14.662 Recitation 11

Card, Cardoso, and Kline (2014): Bargaining, Sorting, and the Gender Wage Gap

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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 α_{it} onto observables: $\alpha_{it} = \alpha_i + X_{it}'\beta^{G(i)} + \varepsilon_{it}$

- Then we can write two-way FE model

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

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

$$\text{and} \quad r_{it} \equiv \gamma^{G(i)}\left(\phi_{J(i,t)t} + m_{iJ(i,t)}\right) + \varepsilon_{it}$$

AKM-Style Identification

- Can we estimate this by OLS? Need orthogonality:

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

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

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

$$\begin{aligned} E[\Delta r_i \cdot \Delta D_i^j | G(i)] = & E[\Delta r_i | \Delta D_i^j = 1, G(i)] P(\Delta D_i^j = 1, G(i)) \\ & - E[\Delta r_i | \Delta D_i^j = -1, G(i)] P(\Delta D_i^j = -1, G(i)) \end{aligned}$$

  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 Δr_i on average;
  - (Tortured) analogy: time as a binary instrument, joiners/leavers as compliers/defiers. ATE identified if $Cov(Y_1 - Y_0, D_1 - D_0 | G) = 0$

Violations of Orthogonality

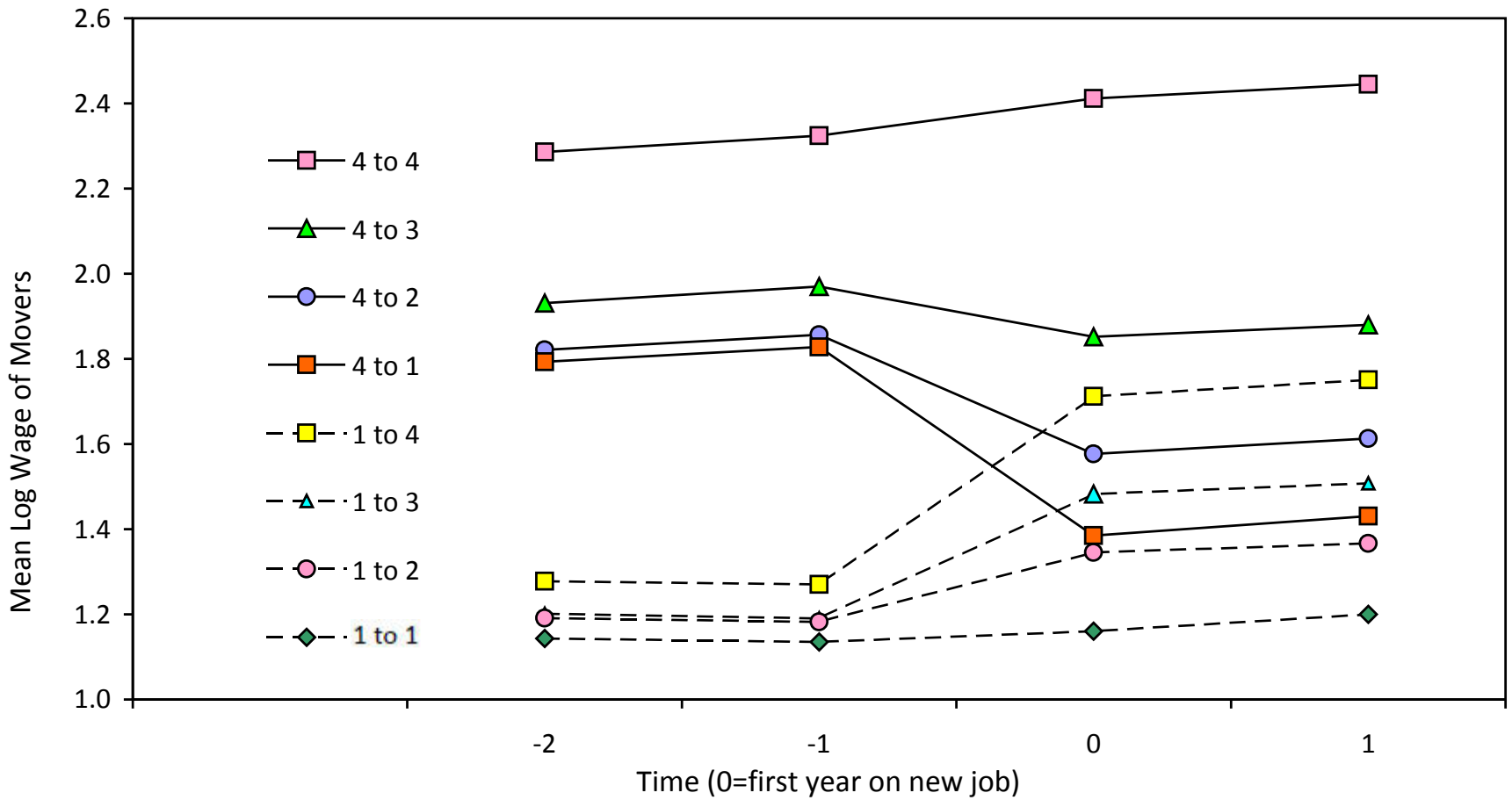
- Can write:

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

- Identification fails if:
  - Mobility is related to firm-wide shocks (ϕ): 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 (ε): 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

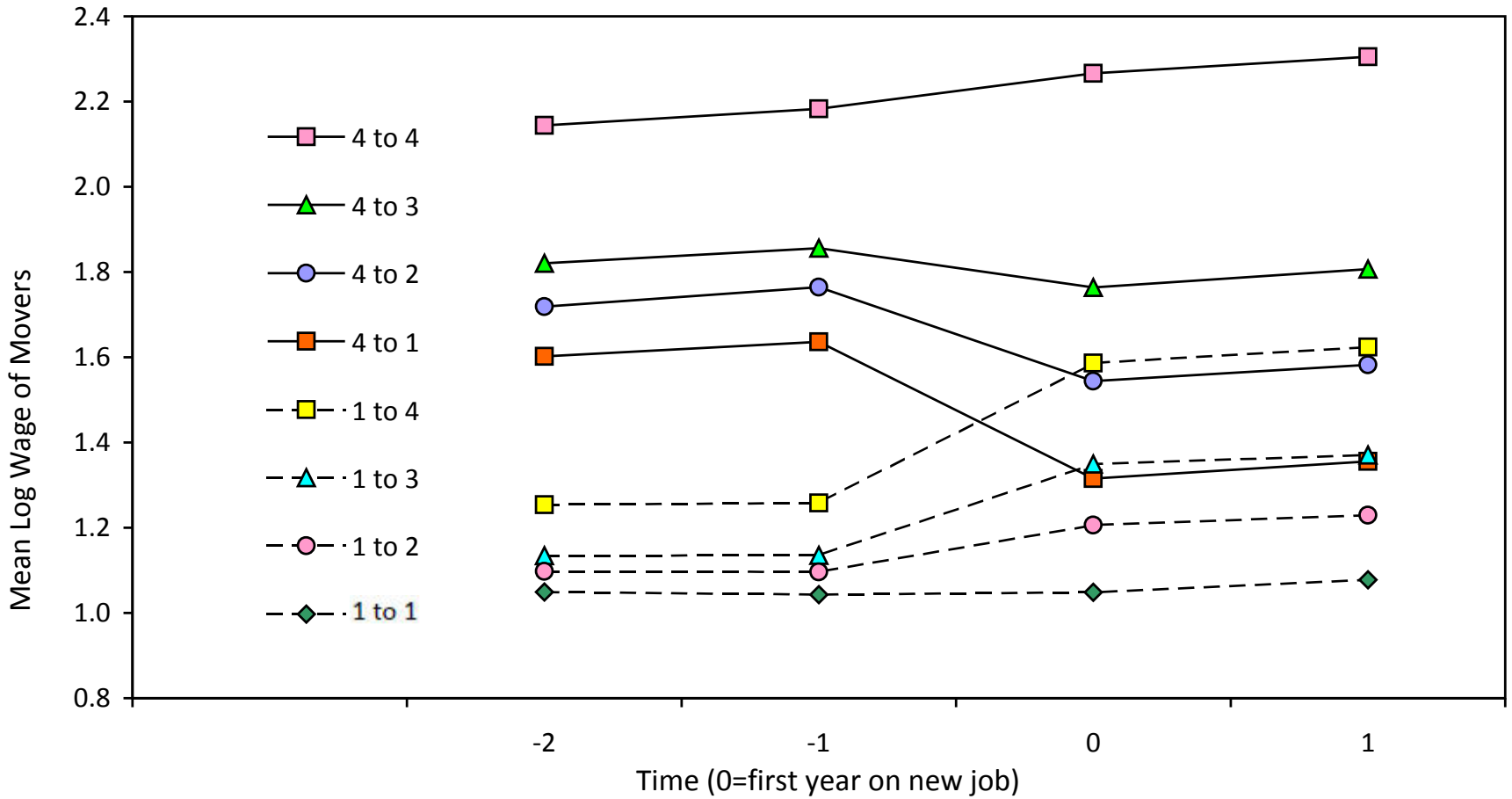


Courtesy of David Card, Ana Rute Cardoso, and Patrick Kline. Used with permission.

- Parallel pre-trends; apparently symmetry

Identification Diagnostics (Women)

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

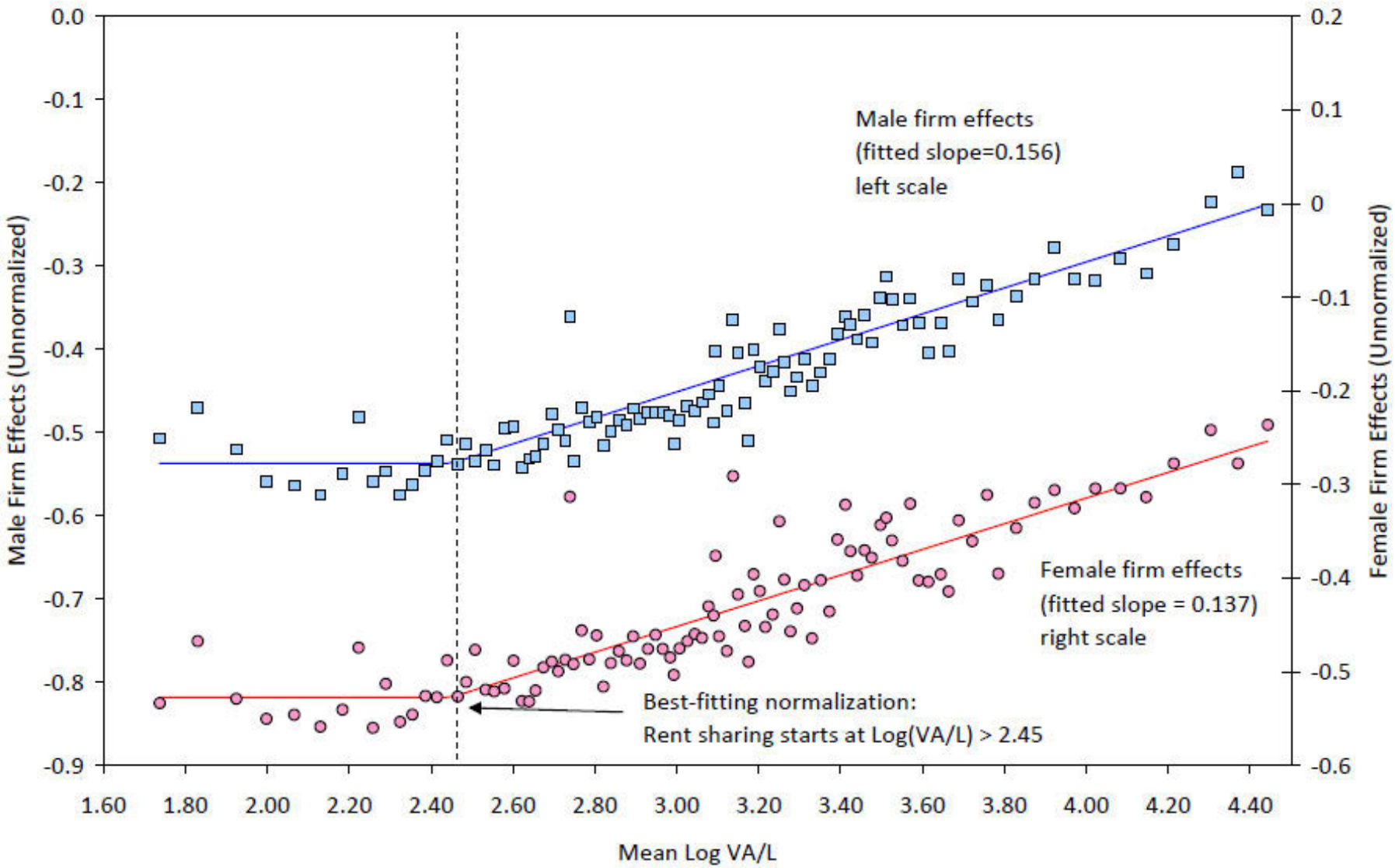
- In AKM, firm effects are only identified up to a normalizing constant within "connected sets" (firms that have movers in common)
  - Just as only cells with variation contribute effects to usual FEs
- In two-sector CCK, need a further normalization to compare across sectors (i.e. compare female premiums 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 τ
- Reflects "hockey-stick" pattern shape in estimated firm fixed effects

Normalizing Firm Fixed Effects

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

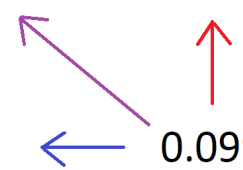


Decomposing Premiums

- As in typical Oaxaca-Blinder decomposition,

$$\begin{aligned} E[\psi^M|G=M]-E[\psi^F|G=F] =& E[\psi^M-\psi^F|G=M] \\ &+E[\psi^F|G=M]-E[\psi^F|G=F] \\ =& E[\psi^M-\psi^F|G=F] \\ &+E[\psi^M|G=M]-E[\psi^M|G=F] \end{aligned}$$

Means of Estimated Firm Effects:	Males	Females
Firm Effects for Males ($\widehat{\psi}^M_{j(i,t)}$)	0.148	0.114
Firm Effects for Females ($\widehat{\psi}^F_{j(i,t)}$)	0.145	0.099



- $3.5\% - 4.5\%$ 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 γ^F/γ^M

- Can directly estimate slope of ψ^F to ψ^M by estimating:

$$\widehat{\psi^F} = (\gamma^F/\gamma^M)\widehat{\psi^M} + \eta$$

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

- Alternatively, assuming

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

we have

$$\psi^g_{J(i,t)} = \pi^g E\bar{VA}_{J(i,t)} + \nu^g_{J(i,t)}$$

$$\text{where } \pi^F/\pi^M = \gamma^F/\gamma^M$$

which we can esimate by OLS using cross-firm variation (i.e. comparing slopes from Figure 4), within-firm (time) variation, or both

Between-Firm Estimates of γ^F / γ^M

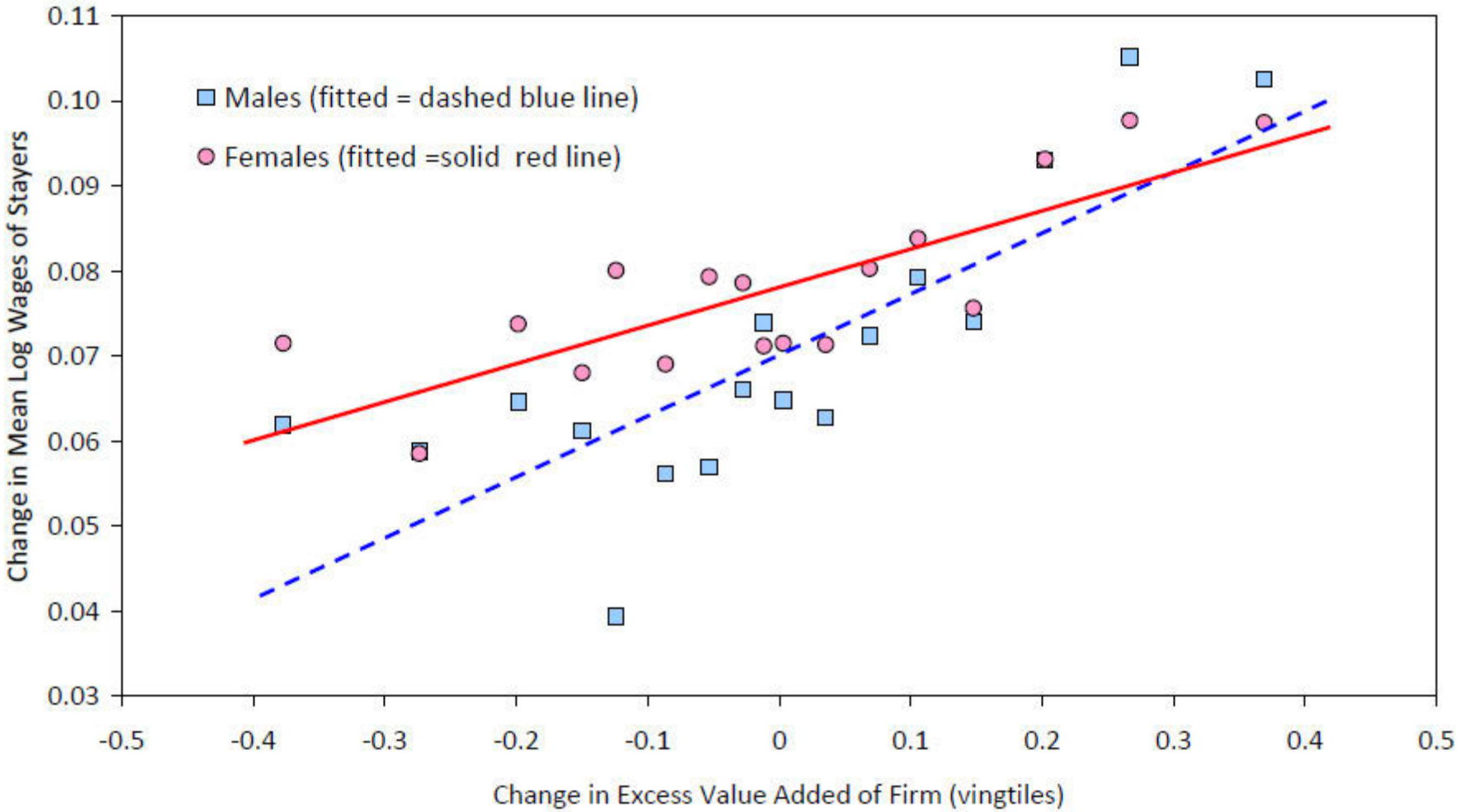
Table 5: Estimated Relationship Between Estimated Firm Effects and Mean Log Value-Added per Worker

		Regressions of Firm Effects on log(VA/L)						
	Number Firms (1)	All Males (2)	All Females (3)	Females in "Female" Occ's (4)	Females in "Male" Occ's (5)	Ratio to Men: All Females (6)	Ratio to Men: Females in "Female" Occ's (7)	Ratio to Men: Females in "Male" Occ's (8)
1. Dual connected with VA/L	47,477	0.156 (0.006)	0.137 (0.006)			0.879 (0.031)		
2. Dual connected, with VA/L and females in "female" occupations	42,667	0.155 (0.006)	0.136 (0.006)	0.136 (0.007)		0.879 (0.032)	0.875 (0.043)	
2. Dual connected, with VA/L and females in "male" occupations	14,638	0.138 (0.008)	0.128 (0.008)		0.129 (0.009)	0.924 (0.048)		0.933 (0.049)

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.

Within-Firm Estimates of γ^F / γ^M

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



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

- Ratio of slopes (either OLS or instrumented by lags) : ≈ 0.9

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)
  - Differental preferences over job flexibility? (Goldin, 2014)

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