Topic 5.2 - Unions: Wage and Employment Determination

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Economics 471

Wage and Employment Determination

How do firms and unions interact in the setting of employment and wages?

- The view taken in the economic literature is that unions maximize an objective (utility) function subject to firm behaviour

Union Objectives:

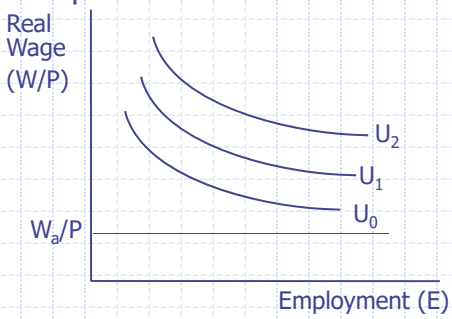
- What do unions want?
- "more" – Samuel Gompers, founder of the American Federation of Labour
- Typically assume that a union's utility depends on wages and employment – and that unions want more of both

Union Objectives

- Note that the union's objectives are not necessarily the same as those of the union members
- Asymmetric information on the available options may allow the union to pursue its own objectives
- Heterogeneity of preferences among union members may make it difficult to represent all members goals
- Nonetheless it is useful to think of the union acting as a single decision making unit in search of higher wages and employment

The Union's Indifference Curves

Thus, the union's indifference curves have the usual shape



Downward Sloping:
- High wage is necessary to compensate for low employment

Convex:
- With a high wage and low employment willing to give up a lot of wages to increase E
- What really matters to workers is the real wage W/P

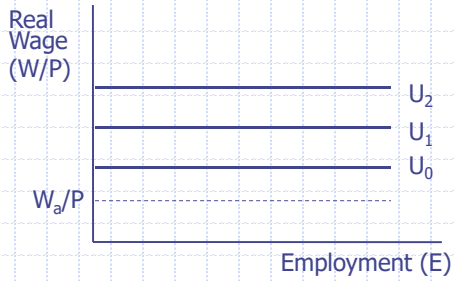
The worker's alternative wage also matters
- Represents lower bound on wage compensation
- Otherwise would choose the alternative (especially when faced with union dues)

Alternative Objective Functions

- Other union objective functions have also been suggested

1. Maximize the wage rate

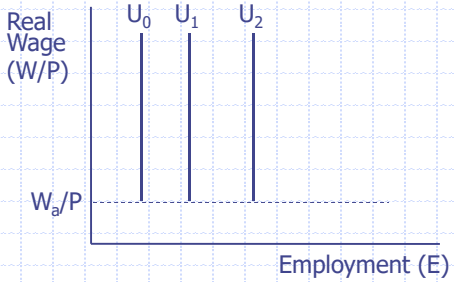
- Place all the weight on wages and none on employment



- Utility increases "vertically" only
- Sometimes appears that unions act this way

Alternative Objective Functions

2. Maximize employment



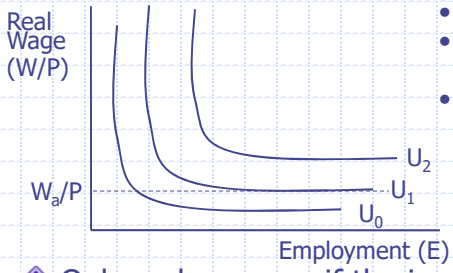
- Utility increases "horizontally"

- Recall that union membership matters to the union because it increases union dues

Alternative Objective Functions

3. Maximize the real wage bill (W/P•E)

- The real wage bill is just total labour income
- Here the union places weight on both wages and employment



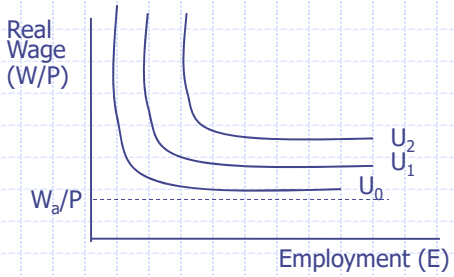
- W/P•E =constant
- Equation for a rectangular hyperbola
- Implies that the union would allow the wage to fall below W_a

- Only makes sense if the income is shared between employed and unemployed members
- Otherwise it matters if 3 members make $100,000 or 30 members make $10,000 each

Alternative Objective Functions

4. Maximize real economic rent (W/P- W_a/P)•E

- Similar to profit maximization for a monopolist
  - here we implicitly assume the union has a monopoly on the sale of labour
- The alternative wage represents the opportunity cost to each member



W/P•E = total revenue
W_a/P•E = total cost

- Indifference curves are rectangular hyperbolas
- The origin shifts up to (0,W_a/P)

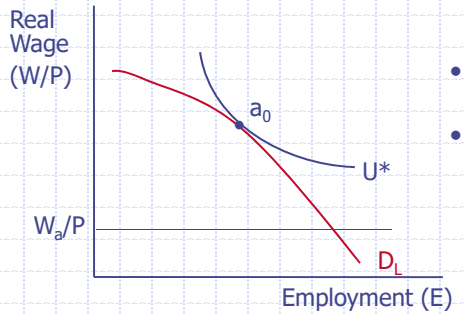
- Most plausible but still requires income sharing

Union Constraints

- The "choice" of wages and employment by the union is constrained by the firm's behaviour
- Assume that the firm is dealing with a profit-maximizing competitive firm
- Also assume (initially) that the determination of wages and employment is carried out in two stages
- In the first stage the union and firm negotiate over the wage
- In the second stage the firm is allowed to choose the level of employment based on the negotiated wage
- The firm need only to look to its labour demand curve which specifies the profit maximizing employment level at each wage

Union Constraints

In a sense, the firm's labour demand curve can be viewed as a constraint on union behaviour

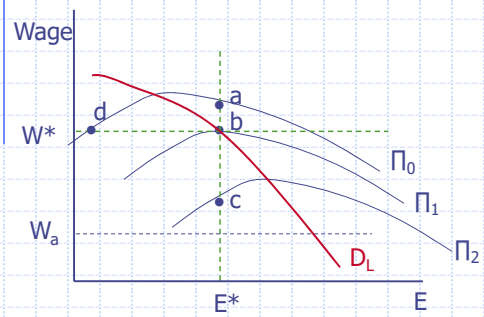


- If the firm can not be induced off of the demand curve
- Union utility maximization occurs at a point of tangency (a_0)

- a_0 represents one of the possible outcomes from collective bargaining in this model
- In fact, it is the unions preferred outcome

The Firm's Preferred Outcome

- The firm prefers outcomes that yield higher profits
- Profits vary along the firm's labour demand curve

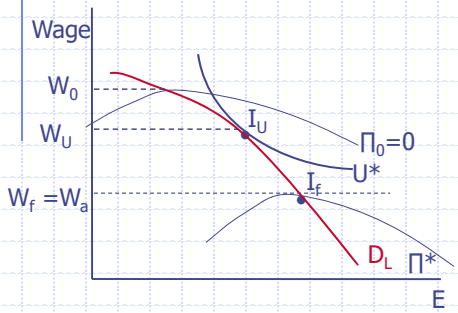


- To see this consider the firm's isoprofit curves
- Each isoprofit is maximized at the demand curve
- The demand curve gives the profit-maximizing employment level at each wage
- e.g. given w* the firm maximizes profits at E*

- Isoprofits lower on the demand curve are associated with higher profits (preferred by the firm)
- For a given level of employment (E*) profits will be higher when wages are lower

Bargaining Range

- The range of wages along the demand curve over which bargaining can occur is constrained



1. The lowest possible wage the firm can negotiate is W_a
   - Thus, the firm's ideal wage/ employment combination is I_f (where $W_f=W_a$)
2. The zero-profit isoprofit limits the wage the union can ask for
   - Doesn't want the firm to go out of business

- As drawn the zero profit constraint is not binding
  - The union prefers a wage less than W_0 (I_U) because of the negative employment effects of a higher wage
- The bargaining range is the interval $[W_a, \min(W_0, W_U)]$

Some Implications

I. Elasticity of Demand:

- In the absence of the union the competitive wage is given by W_a
- Thus, if the union has any bargaining power wages will be higher and employment lower with the union
- Because of this the likelihood of a successful union drive and union utility increase when the labour demand curve is inelastic
  - The union can demand higher wages without employment falling by much
  - Allows the union to reach a higher indifference curve

Some Implications

- Not surprisingly, a number of union practices are aimed at making labour demand more inelastic

These include:

Reducing the number of substitutes for union labour

- Through occupational licensing and apprenticeships
- Supporting legislation that raises the wages of non-union workers – like minimum wage legislation

Reducing substitutes for union-made products

- Support for quotas and tariffs on foreign competition
- Advertising on products (union labels on beer)
- Attempts to organize all firms in a particular industry

Some Implications

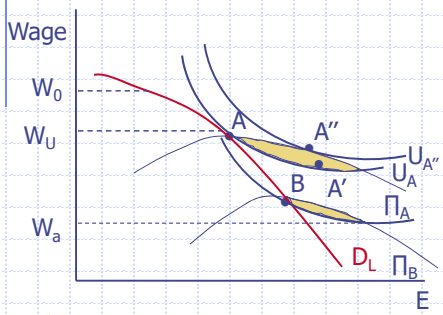
II Labour Market Efficiency:

- The outcome implied by the model is inefficient because unions reduce the total value of labour's contribution to national income
- If unions are able to raise wages (reduce employment) in union sectors employment increases in nonunion firms (if available etc.)
- The last worker hired by a nonunion firm would have greater productivity if she moved to the union sector
- Could move workers from the nonunion sector to the union sector and increase national income

i.e. there is some deadweight loss associated with unionization

Efficient Contracts

- The fact that the previous equilibrium is inefficient suggests there might be a "better" contract off of the demand curve



Point A: represents the "ideal" union outcome in previous model

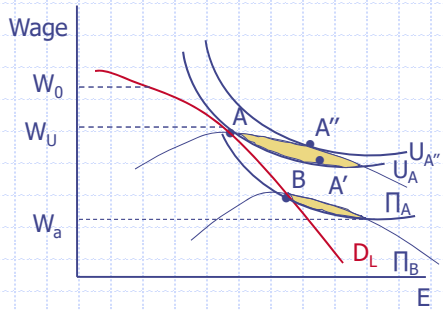
Both the union and the firm are better off moving to a contract in the shaded region

At A' both the union and firm are better off

Point B: Again there is a shaded region in which both parties benefit

- When will all the gains from trade be exhausted?
- No change can make one party better off without making the other party worse off (true at A'')

Efficient Contract (A")

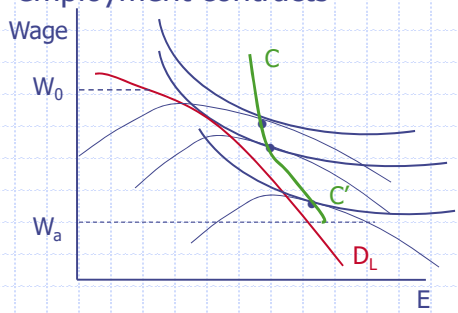


- At A" all of the gains from trade are exhausted
- This occurs at a point of tangency between the union's indifference curve and the firm's isoprofit curve

- A" is a "Pareto-efficient" contract
- Can't make the union better off without reducing the profits of the firm
- Can't increase the profits of the firm without reducing the utility of the union

Contract Curve

- The locus of all of the relevant Pareto-efficient wage-employment contracts



- Contract Curve = C - C'
- The contract curve lies to the right of D_L
- Indifference curves are downward sloping
- Can only be tangent to the right of D_L - upward sloping to the left

- Points up on C-C' are preferred by the union and those lower on C-C' are preferred by the firm
- Bargaining range is determined by zero economic profit and the workers' alternative wage

Implications

1. Featherbedding

- Outcomes on the contract curve contain higher levels of employment than the firm would choose on its own
- The firm is overstaffed

e.g. airlines that really only need 2 pilots to fly an airplane will hire 3 pilots

- The firm and the union will be forced to negotiate "make-work" or featherbedding practices to share tasks
- With 3 pilots instead of 2 might restrict the number of hours that a pilot is allowed to fly

Implications

2. Relationship between wages and employment

- The negative "ceteris paribus" relationship between wages and employment need not hold
- The contract curve could be upward sloping, vertical or any other shape

3. "Efficiency"

- Although the term "efficient contract" is used for all contracts on the contract curve they may not be allocatively efficient
- "Efficient" in that they exhaust all bargaining gains
- May not yield an optimal allocation of labour within the firm or between union and nonunion sectors
  - featherbedding and wage differentials

Obstacles to Reaching Efficient Contracts

- There are obvious incentives for firms and unions to reach an agreement on the contract curve
- These agreement may, however, be difficult to reach

Why?

1. Imperfect Information

- May not realize that there are gains to be made if there is not full information about willingness/ability to trade
- Full information is not likely given that both parties have an incentive to misrepresent their preferences

Obstacles to Reaching Efficient Contracts

2. Difficult to enforce employment contracts

- The firm has an incentive to reduce employment at the negotiated wage (reach the demand curve)
- It is harder to monitor the firm if labour demand shifts over the contract period
- Unlikely to get an agreement that covers all possible contingencies

Bargaining Theory

- The union models we have examined so far suggest that there is a range of possible outcomes
- Some of these outcomes are more preferred by the firm and some are better for the union

Bargaining Theory is used to:

1. Predict the likely outcome of such bargaining
2. Determine what factors are relevant in influencing the outcome

- The basic idea is that the union and firm will engage in strategic behaviour (like a card game or chess)
- Both parties conjecture about the potential actions of their collective bargaining partner

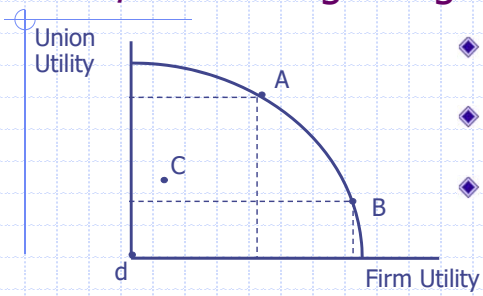
The Basic Bargaining Problem

There is a set of characteristics that is common to all bargaining situations

- There is a set of possible outcomes
- Each party involved in bargaining has a minimum acceptable outcome
- Neither party would agree to an outcome that yields less utility than the minimum acceptable outcome

- For the bargaining problem of a collective agreement between a firm and a union the problem might be illustrated as follows:

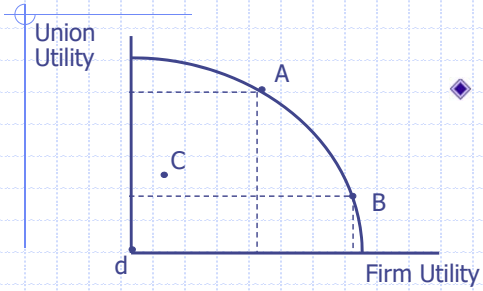
Firm/Union Bargaining Problem



- d = disagreement or "threat point"
- Utility achieved if no agreement is reached
- Represents the minimum acceptable outcome (e.g. alternative wage)

- The area bounded by the curve represents the set of feasible outcomes
  - Both parties are as well off or better than d
- Bounded by the firm's profits
- Points on the boundary are Pareto Efficient
- To see this consider point C (inside the boundary)
- Not Pareto Efficient as both parties can be made better off
  - Creates an incentive for cooperation

Firm/Union Bargaining Problem



- At point A, can't make the firm better off without making the union worse off

- Conflict arises because the set of Pareto Efficient outcomes yield higher utility for one party at the cost of the other
- Point B is also Pareto Efficient but yields higher utility to the firm than A and lower utility to the union
- This tension often leads to threats
  - Threaten non-agreement (lower utility) if your preferred outcome is not achieved

Bargaining Problem Solutions

There are two classes of solutions:

1. Theories that pertain to the bargaining outcome
   - Give a set of properties that describe the outcome
2. Theories that pertain to the bargaining process
   - Model the process of bargaining along with giving predictions about the outcome
   - What follows are examples of each of these

The Nash Bargaining Solution:

- Follows from the work of John Nash
- Assumes perfect information about the possible payoffs and preferences
  - Not about what the other party will do

The Nash Bargaining Solution

- Outlines four axioms that a solution to the bargaining problem must obey

1. The outcome must be Pareto Efficient
   - With perfect information rational bargainers will exhaust all of the gains from trade
2. If the bargaining set is "symmetric" the solution must give equal utility increments to each party
   - "Symmetric" – could put firm utility on the y-axis and union utility on the x-axis without changing the feasible set
   - Bargaining power depends on possible outcomes
   - With symmetry both parties have the same amount of bargaining power

The Nash Bargaining Solution

3. The solution is not altered by a linear transformation of either party's utility function
   - The units that utility is measured in should not matter
   - Rules out comparisons of the firm's utility to the unions utility
4. Independence of Irrelevant Alternatives
   - Irrelevant alternatives are a subset of all the possible outcomes that are not chosen

The basic idea is as follows:

- Suppose you "play the game" with all possible outcomes and come to a solution

The Nash Bargaining Solution

- If we remove some of the possible outcomes (other than the solution) we should get the exact same outcome

Example: Deciding on how to get to school

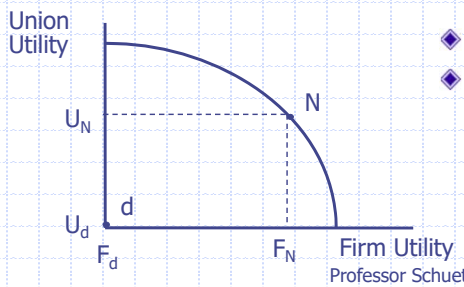
- Choose between: bus, car and bike
- Suppose you choose to ride your bike
- You find out that, in fact, the buses are not running
- This should not change your decision to ride your bike
- It is a little more complex in a two person situation and it is an axiom that is often violated in experiments

Nash Equilibrium

- It turns out that these four axioms imply a unique solution to the bargaining problem
- The "Nash Equilibrium" is such that the product of the two parties' utility increment is maximized

Utility Increment = utility from the actual outcome – utility from disagreement

- i.e. maximizes $(U-U_d)(F-F_d)$



- In terms of the graph
- Find the point on the boundary that generates the biggest possible rectangle

Rubinstein's Bargaining Theory

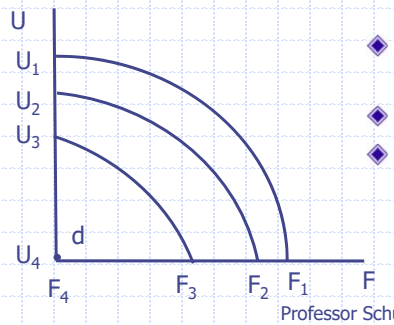
- Rubinstein models the bargaining process
- Clearly there are a number of different ways in which firm's and unions will interact
- The interaction will depend, in part, on the "rules" of the game

The rules in Rubinstein's game are as follows:

- The bargainers take turns making offers
- The offer is either accepted or rejected
- If accepted bargaining ends
- If rejected a counteroffer is made

Assumptions

- Perfect information
- Each party cares only about the utility derived at the end of the process
- Each round in which an agreement is not reached is costly to both parties
  - Potential profits from bargaining (boundary) decrease

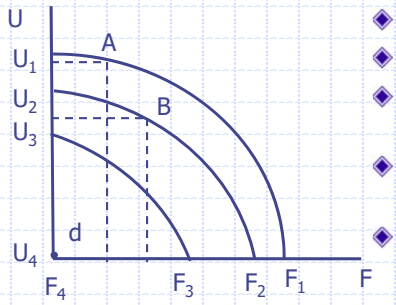


- First period bargaining boundary = $U_1 - F_1$
- Second period falls to $U_2 - F_2$
- By period four the only feasible outcome is disagreement

Assumptions

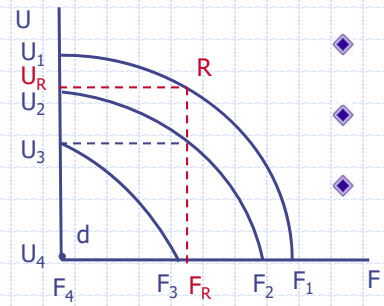
- Each party acts rationally and can expect the other party to do the same
  - Rules outs non-credible threats

Example: The union starts the bargaining by offering A and only A in the following graph



- i.e. otherwise end up at d
- This is not a credible threat
- The firm knows that if it offers B in period 2 the union will accept
- B gives higher utility than the union could possibly get in round 3
- Certainly better than disagreement

Equilibrium – Union Makes First Offer



- The equilibrium will occur at R if the union moves first
- i.e. the union will offer and the firm will accept R
- To see this we must use backward induction

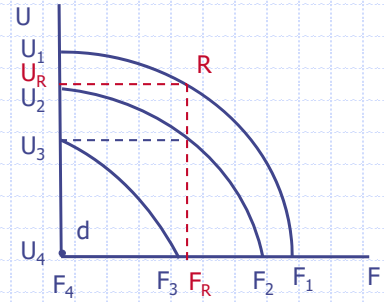
Period 2: the firm moves, period 3: the union moves, period 4: no decision to make

- The best the firm can do in period 4 is F_4

Period 3: the union can offer the firm any outcome better than or equal to F_4 and the firm will accept

- The union will offer (U_3,F_4)

Equilibrium – Union Makes First Offer



Period 2: the firm knows that if negotiations go to period 3 the union can get U_3 – must at least match this

- The firm will offer (U_3,F_R)

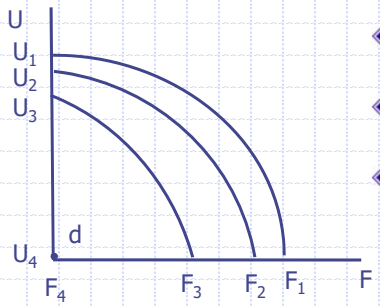
Period 1: The same rational leads to the union offering and getting (U_R,F_R)

- The equilibrium avoids any delay costs

Delay Costs

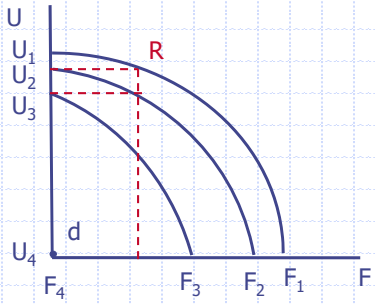
- Notice that delay costs are important in that the threat of these costs give the negotiators power
- In fact, what really gives a party power in negotiations is the relative delay costs

To see this consider the following diagram:



- The feasible set in period 1 is the same as before
- Delay costs to the firm are also the same
- Unions delay costs have decreased

Delay Costs



- The relative delay costs for the firm have increased
- This decreases the bargaining power of the firm and increases that of the union

- Not surprisingly, the outcome is more favourable for the union
- The outcome would not have changed if both parties had experienced a proportional decrease in delay costs

Some Final Words

- Clearly, Rubinstein's model is overly simplistic
  - e.g. usually no rule on who makes an offer and when
- Captures the importance of relative delay costs in determining the equilibrium outcome
- Might help to explain why strikes or lockouts are important in bargaining
  - Strikes may impose greater proportional costs on one party than the other
- Doesn't help to explain why strikes actually occur
- Rubinstein's equilibrium occurs in the first period (avoiding the strike)

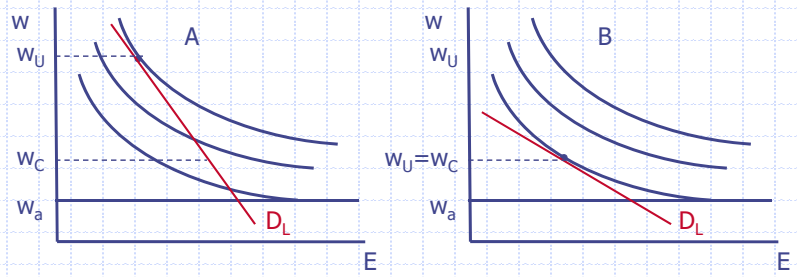
Some Final Words

- The strike is irrational
- Could agree to the strike outcome in advance and save the costs (share the savings)
- The irrationality of strikes is known as the "Hicks Paradox"
- Most models that attempt to explain strikes assume that there is asymmetric information
- e.g. that the firm knows more about the size of the pie than the union does
- In such circumstances strikes may make sense

More on Bargaining Power

- So far, we have thought of bargaining power as the ability of one party to raise (lower) wages
  - i.e. a "powerful" union is one that can negotiate an outcome close to its preferred outcome
- However, union bargaining power is also related to the elasticity of labour demand
- Here the notion of bargaining power is associated with the union's willingness to raise wages
- The more inelastic the labour demand curve is the more willing the union is to raise wages (smaller employment loss)
- It is possible for a union to be powerful in one respect but not in the other

More on Bargaining Power



- Panel A shows a union that is willing to raise wages substantially but is unable to do so
- Panel B shows a union that is not willing to raise wages but that can obtain its preferred outcome
- Of course, unions can be powerful or weak according to both meanings as well