Market power and tax design

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Motivation

- In recent decades, many OECD countries experienced
  - (i) rise in wage inequality
  - (ii) decline in labor share
- Possible explanations: SBTC/RBTC, globalization, lower price inv. goods, market power..
- What are the implications of labor market power for the design of optimal redistributive policies?

Motivation

- In recent decades, many OECD countries experienced
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- What are the implications of labor market power for the design of optimal redistributive policies?

This paper

- I extend the Mirrlees (1971) framework with endogenous wages, which are determined either
  - competitively
  - by workers (unions)
  - by firms (monopsony)
- In all cases: how should income taxes be set?
- What this paper is **not** (yet) about:
  - profit taxation
  - unemployment

Main findings

- In the presence of market power, taxes play both a redistributive and a corrective (Pigouvian) role
- Market power provides a force for lower tax rates
- Compared to the competitive benchmark, welfare generally lower with unions but might be higher with a monopsony

General framework

Households

- Households are indexed by their type $n \in \mathcal{N}$, which is distributed according to a distribution function F_n with density f_n
- For simplicity, I assume preferences are quasi-linear:

$$u_n = c_n - v(l_n),$$

with $v(\cdot)$ increasing and strictly convex

Production

- Aggregate production is described by:

$$Y = \left[\int_{\mathcal{N}} a_n L_n^{\frac{\sigma-1}{\sigma}} \mathrm{d}n \right]^{\frac{\sigma}{\sigma-1}}$$

- Here, a_n is a productivity shifter and $L_n = l_n f_n$ is the aggregate labor input of type n

- Parameter $\sigma \geq 0$ is the CES ($=$ own-wage elasticity of labor demand)

- Production features CRS $\rightarrow$ zero profits if wage $=$ MPL

- Note: n indexes a type (not the same as productivity). Mirrlees: $a_n = n$ and $\sigma = \infty$

Government

- Social welfare:

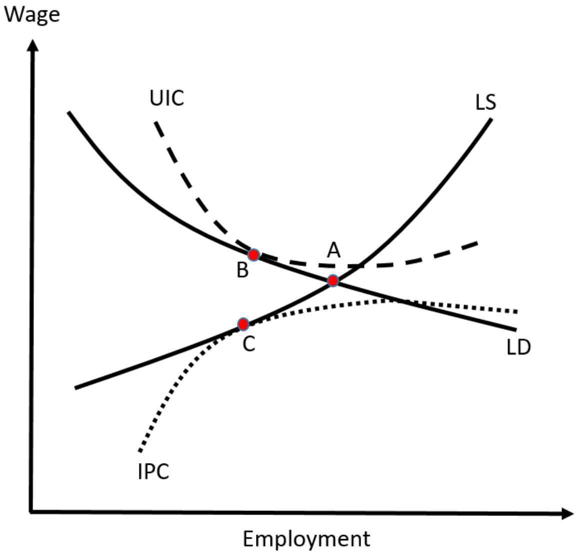
$$\mathcal{W} = \int_{\mathcal{N}} \Psi(u_n) \mathrm{d}F_n,$$

with $\Psi(\cdot)$ increasing and weakly concave

- The government can levy a non-linear tax $T(\cdot)$ on labor earnings $z_n = w_n l_n$ (note: w_n also endogenous)

- Profits (if any) can be taxed lump-sum

Wage determination



Case (i): Competitive equilibrium

Equilibrium

- Equilibrium conditions
  (i) Labor demand:

$$a_n(Y/L_n)^{1/\sigma} = w_n$$

  (ii) Labor supply:

$$w_n(1 - T'(w_n l_n)) = v'(l_n)$$

  (iii) Market clearing:

$$L_n = l_n f_n$$

- Optimal tax problem studied in Sachs, Tsyvinski and Werquin (2017)
  - I impose CES production and use the mechanism design approach

Mechanism design formulation

- Incentive compatibility:

$$\dot{u}_n = v'(l_n) l_n \frac{\dot{w}_n}{w_n},$$

  where a dot denotes a type-derivative

- From the labor demand equation:

$$\frac{\dot{w}_n}{w_n} = \frac{\dot{a}_n}{a_n} - \frac{1}{\sigma}\left(\frac{\dot{l}_n}{l_n} + \frac{\dot{f}_n}{f_n}\right)$$

- Introduce a constraint $b_n = \dot{l}_n$. This is now a standard optimal control problem (with state variables $\{u_n, l_n\}$ and control b_n)

Optimal tax formulas

- Introduce welfare weight $g_n \equiv \Psi'(u_n)/\eta$. The first result is standard:

$$\int_{\mathcal{N}} g_n \, \mathrm{d}F_n = 1$$

- Second result more interesting:

$$\frac{T'(z_n)}{1 - T'(z_n)} = \left(1 + \frac{1}{\varepsilon_n}\right) \frac{\int_n^{\bar{n}} (1 - g_m) \mathrm{d}F_m}{f_n} \left(\frac{\dot{a}_n}{a_n} - \frac{1}{\sigma} \frac{\dot{f}_n}{f_n}\right) - \frac{1 - g_n}{\sigma}$$

- The first part is as in a model with exogenous wages (except for a modification of the C_n-term)

Optimal tax formulas (ii)

- What about the second term?

$$\frac{T'(z_n)}{1-T'(z_n)} = \left(1+\frac{1}{\varepsilon_n}\right)\frac{\int_n^{\bar{n}}(1-g_m)\mathrm{d}F_m}{f_n}\left(\frac{\dot{a}_n}{a_n}-\frac{1}{\sigma}\frac{\dot{f}_n}{f_n}\right)-\frac{1-g_n}{\sigma}$$

- As in Stiglitz (1982), lower MTR for higher income levels
- Why? Consider a reduction in MTR at some income level z_n
  - Affected individuals raise effort, which lowers their wage
  - Through GE-effects, wages of other workers increases
  - Due to CRS and CES, these gains are 'evenly spread'
  - Welfare effect proportional to $1-g_n$
  - The impact is higher, the lower is σ

Case (ii): Unions

Equilibrium

- The union representing type-n workers solves:

$$\max_{\{w_n, l_n\}} \quad u_n = w_n l_n - T(w_n l_n) - v(l_n)$$

$$\text{s.t.} \quad a_n \left(\frac{Y}{l_n f_n} \right)^{1/\sigma} = w_n$$

- Note: rationing on the *intensive* margin

- First-order condition:

$$w_n(1 - T'(w_n l_n))(1 - 1/\sigma) = v'(l_n)$$

- Note: interior solution requires $\sigma > 1$, which I thus assume

Mechanism design formulation

- Incentive compatibility:

$$\dot{u}_n = \frac{v'(l_n)l_n}{1 - 1/\sigma}\left(\frac{\dot{a}_n}{a_n} - \frac{1}{\sigma}\frac{\dot{f}_n}{f_n}\right)$$

- Maximizing SWF s.t. ARC and ICC is again a standard optimal control problem (with u_n as state and l_n as control variable)

Optimal tax formulas

- Again, the average welfare weight equals one:

$$\int_{\mathcal{N}} g_n \, \mathrm{d}F_n = 1$$

- Second result more interesting:

$$\frac{T'(z_n)}{1-T'(z_n)} = \left(1+\frac{1}{\varepsilon_n}\right)\frac{\int_n^{\bar{n}}(1-g_m)\mathrm{d}F_m}{f_n}\left(\frac{\dot{a}_n}{a_n}-\frac{1}{\sigma}\frac{\dot{f}_n}{f_n}\right)-\frac{1}{\sigma}$$

- The first part is exactly the same as before. In the second part there is no '$-g_n$'

Optimal tax formulas (ii)

- Hence, optimal tax rates are *lower* than in competitive labor markets
- Why is that? Suppose no distributive preferences: $g_n = 1$ for all n

$$\frac{T'(z_n)}{1 - T'(z_n)} = -\frac{1}{\sigma}$$

- This restores efficiency: MPL $= v'(l_n) \rightarrow$ final term is Pigouvian
- Intuition: monopoly (union) restricts output (labor supply). Lower MTR to partially off-set this distortion

Case (iii): Monopsony

Equilibrium

- For tractability, impose $\sigma = \infty$. The monopsonist solves:

$$\max_{[w_n, l_n]_{\mathcal{N}}} \quad \Pi = \int_{\mathcal{N}} (a_n - w_n) l_n \, \mathrm{d}F_n$$
$$\text{s.t.} \quad \forall n: \;\; w_n(1 - T'(w_n l_n)) = v'(l_n)$$

- The optimal tax problem is the most complicated one. Here's why:

$$\frac{a_n}{v'(l_n)} \left[(1 - T'(z_n)) - z_n T''(z_n) \right] = 1 + \frac{1}{\varepsilon_n}$$

- Labor-market equilibrium depends not only on the level and slope of $T(\cdot)$, but also on the *curvature*

Mechanism design formulation

- Incentive compatibility:

$$\dot{u}_n = v'(l_n) \frac{\int_{\underline{n}}^{n} \dot{a}_m l_m \mathrm{d}m}{a_n l_n - \int_{\underline{n}}^{n} \dot{a}_m l_m \mathrm{d}m} \dot{l}_n$$

- Again, add $b_n = \dot{l}_n$ as a constraint. This is now a standard optimal control problem (with state variables $\{u_n, l_n\}$ and control b_n)

Optimal tax formulas

- By now, it should not be a surprise that

$$\int_{\mathcal{N}} g_n \, \mathrm{d}F_n = 1$$

- Unfortunately, optimal tax expressions are complicated and hard to interpret...

- Special case: $\Psi(\cdot)$ linear and $\varepsilon_n = \varepsilon$

$$T'(z_n) = -\frac{1}{\varepsilon}$$

- Again, this restores efficiency: $a_n = v'(l_n)$

Optimal tax formulas (ii)

- With a preference for redistribution, the government ensures the firm does not extract surplus from the lowest type: $a_{\underline{n}} = w_{\underline{n}}$
- It can do so by making sure the tax function is concave at the bottom ($T''(z_{\underline{n}}) < 0$)
- Intuition: individuals become very responsive to wage changes (i.e., work much less if wages goes down) $\rightarrow$ limits the firm's market power

Welfare comparison

Welfare comparison

- No theoretical results, but simulations suggest:

$$\mathcal{W}^M > \mathcal{W}^C > \mathcal{W}^U$$

  Market power need not be bad for welfare (provided profits can be taxed)

- Intuition: information rents (which prevent FB) increase in the workers' bargaining power

Thank you for your attention!

Monopsony with non-linear contracts

- Suppose the monopsonist can engage in first degree price discrimination. It solves:

$$\max_{[z_n, l_n]_{\mathcal{N}}} \quad \Pi = \int_{\mathcal{N}} (a_n l_n - z_n) \, \mathrm{d}F_n$$
$$\text{s.t.} \quad \forall n: \; z_n - T(z_n) - v(l_n) \geq -T(0) - v(0)$$

- Here, the first-order condition is replaced by a voluntary participation constraint

- Now, first-best attainable! Set $T'(z_n) = 0$ everywhere and use profit taxes to finance $-T(0) > 0$

- Intuition: no information rents. By taking over the firm, the gov't overcomes information problems