LABOR MATCHING MODELS: BASIC BUILDING BLOCKS

NOVEMBER 8, 2011

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"**

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- ❒ **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, 2010 *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**

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BASIC BUILDING BLOCKS

❏ **Aggregate matching function**

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

$$m(u_t, v_t)$$

  ❏ **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**

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

Churning of jobs; a job is not an absorbing state

$$N_{t+1} = (1 - \rho^x)N_t + m(u_t, v_t)$$ **Aggregate law of motion of employment**

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

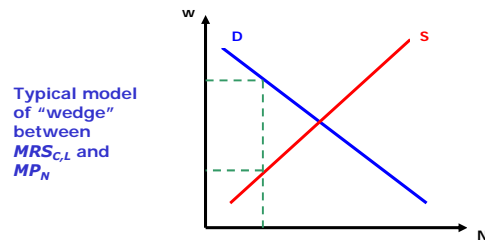**Number of new jobs (matches) that form in *t* and will become active in *t*+1**

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

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BASIC BUILDING BLOCKS

❒ **Wage determination**

   ❒ **Labor transactions not neoclassical(-based), so no simple supply-and-demand based pricing**

Typical model of "wedge" between $MRS_{C,L}$ **and** MP_N

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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**

neoclassical-based equilibrium quarantines this range of wages

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BASIC BUILDING BLOCKS

❐ **Wage determination**
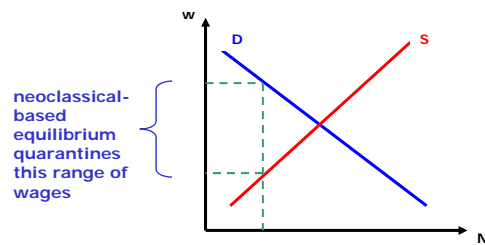 ❐ **Labor transactions not neoclassical(-based), so no simple supply-and-demand based pricing**
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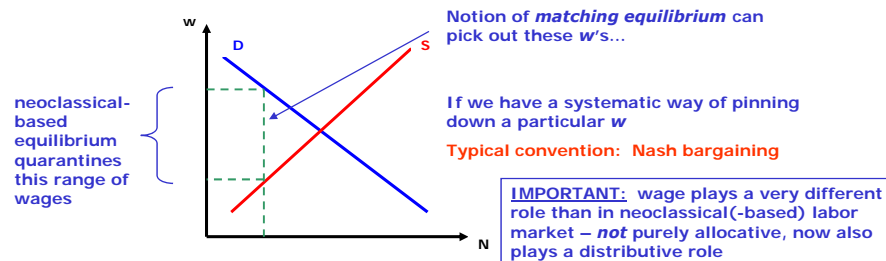   ❐ **Exist due to the matching friction**
    ❐ **Allows a wide range (too wide?) of wage-determination schemes – one of the points of Hall (2005 *AER*)**

neoclassical-based equilibrium quarantines this range of wages

Notion of *matching equilibrium* can pick out these *w*'s...

If we have a systematic way of pinning down a particular *w*

Typical convention: Nash bargaining

IMPORTANT: wage plays a very different role than in neoclassical(-based) labor market – *not* purely allocative, now also plays a distributive role

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BASIC BUILDING BLOCKS

❐ **(Generalized) Nash Bargaining**

Bargaining powers *η* and 1-*η* measure "strength" of each party in negotiations

$$\max_{w_t} \left(W(w_t) - U(w_t) \right)^{\eta} \left(J(w_t) - V(w_t) \right)^{1-\eta}$$

Net payoff to an individual of agreeing to wage *w* and beginning production

Net payoff to a firm of agreeing to wage *w* and beginning production

Original Nash 1950 was *η* = 0.5

  ❐ **The unique problem whose solution satisfies three axioms (Nash 1950)**
    ❐ **Pareto optimality**
    ❐ **Scale invariance**
    ❐ **Independence of irrelevant alternatives**

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❑ **Given an extensive-form foundation by Binmore (1980) and Binmore, Rubinstein, Wolinksy (1986)**
   ❑ **Nash solution the limiting solution of a Rubinstein alternating-offers game (as time interval between successive offers → zero)**
   ❑ **In which (η, 1- η) measure discount factors of each party between successive offers**

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ANALYSIS OF MODEL

❑ **Study firm vacancy posting decision**
   ❑ **A representative firm that decides "how many" workers to (try to) hire**

"Large" firm
      ❑ **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**

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- ❐ **Study wage determination**

  Pissarides Chapter 1, RSW 2005 JEL

  Shimer 2005, Hall 2005, Hagedorn and Manovskii 2008

- ❐ **Aggregate up to full dynamic stochastic general equilibrium**

  i.e., just the labor-market 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*)**