Graduate Labor Economics

Lecture 7: Market Concentration and Monopsony Power

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 Email: brendan.m.price@frb.gov. These notes are adapted from UC Davis course ECN 250A, which I taught in Winter 2018 and Spring 2019. Any views or opinions expressed here are my own and do not necessarily represent the views or policies of the Board of Governors of the Federal Reserve System or its staff. This version: March 21, 2020.

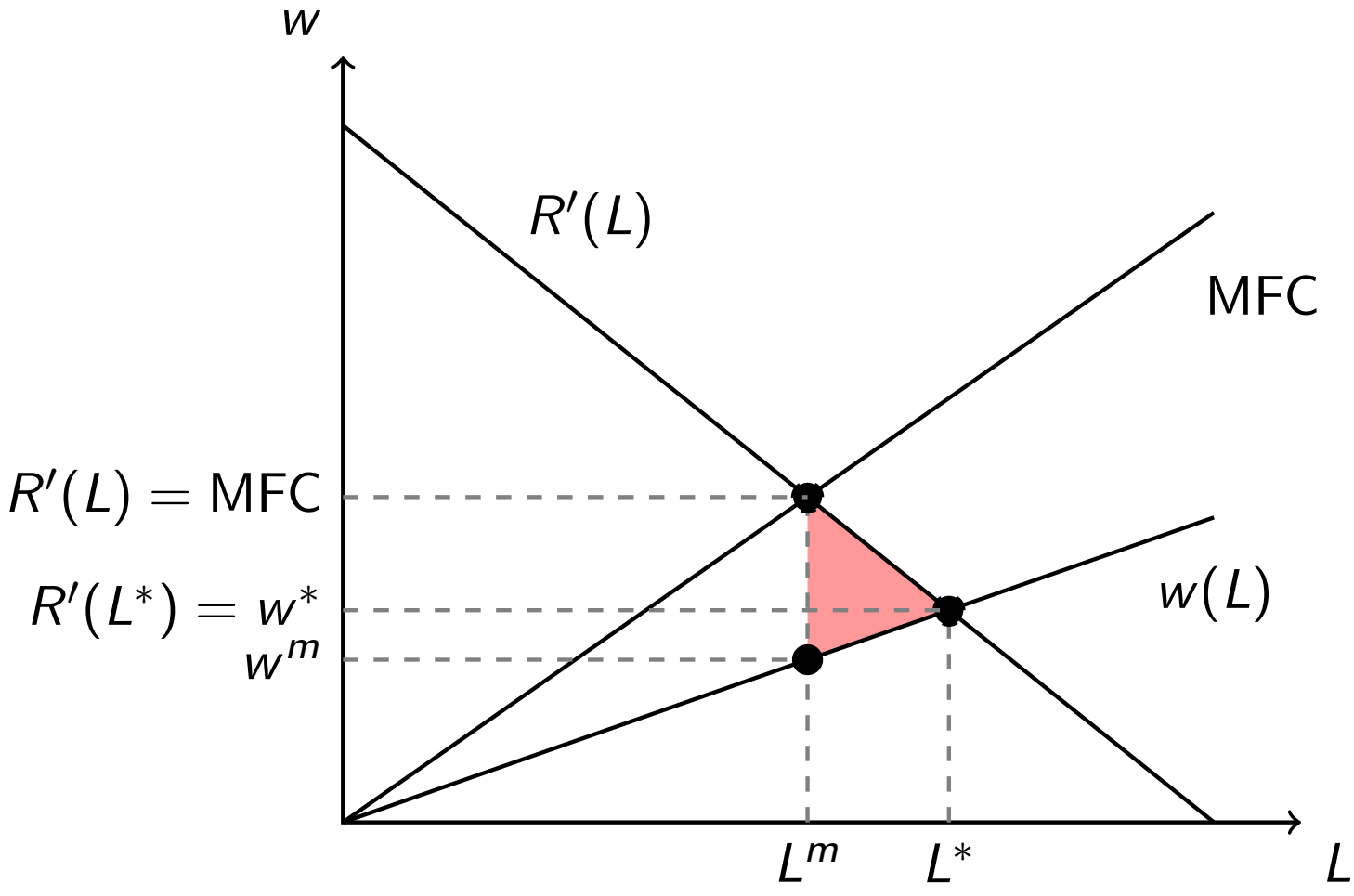
Today's lecture

- Monopsony models
- Matsudaira (2014)

The static model of monopsony (Robinson 1933)

- Key condition: firm faces upward sloping labor supply $w(L)$
  - Literal case: firm is "only buyer" of labor
  - More realistic: horizontal differentiation
- Employer must pay everyone the same wage (can relax this)
  - Doesn't know reservation wages
  - Fairness norms, morale
  - Anti-discrimination laws
- The employer's problem: $\max_L \; R(L) - w(L)L$
- FOC: $\underbrace{R'(L)}_{\text{MRPL}} = \underbrace{w(L) + w'(L)L}_{\text{marginal factor cost}}$
- Inverse-elasticity wage markdown: $\frac{R'(L)-w}{w} = \frac{1}{\varepsilon}$

Monopsony power $\Longrightarrow$ lower wages, deadweight loss



Dynamic monopsony (Boal and Ransom 1997)

- Dynamic labor supply: $L_t = L_{t-1} + h(w_t, L_{t-1}) - q(w_t, L_{t-1})$
  - Raising wages increases hires, reduces quits
  - Quits are probably increasing in L_{t-1}
  - Less clear how hires relate to L_{t-1}
- Short-term supply elasticity ε_{SR}, long-term elasticity ε_{LR}
- Firm discount factor β
- Markdown rule: $\frac{R'(L)-w}{w} = (1-\beta)\frac{1}{\varepsilon_{SR}} + \beta\frac{1}{\varepsilon_{LR}}$
  - Presumably, $|\varepsilon_{LR}| > |\varepsilon_{SR}|$
  - Bigger $\beta \implies$ smaller markdown
  - Patient firms "invest" in employee retention
- See lecture notes for details

Explanatory power of the monopsony model

- Common sense: most firms have *some* monopsony power
  - Lower wages by 10 cents: would everyone quit?
  - Jobs are many-dimensional, workers have different tastes
- Competitive model hard to square with numerous facts
  - Efforts at recruitment
  - Firm-size wage premium
  - Scarring effects of job loss
- Growing market concentration may explain recent trends
  - Rising profit margins
  - Falling labor share
  - Stagnant wage growth
  - Rising between-firm wage dispersion

Matsudaira (2014): motivation

- How competitive are low-wage labor markets?
  - Seemingly thick markets . . .
  - . . . but indications of market power
- "Why do we care?"
  - Understanding the wage structure
  - Evaluating labor market regulations
- Independent interest in healthcare jobs
  - Large and growing share of employment
  - Will costs rise as care expands?

Testing for monopsony

- Test whether firms face upward-sloping labor supply
- Two "dual" approaches
  - Mandated change in $w \implies$ how does L respond?
  - Mandated change in $L \implies$ how does w respond?
- Prior literature uses first approach
  - Falch (2010): Norwegian teachers
  - Staiger et al. (2010): nurses at VA hospitals
- Second approach has a conceptual advantage
  - Under monopsony, $w \uparrow$ has ambiguous effect on L
  - But a mandated increase in L always raises wages

Minimum staffing ratios

- Identifying variation: CA minimum nurse staffing law
  - Signed July 1999, effective January 2000, enforced April 2000
  - Applied only to nursing homes (not hospitals)
  - Mandated 3.2 nursing hours per resident-day
  - Penalties for noncompliance
- Why this policy, why now?
  - Perpetual concern: policy endogeneity
  - Was it a response to labor market conditions?
  - Matsudaira says no: it's about patient care

OLS specification

- (Inverse) labor supply for home i in region r in year t

$$w_{irt} = \beta_0 + \beta_1 n_{irt} + \alpha_i + \theta_{rt} + \varepsilon_{irt}$$

- Log-log specification: interpret β_1 as (inverse) elasticity
- Estimate in d-year differences, $d \in \{1, 2, 3, 4\}$

$$\Delta^d w_{ir} = \beta_1^d \Delta^d n_{ir} + \theta_r^d + \Delta^d \varepsilon_{ir}$$

- Why vary the horizon?
  - Supply likely more elastic in the long-run
  - Firms may be slow to comply with the policy

IV strategy

- Concern: supply shifts in $\Delta^d \varepsilon_{ir}$ correlated with $\Delta^d n_{ir}$
- Solution: instrument for $\Delta^d n_{ir}$ using policy variation
  - $HPRD_i \equiv$ (baseline) nurse hours per resident-day
  - Instrument: $GAP_i \equiv \max\{3.2 - HPRD_i, 0\}$
- Statistical issue: mean reversion
  - Non-compliant firms may revert towards compliance
  - To mitigate: average $HPRD_i$ over 1997–1998
  - Could use pre-trends to diagnose any residual issue

Data on California nursing homes

- Long-Term Care Facilities Annual Financial Data
  - Mandatory reporting by CA nursing homes
  - Collected for state certification for Medicaid/Medicare
- Sample selection
  - Data on 1,223 privately run nursing homes
  - Keep 1,091 with data from 1995–1999
  - Drop four outliers ($HPRD_i > 7$)
  - Keep 1,031 with data from 1995–2003
- Always ask: survivorship bias?
  - Will treatment drive some firms out of business?
  - Will treatment affect filing of disclosure reports?
  - Will treatment affect quality of reported data?

Sample descriptives (or: spot the threats)

TABLE 1.—1999 DESCRIPTIVE STATISTICS FOR LONG-TERM CARE FACILITIES IN ANALYSIS SAMPLE BY STAFFING LEVEL

		Quartiles of 1997–1998 HPRD Distribution			
	All	First	Second	Third	Fourth
Number of beds	101.3	93.3	103.1	106.6	102.3
	[48.9]	[40.7]	[43.4]	[52.2]	[56.7]
Average employees	100.4	81.5	96.5	104.5	119.4
	[47.3]	[33.2]	[38.0]	[46.2]	[59.4]
Total care health revenues ($1,000s)	3,812.7	3,137.8	4,003.0	3,999.0	4,112.5
	[2,092.2]	[1,656.0]	[1,877.5]	[2,067.4]	[2,529.7]
Average occupancy	87.8	89.3	87.7	86.9	87.2
% patient-days paid by Medical	67.9	77.8	72.8	65.9	51.8
% patient-days self-paid	24.9	13.3	18.3	26.6	41.6
Average direct care nurses	60.8	49.9	58.6	64.3	70.4
Average number of nurse aides	40.5	33.8	39.8	43.6	44.8
Total number of nurse aides (NAs)	63.8	50.9	60.0	66.3	78.2
NAs employed continuously 1 year	24.0	19.7	22.8	25.8	27.9

There are 1,031 firms overall, with 258 or 257 in each of the quartiles based on the average 1997–1998 staffing (HPRD) level. All firms in the fourth quartile are in compliance with the 3.2 HPRD threshold taking effect in 2000. Sixteen percent of facilities in the third quartile and none in the lower two quartiles are in compliance. Standard deviations of selected variables are in brackets.

(Matsudaira, 2014, Table 1)

Multiple skill groups

- Occupations easily ordered by skill
  - Supervisors: $32/hour
  - Registered nurses (RNs): $24/hour
  - Licensed vocational nurses (LVNs): $18/hour
  - Nurse aides: $9.50/hour
- Mandate refers to *total nursing hours*
  - Cheapest way to comply: nurse aides
  - Extensive and/or intensive margin

A note on (effective) writing

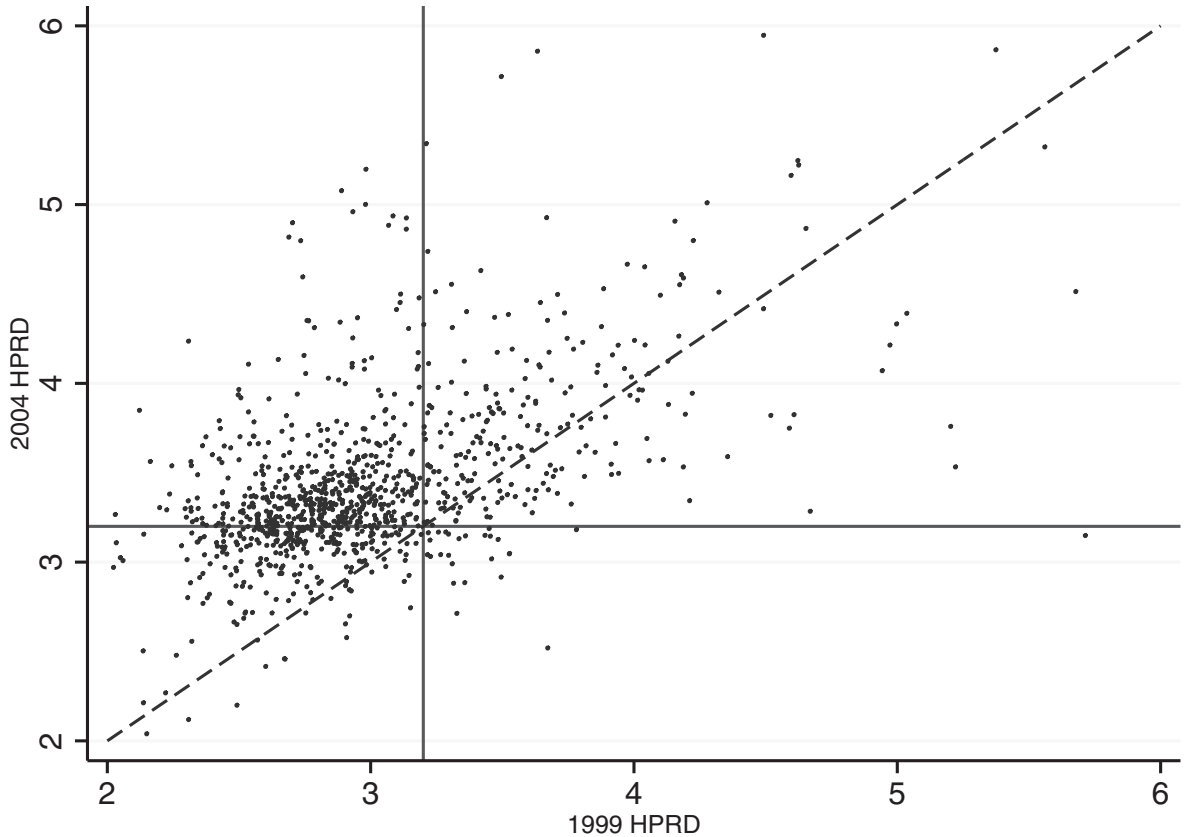
- Beginning of results section:

  [Manning (2003)] suggests several empirical regularities found in labor markets that may be more easily reconciled with monopsony models than with perfect competition. Before turning to the main analyses, it is provocative to note that at least two of these phenomena—an employer-size wage effect and wage dispersion for similar workers—are present in the nursing home labor market.

- What is Matsudaira doing here?
  - We're about to see evidence against monopsony
  - Matsudaira wants us to find this surprising!
  - Presence of these regularities may not prove monopsony

Threshold question: did the policy have "bite"?

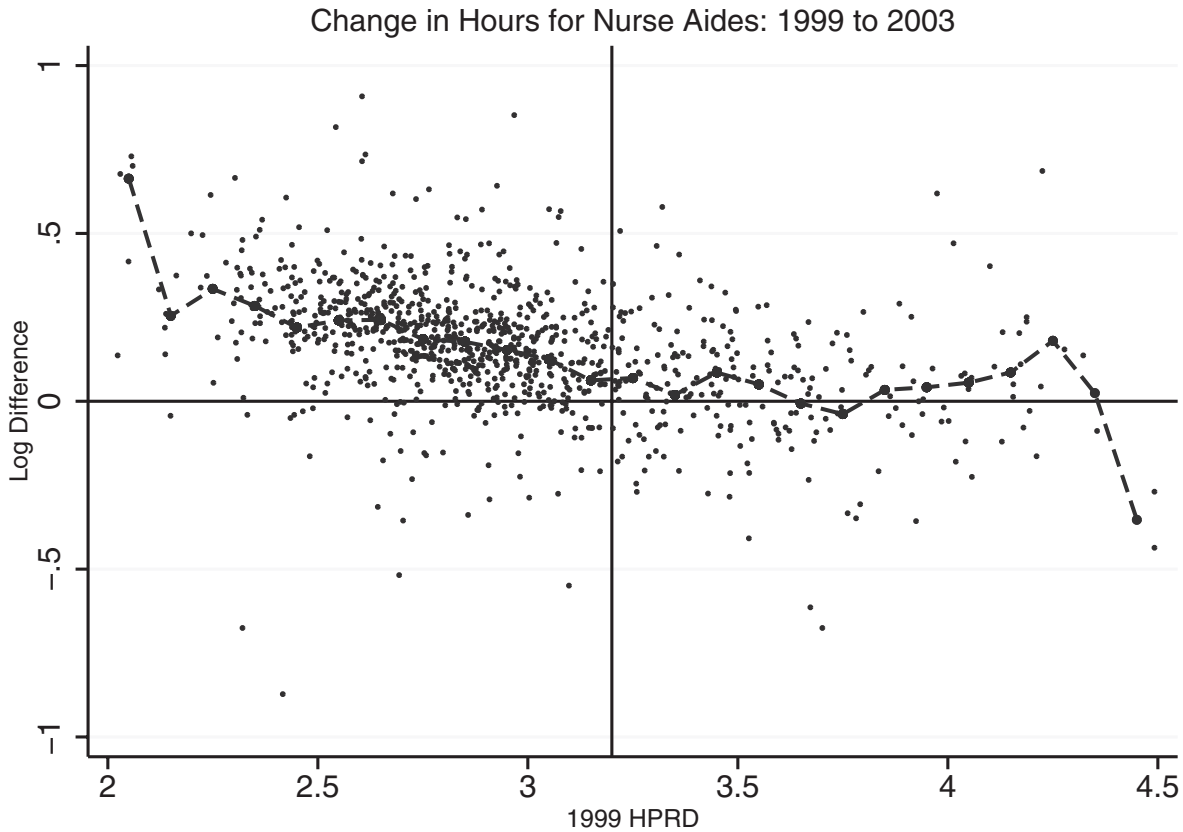
FIGURE 1.—CHANGES IN TOTAL NURSING HOURS PER PATIENT-DAY BY INITIAL STAFFING LEVELS, 1999–2004



(Matsudaira, 2014, Figure 1)

Homes complied by employing more nurse aides

FIGURE 2.—FOUR-YEAR CHANGES IN LOG ANNUAL HOURS OF NURSE AIDES AFTER MINIMUM STAFFING LEGISLATION ENACTED IN 1999



(Matsudaira, 2014, Figure 2)

Strong first-stage effect on nurse-aide hours

TABLE 2.—EFFECT OF MINIMUM STAFFING LEGISLATION ON EMPLOYMENT OF NURSE AIDES (LOG OF TOTAL HOURS), THREE YEARS POSTPOLICY

	1	2	3	4
$GAP_{\overline{9798}}$	0.2314	0.2245	0.2176	0.1501
	(0.0252)	(0.0242)	(0.0249)	(0.0429)
$HPRD_{\overline{9798}} - 3.2$				−0.0421
				(0.0232)
Constant	0.0820	0.0862	NA	NA
	(0.0110)	(0.0102)	(—)	(—)
County fixed effects	No	No	Yes	Yes
Outliers removed	No	Yes	Yes	Yes
R^2	0.0767	0.0804	0.1118	0.1169
Facilities (N)	1,031	1,030	1,030	1,030
Partial F	84.60	86.11	78.61	12.65

The dependent variable across all columns is the difference in the log of average total annual hours worked by nurse aides, 2003–1999. Columns 2–4 omit one nursing home that experiences more than a 1.5 log point change in nurse aide staffing. Robust standard errors are in parentheses.

(Matsudaira, 2014, Table 2)

Interpreting the first stage

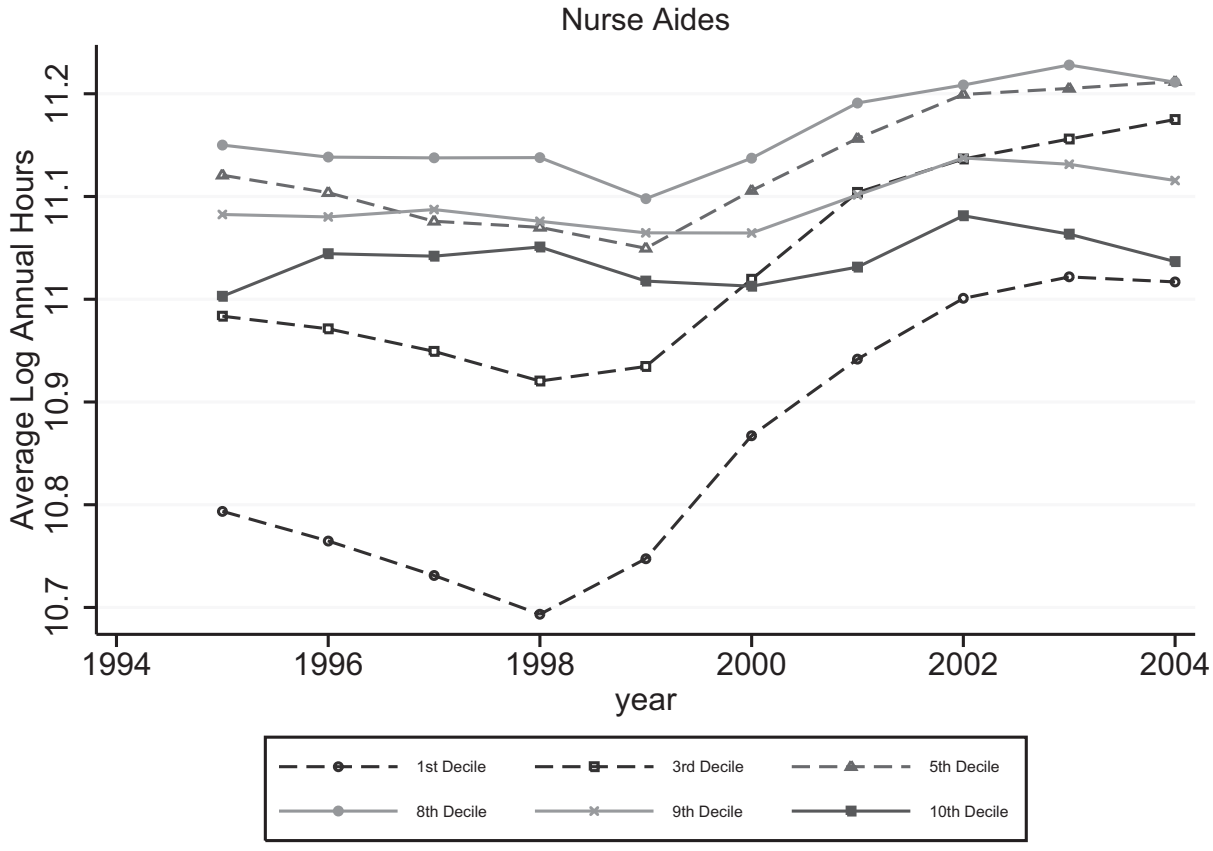
- Typical noncompliant home: $HPRD_i = 2.7$
  - $\Longrightarrow$ $GAP_i = 0.5$
  - $\Longrightarrow$ 12% ($= 0.5 \times 0.23$) increase in nurse aides
- Similar coefficients for log hours, log bodies
  - $\Longrightarrow$ homes adjust along extensive margin
  - Avoid overtime pay? Long shifts already?
- Strong F-statistics for nurse aides
- Weak relationships for LVNs and RNs

Threats

- Difference-in-differences design
- Standard assumption: parallel trends
  - Non-neutral changes in staffing patterns?
  - Concurrent policy changes?
  - Anticipatory behavior?
- Standard diagnostics
  - Look at pretrends
  - Look for placebo outcomes

Similar pretrends, then treatment effects

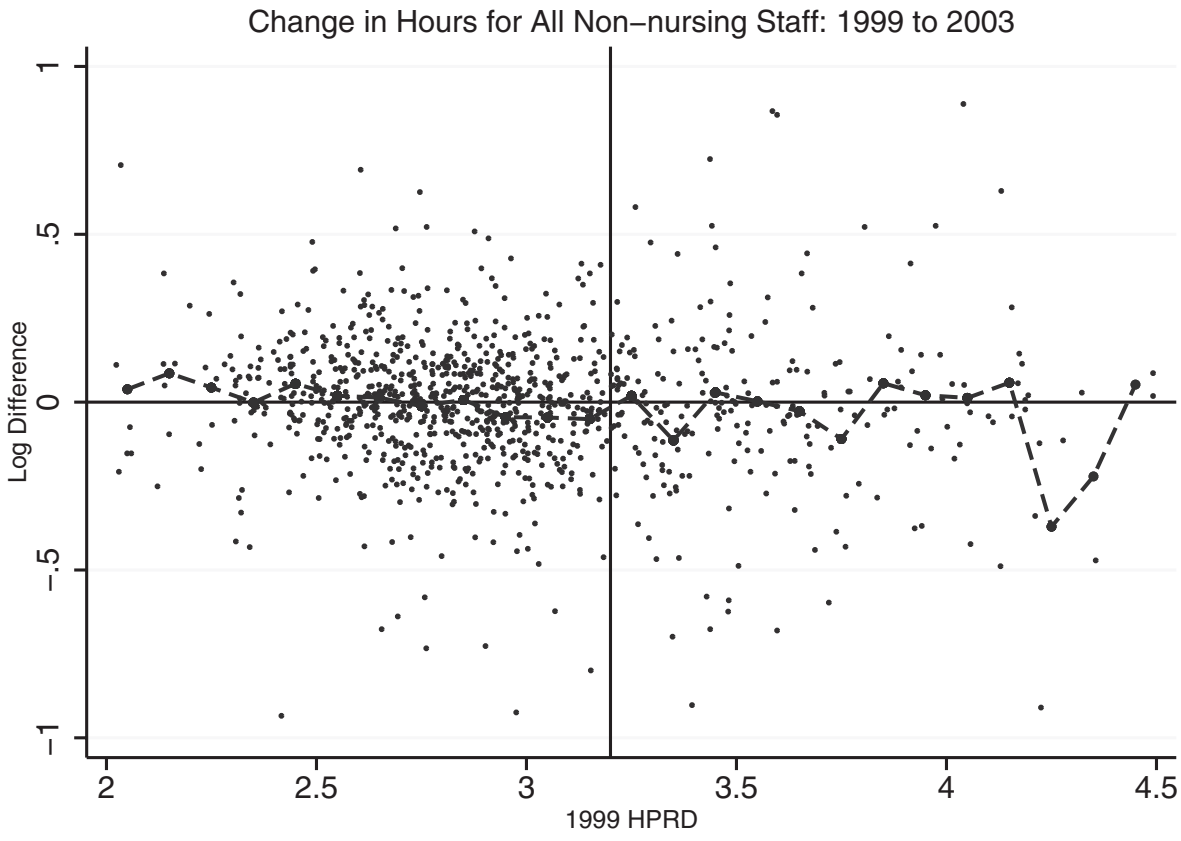
FIGURE 4.—TRENDS IN NURSE AIDE HOURS BY DECILE OF THE AVERAGE 1997–1998 STAFFING (HPRD) DISTRIBUTION, 1995–2004



(Matsudaira, 2014, Figure 4)

Placebo test: non-nursing staff

FIGURE 5.—FOUR-YEAR CHANGES IN LOG TOTAL ANNUAL HOURS AFTER MINIMUM STAFFING LEGISLATION ENACTED IN 1999 FOR ALL NONNURSING STAFF



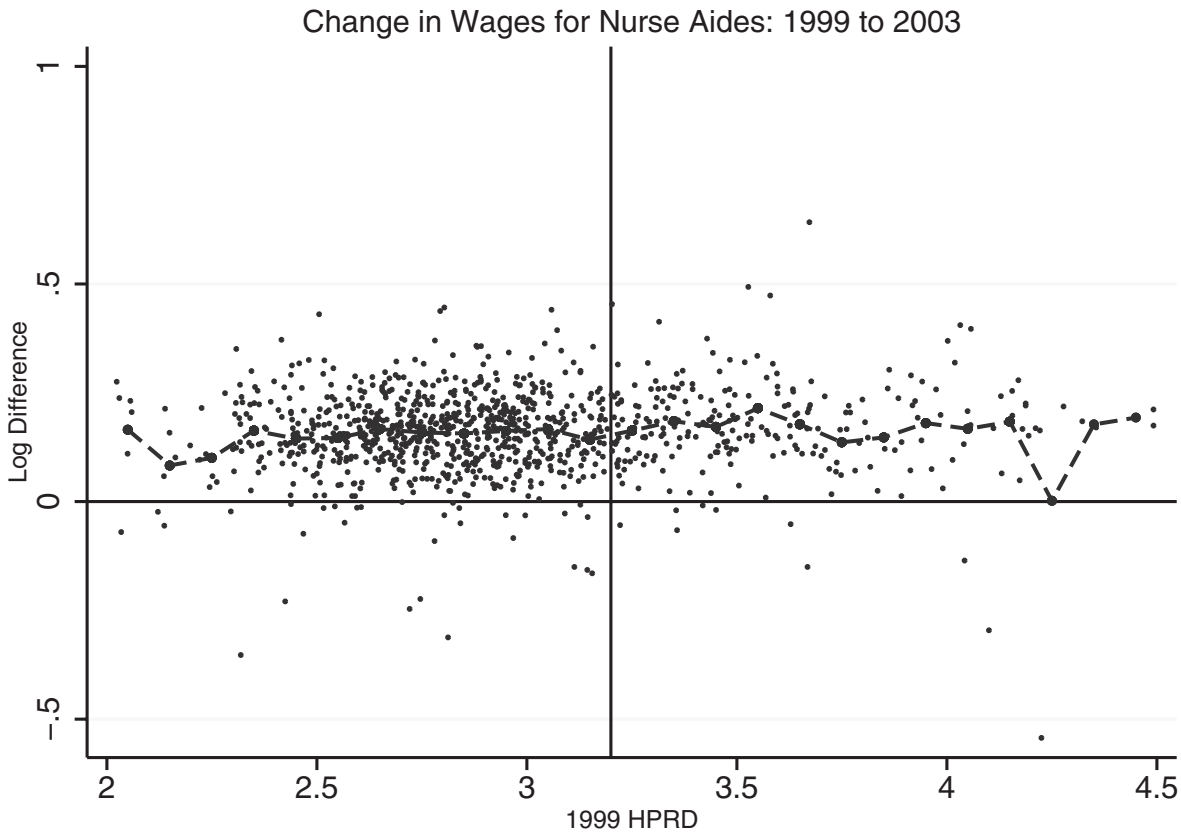
(Matsudaira, 2014, Figure 5)

Taking stock: where are we?

- Good to step back, think big picture
- Where are we in the argument?
  - Minimum staffing policy increased employment
  - Strong first stage only for nurse aides
  - No obvious confounds
- Next question: did firms have to raise wages?
  - Big increase in labor demand
  - Industry-wide, state-wide

Headline result: no change in wages!

FIGURE 6.—FOUR-YEAR CHANGES IN LOG WAGES AFTER MINIMUM STAFFING LEGISLATION ENACTED IN 1999 FOR NURSE AIDES



(Matsudaira, 2014, Figure 6)

Formal IV estimates

TABLE 5.—INSTRUMENTAL VARIABLES ESTIMATES OF INVERSE LABOR SUPPLY ELASTICITY FOR NURSE AIDES

	1	2	3	4
Δ Log Hours, 2003–1999	−0.0363	−0.0368	−0.0475	−0.2281
	(0.0500)	(0.0516)	(0.0564)	(0.1549)
$HPRD_{\overline{9798}}$ −3.2				−0.0245
				(0.0203)
Constant	0.1653	0.1654	NA	NA
	(0.0085)	(0.0088)	(—)	(—)
County fixed effects	No	No	Yes	Yes
Outliers removed	No	Yes	Yes	Yes
R^2	0.023	0.023	0.090	0.015

The dependent variable in all models is the change in log total salary and wages from 1999 to 2003. Columns 2–4 omit one nursing home that experiences more than a 1.5 log point change in nurse aide staffing. Robust standard errors in parentheses.

(Matsudaira, 2014, Table 5)

Interpretation

- Inverse elasticity indistinguishable from zero
  - Negative point estimates (wrong-signed)
  - Upper bound: 0.06–0.08 (small)
- Matsudaira's story: flat supply curve
- Other explanations?
  - Downskilling
  - Better amenities
  - Collective bargaining
- External validity?
- Two final analyses, both inconclusive
  - Short-run vs. long-run elasticities
  - Urban vs. non-urban areas

Postscript: figures vs. tables

- Matsudaira (2014) contains six figures, seven tables
- What are figures good for?
  - Transparently showing the data
  - Justifying parametric assumptions
  - Reducing cognitive load on the reader
  - Making a lasting impression
- What are tables good for?
  - Concisely presenting many specifications
  - Facilitating back-of-the-envelope calculations
  - Reporting sample sizes, R^2, test statistics
- Use each to its best advantage