I appreciate the opportunity to be here

Today: Overview of data, theory and questions

I do not include many citations in this talk
I apologize in advance if I do not reference your work

Takeaways:

1. Gross and net migration facts need more study
2. Labor models used to study gross migration
   Urban models used to study net migration
3. Urban vs. Labor: different conclusions from same facts
Defining Terms

- Net migration: Change in population (no births/deaths)
- Gross migration: People moving to different places
- Net = Inflows - Outflows.
Data Sources

- **Net Migration**: Census/ACS data

- **Gross Migration**:
  - **Census/ACS**
    - Data on demographics and income of movers
    - 1-year moves start 2000, 5-year moves start 1940
  - **IRS** (no information on movers)
    - Data on county-county moves: → MSA-MSA moves
    - Data start in 1985 (1982)
  - **Other data with demographics**
    - CPS (annual, 1964 forward): county, state moves
    - NLSY (1979 - 1994): state moves
    - NYFRB / Equifax (1999 forward): Census block
Aggregate Move Rate, 20% Decline from 1985-2013

Data from IRS
Data from ACS. Data from 2000-2002 labeled as “2001”
Across-State Migration by Educ. for Owners, 2001-2015

Data from ACS. Data from 2000-2002 labeled as “2001”
## Changes in Across-State Migration, 2001-2015

<table>
<thead>
<tr>
<th>Age</th>
<th>Status</th>
<th>Skill</th>
<th>2001</th>
<th>2015</th>
<th>Delta</th>
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<tr>
<td>Young</td>
<td>Renter</td>
<td>High</td>
<td>10.12</td>
<td>9.22</td>
<td>0.90</td>
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<tr>
<td></td>
<td></td>
<td>Low</td>
<td>3.98</td>
<td>2.78</td>
<td>1.21</td>
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<tr>
<td>Young</td>
<td>Owner</td>
<td>High</td>
<td>1.98</td>
<td>1.45</td>
<td>0.52</td>
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<td></td>
<td></td>
<td>Low</td>
<td>0.74</td>
<td>0.72</td>
<td>0.02</td>
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<tr>
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<td>Renter</td>
<td>High</td>
<td>4.60</td>
<td>4.32</td>
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<tr>
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<td></td>
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<td>1.80</td>
<td>0.36</td>
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<tr>
<td>Old</td>
<td>Owner</td>
<td>High</td>
<td>1.03</td>
<td>1.01</td>
<td>0.02</td>
</tr>
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<td></td>
<td></td>
<td>Low</td>
<td>0.54</td>
<td>0.50</td>
<td>0.05</td>
</tr>
</tbody>
</table>

Data from ACS. Young = 21 - 50. Old > 50.
Low Skill = High School or Less. High Skill = 4+ Years of College
Migration Rate by MSA: Change vs. Level

Data from IRS. Insight from Coate and Magnum (2016)

Simple linear regression $R^2 = 0.43$
Migration Rate by MSA: 1985-89 vs 2010-13

Data from IRS. Insight from Coate and Magnum (2016)
Data from IRS. Std. Dev. = 5.4% and [10, 90] = [3.3%, 7.9%]

Data from IRS and Census. Correlation = -0.42. R² = 0.18

Data from IRS and Census. Correlation = -0.05. R2 = 0.00
Gross vs. Net Migration

- Define $n_{it} = a_{it} - l_{it}$
  - $n_{it}$ is net migration rate
  - $a_{it}$ is the arrivals rate
  - $l_{it}$ is the departures rate

- Estimate
  
  $a_{it} \overset{arrival rate}{=} \beta n_{it} \overset{netmig rate}{=} + \lambda M_i \overset{MSA dummies}{=} + \gamma D_t \overset{year dummies}{=} + e_{it} \overset{error}{=}$

- Regress $a_{it}$ and $n_{it}$ on MSA and year dummies, plot residuals
$\beta = 0.68$ and $R^2 = 0.49$. 195 outliers excluded (out of 8,395) 
(2SLS estimate of $\beta = 0.74$)
Impulse Response to Wage Shocks

- Suppose $Y_{it} = z_{it} L_{it}$. Then $W_{it} = z_{it}$
- Denote $w_{it} = \ln(W_{it})$ and specify
  \[ \Delta \hat{w}_{it} = \rho \Delta \hat{w}_{it-1} + \epsilon_{it} \]
  where $\hat{w}_{it} = w_{it} - \left( \frac{1}{J} \right) \sum_{j=1}^{J} w_{jt}$

- Wage data by MSA from BEA
- Estimate $\rho = 0.14$ and $\sigma_{\epsilon} = 1.6\%$
- Regress $x_{it+s}$ on $\epsilon_{it}$ for $s = 0, \ldots, 9$, $x_{it}$ is population (IRS/BEA), arrival and departure rates (IRS)
MSA Population Impulse Response (by year)

Cumulative population pct. increase to a 1SD rel. wage growth shock
Yearly percentage point change to a 1SD rel. wage growth shock
Recap of Facts

1. **Time Series**
   - Gross migration rate fallen by 2 pct points since 1985
   - Rates for all ages, education, housing tenure declined
   - Rates for age 21-50 renters declined 1ppt since 2001
   - Rates fell most for MSAs with largest initial rates
   - No obvious decline in net migration rates

2. **Cross Section**
   - Large, permanent variation: $[10, 90] = [3.3\%, 7.9\%]$  
   - Migration rates decline with MSA size:  
     1st decile 13\%, 10th decile 7\%
   - Migration rates fallen over time for all MSA sizes
3. **Net Migration**
   - Arrivals and net migration positively correlated, linear
   - 1 ppt increase in net → arrival rate inc by 0.74 ppt

4. **Shocks and Responses**
   - MSA-level relative log wages near a random walk
   - Pop, arrival & departure rates slow to respond to shocks
   - 50% of the 10-year pop. adjustment complete by year 2
We have made progress on explaining the time series decline

- Aging population, 2-earner households, housing bust are not obvious candidates (Molloy, Smith, Wozniak 2011)

- Karahan and Rhee (2014) suggest aging workforce changes bargaining and employment of all workers

- Better information about match quality leads to fewer mistakes (Kaplan and Schulhofer-Wohl 2012)

- Search technology along with “rootedness” and income dispersion leads to decline in migration in the highest migration cities (Coate and Magnum 2016)
Notes on Gross Migration, Net Migration and Shocks

- We have made less progress on
  - Size and gross migration rates
  - Link of gross migration, net migration and shocks
    (Blanchard and Katz 1992)

- Different models for different topics:
  - Net migration: Urban Economics
  - Gross migration: Labor / Macro Economics

- Urban and Labor models have irreconcilable differences
  - Urban: Locations provide same utility
  - Labor: Big cities provide more utility
Assume Cobb Douglas utility: \((1 - \alpha) \ln c + \alpha \ln h\)

- Household receives wage \(w\)

- Utility maximization implies \(c = (1 - \alpha) w\).

- Assume fixed housing = 1 such that \(h = 1/N\).

- Free mobility: Assume all cities provide the same utility
Assume two cities with total population = 1. Identical utility:

\[(1 - \alpha) \ln w_1 - \alpha \ln N_1 = (1 - \alpha) \ln w_2 - \alpha \ln (1 - N_1)\]

This implies

\[
\ln \left(\frac{N_1}{1 - N_1}\right) = \left(\frac{1 - \alpha}{\alpha}\right) \ln \left(\frac{w_1}{w_2}\right)
\]

If city 1 experiences a wage shock, then

\[
\frac{\Delta N_1 / N_1}{1 - N_1} = \left(\frac{1 - \alpha}{\alpha}\right) \frac{\Delta w_1}{w_1}
\]
People choose to live in one of \( j = 1, \ldots, J \) locations.

Utility is \( u_j + \epsilon_j \). City chosen is \( \text{arg max} \{ u_j + \epsilon_j \}_{j=1}^J \).

\( \epsilon_j \) i.i.d. extreme value, location \( i \) chosen with probability

\[
p_i = \frac{\exp (u_i)}{\sum_{j=1}^J \exp (u_j)}
\]

This implies big cities provide higher utility!

\[
\ln p_i - \ln p_k = u_i - u_k
\]
Suppose \( u_i = \lambda \{(1 - \alpha) \ln w_i - \alpha \ln N_i\} \) as before
\( \lambda \) is required to scale utility given the variance of shocks

2 cities, total population 1: \( N_1 = p_1 \) and \( N_2 = p_2 = 1 - N_1 \)

Then \( \ln p_1 - \ln p_2 = u_1 - u_2 \) implies

\[
\ln \left( \frac{N_1}{1 - N_1} \right) = \left[ \frac{\lambda (1 - \alpha)}{1 + \lambda \alpha} \right] \ln \left( \frac{w_1}{w_2} \right)
\]

Giving this relationship of population and wage changes:

\[
\frac{\Delta N_1 / N_1}{1 - N_1} = \left[ \frac{\lambda (1 - \alpha)}{1 + \lambda \alpha} \right] \frac{\Delta w_1}{w_1}
\]
Denote $r$ as rental price per unit of housing

Utility is $(1 - \alpha) \ln c + \alpha \ln h$. Maximization implies

$$c = (1 - \alpha) w \quad \text{and} \quad rh = \alpha w$$

Substitute for $c$ and $h$ in utility. Indifference implies

$$\ln (w_1) - \alpha \ln (r_1) + \ln (Q_1) = \ln (w_2) - \alpha \ln (r_2) + \ln (Q_2)$$

where $Q_i$ is “quality of life” in MSA $i$

Measured quality of life satisfies

$$\ln \left( \frac{Q_1}{Q_2} \right) = \ln \left( \frac{w_1}{w_2} \right) + \alpha \ln \left( \frac{r_1}{r_2} \right)$$
• Decision-making implies $\ln (p_1) - \ln (p_2) = u_1 - u_2$

• Equilibrium and optimality imply

\[
p_i = N_i = \frac{1}{h_i} = \frac{r_i}{\alpha w_i}
\]

• Substitute:

\[
\ln (p_1) - \ln (p_2) = \ln \left(\frac{r_1}{r_2}\right) - \ln \left(\frac{w_1}{w_2}\right)
\]

\[
u_1 - u_2 = \lambda \left\{\ln \left(\frac{w_1}{w_2}\right) - \alpha \ln \left(\frac{r_1}{r_2}\right) + \ln \left(\frac{Q_1}{Q_2}\right)\right\}
\]

• Measured quality of life satisfies

\[
\ln \left(\frac{Q_1}{Q_2}\right) = -\left(\frac{1 + \lambda}{\lambda}\right) \ln \left(\frac{w_1}{w_2}\right) + \left(1 + \alpha \lambda\right) \ln \left(\frac{r_1}{r_2}\right)
\]
Implications for Measurement

Urban: \( \ln \left( \frac{Q_1}{Q_2} \right) = -1 \ln \left( \frac{w_1}{w_2} \right) + \alpha \ln \left( \frac{r_1}{r_2} \right) \)

Labor: \( = - \left( \frac{1+\lambda}{\lambda} \right) \ln \left( \frac{w_1}{w_2} \right) + \left( \frac{1+\alpha\lambda}{\lambda} \right) \ln \left( \frac{r_1}{r_2} \right) \)

- Suppose \( \lambda = 1 \) as an illustrative example

- Set \( w_1 = w_2 \) and \( r_1 = 1.1r_2 \)
  - Urban predicts \( Q_1 \) is 2.5% higher than \( Q_2 \)
  - Labor predicts \( Q_1 \) is 12.5% higher

- Set \( r_1 = r_2 \) and \( w_1 = 1.1w_2 \)
  - Urban predicts \( Q_1 \) is 10% lower than \( Q_2 \)
  - Labor predicts \( Q_1 \) is 20% lower
Concluding Thoughts on Models

- Urban models designed to study net migration
  1. Model is static: instantaneous adjustment to shocks
  2. Typical assumption: all places provide same utility
  3. Not useful to study slow adjustment or gross migration

- Labor models designed to study gross migration
  1. Places provide different utility, people choose the max
  2. Useful to study gross migration
  3. Can use to study net migration if impose market clearing

- Using same underlying data, Urban and Labor models imply different estimates and elasticities

- Guess: Labor models with moving costs and forward-looking agents will be used more in Urban Economics