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Three Papers on Bargaining

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Bargaining Unexplained

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Abstract

We know that people strike bargains and that civilized life could not proceed otherwise. Bargaining models yield solutions comparable to the general equilibrium in a competitive economy with universal self-interested behaviour subject only to economy-wide rules. Such models can be based upon a shared sense of what is fair, a sequences of concessions or an imposed bargaining procedure. The assumptions in these models are so from bargaining as it is experienced and the requirements for equilibrium so stringent that, if anything, the models serve to reduce confidence that bargains will actually be struck. Confidence in the efficacy of bargaining is more appropriately based upon experience rather than upon bargaining theory.

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Keywords: bargaining, compromise, fairness, self-interest

“...constitutional rules are themselves amenable to amendment, but only through a process of negotiation which ensures that there is an opportunity for the constitutionally defined rights of all the parties to be respected and reconciled”, Supreme Court of Canada, *Reference re: Secession of Quebec*, (1998 at paragraph 76).

Society runs on a mixture of self-interest and compromise within the confines of generally-accepted rules. Economics is the study of self-interest as exemplified by the competitive economy where, contrary to what one might expect, an efficient outcome emerges when each person does what is best for himself alone without concern for the welfare of anybody else. Bargaining as compromise is fundamentally different. You want this, I want that, and we strike a deal where each gets a portion, but only a portion, of his demands.

This paper is a study of bargaining models with special reference to the economist's quest to explain as much a possible of the world as the outcome of purely self-interested behaviour. It is argued here that the objective is attained in one sense, but not all in another. It is attained in the sense that the bargaining models yield solutions in which each bargainer's share of the pie is determined. It is not attained in the sense of supplying confidence that bargains will, in fact, be struck because the requirements for successful bargaining implicit in the assumptions of the models are vastly different from the circumstances of bargaining as we know it. In proving the existence of a bargaining equilibrium, the models demonstrate the very opposite. Such confidence as we have in the success of bargaining is based upon experience rather than theory.

Bargaining is everywhere. As these words are being written, Sunnis and Shiites in Iraq are attempting to forge a viable government in which the interests of both are taken into account. We do not yet know whether they will be able to do so. If the argument in this paper is correct, the outcome will depend on something more than a mechanical resolution of competing interests. Comparable, if less lethal, uncertainties arise every day when the Senate and the House of Representatives pass distinct versions of a bill and must resolve their differences if a final bill is to emerge, and when proportional representation requires political parties to form a majority coalition. Recall Duverger's "law" that first-past-the-post and proportional representation differ in the timing of the bargaining required, within political parties before the election in the one case and between political parties after the election in the other. Some time ago in Canada, two rival conservative parties, the Progressive Conservatives and the Alliance, merged into a single Conservative Party which is now the largest party in Parliament. The terms of that merger had to be confined within limits beyond which it was not in the interest of one or the other party to go.

Within those limits, the organization of the new party had to be negotiated with nothing analogous to the general equilibrium of a competitive economy determining what the outcome of such negotiation must be. Bargaining succeeds more often than died-in-the-wool economists might expect, but it sometimes fails, and our models are poor predictors of what actual outcomes will turn out to be.

This article begins with an exposition of the paradigmatic bargaining situation where two people are jointly entitled to a pie if and only if they can agree about how large each person's slice is to be, a situation with no indication of which among the many mutually-advantageous bargains will actually be struck. There follows expositions of three bargaining solutions: the Nash bargaining solution based upon a common sense of fairness, Hicks and Zeuthen's models of alternating concessions and the Staahl-Rubinstein solution based upon an imposed bargaining procedure. Solutions are examined with emphasis upon the assumptions required for the solutions to emerge, upon the distance between bargaining as portrayed in the models and as experienced in economic and political life, and upon what is claimed here to be a potentially dangerous tendency to convey the impression that bargaining is more determinate and trustworthy than it really is. A simple proof of the Staahl-Rubinstein bargaining solution, including a discussion of the implications of variations in the assumptions, is presented as an appendix.

The Paradigmatic Bargain

A bargain is a division of the spoils. Two people are entitled to something collectively, but they cannot appropriate or make use of it until they agree about how it is to be shared. Bargaining may be over the allocation of things or of money. A bargain must make both participants better off than if no bargain were struck, but a conflict of interest remains, for a particular allocation must be chosen from the set of all possible allocations, some relatively advantageous to one party, some relatively advantageous to the other.

The paradigmatic bargain is illustrated in Figure 1. Two people, an engineer, E, and an ophthalmologist, O, (The mnemonics will change presently.) are considering a joint venture that will supply them with a combined income of Y. Without the joint venture, their "outside" incomes would be \underline{Y}_E and \underline{Y}_O , represented on the figure as the "no-agreement point" α . The joint venture can be advantageous if and only if $Y > \underline{Y}_E + \underline{Y}_O$. The combined gain from the venture is P (the pie to be divided between them) such that

$$\underline{Y}_E + \underline{Y}_O + P = Y \quad (1)$$

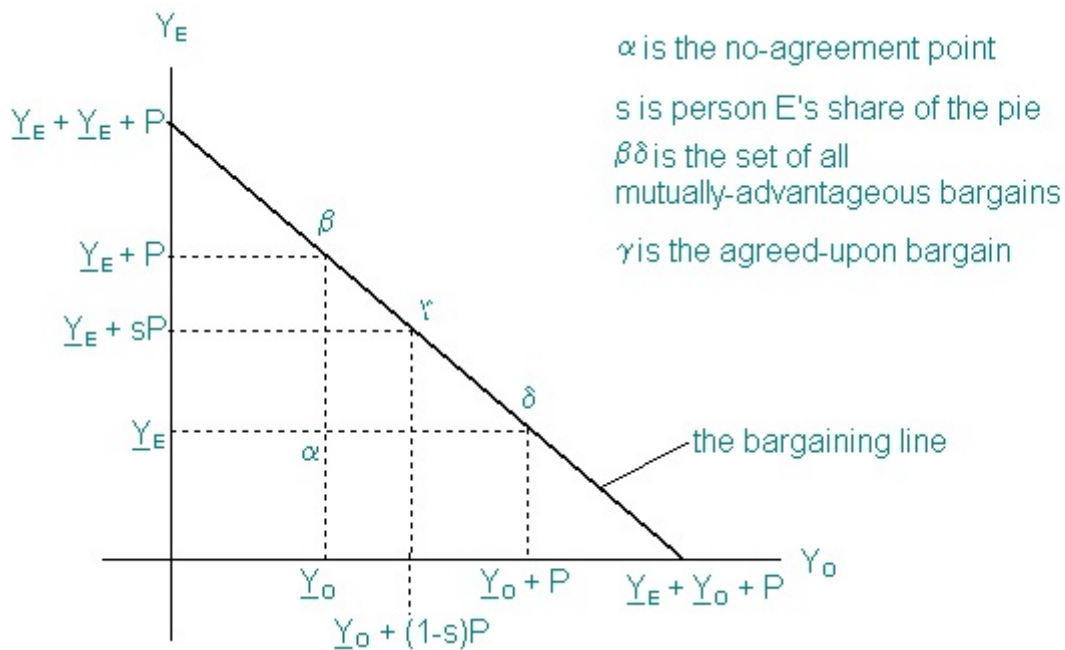
represented on the figure by the height of the diagonal 45° line, called the “bargaining line”. The venture cannot proceed until persons E and O agree on how the revenue from the venture is to be shared between them. Since neither party would ever agree to an allocation yielding less than their outside incomes, the post-bargaining incomes, Y_E and Y_O , must be such that the $Y_E > \underline{Y}_E$ and $Y_O > \underline{Y}_O$. The bargaining problem is to agree on sharing or the pie with a portion s , between 0 and 1, accruing to person E and the remainder $(1 - s)$ accruing to person O, yielding post-bargaining incomes and net gains, ΔY_E and ΔY_O , such that

$$\Delta Y_E = (Y_E - \underline{Y}_E) = sP \quad (2)$$

and
$$\Delta Y_O = (Y_O - \underline{Y}_O) = (1 - s)P \quad (3)$$

Starting from the no-agreement point, α , all mutually-advantageous bargains can be represented as points on the bargaining line between β (for which $s = 1$ and where the entire surplus accrues to person E) and δ (for which $s = 0$ and where the entire surplus accrues to person O). A bargain is represented by the point γ between these limits. An increase in s moves γ toward β , and a decrease in s moves γ toward δ . Nothing so far suggests how such a bargain might be struck.

Figure 1: The Paradigmatic Bargain



The example of a joint venture between the engineer and the ophthalmologist will do for this article, but the problem of sharing a pie is everywhere: in joint ventures between firms, in reconciling legislation between the House and the Senate, in choosing platforms of political parties, in assigning cabinet posts under a system of proportional representation, in “bargaining in the shadow of the law” to avoid expense of going to trial, in international relations where the alternative to agreement is war. Contexts vary, but something of the paradigmatic bargain remains. The central question in this essay is whether, singly or together, the bargaining solutions to be discussed supply an adequate explanation of how bargains are actually struck.

Bargaining Models

Ideally, confidence in the determinacy of bargaining would be bolstered by the existence of equilibrium in explicit models of bargaining. Three such models will be examined briefly in turn, models based upon a common sense of fairness, a sequence of concessions and a prescribed bargaining procedure. For each, it will be argued that the model, though interesting and instructive, does not in the end supply the confidence we seek.

A) A Shared Sense of What is Fair.

Begin with the working assumption (to be modified presently) that, for the simple paradigmatic bargain over the apportionment of a fixed sum of money between two people, a “fair” bargain is a fifty-fifty split. Even so, the notion of fairness would be vague and perhaps of little use unless it could be extended in some natural way from bargaining over dollars to bargaining over the apportionment of things - like family heirlooms or authority over children in the event of divorce - for which there are no well-specified market prices. Sometimes gains from a bargain can only be represented as utilities. Utility supplants money as the object of bargaining when a sense of fairness leads bargainers to take account of disparities in their incomes.

The difficulty in bargaining about utilities is that utility is ordinal, defined up to a linear transformation, and not comparable from one person to the next. For bargaining over a sum of money, P , it is commonly supposed that a fair bargain is a fifty-fifty split, with $\Delta Y_E = \Delta Y_O$ and with person E’s share, s , equal to one half. Similarly, in bargaining over the assignment of utilities, we would like to equate Δu^E and Δu^O where Δu^E is the impact of the bargain on the utility, $u^E(Y_E)$, of person E and Δu^O is the impact of the bargain on the utility, $u^O(Y_O)$, of person O. We would like to define a fair division of the pie as one for which $\Delta u^E = \Delta u^O$

where $\Delta u^E = [u^E(\underline{Y}_E + sP) - u^E(\underline{Y}_E)]$ (4)

$$\Delta u^O = [u^O(\underline{Y}_O + (1 - s)P) - u^O(\underline{Y}_O)]$$
 (5)

and where \underline{Y}_E and \underline{Y}_O are incomes of persons E and O as they were prior to the bargain. That is not feasible because utilities are incommensurate. The resulting value of s would be affected by a linear transformation of either utility function.

There is a way around this difficulty, leading to a rule called the Nash bargaining solution (Nash, 1950). Whenever ΔY_E is equal to ΔY_O , the product $\Delta Y_E \Delta Y_O$ is automatically maximized subject to the constraint that $\Delta Y_E + \Delta Y_O = P$, and the product $s(1 - s)$ is maximized as well. This property of fair allocation can be extended from income to utility even though the simple equality of shares cannot. The Nash bargaining solution is to choose s to maximize the product

$$\Delta u^E \Delta u^O = [u^E(\underline{Y}_E + s P) - u^E(\underline{Y}_E)] [u^O(\underline{Y}_O + (1 - s) P) - u^O(\underline{Y}_O)]$$
 (6)

yielding a value of s that is independent of a linear transformation of either utility function and that equals 1/2 - a 50-50 split of the pie - whenever both utilities are linear functions of income.

The Nash bargaining solution is a theorem derived, like all theorems, from a set of axioms. Among Nash's axioms is this: "If S is symmetric and u_1 and u_2 display this then $c(S)$ must lie on the line $u_1 = u_2$." (axiom # 8) where S is the set of all possible outcomes and $c(S)$ is the set of all possible fair outcomes. All by itself, Nash's axiom #8 mandates a fifty-fifty split of the pie in the simple paradigmatic bargain or whenever utility is proportional to income. Nash's program is to extend the notion of fair allocation from money to utils, but not to justify the fair allocation itself. Bargainers who for one reason or another refuse to accept a fifty-fifty split as a fair allocation of the pie - bargainers who do not conform to axiom #8 - would have no difficulty in refusing to accept the shares assigned in the Nash bargaining solution.¹

The Nash bargaining solution is redistributive - assigning the larger slice to the person with the smaller income - if bargainers' utility of income functions are the same and if the common utility of income function is concave, but the Nash bargaining solution is not always

¹The notion of fairness can be expanded from mere equality, as in Nash's model, to include the absence of envy with an appeal to efficiency when equality and the absence of envy cannot be attained except by trimming the pie. For a thorough analysis of these considerations see Brams and Taylor (1996).

redistributive.² Also, to agree on an allocation of the pie in accordance with the Nash bargaining solution, bargainers would need to know one another's utility of income functions. Without such knowledge, a resort to a fifty-fifty split might be the only feasible procedure.

For bargains over the allocation of money, a fifty-fifty split might be acceptable not just because it is fair, but because it is a focal point, the only readily-recognizable rule. If a fifty-fifty split were customary, then all bargainers would know exactly what to do. A general convention that people in a dispute ought to split the difference evenly would be relatively easy for everybody to follow. Other conventions would be difficult to maintain. For instance, a convention supplying two-thirds of the pie to person E and the remaining third to person O is meaningless without a prior understanding about who is to play the role of person E and who is to play the role of person O. Perhaps such a convention might be founded on class structure, but that would require a substantial modification of the assumptions about the paradigmatic bargain in Figure 1.

A convention to divide the pie equally might be enforced by an understanding that anybody who deviates from the convention will be punished not by the state as one would be punished for robbery, but by his fellow citizens who would refuse to deal with him again.³ But a convention enforced by sanction is the antithesis of what most people would think of as a bargain. A law punishing people for robbery implies a nation-wide convention not to steal, but such a convention is not a bargain in the sense described in Figure 1. Nor is a convention punishing people by ostracism for refusing to accept an equal division of the pie. Bargaining only takes place in the absence of coercion.

There are two incentive problems. The first has to do with the creation of disputes. If disputes are to be resolved by a fifty-fifty split of the pie, it becomes in everybody's interest to create disputes at other people's expense. I assert that a third of what you claim to be your land is

²Suppose i) that persons E and O are bargaining over the allocation of \$P, ii) that their utility functions are $U_E = (Y_E)^{1/2}$ and $U_O = Y_O$ where Y_E and Y_O are their incomes, and iii) that, to keep the arithmetic simple, the initial income of person E is zero. On these assumptions, the value of $\Delta u^E \Delta u^O$ in equation (6) reduces to $[(sP)^{1/2}][(1-s)P]$ which is maximized when $s = 1/3$. The fair share of person E is either $1/2$ or $1/3$ depending on whether fairness is defined with reference to dollars or to utils. This is true despite the fact that person E could well be very much less well off than person O.

³Such a mechanism is analyzed by Axelrod (1984).

really mine, and we agree that I get one sixth. A state of affairs where what anybody chooses to call a dispute is resolved by a fifty-fifty split is untenable in the long run. The notion of a fair bargain is meaningless except in a context of well-established property rights. A bargain to split what is initially jointly-owned or collective property may be fair. A bargain to split what is initially your exclusive property is automatically unfair. Unfortunately, the line between individually-owned and collectively-owned property is not always as sharp as we would like. Disputes over the redistribution of income can be framed as being between people who see the present distribution of property as inviolate and people who see the present distribution of property as the residue of ancient theft or who look upon the entire national income as collective property to be allocated in the service of the common good.

The other problem has to do with bargainers' motivation. When we speak of "explaining" bargains, what we really have in mind is a bargaining outcome comparable to the outcome in general equilibrium in competitive markets where people act in their own interest exclusively, responding to market-determined prices but not to one another. Nobody in perfect competition is "fair". Everybody is unremittingly greedy, cooperating with others if and only if it is personally advantageous to do so. To accept a fair bargain because it is fair is a different order of behaviour altogether. It is the incorporation of uncoerced good-will into the core of the market. It is an admission of failure in the great project of explaining outcomes in the economy by self-interest alone. Indeed, if people could be relied upon to be "fair" voluntarily, the market itself might prove unnecessary except perhaps to identify each person's appropriate behaviour in any given situation.

Genuine bargaining is, almost by definition, indeterminate. A bargain is the resolution of a dispute. If bargainers can be relied upon to respect a notion of fairness, to agree on a fifty-fifty split of the pie, or to accept shares mandated by the Nash bargaining solution, then bargaining is just playacting, for there is no real dispute and nothing left to bargain about.

B) A Sequence of Concessions

In the early nineteen-thirties, Hicks (1932) and Zeuthen (1930) developed models of bargaining between companies and unions when both have a degree of monopoly power. Bargaining in these models consisted of a series of concessions dependent on the harm to each party from a failure to agree and upon each party's judgment of the likelihood that the other would concede instead. Hicks draws what he calls an "employer's concession curve" and a "union's resistance curve". The crossing of these curves identifies the agreed-upon wage. In the

Zeuthen model, the failure of employees and owners to agree leads to “conflict”, the exact meaning of which is not spelled out in detail. Zeuthen’s principal assumption is that each bargainer’s concession to the other is proportional to his expected harm from conflict as it would be if antagonism between the bargainers rises to the point where the entire pie is wasted through a failure to agree.

Both models allocate the surplus in proportion to harms that do not actually occur because they are averted by timely concessions. Strikes in Hick’s model are imagined strikes. Conflict in Zeuthen’s model is imagined conflict. Neither model contains an explanation of when, if at all, bargaining breaks down and the unfortunate alternative to agreement is realized. Nor is it explained how bargaining in the midst of a strike or bargaining in the midst of conflict differs from bargaining in anticipation of these events. Neither party is bloody-minded, insisting on favourable terms come hell or high water. This consideration is especially problematic because, if one bargainer is really and truly adamant, it is usually in the interest of the other party to back down. More will be said about this presently. Bargaining is made determinate within these models, but only by ignoring essential features of the world where bargains are struck. There is no satisfactory explanation of the timing and the magnitude of concessions, and no allowance for the possibility that the final agreement is conditioned by the history of bidding as well as by the initial values of the bargainers’ harms from conflict.

Genuine concessions are modeled by Cross (1965)⁴. Both parties’ concessions are rendered determinate by the principle that delay is costly so that, if you do not concede quickly, then I must. At least three kinds of harm might be identified. a) loss by both parties of what would otherwise be their shares of the pie, b) delay which may be more costly for one party than for another depending on their rates of discount, and c) actual harm inflicted as when a labour union goes on strike or when the firm locks out its employees. Cross attempts to derive the sequence of concessions as the outcome of rational, self-interested behaviour, transporting this aspect of bargaining from the domain of psychology - where people may act stubbornly, vindictively or irrationally - into the domain of economics - where each person does what is best for himself in the light of his best guess of what others will do. Yet the model contains no persuasive explanation of why bargainers do not proceed to the ultimate deal all at once if the ultimate deal is predictable from the initial conditions, as Cross assumes it to be.

In the light of subsequent literature, these models would seem to be open to the objection

⁴See also Ellingsen (1999).

that the bargainers are neither entirely fair-minded, as in the Nash bargaining solution, nor entirely self-interested in any rational and calculating way. Bargainers are seen as making concessions, but their concessions do not arise naturally from the maximization of an objective function in response to given constraints. It is difficult to decide how much weight to attach to this objection. Want of strict rationality may account for the eclipse of these models in economic literature, but, in their defense, it may be argued that bargaining is not really as rational a process as more recent models would suggest.

C) Mutually-agreed upon Procedures

A bargaining solution may arise not just from a common understanding of fairness or as the outcome of a sequence of concessions, but as the outcome of a prescribed sequence of alternating offers by one party to be accepted or rejected by the other.

Begin with the simplest possible case. Persons E and O (now mnemonic for even and odd) are bargaining over the allocation of a pie that emerges just for an instant and disappears if it is not shared at once. The pie appears for just long enough for one person say, "I offer you such-and-such a share and I will take the rest.", and for the other person to reply either "yes" or "no". No other speech is admitted. Suppose, no matter why, it is person O who is entitled to make the offer. If the person E's response is "yes", the pie is shared accordingly. If person E's response is "no", the pie vanishes and nobody gets anything.

It is obvious what happens. As long as both parties are super-rational, person O offers person E a penny, keeping all the rest of the pie for himself. Recognizing that a penny is better than nothing, person E accepts the offer, and the pie is allocated accordingly. If the original pie was \$100, person E ends up with one penny and person O ends up with \$99.99. In effect, the person entitled to make the take-it-or-leave-it offer gets to keep the entire pie.

If that seems a bit harsh, and much too far from anything we would ordinarily call bargaining, we can even out the allocation by allowing the pie to disappear over two time periods rather than just one. Suppose that i) the pie appears at sunrise of day 1 and disappears in two stages, half at sunset on day 1 and the other half at sunset on day 2, ii) offers to share of the pie (or what remains of it when the offer is made) are made at noon each day, by person O on day 1 and, if person O's offer is rejected, by person E on day 2, iii) every offer is an assignment of shares, iv) the recipient of an offer must accept or reject it immediately, v) nothing else may be said by either person and vi) (an assumption soon to be relaxed) there is no discounting of future

income.

Again it is obvious what must happen. At noon on day 1, person O offers person E *half* the pie, and person E accepts. Why? If person E rejected person O's offer on day 1, the most person E could expect would be half the original pie because nothing more would be left on day 2 when it is person E's turn to make an offer. Except for the switch in roles and the size of the pie, both parties find themselves in the same situation at noon on day 2 as in the one period take-it-or-leave-it bargain, and they act accordingly. Since person E can assure himself half of the pie (less a penny) by waiting until his turn to make an offer comes round, he would never accept less than half of the pie in any offer from person O on day 1, and person O has no incentive to offer more.

There is, of course, nothing inevitable about the equal sharing of the pie or about the restriction of bargaining to two periods. The pie may disappear over any number of days, and the disappearances each day need not be the same. Suppose the pie diminishes over four days: $1/10$ at sunset on day 1, $2/10$ at sunset on day 2, $3/10$ at sunset on day 3 and the remaining $4/10$ at sunset on day 4. If so, then at noon on day 1, person O offers $3/5$ of the pie [$2/10$ plus $4/10$] to person E, leaving the remaining $2/5$ of the pie [$1/10$ plus $3/10$] for himself, and person E accepts. Person O would accept nothing less. Person E need offer nothing more. The logic of this allocations is backward induction.

Begin by supposing that no deal has been struck by noon on day 4, the last day when any of the pie remains. Since the day 4 is an even day, it is person E's turn to make an offer. As in the one period case, person E offers just a penny to person O, keeping the remainder - which is only $4/10$ of the original pie - for himself. Now step backward from the day 4 to day 3 when $7/10$ of the pie remains and when person O is entitled to make the offer. Person O cannot expect person E to accept anything less than $4/10$ of the pie, for that is what person E could acquire by waiting for his turn to make an offer, but person O need not offer more. Person O offers $4/10$ of the pie to person E, keeping the remaining $3/10$ of the pie for himself. Step backward one more day to day 2 when $9/10$ of the pie remains and person E is entitled to make the offer. Person E cannot expect person O to accept anything less than $3/10$ of the pie, for that is what person O could acquire by waiting, but person E need not offer more. Person E offers $3/10$ of the pie to person O, and keeps the remaining $6/10$ of the pie for himself. Finally, person O is entitled to make the offer in day 1 before any of the pie has vanished. Person O cannot expect person E to accept anything less than $6/10$ of the pie which is what person E could acquire by waiting, but person O need not offer more. Person O offers $6/10$ of the pie to person E, keeping the remaining $4/10$ of the pie for

himself.

When the pie diminishes over a number of days, each bargainer captures the sum of the diminutions of the pie on the evenings of all the days when he is entitled to make the offer. Person E obtains a slice equal to the sum of the diminutions in all even-numbered days, and person O obtains a slice equal to the sum of the diminutions on all odd-numbered days.

Generalizing slightly, when time is graduated in years rather than days, when a pie of size P diminishes spontaneously over the course of n years, when person E is entitled to make an offer in all even years and when person O is entitled to make an offer in all odd years, then an acceptable offer would be made in the very first year of bargaining with a slice P_E to person E and a slice P_O to person O where

$$P_E = \sum_{t \text{ even}} p_t \quad \text{and} \quad P_O = \sum_{t \text{ odd}} p_t \quad \text{and} \quad P_E + P_O = P \quad (7)$$

where p_t is the size of the slice of the pie that disappears on the year t. This is an equilibrium bargain because it is in the interest for each person to accept a share of the pie equal to the sum of the disappearances on all of the times when he would be entitled to make the take-it-or-leave-it offer. None of the pie is lost in the process of bargaining because the bargain is struck in the of the first year before any of the pie has disappeared.

An interesting extension of this model replaces disappearance by discounting. Suppose that i) the pie over which people bargain lasts undiminished forever, or would do so unless a bargain is struck, but ii) the bargainers value present income over future income, each in accordance with his own rate of discount, and iii) bargainers are entitled to make offers in alternative years. It can be shown that, once again, a bargain is struck as soon as bargaining begins, but that now the equilibrium shares of the pie are inversely proportional to the bargainers' discount rates. Specifically, person E's share becomes

$$s = r_O / (r_E + r_O) \quad (8a)$$

and person O's share must be

$$(1 - s) = r_E / (r_E + r_O) \quad (8b)$$

where r_E and r_O are the discount rates of persons E and O. If my discount rate is high, my share of

the pie is correspondingly low. To have a high discount rate is analogous to sacrificing a large share of the pie if one refuses the other bargainer's offer, so that one's equilibrium share of the pie is correspondingly reduced. Equation (8) is called the Staahl-Rubinstein bargaining theorem.⁵ A simple, and hopefully intuitive, proof of the theorem is presented as an appendix.

To induce a deal as soon as bargaining begins, the present value of the pie must be made to shrink when the deal is delayed. Two equally effective processes have been discussed: physical contraction over time, and reduction in present value due to discounting. The processes are analytically similar, but the latter has the distinct advantage that it is based upon the characteristics of bargainers (their rates of discount) rather than upon the imposed conditions in which bargaining takes place. Rates of discount are attached to people. Physical shrinkage of the pie is not.

The explanation based upon bargainers' discount rates has serious problems of its own. As shown in the appendix, equation (8) is strictly valid as a bargaining equilibrium if and only if the bargainers are immortal and the pie lasts forever in the event that no bargain is struck. The Staahl-Rubinstein bargaining solution requires that bargainers E and O must be prepared to carry on making offer and counter-offer in the year 3010 if no agreement had been reached before that date. Without that assumption, equation (8) is just an approximation, though it becomes more and more accurate the longer the time before the pie finally disintegrates.

Nothing so extreme is required for the explanation based on physical diminution of the pie. Bargaining opportunities arise from time to time, and then disappear. In business and politics, it is rare for today's opportunities to remain available in five years time, and it is not unreasonable to suppose that physical shrinkage of the pie might have more impact on the outcome of bargains than bargainers' rates of discount.

The combined effect of shrinkage of the pie and discounting by bargainers is easy enough to compute. Consider a "bargaining" regime with alternating offers beginning in the year 0 and continuing up to the year T, where, for convenience, T is assumed to be even. If no deal has been struck by the year T, there is an arbitrarily-imposed apportionment in that year with a share S to person E and a share (1 - S) to person O. It is shown in the appendix that a bargain is struck

⁵The earliest bargaining solution of this type was proposed by Ingolf Staahl (1972). A more tractable form of the model was proposed by Ariel Rubinstein (1982). For a short and simple demonstration of the Staahl-Rubinstein bargaining model, see Sutton (1986). For a thorough treatment of the subject, see Osborne and Rubinstein, (1990) and Muthoo (1999).

immediately in the very first year of bargaining, with a share $s(0)$ to person E, where (to a first approximation and abstracting from a small first-mover advantage)

$$s(0) = (1 - z)[r_o / (r_E + r_o)] + zS \quad (9)$$

and where
$$z = [\{1/(1 + r_E)\} \{1/(1 + r_o)\}^{(T-1)/2}] \quad (10)$$

It follows immediately from equation (9) that person E's share varies steadily from S when $T = 0$ to $r_o / \{r_E + r_o\}$, which is the Staahl-Rubinstein bargaining solution, when T approaches infinity. Person E's share is a weighted average of what it would be if bargainers did not discount future income and what it would be with discounting in circumstances where the pie lasts undiminished forever unless a deal is struck.

Suppose, for example, that the pie is divided equally ($S = 1/2$) in the eighth year unless a deal is struck beforehand (i.e. $T = 8$), that person E's discount rate is 9% ($r_E = .09$) and that person O's discount rate is 1% ($r_o = .01$). If so, the pie is allocated by common consent in the year 0, with a share of 37.2% to person E and the remaining 62.8% to person O. In the year 0, person E would offer person O a share of 62.8% and person O would accept. By contrast, if the pie would remain undiminished forever, person E's share would be only 10% in accordance with the pure Staahl-Rubinstein bargaining solution in equation (8) or, equivalently, in equation (9) when T approaches infinity. Person E's share of 37.2% in this deal is much closer to the 50% he would obtain if the bargainers did not discount future income than the 10% he would obtain if bargainers discounted future income but the pie lasted forever. One example proves nothing, but it does highlight the significance of the assumption in the Staahl-Rubinstein model that the pie remains undiminished, and ready to be allocated, forever unless some bargain is struck.

An equilibrium bargain can be computed for any arbitrarily-assigned pattern of disappearance of the pie or apportionment of the pie between bargainers at an assigned time some years ahead. What cannot be altered if there is to be an equilibrium at all is the imposed sequence of offers to be accepted or rejected by the other party. Nothing works unless bargainers respect the required sequence of speech. The procedure itself may be agreed-upon by bargainers or externally-imposed. If the procedure originates from a prior agreement between the bargainers, and in so far as its outcome may be predicted from the characteristics of the bargainers and of the procedure itself, then the outcome of bargaining is foretold in the chosen procedure, and there is really nothing to bargain about. What we are calling bargaining would, once again, be play-acting, with no real give and take between bargainers, and there would be is some question about

whether what is being called bargaining theory is really about bargaining at all. Nor would the procedure correspond to what we normally think of as a bargain if the procedure were externally imposed, for, once again, the outcome of bargaining would be pre-determined before the bargainers ever meet.

D) Conversations and Threats

Whatever else it may be, bargaining is a conversation. Bargainers talk to one another, make offers, tell stories about why their offers ought to be accepted, appeal to one another's sense of fairness, reject offers, and so on. The model of bargaining as fair division ignores this aspect of bargaining altogether, for outcomes emerge directly from the initial conditions with no room for speech at all. The Staahl-Rubinstein solution acquires a certain plausibility from its resemblance to conversation, but the conversation is artificial in two respects: It is artificial because, as discussed above, the equilibrium deal is struck before any actual conversation takes place. It is also artificial because bargainers are severely restricted in what they can say and when they can say it. Speech is limited to three, and only three, utterances: "I offer ...", "Yes" and "No", with a switch in the bargainers' roles at each stage of the conversation, until a deal is struck. There is a prescribed spacing between utterances and a prescribed order of speech, neither of which are to be found in actual conversation or negotiation between firms, between employer and employees or between the buyer and seller of a house.

Actual bargaining is far less orderly and coherent than the model would suggest. There is no fixed order of speech. People interrupt one another. People try to persuade one another of their good faith and of their unwillingness to accept one penny less than some offered amount. *Ex post*, negotiation may have been a sequence of offers, first by one person, then by the other. *Ex ante*, there is no prescribed order of speech, no restriction on the content of speech and, most importantly, no prescribed time between utterances. And it is the *ex ante* sequence, or absence of sequence, that matters in actual bargaining. Nobody enforces the prescribed sequence of offers or the rule of silence in the intervals between one offer and the next. Talk is unrestricted. There are in practice no gags, and, without gags, it is virtually impossible to predict what the outcome of bargaining will be. The ordering of speech in the Staahl-Rubinstein model is more than a convenient simplification. It is an essential part of the model without which the model falls apart completely.

Equally indispensable in the Staahl-Rubinstein bargaining solution is the assumption of "sub-game perfection": that bargainers cannot promise today to act tomorrow in a way that will

not be in their interest when tomorrow comes. What this amounts to is the total banishment from the model of promises and threats. Return to the example where $r_E = 9\%$, $r_O = 1\%$ and the pie remains undiminished but unallocated forever unless some bargain is struck. In that case, the Staahl-Rubinstein bargaining solution supplies 10% of the pie to person E and the remaining 90% to person O. An entirely different outcome emerges if person E can commit himself while person O cannot. Then, person E can appropriate any share of the pie - say 60% - by committing himself to accept nothing less. Person E might make the commitment binding by means of a side contract with a third party to pay the third party a substantial sum if he accepts less than 60% of the pie in his bargain with person O. Person O must give way, for the alternative is to lose the entire pie and to acquire nothing. To be sure, person E has no monopoly on threats. If person E can make threats backed up by side contracts or by a need to preserve his reputation as a tough and astute bargainer, then so too can person O. If they threaten one another and if their threats are incompatible, adding up to more than the value of the pie to be shared, there can be no agreement and both end up with nothing.

Risk of failure makes bargainers cautious but does not abolish threats altogether. Abandon the rigid sequence, and the outcome of bargaining comes to depend on who gets to make the first threat, on the credibility of threats, on the parties' concern for their reputations, on how stubborn they choose to be. Abandon the rigid sequence, and the neat bargaining equilibrium disintegrates. The postulate of sub-game perfection preserves the sequence automatically. There may be times when this postulate is reasonable and accurate, but there are surely other times when it is not. Bargainers may have an incentive to hang tough, to "make yourself into a force of nature". Adolph Hitler is alleged to have said while bargaining that "one of us has got to be reasonable, and it isn't going to be Hitler."

The *locus classicus* on threats and blackmail is Schelling (1956). The article is not, strictly-speaking, a theory of bargaining, for it supplies no formal prediction of how shares of a pie will actually be allocated among the claimants. It is an examination of relevant considerations, placing considerable stress on commitment and on the importance of binding oneself to refuse anything less than some large share of the pie. Perhaps, the lion's share of the pie goes to whoever is the first to commit himself and to communicate that commitment to the other bargainer, but it is virtually impossible to say *a priori* who that will turn out to be.

Concern for reputation may influence bargaining in two opposite ways. On the one hand, you want a reputation for being reasonable and accommodating to induce prospective partners to join with you in new ventures. Nobody wants to become your partner if you are expected to be

too rigid whenever conflicts of interest arise. On the other hand, costly intransigence today may pay off tomorrow as a warning to partners in future bargains that you are tough. Your partners might be induced to concede to your demands if you acquire a reputation for being stubborn enough to resist conceding to theirs. You want to appear soft to prospective partners and hard afterwards. The postulate of sequential rationality, or sub-game perfection, abstracts such behaviour away. Seduced by the elegance of these assumptions - possibly even by the connotations of the words "rationality" and "perfection", for who can object to anything that is at once rational and perfect - a vast range of behaviour is swept out of sight. Schelling's essay remains as a corrective, even a reproach, to much of the more recent literature on bargaining.

Reconsideration of the Paradigmatic Bargain

Ideally, as in the standard model of the competitive economy, property rights to capital and to one's own labour would be so well specified that there would remain nothing to bargain about. With reference to the paradigmatic bargain in figure 1, the no-agreement point, α , would occupy a position like γ on the bargaining line. The world is not like that. There is some bilateral monopoly. Property rights are always fuzzy at the edges, giving rise to controversy over who owns what. Bargains circumvent costly litigation. Innovation typically creates surplus that can only be appropriated once people can coordinate their actions agree upon each person's share. Bargaining is required for the formation of platforms of political parties. Negotiation among nations averts the descent into war. Within the economy, bargaining may be thought of as the transformation by agreement of the unowned surplus into new entitlements.

On the other hand, property rights might be dispensed with altogether if bargaining were really as determinate as the bargaining models would suggest. The no-agreement point would become the parties' expected incomes (or utilities depending on how the problem is formulated) in a hypothetical world of chaos circumvented by deals leading to some point γ on the bargaining line. All resources might be allocated efficiently and all goods and services distributed among people through negotiation rather than price-taking. If that is preposterous, as it surely is, there must be some general principle that people can strike small bargains but not large ones. Doubts about the existence of a bargaining equilibrium serve to reinforce the economists' venerable prescription to subsume as much as possible of society's activity under the banner of greed, leaving for compromise and for bargaining only what cannot be attended to in any other way. The prescription is to design institutions that reduce bargaining to the narrowest attainable scope, allowing as much as possible of the world's business to be undertaken within the domain of

price-taking and confining our limited capacity to bargain to those domains where bargaining is really indispensable.⁶

Confidence in people's capacity for compromise originates from experience rather than theory, but we also know that bargaining does fail from time to time. Models in which bargaining is unambiguously determinate may convey the impression that bargaining is more trustworthy than is actually the case, and, in doing so, may serve to reinforce the common presumption, exemplified by the quotation from the Canadian Supreme Court at the beginning of this paper, that reasonable people "sitting around the table" can always resolve their differences, can compromise, can strike a deal. So confident of this was the Court that it virtually mandated compromise as part of the Canadian Constitution, risking great harm should such compromise fail to be reached.⁷ The critical examination of bargaining in this paper may serve as a corrective.

The simple framework in figure 1 might be expanded in many ways: The unique, universally-recognized no-agreement point may be replaced with a pair of points representing the bargainers' divergent opinions of what would happen to each bargainer if no bargain is struck. Alternatively, the single no-agreement point may be replaced by the indeterminacy in war or other conflict represented by a set of points from among which one point would be chosen at random. The number of bargainers may be increased. The introduction of one or more additional bargainers allows for the possibility that a majority becomes sufficient to determine the allocation of the pie, opening the possibility of predatory bargain where a majority takes all and the minority is left out completely. There may be some question about who is entitled to be included among the bargainers and who is not. Bargaining itself may be costly. There may be a sequence of bargains where the resolution of one influences the prospect of resolving another. Suffice to say here that indeterminacy in the original paradigmatic bargain is inherited by the extensions.

⁶"...if we economists mind our own business, and do that business well, we can, I believe, contribute mightily to the economizing, that is to the full but thrifty utilization, of that scarce resource Love - which we know, just as well as anybody else, to be the most precious thing in the world." D. H. Robertson "What does the Economist Economize?"(1956, page 154). For Love, one might substitute a willingness to compromise, to strike a deal.

⁷On the Canadian Supreme Court's faith in negotiation, see Usher (1999).

Conclusion:

In high school geometry, we derived far from self-evident theorems - such as that the square on the hypotenuse equals the sum of the squares on the other two sides - from axioms seen as self-evidently correct. In the social sciences, we have no such luxury. Axioms are no longer self-evidently correct, but must instead be sufficiently representative of what the theorems are about to render theorems interesting and useful: not so close as to convert theorems into tautologies, but not so distant as to raise doubts about whether the terms in the theorems correspond to the things they are claimed to depict. The theorem "A implies A" is valid but useless. A theorem about, for example, prices would not really be about prices if what are called prices in the assumptions are too far from prices as we encounter them in everyday life.

As originally formulated, the Nash bargaining solution is not a tautology, but it is open to misuse. The original theorem is that if bargainers are prepared to split the difference in certain simple situations and on several other quite plausible assumptions, a mutually-acceptable bargain is struck in more complex situations such as the allocation of things rather than money, a bargain characterized by the maximization of the expression in equation (6) above. The misuse is to suppose that the theorem supplies reason to believe that bargains in simple situations will in fact be struck. It does no such thing because the Nash bargaining solution is an application rather than a justification of that belief.

By contrast, the Staahl-Rubinstein bargaining solution requires assumptions that are very far from the circumstances of bargaining as we know it. The fixed sequence of speech, stubborn bargaining blocked by sub-game perfection and the preservation of the pie forever unless a bargain is struck are so far from bargaining as we know it as to raise questions about the so-called bargaining solution is really about.

Comparison with the competitive equilibrium is instructive. Theorems about the existence and stability of the competitive equilibrium are derived from assumptions that are not, strictly speaking, entirely true. We nevertheless believe that, subject to well-known qualifications, the assumptions are close enough to what it is supposed to represent and there is enough distance between assumptions and theorems for the theorems about equilibrium to convey something interesting and important.

Three questions arise from our examination of bargaining solutions: 1) How does one decide whether assumptions of models said to be about bargaining are accurate enough to supply

confidence that bargains will, in fact, be struck? 2) Are the assumptions behind the various bargaining solutions accurate enough? 3) If not, is that because the “true” bargaining equilibrium has not yet been identified or because there is no equilibrium out there to be found?

To the first question, there would seem to be no simple answer, no well-specified test of whether assumptions are good enough. Each reader must answer this question for himself with whatever aid is to be had from our analysis of the main bargaining solutions. My answer to the second question is no; I hope to have persuaded the reader that my answer is correct. Answers to the third question cannot be other than speculative, for how can one prove that a completely satisfactory bargaining equilibrium will never be identified? My own answer to the third question is that there is no equilibrium to be found, implying that bargaining and compromise, ubiquitous as they may be, are fundamentally different from purely self-interested behaviour as exhibited in price-taking in a competitive economy, that something over and above pure self-interest is required, especially in a democratic society, to get the world’s work done. Society, as said at the beginning of this paper, runs on a mixture of self-interest and compromise.

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Appendix: Derivation of the Staahl-Rubinstein Bargaining Solution

A pie is to be shared by agreement between two people, E and O, both completely rational and unreservedly greedy, through a prescribed sequence of alternating offers, terminating when an offer is accepted. There is one, and only one, offer per year. In the first minute of every year t , one person - person E in even years and person O in odd years - makes an offer assigning a share $s(t)$ to person E and a share $1 - s(t)$ to person O. In the second minute, the other person says either “yes” or “no”. If “yes”, the pie is immediately divided accordingly. If “no”, nothing happens until the following year when the process is repeated with the roles reversed. The pie remains undiminished and unallocated forever or until somebody’s offer is accepted.

The Staahl-Rubinstein bargaining solution is an equilibrium determination of shares depending on the persons’ rates of interest, r_E for person E and r_O for person O. Though bargaining could go on indefinitely, the very opposite occurs. Whichever person is entitled to make the first offer proposes a share $s(0) = r_O/(r_O + r_E)$ for person E, leaving a share $r_E/(r_O + r_E)$ for person O. The other party accepts.

The derivation of the Staahl-Rubinstein bargaining solution makes use of the intermediate assumption that, if no deal is struck by some year T , the pie is then allocated arbitrarily with a share S assigned to person E and the remaining share $(1 - S)$ assigned to person O. The solution itself is then derived by raising T to infinity. A key assumption in the proof is sub-game perfection: Neither party can promise to refuse any offer of less than some given share if that offer is the best available at the time it is made. Suppose for convenience that the process begins in the year 0 and that T is even, so that person E makes the first offer and the final offer as well.

The proof is by reverse induction. In the year T , person E offers to take a share S , leaving person O with a share $(1 - S)$. Person O will not take less because $(1 - S)$ is his arbitrarily-assigned share in the year T , and person E need not offer more. Thus,

$$S(T) = S \tag{A1}$$

Go back one year to the year $T - 1$ when it is person O’s turn to make the offer. His offer, $s(T - 1)$, to person E must leave person E no worse off than person E would be by waiting one year for his assigned share, S , of the pie, but person O need not offer more. The present value in the year $T - 1$ of a share S in the year T is $S/(1 + r_E)$, and that is what person E is offered.

$$S(T - 1) = S/(1 + r_E) \quad (A2)$$

leaving a share $1 - S/(1 + r_E)$ for person O.

Now step back an additional year to $T - 2$ when person E is again entitled to make the offer. The most that person E need offer person O is $[1 - S/(1 + r_E)]/(1 + r_O)$ which is the present value of what person O could obtain by waiting a year for his turn to make an offer. Person E's share is the remainder

$$s(T - 2) = 1 - [1 - S/(1 + r_E)]/(1 + r_O) = x + zS \quad (A3)$$

where $x = r_O/(1 + r_O)$ and $z = 1/(1 + r_O)(1 + r_E)$.

The derivation of person E's offer in the year when bargaining begins makes use of the fact that person E's share in the year $T - 4$ bears precisely the relation to his share in the year $T - 2$ that his share in the year $T - 2$ bore to his share in the year T , and so on all the way back to the year 0. Specifically,

$$s(T - 4) = x + zs(T - 2) = x + z[x + zS] = x[1 + z] + z^2S \quad (A4)$$

$$s(T - 6) = x + zs(T - 4) = x[1 + z + z^2] + z^3S \quad (A5)$$

and so on, each pair of years adding an extra term to the time series in square brackets and an extra power of z in the second expression, until

$$s(0) = x[1 + z + zy^2 + \dots + z^{(T/2) - 1}] + z^{T/2}S = (1 - z^{T/2})[x/(1 - z)] + z^{T/2}S \quad (A6)$$

which is a weighted average of $[x/(1 - z)]$ and S , equal to the former when T approaches infinity and to the latter when $T = 0$. Note finally that

$$x/(1 - z) = (r_O + r_O r_E)/(r_O + r_E + r_O r_E) \approx r_O/(r_O + r_E) \quad (A7)$$

where the approximation holds exactly when the "years" are short enough to remove person E's first mover advantage. Ignoring $r_O r_E$, the equilibrium share, $s(0)$, of person E is

$$s(0) = (1 - z^{T/2})[r_O/(r_O + r_E)] + (z^{T/2})S \quad (A8)$$

which is equation (9) in the text. As soon as bargaining begins, person E offers a share $1 - s(0)$ to person O, leaving a share $s(0)$ for himself. Person O accepts, and the bargain is struck.

Suppose $r_O = 1\%$ and $r_E = 9\%$. Person E's share in the Staahl-Rubinstein bargaining solution is $1/10$. Person E's share rises to 37.2%, in accordance to equation (A8), when an arbitrary distribution with $S = 1/2$ would be imposed in the year 8 (i.e. $T = 8$) if a deal has not already been reached. A similar formula could be derived from the assumption that the pie disintegrates if not already allocated by agreement in some year T .

Bargaining Assumptions in the Study of Politics, Law and War

Dan Usher

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Abstract: Bargaining is ubiquitous but indeterminate. There is in practice no sure way of predicting in any particular case whether a bargain will be struck and, if so, what its terms will turn out to be. Bargaining must be determinate in models of politics, law and war, for it is the essence of such models that outcomes be derivable even when bargaining has an essential role to play. This essay is a review of how the circle is squared. Sometimes a bargaining solution is simply assumed. Sometimes special circumstances are invoked to explain the failure to strike mutually-advantageous bargains on the understanding that bargains would otherwise be struck. Determinate bargaining is implicit in the notion of transaction cost though the allocation of such cost among bargainers is unexplained. A model of bargaining in legislatures is determinate on the strength of assumptions very far from bargaining as normally experienced.

JEL Classification: C70

Keywords: bargaining, transaction cost, electoral equilibrium

A great strength of the model of the competitive economy is the complete absence of bargaining. People respond not to one another directly, but to market-determined prices. Nobody communicates with anybody else. No deals are struck. The reality, of course, is that bargaining is everywhere: in dealings between firms, in wage-setting between union and management, in the resolution of disputes over the content of property rights, in the formation of platforms of political parties, in the formation of government under proportional representation, in deals within and between legislatures, in resolving disputes between nations.

This paper is a brief and selective survey of how bargaining has been incorporated into models of politics, law and war when it is obvious that bargaining has an essential part to play, but far from obvious that bargaining is determinate. Models have been developed within which bargaining, like pricing in a competitive economy, is determinate, but the assumptions of these models tend to be so far from bargaining as we know it that the models are as likely to cast doubt as to provide assurance that bargains will actually be struck. Such assurance as we have may be simply empirical, resting on the observation that, no matter why, agreements are reached often enough for the world's work to proceed.

The paper begins with a description of the paradigmatic bargaining situation where a pie is to be divided by agreement between two parties, with no basis for predicting which of many mutually-advantageous apportionments, some relatively advantageous to one party, some to the other, will be selected. The substance of the paper is a discussion of how determinacy is invoked: the arbitrary imposition of a bargaining solution in models where bargaining is inextricable but the focus is on something else, the explanation of bargaining failure in circumstances where it might be expected to succeed, the cost of bargaining as an important consideration in the choice of laws, and the attempt to render bargaining determinate in the apportionment by the legislature of the entire national income among legislators or their constituents. Finally, it is argued that bargaining within politics can be benign or predatory that impediments to predatory bargaining are a requirement for the maintenance of a democratic society.

The Paradigmatic Bargain

Two parties, E and O, are considering a joint venture. Their incomes prior to the establishment of the joint venture, or if the joint venture does not materialize, are \underline{Y}_E and \underline{Y}_O . The joint venture would raise their combined income from $\underline{Y}_E + \underline{Y}_O$ to Y , yielding a surplus of P where

$$Y = \underline{Y}_E + \underline{Y}_O + P \quad (1)$$

The venture cannot proceed until the two parties agree about how the surplus is to be shared between them. They must agree upon a value of s between 0 and 1 such that

$$Y_E = \underline{Y}_E + sP \quad (2)$$

and
$$Y_O = \underline{Y}_O + (1 - s)P \quad (3)$$

where Y_E and Y_O are their incomes once the venture proceeds. [It makes no difference to the problem whether or not participation in the venture requires the parties to give up their original incomes as long as each person's total income is increased.] Agreement on the value of s is the paradigmatic bargain.

Figure 1: The Paradigmatic Bargain

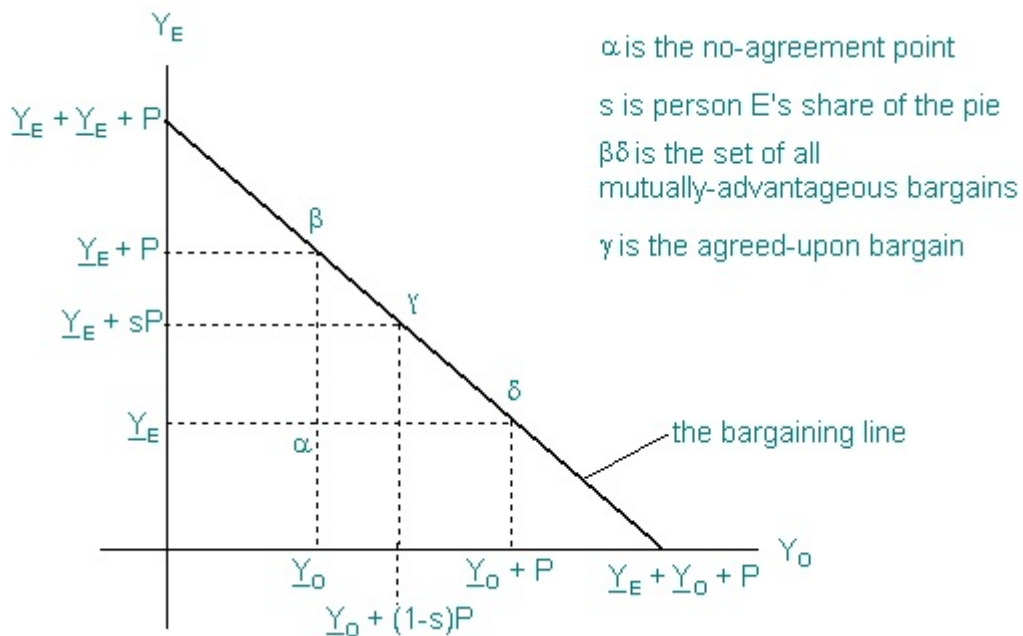


Figure 1 shows person E's income on the vertical axis and person O's income on the horizontal axis. Incomes if the joint venture does not proceed are indicated by the "no-agreement point", α . If the venture proceeds, all possible allocations of income are indicated by the "bargaining line" at a height Y and at 45° to both axes. Mutually-advantageous bargains are indicated by points on the bargaining line between β where $s = 1$ and δ where $s = 0$. A bargain is

an agreement between persons E and O represented by a point γ within the range from β , which is best for person E, up to δ , which is best for person O.

How might γ be chosen? One might suppose that “reasonable people” would agree on a 50-50 split, but “economic man” is not reasonable in that sense of the term. One party may hang tough, refusing to accept anything less than, say, 75% of the pie and confronting the other with the unfortunate choice between 25% and no gain at all. Nothing in the formulation of the paradigmatic bargain rules out such behaviour or guarantees that a deal will be struck.⁸

For some purposes, it may be sufficient to postulate that, no matter why, a bargain will be struck because that is how people are known to behave. Admittedly, bargainers sometimes fail to reach an agreement, but failure is rare enough for the world’s work to proceed. This empirical view is not altogether satisfactory because it supplies no basis for predicting when bargains are struck and, if so, how the value of s is chosen. If one is confident that some bargain will emerge, there may be no harm in practice in postulating a 50-50 split.

Alternatively, a bargaining solution may be derived from a well-specified model of how people behave. Such models have been constructed, but, as argued elsewhere⁹, the assumptions required to render bargaining determinate are so far from how people are observed to behave that the effect of the models is to cast doubt upon, rather than to support, the inference that bargains are actually struck.

Though formulated with reference to a joint venture between businessmen, the model is much more general, and can be extended to all of the bargaining situations as listed above. We turn now to contexts where bargaining assumptions have been employed.

A Postulated Allocation

A fixed division of the spoils is implicit in Hart’s (1995) model of joint ventures and in Alesina and Robinson’s (1995) model of partisan politics. Though the papers differ in their imposed allocations, they are alike in the imposition of a pre-determined bargaining rule so as to focus on other aspects of markets or politics.

⁸On bargaining blocked by threats, see Schelling (1956)

⁹For a critique of models of determinate bargaining, see Usher (2009)

In *Firms, Contracts and Financial Structure*, Hart (1995) explains the pattern of ownership as a trade off between economies of scale and the loss of incentive when one cannot reap the full benefit from one's activities. Patterns of ownership are exemplified by the relation between General Motors and the Fisher Body company that makes frames for General Motors' cars. The two companies may i) remain entirely separate, buying or selling from one another or from other companies on the open market, ii) amalgamate into one large company or iii) establish a close working relation with one another. The choice among these options depends upon economies of management and impediments to cooperation when neither firm can verify the other's relation-specific investment. Hart shows that, though the *potential* combined profit under cooperation (iii) may exceed the combined profit under amalgamation (ii), amalgamation may nevertheless be the better option when relation-specific expenditures are unverifiable. A stripped down version of Hart's model is sufficient to focus on his assumption about bargaining which is our immediate concern.

Consider two firms, F and G. If they remain entirely separate from one another, their profits would be π_F and π_G . If they remain as separate entities but cooperate, their combined profit, $\pi_C(f, g)$, would be dependent upon their relation-specific investments, f by firm F and g by firm G. The critical assumption about the relation-specific investments is that neither firm's investment is *verifiable* by the other. Each firm is assumed to know both firms' profits, π_F and π_G , in the absence of cooperation, the profit, π_A , of the amalgamated firm and the profit function, $\pi_C(f, g)$, of the two firms together in the event that they cooperate. Knowing its own relation-specific investment, f or g as the case may be, each firm is in a position to infer the relation-specific of the other firm, but it cannot demonstrate this knowledge objectively to a third party because outsiders cannot be expected to know f or g. That being so, an agreed-upon rule for apportioning combined profit between the firms cannot be made to depend upon their relation-specific investments. A distinction is therefore drawn between the *true* surplus, T, from cooperation where

$$T = \pi_C(f, g) - [\pi_F + \pi_G] - f - g \quad (4)$$

and the *verifiable* surplus, S, from cooperation where

$$S = \pi_C(f, g) - [\pi_F + \pi_G] \quad (5)$$

Two key behavioural assumptions are introduced: the *informational* assumption that only the verifiable surplus can serve as a basis for assigning each firm's share of the benefit of

cooperation and the *bargaining* assumption that the two firms split the verifiable surplus, S, evenly, half to firm F and half to firm G. On these assumption, firm F's profit in the event of cooperation, π_{FC} where C is mnemonic for cooperation, becomes

$$\pi_{FC} = \pi_F + S/2 - f \quad (6)$$

and firm G's profit in the event of cooperation, π_{GC} , becomes

$$\pi_{GC} = \pi_G + S/2 - g \quad (7)$$

Hart's main proposition is that, without verification, both relation-specific investments are too small and the combined profit is less than it might be because both firms invest to maximize their own surpluses rather than the surplus of the two firms together. It could easily happen that - as between amalgamation and cooperation - the total profit of the two firms together would be higher under cooperation if relation-specific investments could be verified, but the total profit is actually higher under amalgamation because each firm's relation-specific investment is concealed from the other.

Bargaining failure leads to the wrong form of industrial organization. To establish this proposition, Hart required an assumption about how a surplus is divided between firms. The postulated 50-50 split is satisfactory for Hart's purpose, even though it is neither derived or derivable from more basic assumption in Hart's model.

In *Partisan Politics, Divided Government and the Economy*, Alesina and Rosenthal (1995) consider a society where all political outcomes can be represented by points on a left-right continuum. Politics is about the choice of a number, x, on a scale from 0 to 1. Every voter has a favourite position on that scale, and his only concern is to minimize the distance between his favourite positions and the political outcome as determined by voting and by bargaining among politicians elected to office. There are two parties, left and right, with different ideal points on the continuum. Preferences of politicians within each political party are the same. All politicians in the "left" party have the same first preference x_L , and all politicians in the "right" party have the same first preference x_R , where, of course, $x_L < x_R$ meaning that the preferred outcome of the "right" party is to the right of the preferred outcome of the "left" party on the left-right scale. Each party, if it could have its own way, would arrange a political outcome in accordance with its first preference.

Citizens elect legislators and a president. Voting for legislators is by proportional representation. Citizens vote for parties rather than for legislators directly, and then seats in the legislature are allocated to the parties in accordance with the number of votes received.

The final outcome is a point on the left-right continuum, determined simultaneously by two costless bargains, one within the legislature and another between the legislature and the president. Bargaining within the legislature yields a legislative preference, x_Q , where

$$x_Q = \alpha x_L + (1-\alpha)x_R \quad (8)$$

where x_L and x_R are the first preferences of the “left” and “right” parties and where α is the left party’s share of the seats in the legislature. All legislators’ preferences are weighted equally in a compromise where each party’s political power is proportional to its membership in the legislature. This is a very strong assumption, for it might have been assumed that the majority party gets its way completely. Bargaining between the legislature and the executive supplies the final political outcome, x , where

$$x = \beta x_Q + (1-\beta)x_P \quad (9)$$

where x_P is the first preference of the president (which must be either x_L if the president is from the “left” party or x_R if the president is from the “right” party) and where β , which must lie between 0 and 1, is the legislature’s bargaining power in its dealings with the president. Nothing in the model determines the magnitude of β .

The weights α and β are representations of bargaining power, looked upon as unexplained facts of political life. Within the legislature, each party’s bargaining power is proportional to its number of seats. Between legislature and president, bargaining power depends on a parameter pulled out of thin air. This mode of analysis is wrong or useless, but nor is it grounded upon any persuasive explanation of how rational and self-interested people come to agree. Bargaining power is postulated, not rationalized or explained.

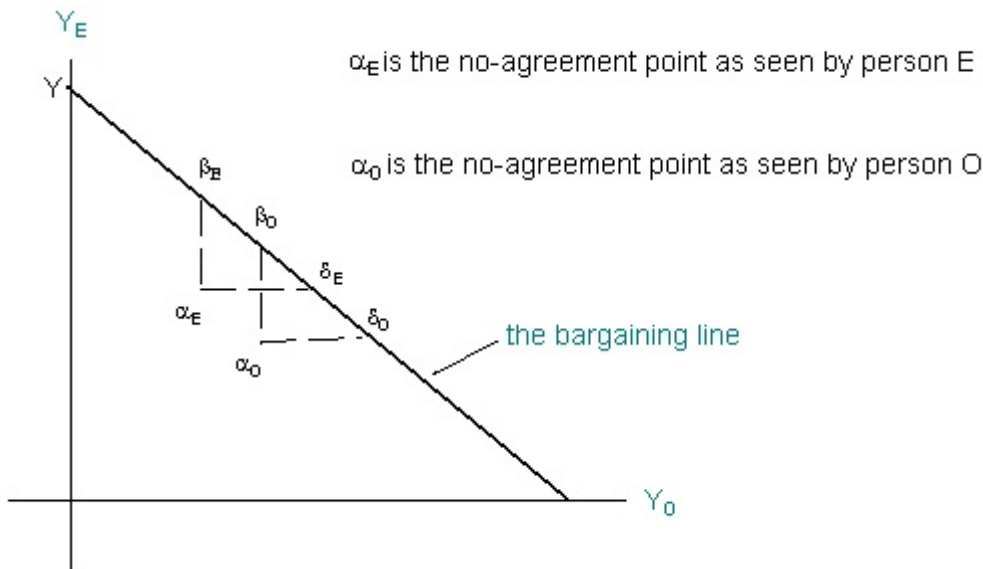
Alesina and Rosenthal’s bargaining postulates are advanced, in my opinion, not as an accurate depiction of bargaining, as it were, from the inside, but as components of a larger model of the workings of democratic government and as springboard enabling Alesina and Rosenthal to develop interesting and insightful propositions about voting in the formation of public policy. They explain, for example, how rational voters’ choices between Republican and Democratic candidates for the legislature are influenced by whether the President is Republican or

Democratic. Like any theory, this theory of political behaviour might be verified by the accuracy of its predictions, but that line of defense is only available if we are not interested in bargaining *per se* and as long as we do not allow ourselves, on the strength of the theory, to suppose that bargaining is more predictable and determinate than is really the case.

The Frustration of Bargaining through Discordant Optimism

Another strand of bargaining literature starts with the premise that the paradigmatic bargaining is determinate, and proceeds to explain why bargaining breaks down regardless. This line of reasoning is exemplified by Priest and Klein's (1984) model of the failure of bargaining to avert costly litigation and by Fearon's (1995) explanation of the descent into war. The common assumption in these papers is the replacement of the no-agreement point α in the paradigmatic bargain with a pair of points representing the bargainer's different expectations of what might happen if bargaining fails.

Figure 2: Discordant Optimism with Feasible Bargains Remaining

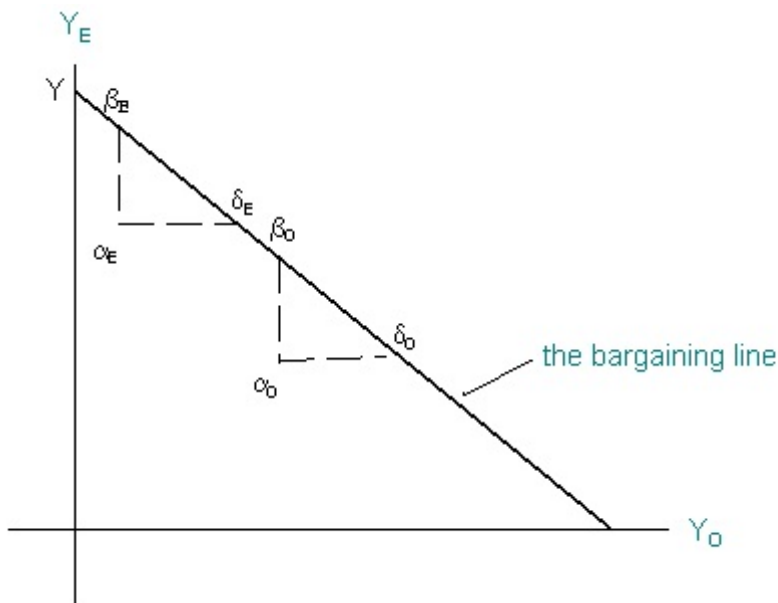


In the paradigmatic bargain in figure 1, the no-agreement point and the set of mutually-advantageous bargains are common knowledge. That need not be so. It is entirely possible for person E and person O to see different no-agreement points. Suppose both parties

are relatively optimistic about their prospects if bargaining fails. If so, person E's no-agreement point, α_E , would be to the north-east of person O's no-agreement point, α_O , and, as illustrated in both figures 2 and 3, the range of bargains - from β_E to δ_E - seen as advantageous by person E must be to the left along the bargaining line of the range of bargains - from β_O to δ_O - seen as advantageous by person O.

The two ranges may or may not overlap. If they do, as illustrated in figure 2, β_O must be to the left of δ_E along the bargaining line, leaving a range of feasible bargains - from β_O to δ_E - within which both parties believe themselves to be better off than they would be at their perceived no-agreement points, α_E and α_O . In this case, the parties see the no-agreement point differently but not so differently that there are no mutually-advantageous bargains left. The range of mutually-advantageous bargains shrinks but does not disappear altogether. If there is a determinate solution to the paradigmatic bargain, then the narrowing of the range of bargains should have no effect upon the feasibility of bargaining itself. If a bargain can be struck within the range from β to δ , then a bargain can be struck within the narrower range from β_O to δ_E as well.

Figure 3: Discordant Optimism Destroys Feasible Bargaining



Alternatively, as illustrated in figure 3, both parties may turn out to be so optimistic about their prospects in the absence of an agreement - the no-agreement point α_E as seen by person E may be so far away from the no-agreement point α_O as seen by person O - that there remains no

common ground for a bargain. The entire range from β_E to δ_E may be to the left of the entire range from β_O to δ_O with no space left in between where what both parties see as an advantageous deal can be struck. The truth, if only the bargainers knew it, is that there is a range of mutually-advantageous bargains as in the paradigmatic bargain of figure 1, but that range must be visible to both parties. Discordant optimism may block bargaining altogether.

In Priest and Klein’s (1984) model of the bargaining to avert costly legislation, persons E and O are two parties with disagreements that may be resolved by costless negotiation or by costly litigation. Their combined cost of litigation as seen by person E is the vertical distance between α_E and the bargaining line, and, as seen by person O, is the vertical distance between α_O and the bargaining line. As figures 2 and 3 are drawn, both parties are relatively optimistic about the outcome of litigation. There remains room for a deal in the circumstances of figure 2 but not in the circumstances of figure 3.

Fearon’s (1995) model of bargaining as an alternative to war is analytically the same, but with the additional feature that the no-agreement points can be associated with assessments of the probability of winning the war. The actors E and O become countries. Their incomes are national incomes. The bargaining line is the locus of all possible pairs of national incomes resulting from negotiation rather than war. Once again, figures 2 and 3 differ according to whether or not divergent optimism destroys all prospects of an agreement seen by both parties as preferable to the outcome of war. In both cases, the no-agreement points, α_E and α_O , can be thought of as countries’ estimates of either their post-war incomes or of their expected post-war incomes on the understanding that the entire remaining income accrues to the victor with nothing left over for the vanquished.

The no-agreement points in the event of war can also be thought of as the outcome of “conflict”. Ignore discordant optimism and suppose that the countries’ prospects in the event of war can be represented by a “conflict success function”

$$s_E = C(F_E, F_O) \tag{10}$$

connecting country E’s share of the spoils to both countries’ “fighting expenditures”, F_E and F_O . To serve its purpose, the conflict success function, C , must have the property that country E’s share of the spoils is an increasing function of its fighting expenditure and a decreasing function of country O’s fighting expenditure, that is.

$$\delta s_E / \delta F_E > 0 \quad \text{and} \quad \delta s_E / \delta F_O < 0 \quad (11)$$

Let the countries' national incomes in the event that war is averted be Y_E^* and Y_O^* , and suppose the cost of war is limited to expenditures on fighting, ignoring the additional cost of destruction. The countries' combined post-war residual incomes available for peaceful uses becomes $[(Y_E^* - F_E) + (Y_O^* - F_O)]$. The conflict success function assigns each country's share. The countries' post-war incomes available for peaceful purposes become \underline{Y}_E and \underline{Y}_O where

$$\underline{Y}_E = C(F_E, F_O)[(Y_E^* - F_E) + (Y_O^* - F_O)] \quad (12)$$

and
$$\underline{Y}_O = \{1 - C(F_E, F_O)\}[(Y_E^* - F_E) + (Y_O^* - F_O)] \quad (13)$$

The amount in square brackets is what remains of the combined income of both parties after the waste of resources in fighting, and the expression in curly brackets in the lower equation represents person O's expected share of the combined income.

Now the no-agreement point α in figure 1 signifies the countries' expected post-war national incomes, \underline{Y}_E and \underline{Y}_O as indicated in equations (12) and (13). The location of the no-agreement point reflects the Nash equilibrium when each countries' fighting expenditure is chosen to maximize its post-war income in the light of its estimate of the fighting expenditure of the other.¹⁰

Discordant optimism is easily re-introduced by assuming the conflict success function as seen by country E to differ from the function as seen by country O. A distinction might also be drawn between arming and fighting. Each party arms itself to deter the other from starting a war as well as to increase its chance of winning if war breaks out nevertheless.¹¹

¹⁰This model was born as an explanation of rent-seeking where resources are (from a social point of view) wasted in competing efforts by importers petitioning for a share of import quotas at the disposal of the government. Rent-seeking was discussed in a general way by Tullock (1967) but christened and more fully analysed by Krueger (1974). Tullock (1980) introduced the first example of a conflict success function, but the function was christened and more fully analysed by Hirshleifer (1989) and (1991) who turned the model from competition over favours from the government to direct conflict between people or nations.

¹¹See Intrilligator and Britto (1984) and Garfinkel (1990). The standard model of conflict draws no distinction between deliberate fighting expenditure, F , and the damage to everybody that war brings.

Whether discordant optimism is a necessary or sufficient condition for bargaining failure depends upon whether or not the paradigmatic bargain is seen as determinate. If it is, then discordant optimism becomes a necessary condition. In the absence of discordant optimism, bargaining succeeds; with sufficiently pronounced discordant optimism, bargaining fails. But if the paradigmatic bargain is not seen as determinate, then discordant optimism is sufficient but not necessary because bargaining may fail regardless. Bargainers may be just plain stubborn, each demanding more than the other is prepared to concede.

Transaction Cost

There is a doctrine in the economics of law that good law is whatever serves to minimize something called transaction, part of which is a cost of bargaining. The doctrine is an application of the wider principle that the object of law is to maximize the national income, very broadly defined, regardless of the distribution of income. Transaction cost has been defined as encompassing “all those costs that cannot be conceived to exist in a Robinson Crusoe economy....a spectrum of institutional costs including those of information, of negotiation, of drawing up and enforcing contracts, of delineating and policing property rights, of monitoring performance, and of changing institutional arrangements. In short, they comprise all those costs not directly incurred in the physical process of production.”¹²

A few almost randomly chosen quotations from Richard Posner’s *Economic Analysis of Law* (fifth edition, 1998) conveys a sense of how the concept is employed:

- The Coase theorem is “that, if transactions are costless, the initial assignment of property rights will not affect the ultimate use of the property” (8).
- “If there are significant elements of bilateral monopoly,...transaction costs may be quite high. Negotiations to settle a lawsuit are an example. Because the plaintiff can settle only with the defendant, and the defendant only with the plaintiff, there is a range of prices within which each party will prefer settlement to the more costly alternative of litigation. Ascertaining this range may be costly, and the parties may consume much time and resources in bargaining within the range.” (68)

¹²Steven Cheung, “Economic Organization and Transaction Costs” *The New Palgrave: A Dictionary of Economics*, volume 2, 56.

- “Efficiency requires that the driver drive more slowly. But because transaction costs with potential victims such as yourself are prohibitive, he will not do so unless the legal system steps in, as by holding him liable for damages... should an accident occur.” (180)

- “A doctor chances upon a stranger lying unconscious on the street, treats him, and later demands a fee...The cause of the high transaction cost in that case is incapacity. In other cases it may be time (e.g., the stranger is conscious but bleeding profusely and there is no time to discuss terms). In such cases, the law considers whether, had transaction cost not been prohibitive, the parties would have come to terms, and if so what (approximately) the terms would be.”(151)

Transaction cost is typically thought of as encompassing more than the cost of bargaining, but in so far as it includes a cost of bargaining, there is some question as to how it can be reconciled with the paradigmatic bargain in figure 1 which allows for no cost of bargaining at all. Costly bargaining must be reconciled with bargaining to circumvent cost. If bargaining is costly, might not parties negotiate to avoid that cost too? One can imagine three ways around this conundrum.

Transaction cost may be looked upon as a ticket to the bargaining table, a fixed amount that each bargainer must pay to exercise his right to negotiate over the sharing of the pie: the cost of legal services, the value of time lost in striking a deal, etc. For any agreed-upon γ , the incomes of the bargainers, $\underline{Y}_E + sP$ and $\underline{Y}_O + (1 - s)P$, would each be reduced by the price of the ticket to bargain. Another reconciliation is to look upon transaction cost as the expected value of harm from bargaining failure. If the probability that negotiation breaks down is ϕ , the transaction cost becomes ϕP where P is the value of the pie. Both of these costs may be present. They must, of course, be small enough that there remains a net surplus to bargain about.

A third cost of bargaining might consist of expenditures to shift the no-agreement point. With reference to the paradigmatic bargain in figure 1, person E might devote resources to pushing the point α to the east, while person O devotes resources to pushing the point α to the south, each party enlarging the bargaining range in its favour and, if the ploy works, improving the terms of the bargain that is actually struck. For example, person E would surely gain by pushing α to the east as long as there is no comparable push from person O and if shares of the pie are determined in a 50-50 split of the surplus over and above the no-agreement point. A waste, qualitatively, comparable to the waste in conflict, would arise if both parties pushed at once. This variant of transaction cost is more like arming than fighting. Each party devotes resources to increasing its chance of winning a battle that they both hope will never be fought, in the

expectation of improving it's terms in a bargain to resolve the dispute.

It is sometimes argued that transaction cost is itself a manifestation of conflict, but this is problematic, relying as it does on an implicit analogy between social and physical technology. An ordinary cost is the amount of money that must be spent to acquire something. We speak of the cost of oranges at the grocery store. We speak of the cost of production of an automobile as an amount of money dependent on the price of inputs and the technology of automobile manufacture. We are content to speak of the cost of production of things because we are confident of the existence of some physical technology of production connecting inputs and output of the thing produced. To speak of transaction cost is implicitly to show the same confidence about the technology of negotiation, a confidence unwarranted without some strong reason for believing that such technology exists, or, at a minimum, that there is a rule for measuring the magnitude of transaction cost. There is no such rule. Though one can often imagine what transaction cost might be, the notion of transaction cost comes unequipped with a mechanism for deciding whether it is large or small in every particular case. We are expected to recognize transaction cost when we see it and to know in our hearts whether it is large or small.

Whether such imprecision is tolerable depends critically on how the notion of transaction cost is employed. Its principal usage is in the literature of law and economics as an aid for determining what the law ought to be. Legislators passing laws and judges interpreting laws are expected to minimize transaction cost in circumstances where they must rely on gut feelings or experience in deciding when transaction cost is likely to be high and when it is likely to be low. That may be the best we can hope for in this imperfect world, but there remains a nagging suspicion that what is unmeasured in theory may turn out to be mischievous in practice.

Minimization of transaction cost prescribes that law A is better than law B if the common purpose of both laws is attained by law A at a lower transaction cost. There are, however, two versions of this doctrine. The more modest version is that, whatever the objective of law or public policy, that objective should be attained at the lowest possible transaction cost. For example, if the state chooses to redistribute income from rich to poor or to engage in programs to that effect, public policy should be conducted in such a way that a given benefit to the poor is attained with the least possible harm to the rich. Unavoidable deadweight loss in taxation could easily create conditions where a gain of \$5 to the poor can only be procured at a cost of \$10 to the rich. That would be no violation of the minimization of transaction cost as long as no alternative policy could procure the \$5 gain to the poor at a cost of only \$9 to the rich.

The other version of this doctrine is less benign. In this version, the minimization of transaction cost is an aspect of the search for efficiency in the economy as a whole, where efficiency is linked to the maximization of the national income or some other measure of the sum total of the incomes of everybody concerned.¹³ Good law is seen as whatever minimizes transaction cost, regardless of how that cost is apportioned among plaintiff, defendant and the state. Transaction cost becomes the difference between the national income as it might be and the national income as it is. In this version, all dollars are equal to whomever they may accrue and from whomever they may be taken. A law that augments one person's income by \$10 and diminishes another's incomes by \$8 is a good law, at least in so far as there is no alternative making both people better off. There is much to be said for this principle in many of the contexts where it is invoked. The minimization of transaction cost may be the appropriate criterion in the design of laws for a new and as yet unsettled country where prospective settlers have no idea what roles they will play once the new country is established. It may be appropriate in commercial law where businessmen have equal chances of appearing before the courts as plaintiff or defendant. But, taken to its logical extreme, this interpretation of the minimization of transaction cost would block all redistribution of income, for there is inevitably some transaction cost in any transfer of income through the public sector from rich to poor.¹⁴

The notion of transaction cost is divorced from any apportionment among bargainers of whatever it is they are bargaining about. A doctrine emphasizing the total cost of bargaining without reference to how the bargain is struck or how the pie is ultimately divided is only half a theory, and there is some question as to whether one half can be trusted without the other. In practice, transaction cost may depend on who gets what in the splitting of the pie. We may not know the cost of splitting the pie until we know how and to whose advantage it is split.

Bargaining in Legislatures

¹³as distinct from a utilitarian criterion or from a measure of the national income weighted by the degree of equality in the distribution of income.

¹⁴In texts of law and economics, we learn that the choice between negligence and strict liability in tort law turns on the costs associated with each rule, the sum of the cost of care and the expected cost of accidents which nonetheless occur. In the history of law, we learn that the very distinction between negligence and strict liability originated in the law of industrial accidents where, in practice, a negligence rule placed the burden of industrial accidents upon workers (because owners were typically not deemed negligent) and a regime of strict liability placed the burden upon owners. See Lawrence M. Friedman, "Torts", *A History of American Law*, 1986.

In the models discussed so far, important results are derived on the working assumption - which may be justified on the strength of pure bargaining models such as those discussed in the preceding paper - that there is a distinct equilibrium to the paradigmatic bargain in Figure 1. Alternatively, a bargaining equilibrium - inspired by the Staahl-Rubinstein bargaining theorem based to some extent on the pure bargaining models - may be derived for a particular situation. Inspired by the Staahl-Rubinstein bargaining theorem, Baron and Frerejohn (1989) derive such a model in a paper called "Bargaining in Legislatures".¹⁵ It is to be argued here that the assumptions required to procure a bargaining equilibrium are very far from the nature of bargaining as we experience it and that the article misleads us into overlooking serious impediments to bargaining in the context of majority rule voting.

A legislature must allocate an amount Y among its N members, where all decisions are made by majority rule voting. Any allocation can be represented by a vector $(y_1, y_2, y_3, \dots, y_N)$ where y_i is the allocation to person i . An allocation is accepted when a bill proposing that allocation is passed with a majority of at least $(N + 1)/2$ members. (For convenience, N is assumed to be odd.)

Two well-known difficulties with majority rule voting in this context are the paradox of voting and the exploitation problem. The paradox of voting is that any allocation can be defeated in a pair-wise vote. For example if $N = 3$ and $Y = 90$, the fair allocation $(30, 30, 30)$ can be defeated by the allocation $(35, 35, 20)$ where a majority of somewhat better off and a minority is significantly worse off, but $(35, 35, 20)$ can be defeated by $(30, 35, 25)$ and so on ad infinitum. The exploitation problem is that any majority that can strike a bargain and stick to it is in a position to grab the entire income - 90 in this example - for itself. For instance, the first two members of the legislature might strike a bargain in favour of the allocation $(45, 45, 0)$, promising faithfully to vote against any other allocation. Such a deal neutralizes the paradox of voting as long as participants refuse to be bid away from the coalition. The third person, who loses out completely under the deal, might try to draw the first person away from the deal by proposing an allocation of $(50, 0, 40)$ instead. The deal requires the first person to vote for $(45, 45, 0)$ regardless.

It is in this context that "Bargaining in Legislatures" is interesting. The unattainable ideal of an allocation that can defeat any other allocation in a pair-wise vote is replaced by a set of rules

¹⁵On the mechanics of the Staahl-Rubinstein bargaining model, see the exposition in Muthoo (1999).

for proposing, amending, accepting and rejecting bills specifying the distribution of income among a group of legislators or their constituents. A simple variant of the model would allow a randomly-chosen “formateur” to propose any allocation he pleases on the understanding that his choice becomes the decision of the legislature if accepted in an up-or-down vote. Otherwise, a new formateur is chosen at random and the process is repeated, but only once on the understanding that the object of voting, Y , is lost altogether if a bill is rejected on the second round. Central to the model is a rate of time discount, so that dollar accruing on the second round of voting is worth less than a dollar accruing on the first round. The model may be extended in several respects. In particular, amendments may be allowed in each round of voting, and voting may be continued, round after round, for ever if necessary, until a bill is finally passed. The very simplest version of the model, with just two rounds of voting and with no amendments allowed, is sufficient to illustrate characteristics of the model that are especially relevant here.

Why has voting become determinate? Let the three members of the legislature be A, B and C, suppose A wins the (three sided) coin toss to become the formateur in the first round of voting and suppose everybody’s discount factor ($1/[1 + r]$) where r is the rate of interest) is 0.9. To see what person A proposes, consider what might happen in the second round if the proposed bill in the first round is voted down. Whoever wins the coin toss to become the formateur in the second round proposes a bill supplying a penny to each of the other two members of the legislature and leaving almost the entire income, Y less two pennies, for himself. He can get away with that manoeuvre because, by assumption, nobody gets anything if the bill proposed in the second round is voted down and a penny is deemed better than nothing. Since each person’s probability of becoming the formateur in the second round is $1/3$, and ignoring the penny, each person’s expected incomes if voting proceeds to a second round become $Y/3$ with a present value in the first round of $0.3Y$ when, as is being assumed, the discount factor is 0.9. That being so, person A can obtain a majority in the first round for a bill supplying at least $0.3Y$ to either person B or person C and leaving $0.7Y$ for himself. To procure a majority consisting of person A and person B, person A proposes an allocation $(63, 27, 0)$.

Alternatively, if unanimity were required to block an amendment in the first round, both person B and person C must be supplied with incomes of 27 in the first round, forcing person A to propose an allocation of $(36, 27, 27)$.

The model is internally consistent and does give rise to a unique equilibrium. Its significance for the feasibility of bargaining in a democratic society rests not just on its consistency, but on whether its assumptions are close enough to democratic politics as we know it

to supply confidence that some equilibrium will arise there too. This is doubtful.

A key assumption, without which everything falls apart, is “sub-game perfection”. The assumption is that I cannot promise to act tomorrow in a way that will not be in my interest when tomorrow comes. Sub-game perfection becomes a universal unwillingness or inability to keep one’s word. Without that assumption and in a somewhat expanded model in which voting continues, stage after stage, forever or until some bill is finally passed, a majority in the legislature can side-line the formateur altogether by agreeing among themselves on the allocation of the national income, the composition of the cabinet or the policies of the government in office, and automatically rejecting any offer by a formateur who is not part of the coalition. Then, as soon as the random process by which formateurs are selected yields a formateur from the coalition, he proposes the pre-arranged deal and it is approved by a majority of voters. Parties in the coalition “simply say no” until their deal is finally proposed. Such binding promises are postulated away by the assumption of sub-game perfect equilibrium, but eviction from the model is not eviction from politics as actually conducted.

Consider once again the two stage allocative process as described above where a mere majority is sufficient to pass a bill in the first stage, and note that, before the formateur is chosen, each of the three people has an equal chance of becoming formateur, so that each person’s expected income must be a third of the total income to be allocated. Each person’s expected income must be 30.

Now, suppose that, before the formateur is selected, person B and person C strike a deal never to vote in the first stage for any allocation other than (0, 45, 45), cutting out person A altogether. To compute expected incomes of person B and person C, observe that there is a two-thirds chance of one of the two becoming the formateur in the first round of voting, and that otherwise, there is a two-thirds chance of one of them becoming the formateur in the second round. Thus, the expected income of each of person B and person C becomes $\{(2/3)45 + (1/3)[(2/3)(0.9)45]\}$ which is equal to 39. The deal struck between person B and person C raises each of their expected incomes from 30 to 39 while at the same time lowering the expected income of person A from 12. The meaning of sub-game perfection in this context is that such deals would not be respected.

If bargaining in legislatures were as feasible and as determinate as the Baron and Frerejohn bargaining model might lead one to believe, there would seem to be no reason why it would be confined to bargaining within the legislature as a whole. If the entire legislature can bargain its

way to an allocation of income among its members, so too can a majority in the legislature bent upon exploitation of the corresponding minority. Strictly-speaking, the model is constructed with reference to the entire legislature, but in so far as it can be said to explain bargaining, it should apply to a faction in the legislature as well. If feasible at all, bargaining should be equally feasible in both contexts.

Turn now to the broader question of whether the Baron and Frerejohn process is a reasonable representation of what we normally think of as bargaining. There is cause for doubt. Note first that there are many processes by which an amount Y might be allocated among N people. There might be a prior agreement to allocate Y equally, supplying each person with Y/N . There might be a prior agreement to allocate Y randomly, so that one person gets everything and nobody else gets anything in accordance with the flip of an N -sided coin. Nobody would ever be inclined to think of the adoption of either of these processes as bargaining, though people (for instance, with different degrees of risk aversion) might well bargain over which of these processes to adopt. The Baron and Frerejohn process can be thought of as a complex mixture of these simple processes with other ingredients besides. Certainly, the random selection of formateur has something in common with random selection of income because selection as formateur automatically raises one's expected income. The Baron and Frerejohn process can be seen as a way to circumvent bargaining rather than as a description of the mechanism of bargaining itself. It is at least arguable that the Baron and Frerejohn process is better thought of as an idealization of parliamentary procedure, with chance substituting for the right of the government in office to propose legislation.

True bargaining may even be postulated away by the imposition of sub-game perfection. True bargaining may be required in the deal between person B and person C, as described above, where one of the many possible majority coalitions must establish itself and a division of the spoils must be agreed upon. The implicit assumption above that the spoils are divided equally is entirely arbitrary.

There is finally the question of applicability. Baron and Frerejohn do not actually postulate a fixed income Y . Instead, "the task before the legislature is to choose a nonnegative distribution of one unit of benefits among the districts according to majority rule, with no side payments outside the legislature permitted." (page 1184), and the application they emphasize is "government formation in multiparty parliamentary systems when no party has a majority of seats" (page 1194). Yet there is nothing in the logic of the model to block the interpretation of "one unit of benefits" as the national income Y . To be sure, the model is much more reasonable in

the context of government formation, but it is not, strictly-speaking, confined there. Though this is, I suspect, far from the authors' intention, the model would seem to serve an explanation and even justification of democratic communism where the entire national income is allocated by one vast bargain within the legislature. It is commonly believed, a belief that I share and that I suspect Baron and Frerejohn share too, that democratic communism is impossible, that the explicit sharing of the entire national income among the entire population is a task that the legislature cannot perform, and that the attempt to undertake such a task would destroy the consensus on which democracy depends. The Baron and Frerejohn model would suggest otherwise. The problem here is to discover a criterion for separating those bargaining problems which can in practice be solved from those which cannot, and how to keep the latter away from the legislature.

Conclusion

Running through all of the critiques in this paper of models where bargaining assumptions are employed is one large question to which various answers are supplied: Under what circumstances is it reasonable, and under what circumstances is it not reasonable, to suppose that bargains will be struck? It was claimed in an earlier paper (Usher, 2009) that bargaining is unexplained in the sense that there is no adequate equilibrium in paradigmatic bargain comparable to the general equilibrium in a competitive economy, that assumptions yielding such equilibria are very far away from the circumstances of bargaining as it is experienced. In Hart's model interfirm cooperation, bargains can be struck if and only if compliance with the terms of the bargain can be publically verified. In Priest and Klein's model of litigation and in Fearon's model of the descent into war, otherwise feasible bargains are blocked by discordant optimism where each party sees a no-agreement point that is relatively favourable to itself. In models of transaction cost, in so far as it refers to bargaining, bargains are always feasible at a price which is sometimes worth paying and sometimes not, and laws may be designed to minimize transaction cost in society as a whole. In Baron and Frerejohn's model of bargaining in legislatures, bargaining is "proved" feasible, but only by the imposition of very restrictive rules on the bargaining process. In the end the question of when and how bargains are struck remains theoretically elusive. We know from experience that bargains are frequently, but not invariably, struck. One suspects but cannot prove that the size of the pie matters, so that people can strike bargains as long as there is not too much at stake, making deals possible between firms or litigants but not over the allocation of the entire national income as democratic communism would require. All of the conclusions in all of the models discussed here can at best yield helpful rules of thumb because and in so far as the paradigmatic bargain is indeterminate.

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Bargaining and Voting

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Abstract: Government by majority rule voting requires that compromise be attainable, but not too easily. Little of the nation's business could be transacted without an ability on the part of the legislators and political parties to strike bargains, but government by majority rule voting would be destroyed by a bargaining equilibrium comparable to the general equilibrium in a competitive economy. Democratic government is designed to foster bargaining where it should be fostered and to impede bargaining where it should be impeded.

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Keywords: bargaining, majority rule voting

Majority rule voting is infused with bargaining: *reconciliatory* bargaining to fill gaps that would otherwise render majority rule voting indeterminate, and *predatory* bargaining by a majority of voters to reassign income and privileges from the minority to itself. Governments are designed to facilitate the one and to impede the other. In the absence of a bargaining equilibrium, the dependence of majority rule voting on bargaining imports an indeterminacy into democracy itself. This paper is an attempt to develop and justify these propositions.

Bargaining is commonly described as the allocation of a pie by common consent among people who are collectively entitled to it but who cannot appropriate it until they agree on how it is to be shared. Here, bargaining is more than that. It is also the self-selection of participants among a great field of possible participants. Bargaining within majority rule voting differs from bargaining within markets. In markets, many groups of participants - buyers and sellers - are formed simultaneously, until, in the limit, there emerges a single market price or vector of market prices.¹⁶ In majority rule voting, the bargain that matters is within just one of the many possible majorities in the legislature.

Majority-rule voting is depicted here as a caricature of Athenian democracy in a community where citizens differ in their *interests* but not in their *opinions* about the consequences of public policy. In modern democracy, citizens do not vote for legislation directly. Instead, citizens vote for representatives, and representatives vote for bills in the legislature. Here, there are no representatives. All citizens are entitled to participate equally in the legislature. To say that voters differ in interests rather than opinions is to abstract from the possibility that, in a choice among policies, the policy which is best for any one person is automatically best for everybody else as well, but people disagree about which policy that is. Here, if person 1 favours policy A and person 2 prefers policy B, it must be because policy A is really better for person 1 and policy B is really better for person 2. The allocation of benefits to different people is assumed to be common knowledge.

Within majority rule voting, a reconciliatory bargain is required when, for example, the police force might be reorganized in many alternative ways, any reorganization leaves everybody somewhat better off, people differ in their preferences among these alternatives, but some specific reorganization must be agreed upon if the status quo is to be replaced. Reorganization could be arranged by the election of a designated chooser, but the need for bargaining reemerges when the designated chooser must himself be chosen. By contrast, a predatory bargain might

¹⁶On this process, see Newman (1965) and Osborne and Rubinstein (1990).

assign a disproportionately large share of the burden of taxation onto a minority of the states or of the population as a whole. Such bargains are a standing temptation in majority rule voting.¹⁷

The significance of bargaining within majority rule voting depends very much on whether or not bargaining is determinate, whether or not there exists a bargaining equilibrium comparable to the general equilibrium in a competitive economy. I have argued in a preceding article¹⁸ that alleged bargaining equilibria - based upon a common sense of fairness in the Nash equilibrium or upon a universally-accepted bargaining process in the Staahl-Rubinstein bargaining solution - are too far from bargaining as we know it to supply the political equilibrium we seek. People do often compromise, but there is no assurance that some deal will inevitably be struck. If this be correct, government by majority-rule voting rests upon good-will among citizens and their representatives with no mechanical resolution of disputes. The danger is that what is unexplained in theory may on occasion prove unreliable in practice, that democracy may one day work less well than is expected or break down altogether because reconciliatory bargains cannot be struck or because predatory bargains prove intolerable to the community as a whole.

The core of this paper is a listing of circumstances - within the legislature or in society at large - where majority rule voting is susceptible to predatory bargaining or where reconciliatory bargaining is required. There follows discussion of how government by majority rule voting is upheld by procedures and constraints to foster bargaining that should be fostered and to thwart bargaining that should be thwarted.

¹⁷In a sense, all bargains are reconciliatory in that the pie, however acquired, must be shared by mutual consent. Predatory bargains are characterized by negative externalities as gains to participants are acquired at the expense of outsiders. Useful in the context of voting, this classification not exhaustive. One might imagine bargains with positive externalities, as, for example, when patents are pooled in the development of a new product. The formation of a cartel is a predatory bargain within the economy.

¹⁸This paper is the last of three papers on aspects of bargaining. The first paper, called "Bargaining Unexplained" (Usher, 2010a) is a critique of bargaining models with emphasis upon the indeterminacy of bargaining.. The argument is that bargaining models are too distant in their assumptions from the circumstances of bargaining to supply any confidence that bargains will in practice be struck. Whatever confidence there may be that bargains will be struck rests on experience unaided by formal models. The second paper, called "Bargaining Models in Politics Law and War"(Usher, 2010b), is about how a postulated bargaining equilibrium can serve as a building block in models of various aspects of society.

Bargaining in the Legislature

Need for reconciliatory bargaining and opportunities for predatory vary with the pattern of voting. Voting may be to choose i) between a pair of options ii) among several mutually-exclusive options, iii) a parameter, iv) a pair or multiplicity of options, each from its own set of alternatives, v) a many-faceted public policy or vi) the allocation of income among voters. Emphasis is upon the last two patterns with preceding patterns introduced by way of contrast.

i) A Pair of Options: The legislature is confronted with a simple choice, to pass a bill or to reject it, with no amendments allowed. If n out of N legislators favours the bill, if $n > N/2$ and with no side-payments allowed, the bill passes with no need or opportunity for bargaining.

Bargaining becomes possible if side payments are permitted or cannot be prevented. Consider a 9-person legislature with 5 people in favour of a certain bill and with the remaining 4 people are opposed. In a straight vote, the bill is passed with a 5 to 4 majority. Suppose also that everybody places a value of \$100 on his preferred option, so that each of the 4 people opposed to the bill would pay up to \$100 to have the bill lose instead, and each of the 5 people in favour of the bill would pay up to \$100 if necessary to preserve the win. If side payments were allowed or could not be prevented, the 4 opponents of the bill could not advantageously compensate the 5 supporters to vote against the bill, but a mutually-advantageous deal could be struck between the 4 opponents and 1 of the supporters, in which the 1 supporter is paid not less than \$100 but not more than \$400 to switch sides, transforming the 5-to-4 win into a 5-to-4 loss.

Such a bargain is clearly predatory, benefitting one group of voters at the expense of the rest. The bargain is also indeterminate, for no formal mechanism determines the size of the bribe within its limits of \$100 and \$400. There are other possibilities. If all five people in favour of the bill came to believe that enough of them could be bribed to block the passage of the bill, the minimum required bribe could fall well short of \$100. If the four opponents of the bill could also be bribed to switch votes, there is no telling what might eventually happen. Absence of any universally-recognized equilibrium is a large part of the reason why the selling of votes is illegal. In other contexts to be discussed below, the trading of votes involves many of the same problems as the selling of votes, but the trading of votes is not illegal.

The greatest problem with up-or-down voting is that there may be too much at stake, so much that the losers would prefer to rebel or to break up the state than to acquiesce in the outcome

of the vote. Democracy¹⁹ is a recipe for chaos unless the range of what can be voted about is constrained enough that the losers are prepared to acquiesce peacefully and the winners, if winning supplies control of the government, are prepared to risk the loss of their authority in the next election.

ii) Several mutually-exclusive alternatives: Much depends upon the rules specifying how voting is conducted. In principle, the legislature could adopt a plurality rule, such as is employed in many countries for choosing among candidates for office, according to which each person votes for a preferred alternative and the alternative with the most votes wins. This procedure is never adopted in voting for bills in the legislature, in part because a Condorcet winner - an alternative preferred to all other alternatives and that would beat any other in a pair-wise vote - may lose out in this voting process.²⁰ This disadvantage is often tolerated in voting for candidates, but it would never be tolerated in voting for options within the legislature where bills and amendments to bills compete in one and the same contest.

The standard Parliamentary procedure is a sequence of pair-wise votes where amendments are voted upon in the reverse order that they are presented, where the second-to-last vote is between the original bill and the bill as amended and where the last vote is between the winner of the preceding vote and the status quo. This process automatically yields the Condorcet winner if there is one. Otherwise, there is scope for predatory bargaining. Consider the choice among the status quo, A, a bill to replace the status quo, B, and an amended bill, C in a legislature with three voters whose orders of preference, from most preferred to least preferred, are ABC, BCA and CAB. This generates a standard “paradox of voting” where each option is defeated by some other option in a pair-wise vote²¹. In the standard Parliamentary procedure, the status quo is destined to prevail because the original bill, B, wins in the first of the two pair-wise votes (between the

¹⁹The word “democracy” is used here synonymously with majority rule voting with surrounding arrangements such that majority rule voting is expected to persist for a long time. Limited franchise and abstentions are largely ignored. On other uses of the word “democracy”, see Dunn (2005).

²⁰Expand the number of voters from three to ten, and suppose preference orderings among the three options are follows: two people’s orderings are ABC, two people’s orderings are ACB, three people’s orderings are BCA and the remaining three people’s orderings are CBA. Under a plurality rule, A wins the election with 4 votes, as against 3 votes for B and 3 votes for C, despite the fact that A would lose by 6 votes to 4 in a pair-wise contest between either B or C.

²¹For an exposition and history of the paradox of voting, see Black and Newing (1958)

original bill, B, and the amended bill, C), and then the status quo, A, wins in the second and final pair-wise vote (between the original bill, B, and the status quo, A) That is the outcome in pure voting, with no element of strategy or bargaining. Parliamentary procedure is designed to give the edge to the status quo, so that innovation only succeeds where there is a reasonably strong preference for it.²²

Even within Parliamentary procedure, there is still room for strategic voting and predatory bargaining. Two of the three voters - the person with preferences BCA and the person with preferences CAB - prefer the amended bill, C, to the status quo, A. Both become better off if the person with preferences BCA acts strategically in the initial vote, voting not for his first preference B, but for the amended bill, C, which then beats A in the final vote. On the other hand, the remaining person, with preferences ABC, is harmed by the manoeuvre, for the outcome is shifted from his most preferred, A, to his least preferred, C, alternative.

That is not the end of the story. To make the best of a bad situation, the person with preference ABC, who but for strategic voting would have attained his first best, may offer this deal to the person with preference ordering BCA: "You vote for B over C in the first round, and I in turn promise to vote for B instead of A in the second, for outcome B is better for both of us than outcome C". Both parties to the deal become better off as long as all promise are kept.

All such bargaining is predatory. Bribery, as discussed in connection with voting about a pair of options, is feasible here too, but may be unnecessary because most of what might be attained by illegal bribery can be attained by legally-permitted vote-trading instead.

iii) Choosing a Parameter: A prime example of such a parameter is the tax rate, t , in the negative income tax, where all income is taxed at a uniform rate and the proceeds of the tax are redistributed in equal amounts to everybody. Then, as long as nobody abstains, everybody votes selfishly and there is an inverse correlation among incomes and preferred tax rates (the higher a person's income, the lower is his preferred rate of tax), there is an unambiguous Condorcet winner among all possible tax rates. The tax rate preferred by the person with the median income beats all other tax rates in a pair-wise vote. When the tax rate is determined by voting in the legislature, the rate preferred by the median voter must emerge victorious in any sequence of votes among alternatives as long as that rate is included somewhere within the sequence.

²²For a brief introduction to the logic of parliamentary procedure, see Riker (1980b)

iv) A Pair of Choices: With several mutually-exclusive options, vote-trading can only be between different links in the chain of pair-wise votes. But, vote-trading may also occur between bills on different matters to be resolved by voting in the legislature. This too is best described by an example.

Two up-or-down bills are under consideration in the legislature. One bill is to ban abortion. The other bill is to deregulate the economy. Represent passage of the first bill by A, and its rejection by S_A , where A refers to abortion and S refers to the status quo. Represent passage of the second bill by D, and its rejection by S_D where D refers to deregulation, There are four possible outcomes on both bills together: (A, D), (S_A , S_D), (A, S_D) and (S_A , D). The legislature consists of three groups of people, 30% religious, 30% free-marketeers, and 40 % moderates.

Moderates want neither bill passed, but, if just one bill is to be passed, they do not care which bill it is. Their order of preference among pairs of outcomes is

$$(S_A, S_D), (A, S_D) = (S_A, D), (A, D)$$

where “=” means indifference. Free-marketeers are passionately in favour of deregulation, but, other things being equal, oppose the prohibition of abortion. Their order of preference is

$$(S_A, D), (A, D), (S_A, S_D), (A, S_D)$$

Religious folks are passionately in favour of the prohibition of abortion, but, other things being equal, oppose deregulation. Their order of preference is

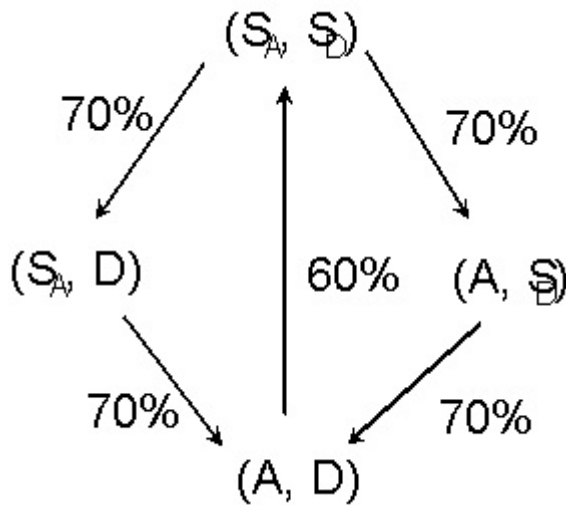
$$(A, S_D), (A, D), (S_A, S_D), (S_A, D)$$

Suppose that the two bills, to prohibit abortion and the to deregulate the economy, are voted upon separately and that everybody votes sincerely with no trading of some people’s votes on one bill in return for other people’s vote on a different bill. When preferences are as postulated above, both bills are destined to fail, with 30% of the legislature in favour and 70% opposed. The outcome is (S_A , S_D) which is the first preference of the moderates but is the next to last preference of both the free marketeers and the religious folk.

A better result for both religious folk and free marketeers (though much worse for the moderates) can be obtained by a bargain between them. The religious folk pledge to vote for

deregulation, and, in return, the free marketers pledge to vote to prohibit abortion. The deal causes both bills to pass with 60% of the vote, changing the overall result of voting from (S_A, S_D) which is third on both group's ordering to (A, D) which is second. Such deals are implicit in the formation of the platforms of political parties. The current alliance between God and money on what is commonly called "the right" has more to do with elections than with any natural affinity between them.

Figure 1: Contests between Combinations of Outcomes



The alliance between religious folk and free marketers is not the only possible alliance. A better deal for both moderates and the free marketers can be had by the former pledging to vote for D in return for the latter voting against A, yielding the outcome (S_A, D) . A similar deal is possible between religious folk and moderates. There is no telling which among these possible deals will actually be struck.

v) Many-faceted Public Policy: Consider the recent health care debate in the US Congress. Ultimately, a health care bill is to be voted up or down. Before that can happen, among other things,

- whether there is to be a public option

- the size of the tax, if any, on very expensive private health care plans
- whether insurance companies can refuse to cover pre-existing conditions
- the subsidization of the cost of health care for poor people
- taxation of people who choose not to take out health insurance
- an excise tax on the very wealthy to cover the extra cost of insuring the poor

The important consideration here is that an agreement on these matters must be struck before voting takes place, for there must be something definite to vote about. There must, in other words, be a large reconciliatory bargain. Health insurance is not unique in this respect. The committee system of the US Congress can be thought of as the source of reconciliatory bargains on a whole range of public policy, and there are comparable arrangements in every democratic society. [Shepsle and Weingast, (1981) and (1987)]

Formally, a reconciliatory bargain may be thought of as an agreement on a vector β of characteristics of public policy as exemplified by the list of components of a prospective health care bill, except that any actual list is very much longer and more complex. Each legislator i may be thought of as having a bifurcated utility function, with utility equal to U^i_0 if no bill is passed and to $U^i(\beta)$ if a bill with characteristics β is passed. In an up-or-down vote on a bill with characteristics β , the legislator i votes for the bill if and only if $U^i(\beta) > U^i_0$.

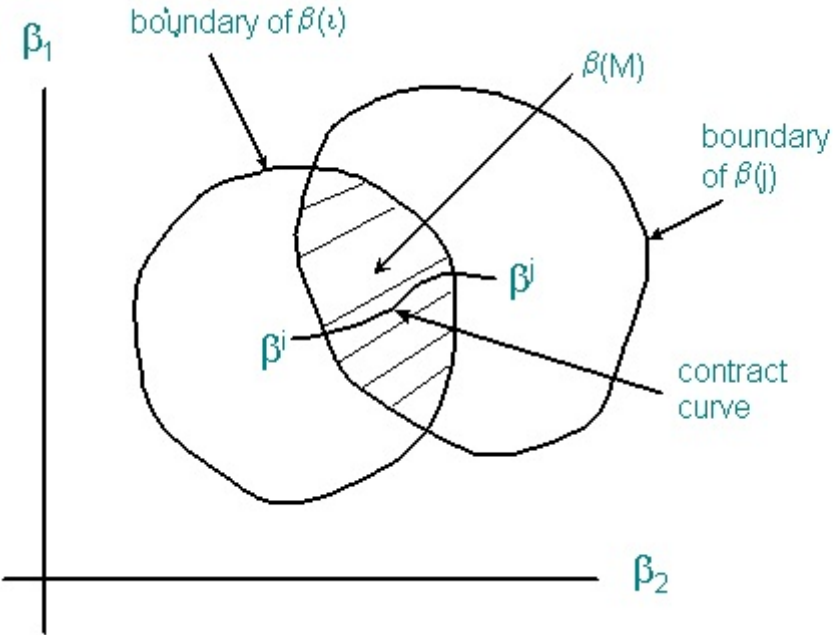
Now bargaining among legislators is required. For each legislator i , there is an approval set $\beta(i)$, a range of bills all preferred by legislator i to the status quo, and, within the approval set, there is one bill, β^i , that is preferred by legislator i to all others. Specifically, for any legislator i and any bill β , $U^i(\beta^i) \geq U^i(\beta)$, and $U^i(\beta) > U^i_0$ if and only if β lies within the set $\beta(i)$.

The approval set is empty for any legislator unalterably opposed to any bill regardless of β . For a bill to have any chance of passing, there must be a majority set, $\beta(M)$, such that, for any β within $\beta(M)$, at least half the legislators favour the bill and are prepared to vote for it. Any β within $\beta(M)$ must be contained in the approval sets of at least half of the legislators, but the set of legislators favouring the bill need not be the same for all values of β within the majority set.

The bargaining problem here is to select some value of β within $\beta(M)$, a value called β^* , so that there may be an up-or-down vote. Otherwise, voting would be indeterminate. This is the quintessential reconciliatory bargain.

The choice of β^* is illustrated in figure 2 for a two-dimensional bill in a three-person

legislature. The dimensions of the bill are called 1 and 2, so that β is a vector (β_1, β_2) . The three legislators are called i, j and k , among whom legislator k is unalterably opposed to the bill and legislators i and j are in favour as long as β is within their approval sets, $\beta(i)$ and $\beta(j)$, which



must overlap if any version of the bill is to be passed. The most preferred points of persons i and j are shown on the figure as β^i and β^j . If these points just happen to coincide, the value β^* would be chosen accordingly. Otherwise, legislators i and j might be expected to choose some β^* on the contract curve between β^i and β^j .

Figure 2: Bargaining About the Content of Legislation

The bargaining problem is to select a point on the contract curve in figure 2. It is common knowledge that such bargains are often struck, but there are exceptions. Occasionally, bargaining breaks down altogether. Equilibrium values, such as β^* , have been derived within formal models of bargaining, but, as mentioned in footnote 3, the designation of something as bargaining does not make it so.²³ The problem becomes more complicated when there are many voters with different approval sets of bills that are preferable to the status quo, and when there are more than two dimensions to β .

Once again, the bargaining problem is two-sided: who participates in a coalition with whom, and how do participants settle upon one of the many possible values of β all advantageous to every participant but where each participant has his own best value of β . In practice, such bargains are struck. How they are struck is not adequately explained in standard bargaining theory.²⁴

vi) The Allocation of the National Income among Voters: A group of N people is collectively entitled to a total income of Y that can only be appropriated once each person's income is assigned. Assignment of income is by majority rule voting, so that income is appropriated if and only if a majority of at least $(N + 1)/2$ people (when N is odd) can come to an agreement about what each person's income is to be. This regime of democratic communism is of interest not because it is representative of any society that we know, but, quite the reverse, because it is an outcome that actual democratic governments are designed to avoid.

Two well-known difficulties arise. The first, shared with the choice by voting of one

²³This point is elaborated in "Bargaining Unexplained".

²⁴Political scientists are well aware of this problem and profoundly disturbed by it. In the words of William Riker, "In the nineteenth century, economics was often called the "dismal science" largely because the equilibria predicted from price theory were not palatable to those who called it dismal. In what seems to me a deeper sense, however, politics is *the* dismal science because there are no fundamental equilibria to predict." Riker (1980, 433). On narrowing, if not eliminating, the range of bargaining within the legislature, see Shepsle and Weingast (1981).

among several mutually exclusive alternatives (item (ii) above) is the “paradox of voting”; as long as everybody acts self-interestedly, there is no allocation that cannot be defeated by some other allocation in a pair-wise vote. Consider a legislature of 5 people allocating 150 units among its members. The “fair” allocation $\{30, 30, 30, 30, 30\}$ can be overturned in a pair-wise vote by an unfair allocation, such as $(50, 50, 50, 0, 0)$, which in turn can be overturned by an allocation such as $(60, 0, 0, 45, 45)$, and so on ad infinitum. The paradox of voting is analytically similar in this context to the paradox of voting for one of several alternatives, but it is more pervasive and more extreme. There, a paradox of voting is a possibility that may or may not be realized, for preferences may easily be such that one alternative beats all others in a pair-wise vote. Here, the paradox of voting is universal, for no allocation can ever be superior to all the rest.

The other difficulty is more pernicious. Allocation of income by majority rule voting is subject to the “exploitation problem” that, when legislators can make binding deals among themselves, any majority coalition can appropriate the entire national income for itself, leaving nothing for anybody outside of the coalition. A majority of the poor may use the power of the vote to dispossess the rich completely. A majority of one religion may use the power of the vote to dispossess and deny rights to members of another religion. The ploy requires commitment, but it is feasible and it assigns the entire national income to whichever majority coalition is first to organize itself appropriately. Returning to our example of 5 people collectively entitled to an income of 150, any three people - for example, the first three - could make themselves better off than they would be under a “fair” allocation, $(30, 30, 30)$, by agreeing among themselves to vote against any allocation other than $(50, 50, 50, 0, 0)$.

The exploitation problem has been recognized for as long as people have speculated about politics, is the standard objection to democracy and must be dealt with in the design of democratic governments today. Throughout recorded history, thoughtful people have doubted whether democracy could ever be made to work.²⁵ Whatever its merits as an ideal, government by

²⁵In the Putney debates of 1647, Henry Ireton, a supporter of Oliver Cromwell, had this to say in defense of property qualifications on the right to vote: “... by the same right of nature (whatever that be) that you pretend... one man hath an equal right with another to the choosing of him that shall govern him - by the same right of nature, he hath the same equal right in any good he sees - meat, drink, clothes - to take of them for his sustenance....if this be allowed because by the right of nature we are free, we are equal, one man must have as much voice as another, then show me what step or difference there is why I may not by the same right take your property...” Woodhouse (1974). Every democracy must respond to Ireton’s challenge.

majority-rule voting was thought to be impossible in practice. Sooner or later, democracy would self-destruct. A majority of voters would employ its authority over the government and the army to deprive the corresponding minority of income, property and civil rights, redirecting income and privilege to members of the majority coalition and, in the end, eroding the willingness of citizens to accept the will of the majority peacefully. Anticipating its fate at the hands of its successors, an unpopular party in office might use the power of the state to squelch the opposition; better to rule tyrannically than to be dominated by a predatory majority in a democratic state. Recognition of a certain validity in the anti-democratic argument has led political theorists to search for constraints upon predatory voting and, more importantly, to design institutions that hold predatory majorities in check. Fear of predatory majorities was a central concern of the authors of the Constitution of the United States.

Two other voting contexts should be mentioned. Similar but not quite the same as the choice of parameters for public policy in item (v) above is the choice of platforms of political parties. Especially, but not exclusively, when legislators are selected by plurality (first-past-the-post) voting, the platforms of political parties are established by compromise among their different factions. One faction is concerned about language rights. Another faction is concerned about agricultural price supports. The party in which they are combined may be concerned with both, though perhaps with less enthusiasm than either faction alone. Compromise must be struck before the election so that voters know what they are voting for.

Closer to the allocation by voting of the national income in item (vi) is the choice of a cabinet under proportional representation or when no party commands a plurality in the legislature. Voting determines the numbers of legislators from the different parties, but no executive can be formed until an bargain is struck among a selection of parties which together command a majority in the legislature (or a minority coalition with a reasonable prospects of not being voted out of office immediately) allocating cabinet post among the parties in the governing coalition. Unless one party has a clear majority of the seats in the legislature, the composition of the Cabinet cannot be determined as the outcome of voting alone. Such compromise is regularly required in Israel, Germany and many other countries today.²⁶

²⁶A much studied proposition in political science is “Duverger’s law” on the political consequences of voting rules: First-past-the-post encourages the formation of just two political parties with broad platforms worked out in bargaining *before* the election, while proportional representation encourages the formation of many ideologically-narrow political parties that must be reconciled in bargaining *after* the election for the formation of the cabinet and of the policies of the government in office. See Riker (1982).

Promoting Reconciliatory Bargains and Discouraging Predatory Bargains

Reconciliatory bargaining within majority rule voting is fostered by subsidiary rules²⁷ and by delegation. Predatory bargaining is impeded by the insulation of majority rule voting from aspects of society that cannot be safely voted about and by the design of government to render bargains difficult, introducing what is in effect a benevolent inefficiency into government if and when predatory bargaining cannot be stopped altogether. Democracy is not just majority rule voting. It is voting surrounded by other institutions that fence off majority rule voting from domains of life where the exploitation of minorities by majority would destroy democracy itself. Democracy is defended, albeit imperfectly, against predatory bargaining by the rule of law, by private property, by the design of government and by the composition of society.

Subsidiary rules - the rules of parliamentary procedure - mandate a particular sequence of votes to ensure that voting is determinate, even though, as discussed above, the outcome of voting is not impervious to predatory bargaining.

The role of delegation can be illustrated in a variant of the example of the paradox of voting where three people, 1, 2 and 3, are voting to choose one of three options, A, B and C and where orders of preference are ABC for person 1, BCA for person 2 and CAB for person 3, so that each option can be defeated by some other option in a pair-wise vote. Add two more people, 4 and 5, and one more option, D. Option A can, once again, be thought of as the status quo, and options B, C and D can be thought of as three variants of a bill before the legislature. Persons 1,2 and 3 all prefer any of the three variants of the bill to the status quo, but they differ in their preferences among them; their orders of preference are respectively BCDA, CDBA and DBCA. Persons 4 and 5 have identical preferences; they prefer the status quo A, but are indifferent among B, C and D. Supporters of the bill must decide among themselves which version of the bill to adopt, knowing that whichever bill they agree upon will win 3-to-2 in the final vote. This is an instance of “many-sided public policy” where all alternatives are on an equal footing and where there is no obvious rule for deciding which variant of the bill should be supported. Delegation in this context is the

²⁷Subsidiary rules are often referred to as institutions. I am uncomfortable with this usage because “institution” can mean two very different things. It can refer to rules, but is sometimes used to designate organizations like corporations or the Bank of England. On the former usage see Riker (1980a). On the latter usage, see North, Wallis and Weingast (2009). No purpose is served by not keeping these meanings apart.

appointment of a representative of all the bill's supporters to choose whichever variant he thinks best.

Delegation may take many forms: The ancient Romans would appoint a dictator, typically for six months in a time of war, with absolute power during his tenure, and only held responsible for his actions when his tenure is up. A more modest delegation allows the Prime Minister to propose a version of a bill that is at least tolerable to the great majority of its supporters. A committee of Parliament, the Senate or the House of Representatives may be instructed to work out the details of a bill when it would be cumbersome or excessively time-consuming for the entire legislature to do so.²⁸ The risk in delegation is that the delegate may refuse to relinquish authority when it is time to do so. Both Maggie Thatcher and Tony Blair were easily divested of authority by their party caucus. The appointment of Hitler as Chancellor of Germany in 1933 is the classic example of delegation gone wrong. The ideal in delegation is to dispense with bargaining altogether, but the main objective of delegation may be achieved if bargaining is contracted to within a manageable scope.

There is little doubt that subsidiary rules and delegation are helpful or even necessary for the maintenance of government by majority rule voting which might otherwise break down in dissension and chaos. The question here is whether, between them, they are sufficient to dispense with bargaining altogether. The claim in this article is that they are not, that a core requirement for bargaining remains.

Rules and delegates must themselves be chosen. Bargains circumvented by rules or by delegation reemerge when rules or delegates are selected. To circumvent the paradox of voting, rules or delegates must in the end lead to the selection of A, B or C. Once this is recognized, the choice of rules or delegates becomes tantamount to the choice among options A, B and C. Bargaining required for the latter choice is required for the former as well. But there is a difference in timing. Once chosen, the rules of the legislature are typically in force for a long time during which many different bills are considered, so that legislators who may be unhappy with the effect of rules on some particular bill may be reluctant to change the rules because they want the rules to remain in force for many other bills to come. A particular rule might be advantageous over the long haul even though it is disadvantageous today.

Insulation of voting from what cannot be safely voted about is a part of the rationale for

²⁸On delegation in the US Congress see Kiewiet and McCubbins (1991)

civil rights.²⁹ Free speech, privacy and freedom from arbitrary imprisonment are surely valuable in their own right, but they are also valuable as a defense of majority rule voting, for democracy could not be sustained - no minority acquiescing peacefully to the decisions of the majority and no government in office willing to risk loss of office in an election - if a majority in Parliament could terrorize or punish the minority at will. The rule of law plays a similar role. A ban on ad hominem legislation and on unequal treatment by the courts places a limit upon what one stands to lose if one's party fails to win the election. Laws must not reward the supporters of the party in power or punish its enemies. Actual governments violate this principle to some extent, but gross violations place democracy in jeopardy.

Majority rule voting is also defended by the constitutional protection of private property. Like civil rights, property rights are valuable in themselves. The national income is very much larger, and citizens are very much more prosperous, when at least a significant proportion of the nation's property is privately owned than when the entire means of production is directed by the state. But efficiency is not the only virtue. Constitutional protection of property rights preserves people's willing to respect the results of an election by limiting what one stands to lose at the ballot box. Without secure property rights, predatory bargains would be too lucrative for the majority and too devastating for the minority. A majority in the legislature could impoverish the minority completely. No government would be prepared to risk loss of office in an election if its successor could not be trusted to respect the property of its supporters. Constitutional protection of property rights preserves democracy by drastically reducing the scope for predatory bargaining, allowing much less opportunity for exploitation because there is much less for legislators to bargain about. The exploitation problem would prove insurmountable and democracy would very soon self-destruct unless at least a substantial core of property is immune from expropriation. Not all capitalist societies are democracies, but all democracies are capitalist, at least to the extent of maintaining private ownership of a significant portion of the means of production.³⁰

Hence the prohibition in the Fifth Amendment of the Constitution of the United States against the taking of "private property... for public use without just compensation". Similar prohibitions are to be found in the constitutions of every other democratic country. There is much debate over how far the prohibition of taking without compensation should go, for virtually anything the government might do is beneficial to some people at the expense of others, and it is neither feasible nor desirable for the government to compensate the losers in each and every

²⁹"Insulation" as a requirement for democracy is discussed in Tilly (2007).

³⁰ On the logic of the connection between voting and capitalism, see Usher (1981).

public decision. In particular, an absolute constitutional prohibition of taking without compensation would block all redistribution of income from rich to poor. A line must be drawn between property rights and the right to vote. Pushing the line too far in either direction is likely to endanger the stability of majority rule voting.³¹

Disparities in peoples' incomes may be destructive, but are not necessarily so. Democracy is unlikely to withstand a bifurcation of society into distinct social classes, one very rich and the other very poor, for the poor would have every incentive to vote for the expropriation of the rich, while the rich in turn would have every incentive to abandon democracy to preserve their privileges. But, with a broad continuum of incomes, the distribution of income may be safely contracted by progressive income taxation. Unlike exploitation of the adherents of one religion by the adherents of another, progressive income taxation need pose no threat to democracy because there is a limit - well short of 100% - to how high a tax it would be in the interest of the poor to impose. The constraint is deadweight loss in taxation - through the trade-offs between labour and leisure, between consumption and investment, between tax payment and tax evasion - causing the tax base to shrink as the tax rate rises, and placing a ceiling on the tax rate it is in anybody's interest to impose. Deadweight loss in taxation supplements other impediments to bargaining in the preservation of democracy.³² A distinction can be drawn in this context between systematic redistribution from rich to poor and arbitrary expropriation of some people for the benefit of others. Systematic redistribution, as exemplified by the negative income tax, can be supportive of majority rule voting because there is a natural stopping point beyond which the median voter does not wish to go and because democracy may be threatened by excessive disparities between rich and poor .

The intensity of the exploitation problem is also reduced by cost-benefit analysis for public projects. Suppose each legislator represents a distinct constituency, each constituency has a pet project, a road for example, and all projects would be financed out of general tax revenue. Every legislator can then be expected to favour the project in his constituency but to oppose the

³¹For the absolutist position that all redistribution is a "taking" prohibited by the U.S. Constitution, see Epstein (1985).

³²The response to Ireton's challenge in footnote 10 is two-fold: that property rights may be constitutionally protected from total expropriation by the poor, and that there is a definite limit beyond which no majority of the poor would wish to redistribute property for fear of having more to lose from the corresponding reduction in the national income than it has to gain from the increase in its share.

projects in every other constituency, so that every project would be voted down in a sequence of votes for one project at a time. A deal might be then struck among a majority of legislators to undertake all projects in their constituencies, but to reject projects in other constituencies. To avoid predatory bargains of this sort, there may be a universal agreement to undertake all projects, or, alternatively when benefits of some projects exceed cost but benefits of others do not, to undertake all projects passing an efficiency test maximizing every constituency's expected gain in the long run.

Majority rule voting cannot be insulated from all contentious issues. Where interests of different groups conflict, where some degree of taking by majorities from minorities is unavoidable, and where the risk of predatory bargaining cannot be removed altogether without at the same time curtailing essential public services, the structure of government may be constitutionally mandated to create difficulties in passing bills without wide-spread support in the entire population. Democracy is defended from the worst of predatory bargaining by the design of government: by checks and balances inherent in the separation of powers among legislature, executive and judiciary as well as in the duplication of legislatures.

It is at least arguable that the separation of powers - between central and state governments and between the different houses of the legislature and among president, legislature and judiciary - is explicitly designed to make government inefficient by requiring consent among different branches of government if anything constructive is to be done. Constitutions of democratic countries are designed with bargaining as friction to stop governments from working too well. None of this would block a predatory majority if bargaining were as determinate and as costless as some of our bargaining models would suggest. The division of powers and the corresponding checks and balances supports democratic government because and only because bargaining is costly and indeterminate. The hope is that friction and indeterminacy in bargaining drive up the cost of exploitation by majority rule voting to the point where the manoeuvre is no longer advantageous.

Arbitrary actions by a narrow and perhaps unrepresentative majority in the legislature are also contained by the establishment of two legislatures with different representations in the population as a whole, the house of Commons and Senate in Canada, and the Senate and the House of Representatives in the United States. With two legislatures, a predatory majority in one may be thwarted by a different predatory majority in the other. To exploit their minorities, the two factions would need to compromise. That in itself may be difficult. If successful, it would be tantamount to the formation of a larger majority in society as a whole with a correspondingly

smaller minority and correspondingly smaller gains from exploitation. When each legislature represents the will of the people imperfectly and when a bare majority is sufficient to pass bills, a double majority is thought to be safer than a majority in one legislature alone.³³ The ideal in the design of public institutions is the creation of a “structural induced equilibrium”, a government so constrained by the separation of powers among legislature, executive and judiciary, by the delegation of authority to committees and by other means that there emerges a unique political outcome with no recourse to bargaining, an outcome comparable to the equilibrium of a competitive economy.³⁴

These considerations were of great concern to the authors of the American Constitution. In the words of Thomas Jefferson, “An elective despotism was not the government we fought for, but one which should not only be founded on free principles but in which the power of government should be so divided and balanced among the several bodies of magistracy, as so no one could transcend their legal limits, without being effectively checked and restrained by the others.” (Quoted in Madison, *The Federalist Papers* #48). “In the compound republic of America, the power surrendered by the people is first divided between two distinct governments, and then the portion allotted to each is subdivided among distinct and separate departments. Hence a double security arises to the rights of people. The different governments will control each other at the same time as it will be controlled by itself” (Madison, *The Federalist Papers* , #51).

Democracy may depend upon the composition of society in ways that have been recognized since the beginning of political theorizing in Ancient Greece. Predatory bargaining is easier in some types of society than in others. It is relatively easy in a societies composed of a few clearly-identified races, religions or tribes than in either a very diverse society or a society where people are much alike. Referring principally to democracies, Aristotle (1946, 210) wrote that a “state cannot be constructed from any chance body of persons....Most of the states that have admitted persons of another stock.... have been troubled by sedition...”. Voltaire (quoted in Gordon, 1999, 230.) observed that “If there were only one religion in England, we should have no fear of despotism; if there were two, they would cut each other’s throats; but there are thirty, and

³³In a review of the history of democracy from Ancient Athens until the present day, Gordon (1999) develops a case for the proposition that democracy can only be preserved when the potential for exploitation of minority by majority is constrained by countervailing power within the legislature and among the different branches of government.

³⁴Structure-induced equilibrium, along with other models of political equilibrium are discussed, very briefly, in the appendix.

live in peace and happiness”. In defense of the new American constitution, James Madison (1789, #51) observed that “Whilst all ...will be derived from, and dependant on the society, the society itself will be broken into many parts, interests and classes of citizens, that the rights of individuals, or of a minority, will be in little danger from interested combinations of the majority. ... security of civil rights...consists... in the multiplicity of interests and... in the multiplication of sects.” Any badge separating people into two distinct factions is potentially corruptive. Recognition of this danger is the basis for the separation of church and state in the Constitution of the United States. Rabushka and Shepsle, (1972), Chua (2003) and Mann (2005) have extended this line of reasoning to the study of ethnic cleansing.

Concluding Observation

Democratic politics is infused with bargaining in two very different ways: Bargaining is required to fill in the gaps when outcomes under the rules of parliamentary procedure are less than completely determinate. Bargaining is indispensable when, for instance, committees of the Senate and the House of representatives come together to forge a common bill in the event that two somewhat different bills on one and the same subject have been passed in the two houses of Congress, or when a political party forges a common platform out of the somewhat similar, somewhat different views of the party supporters. But bargaining is also an essential part of the process by which a majority in the legislature can employ the power of the vote to exploit the corresponding minority, directing to itself a disproportionate share of the national income and the fruits of office. A principal objective in the design of of constitutions for democratic government is to foster one aspect of bargaining and to thwart the other.

Government by majority rule voting is infused with bargaining and compromise in ways that other forms of government are not. The King issues commands that his subjects must obey. He alone appoints the cabinet. He alone chooses whether or not to reform health care and how the reformed health care system is designed. Officials appointed to design a program of health care reform must craft a program the king is prepared to accept, and he alone resolves disputes among them. It is under his authority that laws are established, modified or abolished. Actual monarchies today are typically half way between true monarchy and democracy. Stalin was even less constrained. There are limits beyond which subjects of king or dictator can be expected to rebel, but the need for accommodation and compromise is very much less than under democratic government with majority rule voting.

It was argued in the first article in this series Usher (2010a) that bargaining is indeterminate, with no plausible bargaining equilibrium comparable to the equilibrium in a competitive economy. This fundamental indeterminacy is inherited by majority rule voting. In other contexts, the indeterminacy of bargaining - the absence of a unique bargaining equilibrium - is unfortunate. In the context of voting, it is not, for compromise is at once necessary and potentially destructive. Democracy requires that people be able to compromise, but not too easily.

Appendix: The Escape from Bargaining to Equilibrium

This appendix is little more than a list of models that attempt, one way or another, to circumvent bargaining through the installation of a political equilibrium comparable to the equilibrium in the competitive economy. Of these attempts, all are successful in that conclusions flow from assumptions, all are dubious in that the assumptions are too far from bargaining as we know it to liberate majority rule voting from bargaining altogether, and all are useful in identifying forces or mechanisms that narrow the range within which bargaining is required, even perhaps to the point where residual bargains are manageable.

The natural starting point, historically and logically, is the *median voter theorem* yielding an equilibrium in pure voting when voters' preferences are single-peaked, when, for example, each voter's preferred tax rate is a decreasing function of that person's income. [Black, 1948)]. A similar outcome is guaranteed by the *probabilistic voting theorem* under much less promising circumstances. The probabilistic voting theorem circumvents the exploitation problem, guaranteeing a unique outcome, represented in the platforms of both of two competing political parties. The source of equilibrium is set of a concave votes-to-offers functions for each interest group in society, allowing political parties to maximize votes in the allocation of the national income among interest groups and leaving nothing whatsoever to bargain about. [Mueller, (2003), chapter 12]. The theorem has been criticized on the grounds that some groups might be excluded altogether, restoring the paradox of voting, [Usher, 1995] and that the required concavity in the groups' votes-to-income is artificial, [Kirchgassner, 2000].

Delegation is carried to its logical extreme, with no place left for bargaining, in the *citizen-candidate* models of Osborne and Slivinski (1996) and by Besley and Coate (1997). All citizens participate in the legislature, anybody can run for office, everybody's preference is common knowledge and whoever wins the election is expected to act in accordance with his own preference exclusively because no promise to act otherwise would be credible. The models differ in their assumptions about voters' preferences. In the Osborne and Slivinski, voting is about the choice of a parameter such as the rate in a negative income tax. In Besley and Coate, a wider range of options is allowed including the allocation among voters of the entire national income. For a dyspeptic critique of these models, see Usher (2005).

Containment of bargaining through the design of government is carried to its logical extreme in Shepsle and Weingast's model (1981 and 1987) of *structure induced equilibrium*, the principal example being the committee system in the US Congress designed to restrict the range

of options facing the House and Senate as a whole. A distinction need be drawn in this context between structural constraints that reduce the range of bargaining and structural constraints the eliminate the need for bargaining altogether. The title of Shepsle and Weingast's paper is "Structure-induced equilibrium and legislative choice." The word "equilibrium" might be replaced by the clumsy but more accurate phrase "reduction in the range over which bargaining is required for political outcomes to emerge", but the moral of the article would be preserved. See also Riker (1980a).

Appendix on Compromise vs Utilitarianism

Moralists tell us that there is something called “the good” or “the right” for society as a whole. Economists sometimes appeal to a notion of the common good, of social welfare as a measure of what is best everybody, the objective function of a benevolent dictator subject to whatever technical and social constraints there may be and expressed as a function of personal incomes,

$$W = W(y_1, y_2, \dots, y_N) \quad (A1)$$

where W is social welfare, y_i is the income of person i , and N is total population. Utilitarians define social welfare as the sum of every person’s utility, interpreting the injunction to seek “the greatest good for the greatest number” as a mandate to maximize that sum, transforming the general welfare function in equation (A1) into

$$W = \sum_{(i=1 \text{ to } N)} u_i \quad (A2)$$

where u_i is the utility of person i . Narrow definitions of social welfare and personal utility make them dependent on people’s incomes exclusively. Broad definition of social welfare and personal utility make them dependent on income together with whatever else makes people happy. Here, for convenience, the narrow definition are adopted.

So far in this paper, voters have been looked upon as strictly selfish. On that restriction, government by majority rule voting has an inextricable requirement for compromise if any determinate outcome is to be attained. The question in this appendix is whether the need for compromise persists when people vote not just in their own self-interest, but for what they see as the common good as well.

The answer to this question depends largely on whether people’s perceptions of the common good are the same. If everybody has exactly the same perception of the common good, there can be nothing on that score to compromise about. If each person has his own unique perception of the common good, then, though people’s perceptions may be similar, there is no less need for compromise about what is best for society than about what is best for oneself. It is argued here that the latter view is correct, that people differ in their perceptions of the common good and that differences must be reconciled in decision-making by majority rule voting.

The question becomes whether there is a universal social welfare function $W(y_1, y_2, \dots, y_N)$ which is the same for everybody, or whether each person i has his own unique social welfare function $W^i(y_1, y_2, \dots, y_N)$. Normally, all person-specific social welfare functions would be similar, so that, for example, a doubling of everybody's income would cause everybody's perceived social welfare to increase. But W^i and W^j would not be commensurate, and it would be meaningless to say that $W^i > W^j$ or vice versa.

Assume from here on that the social welfare function, W , is utilitarian in accordance with equation (A2), though that, in turn, will be clarified and modified in some respects as we proceed.

Plain self-interest would normally be people's principal concern in choosing which party to vote for, but people's perception of the common good must be relevant too, for the very notion of the common good would otherwise be vacuous. An ideal with no influence on people's actions is not an ideal at all. The millionaire socialist and the impoverished libertarian may be unusual, but they are not absent altogether. A person's utility of income function must therefore be of the general form

$$u_i = u^i(y_i, W_i) \tag{A3}$$

where u_i , y_i and W_i are person i 's utility, income and indicator of the common good, though y_i and W_i can be interpreted more broadly as whatever contributes to one's personal well-being apart from any concern for anybody else and as whatever serves to enhance the good of the community as person i sees it. But if everybody's measure of the common good, W_i , is the same, the subscript i becomes superfluous and W_i in equation (A3) can be replaced with one and the same W , transforming equation (A3) into the simpler utility function

$$u_i = u^i(y_i, W) \tag{A4}$$

Even with complete agreement about the form of W , there might still be disagreement about its importance. People might differ about the relative importance of social welfare and personal benefit. Some people may be very public-spirited. Others may be less so. Still others not at all. Each person has a "demand price" of W , an amount $\delta y_i / \delta W$ representing what that person is to pay to see W increased. Think of social welfare as a public good that may be larger or smaller depending on how much people are prepared to pay to augment it. If technical and social constraints gave rise to a single "supply price" p , the amount that everybody must pay to increase W by one unit, then every person i for whom $\delta y_i / \delta W > p$ would favour the increase in W and

everybody for whom $\delta y_i / \delta W < p$ would oppose it.³⁵ If W were determined by majority rule voting, and if the choice of W were all that people vote about, then the preference of the median voter would prevail. Otherwise, if concern for W had to be considered along with other matters, a degree of compromise might be required.

Differences in people's assessment of the content of the common good come to light on closer inspection of the utilitarian social welfare function in equation (A2). Four distinct difficulties may be identified, the first connected to the interpretation of u and the others connected to the interpretation of N .

- 1) The only precise measure of utility, a measure associated with risk aversion, yields no unique measure of W for society as a whole
- 2) People's concern for other people may be confined to sub-groups within the larger population or may extend beyond a single political entity to all or part of the population of the world
- 3) A distinction must be drawn between average and total welfare in any comparison between societies with different populations
- 4) There is no universally-accepted right way of weighting present and future lives

These problems will be discussed in turn with special reference to the question of whether social welfare, W , can reasonably be thought of as "the good" about which there can be no dispute, or as nothing more than a person's concern for others where people differ in their concern for others and where different people's concerns must be reconciled by voting or by compromise

³⁵ The supply price, p , is unlikely to be the same for everybody. Suppose i) the common good boils down to a combination of average income and the distribution of income, so that, the larger the average income and the narrower the distribution of income, the greater the common good, ii) the distribution of income can be narrowed by progressive taxation that reduces the average income as well, but in such a way that W is increased as long as the tax rate is not too high and iii) the variable y_i in equation (A4) is interpreted as net (post-tax, post-transfer) income. On these assumptions, there is a schedule of supply prices of W , negative for the poor (whose income is increased as W is increased), and rising steadily with income, but it is still the case that every person i for whom $\delta y_i / \delta W > p$ would favour the increase in W (now procured by an increase in the tax rate) and everybody for whom $\delta y_i / \delta W < p$ would oppose it. This is a standard proposition in public finance modified to allow for the possibility that not everybody is completely selfish.

in the formation of public policy.

To avoid unnecessary complications, it is convenient to adopt the schizophrenic assumption from the study of public finance that people's utility functions are dependent on personal income alone but that public decisions are made by a benevolent dictator who maximizes a social welfare function. People wear different hats in private and in public, a completely selfish hat in one context and a completely altruistic hat in the other. Thus, equation (A4) is contracted to

$$u_i = u^i(y_i) \quad (A5)$$

but the utilitarian objective in equation (A2) remains the same.

1) The measure of W in equation (A2) cannot be meaningful unless each person's utility, u_i , can be measured on a common scale. For some purpose, it might be sufficient to say that you recognize a person's degree of happiness when you see it, but something more objective would seem to be required to forestall the need for compromise among people who profess to see happiness differently. The only precise specification of which I am aware is the Von Neumann-Morgenstern measure of individual utility as a reflection of risk aversion³⁶. Essential properties of this measure of utility are that i) it is only defined up to a linear transformation, so that, if $u(y)$ is a satisfactory representation of a person's behaviour, then so too is $v(y)$ where $v(y) = Au(y) + B$ for any positive A and any B whatsoever, and ii) as seen by person i , the welfare in society α is greater than the welfare of society β if and only if person i , given the choice of entering either society with equal chances of occupying the circumstances (specifically, having the same income) of each person there, would choose to enter society α .

The difficulty with this measure of individual utility as a basis for a utilitarian social welfare is what to do when, as is almost surely the case, some people are more risk averse than

³⁶Imagine that a person's entire income might be determined in single gamble with a big prize of a large income, a little prize of a small income and a certain probability of winning the big prize. For any specified income in between, the person's utility of that income can then be defined as the probability of the big prize for which that person would be indifferent between the specified income as a sure thing and the outcome of the gamble. It can be shown that a person's utility of income function would be concave if and only if that person is risk averse, that utility is defined up to a linear transformation and that, given a choice between entering two societies with different distributions of income, the person would choose the society with the higher expected utility. This is the Von Neumann-Morgenstern measure from chapter 3 of *The Theory of Games and Economic Behaviour*, 1953.

others. There are two options, neither completely satisfactory. The first is to represent each u_i in the utilitarian measure of W in equation (A2) by person i 's own utility of income function in equation (A5) as measured by the Von-Neumann-Morgenstern procedure.³⁷ The principal difficulty with this procedure is that different utilities may be ascribed to people with the same income depending on their attitude toward risk; the utility ascribed to a risk neutral person would be higher than the utility ascribed to a risk averse person even when their incomes are the same. Social welfare as measured would be increased by public policy increasing the incomes of risk neutral people at the expense of risk averse people.

The other procedure is to appoint some person's utility function, or to choose some allegedly typical utility function, as representative of utility in the population as a whole. Then the measure of u_i in equation (A2) is replaced by the function $u^j(y_i)$ where y_i is the income of person i but where $u^j(y_i)$ is the utility of the representative person j as it would be if person j had the same income of person i . The difficulty here is that there is a different measure of social welfare, W^j , for each choice of the representative person j . Everybody has his own unique utilitarian social welfare function. That may not matter much in practice, but it does require compromise among people when some social welfare function has to be chosen as criterion for the choice of public policy.

2) Ignored so far is the scope of the community to which the social welfare function refers. The N in equation (A2) is the population of a given group of people, with no discussion of who those people might be, the implicit assumption being that they constitute the community in which voting takes place. In practice, concern for others may be restricted to a portion of the community or extended to people outside the community, geographically or in time. A union member may be especially concerned about the welfare of other union members. A devotee of some religion may be especially concerned about others of the same faith. Both may be prepared to sacrifice for the good of others in their class, but not for the good of people outside their class. For such people, the W in equation (A2) may be meaningful, but only when interpreted as the welfare of their own social class. In a society of such people - and which society is not? - compromise is no less of an ingredient in public decision-making by majority rule voting than in a society where everybody is strictly selfish, perhaps even more so.

The relevant community - the set of N people whose utilities are taken into account in

³⁷With reference to the Von Neumann-Morgenstern procedure as described in footnote 3, everybody's utility of income function would have to be defined with respect to the same big prize and the same little prize, so that everybody's measured utility lies between 0 and 1. Otherwise, different people's utilities would not be commensurate at all.

one's assessment of the common good in equation (A2) - may be extended from one's own country to other countries or to the entire world. There may be a graduated concern for others, most for one's immediate family, next for one's social class or close associates, then for people in one's own country, then for people in similar countries and last for everybody else. If so, there can be no unique society-wide measure of W. Everybody has his own version of the common good, and compromise is every bit as necessary for public decision-making about what is best for the community as in public decision-making where strictly selfish concerns must be reconciled. Compromise about the content of W is required.

Restricted concern for others may be represented by a modification of the utilitarian objective. For any person j, everybody else can be ordered in accordance with person j's degree of sympathy, and the utilitarian objective in equation (A2) can be transformed into

$$W^j = \sum_{(i = 1 \text{ to } 7 \text{ billion})} \delta_{ij} u^j(y_i) \quad (A6)$$

where W^j is social welfare as perceived by person j, $u^j(y_i)$ is the utility of person i as perceived by person j and δ_{ij} is the weighting that person j attaches to the utility of person i when everybody in the world is ordered in accordance to person j's concern for them, so that δ_{ij} remains constant or diminishes with every increase in i. If person j belongs to a country with million people and is equally concerned about all of his fellow citizens but about nobody else, then $\delta_{ij} = 1$ (or some positive number) for all i from 1 to 1 million, and $\delta_{ij} = 0$ for all $i > 1,000,000$. Concerns may be more finely graduated, higher for one's town or one's social class, next for one's province, next for the rest of one's country, and so on. Saints may be equally concerned about everybody. Ordinary people are not. The corresponding measure of social welfare may differ radically from one person to the next, and compromise is surely required in the choice of public policy.

3) Special problems arise in comparing the welfare of societies with different populations or in the choice among alternate policies for one society where the size of the population will be affected. A person may favour the maximization of total welfare, average welfare or a mixture of the two. The distinction is between "total utilitarianism" where the common good is measured by W in equation (A2) above "average utilitarianism" where the common good, W, is measure as

$$W = (1/n) \sum_{(i \in N)} u_i \quad (A7)$$

If the population is doubled without affecting the size or distribution of people's utilities, then total utility is doubled as well but average utility remains the same. Consider a choice between

society α with a small population of quite prosperous people and society β with a very large population of less prosperous people. Average utilitarianism picks the former; total utilitarianism picks the latter.³⁸ Notice, however, that the distinction between average and total utilitarianism is of no consequence unless populations differ because, with a given population, public policy that maximizes the one must automatically maximize the other. In comparisons among societies with different populations, people's valuations of the common good may be in accordance with either version of utilitarianism, so that, once again, there may be no escape from compromise in the determination of public policy

4) The contrast between average utilitarianism and total utilitarianism is most pronounced in the allowance for people yet unborn, especially, where the size of the population tomorrow may be affected by our actions today. Both versions of utilitarianism are open to the charge of being contrary to what most people see as good for society. Average utilitarianism would count a future world with no more than a dozen happy people as ethically superior to a future world with millions of somewhat less happy people. Total utilitarianism leads to the "repugnant conclusion" that a future with trillions of people just happy enough to be above the margin where one would be indifferent between life and death would be ethically superior to a society with millions of very happy people.³⁹ Total utilitarianism is normally interpreted as placing the same weight upon the life of a person who may or may not be born as on the life of someone who will definitely be born whatever we do today.

Unaccounted for in either variant of utilitarianism, is the probability of extinction as an independent concern. A person may not care much whether the world's population in the year 3000 is 10 billion or 10 million, but may care very much that the flame not be extinguished, that

³⁸It has been suggested by Ng (1986) that policy be designed to maximize a function $Wf(N)$ where W is average utility, N is population and f is a concave with a finite upper limit.

³⁹On "the repugnant conclusion", see Parfit [Derek Parfit, *Reasons and Persons*] 1984, chapter 17. Valuation of future lives is also discussed extensively in Broome [John Broome, *Weighing Lives*, 2004] and Blackerby, Bossert and Donaldson [Charley Blackorby, Walter Bossert and David Donaldson, *Population Issues in Social Choice Theory, Welfare Economics and Ethics*] 2005. Broome's book is an excellent relatively non-technical introduction to the subject. Himself a firm utilitarian, Broome succeeded in persuading me that I am not. A distinction must however be drawn between utilitarianism mandating the sum or average of people's utilities as the only valid ethical criterion and utilitarianism as mere consequentialism opposed to the designation of certain principles as right in themselves no matter what their consequences for people might be. I have no difficulty with the latter.

some recognizable human society be preserved. A person may prefer a future with a world population of a million people lasting for a thousand generations to a future with a billion equally happy people lasting for one generation only. Neither average nor total utilitarianism ranks one above the other, and the discounting of utils, which most utilitarians reject, would rank the latter as superior.⁴⁰

Or imagine that a meteorite will strike the earth and wipe out mankind completely in the year 2200, just as the dinosaurs were wiped out millions of years ago, unless a super rocket is dispatched to intercept and destroy the meteorite in the next year or two. The rocket is very expensive to produce and has no other use, but there is no doubt that it will save mankind and that we shall all be destroyed without it. The rocket would be financed by a world wide proportional income tax. The question for each person is, "What is the highest tax rate you would be prepared to pay - what portion of your current income would you give up now - to save mankind in the year 2200?" Interesting subsidiary questions are, "How much more would you prepared to pay if you knew the population of the world in the year 2200 would be 20 billion people than if you knew the population of the world would be 1 billion people, on the understanding that the circumstances of the average person and the prospects for mankind's continuance would be the same regardless of population?" "What if there were just a certain chance of extermination in the year 2200?"⁴¹

For such questions, a utilitarian criterion is almost meaningless, for there can be no weighting of present lives and future lives on the same scale. Nor, I suspect, would anybody be prepared to sacrifice twenty times as much to preserve the larger population as to preserve the smaller one. There is really no alternative but for each person to ask himself how much he cares about the distant future, and there is no basis for supposing that everybody's sense of what is right or good is the same. No general function substitutes for introspection of what one really values and there is no substitute for compromise when some yes-or-no public decision is inevitable.

⁴⁰The true W_i is the probability that "The Economic Prerequisite to Democracy" will still be read in the year 3000, a proposition with which all authors, *mutatis mutandis*, must surely agree.

⁴¹Broome (2004, page 44) considers such questions under the heading of "pattern goods", but it is not clear to me how he relates this to the weighting of lives. Parfit (1984, pages 453-4) states that "the destruction of mankind would be by far the greatest of all conceivable crimes", but then asserts that the "badness of this crime would lie in the vast reduction in the possible sum of happiness"

A utilitarian rule may facilitate compromise, especially in a country with a reasonably homogeneous population. Some compromise must be struck if laws, customs and morals are to be established at all. The utilitarian objective may serve as a focal point, as the best that one can reasonably hope for in practice and as appropriate for one's children in so far as one really does not know what station in society they will come to occupy. The more diverse a society and the sharper the divisions among social classes, the weaker a consensus on a utilitarian criterion is likely to be. Utilitarianism as compromise is very different from utilitarianism as a firm principle of "the good" or "the right".

It must be admitted that the biased utilitarian indicator of person j 's assessment of social welfare in equation (A6) appears, and to some extent is, undemocratic. On the one hand, if a person may vote selfishly, as people are commonly supposed to do, there is surely nothing wrong in voting with a degree of less-than-universal concern for others. On the other hand, the rules of democratic society must be impartial if democratic society is to work at all. Each of these views may be right in its own context. An impartial utilitarian criterion may be appropriate for the choice of constitutional rules promoting the greatest good not just for the greatest number, but for virtually everybody: the rule of law, everybody's right to vote, a right to privacy, and so on. Lurking in the background of the utilitarian objective in this context is a social contract among people who do not know at the time the contract is struck what part they are to play in the society to come.

Otherwise and beyond this limited sphere, each person has his own distinct view of the common good. People's sense of the common good may well differ about abortion, the death penalty, global warming, education, health care, foreign aid, redistribution of income, concern for people outside one's own country, provision for generations to come, and the appropriate weighting in public policy of concern for oneself and concern for others. .

With no impartial, universal and objective utilitarian criterion that can reasonably be identified as "the good", the best that can be hoped for is enough similarity and accommodation among people's views that a common policy can be forged by the usual combination of voting and compromise.

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