central bank should directly stabilize market tightness

- Not unemployment, as seems to have been conjectured in some NK search models
- Recalls a central message of Hosios and Moen
 - Market tightness the central measure governing search efficiency...
 - ...hence perhaps not surprising that *that's* what monetary authority should care about

OPTIMAL POLICY ANALYSIS

- Intuition for appearance of θ_t directly in central bank objective?
(p. 13-15)
 - θ_t proxies for composition of consumption across market goods and home goods
 - (Recall $C_t = C_t^m + (1-n_t)w^u$)
 - Fluctuations in production of home goods governed by fluctuations in n_t which in turn are governed by fluctuations in θ_t

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- ❑ Standard New Keynesian policy prescription
 - ❑ Keep composition of final consumption basket (perfectly) symmetric across differentiated intermediate products
 - ❑ Requires zero inflation at all dates and states, so all goods markets are at same point on demand functions (symmetric equilibrium) – King and Wolman (1999)

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- ❑ Here: composition between market and home-produced goods also matters
 - Requires search and matching process
 - Not directly affected by search and matching process

- ❑ But (apparently) need not take this interpretation literally
 - ❑ Main idea is market-based utility vs. non-market-based utility
 - ❑ So more general principle seems to be: **composition of welfare matters**

Eliminates relative price dispersion
 ↔ quantity dispersion

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 - ❑ **Unmodeled labor market friction generates a gap between real wage and marginal rate of substitution between consumption and leisure**
 - ❑ **Real wage rigidity breaks divine coincidence**

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 - ❑ **Nothing to do with search and matching frictions per se**
 - ❑ **A EHL-type of policy effect**

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 - ❑ **A EHL-type of policy effect**
- ❑ **Exogenous variations in bargaining power break divine coincidence**
 - ❑ **More general seems to be: something that affects wages (hence marginal cost) but that doesn't (directly) have to do with production of market goods**
 - ❑ **Conjecture: variations in w^u ("home production technology") would break divine coincidence**
 - ❑ **More general: any shift in "outside option," which affects surpluses, would do it**
 - ❑ **Arseneau and Chugh (2008 *JME*): shifts in labor tax rates shift surpluses**