Firm Wage-Setting Power

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Although economists go-to model of the labor market is often one with **perfect competition** [...] in many applications I think it is more appropriate to model the labor market as **imperfectly competitive**, subject to **monopsony-like effects**, collusive behavior by firms, search frictions, and surpluses that are bargained over...

As a result of these labor market features, firms should be viewed as **wage-setters or wage-negotiators**, rather than wage- takers.

Notice that I don't call these features imperfections. They are the way the labor market works. **The assumption of perfect competition is the deviation from the norm of imperfection as far as the labor market is concerned**

Alan Krueger
August 24, 2018

This presentation

- How meaningful is the departure from perfect competition in labor markets?
- What are the associated efficiency costs of labor monopsony power?

This project:

- Propose an empirical strategy to identify labor market power in production data
- But accounting the presence of product market power
- Use traditional firm-level data and incorporate additional sources (employer-employee data)
- Exploit a general equilibrium oligopsony model to quantify welfare costs and construct counterfactuals

Outline for today

1. Identification of labor market power (individual wage elasticities)
   1.1 Cost side approach
   1.2 Identification problems in standard strategies
   1.3 Alternatives
2. General equilibrium oligopsony model
   2.1 Incorporate monopsony power information to a tractable model
   2.2 Account for monopoly power
   2.3 Evaluate the impact of labor market intervention policies.

Related literature

Measuring Product Market Power

- *De Loecker and Warzynski (2012)*, Jaumandreu and Yin (2017); Jaumandreu and Lin (2017); Jaumandreu (2018), Flynn and Gandhi (Dec, 2018), Flynn, Gandhi and Traina (March, 2019)

Implications of Product Market Power

- Autor et al. (2017), Edmond et al. (2019), De Loecker and Eeckhout (2018), De Loecker et al. (Nov, 2018), Syverson (2019)

Measuring Labor Market Power

- Azar et al. (2017, 2018); Benmelech et al. (2018), Hershbein et al. (2019), Dube et al. (2018), Berger, Herkenhoff and Mongey (March, 2019)
- *Manning (2003); Webber (2015)*
- *Dobbelaere and Mairesse (2013)*, Tortarolo and Zarate (2018)

Implications of Labor Market Power

- *Naidu et al. (2018)*, Berger, Herkenhoff and Mongey (March, 2019), Hershbein et al. (2019)

Cost side approach

- For a flexible input v and labor l, we have:

$$\frac{\theta_{it}^{v}}{s_{it}^{v}} = \mu_{it}$$
$$\frac{\theta_{it}^{L}}{s_{it}^{L}} = \mu_{it}\nu_{it}^{-1}$$

- With $\nu_{it} = 1 + \frac{1}{\varepsilon_{it^{w}}}$
- If θ_{it}^{v} and θ_{it}^{m} are known, then can recover product price *markups* and wage *markdowns*
- This requires the estimation of the production function. Standard strategy is to follow De Loecker and Warzinsky (2012)
- But recent literature points out important identification failures of this strategies

Basic structure

$$q_t = f(l_t, k_t, m_t; \beta) + \omega_t + \varepsilon_t$$

- m_t is chosen flexibly each period, with no dynamic implications. Capital is quasi-fixed and labor is chosen before m_t
- ω_t follows exogenous first order Markov process:

$$\omega_t = g(\omega_{t-1}) + \xi_t$$
$$E(\xi_t \mid k_t, l_{t-s}, k_{t-s}, m_{t-s}) = 0 \text{ for all s} \geq 1$$

- Scalar unobservable and strictly monotonicity imply that:

$$m_t = m_t(l_t, k_t, \omega_t)$$
$$\Rightarrow \omega_t = m_t^{-1}(l_t, k_t, m_t)$$

Basic structure

- Substitute ω_t for $m_t^{-1}(l_t, k_t, m_t)$ and run:
$$q_t = f(l_t, k_t, m_t; \beta) + m_t^{-1}(l_t, k_t, m_t) + \varepsilon_t$$

- Obtain $\phi_t = f(l_t, k_t, m_t; \beta) + \omega_t$ and ϕ_{t-1}. Then have:
$$\phi_t = f(l_t, k_t, m_t; \beta) + g(\phi_{t-1} - f(l_{t-1}, k_{t-1}, m_{t-1}; \beta)) + \xi_t$$

- Based on timing assumptions, can construct moments:
$$E\left(\xi_t(\beta) \otimes \begin{pmatrix} k_t \\ l_{t-1} \\ m_{t-1} \end{pmatrix}\right) = 0$$

What's wrong?

Structure insufficient to identify $f(.)$

- ACF (2015), Ackerberg (2016): Proxy structure previously described does not identify β_m (any variable input elasticity!)
- Under no input price variation, m_t is correlated with ω_{it}, so we need instrument
- If we use lagged input as instrument:

$$m_t = m_t(l_t, k_t, g(l_{t-1}, k_{t-1}, m_{t-1}) + \xi_t)$$

- Conditional on $(l_t, k_t, l_{t-1}, k_{t-1}, m_{t-1})$ all variation of m_t is via ξ_t, so no variation left to estimate β_m
- Need m_{t-1} uncorrelated with ξ_t (exclusion restriction) but need m_{t-1} correlated with ξ_t (instrument strength)

What's wrong?

Allowing input price variation is not a solution

- Give lagged inputs validity as instrument by adding an extra state variable

$$m_t = (l_t, k_t, g(l_{t-1}, m_{t-1}, k_{t-1}, p^m_{t-1}) + \xi_t)$$

- m_{t-1} correlated with price of firm's inputs, but uncorrelated with ω_t
- Bond and Sonderbom (2005), FG (2019): Not a practical solution:
  - Firm level input prices are hard to observe
  - If prices are unobserved, we are introducing an omitted variable bias.
  - Even if prices are observed, we need exogenous firm-level variation in prices.
  - FGT (2019): if prices are orthogonal to productivity, DLW estimator still provides bias

What's wrong?

Scalar Unobservable Assumption (SUA)

- $\omega_t \in \mathbb{R}$ is the **only** unobservable affecting m_t
- This rules out optimization error, measurement errors, unobserved firm specific input prices, ...
- DLW (2012) propose to include firm characteristics that potentially can explain such heterogeneity:

$$m_t = m_t(l_t, k_t, z_t)$$

- But usually $m_{it} = m_t(l_{it}, k_{it}, z_{it}, \delta_{it})$, with unobserved demand heterogeneity embodied in δ_{it}.
- Ignoring demand heterogeneity is a potential source of biases and may be internally inconsistent

Alternatives

- Simultaneously estimate markups and output elasticities
  - Jaumandreu (2018), Jaumandreu and Lin (2018), Jaumandreu and Yin (2018), Doraszelski and Jaumandreu (2013, 2018)
- Impose more economic structure and partial identification
  - Flynn and Gandhi (2018), Flynn, Gandhi and Traina (2019)
- Relax scalar unobservable assumption
  - ABBP (2007), Bond and Soderbom (2005)
  - Hu, Huang and Sasaki (2019), Brand (Work in progress)

Model

- Based on Atkeson and Burstein (AER, 2008), Hsieh and Klenow (QJE, 2009), Card et al. (JLE, 2018), Morlacco (WP 2019), Berger et al (WP, 2019)

Environment

- Representative household
- Multiple firms with different productivity: $z_{ijt} \sim F(z)$
  - Continuum of sectors $j \in [0, 1]$
  - Finite number of firms in each sector: $i \in \{1, 2, ..., M_j\}$
- Consumption goods are perfect substitutes*

Model

Household

- Choose amount of labor to supply each firm n_{ijt}, capital K_{t+1} and consumption c_{ijt} :

$$\max_{n_{ijt}, c_{ijt}, K_{t+1}} \sum_{t=0}^{\infty} \beta^t u \left(C_t - \frac{1}{\bar{\varphi}^{\frac{1}{\varphi}}} \frac{N_t^{1+\frac{1}{\varphi}}}{1+\frac{1}{\varphi}} \right)$$

$$N_t := \left[\int_0^1 N_{jt}^{\frac{\theta+1}{\theta}} \, dj \right]^{\frac{\theta}{\theta+1}}$$

$$N_{jt} := \left[\sum_{i \in M_j} n_{jt}^{\frac{\eta+1}{\eta}} \right]^{\frac{\eta}{\eta+1}}$$

$$C_t := \int_0^1 \left(\sum_{i \in M_j} c_{ijt} \right) dj \quad (*)$$

- Subject to budget constraint:

$$C_t + [K_{t+1} - (1-\delta) K_t] = \left[\int_0^1 \left(\sum_{i \in M_j} w_{ijt} n_{ijt} \right) dj \right] + R_t K_t + \Pi_t$$

Model

Elasticities

- θ: mobility across sectors.
  - If $\theta \to 0$ then $N_{jt} = N_{kt} \forall j, k \in [0, 1]$: largest degree of monopsony power for firms
- η : mobility across firms within a sector. E.g. mobility costs, search frictions, heterogeneous preferences...
  - If $\eta \to 0$ then $n_{jt} = n_{kt} \forall j, k \in \{1, ..., M_j\}$: largest degree of monopsony power for firms

Model

Labor Supply

- Given w_{ijt}, first order conditions for household yields an upward sloping labor supply curve:

$$n_{ijt} = \bar{\varphi} \left(\frac{w_{ijt}}{W_{jt}} \right)^{\eta} \left(\frac{W_{jt}}{W_t} \right)^{\theta} W_t^{\varphi}$$

- And the respective inverse labor supply curve:

$$w_{ijt} = \bar{\varphi}^{-\frac{1}{\varphi}} \left(\frac{n_{ijt}}{N_{jt}} \right)^{1/\eta} \left(\frac{N_{jt}}{N_t} \right)^{1/\theta} N_t^{1/\varphi}$$

Model

Firms

- Firms choose k_{ijt} and n_{ijt} (Cournot competition), taken N_t and W_t as given.

$$\pi_{ijt} = \max_{n_{ijt}, k_{ijt}} \bar{Z} z_{ijt} \left(k_{ijt}^{1-\gamma} n_{ijt}^{\gamma}\right)^{\alpha} - R_t k_{ijt} - w_{ijt} n_{ijt}$$

$$s.t.$$

$$w_{ijt} = \bar{\varphi}^{-\frac{1}{\varphi}} \left(\frac{n_{ijt}}{N_{jt}}\right)^{1/\eta} \left(\frac{N_{jt}}{N_t}\right)^{1/\theta} N_t^{1/\varphi}$$

- Above problem can be simplified to:

$$\pi_{ijt} = \max_{n_{ijt}, k_{ijt}} \tilde{Z} \widetilde{z}_{ijt} n_{ijt}^{\widetilde{\alpha}} - w_{ijt} n_{ijt}$$

$$s.t.$$

$$w_{ijt} = \bar{\varphi}^{-\frac{1}{\varphi}} \left(\frac{n_{ijt}}{N_{jt}}\right)^{1/\eta} \left(\frac{N_{jt}}{N_t}\right)^{1/\theta} N_t^{1/\varphi}$$

Model

- Firms are going to markdown wages below the marginal revenue product of labor:

$$
\begin{aligned}
w_{ijt} &= \nu_{ijt}\mathrm{MRPL}_{ijt}, \quad \nu_{ijt} \in (0,1) \\
\nu_{ijt} &= \frac{\varepsilon^{w}_{ijt}}{1+\varepsilon^{w}_{ijt}} \\
\varepsilon^{w}_{ijt} &= \left[\frac{1}{\eta}\left(1-s^{w}_{ijt}\right)+\frac{1}{\theta}s^{w}_{ijt}\right]^{-1} \\
s^{w}_{ijt} &= \frac{w_{ijt}n_{ijt}}{\sum_{i\in j} w_{ijt}n_{ijt}}
\end{aligned}
$$

Model

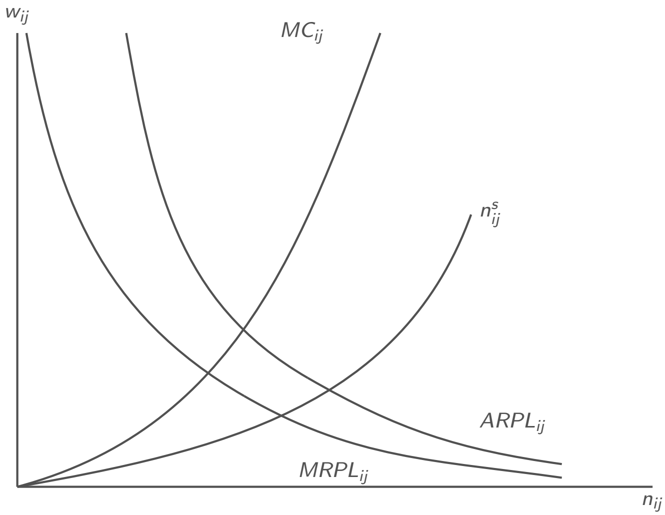

Figure: Firm Structure

Model

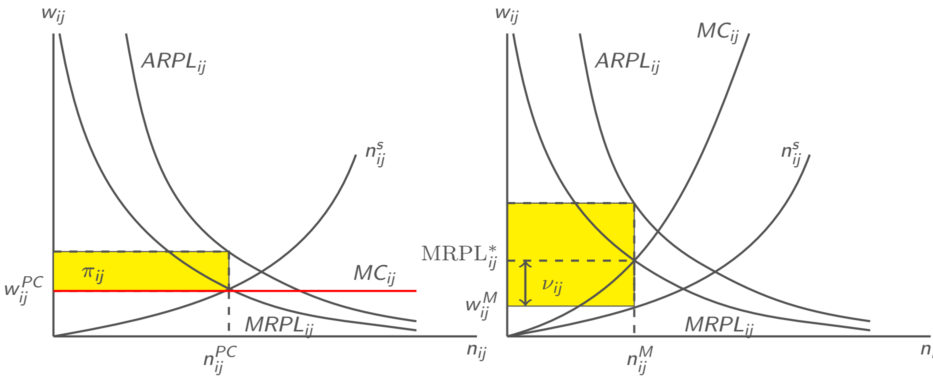

Figure: Wage-Taking and Oligopsonistic Equilibrium

Model

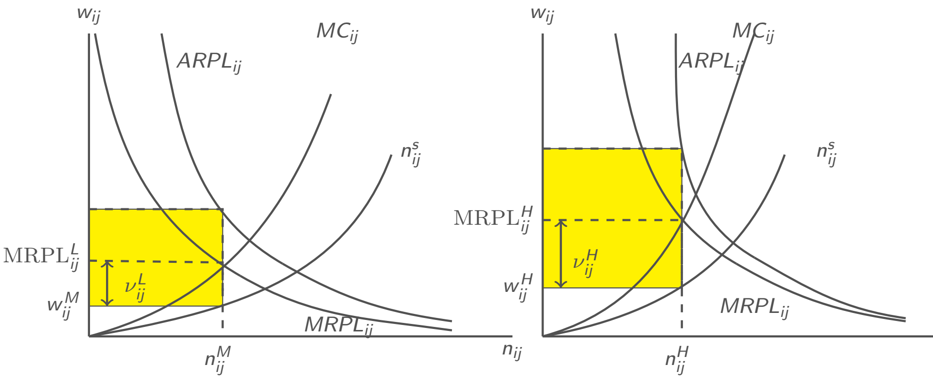

Figure: Firm level optimality and differences in productivity

What's next

- Work on production function estimation
- Work on product market structure
  - Edmond, Midrigal and Xu (AER 2015, WP 2019)
  - Peters (R&R ECTA)
  - Amiti, Itskhoki and Konings (REStud, 2019)

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