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THE PROBLEM OF EXTERNALITY*

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I. INTRODUCTION

ON the modern research agenda externalities occupy a rather prominent position. The increasing complexity of modern technology and society seems to create yet additional unwanted side effects that require classification on a lengthening list of externalities. However, externalities are of interest not only as current policy issues but also from a more theoretical point of view. Using Pigou's terminology, we say that when an externality is present there is a divergence between private and social cost. We interpret this to mean that when all voluntary contractual arrangements have been entered into by market transactors, there still remain some interactions that ought to be internalized but which the market forces left to themselves cannot cope with. This is the basis, for example, for the assertion of Buchanan and Stubblebine that "externality has been, and is, central to the neoclassical critique of market organization."¹ Without interference in the price mechanism, some transactions that would be beneficial are not carried out. Two conclusions follow: first, that since market forces by themselves are unable to eliminate the remaining inefficiencies, some government action is automatically necessitated; second, a conceptually feasible alternative to government action is that, through a suitable establishment of appropriate markets, economic agents can be made to take into account the side effects they generate.²

One may then inquire why market transactors are unable to make the emitter of an externality internalize the costs of his actions. The only reason why wealth-maximizing economic agents do not undertake these transactions must be that the cost of carrying out the actual transaction is greater

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¹ James M. Buchanan & W. C. Stubblebine, *Externality*, 29 *Economica* 371 (n.s. 1962).

² See, for example, Kenneth J. Arrow, *The Organization of Economic Activity: Issues Pertinent to the Choice of Market vs. Non-market Allocation*, in *Public Expenditure and Policy Analysis* 59-73 (Robert H. Haveman & Julius Margolis eds. 1970).

than the expected benefit. Ultimately, the relevance of externalities must lie in the fact that they indicate the presence of some transaction costs. For if there were no costs of transacting, then the potential Pareto improvement could be realized by costless bargaining between self-interested economic agents.³ Transaction costs are therefore a necessary condition for the persistence of unwanted effects from externalities, for with zero transaction costs side effects will be internalized and will not negatively affect resource allocation. The conclusion is thus unambiguous: in the theory of externalities, transaction costs are the root of all evil. But for transaction costs, such perversions of the invisible hand could not even occur much less persist.⁴

However straightforward this may seem, in contemporary literature there appear to be two radically different approaches to the problem of externalities, delineated from each other both by conflicting theoretical foundations and by the policy implications derived from them. On one hand, there is the modern welfare theory, based on general equilibrium analysis,

³ Calabresi puts this point nicely: "Thus if one assumes rationality, no transaction costs, and no legal impediment to bargaining, *all* misallocations of resources would be fully cured in the market by bargains. Far from surprising, this statement is tautological, at least if one accepts any of the various definitions of misallocation. These ultimately come down to a statement akin to the following: A misallocation exists when there is available a possible reallocation in which all of those who would lose from the reallocation could be fully compensated by those who would gain, and, at the end of this compensation process, there would still be someone who would be better off than before. . . . If people are rational, bargains are costless, and there are no legal impediments to bargains, transactions will *ex hypothesi* occur to the point where bargains can no longer improve the situation; to the point, in short of optimal resource allocation. We can, therefore, state as an axiom the proposition that all externalities can be internalized and all misallocations, even those created by legal structures, can be remedied by the market, except to the extent that transactions cost money or the structure itself creates some impediments to bargaining." Guido Calabresi, *Transaction Costs, Resource Allocation, and Liability Rules: A Comment*, 11 *J. Law & Econ.* 67, 68 (1968). Stigler's remark on this is worth repeating: "If this proposition strikes you as incredible on first hearing, join the club. The world of zero transaction costs turns out to be as strange as the physical world would be without friction. Monopolies would be compensated to act like competitors, and insurance companies would not exist." George J. Stigler, *The Law and Economics of Public Policy: A Plea to the Scholars*, 1 *J. Legal Stud.* 1, 12 (1972).

⁴ Francis M. Bator, *The Anatomy of Market Failure*, 72 *Q. J. Econ.* 351, 357 (1958), makes a distinction between three classes of market failure: externalities, monopoly, and public goods. It is therefore interesting to note that both monopoly and public goods can be treated as subcategories of externalities. Demsetz makes the following observation: "A world in which negotiating costs are zero is a world in which no monopolistic inefficiencies will be present, simply because the buyer and seller both can profit from negotiations that result in a reduction and elimination of inefficiencies." Harold Demsetz, *Why Regulate Utilities?*, 11 *J. Law & Econ.* 55, 61 (1968). Guido Calabresi, *supra* note 3, at 70, makes this same point: "Assuming no transaction costs, those who lose from the relative underproduction of monopolies could bribe the monopolists to produce more." The point is that the negative effects of monopolies occur because market power allows a producer to deviate from the competitive allocation, and the result is a lower level of satisfaction for consumers. This is an externality in consumption: the utility of the consumers is affected by the utility-maximizing behavior of the monopolist and transaction costs prevent a change in the activities of the monopolist. The case is the same with respect to public goods.

which attempts to evaluate actual economic performance by the measuring rod provided by the maximum welfare solution derived from a Walrasian general equilibrium system. On the other, there is the view of externalities, originating with the Coase theorem, according to which it is neither possible to identify the real source of an externality nor to establish uniquely the fact that there even is an externality if the possibility of bargaining and side payments is taken into account.

The task attempted in this paper is essentially twofold. First, although the role of transaction costs in the generation of externalities is well understood, no systematic analysis as yet exists of exactly what kinds of transaction costs are necessary to generate externalities. Thus, this paper will analyze the concept of transaction costs as it pertains specifically to externalities. Section II attempts a suitable classification of transaction costs, and Section III extends the analysis to the modern general equilibrium approach to externalities. Two major conclusions emerge: first, that it is not possible to specify any class of transaction costs that—given individual wealth-maximizing behavior under well-specified constraints that include exchange costs—generate externalities that constitute deviations from an *attainable* optimum; second, that the concept of externalities—insofar as the word is intended to connote, as Buchanan and Stubblebine would have it, the existence of an analytically proven market failure—is void of any positive content but, on the contrary, simply constitutes a normative judgment about the role of government and the ability of markets to establish mutually beneficial exchanges. That is to say, it cannot be shown with purely conceptual analysis that markets do not handle externalities: any such assertion necessitates an *assumption* that the government can do better. That this assumption is valid cannot be proved analytically, and it follows that market failure is an essentially normative judgment.

The second task attempted in this paper is to draw the conclusions implicit in the analysis of Section III about the relationship between the Coase theory of externalities and the standard Pigou tradition. A widespread misconception exists that the Coase analysis implies that no government policy is desirable and that the Pigou tradition shows the optimality of certain taxes. It is shown in Section IV that, if the implications of individual wealth maximization under known constraints are drawn correctly, it is really the Pigou tradition that logically suggests no policy, whereas the Coase analysis does give rise to positive suggestions which could assign an important role to the government.

II. TRANSACTION COSTS AND EXTERNALITIES

In view of the crucial role of transaction costs in generating externalities, it is remarkable that no systematic analysis exists of the nature of transaction

costs. In recent years the concept has achieved a rather prominent place. On the one hand, it has become a catch-all phrase for unspecified interferences with the price mechanism; on the other, it has been shown that an understanding of this concept is necessary for the foundations of monetary theory.⁵ In current literature there appear to be three possible interpretations of the nature of transaction costs: the immediate question is if any or all of these interpretations generate externalities as deviations from an otherwise attainable optimum. We proceed by assuming the existence of some side effects, namely, a difference between social and private costs, and ask what sort of transaction costs are consistent with the origination and perpetuation of this situation.

The perhaps most common notion of transaction costs among mathematical economists is one which is comparatively simple to handle with mathematical tools: a fixed proportion of whatever is being traded is assumed to disappear in the transaction itself.⁶ This idea is then employed to show that a specific medium of exchange may have lower transaction costs than any other good in the economy so that a smaller amount of real resources is consumed in the exchange process by switching from barter to money.

What is noteworthy about this concept of transaction costs is that in no significant way does it differ from a regular transportation cost. In the process of moving resources from one location to another—in this particular context from one person to another—a certain amount of the goods to be traded is used up. The conditions that are put on transaction costs, in order to prove existence of a transaction-cost-constrained equilibrium, are then just the same as those normally put on transportation costs: a well-defined convex production set is assumed. Just as self-interested individuals will select the cheapest mode of transportation, it is possible to show that they may choose to use a medium of exchange as an alternative to barter if less resources are used as a consequence. It is difficult to see, however, that anything significant is added to the traditional treatment of transportation costs in the already existing literature: the strictly proportional costs of transaction convey nothing of significance that is not already known from earlier analysis. The specific application to money is new, and that is all.

⁵ This was brought to the attention of modern eyes by Robert W. Clower, *Foundations of Monetary Theory*, reprinted in *Monetary Theory*, (Robert W. Clower ed. 1969), and his introduction to the same.

⁶ See, for example, Duncan K. Foley, *Economic Equilibrium with Costly Marketing*, 2 *J. Econ. Theory* 276 (1970); F. Hahn, *On Transaction Costs, Inessential Sequence Economies, and Money*, 40 *Rev. Econ. Stud.* 449 (1973); Mordecai Kurz, *Equilibrium with Transaction Costs and Money in a Single Market Exchange*, 7 *J. Econ. Theory* 418 (1974); Jürg Niehans, *Money and Barter in General Equilibrium with Transactions Costs*, 61 *Am. Econ. Rev.* 773 (1971); *id.*, *Interest and Credit in General Equilibrium with Transactions Costs*, 65 *Am. Econ. Rev.* 548 (1975).

Furthermore, it is difficult to see in what significant way ordinary transportation costs or proportional transaction costs differ from regular costs of production. Moving resources from one location to another or from one person to another will presumably only be done if there is a net increase in the evaluation of the resources at the two different locations. Fundamentally, therefore, both transportation costs and proportional transaction costs are productive in precisely the same way that resources used up in the physical transformation of inputs into outputs are productive—indeed, they could be treated in an identical manner with no loss of information. All that is required is to interpret an exchange as a productive activity requiring certain resources in a specified technological relationship.

Can this notion of transaction costs be shown to generate externalities as well as be a medium of exchange? Consider a simple example: a steel producer generates smoke that fouls the drying linen of a neighboring laundry owner. The laundry owner knows the costs of transacting with the steel producer to make him reduce the smoke outpour, and these costs stand in direct proportion to the amount of smoke reduction desired or, what is the same thing, to the value of the clean laundry the owner estimates he will get from the smoke reduction. Clearly, if these costs are lower than the expected benefits the smoke output will be reduced, otherwise not. Suppose it is not: the laundry owner endures the smoke. Is this a Pareto-relevant externality?⁷ Clearly not, for the equilibrium that is reached is already a Pareto optimum—it is too costly to bargain for a reduction of the smoke, and hence the market participants and society are better off if the smoke is left to soil the laundry. This conclusion is unaffected by the problems of small or large number cases: in principle, it does not matter if we talk about the costs of eliminating the smog in the Los Angeles basin, for example. If it is too costly for the smog breathers to pay the smog creators to reduce their emissions, then the observed amount of smog is quite clearly consistent with a Pareto optimum. Hence, we must conclude that, if transaction costs are well known to the agents involved and strictly proportional to the value of the transaction, there will be no externalities in the sense of a deviation from an optimum. Proportional transaction costs do not generate Pareto-relevant externalities, but only the trivial Pareto-irrelevant variety.

The second version of the notion of transaction costs employed in modern literature is one which is conceptually equal in simplicity to the fixed-proportions variety, but one which is more tricky to handle mathematically.

⁷ James M. Buchanan & W. C. Stubblebine, *supra* note 1, make this distinction between Pareto-relevant and Pareto-irrelevant externalities. With the latter they understand side effects that are too costly to remove. They also assert that the modern treatment of externalities is concerned with Pareto-relevant externalities, namely, side effects that can be shown to be removed at a net positive benefit for society.

It concerns the idea that a trade may be costless to carry through, but may still require resources to organize: there may be setup costs associated with each exchange. Such a cost is no longer proportional to the trade itself, but is a fixed cost which is independent of the amount to be exchanged. This introduces an important nonconvexity, and havoc is wrought with existence and uniqueness proofs. In dealing with this, mathematical economists have been forced to resort to radical measures. One such measure⁸ consists of taking the closed convex hull of the nonconvex set and replacing the problematic nonconvexity with its closest approximation of a well-behaved convex set according to some specified measure. It can then be shown that, if the new convexified set does not differ substantially from the nonconvex one, there will exist an approximate equilibrium in spite of the nonconvexity, and markets will clear except for a negligible fraction. It follows that the resource misallocations resulting from such setup costs are small if the nonconvexities are small in relation to the size of the economy.⁹

Several observations are in order. Although it is nice to know that a problem can be ignored if its consequences are insignificant, it is not clear that this is relevant with respect to fixed setup costs—in fact, mathematical economists would seem to agree on the point that such costs are of great importance. The fact that present mathematical techniques make it impossible to handle this version of the transaction-cost concept does not appear to be of any earth-shattering significance: the economics profession has shown itself quite content with this state of affairs for a long time. For it is difficult to see any significant difference between the setup cost of an exchange, called a transaction cost, and the setup cost of the basic unit of production, or the fixed cost of the firm.¹⁰ We have known for a long time that such fixed costs are inconsistent with available existence proofs, and have reconciled ourselves to looking away from the problem of the indeterminate firm size in general equilibrium theory, while retaining the notion of fixed costs in partial equilibrium analysis. Furthermore, the parallel to the fixed cost in production theory points to the significant observation that the fixed setup cost of an exchange is not really fixed at all. Just as the firm can choose any level of its fixed costs, so may the individual transactor choose between different trades with different setup costs—that is, the fixed cost in any trade is really en-

⁸ As proposed by Walter Perrin Heller, *Transactions with Set-Up Costs*, 4 *J. Econ. Theory* 465 (1972).

⁹ Although it is possible to give a precise mathematical meaning to the phrase “small in relation to the economy,” this has no operational interpretation. Thus we cannot turn to mathematical economists to tell us if setup costs can be neglected in determining policy towards externalities in modern capitalistic economies, for example.

¹⁰ See Jack Hirshleifer, *Price Theory and Applications* 254-58 (1976), for an elaboration on this theme.

dogenously determined as a known and adjusted cost of "producing" the exchange. There is already a well-developed body of economic doctrine that can be brought to bear on this problem, and the difficulties involved seem to concern the limitations of present mathematical techniques rather than the logic of economic ideas.

Can this version of the transaction-cost concept be used to account for the presence of externalities? If an externality exists between two agents but it would cost too much in terms of resources to set up the transaction between them that would make the emitter internalize the costs of the side effects of his actions, then it follows that the externality is a Pareto-irrelevant one. Reverting once again to the simplistic example of the laundry and the steel producer, this means that if it costs the laundry owner too much to get the steel manufacturer to reduce his emissions, he will rather endure the smoke. Again, this is a conclusion that is unaffected by the number of transactors involved. If it costs smog breathers too much to set up the exchange that induces the emitters to reduce the outpour of pollutants, then it follows necessarily that, the funny smell notwithstanding, the optimal level of pollution has been achieved.

Neither of these definitions of transaction costs is then consistent with our accepted ideas of what is to be understood by externalities. However, there is a third line of thought on transaction costs which may be found in Coase's definition:

In order to carry out a market transaction it is necessary to discover who it is that one wishes to deal with, to inform people that one wishes to deal and on what terms, to conduct negotiations leading up to a bargain, to draw up the contract, to undertake the inspection needed to make sure that the terms of the contract are being observed, and so on.¹¹

Since it would appear that this definition is even more difficult to handle with mathematical tools than the previous one, it is consequently no surprise that this notion is prevalent among nonmathematical writers—notably those who treat issues in law and economics.

It is necessary to take the definition of transaction costs by Coase a little further. A natural classification of transaction costs consistent with his definition can be obtained from the different phases of the exchange process itself. In order for an exchange between two parties to be set up it is necessary that the two search each other out, which is costly in terms of time and resources. If the search is successful and the parties make contact they must inform each other of the exchange opportunity that may be present, and the conveying of such information will again require resources. If there are

¹¹ R. H. Coase, *The Problem of Social Cost*, 3 *J. Law & Econ.* 1, 15 (1960).

several economic agents on either side of the potential bargain to be struck, some costs of decision making will be incurred before the terms of trade can be decided on. Often such agreeable terms can only be determined after costly bargaining between the parties involved. After the trade has been decided on, there will be the costs of policing and monitoring the other party to see that his obligations are carried out as determined by the terms of the contract, and of enforcing the agreement reached. These, then, represent the first approximation to a workable concept of transaction costs: search and information costs, bargaining and decision costs, policing and enforcement costs.

Yet, this functional taxonomy of different transaction costs is unnecessarily elaborate: fundamentally, the three classes reduce to a single one—for they all have in common that they represent resource losses due to lack of information. Both search and information costs owe their existence to imperfect information about the existence and location of trading opportunities or about the quality or other characteristics of items available for trade. The case is the same for bargaining and decision costs: these represent resources spent in finding out the desire of economic agents to participate in trading at certain prices and conditions. What is being revealed in a bargaining situation is information about willingness to trade on certain conditions, and decision costs are resources spent in determining whether the terms of the trade are mutually agreeable. Policing and enforcement costs are incurred because there is lack of knowledge as to whether one (or both) of the parties involved in the agreement will violate his part of the bargain: if there were adequate foreknowledge on his part, these costs could be avoided by contractual stipulations or by declining to trade with agents who would be known to avoid fulfilling their obligations. Therefore, it is really necessary to talk only about one type of transaction cost: resource losses incurred due to imperfect information.

In the modern treatment of uncertainty, the individual is considered to associate his uncertain choice variables with a subjective probability distribution, described by its mean and variance, over all possible states of the world. This treatment of the problem then presupposes that the individual agent has stable probability estimates of finding someone to trade with, of that person being costly to bargain with, of that party being inclined to cheat on the terms of the agreement. In the case of externalities this implies that some unwanted side effects remain because of the uncertainty associated with undertaking the transaction that would eliminate them.

Reverting to our simple laundry-smoke example, the laundry owner in deciding whether to transact with the smoke emitter to curtail his outpour may not be certain about the costs of doing so. We may then envision four cases, defined according to whether the laundry owner (i) has correct or

incorrect subjective probability estimates,¹² and (ii) decides to endure or transact away the smoke. This can be illustrated as in Table 1.

TABLE 1

		Expectations	
		Correct	Incorrect
Smoke	Reduced	I	III
	Endured	II	IV

In case I, the laundry owner correctly anticipates the costs of bargaining to be low enough for him to gain from reducing the smoke outpour from the steel mill: the externality becomes internalized by the steel operator. In case II, he correctly anticipates the cost of smoke reduction would be too high: he thus lives with the smoke. The externality is now internalized by the laundry operator, and there is no inoptimality problem. In case III, the laundry owner decides to bargain for reduction in smoke outpour but finds in the process of bargaining and policing the agreement that it cost him too much to do so.¹³ In case IV, he decides to live with the smoke in the belief that it would cost too much to reduce it but is incorrect: he would have gained from reducing it in view of the costs of transacting with the steel operator.

We have already noted that in cases I and II there is no Pareto-relevant externality remaining; the question remains whether there is one in cases III and IV. In case number III there is obviously no Pareto-relevant side effect remaining; on the contrary, there is too little smoke. The laundry owner lost by having the smoke reduced, so total income is lower in case III than it would have been if the smoke had been endured. In case IV, however, the laundry owner should have bargained for a reduction in smoke outpour but failed to do so. This is then the only case that can qualify as a potential externality.

From the point of view of the laundry owner, it would not appear that it is a mistake to endure the smoke: given the information that he has at his disposal, he performs his constrained optimization and does nothing. His information is incomplete or wrong, so he makes the wrong decision: given the correct information there is a loss of income from the enduring of the smoke, and the situation looks very much like what we associate with an

¹² Strictly speaking, there can be no "correct" or "incorrect" probability estimates when probabilities are purely subjective, but only when there is some objective "truth" that can be ascertained. With correct probability estimates we may then understand stable rather than changing subjective estimates.

¹³ For obvious reasons, we may disregard the alternative possibility of the actual costs being lower than the expected.

externality. Yet that interpretation is fundamentally incorrect, for, with the information that the laundry owner has at his disposal when he makes the decision, he decides correctly, as constrained optimization procedures would have it. It is only later that he may realize that he has made a mistake, in view of additional information that was not available at the time. This can be regarded as an externality only if you assume that "he should have known better" or that there is someone else who does know better. This issue will be dealt with in the next section.

In summary, it would seem, then, that no kind of known transaction costs can possibly generate anything looking like a Pareto-relevant externality. Once the logical implications of bargaining under transaction costs are fully accepted, it is seen that all existing side effects are internalized one way or the other. An assertion that externalities represent a deviation from an optimal allocation of resources then implies that the analyst considers himself in possession of superior information than what is available to market transactors: he knows the "true" probabilities, as it were. The issue of whether an alternative and improved allocation of resources exists is then seen to hinge on whether there is available relevant information about better alternatives.

III. PARETO OPTIMALITY AND EXTERNALITIES

From a doctrinal standpoint, it would seem to be consistent with the treatments of Marshall and Pigou, the originators of the concept of externality, to conduct the analysis within a strict partial equilibrium context. Yet, in modern treatises, partial equilibrium analysis is not the normal methodology for dealing with externalities. "We are all Walrasians now" almost anybody from outside the University of Chicago might be expected to say with a confident smile on his face.

Exactly how the partial equilibrium approach to externalities came to be grafted on to the trunk of the general equilibrium tree as a branch of its own is an interesting story that will not be pursued here. It might be conjectured that the demise of the social welfare function had something to do with it: for to understand the distinction between social and private cost it is easy to refer to such a function. That is to say, whenever private agents do not take into account the greater social implications of their actions, we may conceive of a loss of social welfare. But we were told that it was not possible even under reasonable conditions to use that notion, and instead we have resorted to the Pareto optimum of the general equilibrium system as our point of reference for discussing the welfare problems associated with externalities. It is of course possible that social cost in the mind of Pigou is the solution to an appropriately constructed Walrasian model, although this has not been shown. However that may be, for modern purposes it is agreed that the

negative effects of externalities are associated with the Pareto optimum as a measuring rod.

The impact of externalities is then shown in the following rather simplistic manner. First, assume a general equilibrium system with appropriate shapes of production and utility functions, one that for every initial endowment yields a unique general equilibrium price vector (call that Model I). Given the distribution of resource ownership in our world, this methodology allows us to conceptualize one Pareto-optimal solution, and only one. Secondly, into this system, introduce externalities, and let the auctioneer grind out the new equilibrium price vector (call that Model II). In general, this vector, and its associated equilibrium allocation of resources, will be different from that of Model I. Hence it follows that externalities imply that the Pareto optimum of Model I is not attained.

This is the positive methodology of modern welfare theory. The only normative judgments that appear to be involved in the conclusion that externalities ought to be eliminated are the ones generally accepted by the economics science that (i) individual preferences alone matter and (ii) the notion of Pareto optimality is at least inoffensive from an ethical standpoint. Given this, we can show that externalities unambiguously imply a distortion.

However, there is also one more strong implication of the analysis: private contracting in markets will not lead to the elimination of the negative influences of externalities. This follows from the simple fact that the allocation in Model II above is different from that of Model I. Hence the policy implication: government intervention is necessary to correct the failure of the market forces. Again, this is thought to be an essentially positive conclusion, void of any judgments as to the proper role of government in a free society.

We may now inquire into the role of transaction costs in this framework. It can then be seen that Model II above, the one with externalities, must contain some transaction costs, for otherwise the Walrasian auctioneer would help self-interested economic agents bargain away the negative effects of the externality. On the other hand, Model I cannot contain any transaction costs, for it is a description of a situation in which no externalities exist and a Pareto optimum is reached. Indeed, we may state that the failure of Model II to be an optimum is due to the presence of transaction costs. Thus it can be seen that the policy implication that the government must intervene rests on the implicit comparison of a world with transaction costs with one with zero transaction costs.

The literature on welfare economics abounds with examples of the use of this methodology. For example, the gauge for measuring monopoly problems is the world of perfect competition, that is, implicitly, the Pareto optimum of a suitable Walrasian framework, or Model I above. In the interna-

tional trade literature, various distortions are measured as against this same point of reference. Signaling theory asserts that, relative to a world in which information is perfect, our world is suboptimal.¹⁴ In judging the ability of markets to handle the public-goods aspect of information, various authors use as a point of reference a world in which information is a perfectly private good, that is, one in which there are no costs of making users of information pay its value in use.¹⁵ And, naturally, this is the basis for the proof of the optimality of the Pigovian tax rules: they can be shown to establish the resource allocation that would rule in a world of perfect information.¹⁶

However, it is far from obvious that the point of reference for the misallocation effects of externalities and other distortions ought to be Model I (that is, the Pareto optimum of the Walrasian model with zero transaction costs), for it is a rather well-known fact that the world in which we live is plagued with various kinds of transaction costs. Transfer and setup costs are sometimes observed, and bargaining, decision, and policing costs have been known to enter into private contracting and exchange. It is clear, of course, but of no particular consequence for externality problems, that it would be desirable to reduce such transaction costs, of whatever kind, preferably to zero if that were possible, just as it would be desirable to decrease costs of production in a firm.¹⁷ Surely there must be something more of substance in the reference to the Pareto optimum.

Given the actual costs of transacting observed in our world, the immediate problem is whether we should include such costs in the constraints that specify the Pareto optimal solution from which we measure the distortions due to externalities. There are at least two substantive arguments why this would be a correct approach. The first is given by Buchanan and Stubblebine: not all externalities are Pareto relevant.¹⁸ This implies that in the Pareto optimum not all externalities, whether marginal or inframarginal, should be reduced to zero: we are better off keeping some of them at a

¹⁴ See for example, Kenneth J. Arrow, Higher Education as a Filter, 2 J. Public Econ. 193 (1973); or A. Michael Spence, Market Signaling Theory (1974).

¹⁵ As in, for example, Kenneth J. Arrow, Economic Welfare and the Allocation of Resources for Invention, in *The Rate and Direction of Inventive Activity: Social and Economic Factors* (Nat'l Bureau Econ. Res. 1962). Or similarly, Jack Hirshleifer, *The Private and Social Value of Information and the Reward to Inventive Activity*, 61 Am. Econ. Rev. 561 (1971).

¹⁶ For a recent proof of this proposition, see the lucid exposition of William J. Baumol & Wallace E. Oates, *The Theory of Environmental Policy* (1975).

¹⁷ This is much like stating that a world in which apples are costly to produce is inoptimal compared to one in which apples are a free good. While obviously true, this observation cannot serve as a foundation for any decisions on resource allocation in the apple industry. Or to take a different simile, it is as though a transportation economist who is asked to calculate the optimal fare structure for a railroad company operating between Los Angeles and New York would say: suppose transportation costs did not exist.

¹⁸ James M. Buchanan & W. C. Stubblebine, *supra* note 1, at 375-76.

positive level. This is not the case in Model I above: in the perfectly competitive solution to a Walrasian model, all side effects are either internalized or eliminated. But the simple fact is that, if there are costs of transacting present in our world, then it may be too costly to eliminate all externalities, so we should preserve some of them in order to reach an optimum. Hence, as a suitable reference point, we ought to use a transaction-cost-constrained model that describes the relevant and attainable optimum, not the irrelevant and unattainable solution to a model with zero transaction costs. The second argument why we ought not to use the world of zero transaction costs as a frame of reference is given by Demsetz in a critique of that particular methodology in Arrow's discussion of the public-goods problems associated with inventions.¹⁹ The point is that it is a logical fallacy to use as a frame of reference a world in which transaction costs are zero, for that world is unattainable, given human behavior in our world. Since it is unattainable, it is clearly incorrect to use it as a frame of reference in judging the welfare implications of actions in our own world with its inherent and unavoidable transaction costs.

Both these arguments are compelling, and they have important consequences for all welfare judgments in economics. If we include costs of transacting in the constraints that describe the conditions under which economic agents perform their individual wealth maximization, we would then describe an attainable optimum, and this is the one we should use in judging optimality and welfare problems. The immediate question is then in what way this alternative, transaction-cost-constrained equilibrium differs from Model II above. The answer is of course that they would not differ in any way, for Model II is precisely the one that describes the allocation of resources in our present world with its attendant transaction costs. This then, ought to be the attainable optimum that we should strive to achieve. However, that description also contains whatever externalities are observed in the real world. It would seem that if side effects persist they must be of the Pareto-irrelevant variety, for otherwise they would not be observed but transacted away by self-interested economic agents.

The conclusion, unpalatable to many economists, would seem to be that if it exists it must be optimal, and if it does not exist it is because it is too costly, so that is optimal too. If you do not like the smell of the air, seek comfort in

¹⁹ Harold Demsetz, *Information and Efficiency: Another Viewpoint*, 12 *J. Law & Econ.* 1 (1969). Demsetz's comment is on the article on inventive activity by Arrow, cited in note 15 *supra*. In showing that Arrow commits the fallacy of skipping from a world of zero transaction costs, where he derives his theorems, to a world of positive transaction costs, where he (incorrectly) applies these results, Demsetz accuses Arrow of "three logical fallacies—the *grass is always greener fallacy*, the *fallacy of the free lunch*, and the *people could be different fallacy*." *Id.* at 2.

the knowledge that it would cost you more than it is worth to you to do away with the stench, for, otherwise, would you not do it? Again, the conclusion is the same whether we talk about large or small number cases—the only difference being that in the former case we introduce an important setup cost of the group of bargainers on one side of the market, or both. Conceptually, the problem is the same: if it is too costly to eliminate, the side effect is optimal. If we include transaction costs in the constraints, this appears to be the unavoidable conundrum we end up in: externalities are irrelevant, monopoly problems do not exist, public goods present no difficulties, and so on.²⁰

This conclusion seems inherent in the methodology of the general equilibrium treatment: the point of the paradigm is to establish the conditions under which a system of markets can reach equilibrium simultaneously in all markets. Once the constraints in the form of tastes, technology, endowments, information, costs of transacting, and so forth, all have been suitably specified, the logic of the framework leads to a description of a Pareto optimal equilibrium (if it exists). If the constraints describe our world, then we must conclude that the world is optimal relative to those constraints. The very conceptual framework of the model would seem to make it singularly unsuited for treating welfare and optimality problems.

It is difficult to see, then, how it is possible to prove analytically that the presence of externalities imply welfare problems. Once we realize that externalities can remain uninternalized only if there are costs of transacting, and once we include such costs in the constraints on individual and government behavior, then we cannot show that there are any deviations from an attainable optimum. It is possible, of course, to assert or assume that people will not take into account the greater good of their personal actions. As a matter of fact, this is what is normally done in the welfare literature: the divergence between private and social cost is never proved to exist, but always *initially assumed* to exist. Thus, for example, Pigou:

The essence of the matter is that one person, A, in the course of rendering services, for which payment is made, to a second person, B, incidentally also renders services or disservices to other persons (not producers of like services) of such a sort *that payment cannot be exacted from the benefited parties or compensation enforced on behalf of the injured parties.*²¹

Pigou here simply *assumes* that the costs of exacting compensating payments exceed the benefits, but he does not prove that there is a good reason for

²⁰ For an enjoyable elaboration around this theme, see E. J. Mishan, *Pangloss on Pollution*, 73 *Swedish J. Econ.* 113 (1971).

²¹ A. C. Pigou, *The Economics of Welfare* 183 (4th ed. 1928).

assuming that somebody else, outside the market, can do it cheaper or better. Again, at a later point he continues:

there are a number of other (cases) in which, owing to the technical difficulties of enforcing compensation for incidental disservices, marginal net private product is greater than marginal social net product. Thus, incidental uncharged disservices are rendered to third parties.²²

The difference between private and social cost is simply *postulated*, and it is not shown that an alternative method, an alternative to private contracting through market exchange, can decrease the costs of internalizing the effects on third parties. If the government, or some other nonmarket force, cannot do it at a cheaper cost than the market, then there is no difference at all between private and social cost. From Pigou's assertion that there is such a difference we must infer that he believes that the government can take the social cost into account better than the market can. But, in the absence of an analytical proof that this is the case, it remains an assertion, to be taken on faith.

If this is what the word externality means, it may be noted how utterly normative the concept is. There is no proof that the market, in the presence of costs of transacting, does not attain an optimum, but a simple assertion: the market leads to an inoptimal solution *relative to what the government can attain*. To make this a reasonable proposition we must *assume* that the government can do better than the market can—and this is the implicit point of reference according to which we judge market performance. This is to be taken on faith since there is no well-specified cost-benefit analysis of a particular government policy that can eliminate the externality and equalize private and social cost. Furthermore, it is not a qualified statement: on the contrary, it is a quite general one. It says that, when there are externalities, the market does not work, but the government does—no matter how small or large the externalities, no matter what the structure of transaction costs is, no matter how many agents are involved in the generation of externalities. In the presence of side effects, markets fail.

It may then be seen that *any* kind of transaction cost is capable of generating an "externality." If some transactions do not occur because of a proportional transaction cost, an externality may exist—*if* we can show that the government knows a better way of internalizing the side effect than private parties do. Or if there is a setup cost that prevents internalization, there may be an externality—*if* the government can find a better way than markets. Or if uncertainty and imperfect information prevent certain transactions from occurring, the side effect may be there—*if* we can assume that the govern-

²² *Id.* at 185.

ment knows better. However, if we cannot assume that the government knows better, then there is no externality.

The conclusion is rather startling: transaction costs per se have nothing to do with externalities. What is involved is a value judgment: if you believe that markets internalize everything, you will believe that externalities do not exist; on the other hand, if you believe that markets do not internalize side effects, you will believe in the persistence of externalities as deviations from an attainable optimum. This is not science; it is metaphysics: value judgments and political goals will enter into the determination of whether externalities occur in our world. You cannot show analytically that the government, in principle and in all cases, handles externalities better than the market; nor can you prove the opposite: it all depends on what point of reference you choose. And *that* is not a question of positive economics. By choosing the appropriate point of reference, the "conclusion" is reached that government intervention (or no government intervention) is optimal. Someone wishing to justify government intervention will choose the competitive equilibrium of Model I as the appropriate point of reference; someone who wants to avoid government intervention will choose Model II instead, with its transaction-cost-constrained equilibrium as the only relevant and attainable optimum. This is not positive economics; it is a political discussion, at least until we can better justify the choice of appropriate reference points.

It is thus doubtful whether the term "externality" has any meaningful interpretation, except as an indicator of the political beliefs and value judgments of the person who uses (or avoids using) the term. However, the further question remains whether we can say anything at all of what kinds of policies, if any, would be desirable to deal with pollution and other matters that economists and politicians alike (and sometimes the two are indistinguishable) are concerned with. This will be dealt with in the next section.

IV. THE POLICY ISSUE

The policy implications of the Pigou tradition in modern welfare theory are strong and simple. The argument goes somewhat along the following lines: take as an initial datum the proposition that we can conceptually define a competitive equilibrium, and then demonstrate the fact that in the presence of externalities actual markets, as observed in today's capitalistic economies, for example, do not achieve the Pareto optimum described by the competitive model. Since it can be easily established that in this case markets will not establish an optimum, it follows immediately that the government must do something since there simply is no other alternative.²³ In addition,

²³ Since there seems to be no alternative, we are prone to take it on faith that the government, with its self-interested bureaucrats and politicians, always is a better decision maker than the

however, the theory does something more: in the case of externalities, it tells you to impose taxes or subsidies, of a very special kind, on the emitter of the externality. It can be demonstrated that such a Pigovian tax-subsidy scheme indeed is capable of attaining the equilibrium which is the optimum, at least as long as we assume that it is possible to make the distinction between emitters and recipients.

Modern discussion of tax rules has centered on a different, but equally important, point: with our limited information about production and utility functions, we cannot adequately describe the allocation of the competitive equilibrium so that the Pigovian taxes can be calculated correctly. Given this, the Pigovian taxman must resort to other means to determine the proper rates. Baumol suggests: “. . . given the limited information at our disposal, it is perfectly reasonable to act on the basis of a set of minimum standards of acceptability.”²⁴ Such minimum standards of acceptability can then act as a proxy for the Pareto optimum to be established.

This, of course, dispenses totally with the competitive equilibrium as a point of reference. All that is required is that we tax an activity which we all agree is carried to an extreme, so that we reduce it to an acceptable level. The modern treatment seems to go in this way: first, pretend that there is a competitive equilibrium applicable to our world. Secondly, since we cannot really discern that point of reference, find out by subjective estimation which way the world actually deviates from a perceived optimum; and, thirdly, correct it with taxes to approximate that subjective optimum. However, since that subjective point of reference can only be derived by pure ad hoc value judgments, there can be no *general* proof of the optimality of the implied tax rules. That the tax rules are still optimal follows from the derivation of the “approximate equilibrium”: it is defined to comprise “reasonable” standards that we all agree on—and if we all agree on it, it must be optimal. If that is the case one wonders why the notion of the competitive equilibrium is at all necessary—optimality already being presupposed, any method that attains that alternative, attainable resource allocation will necessarily be optimal.

Fortunately, there is another approach to the general problem of externalities that significantly differs from the mainstream analysis. This is the approach originating with Coase,²⁵ which has introduced several question

individual agent when the invisible hand is performing less than perfectly. The analysis is greatly complicated if we allow for the fact that not all government decisions are Pareto optimal, but are simply acts of utility-maximizing agents who have all the policy powers of the government vested in them.

²⁴ William J. Baumol, *On Taxation and the Control of Externalities*, 62 *Am. Econ. Rev.* 318 (1972).

²⁵ R. H. Coase, *supra* note 11.

marks into the standard treatment of externalities. The difficulty lies in finding the exact relationship between the treatment of Coase and that of modern welfare theory with its origins in Pigou. From the discussion of transaction costs in Section II, it is obvious that Coase's notion of this concept is identical to what was labeled transaction costs due to imperfect information. Coase proceeds to show that when there are no costs of transacting, then all externalities will be eliminated, as costless transaction opportunities will allow suitable modifications of transactors' behavior so that all undesirable side effects are properly internalized. In this case, it is possible to show that the assignment of liability rules is irrelevant for the allocation of resources in equilibrium, and many authors seem to think this is the most important and controversial conclusion to come out of Coase's treatment. However, it is clear that only an imperfect understanding of the transaction-cost concept can make the nonrelevance of liability rules puzzling. For with zero transaction costs we must now understand zero setup and transfer costs, and also complete and costless information about prices, qualities, and desired transactions, including no cheating and strategic bargaining behavior. That resources in such a case will go to their highest value in use is a trivial consequence: it will not matter who is assigned ownership rights or liability obligations initially, for whoever has the highest relative valuation of any particular resource will offer most for it and will acquire that resource by costless exchange—at least, this will be true insofar as alternative allocations resulting from different wealth distributions may be disregarded. This cannot in any way be a startling result unless the notion of transaction costs is imperfectly understood.²⁶

The important and lasting contribution in Coase's article, in the opinion of this writer, is his focus on the all-important concept of transaction costs as preventing certain trades which otherwise would be mutually beneficial if carried out. This directs the analysis to the heart of the problem rather than to its symptoms: for transaction costs are a necessary condition for deviations from an attainable optimum to persist. The immediate implication, so often overlooked in subsequent writings on Coase's work, is that when there are transaction costs and informational differences between traders, then it may very well matter to whom liabilities and rights are assigned. This directs the analysis to policy matters, which will be taken up after a few observations on the methodological differences between Coase's analysis and modern welfare theory.

²⁶ This seems to be the point that Donald H. Regan entirely misses in his *The Problem of Social Cost Revisited*, 15 *J. Law & Econ.* 427 (1972). First, he asserts that there is no individual behavior that yields efficient allocation of resources in the presence of externalities. This is clearly wrong, since a Walrasian general equilibrium model with zero transaction costs indeed achieves this result as long as transactors are utility maximizers. Secondly, he asserts that the

It is notable how completely the Coase approach bypasses both the problem of deciding who is the emitter and who is the recipient of an externality and the rather shady distinction between pecuniary and technological externalities so central to the Pigovian tax rules. Perhaps the real significance of the court cases cited by Coase is that the distinction between emitter and recipient of an externality is irrelevant: what matters is whether we achieve a higher-valued output by putting the liability on one or the other of the parties involved, and not who is the “source” of the externality. Since at least two parties are necessarily involved, either may be considered the source. It is noteworthy how the legal profession and the courts have come to grips with this point well before economists. The legal cases referred to by Coase show how courts in the presence of transaction costs have placed the liability sometimes with the “emitter” and sometimes with the “recipient” as these would be identified by an economist trained in modern welfare theory. Nor is the distinction between pecuniary and technological externalities in any way relevant for Coase’s arguments: what matters is the role of transaction costs, and how such costs affect the allocation of resources.

Perhaps the distinction between the Coase approach and modern welfare theory can best be understood as being very similar to the one between Walrasian general equilibrium theory and Marshallian partial equilibrium theory. The former uses the reference point of a global Pareto optimum under zero transaction costs, and all externalities are measured as deviations from that optimum. The latter only makes comparative static exercises,²⁷

only context in which Coase’s argument makes sense is in a game theoretic setting. He then goes on to show that Coase’s results do not hold. What is ironic about this is that he employs no specific definition of transaction costs; however, his examples and his use of game theory show that he implicitly uses the kind of transaction costs that Coase refers to and that we have here labeled information costs. What Regan really does is to show that Coase’s results do not hold in the presence of transaction costs—but that is what Coase has said all along. For a formal analysis of these issues, and for a proof of the invariance proposition, see Kenneth J. Arrow, *The Property Rights Doctrine and Demand Revelation under Incomplete Information*, (Technical Report No. 243, Inst. Mathematical Studies Soc. Sci., Stanford Univ. Aug. 1977), esp. at 2-5. Arrow also shows that when information is less than perfect, inoptimalities result. *Id.* at 10-14. Private bargaining can then be shown not to attain the relevant optimum, the solution that Arrow has specified as the optimum. What he seems to disregard, however, is that, if a suboptimal solution is reached, then there will exist incentives for the two parties to exchange, at some positive price, the information that can show why they have reached a suboptimum. It would seem to be implicit in Arrow’s treatment—as well as in others—that it is difficult or impossible to make such exchanges, due perhaps to the public-goods aspects of privately owned information or to the problems of authenticating the quality of information for sale. Thus, the reason for the inoptimality is really to be sought in the special characteristics of information as a commodity, bringing us back to the issue that Demsetz, *supra* note 19, has already accused Arrow of mishandling. That is to say, if what Arrow (with the superior information available to the analyst) has chosen as an optimum turns out not to be an optimum at all, then there are no grounds for stating that the outcome of the game is “suboptimal”—for now that point of reference is not allowed any longer.

²⁷ On these and related issues, see Axel Leijonhufvud, *Varieties of Price Theory*: What

and consequently employs marginal analysis in making the judgment of whether resource allocation ought to be changed from some given state or not: are the costs of altering the current allocation worth the benefits? The answer to this question requires no zero-transaction-cost point of reference.

Many times the Coase analysis has been criticized for seemingly implying that no government action can ever be justified. Yet it is striking that the Coase approach, correctly interpreted, would imply exactly the same results that a correctly amended Pigou analysis would advocate. In the presence of transaction costs, liability assignments and ownership rights will have effects on the allocation of resources. As a consequence, transaction costs may prevent the establishment of a desirable allocation of resources, one that everyone would agree is better than the one attained when transactions are costly. In this case the Coase analysis implies one of two corrective measures: (i) find out if there is a feasible way to decrease the costs of transacting between market agents through government action, or (ii), *if* that is not possible, the analysis would suggest employing taxes, legislative action, standards, prohibitions, agencies, or whatever else can be thought of that will achieve the allocation of resources we have already decided is preferred. The implication of status quo is simply not there: the theory says to find practicable ways of diminishing transaction costs, by whatever kind of action is necessary, including governmental action.²⁸ In this way, the Coase recommendations arrive at exactly the same policy implications that the correct Pigou analysis does—the one that dispenses with the competitive equilibrium and sets up a “reasonable standards” approach.

There are two advantages in the Coase approach of choosing the transaction-cost-constrained equilibrium of Model II as the attainable optimum, and both are significant. The first is that the Coase line of reasoning does not limit attention to tax rates alone—any government action that achieves either a decrease in the costs of transaction or some other approximation to a desirable course of action is feasible.²⁹ Not only Pigovian taxes,

Microfoundations for Macrotheory? (1974) (UCLA Working Paper, No. 44); and his forthcoming Marshall lectures.

²⁸ Calabresi concurs in this interpretation: “Some may take Coase’s analysis to suggest that little or no government intervention is usually the best rule. My own conclusions are quite different. His analysis, combined with common intuition or guesses as to the relative costs of transactions, taxation, structural rules and liability rules, can go far to explain various types of heretofore inadequately justified governmental actions.” Guido Calabresi, *supra* note 3, at 73.

²⁹ This statement is made in blatant disregard of the implications of the theory of second best. Indeed, if some of the rather sweeping assertions of this essay are correct, the conclusion seems to be that the theory of second best is vulnerable to exactly the same criticisms that are here leveled against modern welfare with respect to externalities: for if the competitive equilibrium is not an optimum in the presence of transaction costs, there is no feasible “first best.” If we decide that some alternative is preferable to actual resource allocation, then the “reasonable standards”

but all other weapons in the government's arsenal become available as well. Secondly, instead of referring to an imaginary global optimum, the Coase approach *explicitly* requires dealing with marginal concepts in terms of opportunity costs, and always keeps an eye open to the fact that transaction costs are here to stay: the fact that we all agree on the desirability of reducing some externality guarantees that some government action indeed may be desirable since we otherwise could get together and price out of business the beast who creates the disturbance. If the government can make the costs of moving to a preferred allocation lower than the benefits of doing so, there is a guarantee that the result is sanctioned by the Pareto criterion. Any economist who is also a self-interested government consultant ought to embrace the Coase analysis whole-heartedly, for it would seem to call for more and better cost-benefit analysis by government agencies dealing with pollution and other environmental problems.

V. CONCLUSION

In the final analysis, therefore, externalities and market failures are not what is the matter with the world, nor is it externalities and market failure that prevent us from reestablishing the Garden of Eden here on earth—our sad state of affairs is rather due to positive transaction costs and imperfect information. It is a very strange feature of modern welfare-policy prescriptions that they propose to do away with externalities, which are only one of the symptoms of an imperfect world, rather than with transaction costs, which are at the heart of the matter of what prevents Pareto optimal bliss from ruling sublime. For if we could only eliminate transaction costs, externalities would be of no consequence; and given that there are certain costs of transaction and exchange, it is better to let some side effects remain. What is clear, though, is that it would be consistent with the Pareto criterion if some policy, whatever policy, could be devised that will decrease on net the costs of transacting, whether they be due to setup and transfer costs or imperfect information. This is the important conclusion of the Coase analysis, and the one which makes for its analytical attractiveness. The neatness of the Coase analysis lies in the fact that it dispenses completely with what Demsetz has called “the Nirvana approach” and instead calls for what he labels “the comparative systems approach” which explicitly attempts to ascertain the economic consequences of alternative ways of organizing the allocation of resources. The analysis thus directs attention to the point that institutions fulfill an economic function by reducing transaction costs and therefore ought to be treated as variables determined inside the economic scheme of

approach would have us identify that point of reference as the first-best alternative. In either case, the theory of second best is irrelevant.

things. The question then ultimately becomes: how can the economic organization be improved upon by endogenous institutional rearrangements? This is not the outlook of modern welfare theory where the government is seen as a force outside the economic system altogether, which will come to our aid and rectify the havoc wrought by endogenously working market forces, just like the classical *deus ex machina*. Coase opens the door for an economic theory of institutions, whereas modern welfare theory can only gaze into its crystal ball of mathematical abstraction and wisely state that heaven on earth is still far off—which is true, but of no particular consequence either for the correct conduct of economic policy or for the theory of externalities.