Collective Bargaining

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Outline

1. Perfectly competitive labour market if no unions
   - Right-to-manage
   - Efficient contracts
   - Insider-outsider
   - Equilibrium effects
2. Monopsonistic competition if no unions
3. Empirical evidence
4. References

Outline of the introduction

- Historical perspective
- Nowadays
  1. “What do unions do” in Continental Europe?
  2. What are the effects of unions?
- Some facts
- Union goals
- Bargaining theory

Historical perspective

"Labor problems and unionization"

Richard T. Ely (1886) *The Labor Movement in America*
Beatrice and Sidney Webb (1897) *Industrial Democracy* (U.K.)
are the first analyses of "labor movements" and unions. These books and the followers were characterized by

- an interdisciplinary approach ($\rightarrow$ *Industrial relations* after WWII)
- an inductive approach (a lot of case studies)
- an historical and comparative approach
- preoccupation with social reforms

Historical perspective

Already at the end of the 19th/ beginning of the 20th century, a division between
$\rightarrow$ The "labor specialists" (on the whole strong advocates of unionism)
$\rightarrow$ and the "economic theorists" (stressing the monopoly aspects of unions). Even among the latter:

> *"Marshall, Pigou, Taussig and other leading theorists were troubled by the 'peculiarities' of the labor market – the fact that the worker sells himself with his services, that his immediate financial need may place him at a disadvantage in negotiating with employers, that he is influenced by non-pecuniary motives, that he has limited knowledge of alternative opportunities, and that there are objective barriers to free movement of labor" (Reynolds, 1951)*

Nowadays

Unions are widespread in Continental Europe and are an extremely complex “institution”.

Questions arise such as:

1. “What do unions do” in Continental Europe?
2. What are the effects of unions?

“What do unions do” in Continental Europe?

- Explicit bargaining over wages.
- Explicit bargaining over employment is rather unusual.
- Often explicit bargaining over working conditions (e.g. working hours). See Section 1.1.3 of CZ (= Cahuc and Zylberberg, 2004).
- Unions also provide “industrial jurisprudence”: Grievance and arbitrage procedures, the rules governing promotions, discipline, discharges (firing rules) (“human rights” aspects of the workplace). Not covered by the book.

"What do unions do" in Continental Europe?

In addition, in some countries :
$\rightarrow$ unions and employers jointly manage the social security system,[1][2]
$\rightarrow$ they take part to management of many institutions that control the functioning of (part of) the economy :
$\Rightarrow$ "Corporatism", a rather vague notion that refers to strong coordination between employers, unions and the government.
Reference: Teulings and Hartog (1998)

Many differences within Europe.

[1] See Boeri, Brugiavini and Calmfors (2001).

[2] An example is the so-called "Ghent system" in which unemployment insurance schemes are run by trade unions and partially subsidized by the State (Finland, Sweden, Denmark and Belgium).

What are the effects of unions?

According to a well-known reference, Nickell and Layard (1999),

> *"...unions raise unemployment and reduce labor input* (*i.e. hours/population*)*. These effects are, however, offset if unions and employers can coordinate their wage bargaining activities" (p. 3055).*

This chapter presents some basic tools to deal with unions and shows that underlying assumptions are needed to show that unions cause unemployment.

Comprehensive analyses about unions and their effect are available in Booth (1995), Booth, Burda, Calmfors, Checchi, Naylor and Visser (2000) and Boeri, Brugiavini and Calmfors (2001).

Some facts

Indicators of “union power”

More information on iCampus (not compulsory). See the file

`du_caju_et_al_Institutional_features_of_wage_bargaining_in_22_EU_countries.pdf`

Union density = the proportion of wage-earners who are unionized
Collective bargaining coverage = the proportion of wage-earners who are covered by collective agreements.

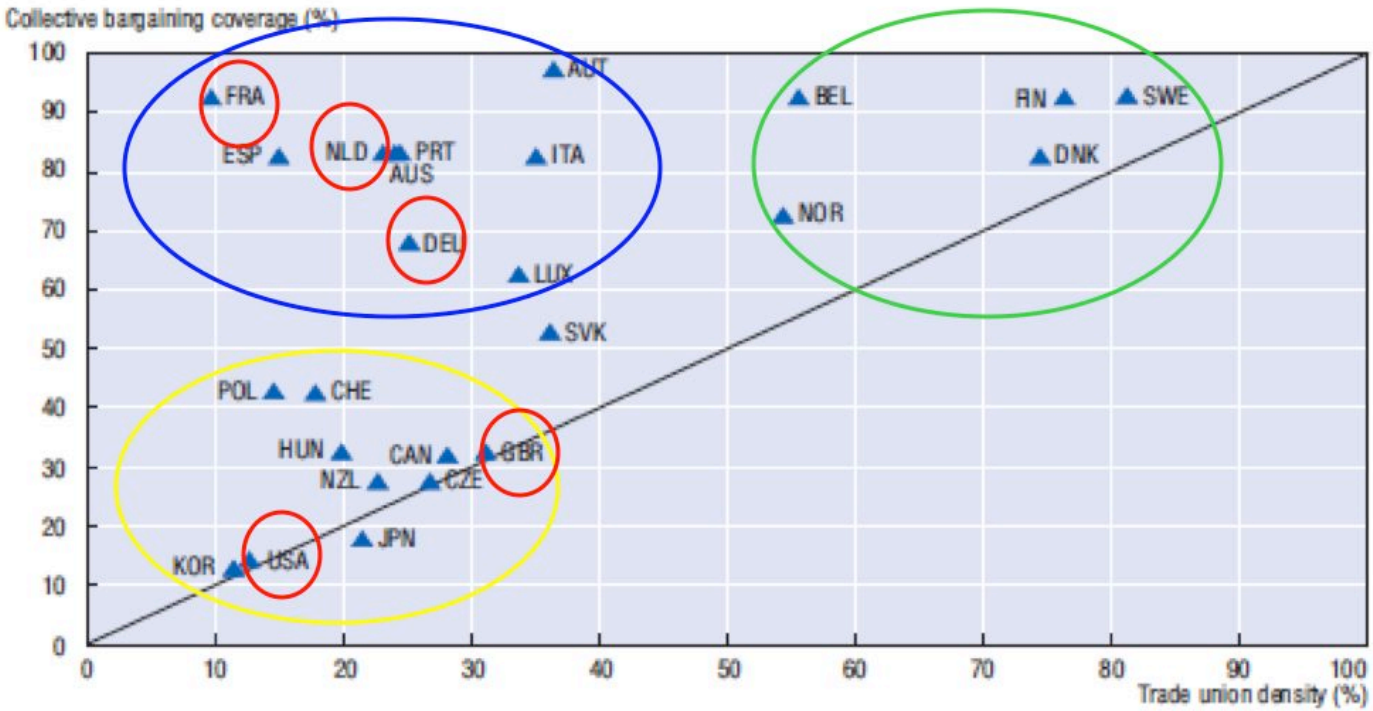
- France (FRA): Union density $\approx$ 10%; Coverage $\approx$ 90% (*qualitatively* similar in Germany (DEU), The Netherlands (NLD),...);
- Nordic countries (and Belgium): density higher than in the previous group and coverage $>$ density;
- U.S.: Union density $\approx$ Coverage $\approx$ 15%

Some facts

Indicators of “union power”

Chart 3.4. **Union density and coverage, 2000**

Percentage of wage and salary earners



OECD (2004), *Employment Outlook*.

Some facts

Indicators of “union power”

In Continental Europe,

- unions are often by law *the* “institution” that has the right to bargain wages
- The same pay between unionized and nonunionized workers
- Often there is also (under certain conditions) mandatory extension of collective agreements to all firms of the sector.

In Australia, the U.S., the U.K., see CZ p. 371

In the U.S., see CZ p. 372.

Union goals

Do unions maximize an objective function?

This is an old debate.
Dunlop (1944) answered yes.
Ross (1948) answered no: “Of all participants in economic life, the trade union is probably least suited to purely economic analysis”.
Currently, there are 3 views:

1. The dominant one: assumes that unions maximize an objective function. Developed by CZ.
2. A perfectly democratic union with heterogeneous members (votes)
3. Union leadership has discretionary power and possible conflicts of objectives with the members.

Union goals

Main assumptions in the book of CZ

- (Mostly) a *static* setting
- A union cares for an *exogenous* number N of (typically) *homogeneous* "members" (N = "the size of the union" $\rightarrow$ various possible interpretations).
- Each of the N "members" supply one unit of labor. The net real wage paid is denoted $w \geq$ an exogenous reservation wage $\overline{w}$ called the "outside option". *Interpretations*: $\overline{w} =$ wage in other firms (the competitive wage if they face a perfect competition environment), unemployment benefits, early retirement benefits,...
- An employed worker attains a level of utility $v(w)$. The latter is increasing and concave (risk aversion).
- Perfect information about preferences, profits,...

Union goals

Main assumptions in the book of CZ

The union is here assumed
$\rightarrow$ to care only for its "members" and
$\rightarrow$ to have a utilitarian objective function $\mathcal{V}_s$ that trades off employment and net wages.[3]
Assuming an equal treatment of all "members" if employment falls short of the size of the union (i.e. if $L < N$): (CZ p. 393-4)

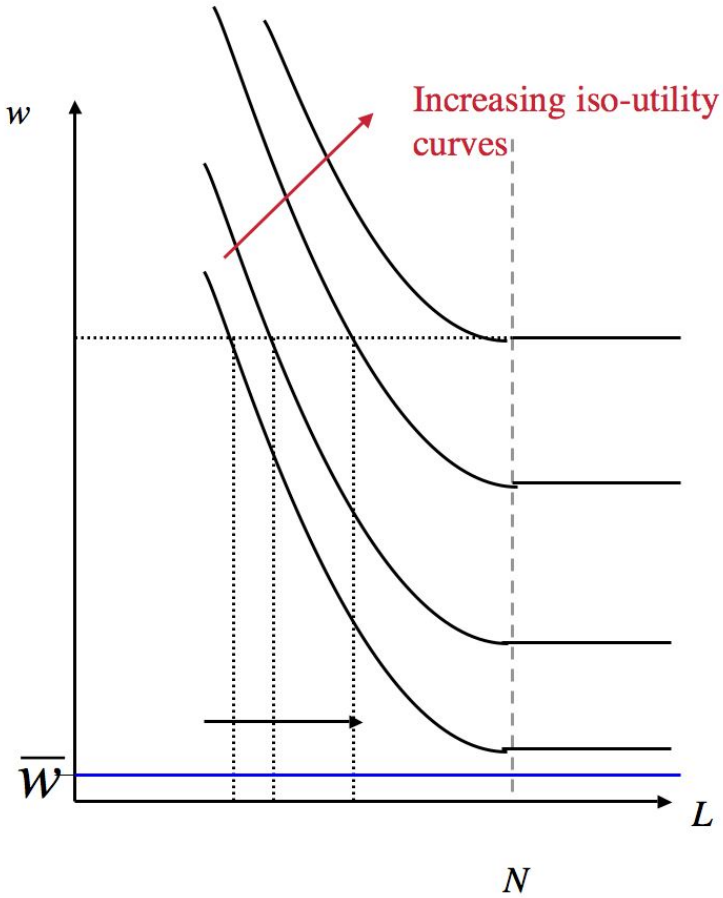
$$\mathcal{V}_s = \ell \cdot v(w) + (1 - \ell) \cdot v(\overline{w}), \text{ where } \ell = \min(1, L/N) \qquad (1)$$

Note: If $\overline{w}$ is an unemployment benefit. Empirical evidence that the utility ("well-being") loss in case of unemployment is larger than the loss of money. Captured by the concavity of $v(\cdot)$ or a different utility function $\tilde{v}(\cdot)$ when unemployed.

[3] Donado and Wälde (2010) extend this arguably narrow perspective: Good health standards are taken into account as well.

Union goals

Indifference curves of the union



Bargaining Theory

Rubinstein (1982)

- Infinite horizon
- Two impatient players who have to share a time-invariant "pie"
- Two players perfectly informed about each other's preferences
- On even dates, player 1 proposes a partition which player 2 accepts or refuses. On odd dates, player 2 has the initiative.

Let r_U et r_Π be the discount rate resp. of the union and the firm owner.
$\Rightarrow$ the "bargaining power of the union" is defined as

$$\gamma = \frac{r_\Pi}{r_U + r_\Pi}$$

If $r_U \to 0$, then $\gamma \to 1$. As r_U / r_Π increases, $\gamma \to 0$. Impatience reduces the bargaining power and conversely.

Bargaining Theory

- $\Pi = \Pi(w)$ is the profit function
- $\overline{\Pi}$ is a "reservation level of profit" (e.g. the firm fires all the workers and recruit other ones or the firm shuts down and relocate in another region). $\overline{\Pi}$ = firm's "outside option" ($\overline{w}$ is the worker's outside option).
- $\mathcal{V}_0$ et Π_0 are the levels reached *during the negotiation* in case of a strike (or other action like work-to-rule, go-slow). Called "inside options".

Under certain conditions, the solution of the Rubinstein bargaining game converges to the following generalized Nash solution:

$$\max_{w} \left(\mathcal{V}_s - \mathcal{V}_0\right)^{\gamma} \left(\Pi - \Pi_0\right)^{1-\gamma}$$

$$\text{s.to } w \geq \overline{w} \text{ and } \Pi \geq \overline{\Pi} \tag{2}$$

Up to know, information is perfect or “complete”.
The threat of a disagreement is important but an agreement is found instantaneously. Why would the player wait in the presence of discounting, loss of production and earnings in case of a strike?

An implication of this is that strikes are nonsense. However, strikes are part of reality.

Explanations:

- Irrational behaviour (“emotions”,...) or bounded rationality;
- Asymmetric information (see Kennan, 1986, and Kennan and Wilson, 1993, for surveys):
  Firm’s profitability unobserved by the union $\Rightarrow$ equilibria with strikes are then possible (for example, “screening” or “signalling” equilibria according to specificity of the game; Kennan and Wilson, 1993, as of p. 55; not compulsory)

Explanations based on asymmetric information have been criticized because if the length of time between offers and counter-offers goes to zero, so does the actual duration of a delay (or strike).

Other explanations for strikes under *complete* information:

- If the union has to choose between striking and continuing to work under the "old wage contract", there exist multiple subgame-perfect equilibria, some of which with a strike (according to Fernandez and Glazer, 1991)
- A preemptive action, to the extent that it is credible, to confer a bargaining advantage (Appelbaum, 2008).

From now on, *complete* information is assumed.

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Assumptions about $\mathcal{V}_s - \mathcal{V}_0$

Let w_0 be the net income of a worker during a strike (without resorting to outside opportunities). Remembering the union's objective (1),

$$\mathcal{V}_s - \mathcal{V}_0 = \begin{cases} (L/N)[v(w) - v(\overline{w})] + [v(\overline{w}) - v(w_0)] & \text{if } L < N \\ v(w) - v(w_0) & \text{if } L \geq N \end{cases} \tag{3}$$

To simplify expressions, CZ, as many authors, assume that $w_0 = \overline{w}$.

Is it a sensible assumption? Few data on strike payments!
Example: In the Belgian metal industry in 2008, the strike payment $= 25€$/day the first week, $31€$ the second one.In 2008, the level of unemployment benefits in Belgium (1st year) ranged between 24 and 44€/day in case of a sufficient record of employment.

Assumptions about $\Pi - \Pi_0$

Consider a single-input *firm* with revenue function

$$R(L) \quad \text{with } R' > 0, R'' < 0.$$

The (real) profit function is then simply: $\Pi(w, L) = R(L) - w \cdot L$

CZ assume $\Pi_0 = 0$ (no production, no fixed cost).

A static right-to-manage model in partial equilibrium: one firm-one union setting

The right-to-manage = "The union and the firm bargain over w knowing that, conditional on w, the firm chooses the level of employment L that maximizes profits."
That is, $\forall w$, L is given by the demand curve

$$R'(L) - w = 0 \Rightarrow L^d(w) = R'^{-1}(w).$$

Along an iso-profit curve

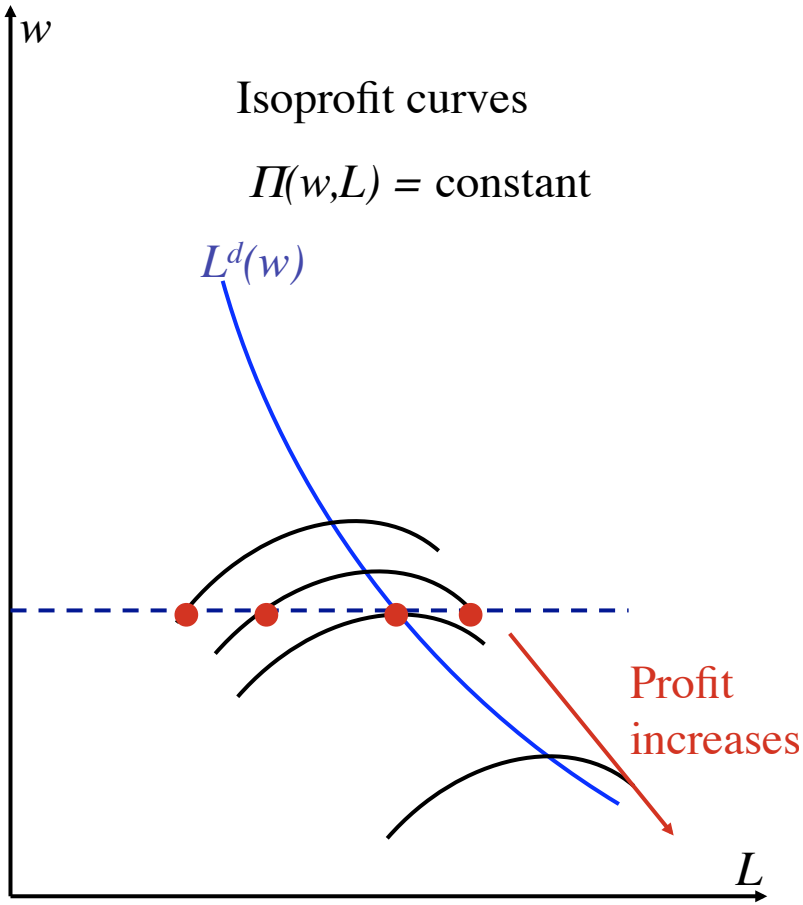
$$\left(R'(L) - w\right) \cdot dL - L \cdot dw = 0$$

and hence the slope of an iso-profit curve is given by:

$$\frac{dw}{dL} = \frac{R'(L) - w}{L}$$

in a two-dimensional space (L, w).

Iso-profit curves



Assumptions

By assumption, the firm bargains with the union

- This can be imposed by law.
- In the anglo-saxon countries, this setting is called ”closed shops” or “union shops”, whereby a new employee has to join the local union within a certain period of time after hiring (OECD, Employment outlook, 2004).

By assumption, the negotiated wage is the same for all workers (no discrimination).

By assumption, at $w = \overline{w}$, the profit level is positive (an unexplained rent to be shared).

The bargaining problem

The maximization

$$\max_{w} \left(\mathcal{V}_s - \mathcal{V}_0 \right)^{\gamma} \left(\Pi - \Pi_0 \right)^{1-\gamma} \tag{4}$$
$$\text{s.to } w \geq \overline{w} \text{ and } L^d \leq N$$

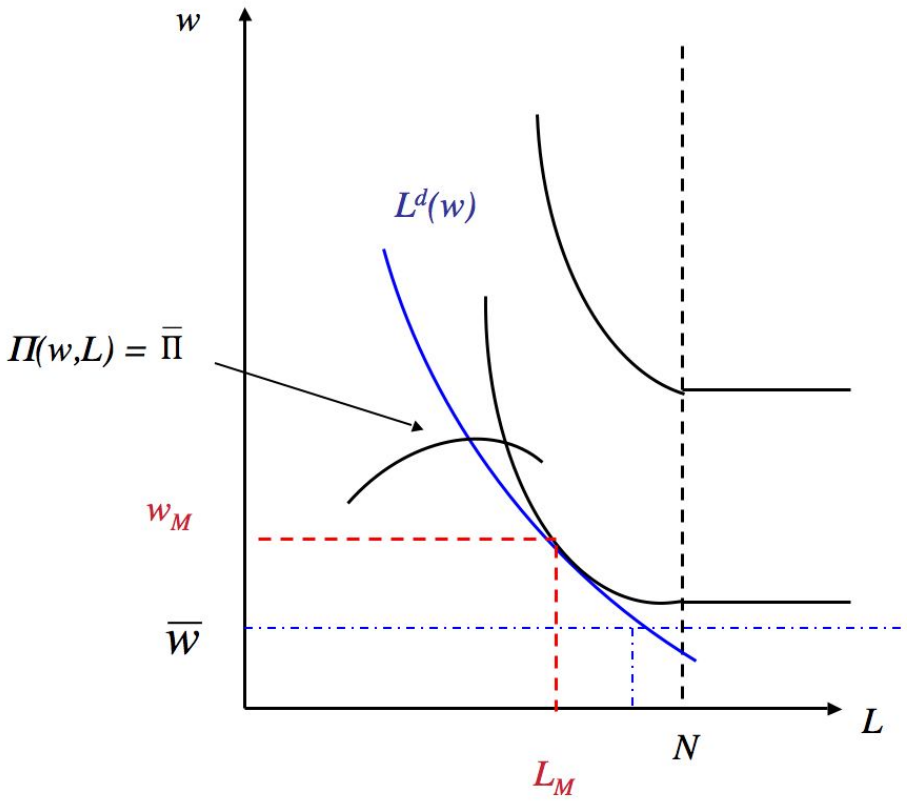
becomes under (1) and the assumption $w_0 = \overline{w}$:

$$\max_{w} \left[L^d(w)/N \right]^{\gamma} \left[v(w) - v(\overline{w}) \right]^{\gamma} \left[\Pi(w) \right]^{1-\gamma} \tag{5}$$
$$\text{s. to } L^d \leq N, w \geq \overline{w} \tag{6}$$

where $\Pi(w)$ the profit function if $L = L^d(w)$, i.e.
$\Pi(w) \equiv \Pi(w, L^d(w)) = R(L^d(w)) - w \cdot L^d(w)$.
CZ search for internal solutions to (4). It is easy to take account of the "outside option" constraint $\Pi \geq \overline{\Pi}$.

The monopoly union ($\gamma = 1$)

Graphical exposition



The monopoly union ($\gamma = 1$)

Analytical solution

Ignore for a while the constraints $L^d \leq N$ and $w \geq \overline{w}$.

$$w_M = \arg\max L^d(w)\,[v(w) - v(\overline{w})] \tag{7}$$

Notations:
The absolute value of the elasticity of labor demand is
$\eta_w^L(w) = -(w/L^d(w))(dL^d(w)/dw) > 0$
The first-order condition (f.o.c.) is then

$$\frac{v(w_M) - v(\overline{w})}{w_M \cdot v'(w_M)} = \frac{1}{\eta_w^L(w_M)} \tag{8}$$

As the right-hand side is positive, one has $w_M > \overline{w}$.

The monopoly union ($\gamma = 1$)

Analytical solution

In sum,

$$\text{If } L^d(w_M) \leq N \qquad \text{then } w = w_M,\ L = L^d(w_M) \tag{9}$$

$$\text{otherwise } L = N,\ w \mid L^d(w) = N \tag{10}$$

i.e. the second case is a corner solution where all members are employed.

The general case $0 \leq \gamma \leq 1$

Consider an interior solution to Problem (5). The f.o.c is an implicit equation in w (see CZ for the proof) :

$$\frac{v(w) - v(\overline{w})}{wv'(w)} = \mu_s \equiv \frac{\gamma}{\gamma\eta_w^L(w) + (1-\gamma)\eta_w^\Pi(w)} \tag{11}$$

where $\eta_w^\Pi(w) = -(w/\Pi(w))(d\Pi(w)/dw) \geq 0$

- Shocks to $R(\cdot)$ affect w if η_w^L or η_w^Π vary. Real rigidity $\neq$ general.
- If $\gamma > 0$, then $w > \overline{w}, \Rightarrow \mu_s$ is a *mark-up*. $\frac{\partial \mu_s}{\partial \gamma} > 0$
- The higher η_w^L or η_w^Π, the lower μ_s. Intuition?
- Sufficient conditions: $\mu_s < 1$, $\frac{\partial \eta_w^L(w)}{\partial w} \geq 0$, $\frac{\partial \eta_w^\Pi(w)}{\partial w} \geq 0$.

The general case $0 \leq \gamma \leq 1$

Approximation and wage rigidity

Taylor expansion of order 1 of $v(w)$ implies $\frac{v(w)-v(\overline{w})}{wv'(w)} \approx 1 - \frac{\overline{w}}{w}$. So,

$$w \approx \frac{\overline{w}}{1-\mu_s} > \overline{w}$$

Particular case leading to totally rigid real wages

Let $v(w) = \frac{w^\sigma}{\sigma}, \sigma \leq 1, \sigma \neq 0$.
relative risk aversion $\equiv \frac{-w \cdot v''(w)}{v'(w)} = 1 - \sigma \geq 0$ (constant)
$\Rightarrow \frac{v(w)-v(\overline{w})}{wv'(w)} = \frac{1}{\sigma}\left[1 - \left(\frac{\overline{w}}{w}\right)^\sigma\right]$

The general case $0 \leq \gamma \leq 1$

Particular case with real wage rigidity

Assuming also an iso-elastic revenue function
$R(L) = A \cdot L^{\alpha}, A > 0, \alpha \in]0,1[$

$\Rightarrow \eta_w^L = 1/(1-\alpha)$ et $\eta_w^{\Pi} = \alpha/(1-\alpha)$, independent of A and w!

$\Rightarrow \mu_s = \frac{\gamma(1-\alpha)}{\gamma+\alpha(1-\gamma)}$, hence $\mu_s \in]0,1[$ if $\gamma > 0$

Then, Equation (11) becomes (check!):

$$w = \frac{\overline{w}}{[1-\sigma \cdot \mu_s]^{1/\sigma}}, \quad \text{with } \frac{\partial w}{\partial \overline{w}} > 0, \ \frac{\partial w}{\partial \mu_s} > 0 \tag{12}$$

and real wages are fully rigid (= not affected by multiplicative shocks i.e. on A).

Bargained wages and unemployment

As Blanchard and Giavazzi (2003), let's assume quite naturally that the "outside option", $\overline{w}$, is negatively affected by the unemployment rate u:

$$\overline{w} = f(u), \text{ with } f'(u) < 0$$

Starting from an equation like (12), it is easily seen that:

$$\ln[w] = \ln[f(u)] - (1/\sigma) \cdot \ln[1 - \sigma \cdot \mu_s] \tag{13}$$

Such a relation between the wage **level** and the unemployment rate is called a "wage curve" (See the section devoted to empirical work).

****

Can the union-firm pair do better than adopting the right-to-manage solution? The answer is yes. See the following section.

Weekly efficient negotiation

CZ p. 397

Even though there is not much evidence that firms and unions bargain over employment, let us see what would be the outcome of a bargain over w and L:

$$\max_{w,L} [L/N]^{\gamma} [v(w) - v(\overline{w})]^{\gamma} [\Pi(w, L)]^{1-\gamma} \text{ s. to } L^d \leq N, w \geq \overline{w} \quad (14)$$

F.O.Cs:

$$L: \quad (1-\gamma)\frac{R'(L) - w}{\Pi(w)} + \frac{\gamma}{L} = 0 \quad (15)$$

$$w: \quad -(1-\gamma)\frac{L}{\Pi(w)} + \frac{\gamma v'(w)}{v(w) - v(\overline{w})} = 0 \quad (16)$$

Weekly efficient negotiation

From the last equation and a Taylor expansion of order 1, one immediately derives that:

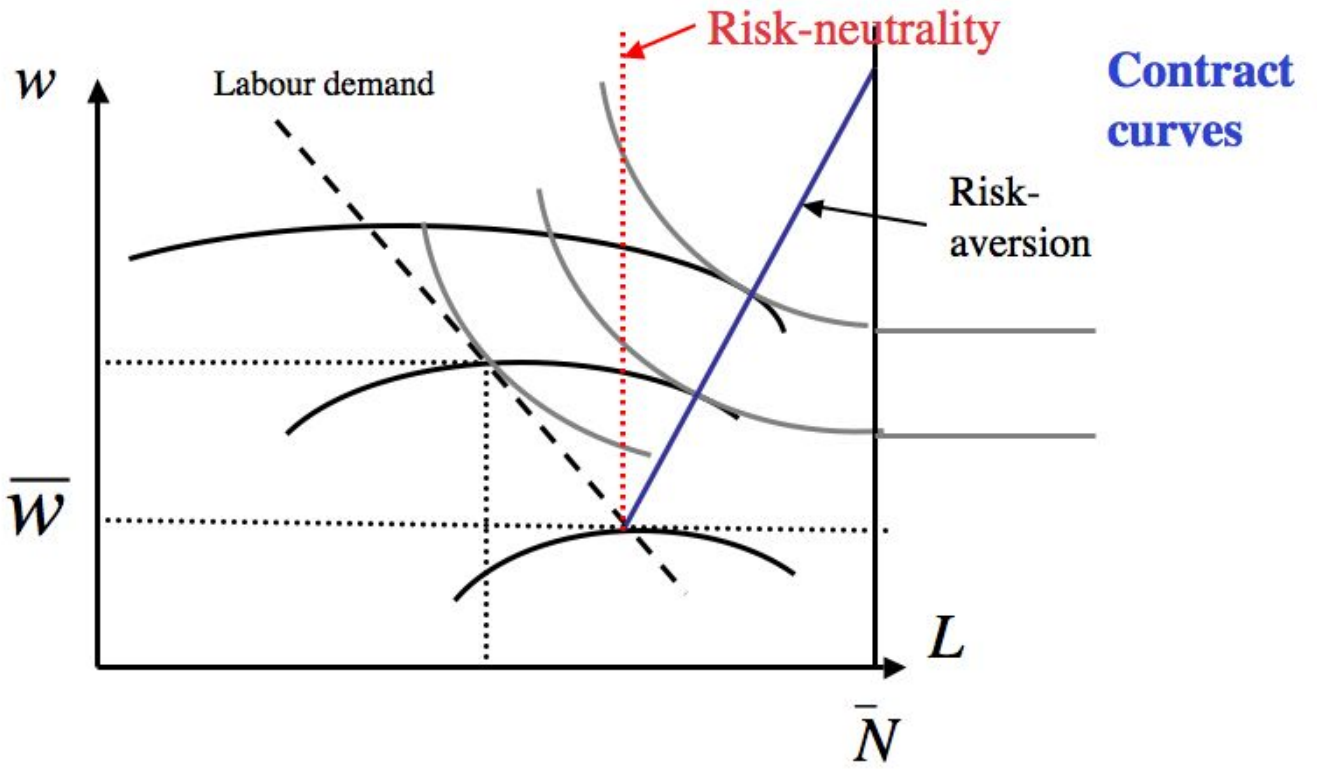
$$w \approx \overline{w} + \frac{\gamma}{1-\gamma}\frac{\Pi(w)}{L}$$

From the two F.O.Cs, an implicit relation between the bargained levels of L and w that is independent of γ.
It is called the "contract curve" and defined by:

$$w - R'(L) = \frac{v(w) - v(\overline{w})}{v'(w)}$$

Totally differentiating this equality w.r. to w and L yields the slope of the contract curve:

Weekly efficient negotiation



Weekly efficient negotiation

Is it plausible?

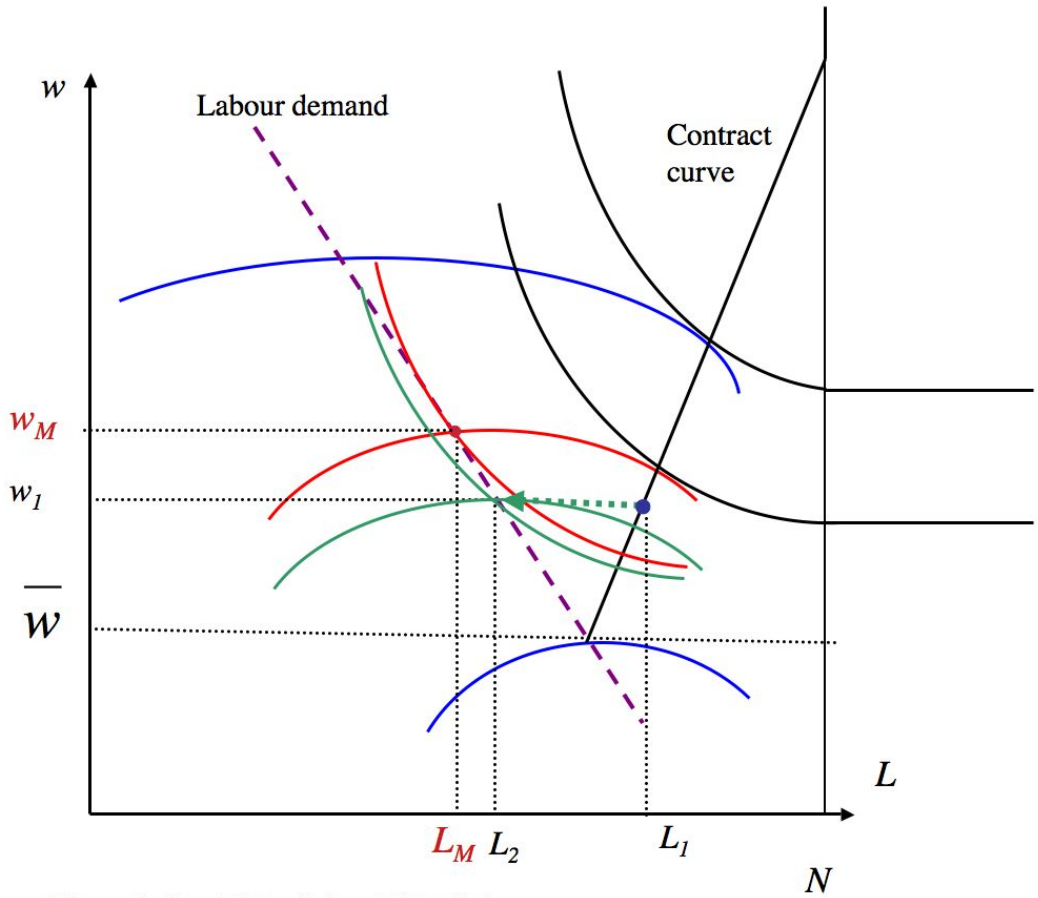
With risk averse workers, employment is higher than at the "alternative wage" $\overline{w}$ (the latter can be interpreted as the competitive wage).

Bargained contracts typically do not stipulate an employment level.

So looking at the next figure, it is easily seen that the firm will increase profits by reneging the contract, namely by moving towards the labor demand curve at the contractual wage rate.
So, it is argued, efficient contracts are not plausible.

Weekly efficient negotiation

Firms renege the contract in a static seting



$\Pi(w_M, L_M) < \Pi(w_1, L_1) < \Pi(w_1, L_2)$

$v_S(w_1, L_2) < v_S(w_M, L_M) < v_S(w_1, L_1)$

Weekly efficient negotiation

Do firms renege the contract in a dynamic setting?

Espinosa and Rhee (1989) (henceforth ER) challenge this conclusion by considering a repeated game.
Let δ (respectively, δ_u) be the firm's (resp., the union's) discount factor.
The firm's (resp. the union's) objectives are

$$\sum_{t=0}^{\infty} \delta^t \Pi(w, L) \qquad (\sum_{t=0}^{\infty} \delta_u^t \mathcal{V}_s(w, L))$$

In ER, the one-shot game leads to the monopoly union solution (w_M, L_M).
Consider a more efficient allocation (w_1, L_1) and a repeated game setting.ER assume that if the firm deviates from an efficient agreement, the union will adopt the following punishment strategy: the wage and employment levels will revert to the monopoly union solution forever.

Weekly efficient negotiation

Do firms renege the contract in a dynamic setting?

In a subgame perfect equilibrium (without renegotiation when the punishment starts), a "sustainable" stationary path $(w_t, L_t) = (w_1, L_1)\ \forall t$ is such that:

$$\left(\sum_{t=0}^{\infty} \delta_u^t\right) \mathcal{V}_s(w_1, L_1) \geq \left(\sum_{t=0}^{\infty} \delta_u^t\right) \mathcal{V}_s(w_M, L_M)$$

$$\left(\sum_{t=0}^{\infty} \delta^t\right) \Pi(w_1, L_1) \geq \Pi(w_1, L_2) + \left(\sum_{t=1}^{\infty} \delta^t\right) \Pi(w_M, L_M)$$

or $0 < \Pi(w_1, L_2) - \Pi(w_1, L_1) \leq \frac{\delta}{1-\delta} [\Pi(w_1, L_1) - \Pi(w_M, L_M)]$

If the discount factor δ is high enough, in a repeated game setting the efficient contract is selected.

In general, the solution can lie anywhere between the right-to-manage solution and the efficient solution according to the time preference of the agents.

Strongly efficient contracts (CZ p. 399)

- Nothing prevents unions and firms to bargain over variables other than employment and wages.
- There is some evidence that unions and firms bargain over the level of unemployment benefits or "severance payments", i.e. a payment given to workers who are redundant.

Assume that

- A union representing *risk-averse* workers bargain simultaneously over w and a benefit b that is added to $\overline{w}$ (interpreted as legal unemployment benefits)
- The firm owner keeps the "right-to-manage" and is *risk-neutral*.
- Still perfect information (no incentive problems: those who are instructed to work offer a unit of labor)

Strongly efficient contracts

CZ p. 399

Whatever the probability ($\ell < 1$) of being employed, compared to a labor contract $\mathcal{C} = (w, b)$ that

- pays w to those who get a job and
- b to those who are redundant, with $\overline{w} + b < w$,

a *risk-averse* union prefers (*ex ante*) a contract $\hat{\mathcal{C}} = (\hat{w}, \hat{b})$ such that

- earnings are lower in case of employment: the wage is $\hat{w} = \ell w + (1 - \ell)(\overline{w} + b) < w$
- a benefit $\hat{b}$ is transferred to redundant workers, with $\hat{b} = \hat{w} - \overline{w} \Rightarrow \overline{w} + \hat{b} = \hat{w}$

$\Leftrightarrow$ Perfect insurance against the unemployment risk

Strongly efficient contracts (CZ p. 399)

CZ show that the risk-neutral employer is indifferent between these two contracts $\mathcal{C}$ and $\hat{\mathcal{C}}$.
In addition, they show that the profit with $\hat{\mathcal{C}}$ is:

$$\Pi(L) = R(L) - \overline{w} \cdot L - \hat{b} \cdot (L + N - L)$$

Hence, the firm chooses the employment level according to $R'(L) = \overline{w}$

With this "strongly efficient contract", it is hard to argue that "unions cause unemployment" (Nickell and Layard, 1999)!
Of course, information is actually imperfect.
Imperfect information about effort on the job $\Rightarrow$ a trade off between insurance and incentives.
In addition, risk-neutrality of firms is an extreme assumption.
$\rightarrow$ the "strongly efficient contract" should be seen as a limit case.

In sub-section 3.2.3 (that can be skipped), CZ extends the analysis to a utilitarian union defending the interest of two types of workers.

They show the existence of a “strongly efficient contract” that
(i) equalizes marginal revenue and the reservation wage for each type and
(ii) leads to perfect wage equality.

In addition to the comment about imperfect information, one can raise the question: Why would individuals invest in human capital if there are equal wages?

A static insider-outsider model in partial equilibrium: one firm-one union setting

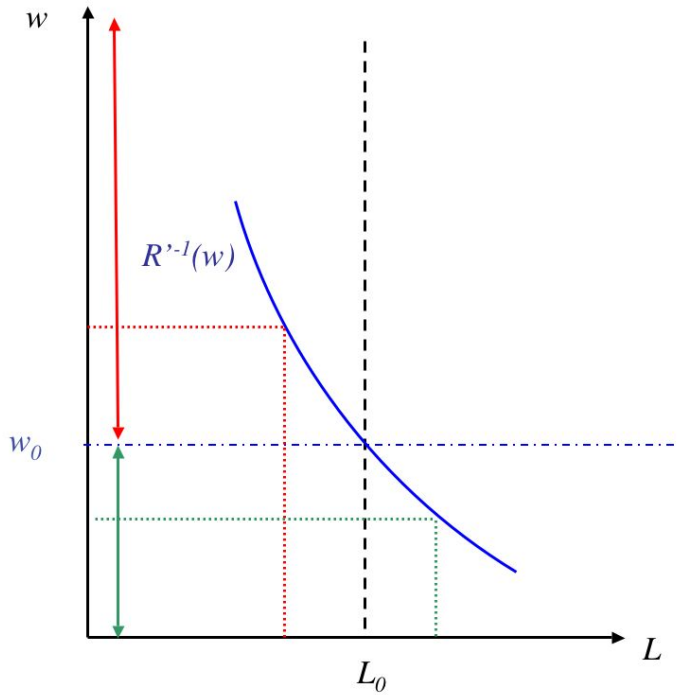
Lindbeck and Snower have built a right-to-manage model where the firm can hire additional workers ("outsiders") if all incumbent workers ("insiders") keep their job.

- At the beginning of the period, L_0 insiders (exogenous)
- Endogenous variables:
  - $L_I \leq L_0$
  - "entrants" $L_E \geq 0$
  - *The* (real) wage, w, paid to all employees (crucial assumption; could capture a requirement of fairness)

To keep things simple, insiders and entrants are perfect substitutes:
The firm's revenue is: $R(L_I + L_E)$
(In most real cases however, replacing many insiders by outsiders would be very costly because insiders have a superior knowledge of the job; this feature can be introduced)

I-O model

w_0 is defined by $R'(L_0) \equiv w_0$.
For any wage level w, $\tilde{L}$ solves $R'(\tilde{L}) = w$
Red region such that $w \geq w_0$: $L_I = \tilde{L} \leq L_0$, $L_E = 0$
Green region such $w \leq w_0$: $L_I = L_0$, $L_E = \tilde{L} - L_0$



I-O model

Two situations

1. If $\tilde{L} \leq L_0$ i.e. if $w \geq w_0$, the problem can be written as above ("r.-to-m.") with a minor change: L_0 replaces N. Let w_1 be the negotiated wage in this case:

$$\frac{v(w_1) - v(\overline{w})}{w_1 v'(w_1)} = \mu_s \equiv \frac{\gamma}{\gamma \eta_w^L + (1-\gamma)\eta_w^\Pi}$$

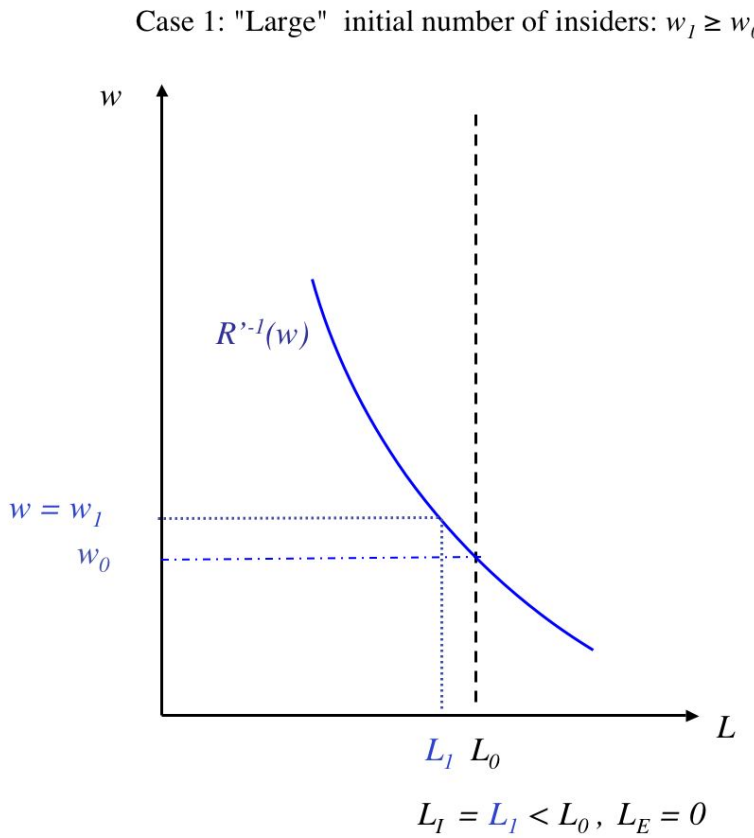
2. If all insiders keep their job, under the above assumptions, the negotiation now ignores one effect, namely "$w \rightarrow$employment":

$$\max_w \left[\cancel{L^d(w)/L_0}\right]^\gamma [v(w) - v(\overline{w})]^\gamma [\Pi(w)]^{1-\gamma} \text{ in CZ : (15)}$$

$\Rightarrow$ the solution w_2 is such that $w_2 > w_1$. Intuition?

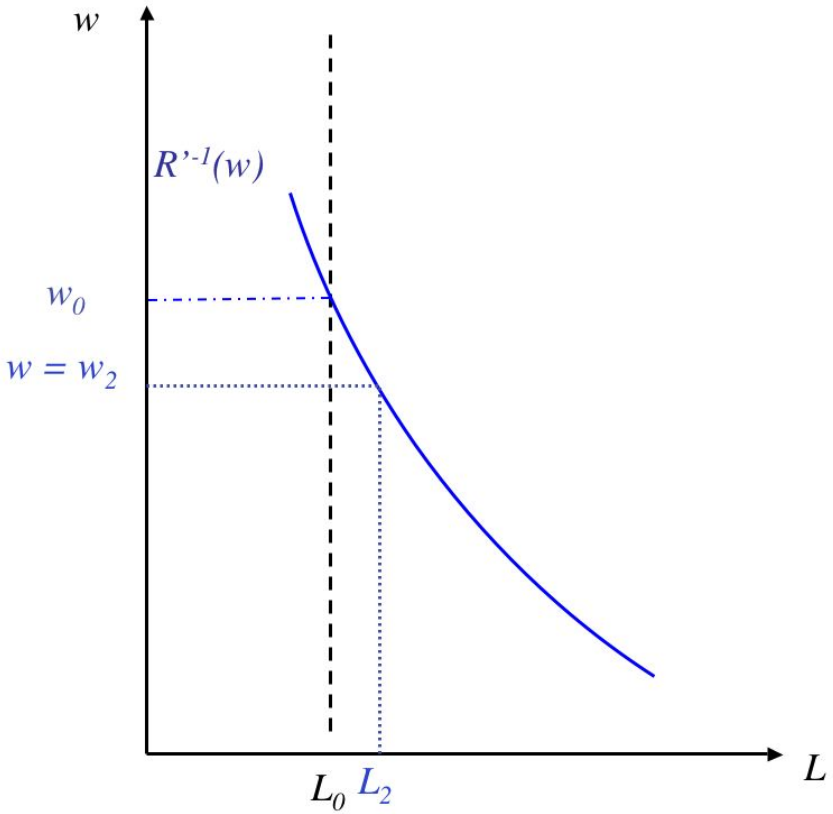
I-O model

The relationship between the bargained wage and L_0:
3 $\neq$ cases. Each of them defined by the position of w_0 w.r. to $w_1 < w_2$.



I-O model

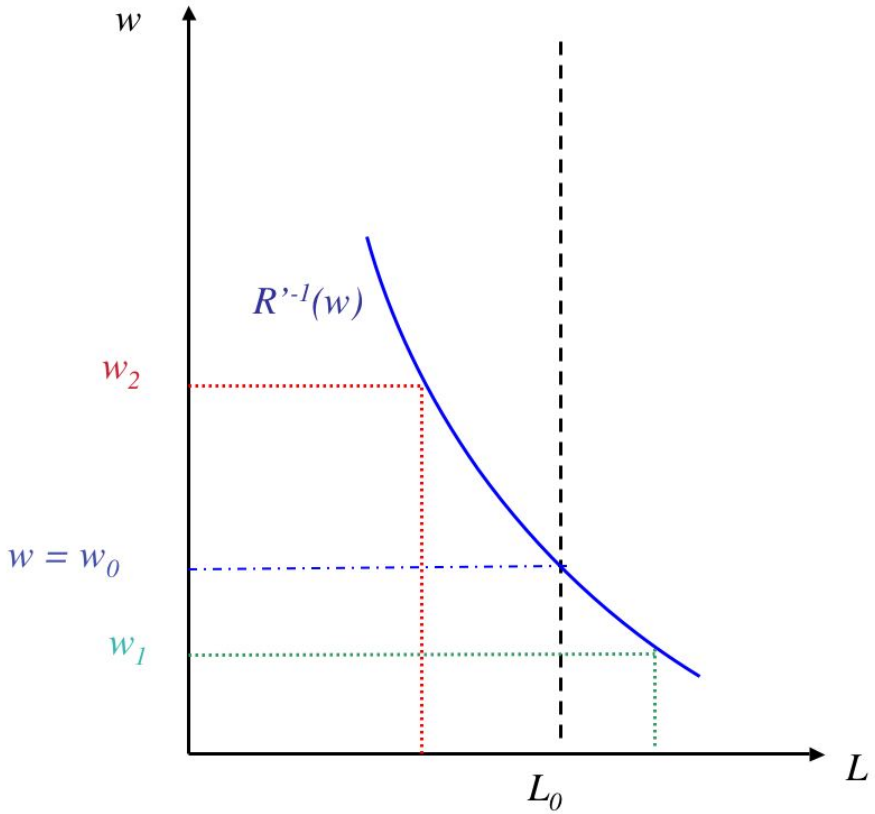
Case 2: "Small" initial number of insiders: $w_2 \leq w_0$



$L_I = L_0,\ L_E = L_2 - L_0$

I-O model

Case 3: "Intermediate" initial number of insiders: $w_2 \geq w_0 \geq w_1$



$L_I = L_0, L_E = 0$

I-O model

Summary

See Figure 7.8 in the book and relate it to the 3 figures above.

The“insiders-outsiders” model
- has been used to explain the persistency of unemployment...
- ... but the conclusion of empirical work can hardly be reconciled with the theoretical propositions derived by this model.

Is the I-O model simplistic?

The explanation for the persistence of unemployment assumes in particular that insiders do not negotiate either a severance payment or a specific wage for possible entrants.

CZ show that if more complex contracts are possible then the conclusions of the basic insiders-outsiders model deeply change.
This part presents similarities with what we have done above.
In particular, if the contract includes a bargain over a severance payment and if entrants can be paid differently (discrimination!), CZ show that (interpret!):

$$R'(L_I + L_E) = \overline{w} \tag{17}$$

Summary in *partial* equilibrium

At the partial equilibrium level, in the “right-to-manage“ case, the impact of unions is not detrimental to employment if

- sufficiently “sophisticated labor contracts”
- “two-tier” contracts are allowed: i.e. insiders and entrants are paid different wages

Are “two-tier” contracts observed in practice?

- There are examples of “two-tier” contracts (US airline industry 1978, in some countries workers on temporary contracts...)
- But it is rarely observed.

Why are "two-tier" contracts rarely observed in unionised firms?

1. Insiders are altruistic and care about the well-being of entrants (put differently, $N >$ size of the union)
2. Argument is based on the plausible assumption that the utility of a worker does not depend on the absolute level of wages but instead on their relative value. Why are firms concerned by this "taste for equity" of workers? Presumably, because "angering new employees when they discover they are underpaid"(Bewley , 1998) will have negative effects on productivity. See also Solow (1990) and Fehr and Falk (1999).

Monopolistic competition and unions

Blanchard and Giavazzi (2003)

This is not covered by CZ.

Basic assumptions

- Monopolistic competition in the goods market $\Rightarrow$ endogenous rents.
- Weakly efficient Nash union-firm bargaining.
- Two periods:
  - Short run: A fixed number m of firms and goods
  - Long run: The number of firms is endogenous (entry condition)
- An exogenous number $\overline{L}$ of homogeneous workers/consumers.

Monopolistic competition and unions

Specific assumptions

- The utility of worker j in each period is given by the following CES utility function:

$$V_j = \left[m^{-1/\sigma} \sum_{i=1}^{m} C_{ij}^{(\sigma-1)/\sigma} \right]^{\sigma/(\sigma-1)} \tag{18}$$

  C_{ij} is worker j's consumption of good i (price P_i)
- elasticity of substitution $\sigma \equiv \overline{\sigma} \cdot g(m) > 1,\ g'(m) > 0$.
- Labour supply $L_j^S \in \{0, 1\}$ every period.
- The entire income is spent on consumption. There are no savings nor capital in the model.

Monopolistic competition and unions

Specific assumptions

- When not employed, nominal income $= Pf(u)$, with $f'(u) < 0$. P is the price index

$$P \equiv \left(\frac{1}{m} \sum_{i=1}^{m} P_i^{1-\sigma} \right)^{1/(1-\sigma)}$$

  In each period, the budget constraint of individual j is:

$$\sum_{i=1}^{m} P_i C_{ij} = W_j \cdot L_j + Pf(u) \cdot (1 - L_j)$$

  where $W_j =$ the nominal wage and $L_j \in \{0, 1\}$.
- All firms have the same simple technology: $Y_i = L_i$
- Firms' (real) entry costs, c, are proportional to output

Union-firm *i* bargaining

Assumptions and notations.

- union goal = the wage bill $W_i \cdot L_i$ (risk-neutrality)
- Nash product
  - Union component = the surplus to workers from working in firm i (under the assumption of *symmetric* consumption). For each individual,
    - It she is employed in firm i, $\sum_{i=1}^{m} P_i C_{ij} = W_j L_j = W_i$
    - If not employed, $\sum_{i=1}^{m} P_i C_{ij} = Pf(u)$
  - Firm's component $= (P_i Y_i - W_i L_i) - 0 = (P_i - W_i) L_i$
- Exogenous union bargaining power γ

So, the bargaining problem is:

$$\underset{W_i, L_i}{Max}\ \Omega = \gamma log((W_i - Pf(u))L_i) + (1-\gamma) log((P_i - W_i)L_i)$$

Short-run partial equilibrium

Taking total demand Y, P and u as given, firm i and its union negotiate the level of employment L_i and the wage W_i. They solve the *static* problem:

$$\begin{aligned} \underset{W_i,L_i}{Max} \quad \Omega \equiv \quad & \gamma log(W_i - Pf(u)) + \gamma logL_i \\ & +(1-\gamma)log(P_i - W_i) + (1-\gamma)logL_i \end{aligned} \tag{19}$$

$$\text{s.to} \qquad Y_i = L_i$$

However, the demand for good i is $Y_i = \frac{Y}{m}\left(\frac{P_i}{P}\right)^{-\sigma}$. This defines a one-to-one relationship between L_i and P_i.
Taking it into account, the problem can be written as $\underset{W_i,P_i}{Max}\ \Omega(W_i, P_i)$.

So, ...

Short-run partial equilibrium

F.O.C.s

$$\frac{\partial \Omega}{\partial P_i} = 0 \quad \Rightarrow \quad \frac{-\sigma (Y/m)(P_i/P)^{-\sigma-1}(1/P)}{(Y/m)(P_i/P)^{-\sigma}} + \frac{1-\gamma}{P_i - W_i} = 0$$

$$\Rightarrow \quad \frac{\sigma}{P_i} = \frac{1-\gamma}{P_i - W_i} \tag{20}$$

$$\frac{\partial \Omega}{\partial W_i} = 0 \quad \Rightarrow \quad \frac{\gamma}{W_i - Pf(u)} = \frac{1-\gamma}{P_i - W_i}$$

$$\Rightarrow \quad \gamma P_i = W_i - (1-\gamma) Pf(u) \tag{21}$$

Hence,

$$(1-\gamma)(P_i - Pf(u)) = P_i - W_i$$

$$\Rightarrow \quad \frac{P_i}{P} = \frac{\sigma}{\sigma - 1} f(u) \tag{22}$$

Short-run partial equilibrium

Let $\mu(m) \equiv \frac{1}{\sigma-1} = \frac{1}{\overline{\sigma} \cdot g(m)-1}$, with $\partial\mu/\partial m < 0, \partial\mu/\partial\overline{\sigma} < 0$. Then, the real wage in firm i is given by (use the F.O.Cs):

$$\begin{aligned} \frac{W_i}{P} &= (1-\gamma)f(u) + \gamma\frac{\sigma}{\sigma-1}f(u) \\ &= \left[1 + \left(\frac{\sigma}{\sigma-1} - 1\right)\gamma\right] f(u) \\ &= (1+\gamma\mu(m))f(u) \qquad (23) \\ \frac{P_i}{P} &= (1+\mu(m))f(u) \qquad (24) \end{aligned}$$

Higher mark-ups $\mu \rightarrow$ higher rents $\rightarrow$ higher real wages, especially if γ is high. All this is conditional on Y, P and u.

Short-run "general" equilibrium

Because the model is symmetric, all firms choose the same price level in equilibrium:

$$P_i = P \quad \forall i \in \{1, ..., m\}$$

So,

$$1 = (1 + \mu(m))f(u)$$

$\mu(m)$ but not γ fixes u (higher $\mu \Rightarrow$ higher u!). Hence,

$$\frac{W_i}{P} = \frac{1 + \gamma\mu(m)}{1 + \mu(m)}$$

higher $\mu(m) \Rightarrow$ lower real wages
higher $\gamma \Rightarrow$ higher real wages $\Rightarrow$ deregulation understood as lowering γ reduces real wages without affecting unemployment: In the short-run (i.e. number of firms m being fixed), a clear loss for unions.

Long-run "general" equilibrium

In the long run, rents must cover entry costs (that - for convenience - are assumed to be proportional to output). Per unit of output:

$$\begin{aligned}
\frac{P_i}{P} - \frac{W_i}{P} &= 1 - \frac{W_i}{P} \\
&= 1 - \left(\frac{1 + \gamma\mu(m)}{1 + \mu(m)} \right) \\
&= \frac{(1-\gamma)\mu(m)}{1 + \mu(m)} \\
&= c \\
\Rightarrow \mu(m) &= \frac{1}{\overset{\oplus}{\overline{\sigma} \cdot g(m)} - 1} = \frac{c}{\underbrace{1 - \gamma - c}_{\text{ass.} > 0}} \qquad (25) \\
\Rightarrow f(\underset{\ominus}{u}) &= \frac{1}{1 + \mu(m)} = 1 - \frac{c}{1 - \gamma} \qquad (26) \\
\Rightarrow W_i/P &= 1 - c \qquad (27)
\end{aligned}$$

Long-run "general" equilibrium

In sum in the *long run*,

1. the real wage is not affected by the workers' bargaining power γ because the supply of firms is fully elastic in the long run: Firms simply reach the break-even point (profit per worker is c).
2. a decrease in γ raises profits and leads to more active firms, more competition and lower mark-ups. Moreover, unemployment shrinks (compare with the short-run!)
3. a decrease in the entry cost c has a positive effect on the the real wage.
4. a decrease in the entry cost favours entry and reduces the unemployment rate.

Extensions: See e.g. Felbermayr and Prat (2011).

Exercise

Using this model of Blanchard and Giavazzi (2003), check whether you understand the following sentences:

> *In the short run, a change in the bargaining power of workers does no more than simply redistributing rents between workers and firms. But in the long run, by changing profits and leading to entry or exit of firms, it induces changes in the level of unemployment (...) labor market deregulation [i.e. lowering γ] comes with a sharp inter-temporal trade-off, lower real wages in the short run in exchange for lower unemployment in the long run. (p. 893)*

Empirical evidence

on product market regulation on panel data of countries

Empirically we have shown that the significant product market de-regulation experienced in the 1990s by some OECD countries was associated with an increase in competition as measured by average firm profitability. Such exogenous increases in competition are further associated with increases in aggregate employment and the real wage. (Griffith, Harrison and Maccartney, 2007, p. C162)

We find that, for the average OECD country, high and long-lasting unemployment benefits, high tax wedges and stringent anti-competitive product market regulation (PMR) increase aggregate unemployment. (Bassanini and Duval, 2009)

Monopsonistic competition

in the absence of unions

This is not covered by CZ.
Is it obvious that perfect competition would prevail in the absence of unions?

> *Proponents of monopsony argue that the textbook model of perfect competition is extreme in that it assumes that a wage cut of a cent causes all workers to quit instantaneously to get jobs elsewhere, an assumption that goes against both common sense and empirical evidence of the sensitivity of quits to wages... Manning (2006), p. 84.*[4]

[4] There is an issue here about the size of the wage elasticity over different time horizons. But, taken literally, the perfectly competitive model assumes it is infinite over the smallest time horizon. A special issue of the *Journal of Labor Economics* (Vol. 28(2), April 2010) contains several papers according to which the elasticity of labour supply (at the individual firm level) is small.

Monopsonistic competition

Monopsony and Unions

Falch and Strom (2007) assume

- A (non-discriminating) monopsony (in partial equilibrium) with one input
- A labour supply curve which is less than perfectly elastic.

Conclusions:

1. The model predicts an inverted-U shaped relationship between the bargaining power of the union and employment.
2. "Bargaining power in the hands of trade unions may give an efficient outcome because 'medium' powerful unions generate an outcome equal to the 'competitive' solution" (The authors' conclusion, p. 206)

Monopsony is a however limit case.

Monopsonistic competition

Monopsony power

In the first chapter about job-search theory,
equilibrium search models were discussed under the assumptions:

- frictions on the labour market,
- model the unemployed and the employed job-seekers seek for a (better) job,
- a large number of firms compete to attract workers by making take-it-or-leave-it wage offers.

In this setting, despite competition, firms keep some monopsony power in equilibrium.

We will not explicitly introduce unions in this setting.

We will assume that

- centralized or sectoral collective bargaining fixes a wage floor (call it z);
- this wage floor is enforced;
- individual firms compete to attract workers, paying wages $\geq z$ (taking z as exogenous).

Other assumptions will be as simple as in the corresponding section of Chap 1, with slight changes.

The presentation is based on Mortensen (2000).

Assumptions

In a continuous time setting with infinitely-lived agents, assume the following stationary environment:

A1 Rational forward-looking and homogeneous risk-neutral agents who only care about their income. For simplicity, the instantaneous value in unemployment is nil (no UB, no cost or search).

A2 Job-seekers choose to reject or accept a job offer, if any. An accepted wage remains constant all along the employment spell. Rejected offers (i) cannot be recalled, (ii) lead to no sanction.

A3 On-the-job search. No threshold wage above which searching on the job no longer pays. $\lambda_u = \lambda_e = \lambda$ designate the equal exogenous arrival rates of job offers respectively for the unemployed and the employed. So, with [A1], the reservation wage $x = 0$.

Assumptions continued

A4 Knowing the exogenous wage floor z, firms choose their wage offer $w \geq z$ and **commit** to pay that wage. To currently employed workers, firms send wage offers ignoring their current wage. The worker's current employer does not respond to the outside offer.

A5 Constant exogenous job destruction rate, $0 < q < +\infty$.

A6 Constant exogenous discount rate, r.

A7 A continuum of worker and firms, each of unitary mass.

Assumptions continued

A8 Workers and vacancies are matched randomly. The matching function measures the rate of *contacts* between v vacancies, u unemployed and $1-u$ employed:[5]

$$m(v, u, 1-u).$$

By [A4],

$$m(v, u, 1-u) = m(v, 1).$$

Furthermore, the flow of *contacts* verify :

$$\lambda \cdot (u + 1 - u) = m(v, 1).$$

So, one can write $\lambda = \lambda(v)$. With standard assumptions about function $m(\cdot)$, $\lambda(v)$ is increasing and concave. The Inada conditions are assumed ($\lambda(0) = 0; \lambda'(0) = +\infty$).

[5] v, u and $1-u$ are rates, the denominator being the normalised size of the labour force.

Given the similarities with the equilibrium search model of Chap. 1, the presentation will be brief and focussed on differences.

$$u = \frac{q}{q + \lambda(v)} \tag{28}$$

If $H(w)$ is the CDF of the wage offers,
the fraction of those *employed* at a wage w or less, i.e. the wage CDF $G(w)$ verifies:

$$G(w) = \frac{q \cdot H(w)}{q + \lambda(v) \cdot \overline{H}(w)} \quad \text{with} \quad \overline{H}(w) \equiv 1 - H(w) \tag{29}$$

Expected discounted profit

The cdf $H(\cdot)$ being given

The expected discounted profit of a filled job paid w is denoted $\Pi_e(w)$. Let $m(v) = \frac{\lambda(v)}{v}$ be the contact rate per vacancy and h be the flow cost of posting a vacancy. Since firms set wages, the expected discounted profit of a vacant job Π_v

$$r\Pi_v = \max_{w \geq z} \{-h + m(v)\left[u \cdot 1 + (1-u)G(w)\right](\Pi_e(w) - \Pi_v)\}, \qquad (30)$$

where

$$r\Pi_e(w) = y - w + \left(q + \lambda(v) \cdot \overline{H}(w)\right)(\Pi_v - \Pi_e(w)) \qquad (31)$$

where y is the marginal product ($y > z$).
The higher the wage paid, the bigger the retention rate $\lambda \cdot H(w)$ and the lower the instantaneous profit.

Free entry

In equilibrium with free entry of vacancies, $\Pi_v = 0$.
This property can then be introduced in (30) and (31) to yield two expressions for $\Pi_e(w)$.
Equating them and using (28) and (29) lead to

$$\frac{h}{m(v)} = \frac{h \cdot v}{\lambda(v)} = \max_{w \geq z} \left[\frac{q}{q + \lambda(v) \cdot \overline{H}(w)} \cdot \frac{y - w}{r + q + \lambda(v) \cdot \overline{H}(w)} \right] \quad (32)$$

A steady-state equilibrium is a vacancy rate v and a wage offer distribution H such that the value of hiring workers is optimal and equal for every wage of the support of H.

In what follows, the equilibrium vacancy rate is characterised and then the distribution and the support of H are defined.

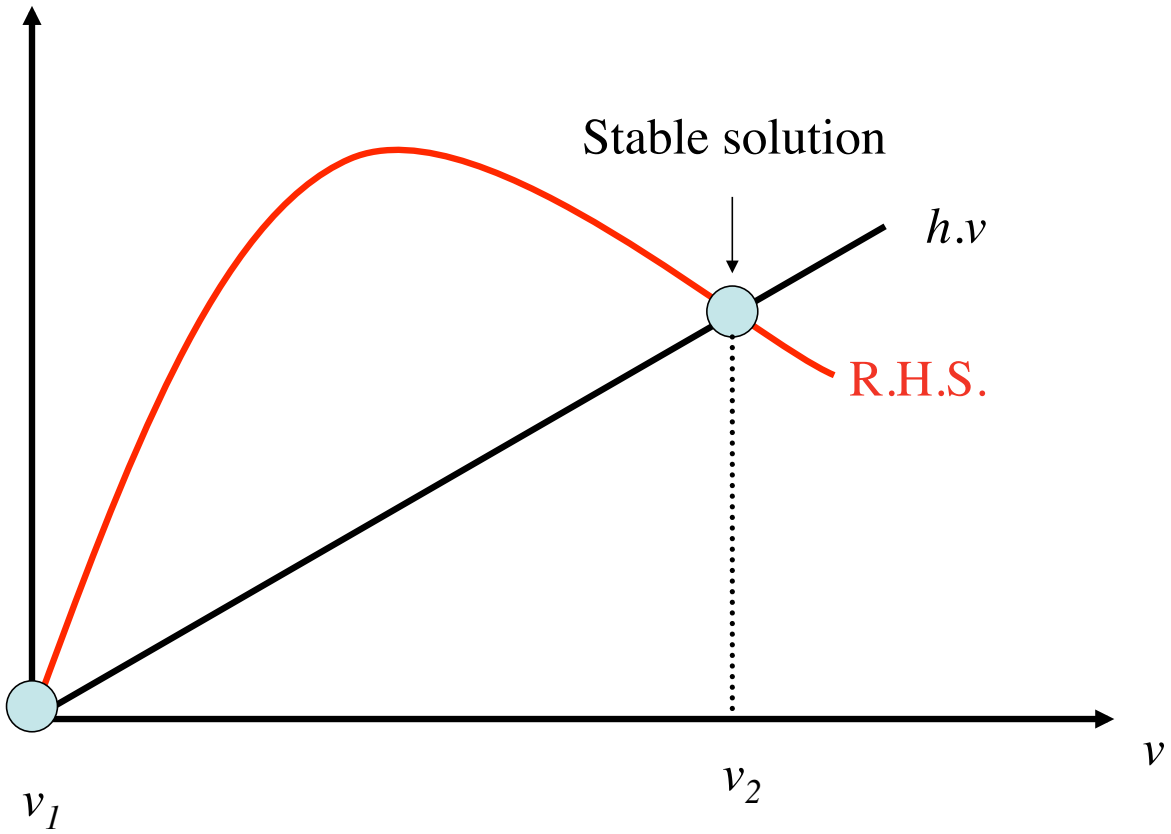
Equilibrium vacancy rate

At the wage floor z, unemployed workers accept job offers since $x = 0$. The optimal lower bound of the support of the wage distribution is therefore z with $H(z) = 0$.
For $w = z$, (32) can be written as an implicit equation in v (conditional on z), namely:

$$h \cdot v = \left[\frac{q}{q + \lambda(v)}\right]\left[\frac{(y - z)\lambda(v)}{r + q + \lambda(v)}\right] \tag{33}$$

There are two equilibria:

- $v_1 = 0$ This solution is unstable since a small increase in v raises the return to vacancy creation more than the cost
- and $v_2 > 0$, which is stable


Stable solution
h.v
R.H.S.
v
v1
v2

Equilibrium wage offer distribution

given $v = v_2$

As in Chapter 1, there is an equilibrium non degenerate wage distribution on a support $[z, \overline{w}]$.[6]
Any equilibrium wage offer $w \geq z$ in the support of H must yield the same profit.
As in Chap.1, $H(w)$ solves:

$$\frac{q}{q + \lambda(v_2) \cdot \overline{H}(w)} \cdot \frac{y - w}{r + q + \lambda(v_2) \cdot \overline{H}(w)} = \frac{q}{q + \lambda(v_2)} \cdot \frac{y - z}{r + q + \lambda(v_2)}$$

$\forall w \in [z, \overline{w}]$,
where $\overline{w}$ is explicitly given by this equality when $w = \overline{w}$ since $H(\overline{w}) = 1$.

[6] Here, $\overline{w}$ has the meaning that should not be confused with "wages in other firms" used earlier in these slides.

Implications of the wage floor z

1) On employment

Looking at the graphical representation of (33),
for any v, a rise in z lowers the curve on the R.H.S. of (33).
Hence, necessarily a higher wage floor lowers v_2.
So, $\lambda(v_2)$ shrinks as well and hence the unemployment rate rises.

$\neq$ conclusion from the partial equilibrium analysis of Falch and Strom (2007).
But, here, contrary to the latter paper, total labour supply is exogenously fixed.

2) On efficiency

Assume the simplification $r \to 0$.
With risk-neutral agents and in the absence of any value to unemployment, a benevolent utilitarian planner would choose v so as to maximise output net of recruiting costs.

Wage floor and efficiency

This planner then solves the following problem:

$$\max_{v} \; y(1-u) - h \cdot v = y\frac{\lambda(v)}{q+\lambda(v)} - h \cdot v \tag{34}$$

Let v^* denote a solution to this problem. v^* verifies:

$$y\frac{q\lambda'(v^*)}{[q+\lambda(v^*)]^2} = h \tag{35}$$

The assumption $\lambda''(v) < 0$ is a sufficient condition.

Is the decentralized economy efficient?

Let us compare v^* to the decentralised equilibrium v_2 *without wage floor* $z = 0$.
Condition (33) evaluated at $r = z = 0$ becomes:

$$h \cdot v_2 = \frac{q \cdot y \cdot \lambda(v_2)}{(q + \lambda(v_2))^2} \tag{36}$$

Combining (35) and (36) yields:

$$y \frac{q\lambda'(v^*)}{[q + \lambda(v^*)]^2} = h = y \frac{q\lambda(v_2)/v_2}{[q + \lambda(v_2)]^2} > y \frac{q\lambda'(v_2)}{[q + \lambda(v_2)]^2} \tag{37}$$

given the assumptions about the function $\lambda(\cdot)$.
Now, since $\frac{q\lambda'(v)}{[q+\lambda(v)]^2}$ is a decreasing function of v, one can conclude that

$$v_2 > v^*$$

The decentralized economy is inefficient

Put another way, *in the decentralised equilibrium without a wage floor, too many vacancies are created*.

The intuition for this result is the following.

Vacancies that are created to hire unemployed people have a social value (they generate a social gain of y).

However, vacancies are also created to attract employed people in better paid jobs. The social gain of this is zero.

That is the reason why the *laissez-faire* economy creates too many vacancies.

A well-chosen wage floor is efficient

A *positive* wage floor z^* equal to

$$y\left(1-\frac{v^*\lambda'(v^*)}{\lambda(v^*)}\right)$$

would be needed to induce the optimal number of vacancies (and the optimal unemployment rate). Mortensen (2000) concludes that

> *Available empirical estimates of the elasticity* $[\frac{v^*\lambda'(v^*)}{\lambda(v^*)}]$ *suggests a value for the ratio* z/y *somewhere in the range between 40% and 60%. (p. 288)*

Implementation of z:

- A union could fix an appropriate wage floor;
- An equivalent legal minimum wage could be chosen by the State.

Notice that the union could be better informed about y and the function λ than the State.

Main message of empirical research

Let “bargaining status” mean unionized vs nonunionized, covered by collective agreements or not, centralized vs decentralized bargaining,...

Main message of Section 6 of the book - that you have to read -:
Hard to find clear-cut conclusions about the effects of “bargaining status”.

Why?

1. Selectivity: Confound "bargaining status" with relevant
   - unobserved worker characteristics (worker's or firm's choice)
   - unobserved firm-level characteristics
2. The "bargaining status" is an endogenous variable (e.g. being or not a union member is related to the "wage hikes a union may obtain", p. 422).
3. To test hypotheses, one has to make assumptions about preferences and revenue functions. Some tests are sensitive to the specific assumption made by the researcher.

Despite these difficulties, it seems that

1. unions have a positive impact on the wage;
2. unions reduce the returns of (un)observable characteristics of workers ($\Rightarrow$ wage compression);
3. union density (or the coverage) is negatively correlated with the dispersion of wages throughout the economy as a whole. This results from the interaction of many effects, in particular (1) and (2) above, but also:
   - $\Diamond$ is there a minimum wage? legal or bargained over?
   - $\Diamond$ sectoral bargaining agreements automatically extended to cover all firms in an industry?
   - $\Diamond$ ...
4. lack of evidence w.r.to productivity;
5. union power has a negative effect on profits

Other effects of unionization

Effect on investment

Employment effects:
a) (Weakly) efficient contracts vs right-to-manage

Fragile conclusions according to CZ.

Dobbelaere and Mairesse (2010) conclude that imperfect competition in the product market and (weakly) efficient bargaining in the labour market are the predominant regime in the 38 French manufacturing industries.
b) Direct estimations of a link "bargaining status" $\rightarrow$ employment"

Mixed results

Read Cahuc and Zylberberg (2004), p. 419-429.

Wages and unemployment

A clear distinction between:

- The Phillips Curve (Phillips, 1958), which is a relationship between wage *growth* and unemployment; studied with *aggregate* time-series methods.
- The Wage Curve (Blanchflower and Oswald, 1994), which is a (logarithmic) relationship between the wage *level* and unemployment *in the local area*; studied with individual data.

An unemployment elasticity of approximately –0.1 is found in many countries all over the world.
Example: For the UK, Bell, Nickell and Quintini (2002) conclude that "The long-run elasticity of average regional wages with respect to regional unemployment is in the range 0.11–0.13 (...). The long-run elasticity of individual wages with respect to regional unemployment is around 0.053."
Why is there such a regularity? This is still not well understood.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