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Bargaining and Wage Premiums

- More profitable firms may command wage premiums in a frictional labor market (e.g. Manning, 2003)
  - Do equally-productive men and women strike different wage bargains?
  - Do women sort to firms with lower premiums?
  - Contrast to productivity/discrimination explanations for gender wage gaps (Mulligan and Rubenstein, 2008; Becker, 1957)

- Abowd, Kramarz, and Margolis (1999) framework identifies wage premiums from matched worker-firm data
  - Can estimate premium distribution for men and women; decompose gap into within-and between-firm components
  - Challenge: need a normalization to compare premiums across gender

- Card, Cardoso, and Kline (2014) use Portugese worker-firm data
  - Firm-specific premiums explain \(\approx 20\%\) of wage variation
  - 5\% of gender wage gap appears due to differential bargaining
  - 15\% of gap explained by under-representation at profitable firms
A Model of Wage Premiums

- Log wages of individual $i$ of gender $G(i)$ in period $t$ at firm $J(i, t)$:

$$w_{iJ(i,t)t} = \alpha_{it} + \gamma^G(i) S_{iJ(i,t)t}$$

$a_{it}$: “alternative wage” $S_{iJ(i,t)t}$: “match surplus.” Bargaining: $\gamma^G(i)$

- Assume $S_{iJ(i,t)t} = \bar{S}_{J(i,t)} + \phi_{J(i,t)t} + m_{iJ(it)}$ (no $i, j, t$ complementarity)

- Further project $\alpha_{it}$ onto observables: $\alpha_{it} = \alpha_i + X'_{it} \beta^G(i) + \varepsilon_{it}$

- Then we can write two-way FE model

$$w_{it} = \alpha_i + \psi^G_{J(i,t)} + X'_{it} \beta^G(i) + r_{it}$$

where $\psi^G_{J(i,t)} \equiv \gamma^G(i) \bar{S}_{J(i,t)}$

and $r_{it} \equiv \gamma^G(i) (\phi_{J(i,t)t} + m_{iJ(i,t)}) + \varepsilon_{it}$
AKM-Style Identification

- Can we estimate this by OLS? Need orthogonality:

\[
E (r_{it} - \bar{r}_i) \ D_{it}^j - \bar{D}_i^j \mid G(i) = 0, \forall j
\]

For \( D_{it}^j = 1\{J(i, t) = j\} \) and time averages \( \bar{r}_i \) and \( \bar{D}_i^j \)

- Consider two-period model (equivalent to first-differences):

\[
E[\Delta r_i \cdot \Delta D_i^j \mid G(i)] = E[\Delta r_i \mid \Delta D_i^j = 1, G(i)]P(\Delta D_i^j = 1, G(i))
- E[\Delta r_i \mid \Delta D_i^j = -1, G(i)]P(\Delta D_i^j = -1, G(i))
\]

In steady state, expect \( P(\Delta D_i^j = 1, G(i)) = P(\Delta D_i^j = -1, G(i)) \)

- Identified if “joiners” and “leavers” have same \( \Delta r_i \) on average;

  - (Tortured) analogy: time as a binary instrument, joiners/leavers as compliers/defiers. ATE identified if \( Cov(Y_1 - Y_0, D_1 - D_0 \mid G) = 0 \)
Violations of Orthogonality

- Can write:

\[ \Delta r_i = \gamma^{G(i)}(\phi_{J(i,2)} - \phi_{J(i,1)} + m_{iJ(i,2)} - m_{iJ(i,1)}) + \Delta \varepsilon_i \]

- Identification fails if:
  - Mobility is related to firm-wide shocks (\(\phi\)): workers may be more likely to leave firms experiencing negative shocks (expect “Ashenfelter dips”)
  - Mobility is related to match quality (\(m\)): expect workers moving from firm A to B see different wage changes than from B to A
  - Mobility is related to transitory wage shocks (\(\varepsilon\)): workers performing well may move to higher wage firm (also expect imbalanced pre-trends; richer \(X_{it}\) controls may help here)

- CCK look for non-parametric evidence of violations of these (strong) restrictions
Identification Diagnostics (Men)

Figure 2a: Mean Wages of Male Job Changers, Classified by Quartile of Mean Co-Worker Wage at Origin and Destination Firm

- Parallel pre-trends; apparently symmetry

Courtesy of David Card, Ana Rute Cardoso, and Patrick Kline. Used with permission.
Figure 2b: Mean Wages of Female Job Changers, Classified by Quartile of Mean Co-Worker Wage at Origin and Destination Firm

- Note orthogonality needed *for each j*, not just on average *(not tested)*
Normalization

- In AKM, firm effects are only identified up to a normalizing constant within “connected sets” (firms that have movers in common)
  - Just as only cells with variation contribute effects to usual FEs

- In two-sector CCK, need a further normalization to compare across sectors (i.e. compare female premiums to male)

- In CCK’s model, true premiums should be zero at firms that offer no surplus above the alternative wage. Using annual value-added data to proxy for average surplus, normalize

\[ E[\psi^g_{J(i,t)} | \bar{VA}_{J(i,t)} \leq \tau] = 0 \]

for some estimated \( \tau \)

- Reflects “hockey-stick” pattern shape in estimated firm fixed effects
Normalizing Firm Fixed Effects

Figure 4: Firm Fixed Effects vs. Log Value Added/Worker

Courtesy of David Card, Ana Rute Cardoso, and Patrick Kline. Used with permission.
Interpretation

Decomposing Premiums

As in typical Oaxaca-Blinder decomposition,

\[ E[\psi^M | G = M] - E[\psi^F | G = F] = E[\psi^M - \psi^F | G = M] \]

\[ + E[\psi^F | G = M] - E[\psi^F | G = F] \]

\[ = E[\psi^M - \psi^F | G = F] \]

\[ + E[\psi^M | G = M] - E[\psi^M | G = F] \]

<table>
<thead>
<tr>
<th>Means of Estimated Firm Effects:</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm Effects for Males (( \hat{\psi}^M_{j(i,t)} ))</td>
<td>0.148</td>
<td>0.114</td>
</tr>
<tr>
<td>Firm Effects for Females (( \hat{\psi}^F_{j(i,t)} ))</td>
<td>0.145</td>
<td>0.099</td>
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</table>

3.5% – 4.5% of wage gap due to sorting; 0.3% – 1.5% to bargaining

- Overall wage gap: 23.4%, so \( \approx 15\% \) of this sorting, \( \approx 5\% \) bargaining
- Mean premium for males: 15%. Implies \( \gamma^F / \gamma^M \approx 0.9 \)
Alternative Estimation of $\gamma^F / \gamma^M$

- Can directly estimate slope of $\psi^F$ to $\psi^M$ by estimating:
  \[
  \hat{\psi}^F = (\gamma^F / \gamma^M)\hat{\psi}^M + \eta
  \]

  To avoid attenuation bias, CCK estimate this on firm group averages (equivalent to IV with group dummies; Angrist, 1991)

- Alternatively, assuming
  \[
  E[\widetilde{S}_{J(i,t)}|\widetilde{VA}_{J(i,t)}, G(i)] = \kappa \max\{0, \widetilde{VA}_{J(i,t)} - \tau\}
  \]
  \[
  \equiv E\widetilde{VA}_{J(i,t)}
  \]

  we have
  \[
  \psi^g_{J(i,t)} = \pi^g E\widetilde{VA}_{J(i,t)} + \nu^g_{J(i,t)}
  \]

  where $\pi^F / \pi^M = \gamma^F / \gamma^M$

  which we can estimate by OLS using cross-firm variation (i.e. comparing slopes from Figure 4), within-firm (time) variation, or both
### Between-Firm Estimates of $\gamma^F/\gamma^M$

#### Table 5: Estimated Relationship Between Estimated Firm Effects and Mean Log Value-Added per Worker

<table>
<thead>
<tr>
<th>Number Firms</th>
<th>All Males</th>
<th>All Females</th>
<th>Females in &quot;Female&quot; Occ's</th>
<th>Females in &quot;Male&quot; Occ's</th>
<th>Ratio to Men: All Females</th>
<th>Ratio to Men: Females in &quot;Female&quot; Occ's</th>
<th>Ratio to Men: Females in &quot;Male&quot; Occ's</th>
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<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
<td>(6)</td>
<td>(7)</td>
<td>(8)</td>
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<tr>
<td>1. Dual connected with VA/L</td>
<td>47,477</td>
<td>0.156</td>
<td>0.137</td>
<td>0.879</td>
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<tr>
<td>2. Dual connected, with VA/L and females in &quot;female&quot; occupations</td>
<td>42,667</td>
<td>0.155</td>
<td>0.136</td>
<td>0.136</td>
<td>0.879</td>
<td>0.875</td>
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<tr>
<td>2. Dual connected, with VA/L and females in &quot;male&quot; occupations</td>
<td>14,638</td>
<td>0.138</td>
<td>0.128</td>
<td>0.129</td>
<td>0.924</td>
<td>0.933</td>
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</tbody>
</table>

Notes: Columns 2-5 report coefficients of mean log value-added per worker in excess of 2.4 in regression models in which the dependent variables are the estimated firm effects for the gender/occupation group identified in the row headings. All specifications include a constant. Models are estimated at the firm level, weighted by the total number of male and female workers at the firm. Ratio estimates in columns 6-8 are obtained by IV method -- see text. Standard errors in parentheses.

Courtesy of David Card, Ana Rute Cardoso, and Patrick Kline. Used with permission.
Within-Firm Estimates of $\gamma^F / \gamma^M$

Figure 6: Changes in Excess Value Added and Changes in Wages of Stayers, 2006-2009

- Ratio of slopes (either OLS or instrumented by lags) : $\approx 0.9$

Courtesy of David Card, Ana Rute Cardoso, and Patrick Kline. Used with permission.
Takeaways

- A simple, relatively transparent way of assessing differential bargaining over wage premiums as an explanation for the gender wage gap
  - Careful description of the data and identifying assumptions
  - Key result obtained by a number of different methods (all clearly presented and transitioned between - really a pleasure to read!)

- Female employees receive \( \approx 90\% \) of wage premiums earned by men, while also being more likely to work at less productive firms

- Natural next question: how do we interpret these reduced-form facts?
  - “Nice girls don’t ask” hypothesis? (Babcock and Laschever, 2003)
  - Taste-based/statistical discrimination?
  - Monopsonistic wage-setting with different elasticities of labor supply? (Manning, 2003; Barth and Dale-Olsen, 2009)
  - Differential preferences over job flexibility? (Goldin, 2014)