Regional Mismatch and Labor Reallocation in an Equilibrium Model of Migration

Plamen T. Nenov (2012)

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Introduction and motivation

- The recent U.S. recession has been characterized by a divergence in regional economic fortunes.
  - Unemployment dispersion across MSAs doubled (from 1.1% in 2000 to 2.3% in 2010).
  - Internal migration in the U.S. fell (from 2% in 2000 to 1.4% in 2010).
  - The U.S. experienced a housing market slump.

Aim of the paper.

- Understand the importance of regional labor reallocation for unemployment.
- Study the degree to which inter-regional mobility in the U.S. leads to reallocation.
- Address the relevance of the housing bust mobility for unemployment and the labor market.

- Reallocation barriers contribute to regional mismatch $\Rightarrow$ shifts in the Beveridge Curve.
Implications of worker reallocation due to different economic conditions between regions on unemployment:

- **Alvarez and Shimer (2011).**

The impact of home ownership on mobility and aggregate unemployment:

- **Head and Lloyd-Ellis (2010).**

The increase in dispersion in regional house prices and wages:

- **Van Nieuwerburgh and Weill (2010).**

Impact of a housing bust on unemployment and on the Beveridge curve:

- **Sterk (2010).**
- **Sahin, Song, Topa and Violante (2011).**
Empirical facts
State characteristics and gross migration flows


\[ y_{st} = \alpha_s + \zeta_t + x'_{st} \gamma + e_{st} \]

- Proxy \( n_{est} = \) Fraction of households with housing equity \( E < c \).

<table>
<thead>
<tr>
<th>Dep. Variable</th>
<th>out-migration rate, 100 ln(out)</th>
<th>in-migration rate, 100 ln(in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>relative unemployment</td>
<td>0.163*** (0.039)</td>
<td>-0.225*** (0.036)</td>
</tr>
<tr>
<td>100 ln(( \frac{u_{st}}{u} ))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>relative house price</td>
<td>0.263*** (0.069)</td>
<td>-0.160*** (0.049)</td>
</tr>
<tr>
<td>100 ln(( \frac{P_{st}}{P} ))</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fact

Migration as an adjustment mechanism to local labor market shocks.

Fact

House prices are associated with variation in migration.
Basic Model of Regional Reallocation
Regional Labor Markets

- Infinite periods
  \( t = 0, 1, 2, \ldots \)
- Measure 1 of islands
- Measure \( L \) of infinitely lived workers:
  - Initial measure of workers in each region:
    \( j : I_{-1}^j \leq L \)
    \[ \text{with } \int I_{-1}^j \, dj = L \]
  - End-of-period measure of workers:
    \( I_t \in [0, L], \bar{L} \geq L \)
- There’s a representative firm in each region
- Jobs remain productive for 1 period
- Regional productivity
  \[ a_t^j = \begin{cases} \bar{a} \\ a \end{cases} \]
- Measure \( v_t^j \) of vacancies with per period cost \( k \)
- Identical matching functions across regions in DMP framework
- Wages are determined by Nash bargaining
Basic Model of Regional Reallocation
Regional Migration and Regional Housing Markets

- Competitive housing and rental market:
  - Rental price $r^j_t$, housing price $p^j_t$
  - Each region $j$ has a fixed supply of housing $H$
  - Real estate firms are equally owned by all workers in the economy and solves:
    $$\max_{\tilde{h}_t} \left\{ r^j_t \tilde{h}_t - p^j_t (\tilde{h}_t - \tilde{h}_{t-1}) + \beta E_t \left[ p^j_{t+1} \right] \tilde{h}_t \right\}$$

- Workers have an idiosyncratic region preference $e$ for their regions.
- Each period workers draw a new $e$ from $F_e$ and support $[-B, B]$
- Fixed cost of moving: $c_o$ and $c_1 (c_o > c_1) \implies \text{Worker heterogeneity}$
- Worker migration $\left\{ \begin{array}{ll}
    \text{directed migration: } \lambda > 0 \\
    \text{random migration: } 1 - \lambda
  \end{array} \right\}$

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Basic Model of Regional Reallocation
Worker Choice

- **Migration value**
  \[
  \bar{V} = \lambda \max_{\tilde{x}} \{ V^1(\tilde{x}) \} + (1 - \lambda) \left( \int V^1(\tilde{a}, l_0, l_1) d\bar{V}^* + \int V^1(a, l_0, l_1) d\bar{V}^* \right)
  \]

- **Beginning-of-period value function**
  \[
  V^1(X) = \max_h \{ v(h) - r(X)h \} + b + \mu(\theta(A))(w(A) - b) + \beta E_X \left[ W^1(X') \right]
  \]
  \[
  W^1(X) = \max_{\bar{e}} \left\{ F_e(\bar{e}) \bar{V} + (1 - F_e(\bar{e})) V^1(X) - F_e(\bar{e})c_1 + \int_{\bar{e}} edF_e \right\}
  \]

**Workers decision.**
Given \( e \), a worker compares the value of staying in the region to the value of moving, net of the migration cost.
Basic Model of Regional Reallocation

Equilibrium characterization results

Timing:

1. Agents observe the regional productivity $a$
2. Workers migration decisions
3. Housing and rental markets open
4. Firms post vacancies
5. Matching of workers and jobs
6. Production occurs and wages are paid

Results:

- Mobile workers weakly prefer regions with lower populations $\rightarrow$ congestion effect on housing rental markets
- Regions with high productivity weakly dominate regions with low productivity in workers migration decisions
- Higher regional productivity, implies lower out-migration from that region and higher in-migration for a given population.
Job destruction: $s \in (0, 1)$.

Unemployed workers that migrate remain unemployed.

$\phi$ employed workers that migrate remain employed.

Wages are rigid in the sense of Hall (2005).

**Estimation Procedure:** indirect inference.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\beta$</td>
<td>discount factor</td>
<td>0.995</td>
</tr>
<tr>
<td>$e$</td>
<td>flow unemployment payoff</td>
<td>0.65</td>
</tr>
<tr>
<td>$s$</td>
<td>job destruction probability</td>
<td>0.034</td>
</tr>
<tr>
<td>$A$</td>
<td>average regional productivity</td>
<td>1</td>
</tr>
<tr>
<td>$\mu(z)$</td>
<td>matching function</td>
<td>$z^{0.605}$</td>
</tr>
<tr>
<td>$L_0$</td>
<td>distribution of immobile workers, $l_0$</td>
<td>${0, 0.04}$</td>
</tr>
<tr>
<td>$1 - \rho_{l_0}$</td>
<td>per-period probability of a switch in $l_0$</td>
<td>0.05</td>
</tr>
</tbody>
</table>
### Parameters Estimates

<table>
<thead>
<tr>
<th></th>
<th>$\rho$</th>
<th>$\sigma_\eta$</th>
<th>$k$</th>
<th>$\gamma$</th>
<th>$\kappa$</th>
<th>$\lambda$</th>
<th>$c_1$</th>
<th>$\sigma_\epsilon$</th>
<th>$\phi$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.9625</td>
<td>0.0054</td>
<td>0.6491</td>
<td>2.7734</td>
<td>0.0336</td>
<td>0.351</td>
<td>17.1775</td>
<td>6.3437</td>
<td>0.0026</td>
</tr>
<tr>
<td>SE</td>
<td>0.0033</td>
<td>0.0012</td>
<td>0.04</td>
<td>0.032</td>
<td>0.0264</td>
<td>0.0329</td>
<td>0.1301</td>
<td>0.092</td>
<td>0.0006</td>
</tr>
</tbody>
</table>

### Correlation coefficients for the data

<table>
<thead>
<tr>
<th></th>
<th>log(out)</th>
<th>log(in)</th>
<th>neg</th>
<th>$\ln(\frac{u}{u})$</th>
<th>$\ln(\frac{p}{p})$</th>
</tr>
</thead>
<tbody>
<tr>
<td>log(out)</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>log(in)</td>
<td>-0.3186</td>
<td>1</td>
<td></td>
<td></td>
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<tr>
<td>neg</td>
<td>-0.0759</td>
<td>-0.0279</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\ln(\frac{u}{u})$</td>
<td>0.2429</td>
<td>-0.4051</td>
<td>0.1084</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>$\ln(\frac{p}{p})$</td>
<td>0.2316</td>
<td>-0.1274</td>
<td>-0.0427</td>
<td>-0.205</td>
<td>1</td>
</tr>
</tbody>
</table>

### Correlation coefficients for the model

<table>
<thead>
<tr>
<th></th>
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<tr>
<td>log(out)</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>log(in)</td>
<td>-0.2464</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>neg</td>
<td>-0.3625</td>
<td>-0.1094</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\ln(\frac{u}{u})$</td>
<td>0.831</td>
<td>-0.213</td>
<td>0.0089</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>$\ln(\frac{p}{p})$</td>
<td>0.0389</td>
<td>0.0277</td>
<td>-0.1064</td>
<td>-0.3366</td>
<td>1</td>
</tr>
</tbody>
</table>
Beveridge curve shifts

Results

Beveridge curve regression: \[ y_t = \alpha_0 + \alpha_1 x_t + \alpha_2 \hat{\sigma}_t^u + \sum_{i=1}^{3} \alpha_{2+i} t^i + e_t \]

<table>
<thead>
<tr>
<th>Dep. Variable:</th>
<th>vacancy rate</th>
<th>ln(v)</th>
</tr>
</thead>
<tbody>
<tr>
<td>unemployment rate (u)</td>
<td>-0.203*** (0.0327)</td>
<td>-0.458*** (0.101)</td>
</tr>
<tr>
<td>State Unemployment Dispersion</td>
<td>1.146** (0.458)</td>
<td>1.146** (0.459)</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Dep. Variable:</th>
<th>unemployment rate</th>
<th>ln(u)</th>
</tr>
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<tbody>
<tr>
<td>v</td>
<td>-2.294*** (0.415)</td>
<td>-1.044*** (0.224)</td>
</tr>
<tr>
<td>State Unemployment Dispersion</td>
<td>3.177*** (0.237)</td>
<td>2.803*** (0.252)</td>
</tr>
</tbody>
</table>

Fact

There is a positive comovement between regional unemployment dispersion and shifts in the Beveridge curve
Beveridge curve shifts

Results

Beveridge curves for model generated and observed data

Fact

The model can explain a large part of the shifts in the Beveridge curve that have not been due to secular trends.
Great Recession Simulation

Purpose:

1. Check the importance of reallocation barriers for the labor market that the structural estimation identified.
2. Examine the quantitative magnitude of the housing bust mobility for regional reallocation and unemployment.

Simulation results:

- Mobility distortion due to the housing bust has a very limited labor market effect.
- This effect is also small on net migration and on labor reallocation and unemployment.

Conclusions:

- Reducing individual mobility will affect gross flows more than regional reallocation and unemployment.
  - Reason: reallocation barriers.

There are positive comovements between out-migration and house prices controlling for unemployment (and vice versa).

Negative comovement between house prices and unemployment with in-migration controlling for unemployment (and vice versa).

The model finds substantial reallocation barriers, which lead to large regional mismatch → the model matches shifts in the U.S. Beveridge curve.

It provides new insights into the migration decisions of individuals, allowing for both directed and random mobility.

Limitation:

The model is silent on the effects of differences in regional income on migration decisions.