
LABOR MATCHING MODELS: BASIC BUILDING BLOCKS

MARCH 29, 2012

BASIC DSGE ISSUES

- ❑ Labor fluctuations at extensive margin (number of people working) larger than at intensive margin (hours worked per employee)
- ❑ Labor markets perhaps the important macro market to understand/model more deeply
 - ❑ **Theoretical interest:** Many results from existing frameworks point to it
 - ❑ **Empirical interest:** Labor-market outcomes the most important economic aspect of many (most?) people's lives
 - ❑ CKM (2007 *Econometrica*) "labor wedges"
- ❑ Explosion of DSGE labor matching models the past few years
 - ❑ Sparked in part by Shimer (2005 *AER*) and Hall (2005 *AER*)
 - ❑ Although their models were not full GE models
 - ❑ Not yet clear what "problems" incorporating labor matching has helped "solve"
 - ❑ ...but has likely shed insight on some issues (e.g., in monetary policy issues, how much attention should be paid to real wage fluctuations?)
- ❑ **Rogerson and Shimer, 2011 *Handbook of Labor Economics***

BASIC LABOR MARKET ISSUES

- ❑ **How can production resources sit idle even when there is “high aggregate demand?”**

- ❑ **Coordination frictions in labor markets**
 - ❑ **Finding a job or an employee takes time and/or resources**
 - ❑ **Not articulated in basic neoclassical/Walrasian framework**

- ❑ **Are labor market transactions “spot” transactions?**
 - ❑ **Or do they occur in the context of ongoing relationships?**
 - ❑ **The answer implies quite different roles for prices (wages)**

- ❑ **“Structural” vs. “frictional” unemployment**
 - ❑ **Structural:** unemployment induced by fundamental changes in technology, etc – dislocations due to insufficient job training, changing technical/educational needs of workforce, etc.
 - ❑ **Frictional:** temporarily unemployed as workers and jobs shuffle from one partner to another

BASIC BUILDING BLOCKS

□ **Aggregate matching function**

$$m(u_t, v_t)$$

Typically assumed to be Cobb-Douglas (see Petrongolo and Pissarides 2001 *JEL*)

- Brings together individuals looking for work (u) and employers looking for workers (v)
- A **technology** from the perspective of the economy (just like aggregate production function)
- Black box that describes all the possible coordination, matching, informational, temporal, geographic, etc. frictions in finding workers and jobs

□ **Employment is a **state variable** (one specific timing; try others)**

Churning of jobs; a job is not an absorbing state

$$N_{t+1} = \underbrace{(1 - \rho^x) N_t}_{\text{Number of existing jobs that end: } \rho^x \text{ exogenous separation rate, but can also endogenize}} + \underbrace{m(u_t, v_t)}_{\text{Number of new jobs (matches) that form in } t \text{ and will become active in } t+1}$$

Aggregate law of motion of employment

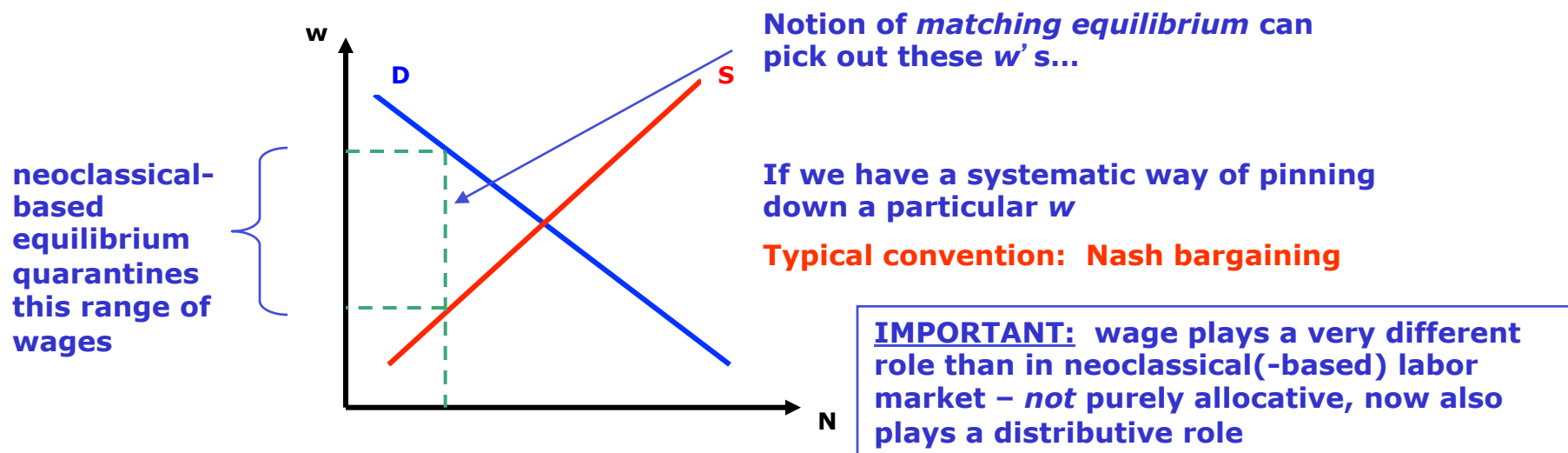
Number of existing jobs that end: ρ^x exogenous separation rate, but can also endogenize

Number of new jobs (matches) that form in t and will become active in $t+1$

ANALOGY: $k_{t+1} = (1 - \delta)k_t + i_t$

BASIC BUILDING BLOCKS

- **Wage determination**
 - Labor transactions not neoclassical(-based), so no simple supply-and-demand based pricing
 - Local (**bilateral, not market-based**) monopolies (local rents) exist between each worker-employer pair
 - Exist due to the matching friction
 - Allows a wide range (too wide?) of wage-determination schemes – one of the points of Hall (2005 AER)



BASIC BUILDING BLOCKS

□ **(Generalized) Nash Bargaining**

$$\max_{w_t} \underbrace{(W(w_t) - U(w_t))^\eta}_{\text{Net payoff to an individual of agreeing to wage } w \text{ and beginning production}} \underbrace{(J(w_t) - V(w_t))^{1-\eta}}_{\text{Net payoff to a firm of agreeing to wage } w \text{ and beginning production}}$$

Bargaining powers η and $1-\eta$ measure "strength" of each party in negotiations
Original Nash 1950 was $\eta = 0.5$

□ **The unique problem whose solution satisfies three axioms (Nash 1950)**

- **Pareto optimality**
- **Scale invariance**
- **Independence of irrelevant alternatives**

□ **Given an extensive-form foundation by Binmore (1980) and Binmore, Rubinstein, Wolinsky (1986)**

- **Nash solution the limiting solution of a Rubinstein alternating-offers game (as time interval between successive offers \rightarrow zero)**
- **In which $(\eta, 1-\eta)$ measure discount factors of each party between successive offers**

ANALYSIS OF MODEL

- Study firm vacancy posting decision
 - A representative firm that decides “how many” workers to (try to) hire
 - The typical setup in DSGE labor matching models...
 - ...in contrast to partial equilibrium labor matching models (one firm/one job) – but equivalent if sufficient linearity
-
- Study household/worker decision(s)
 - No labor-force participation decision in baseline model...
 - Full consumption insurance the norm in DSGE matching models
 - All individuals live in a “large” (infinite) household, so full risk-sharing – **equivalently, complete competitively-priced AD assets**
-
- Study wage determination
-
- Aggregate up to full dynamic stochastic general equilibrium
 - Focus on deterministic **partial-equilibrium steady state** and **dynamics**
 - ...before coming back to full DSGE
 - Analyze efficiency properties (Hosios 1990 *ReStud*, Moen 1997 *JPE*)

Pissarides Chapter 1,
RSW 2005 *JEL*

Shimer 2005, Hall
2005, Hagedorn and
Manovskii 2008

i.e., just the labor-market equilibrium