Hours, Occupations, and Gender Differences in Labor Market Outcomes

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Motivation

• Two classic topics of labor supply are
  - time allocation
  - occupational choice

• These topics are studied in isolation of each other

• We provide evidence of important interactions between them

• Argue in favour of a framework that considers them jointly

• Insightful for analyzing gender differences in labor market outcomes
Motivation

• Consider a particular 3-digit occupation
  - physicians, financial managers, hairdressers, welders and cutters

• Compute two statistics (of annual hours)
  - log of mean annual hours in an occupation
  - standard deviation of log annual hours in an occupation
Occupations differ in terms of the patterns of hours worked within an occupation

Negative mean-dispersion relationship in occupational hours
Motivation

- High-mean low-dispersion occupations (TL, sector 1, nonlinear)
  - managers and supervisors
  - professional (accountants, physicians, lawyers), engineers
  - some machine operators, technicians, mechanics

- Low-mean high-dispersion occupations (BR, sector 2, linear)
  - some professional (carpenters, cooks)
  - some machine operators, technicians
  - teachers, sales workers, waiters, janitors
Overview

- Extend a two-sector Roy model of occupational sorting to incorporate:
  - labor-leisure choice (time allocation)
  - non-linear earnings (nonconvexity)

- Non-linear earnings:
  - hourly wages increase in hours worked
  - differs across occupations

- Link between occupational choice and time allocation:
  - ↑ in the desired hours of work ⇒ bias occupational choice towards occupations in which the non-convexity is more severe
Overview: Gender Differences

- Document further that:
  - men more likely to sort in TL occupations
  - women work less hours than men, within an occupation
  - women receive lower hourly wages, within an occupation

- Use a richer version of the model to understand these gender differences:
  - two-member households
  - key feature – women have a lower time endowment

- Analyze gender differences in:
  - occupational choice
  - hours worked

- Analyze gender wage gap:
  - model accounts for 29% of the gap
  - between occupations – women sort into low wage occupations
  - within occupations – women earn less than men
Data

  - benchmark period: 1986-1995
  - large, analysis by 3-digit occupations and gender
  - age: 16-64
  - at least 30 observations in an occupation: 96% of occupations for men and 77% of occupations for women
  - use consistent 1976-2015 occupational codes (Autor and Dorn, 2013)
1. Negative relationship between the mean and the dispersion in hours in an occupation
   - robust across age, gender, and education groups

2. Fraction of men, relative to women, higher in TL occupations

3. Women work less hours than men, in (almost) all occupations
   - women have higher dispersion in hours than men, in (almost) all occupations

4. Hourly wages decline as we move from TL to BR occupations

5. Women have lower hourly wages than men, in (almost) all occupations
Mean and Dispersion in Occupational Hours

![Graph showing dispersion of occupational hours for men, 1986-1995.](image-url)
Mean and Dispersion in Occupational Hours

- robust across age, gender, and education groups

[Changes in Hours Worked for Occupation Switchers]

- robust over time
• Women work less than men, in (almost) all occupations

• Women have a higher dispersion in hours than men, in (almost) all occupations
Occupational Hours Distribution

- Complementary Cumulative Distribution Function for men $F_{g,t}(x)$:
  \[ F_{g,t}(x) = \text{Prob}(X > x) \]

where $x$ is the:
- log of mean (male) annual hours in an occupation in period $t$; or
- standard deviation of log (male) annual hours in an occupation in period $t$
Occupational Hours Distribution

- Men more likely to be in high-mean low-dispersion (TL) occs. [More]
- Distribution mostly stable for men over time
- Women have reallocated towards high-mean low-dispersion (TL) occs. over time
Men, on average, earn higher hourly wages in the TL than the BR occupations
- holds also after controlling for education

Women earn lower hourly wages than men, in (almost) all occupations
Multi-Member Households Model

- Two-sector Roy model of occupational sorting
  - sectoral abilities

- Extend the model by introducing
  - time allocation decision
    - individuals value leisure
  - heterogeneous preferences over leisure
  - nonlinear production technology in one of the sectors
    - positive effect of hours worked on wages
Multi-Member Households Model

- Unit mass of households with a male ($m$) and a female ($f$)

- Preferences:

$$ U(c_m, c_f, h_m, h_f) = u_m(c_m, h_m) + u_f(c_f, h_f) $$

$$ u_g(c_g, h_g) = \ln c_g + \phi_g \frac{(T_g-h_g)^{1-\gamma}}{1-\gamma} \text{ for } g = m, f $$

- $(T_m, T_f)$ – time endowment for $m$ and $f$
- $(c_m, c_f)$ – consumption for $m$ and $f$
- $(h_m, h_f)$ – (market) hours worked for $m$ and $f$
Distributional Assumptions

- Individuals are heterogeneous in three dimensions
  - $\phi$: taste for leisure
  - $a_1$: skills in sector 1
  - $a_2$: skills in sector 2

- A household is characterized by the 6-tuple $(a_{i1}, a_{i2}, \phi_i)_{i=m,f}$
  - drawn from a multivariate log-normal distribution
Technology

• One homogeneous good is produced with two production technologies (occupations) $j = 1, 2$

\[ Y_j = A_j E_j \]

where $Y_j$ is aggregate output from occupation $j$ and $E_j$ is the aggregate efficiency units of labor in occupation $j$.

• The mapping from individual hours to efficiency units of labor in occupation $j$ satisfies

\[ e_{ij} = a_{ij} h_{ij}^{1+\theta_j}, \]

$a_{ij}$ is the ability of individual $i$ to produce labor services in sector $j$.

- sector 1: $\theta_1 = \theta > 0$ (nonlinear, TL)
- sector 2: $\theta_2 = 0$ (linear, BR)
Effect of Longer Hours on Hourly Wages

- **Static effects**: Conditional on numerous controls, individuals who decide to work fewer hours do get offered lower hourly wages

- **Dynamic effects**: Human Capital
  - Imai and Keane (2004), and others

- **Different across occupational sectors**:

[Wage Profiles in 3-Digit Occupations]
The Household’s Problem

\[
\max \left\{ \ln c_m + \ln c_f + \phi_m \frac{(T_m - [I^m_1 h_{m1} + I^m_2 h_{m2}])^{1-\gamma}}{1-\gamma} + \phi_f \frac{(T_f - [I^f_1 h_{f1} + I^f_2 h_{f2}])^{1-\gamma}}{1-\gamma} \right\}
\]

subject to:

\[
c_m + c_f = \left\{ \sum_{j=1}^{2} I^m_j a_m h_{mj}^{1+\theta_j} + \sum_{j=1}^{2} I^f_j a_f h_{fj}^{1+\theta_j} \right\}.
\]

\( I^m_j \) takes the value of 1 if \( m \) works in sector \( j \)

\( I^f_j \) takes the value of 1 if \( f \) works in sector \( j \)
FOC in a Multi-Member Household

$$\frac{a_{mj}(1 + \theta_j)h_{mj}^{\theta_j}}{a_{mj}h_{mj}^{1+\theta_j} + a_{fi}h_{fi}^{1+\theta_i}} = \phi_m(T_m - h_{mj})^{-\gamma},$$

$$\frac{a_{fi}(1 + \theta_i)h_{fi}^{\theta_i}}{a_{mj}h_{mj}^{1+\theta_j} + a_{fi}h_{fi}^{1+\theta_i}} = \phi_f(T_f - h_{fi})^{-\gamma},$$

- occupational choice and hours are joint decisions
- income effect from the choice of one member,
  - affects hours and occupational choice of other member of the couple
- if $\phi_g$ increases for $g = \{m, f\}$, it increases the incentives for other member of working long hours and choosing sector 1
- correlation of skills and taste for leisure are crucial
Single Individual Problem

\[
\max \left\{ \ln c + \phi \frac{(T - [lh_1 + (1 - l)h_2])^{1-\gamma}}{1 - \gamma} \right\}
\]

subject to:

\[
c = la_1 h_1^{1+\theta} + (1 - l)a_2 h_2,
\]

If the individual chooses to work in occupation \( j \), the optimal choice of hours \( h_j \) satisfies:

\[
\frac{1 + \theta_j}{\phi} = h_j(T - h_j)^{-\gamma} \equiv g(h_j)
\]
Conditional on occupation $j$:

- $h_j$ are independent of occ. productivities $a_j$
- $h_j$ is decreasing in $\phi$
- $\theta > 0 \Rightarrow$ conditional on $\phi$, $h_1 > h_2$
- Convexity of $g(\cdot) \Rightarrow$ variance of hours is lower in sector 1 than 2
Sorting of Workers across Occupations

The probability that an individual with a taste for leisure $\phi$ works in sector 1 is

$$P(I = 1 | \phi) = P \left[ \ln \left( \frac{a_1}{a_2} \right) > z(\phi) \right]$$

where $z'(\phi) > 0$.

- increases with skill ratio $\frac{a_1}{a_2}$
- decreases with taste for leisure $\phi$
  
  : individuals working long hours are more likely to work in sector 1
- convexity of $g(\cdot)$ acts as force in reducing variance of hours in sector 1
Calibration

• $\gamma = 4$, $\theta = 0.60$, $T_m = 5200$, $T_f = 4700$.

• further sample restrictions: married individuals, aged 22-64

• create two sectors of occupations
  - rank occupations by the level of mean hours for men
  - separate into two groups of equal employment size (men plus women)

• 1986-1995 CPS
  - employment shares, annual hours worked, hourly wages

• 1986-1995 PSID
  - correlation in spousal log wages: 0.43
  - correlation in spousal log hours: 0.02
### Data Moments

<table>
<thead>
<tr>
<th>Males</th>
<th>( E )</th>
<th>( \ln \bar{h} )</th>
<th>( sd(\ln h) )</th>
<th>( \ln \bar{w} )</th>
<th>( sd(\ln w) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Linear</td>
<td>0.61</td>
<td>7.73</td>
<td>0.22</td>
<td>2.56</td>
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<tr>
<td>Linear</td>
<td>0.39</td>
<td>7.57</td>
<td>0.32</td>
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<td>0.46</td>
</tr>
<tr>
<td>Aggregate</td>
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<td>7.67</td>
<td>0.26</td>
<td>2.46</td>
<td>0.45</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Females</th>
<th>( E )</th>
<th>( \ln \bar{h} )</th>
<th>( sd(\ln h) )</th>
<th>( \ln \bar{w} )</th>
<th>( sd(\ln w) )</th>
</tr>
</thead>
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<tr>
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<td>0.49</td>
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<td>7.40</td>
<td>0.46</td>
<td>2.04</td>
<td>0.48</td>
</tr>
</tbody>
</table>

- Patterns for men similar to those presented earlier
  - mainly in the TL occupations
  - hours: higher mean and lower dispersion in the nonlinear sector
  - wages: higher in the nonlinear sector
## Data Moments

<table>
<thead>
<tr>
<th></th>
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</tr>
<tr>
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<td>1.00</td>
<td>7.40</td>
</tr>
</tbody>
</table>

- Patterns for women similar to those presented earlier
  - mainly in the BR occupations
  - hours: work less than men, overall and in each sector
  - wages: lower than for men, overall and in each sector
  - wages: the gender gap is similar in both sectors
Baseline Economy

• Men and women are identical, except for the time endowment \((T_m, T_f)\)

• Additional assumptions/restrictions:

  \[
  \begin{align*}
  \rho_{a_1,\phi} &= \rho_{a_2,\phi} = 0 \\
  \rho_{a_1 m, a_1f} &= \rho_{a_2 m, a_2f}
  \end{align*}
  \]

• Parameters to be calibrated:

  \[
  \begin{align*}
  \mu_{a_2} &- \text{mean value of log ability in sector 2, } (\mu_{a_1} = 0) \\
  \mu_{\phi} &- \text{mean value of log taste for leisure} \\
  \sigma_{a_1}^2 &- \text{variance of log ability in sector 1} \\
  \sigma_{a_2}^2 &- \text{variance of log ability in sector 2} \\
  \sigma_{\phi}^2 &- \text{variance of log taste for leisure} \\
  \rho_{a_1, a_2} &- \text{correlation of abilities in occupations 1 and 2} \\
  \rho_{a_1 m, a_1f} &- \text{correlation of ability 1 within couples} \\
  \rho_{\phi m, \phi f} &- \text{correlation of the taste for leisure within couples}
  \end{align*}
  \]
## Targets and Fit of the Model

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value ( \mu_a )</th>
<th>Target ( E_{m}^{NL} )</th>
<th>Data</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \sigma_{a_1}^2 )</td>
<td>0.308 ( \text{sd}(\ln w_{m,NL}) )</td>
<td>0.45</td>
<td>0.48</td>
<td></td>
</tr>
<tr>
<td>( \sigma_{a_2}^2 )</td>
<td>0.198 ( \text{sd}(\ln w_{m,L}) )</td>
<td>0.46</td>
<td>0.43</td>
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</tr>
<tr>
<td>( \mu_\phi )</td>
<td>0.670 ( \ln h_m )</td>
<td>7.67</td>
<td>7.67</td>
<td></td>
</tr>
<tr>
<td>( \sigma_\phi^2 )</td>
<td>0.377 ( \text{sd}(\ln h_m) )</td>
<td>0.26</td>
<td>0.26</td>
<td></td>
</tr>
<tr>
<td>( \rho_{a_1,a_2} )</td>
<td>0.330 ( \ln w_{m,NL} - \ln w_{m,L} )</td>
<td>0.37</td>
<td>0.37</td>
<td></td>
</tr>
<tr>
<td>( \rho_{a_m,a_f} )</td>
<td>0.660 gender corr. of log wages</td>
<td>0.43</td>
<td>0.43</td>
<td></td>
</tr>
<tr>
<td>( \rho_{\phi_m,\phi_f} )</td>
<td>0.815 gender corr. of log hours</td>
<td>0.02</td>
<td>0.02</td>
<td></td>
</tr>
</tbody>
</table>
## Baseline Economy

<table>
<thead>
<tr>
<th></th>
<th>(E)</th>
<th>(\ln \bar{h})</th>
<th>(sd(\ln h))</th>
<th>(\ln \bar{w})</th>
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<tbody>
<tr>
<td><strong>Males</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Linear</td>
<td>0.61</td>
<td>7.75</td>
<td>0.16</td>
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<tr>
<td>Linear</td>
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<td>7.51</td>
<td>0.31</td>
<td>2.22</td>
<td>0.43</td>
</tr>
<tr>
<td>Aggregate</td>
<td>1.00</td>
<td><strong>7.67</strong></td>
<td><strong>0.26</strong></td>
<td><strong>2.46</strong></td>
<td>0.49</td>
</tr>
<tr>
<td><strong>Females</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>7.51</td>
<td>0.20</td>
<td>2.53</td>
<td>0.46</td>
</tr>
<tr>
<td>Linear</td>
<td>0.57</td>
<td>7.13</td>
<td>0.58</td>
<td>2.17</td>
<td>0.43</td>
</tr>
<tr>
<td>Aggregate</td>
<td>1.00</td>
<td>7.31</td>
<td>0.51</td>
<td>2.34</td>
<td>0.48</td>
</tr>
</tbody>
</table>
Hours Worked and Occupational Choice: Men

• Log of mean hours
  - Data: $\ln \bar{h}_{m,1} = 7.73$, $\ln \bar{h}_{m,2} = 7.57$
  - Model: $\ln \bar{h}_{m,1} = 7.75$, $\ln \bar{h}_{m,2} = 7.51$

• SD of log hours
  - Data: $sd(\ln h_{m,1}) = 0.22$, $sd(\ln h_{m,2}) = 0.32$
  - Model: $sd(\ln h_{m,1}) = 0.16$, $sd(\ln h_{m,2}) = 0.31$

• Occupational choice
  - 61% in sector 1 (targeted)

• Mechanism
  - illustrated with the single individual problem
Gender Gaps in Hours and Occupational Choice

- Gender asymmetry: Time endowments $T_f < T_m$

- Gender gap in occupational choice
  - only 43% of women are in sector 1
  - model accounts for 75% of occupational gap (0.24 data vs 0.18 model).

- Gender gap in hours
  - Women work less – overall and in each sector
Gender Gap in Wages

- Model accounts for 29% of the gender wage gap
- Nonlinear sector
  - model accounts for 17% of the gender wage gap
  - $\ln h_{f,1} < \ln h_{m,1} \Rightarrow$ women earn less
  - partially offset – women better selected in terms of $\left( \frac{a_1}{a_2} \right)$
- Linear sector
  - model accounts for 15% of the gender wage gap
  - women worse selected in terms of $a_2$
- Aggregate wage gap: large fraction is due to within-occupation gender wage gap, as in the data.
## The Role of Selection

### Gender Differences in log

<table>
<thead>
<tr>
<th></th>
<th>skills</th>
<th>φ</th>
<th>( \frac{a_1}{a_2} )</th>
<th>( \frac{a_2}{a_1} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>NL</td>
<td>-0.10</td>
<td>0.13</td>
<td>-0.11</td>
<td>-</td>
</tr>
<tr>
<td>L</td>
<td>0.06</td>
<td>0.01</td>
<td>-</td>
<td>0.17</td>
</tr>
</tbody>
</table>

Relative to men, women in NL are:

- more positively selected in skill ratio \( \frac{a_1}{a_2} \)
- more negatively selected in \( \phi \).

Relative to men, women in L are **more negatively** selected in skill ratio \( \frac{a_2}{a_1} \).
The Role of Household Interactions

<table>
<thead>
<tr>
<th></th>
<th>Everyone Single</th>
<th>Baseline Economy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wage Gap (%)</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>Hours Gap (%)</td>
<td>20</td>
<td>36</td>
</tr>
<tr>
<td>Occupational Gap (%)</td>
<td>8</td>
<td>18</td>
</tr>
</tbody>
</table>

**Key finding:** Introducing household interactions

Sensitivity Analysis: Heterogeneity in Occupations

<table>
<thead>
<tr>
<th></th>
<th>$\theta_1$</th>
<th>$\theta_2$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.6</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>0.6</td>
<td>0.2</td>
</tr>
<tr>
<td></td>
<td>0.8</td>
<td>0.2</td>
</tr>
<tr>
<td></td>
<td>0.8</td>
<td>0.4</td>
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Gender Differences

<table>
<thead>
<tr>
<th></th>
<th>Wage</th>
<th>Hours</th>
<th>Share Emp NL</th>
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<tbody>
<tr>
<td></td>
<td>0.12</td>
<td>0.11</td>
<td>0.16</td>
</tr>
<tr>
<td></td>
<td>0.13</td>
<td>0.16</td>
<td>0.17</td>
</tr>
<tr>
<td></td>
<td>0.29</td>
<td>0.32</td>
<td>0.26</td>
</tr>
<tr>
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<td>0.26</td>
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<td></td>
<td>0.17</td>
<td>0.11</td>
<td>0.17</td>
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<td>0.17</td>
<td>0.11</td>
</tr>
</tbody>
</table>
Misallocation and Welfare

• How costly is the gender asymmetry in the time endowment?
  : This question relates to the recent work by Hsieh et al (2016) on the misallocation of talent

• Households optimally choose how to assign discretionary time
  : men and women identical
  : optimal for one member to specialize in home production activities
  : women (men) perform home production activities in half of the households

• Large reallocation of hours worked
  : male hours decrease by 18% (and less likely to be in sector 1)
  : female hours increase by 20.4% (and more likely to be in sector 1)
## Misallocation across Economies

<table>
<thead>
<tr>
<th></th>
<th>$\theta_1$</th>
<th>0.6</th>
<th>0.6</th>
<th>0.8</th>
<th>0.8</th>
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</thead>
<tbody>
<tr>
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<td>0.2</td>
<td>0.4</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Percentage change in:</th>
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</thead>
<tbody>
<tr>
<td>Welfare</td>
<td>10.4</td>
<td>11.7</td>
<td>14.6</td>
<td>18.4</td>
</tr>
<tr>
<td>Output</td>
<td>2.7</td>
<td>4.0</td>
<td>5.1</td>
<td>6.6</td>
</tr>
<tr>
<td>Output per Hour</td>
<td>5.3</td>
<td>7.5</td>
<td>9.7</td>
<td>12.4</td>
</tr>
</tbody>
</table>

- **Large welfare gains of 10.4%**
  - welfare gain at the 90th percentile is 33%

- **Labor productivity increases by 5.3%**
  - higher for women (11%) than men (1.8%)
  - higher for those in occ. 1
Conclusion

• Facts on hours worked (and wages) in occupations
  - negative mean-dispersion relationship in occupational hours
  - hours in an occupation – lower mean and higher dispersion for women
  - wages in an occupation – lower for women

• Two-sector Roy model of occupational sorting
  - sectoral abilities
  - time allocation decision (individuals value leisure)
  - heterogeneous preferences over leisure
  - nonlinear production technology in one of the sectors
  - couples
Conclusion

• Model is consistent with the facts on occupational hours and wages for men and women

• Gender differences in discretionary times, accounts for 29% of the gender wage gap
  
  : large fraction is due to within-occupation gender wage gap, as in the data

• Misallocation: gender equalization leads to large gains in welfare and output per worker.
Additional Slides
Mean and Dispersion in Occupational Hours: by Gender

Figures:
- Men, 1986-1995
- Women, 1986-1995

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Mean and Dispersion in Occupational Hours: by Education

Non-college, 1976-2015

College, 1976-2015
Mean and Dispersion in Occupational Hours: by Age
Over Time: 1976-2015

Men, 1976-1985

Men, 1986-1995

Men, 1996-2005

Men, 2006-2015

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Extensive Margin: Weeks Worked

- Number of weeks worked last year
Intensive Margin

- Usual hours per week last year
Correlation: Intensive vs. Extensive Margin

• Strong positive correlation
Occupational Hours Distribution over Time: Men

Log Mean Annual Hours, Men

Standard Deviation of Log Annual Hours

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Changes in Hours Worked for Occupation Switchers

• Use 1986-1995 IPUMS-CPS data
  : compute mean hours worked in an occupation $j$, $\bar{H}_j$

• Use the 1990 SIPP dataset
  : identify occupational switchers, from occupation $(j - 1)$ to occupation $j$, between months $t - 1$ to $t$
  : compute average change in hours worked between months $t + 1$, $t + 2$, and $t + 3$ and months $t - 2$, $t - 3$, and $t - 4$ (occupational switching during this period is only between months $t - 1$ and $t$)
  : denote the resulting change in log hours for individual $i$ as $\Delta \ln h_{i,j-1}^j$
  : assign to the origin occ. $(j - 1)$ the mean hours worked in that occ., $\bar{H}_{j-1}^j$
  : assign to the destination occ. $j$ the mean hours worked in that occ., $\bar{H}_j^j$
  : dummy variable $S_1$ equal to one if the switch is towards an occup. with lower mean hours worked and zero otherwise
  : dummy variable $S_2$ equal to one if the switch is towards an occup with higher mean hours worked and zero otherwise
Changes in Hours Worked for Occupation Switchers

\[ \Delta \ln h_{j,j-1} = \beta_0 + \beta_1 S_1 + \beta_2 S_1 |\Delta \ln \bar{H}_{j,j-1}| + \beta_3 S_2 + \beta_4 S_2 |\Delta \ln \bar{H}_{j,j-1}| \]

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<th></th>
<th>(\beta_0)</th>
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<td>(</td>
<td>\Delta \ln \bar{H}</td>
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<td>0.022***</td>
<td>-0.245***</td>
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*** – statistically significant at 1%; ** – statistically significant at 5%.

- Results are for men only
- results for women are similar
Wage Profiles in 3-Digit Occupations

- Use the IPUMS-CPS data
  - divide sample into three periods: 1976-85, 1986-95, and 1996-10
  - for each occupation, construct the wage ratios for ages 55 and 25

**Figure:** 55/25 Wage Ratio and Mean Occupational Hours, Men
Wage Profiles in 3-Digit Occupations

**Figure:** 55/40 Wage Ratio and Mean Occupational Hours, Men

![Graph 1](image1)

![Graph 2](image2)

![Graph 3](image3)

**Figure:** Wage at Age 25 and Mean Occupational Hours, Men

![Graph 4](image4)

![Graph 5](image5)

![Graph 6](image6)