Chapter 5 – **Dividing the gains to cooperation: bargaining and rent seeking**

Example of bargaining where bargainers exploit the threat of their outside options (plebs in Roman Republic, can cappers in California).

"When people collaborate in a productive activity ... they typically produce a joint surplus, a level of benefit net of costs such that each may be better-off engaging in the joint activity than if they did not.... The joint surplus is just the difference between the benefits (net of direct costs) each gains from the joint activity and the benefits each would receive in their best alternative." (p.168)

Thus the focus of the analysis shifts from allocation to distribution, requiring a different set of institutions.

A BARGAINING PROCESS arises whenever the agents must determine how the surplus has to be distributed among participants.

In such a process, each participant must receive benefits at least as great as in her next best alternative (*participation constraint*), since each player can always revert to her non-cooperative strategy.

The term BARGAINING POWER conventionally refers to the relative share of the joint surplus gained by a participant.

Bargaining outcomes do not have any relation with initial wealth distribution among participants.

The traditional economist's approach separates the problem of allocation from the problem of distribution. This is justified if allocative efficiency and distributional equity could be thought in isolation (which is not very often the case). Several examples where income/wealth inequality affects allocative efficiency in direct ways (example: inequality and growth).

The main justification is related to the idea that organisational rents are made possible by lack of competition, since in the long run competition eliminates extra-profits.

Standard approach postulates (implicitly or explicitly) two assumptions:
① all aspects of individual interactions are governed by complete and costlessly enforceable contracts
② only competitive transactions take place.

Bowles' intended approach:
① organisational rents are ubiquitous
② advancing one's distributional claim is a resource-using activity
③ conflicts over the distribution of surplus may contribute to inefficiency in three ways:
⇨ breaking down bargaining leading to foregone opportunities
⇨ diverting resources to rent seeking activities (lawyers and similar jobs)
⇨ distortion in the allocation of productive resources (example: excess of capitalisation to reduce unions' power within workplace)

THE NASH MODEL OF BARGAINING

Principles governing an impartial arbitrator choice:
* the outcome should be Pareto optimal (i.e. it belongs to the contract locus)
* the outcome should be symmetrical (i.e. exchanging the order of the participants does not change the outcome - *anonymity*)
* the outcome should be invariant to linear transformation of the utility (i.e. the utility are ordinal and not cardinal → the arbitrator cannot take into account the relative needs of he two parties)
* the outcome should be independent of irrelevant alternatives (i.e. the outcome should not change if the feasible set shrinks leaving the reservation positions and the outcome unaffected).

The Nash model has been used primarily to study how the bargains *are struck*, not how they *should be*.

The unique solution meeting the requirements is the maximisation of the product of the gains expressed in utilities over the fallback positions.

Suppose Upper and Lower are to divide a prize normalised to unit. x is Lower's share. Fallback positions are zero for simplicity.

The ***Nash cooperative solution*** is given by

$$\max_x u(x) \cdot U(1-x)$$

that is satisfied when

$$u'(x) \cdot U(1-x) - u(x) \cdot U'(1-x) = 0 \qquad \Leftrightarrow \qquad \frac{u'(x)}{u(x)} = \frac{U'(1-x)}{U(1-x)}$$

If Lower and Upper have identical utility functions (or one is linear transformation of the other), the solution will be $x^* = \frac{1}{2}$.

The player whose marginal utility function will decline more rapidly (i.e. more risk adverse) will get less.

If we introduce the fallback positions explicitly, z and Z can either be *outside options* (when the relationship terminates in the absence of agreement) or *inside options* (the relationship continues at their non-cooperative values).

We also take into account different bargaining powers (anonymity is dropped), the generalised Nash solution is given by

$$\max_x (u(x) - z)^{\alpha} \cdot (U(1-x) - Z)^{(1-\alpha)}$$

leading to the solution

$$\frac{\alpha u'(x)}{u(x) - z} = \frac{(1-\alpha)U'(1-x)}{U(1-x) - Z}$$

Notice that the share is increasing in the relative fallback position of each player. In facts, if $u(x) = x$ and $U(1-x) = 1-x$, the previous equality becomes

$$\frac{\alpha}{x-z} = \frac{(1-\alpha)}{1-x-Z} \qquad \Leftrightarrow \qquad x = z + \alpha(1-(z+Z))$$

Lower obtains her fallback position augmented by a share in the joint surplus, which is proportional to her bargaining power.

Implications: one's fallback position will influence the outcome and therefore a fifty-fifty split is a likely outcome among identical agents.

BARGAINING IN THE ALTERNATING OFFER MODEL

Nash bargaining model is consistent with social welfare axioms expressing a concept of *collective rationality*. The alternating offer model is concerned with the process of bargaining, and asks what outcome is consistent with the axioms of *individual rationality*.

Key features:
① the process of bargaining is time-consuming, and delay is costly
② bargaining power is inversely related with individual bargaining costs.
⇨ "bargaining power thus derives from the capacity to benefit from inflicting costs on the other".

Rules of the game:
a) designate a "first mover"
b) the first mover makes an offer to split the surplus. If accepted, the game ends. If the offer is rejected, the players obtain their fallback utilities.
c) now the second player has the right to make an offer. The game continues until one offer is accepted.
d) the passing of the time has an opportunity cost, indicated by the discount factor δ.

The model:
* Two players, Lower and Upper, have to split a unitary prize $(v + V = 1)$.
* z and Z are fallback payoffs (continuation). For simplicity $z = Z = 0$.
* Suppose Lower is the first mover. If $\hat{v} \leq 1$ is the maximum she can obtain as offerer, she will be indifferent between obtaining $\hat{v}$ at $t = 0$, $\hat{v}\delta_l$ at $t = 1$, $\hat{v}\delta_l^2$ at $t = 2$, and therefore $\hat{v}\delta_l^i$ at $t = i$. If $\delta < 1 \Rightarrow \lim_{i \to \infty} \delta^i = 0$: therefore waiting excessively is costly.

* By speculation, at $t = 0$ Upper knows that at $t = 1$ Lower will accept an offer equal to $\hat{v}\delta_l$, since he will be indifferent between that offer and $\hat{v}$ now. Thus Upper knows that should she made the offer $\hat{v}\delta_l$, this would be accepted, and she would obtain $(1 - \hat{v}\delta_l)$, which correspond today to

$$\delta_u (1 - \hat{v}\delta_l)$$

* But Lower knows that if she made the offer $\delta_u (1 - \hat{v}\delta_l)$ at time $t = 0$, it would be accepted. Thus the maximum she can obtain is

$$\hat{v} = 1 - \delta_u (1 - \delta_l \hat{v}) = \frac{1 - \delta_u}{1 - \delta_l \delta_u}$$

Since both are rational and use backward induction, the "right" offer is made at the initial stage of the game, and the bargaining process is not observed.

Implications of this solution:
① if $\delta_u = \delta_l$ then $\hat{v} = \frac{1 - \delta}{1 - \delta^2} = \frac{1 - \delta}{(1 - \delta)(1 + \delta)} = \frac{1}{1 + \delta} > \frac{1}{2}$. The first mover obtains a larger share, but the advantage declines with a longer horizon for both players.

② by reintroducing the fallback payoffs, the solution takes the form

$$\hat{v} = z + \frac{1 - \delta_u}{1 - \delta_l \delta_u} (1 - z - Z)$$

Thus $\beta = \frac{1-\delta_u}{1-\delta_l\delta_u}$ represents the bargaining power of Lower, which is increasing in δ_l and decreasing in δ_u: impatience is a weakness! If Lower is infinitely patient ($\delta_l = 1$), she will gain the entire prize. If Upper is patient too ($\delta_u = 1$), the problem does not have solution, because the flowing of time does not have any consequence.

The model identifies four determinants of the outcome:
⇨ the discount factor (what matters is the *relative* cost of waiting, not the absolute one)
⇨ other cost of delay (entering the fallback position)
⇨ the advantage of the first move
⇨ the period of time elapsing between offers.

Example: Upper is liquidity constrained $\rightarrow r_u = 0.13, \delta_u = 0.88$, Lower is unconstrained $\rightarrow r = 0.04, \delta_l = 0.96$. Fallback utilities are assumed to be zero. As a consequence $\hat{v} = 0.76$

Limits:
⇨ both players are assume to know the payoffs of the opponent (whereas there is an incentive to pretend to have different utilities).
⇨ bargaining never brakes down, and outcomes are always Pareto efficient
⇨ outside option does not play any significant role

Adaptive agents learn through experience whether a social norm (dictating a "fair" norm of sharing a prize) has to be followed or modified.

They do not resort to Nash arbitrator, nor they engage in backward induction: they base their actions entirely on their recent experience, and occasionally they try to improve on their current bargain.

Suppose a unitary prize, and a norm dictating that x is the share to be allocated to Row player. Thus $u(x)$ is the Row utility, while $v(1-x)$ is the Column utility. n_R and n_C are respectively the numbers of Row and Column players in the population. If the players agree on a specific division, the prize is divided, otherwise is waived, and another round begins.

The matching rule is that each member of one subgroup is randomly matched only with members of the other group. Each player has memory of the distribution of play of the previous period, and best respond to this distribution with probability $(1-\varepsilon)$.

With probability ε they deviate from best response to prove whether they can get a better deal by increasing their claim by Δ. As long as ε is small, the norm will be sustained over a long period. Occasionally ε may be large enough to make the convenient for the other player best strategy to compromise. In the next period a new norm is established.

Consider Row's best response, given that last period a fraction κ of the Columns claimed not the norm $(1-x)$ but instead $(1-x+\Delta)$. Row knows that reducing her claim to $(x-\Delta)$ will guarantee this lesser payoff with probability 1, whereas persisting with the norm risks getting nothing with probability κ. Therefore Row's best response is to adhere to the norm if

$$\kappa u(0)+(1-\kappa)u(x)\geq u(x-\Delta)$$

which identifies a critical value for $\kappa^* = \dfrac{u(x)-u(x-\Delta)}{u(x)}$ under the assumption that $u(0)=0$. For $\kappa > \kappa^*$ the best strategy for Rows is reducing their claims at the next round.

Similarly, if ρ is the fraction of deviants among Rows, Columns will stick to the norm if

$$\rho v(0)+(1-\rho)v(1-x)\geq v(1-x-\Delta)$$

leading to a critical value of

$$\rho^{*}=\frac{v(1-x)-v(1-x-\Delta)}{v(1-x)}$$

The critical value κ^{*} and ρ^{*} are the utility difference between the norm-determined payoff and the lesser claim, divided by the norm-determined payoff. Notice that $\kappa^{*}(x),\kappa'<0$ and $\rho^{*}(x),\rho'>0$ ⇨ there is a status quo bias.

Define $\lambda(\rho^{*}(x)),\lambda'<0$ as the probability of moving from norm x to $x+\Delta$, and $\mu(\kappa^{*}(x)),\mu'<0$ as the probability to move in the opposite direction from norm x to $x-\Delta$. The norm will tend to increase if $\lambda>\mu$, and conversely.

A stationary norm requires $\lambda(\rho^{*}(x))=\mu(\kappa^{*}(x))$. If sample sizes of the two groups are identical, and if error rates are identical, this collapses to

$$\rho^{*}(x)=\kappa^{*}(x)\qquad\Leftrightarrow\qquad\frac{v(1-x)-v(1-x-\Delta)}{v(1-x)}=\frac{u(x)-u(x-\Delta)}{u(x)}$$

By taking first order approximations when Δ is sufficiently small

$$\frac{\Delta v'(1-x)}{v(1-x)}=\frac{\Delta u'(x)}{u(x)}\qquad\Leftrightarrow\qquad\frac{v'(1-x)}{v(1-x)}=\frac{u'(x)}{u(x)}$$

which is identical to the condition defining the Nash solution to the axiomatic bargaining problem. In fact it can be derived as a solution to the maximisation of the following problem pursued by the arbitrator when fallback position are zero

$$\max_{x}\Delta v(1-x)u(x).$$

Thus a plausible evolutionary process among individuals with limited knowledge and cognitive capacity yields this common bargaining solution as its most likely outcome.

Comparative statics properties:

⇨ an increase in ε (the rate of probing of Rows) raises the equilibrium norm x^*.

⇨ un increase in n_R (the number of Rows) reduces the equilibrium norm x^*.

INEFFICIENCY OF BARGAINING AND RENT SEEKING ACTIVITIES

Three sources of inefficiencies:
① bargaining breakdowns
② diversion of productive resources
③ rent seeking activities (made possible by transaction costs).

① Bargaining inefficiency arises whenever some aspect of the allocation of productive resources both affects the bargaining outcome and is not subject to contract.

Example: Lower and Upper can allocate their efforts to a specific joint activity $Q = Q(e, E)$, or retain it in order to increase their outside options, $z = z(1-e), z' > 0$ and $Z = Z(1-E), Z' > 0$.

The joint output is shared according to Nash cooperative solution. Therefore individual incomes are given by

$$y = z(1-e) + \alpha\big(Q(e,E) - z(1-e) - Z(1-E)\big)$$
$$Y = Z(1-E) + (1-\alpha)\big(Q(e,E) - z(1-e) - Z(1-E)\big)$$

If each player selects the optimal level of effort by maximising her income

$$\frac{dy}{de} = 0 \qquad \Rightarrow \qquad -z_e + \alpha(Q_e + z_e) = \alpha Q_e - (1-\alpha) z_e = 0$$

Only when Lower is residual claimant (i.e. $\alpha = 1$) she will select the level of effort that maximise joint output (corresponding to $Q_e = 0$). But even in this case, Upper will not select her optimal level. The problem arises from the impossibility to sign a contract over (e, E).

② the evidence of rent seeking activities can be obtained by an application of the war of attrition game.

The underlying problem is that individuals undertake unproductive investments attempting to get a prize in a tournament-like setting.

Suppose there is a tournament between two workers: the principal will promote the one of the two working longer. The size of the premium associated to being promoted is v. The cost of an additional hour is c.

There is no symmetric equilibrium in pure strategies (for any strategy t of the opponent, the best strategy is either 0 – not working at all and saving costs – or $t + \varepsilon$ - winning the prize).

Consider the mixed strategy of dropping out at the end of each hour with probability p. The expected payoff of staying in and confronting an agent adopting the same strategy is given by

$$p(v-c)-(1-p)c$$

whereas the expected payoff of dropping out is 0. The critical value equating the two payoffs is $p^* = \frac{c}{v}$.

If each player quits with probability p^*, the probability of terminating the game at each stage of the game is $1-(1-p^*)^2 = 2p^* - p^{*2}$. The expected duration is the inverse of termination probability,
$t^* = \frac{1}{2p^* - p^{*2}} \cong \frac{1}{2p^*} = \frac{v}{2c}$.

If a game last t^* hours, total cost of the game is $t^*c + t^*c = 2t^*c = 2\frac{v}{2c}c = v$: the total (social) cost of capturing the prize is equivalent to the prize! Of course, the winner obtains a net gain of $v - t^*c = v - \frac{v}{2} = \frac{v}{2}$, whereas the looser bears a total cost of $-t^*c = -\frac{v}{2}$.

CONFLICT OF INTERESTS

"Bargaining has an inherent tendency to eliminate the potential gain which is the object of bargaining" (p.195). Once again, this may occur because bargaining breakdown or through resource diversion.

Empirical evidence:
* strikes and work stoppage
* litigations leading to legal activities
* food allocation within rural families.

Open questions:
⇨ consideration of fairness within the bargaining process
⇨ alternative explanations of the bargaining power
⇨ incomplete information.