History of Economic Ideas, II/1994/3

RONALD COASE'S CONTRIBUTIONS AND MAJOR THEMES

STEVEN G. MEDEMA*

University of Colorado at Denver
Department of Economics

This essay surveys Ronald Coase's contributions to economic analysis, including his analyses of the firm, property rights and externalities, public utility pricing, monopoly theory, and accounting, as well as his views on the economic role of government and economic method. In the process, several important themes emerge from his work, including the importance of institutions, transaction costs, and the use of inductive methods of analysis. Coase's basic approach to doing economics, the approach that generated many important contributions to economics, is seen to be at odds both with much of neoclassical analysis (of which he is quite critical) and with the standard Chicago view.

1. Introduction

Ronald H. Coase was born in 1910, and eighty-one years later received the Nobel Prize in economics. However, the road that took Coase to this point was anything but direct. During his school days, his first preference was to study history, but he was unable to do so because he lacked the requisite training in Latin. His second preference was chemistry, but he found that the mathematics required for the chemistry degree "was not to my taste" (Coase, 1991, p. 4). As a result, he decided to study commerce and enrolled at the London School of Economics (LSE) in 1929. It was here that Coase was exposed to Arnold Plant, who set

* The author wishes to thank Thrinn Eggertsson, Warren J. Samuels, and an anonymous referee for instructive comments related to this discussion. The author also gratefully acknowledges the permission granted by the Macmillan Publishing Company to reprint selected materials from his book, *Ronald H. Coase* (1994), within this essay.

him on the road to becoming an economist[1]. He says that Plant "introduce[d] me to Adam Smith's 'invisible hand'. He made me aware of how a competitive economic system could be co-ordinated by the pricing system. But he did not merely influence my ideas. My encountering him changed my life" (Coase, 1991, p. 4). Prior to attending Plant's seminars, Coase's only real exposure to economics was at the Kilburn Grammar School. In fact, Coase did not take a single economics course while he was at the LSE. Nor was he sorry for this, saying that it "gave me a freedom in thinking about economic problems which I might not otherwise have had" (Coase, 1990, p. 3).

Coase taught at the Dundee School of Economics and Commerce from 1932-34, at the University of Liverpool from 1934-35 and at the LSE from 1935-51, the latter period being interrupted by the Second World War, during which he served as a statistician at the Forestry Commission (1940-41) and the Central Statistical Office, Offices of the War Cabinet (1941-46). Coase left the LSE for the US and the University of Buffalo in 1951. He remained at Buffalo until 1958, spent a year at the Center for Advanced Study in the Behavioral Sciences at Stanford, and then accepted an appointment at the University of Virginia in 1959. Although Coase is most closely associated with the Chicago School[2], his two most influential works – "The Nature of the Firm" (1937a) and "The Problem of Social Cost" (1960) – were written before he began his time at Chicago, and by the time that he arrived there, in 1964, to teach at the Law School and to co-edit the *Journal of Law and Economics* (with Aaron Director), his views had already been clearly formed. Coase retired from the University of Chicago in 1981, and from the editorship of the *Journal of Law and Economics* in 1982. In 1991, shortly before his eighty-first birthday, Coase was awarded the Alfred Nobel Memorial Prize in Economic Sciences.

1. See Coase (1982a, 1986, 1988b) regarding Plant's views and his influence on Coase.

2. As we shall see below, however, there are important divergences between Coase's analysis and perspective, and what is commonly thought of as "the Chicago school approach".

The purpose of this paper is to present a brief survey of Coase's contributions to economic analysis. As will become clear, his contributions go well beyond those recognized in "The Nature of the Firm" and "The Problem of Social Cost". Moreover, by viewing the entire corpus of Coase's work, one is able to gain substantial insight into his analysis in these two seminal works – certain aspects of which have been very much misperceived – and into his views on economics generally.

2. The Firm

One of the two articles cited by the Swedish Academy in awarding Coase the Nobel Prize was his 1937 article "The Nature of the Firm". Coase's interest in the firm and the integration process had its genesis in Arnold Plant's lectures on the organization of industries. Coase came away from these lectures with the feeling that economics lacked "any theory which would explain why those industries were organized in the way they were" (Coase, 1988b, p. 7). Furthermore, while Plant maintained that the pricing system "would provide all the coordination needed", Coase could not reconcile this with the fact that "we had in economics a factor of production, management, whose function was to coordinate" (Coase, 1988b, p. 7). The role of management and the employer-employee relation (i.e., hierarchy) in a business suggested to Coase the Plant's theory was "somehow incomplete" (Coase, 1988b, p. 8), and he thus set out to develop the beginnings of a theory that would explain the underlying rationale for the existence and structure of the firm.

Coase begins his analysis with the observation that the idea that the price mechanism automatically functions to coordinate economic activity "does not fit at all" within the firm (Coase, 1937a, p. 387). The world of the firm is not one in which factors of production move between different uses based on changes in relative prices; rather, "a workman moves from department Y to department X ... because he is ordered to do so" by management (Coase, 1937a, p. 387). What we observe within the firm, says Coase, is not the price mechanism, but organization – "'islands of conscious power in this ocean of unconscious co-operation like lumps of butter coagulating in a pail of buttermilk'" (Coase, 1937a, p. 388, quoting D.H. Robertson, 1923, p. 85). This led Coase to conclude that, since the price mechanism directs transactions outside of the firm and management directs transactions within the firm, "... *the distinguishing mark of the firm is the supersession of the price mechanism*" (Coase, 1937a, p. 389, emphasis added). Yet, says Coase, the degree to which the price mechanism is superseded varies across firms and industries. This led Coase to seek the answers to three questions: (i) Given that the price mechanism could provide all of the coordination needed, why are there firms at all? (ii) Given that all transactions could be coordinated within a firm, why do we observe market transactions at all – that is, why is all production not carried out within a single, large firm? (Coase, 1937a, p. 394) (iii) Given that we observe both firm and market organization, what determines the extent to which transactions are coordinated by firms *vis-à-vis* the market?

Coase discovered a rationale for the existence of the firm in the idea that it is costly to use the price mechanism. The standard assumption that all prices are known to all individuals, says Coase, "is clearly not true of the real world" (Coase, 1937a, p. 390 at note 4). Rather, prices must be discovered and contracts arranged, often through the process of negotiating, and this process does not work without cost. Coase suggests that the existence of the firm greatly reduces the number of necessary contracts vis-à-vis the price mechanism, and in the process reduces what he calls marketing costs (later called transaction costs). For a given factor of production, a single (longer-term) contract is substituted for a series of contracts, and this single contract sets out the extent of the power that the entrepreneur has over the factor in directing production (Coase, 1937a, p. 391). Because of the presence of uncertainty, these long-term contracts will necessarily be rather vague in detail, leaving the entrepreneur to determine the exact direction of factors of production as circumstances evolve.

Coase's analysis here brings authority relations into the picture as a fundamental feature of the firm, and provides the key link to explaining the existence of the firm relationship: "When the direction of resources (within the limits of the contract) becomes dependent on the buyer in this way, that relationship which I term a 'firm' may be obtained. A firm is likely therefore to emerge in those cases where a very short term contract would be unsatisfactory" (Coase, 1937a, p. 392). This analysis brought Coase to the point where he could define the firm as "*the system of relationships which comes into existence when the direction of resources is dependent on an entrepreneur*" (Coase, 1937a, p. 393, emphasis added).

Given the transaction-cost reducing function of internal organization, why is it that all transactions are not organized within a single firm? Coase suggests three reasons, which may work separately or in combination. First, the costs of organizing additional transactions within the firm may rise as the firm expands. Second, as the number of internally-organized transactions increases, the entrepreneur may fail to allocate factors of production to their highest-valued uses. Third, smaller firms may have certain advantages over larger firms which allow them to obtain certain factors of production at lower cost (Coase, 1937a, pp. 394-395). The point here is that there are costs associated with using internal organization, as well as with using the price mechanism. Furthermore, other firms may be able to organize a given transaction at a lower cost than the firm in question (Coase, 1937a, p. 394).

The determination of the extent of internal versus market coordination then follows logically from these insights: "*a firm will tend to expand until the costs of organising an extra transaction within the firm become equal to the costs of carrying out the same transaction by means of an exchange on the open market or the costs of organising in another firm*" (Coase, 1937a, p. 395, emphasis added). Thus, the firm will tend to be larger, the smaller are the costs of organizing internally relative to the costs of using the price mechanism or the cost of the good being produced by another firm, and conversely. The importance of considering the cost of a given transaction being organized by another firm is indicated by Coase in a later commentary: "This results in the institutional structure of production being that which minimizes total costs for the output produced" (Coase, 1988d, p. 39). It also begins to account for how production activities across society are divided up among firms.

Coase's definition of the firm and his use of transaction costs to explain its origin and extent represented a fundamental advance upon the theory of the day. While it was only a beginning, it was a foundation on which could be built a more comprehensive theory of the firm than was then in existence, and which could be used as the basis for the development of an analysis of the determinants of industry structure. Yet, despite its revolutionary insights, more than thirty years would pass before this article would have any impact on the profession. The lack of attention paid to "The Nature of the Firm" over the first three decades subsequent to its publication led Coase (1972b, p. 63) to label it "an article much cited and little used". He felt that this lack of attention was derivative of the general character of industrial organization theory which, as he saw it, was essentially applied price theory, focusing on the purchase of inputs and the sale of outputs to the almost total neglect of the factors determining the organization of firms and industries, or, as he put it in his Nobel lecture (1992a), the institutional structure of production. Even more important, said Coase (1972b, pp. 66-69), was the fixation of industrial organization scholars on issues of monopoly. These things served to deflect economists' attention from making in-depth studies of how industries are actually organized and the forces that determine this organization. He suggested that economists were not interested in finding answers to the questions raised by his analysis in "The Nature of the Firm" (Coase, 1972b, p. 65), and that, as a result, "[w]e are, in fact, appallingly ignorant about the forces which determine the organization of industry" (Coase, 1972b, p. 64). All of this was to change by the mid-1970s, as scholars began to examine the organizational structure of the firm and the contracting processes embodied therein.

The last two decades have witnessed a substantial surge of interest in the analysis of firm organization and behavior, much of which has proceeded under the banner of the New Institutional Economics[3]. Most prominent here has been Oliver Williamson

3. For a selection of this literature, see, for example, the articles cited below,

(e.g., 1975, 1985), whose transaction cost approach to firm organization has drawn upon Coase's insights to develop an in-depth picture of the forces that determine the organizational structure of the firm. Others, such as Alchian and Demsetz (1972), Jensen and Meckling (1976), Cheung (1983), and Grossman and Hart (1986), have applied the theories of agency and property rights in an attempt to further probe the issues underlying the organizational structure of the firm. While not all of this literature directly follows Coase's approach (for example, some of these writers deny that there is any essential distinction between firm and market, or that authority relations exist within the firm – both directly in conflict with Coase's (1937a, 1992b) approach –, this literature is responsive to the issues raised by Coase's pioneering analysis, and the effect of this variety of studies and perspectives has been a much greater interest in, and understanding of, the issues surrounding the organizational structure of the firm[4].

3. Property Rights and Externalities

The other paper cited by the Swedish Academy in awarding Coase the Nobel Prize was "The Problem of Social Cost" (1960). This is undoubtedly Coase's most well-known paper, and from it came the set of ideas which have come to be known as the Coase theorem[5]. But in spite of the extraordinary attention given to the

and those reprinted in Medema (1994a), Vol. 1. Eggertsson (1990) provides an excellent survey.

4. A more in-depth discussion of the relationship between Coase's work on the firm and the subsequent literature is presented in Medema (1994b). Coase's (e.g., 1988d, 1992a) own perspective on this work is quite optimistic, although he is convinced that we have some distance to go before we have a thorough understanding of the determinants of the organizational structure of firms.

5. The Coase theorem, while having many variants, may be stated as follows: if rights are fully specified and transaction costs are zero, parties will bargain to an efficient outcome regardless of the initial assignment of rights. The term "Coase theorem" originated in George Stigler's *The Theory of Price*, where he states that "The Coase theorem thus asserts that under perfect competition private and social costs will be equal". Stigler (1966), p. 113. For surveys of the

Coase theorem, this material forms only one component, and one might even say a minor one, of "The Problem of Social Cost". Coase uses this article to illustrate the impact of law on the allocation of resources in society and to attack Pigou and the Pigouvian tradition. In addition, this article, along with Guido Calabresi's "Some Thoughts on Risk Distribution and the Law of Torts" (1961) mark the genesis of the modern field of law and economics. At its most broad level, "The Problem of Social Cost" is a treatise on the economic role of government and, more specifically, the way in which government and those economists who would undertake public policy analysis should go about determining the appropriate policy solutions to perceived economic problems.

3.1. *First Steps: Property Rights and Broadcast Frequencies*

While "The Problem of Social Cost" is one of the most cited articles in the history of economics, it was written only by accident, as a follow-up to "The Federal Communications Commission" (1959). In this earlier paper, Coase sets out to show that government allocation of broadcast frequencies by administrative fiat is misguided, and that this allocative system should be replaced by a market in broadcast frequencies. The need for government allocation of broadcast frequencies was defended on the grounds that these frequencies were in scarce supply and that competition among broadcasters would interfere with the orderly development of radio broadcasting, thereby inconveniencing the listeners. Against this, Coase argued that scarcity is pervasive for all resources, and that the solution to the problem of scarcity is usually allocation by the market, not by the government. Moreover, he said, the problem of chaos on the airwaves, which had brought on the government allocation scheme, was a result not of competition but of the failure to assign rights in broadcast frequencies (Coase, 1959, p. 14). While these regulations provided a solution to the problems of free and unrestricted use of the broad-

literature on the Coase theorem, see Medema (1994b), Chapter 4 and the articles reprinted in Medema (1994a), Vol. 2.

cast spectrum, Coase suggests that this solution misses the mark. The goal, he says, is to obtain the optimum allocation of frequencies across users, and thus, from an economic perspective, "the solution to be sought is that which would have been achieved if the institution of private property and the pricing mechanism were working well" (Coase, 1959, p. 29). Coase maintained that such a solution that is unlikely to be accomplished through a system of fiat-based allocation; instead, he says, "the allocation of resources should be determined by the forces of the market" (Coase, 1959, p. 18).

Coase recognized that the operation of the market depends upon the specification of property rights. But once some mechanism is employed to establish property rights in broadcast frequencies and a market in these rights, resources will flow toward their highest-valued use. Coase states it thus:

> ...the delimitation of rights is an essential prelude to market transactions; but the ultimate result (which maximizes the value of production) is independent of the legal decision (Coase, 1959, p. 27).
>
> Once the legal rights of the parties are established, negotiation is possible to modify the arrangements envisaged in the legal ruling, if the likelihood of being able to do so makes it worthwhile to incur the costs involved in negotiation (Coase, 1959, pp. 26-27).

One may recognize these ideas, which were later repeated in "The Problem of Social Cost", as the core elements of the Coase theorem. The point here is that Pigouvian taxes, subsidies, and regulations are not the only feasible solutions for externality problems. Rather, with well-defined rights, the market may well give a superior solution by allowing resources to flow to their highest-valued uses. As Coase sees it, the problem with the existing structure of broadcasting regulations is that they rule out the possibility of such "desirable" market transactions (Coase, 1959, p. 27 at note 54).

The points Coase raised in this article, especially regarding the virtues of the market *vis-a-vis* the Pigouvian approach, were not immediately accepted, and in fact were regarded as fallacious in some quarters, particularly by economists at the University of Chicago. At the urging of Aaron Director, editor of the *Journal of*

Law and Economics, Coase undertook to dispel these doubts and objections through a more extensive analysis in "The Problem of Social Cost"[6].

3.2. *"The Problem of Social Cost"*

In "The Problem of Social Cost", Coase widens the scope of his analysis to explore the problem of harmful effects generally. In particular, Coase was concerned with taking on the Pigouvian tradition, which by that time had become firmly embedded in neoclassical economic theory. Coase contends that the Pigouvian focus on solving externality problems through the use of taxes, subsidies, or regulations is at worst misplaced, and at best overly narrow, with the result that its prescriptions will often lead to inappropriate policies that have undesirable results (Coase, 1960, p. 2). In support of this, Coase points to two major flaws in the Pigouvian tradition: (i) an ignorance of the reciprocal nature of externality problems and (ii) the failure to see the potential role for the market and the limitations of government in the resolution of these problems.

3.2.1. The Reciprocal Nature of Externalities

Coase begins his analysis in "The Problem of Social Cost" by demonstrating that, contrary to the conventional wisdom, externalities are reciprocal in nature. Coase maintains that it is incorrect to identify one party (e.g., the polluter) *as the cause* of an externality situation. While A's pollution harms B, the restraint of polluting activity would impose harm on A through, for example, the cost of pollution abatement. "We are", says Coase, "dealing with a problem of a reciprocal nature. To avoid the harm to B would inflict harm on A. The real question that has to be decided

6. The story behind this is entertaining, and is presented in Kitch (1983), pp. 220-221.

is: should A be allowed to harm B or should B be allowed to harm A? The problem is to avoid the more serious harm" (Coase, 1960, p. 2).

The two points that Coase is making here – the reciprocal nature of harm and the need to resolve these situations by adopting the least-cost solution – form the cornerstone of the modern economic analysis of law. This contrasts with the traditional approach to law, wherein one party is identified as the cause of the harm and remedies are specified to follow upon the determination of causation. This also provides a point of departure from the Pigouvian approach, in which one party is said to be the sole cause of the harm and tax, subsidy, or regulatory remedies are prescribed to discourage that activity. Such a one-sided view, says Coase, serves to obfuscate the reciprocal nature of the problem, and thus potentially precludes the adoption of the least-cost solution.

3.2.2. The World of Zero Transaction Costs and the Coase Theorem

Coase next turns to an analysis of how the market can resolve problems of harmful effects. In what has become a classic example of externality problems, Coase posits a situation where a rancher and a farmer operate on adjoining parcels of property and there is no fence separating the parcels. The result is that the cattle roam onto the farmer's property and destroy some of his crops. What Coase demonstrates in this example is, in short, that if the pricing system works costlessly (i.e., if transaction costs are zero), then no matter whether the rancher or the farmer is liable for damage, the final allocation of resources will be unaffected; the parties will, in the end, adopt the same, least-cost solution in resolving the problem (Coase, 1960, pp. 2-8). Coase summarizes the point of this example as follows:

> It is necessary to know whether the damaging business is liable or not for damage caused since without the establishment of this initial delimitation of rights there can be no market transactions to transfer and recombine them. *But the ultimate result (which maximizes the value of*

production) is independent of the legal position if the pricing system is assumed to work without cost (Coase, 1960, p. 8, emphasis added).

This is as close as Coase comes in this paper to a statement of what has come to be known as the Coase theorem. To illustrate how these principles would apply to actual instances of harmful effects, Coase examines four 19th century British legal cases in an attempt to demonstrate that, when transactions are costless, legal rules, attempts at social engineering and other such practices are all irrelevant. The economic problem is to maximize the value of production, and attempts by courts to assign rights on other bases will ultimately be defeated by the ability of affected individuals to transact around the initial rights assignment in order to realize mutual gains[7].

A smoothly functioning system of exchange relies on a developed system of property law that establishes ownership of resources. Microeconomic theory tells us that in the presence of such a system, the free exchange of resources will result in those resources being moved to their highest-valued use. Law also creates many other types of entitlements, such as the right to be free from nuisance and from tortious harms, and to secure the performance of a contract. Through his analysis of the zero transaction cost world in "The Problem of Social Cost" (and more specifically, through th mechanism that has come to be known as the Coase theorem), Coase generalized the analysis of the exchange of resources to include the exchange of legal entitlements (Cooter, 1987, p. 457), and in the process brought much of law within the borders of economic analysis.

The Coase theorem certainly constitutes the foremost legacy of "The Problem of Social Cost" to date, and much effort has been devoted to attempts to show the conditions under which the Coase theorem does and does not hold. Yet, in Coase's mind, the central insight of this zero transaction cost analysis is simply that

7. This can be seen quite easily in the context of an Edgeworth Box diagram, where what is being traded are not goods, but rights. The movement to a Pareto-improving position on the contract curve follows immediately upon the specification of the starting points – that is, the initial specification of rights.

it undermines the Pigouvian system[8]. While Pigouvian analysis – and mainstream economic theory generally – proceeds upon the assumption of zero transaction costs, Coase's analysis shows that Pigouvian remedies are unnecessary to reach an efficient outcome in a situation of zero transaction costs. However, Coase explicitly recognizes that the assumption of zero transaction costs is "a very unrealistic assumption" (Coase, 1960, p. 15), and he later cautioned against placing too much emphasis on the analysis of the world of zero transaction costs[9]. While subsequent commentators have focused largely on the zero transaction costs world, one of the core messages of "The Problem of Social Cost" is the importance of transaction costs in economic activity.

3.3.3. The Real World of Positive Transaction Costs

While the analysis of a zero transaction cost world may be illuminating in certain respects, Coase's position is that the real world is the world of positive transaction costs, owing to the difficulties that arise in setting up, making, and carrying out bargaining (or contractual) arrangements:

> 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 (Coase, 1960, p. 15).

When transaction costs are zero, rights will be reallocated through the market until they reach their highest-valued use.

8. See Coase (1993b) for a discussion of this point. Coase's criticisms of Pigou deal primarily with Pigou (1962). It has been claimed that Coase's criticism of Pigou is far too harsh. See, for example, DeSerpa (1993).

9. In a 1981 paper, Coase maintains that "[w]e do not do well to devote ourselves to a detailed study of the world of zero transaction costs, like augurs divining the future by the minute inspection of the entrails of a goose". Coase (1981), p. 187. See also Coase (1988e), pp. 13, 15, 174.

When transaction costs are positive, however, a reallocation of rights will only occur if the increase in the value of output that results from this reallocation is greater than the cost of bringing it about (Coase, 1960, pp. 15-16). If bargaining is not economically feasible, then the initial assignment of rights will play a crucial role in determining whether the value of output is maximized, and the issue, from an efficiency perspective, becomes one of determining the least-cost (or value-of-output maximizing) solution to the problem.

The assignment of rights in accordance with the dictates of efficiency has two advantages. First, it generates the least-cost outcome when transaction costs preclude bargaining. Second, where transaction costs are positive but bargaining is feasible, the least-cost decision rule reduces the need for costly bargaining, freeing resources for other productive uses (Coase, 1960, p. 19). The more general expression of this idea is the statement that law should be structured so as to minimize transaction costs, thereby encouraging efficient bargains of the Coase theorem variety.

Coase also uses this discussion to suggest that judges often recognize both the reciprocal nature of harmful situations (something that economists had been prone to ignore) and the economic implications of their decisions. He says that while courts do not usually use explicit economic language or reasoning in their opinions, terms such as "'reasonable'" or "'common or ordinary use'" reflect an awareness of the economic aspects of the case at hand (Coase, 1960, pp. 19-22). Scholars working in the field of law and economics have seized upon this assertion and attempted to determine the extent to which common law doctrines comport with the dictates of efficiency[10].

While Coase demonstrated that Pigouvian remedies are unnecessary in a zero transaction costs world, he allows that the presence of high transaction costs may necessitate the use of some government regulatory mechanism for resolving problems of harmful effects. Drawing on the analysis he presented in "The

10. The first in-depth study of this sort was Posner (1972). See also Rubin (1977), Priest (1977), and the discussion of this topic in Posner (1992). Coase's views of law and economics will be touched on below.

Nature of the Firm" (1937a), Coase says that government can provide coordination for problems of harmful effects when the market cannot serve this function in a cost-effective manner, just as the firm supplants the market when market transactions in the input arena become too costly. The major problem here, according to Coase, is that the government regulatory apparatus is very costly. Moreover, there is no guarantee that the regulatory agency will follow the appropriate course of action, nor that it will make matters better rather than worse, from an efficiency perspective. Coase does recognize, however, that government regulation may, on occasion, lead to an improvement in economic efficiency, and suggests that the regulatory option is likely to be superior in large numbers situations, such as with air pollution, where the coordination costs that would attend a bargaining solution are likely to be prohibitive (Coase, 1960, p. 18).

However, the absence of a market solution does not, for Coase, indicate a *prima facie* case for government taxation or regulation. It may be that the gains from such interventions are outstripped by the costs, and in such situations, he says, the optimal policy is to *do nothing* at all about problems of harmful effects. One of the problems with modern welfare economics, says Coase, is that its focus on private versus social products results in the perception of a "deficiency" where the two diverge, a deficiency which must be corrected in some way and at all costs, which ignores the possibility that the cure may be worse than the original deficiency. For Coase, the focus on marginal private and social products is misplaced and misleading; the appropriate course of action when comparing alternative institutional arrangements is to compare the *total social product* that results from each of these alternatives. "The comparison of private and social products", he says, "is neither here nor there" (Coase, 1960, p. 34). Coase believes that when all benefits and costs of regulation are taken into account, it will "be commonly the case" that the costs of government regulation exceed the gains, making the optimal (that is, the output-maximizing) solution that of doing nothing. Why, then, do we see so much regulation? Coase opines that it is because economists and policymakers tend to overestimate the net benefits of regulation, largely because they underestimate the costs of government involvement (Coase, 1960, p. 18). However, he says, the determination of the appropriate course of action can only come from an in-depth exploration of the various regulatory and non-regulatory options that are available (Coase, 1960, pp. 18-19)[11].

If, as Coase maintains, the Pigouvian tradition is in error, how should we deal with problems of harmful effects? Coase suggests that we must begin with the view that factors of production are rights – rights to perform certain actions. Hence, the right to generate a harmful effect in the process of producing a good is also a factor of production. The question is whether the cost to society of using that factor (that is, of exercising that right) is worth the benefit received. In determining an answer to this question we must, says Coase, look at these effects in total; that is, all costs and all benefits must be evaluated. The key, according to Coase, is that we need to study the world as it actually exists – that is, the world of positive transaction costs and positive costs of government activities – and evaluate the effects of taxes, subsidies, regulations and «doing nothing» within the framework of such a world. The appropriate solution will be found "not by studying imaginary governments but what real governments actually do" (Coase, 1992a, p. 717). Such a comparative institutional approach allows us to assess the relative impacts of various alternative methods of dealing with problems of harmful effects and thereby to make informed policy choices.

11. Coase's also suggests that the Pigouvian tax will not lead to the socially optimal result. See Coase (1960), pp. 41-42. As Baumol (1972) has pointed out, Coase's analysis represents a fundamental misunderstanding of the Pigouvian tax, in that Coase assumed that the tax would vary with the level of damage rather than (as is proper) being set equal to marginal damage at the efficient level of output. Coase has since acknowledged his error on this score, but continues to correctly hammer away at the Pigouvian tax approach because of the difficulty, if not impossibility, of calculating the optimal tax in the real world. Coase (1988e), pp. 179-185. (In making this argument, Coase is not denying that taxes may be the appropriate mechanism for dealing with externalities in certain circumstances, merely that Pigouvian assertions regarding the attainability of a social optimum are presumptuous.) In addition, Baumol's argument does nothing to deflect Coase's (1960) criticism regarding the failure of the Pigouvian system to account for the governmental costs associated with such remedies.

4. Other Contributions

While Coase's analysis of the firm and of externality situations are the most well-known elements of his work, the corpus of his writings is very broad, ranging across topics such as public utility pricing, monopoly theory, accounting, consumer surplus, blackmail, producers' expectations, the history of economic thought[12], the economic role of government, and economic method. The latter two of these will be dealt with separately below. The present section presents an outline of several of these other important contributions.

4.1. *Public Utility Pricing*

Perhaps the most traditionally micro-theoretic elements of Coase's work are his forays into the areas of pricing and costs. His work on pricing is confined primarily to situations of monopoly, and his most enduring contribution in this area has come through his analysis of price regulation under conditions of natural monopoly. In "The Marginal Cost Controversy" (1946a), Coase sets out to "point out the fundamental defects" in marginal cost pricing policies, policies wherein monopolies are forced to charge prices equal to marginal cost and then given a government subsidy to cover the resulting losses (Coase, 1946a, p. 170). The starting point, for Coase, is the recognition that efficiency dictates that the amount spent on a good must reflect the value of those factors of production in alternative uses. In order to achieve this outcome, two things are necessary. First, the consumer must be charged a price equal to *marginal* cost for each unit of the good purchased. Second, the consumer must be forced to bear the *total* cost of producing the goods he purchases (Coase, 1946a, p. 173). Both of

12. Coase's essays on Adam Smith (1976, 1977c) and Alfred Marshall (e.g., 1975), both of whom he holds in high esteem, give unique insights into the work and lives of these individuals, as well as into Coase's views of the economic system and the way that economists should do economic analysis. His essays in the history of economic thought are reprinted in Coase (1994).

these are necessary, says Coase, in order for the consumer "to choose in a rational manner between spending his money on consuming additional units of the product and spending his money in some other way" (Coase, 1946a, p. 173). Because, under a marginal cost pricing policy, consumers are not forced to bear the full cost of the goods that they consume, such a policy leads to an inefficient allocation of resources. Coase suggested that this problem could be avoided through the adoption of a system of multipart pricing (Coase, 1946a, pp. 173-174).

Coase (1946a, pp. 178-179) also criticizes marginal cost pricing on the grounds that the loss-covering subsidies will likely be financed through distortionary taxes, the effect of which is to drive a wedge between price and marginal cost in whatever market those taxes are applied. Thus, in the process of removing a distortion in one market, the marginal cost approach creates (or exacerbates) a distortion that exists in that or another market through the imposition of a tax. Coase is also concerned that the marginal cost approach will have adverse efficiency effects on the administrative structure of the firm. He suggests that the government, by virtue of the fact that it is providing the firm with a subsidy, will inevitably demand some degree of control over the administration of the firm in order to keep the subsidy down, thereby leading to "complete centralization of the administration of public utility industries" (Coase, 1970, p. 119). This increasing centralization works against the autonomy that is, for Coase, essential for the efficient administration of the firm, and may, as he sees it, be "the most serious disadvantage" of marginal cost pricing (Coase, 1988e, p. 19)[13]. Given all of the foregoing, Coase concludes that marginal cost pricing is "a recipe for waste on a grand scale" (Coase, 1988e, p. 18) and so much so that it is not unambiguously the case that marginal cost pricing should even be preferred to *average cost pricing*[14]. This analysis marked a turning point in the

13. Coase also makes a distributional objection to marginal cost pricing – that those who consume products produced under conditions of decreasing average costs will receive a greater value of goods, for any given expenditure, than those who do not consume such products. Coase (1946a), p. 176.

14. See the discussion of this point in Coase (1946a), pp. 180-181.

professional perception of the relative merits of the marginal cost and multi-part approaches to natural monopoly price regulation[15].

4.2. *The Theory of Monopoly and Imperfect Competition*

Coase also published several other articles dealing with various aspects of monopoly and imperfect competition. His first published paper, "The Problem of Duopoly Reconsidered" (1935), examines duopoly arrangements and their implications for price and output under differing assumptions about the independence of firms. This article embodies a bit of what we would now call elementary game theory, and one sees, from the perspective of the present, shades of Cournot, Bertrand and Hotelling in his analysis. Yet, there is no indication that Coase was familiar with the work of any of these individuals, which may be attributed to his lack of training in economics.

The remainder of Coase's work on the theory of imperfect competition is in the area of monopoly. In "Some Notes on Monopoly Price" (1937b), Coase undertook to refine and further develop Mrs. Robinson's (1933) theory of monopoly by recognizing that the limited information, especially regarding marginal revenue, marginal cost and demand, under which producers engage in their decision making will often preclude monopolists from equating marginal revenue and marginal cost, and thus from producing the profit-maximizing level of output. Coase was also concerned that Mrs. Robinson's analysis did not give sufficient consideration to the effects of the time horizon, and he attempted to remedy this through an examination of the monopolist's situation in the face of short-run and short-run demands. What Coase found, in short, was that in an industry that has moved from a situation of perfect competition to one of monopoly, the short-

15. For surveys of the literature and presentations of the analytics of the various approaches to multi-part pricing, see Brown and Sibley (1986) and Berg and Tschirhart (1988). These sources also contain useful discussions of the limitations of approach that Coase is advocating.

run reduction in output and increase in price will tend to be less than that suggested by Mrs. Robinson, while in the long run these price and output effects will tend to be larger than she suggests.

In "Monopoly Pricing with Interrelated Costs and Demands" (1946b), Coase considers the pricing problems faced by a multi-product firm, specifically, how a firm that produces two goods determines the price and output of each, and how the firm will adjust prices and output levels for these goods in response to changes in taxes on or the demand for one of these products. Both Edgeworth and Hotelling had previously written on this issue, but in a highly mathematical way that was inaccessible to many economists of the day. Coase illuminates these ideas using the simple geometrical analysis that made Mrs. Robinson's *The Economics of Imperfect Competition* (1933) so accessible to the profession.

Coase's final foray into monopoly theory, "Durability and Monopoly" (1972a) did not come for nearly thirty years. In this article, Coase uses a simple graphical and intuitive framework to demonstrate that a monopoly firm which produces a good that is infinitely durable will be forced to sell the good at the competitive price, unless it can decrease the durability of the good or make contractual arrangements through which it promises to limit its production – a result which has come to be known as "the Coase conjecture". The debate over the conditions under which the Coase conjecture does and does not hold continues in the literature[16] its import being reflected in the conjecture's implication that when a monopolist produces a durable good, the welfare effects of this monopoly power will be negligible.

These four articles on monopoly and imperfect competition may seem to stand out as oddities within Coase's writings, in that they do not reflect the type of analysis with which Coase's name is usually associated. For the first three articles, at least, the issue is essentially one of events and timing – Mrs. Robinson's book on imperfect competition had just arrived on the scene, and Coase, like many others, was swept up in the many issues raised by her

16. See, for example, Bond and Samuelson (1984), Malueg and Solow (1990), and Karp (1993).

book. Moreover, two of these articles (1937b, 1946b) were the outgrowth of the course on monopoly that he taught at the LSE in the latter half of the 1930s. But these articles are also indicative of Coase's breadth, and, equally important, of his approach to doing economics: in each of these articles, the arguments are set forth with graphical and intuitive analysis, rather than with mathematics, an approach which reflects Coase's life-long distaste for using mathematics in his work.

4.3 *Accounting and Costs*

Coase recognized that the efficiency of the firm's operations depends a great deal on the proper determination of the costs of production, and for Coase this meant that costs must reflect "what you lose elsewhere by undertaking a supply" (Coase, 1970, p. 124), and efficiency thus requires that the accounting techniques used by firms reflect this method of measuring costs. In "Business Organisation and the Accountant" (1938), Coase uses the economic concept of opportunity cost to critique the theory and practice of cost accounting and to discuss some basic concepts of which the accountant must be aware in order to properly be of service in providing information for business decisions. Coase says that the focus of attention in making business decisions – whether they deal with changes in output, purchasing machinery, or closing down a particular area of operations – should be on how costs and receipts vary with alternative courses of action. In considering the estimation of these future cost variations, Coase eschews the traditional distinction between fixed and variable costs, as such a hard and fast dichotomy between types of costs can be misleading. Instead, he says, attention should be focused on the *avoidable* costs associated with each particular course of action under consideration, where by avoidable costs he means those costs that can be avoided by not pursuing that particular course of action. From this perspective, additional units of output are profitable as long as marginal revenue exceeds marginal avoidable cost, and total receipts exceed total avoidable costs (Coase, 1938, pp. 108-109).

Coase says that the proper measurement of avoidable cost involves a determination of the opportunity cost of a particular course of action:

> The cost of doing anything consists of the receipts which could have been obtained if that particular decision had not been taken ... This particular concept of costs would seem to be the only one which is of use in the solution of business problems, since it concentrates attention on the alternative courses of action which are open to the business man. Costs will only be covered if he chooses, out of the various courses of action which seem open to him, that one which maximises his profits. To cover costs and to maximise profits are essentially two ways of expressing the same phenomenon (Coase, 1938, p. 123).

However, he says, cost accountants do not use an opportunity cost conception of costs, but instead define costs as "all payments that have been made for purposes of production" (Coase, 1938, p. 124)[17]. Because accountants do not properly measure costs, it is questionable whether the businessman can determine accurately the profitability of various alternative courses of action (Coase, 1938, p. 128). However, Coase also recognizes the difficulty of implementing the methods that he advocates, and that, even if these methods are adopted, it would be difficult to determine the profit-maximizing course of action. Moreover, he says, the cost of implementing such methods may exceed the additional profits that would result (Coase, 1938, p. 111). To the extent that these accounting adaptations can be made, however, it will greatly aid the firm in the determination of the profit-maximizing level of output.

While "Business Organisation and the Accountant" has been reprinted in a collection of essays on cost analysis put together primarily for students of accounting and business administration[18], the central ideas contained in Coase's analysis have not had a major impact on accounting. Nor have these ideas

17. Having established the proper definition of costs, Coase then proceeded to illustrate the use of these concepts by applying them to the measurement of the costs of machinery, materials and the interest on capital.

18. See Solomons (1952).

– which fit quite neatly within the LSE tradition on cost theory – had much influence on economics. As James Buchanan points out, however, these essays have a great deal of relevance for the practice of economics, and the message, which represents an important departure from the standard neoclassical conception of costs, has been largely ignored. In neoclassical cost theory, "[c]osts are objectively-measurable outlays, approximated by the value of alternate product" (Buchanan, 1969, p. 28), which, when the usual maximization rules are applied, generate a determinate, objective outcome. Coase's approach, on the other hand, is subjective, one which "quite explicitly ties cost to choice" (Buchanan, 1969, p. 28) through a comprehensive application of the idea of opportunity cost.

Coase's essays on the relation between accounting and economics also show that his economic method of constructing accounts, if applied, would make these accounts more useful for *economic research*. Indeed, studies undertaken by Coase, Edwards and Fowler (1938, 1939) convinced them of the fruitfulness of an approach that looked at firm behavior through the use of accounting records. One of the major insights that they were able to draw from their examination of the accounting records of firms in the British iron and steel industry was that there are major asymmetries across firms in the industry, and they "considered these dissimilarities of such importance that it was not possible to offer a *composite* picture of the way in which assets, liabilities and profits moved in relation to one another through the [trade] cycle" (Coase, Edwards and Fowler, 1939, p. 31, emphasis in original). Perhaps the most important result of this finding is that it throws doubt on the concept of the "representative firm", a concept that is an integral part of firm and industry studies. Whether the use of a concept such as the representative firm is legitimate, then, depends on whether the industry data reveals the existence of such a firm. This, in turn, can only be discerned by examining firm-specific data, such as accounting records. But if their analysis is correct, and if the "representative firm" is in fact a non-existent entity in a wide variety of industries, the conventional economic approach to analyzing industries using the vehicle of the representative firm may well generate results that are inaccurate and misleading[19].

4.4. *Producers' Expectations*

Coase's only extensive encounter with the use of quantitative methods came about in an analysis of the formation of producers' expectations, an investigation undertaken along with Ronald Fowler in the 1930s, using the pig cycle as the case study. It was believed by many at that time that producers expected current prices and costs to continue into the future and that the adjustments in supply that resulted gave rise to disequilibrium cycles – the idea of the "cobweb theorem" in which the establishment of an equilibrium set of prices and quantities is precluded. Since the market for pig products seemed to satisfy the necessary condition for these disequilibrium cycles – that demand must be less elastic than supply – and since this market was generally accepted to embody such expectations-driven cyclical behavior, Coase and Fowler decided to put it to the test, and their results appeared in a series of articles published in *Economica* between 1935 and 1940[20]. What they found was that the conventional explanation for the pig cycle was incorrect, that producers did in fact adjust their expectations of prices and costs very quickly, and that the prediction errors arose from the difficulty of predicting variations in demand and in foreign supply. This led them to conclude that the explanation for the pig cycle must be found in sources other than the cobweb theorem. As B.P. Pashigian (1987, p. 463) has pointed out, the insights contained in these studies put forth the seeds of the rational expectations hypothesis that has come to play such a prominent role in modern macroeconomics, and this work was cited by Muth (1961, p. 21) in one of his classic papers on rational expectations.

19. Coase also maintains that there is an important link between accounting and the organizational structure of the firm. This is explored in Coase (1990).

20. See, for example, Coase and Fowler (1935).

5. Government, the Market, and the Role of the Economist in Public Policy

Many of Coase's writings have dealt with the role played by government within the economic system. His first major foray into this area was a book and a series of articles, published between 1946 and 1954, dealing with the development of the BBC broadcasting monopoly in Great Britain[21]. These works – which were undertaken in connection with the course on public utilities that Coase was teaching at the LSE – are largely positive and historical in nature, and are primarily concerned with describing the development of the BBC monopoly over all aspects of broadcasting, rather than expressing Coase's views of the BBC monopoly in particular or the economic role of government in general. The picture that emerges from Coase's analysis here is, in short, one of private entrepreneurial spirit in broadcasting followed by a process in which the government attenuated the rights of these private entrepreneurs in favor of the BBC, with these actions being defended on technical grounds, and, more frequently, on the grounds that it was desirable to maintain a BBC program monopoly so that only "good" programs were aired. What seems so vexing to Coase about all of this is not the monopoly *per se* – and, indeed, he never suggests that the monopoly should be maintained or abolished – but rather the lack of any substantial effort by policy makers to question the assumptions in favor of the monopoly or to conduct an in-depth examination into the desirability of alternative organizational structures. This is antithetical to one of the central themes of Coase's work – that the optimal course of action in a given situation can only be determined through a careful and systematic examination of the various available alternatives.

Coase undertakes a similar discussion of the British postal monopoly in a series of articles published between 1939 and 1961[22], and these articles, too, are largely positive in nature. What

21. See, for example, Coase (1950, 1954).

22. See, for example, Coase (1955).

his examination shows, briefly stated, is that while the postal monopoly was originally established as a measure to prevent treason and sedition, the force of this monopoly was continually applied to prevent the establishment of competing delivery services, such as the messenger companies and the Oxford and Cambridge Unions, which might injure Post Office revenues.

When Coase came to the US, his attention soon turned to an analysis of the US broadcasting industry, and, specifically, to the role played by the Federal Communications Commission (FCC). In contrast to his positive and largely descriptive analysis of the BBC, Coase's analysis of the FCC combined positive analysis with stiff normative judgment of the FCC's policies and practices[23]. His difficulties with FCC policies lie within two general areas: the allocation of radio frequencies and the method that determines which programs are broadcast.

Coase's aversion to the allocation of frequencies by government fiat was established in "The Federal Communications Commission", and he continued to emphasize this point in subsequent articles, calling the FCC's method of allocating frequencies by fiat "inefficient, inequitable, and inflexible" (Coase, 1966, p. 445), and "a poverty program for millionaires" (Coase and Johnson, 1979, p. 45). Coase gives four arguments in favor of adopting the pricing mechanism to allocate frequencies: (i) "It would avoid the need for much of the costly and time-consuming procedures involved in the assignment of frequencies by the Commission"; (ii) "It would rule out inefficient use of frequencies by bringing any proposal for the use of such frequencies up against the test of the market, with its precise monetary measure of cost and benefit"; (iii) "It would avoid the threat to freedom of the press in its widest sense which is inherent in present procedures, weak though the threat may be at the moment"; and (iv) "it would avoid that arbitrary enrichment of private operators of radio and television stations which inevitably follows from the present system" in which

23. That his attitude toward the FCC is less than charitable can be seen in his assertion that "The FCC is rather like a whale stranded on the seashore, waiting while the local inhabitants, ignorant of whale anatomy, try to show it the direction in which it should swim." Coase (1966), p. 445.

a person "may be granted a very valuable right, one for which he would be willing to pay millions of dollars and which he would be forced to pay if others could bid for the frequency" (Coase, 1961, pp. 53-54). Yet, despite what Coase considers its obvious advantages, those concerned with policy regarding the use of the radio spectrum seem resistant or oblivious to the use of the pricing system.

Coase also disagrees with the FCC policy regarding the financing of the broadcasting system, specifically, its support for the continuation of commercial television and for public television[24] as opposed to pay television. Coase favors the establishment of pay television, and his argument here, as in so many other instances, is based on consumer willingness to pay. The absence of a mechanism by which consumers can register their willingness to pay means that programs which are aired are those which attract the largest audience, rather than those for which consumers would be willing to pay the greatest sum of money. The result is that commercial broadcasting system may be preventing programming resources from being put into their highest-valued uses (Coase, 1966). The standard objection to pay television is that it means the end of free television, which would not be in the public interest. Coase's response is that "What is important is that factors of production should be used where their output is most valuable, and this is most likely to happen if the use of factors of production is determined by what consumers are willing to pay" (Coase, 1961, p. 57). That which is free "is not really 'free'", he says, "and it is less efficient" (Coase, 1961, p. 57). Coase (1968, p. 189) is convinced that the application of elementary economic principles could cure the problems of the US broadcasting industry, but he is of the mind that such a resolution will only come about if the FCC is abolished (Coase and Johnson, 1979).

Coase's discussions of the economic role of government may lead one to conclude that he is decidedly against the imposition of taxes, subsidies, regulations, and government allocative schemes, or, more strongly, that he is anti-government. And he indeed has

24. Coase calls the Public Broadcasting Act of 1967 "a wholly unnecessary and ill-conceived piece of legislation." Coase (1968), p. 2.

gone so far as to state that the government has now become so large that it has reached a state of "negative marginal productivity", and that "the governmental machine is now out of control" (Coase, 1977a, p. 6). However, Coase's opinions here are not driven so much by an inherent anti-government stance as by his belief that the results reveal that government action often (perhaps even usually) generates outcomes inferior to those that would be generated by the market, even in situations of supposed "market failure". Indeed, Coase insists that he is not anti-regulation or anti-government, and he recognizes that the abandonment of regulation would be tantamount to abolishing the legal system (Coase, 1977a, p. 7). What Coase is against is the idea that taxes, subsidies, and regulations are the appropriate solutions in all situations of market failure. In his view, the creation of new regulations and regulatory agencies usually proceeds without a careful examination of the benefits and, especially, the costs of such actions, a process that he attributes to the modern view of government as a savior from all manner of ills (Coase, 1968, p. 14).

Coase sees the question of whether to impose taxes, subsidies, or regulations, as opposed to doing nothing, as an exercise in benefit-cost analysis, where *all* benefits and *all* costs (including those of administering the policy) are taken into account. Each situation should be considered on its own merits, and we should "set up government departments when they do more good than harm" (Coase, 1968, p. 106). The "perfect government", he says, would do exactly this, and enact tax, subsidy, or regulatory schemes only if the expected gains exceed the expected costs, in order to maximize the value of output in society (Coase, 1988e, p. 25). Coase even goes so far as to advocate the extension of benefit-cost analysis to the types of personal rights and civil liberties covered by the First Amendment, as these rights too beget both benefits and costs (Coase, 1977a, p. 30). Coase is convinced that the source of the problems with government policy actions lies in the failure of the government to conduct in-depth studies of the effects of various policy alternatives. If such studies were made, he says, we would likely see a curtailment of many of the types of regulations that are currently in force. Despite Coase's pragmatism, however, there is little question that he maintains a preferential option for the market. As he has put it, "my general prescription for dealing with these matters of social policy is to let individuals decide, to decentralise the system and see what emerges" (Coase, 1968, p. 95)[25].

While Coase has been closely identified with the Coase theorem, with its implication that government intervention is unnecessary for efficiency, and with the Chicago school and its pro-market, *laissez-faire*, non-interventionist stance, a close examination of Coase's writings on the economic role of government reveals a far more pragmatic view than is implied by these caricatures. While there is certainly some degree of convergence between Coase and the Chicago school on this score, Coase's analysis displays much less anti-government animus than is evident within the Chicago school literature and much more emphasis on a case-by-case, benefit-cost approach. For Coase, the appropriate role for government within the economic system is not a matter to be settled by ideology or by mere assertion; rather, it involves the making of careful studies of the effects of the various alternative courses of action that are open in a given situation. A case can be made, then, that it is only because of his combination of a pragmatic approach with a belief in the overstatement of the benefits and understatement of the costs of government intervention that Coase's policy analysis sometimes approaches that associated with the Chicago school.

Coase's views on the role of the economist in the public policy realm[26] are clearly tied to his views on the economic role of government. Coase (1964, p. 196) says that economists have tended to view government agencies as "benevolent associations waiting to take over when the Invisible Hand points in the wrong direction" and are quite content to offer tax, subsidy, or regulatory remedies for any and all situations where markets fail, in their minds, to perform efficiently. Coase is convinced that "[t]his approach has serious weaknesses" (Coase, 1988e, p. 24). Specifi-

25. Coase finds support for the ineffectiveness of government programs and government agents in Smith's (1759, 1776) analysis of human motivation. Coase (1976), p. 544.

26. See, for example, Coase (1974a).

cally, economists have tended make policy proposals without a thorough assessment of their effects – of whether these policies are necessary, of the relative effects of alternative courses of action, and of whether these policies will make matters better or worse. The result, he says, is that "in economic analysis we have 'market failure' but no 'government failure'" (Coase, 1964, p. 196). Coase finds obvious examples of incorrect policy analysis in the advocacy of marginal cost pricing, in many analyses of externalities, and in economists' discussion of the lighthouse, to which he devoted a paper in 1974.

The lighthouse is, within economics, perhaps the quintessential example of market failure, presenting, it is claimed, a classic public good situation. Being both non-rival and non-exclusive in consumption, the lighthouse, as the story goes, could not be profitably provided by the private sector and thus should be provided by the government and financed out of general tax revenues. Coase (1974b) decided to examine the history of lighthouse provision in Great Britain, and what he found was that Great Britain once had a flourishing system of private lighthouses financed by tolls, and that this private system developed because the government agency in charge of lighthouse provision and administration had failed to provide them in adequate amounts. The profitability of this private system was reflected in the high prices that the government was forced to pay when it nationalized the lighthouse system in the nineteenth century. Coase contends that the failure of economists to realize that lighthouses could be privately provided resulted from their failure to make serious studies of lighthouse provision. "[T]he lighthouse", he says, "is simply plucked out of the air to serve as an illustration" (Coase, 1974b, p. 375). While Coase does not maintain that the private system, or even a public system with tolls, is necessarily superior, he says that economists are wrong in saying that these systems are unambiguously worse than public provision financed out of general tax revenues. The resolution of this matter, he says, requires further studies (Coase, 1974b, p. 376)[27].

27. For a critique of Coase's analysis of the lighthouse, see Van Zandt (1993).

However, Coase contends that the reason for economists' erroneous policy conclusions goes beyond their failure to undertake detailed studies of the objects and effects of government policy, and finds its root cause in economists' fixation with what he calls "blackboard economic". He believes that economists are overly prone to compare what they see in the real world with the ideal world of the blackboard and its mathematical optima, which likely cannot be attained, rather than with the alternatives that exist in the real world. "The analysis", he says, "is carried out with great ingenuity but it floats in the air" (Coase, 1988e, p. 28)[28], and the result is economic policy analysis that often obfuscates rather than illuminates the preferable course of action in the real world. Coase maintains that proper economic policy analysis will only follow upon the realization that "Economic policy involves a choice among alternative social institutions, and these are created by the law or are dependent on it" (Coase, 1988e, p. 28). Given this, "Economic policy consists of choosing those legal rules, procedures, and administrative structures which will maximize the value of production" (Coase, 1988e, p. 28). For Coase, comparative institutional analysis is fundamental for proper policy analysis. This is, in fact, a central theme of "The Problem of Social Cost" (Coase, 1993b, pp. 252-253). Effective analysis of this sort requires that economists do three things: (i) realize that institutions, institutional change and comparative institutional analysis are the central objects of economic policy study: (ii) modify their theories to make them useful for engaging in such studies; and (iii) acquire more knowledge about how the economic system actually operates, and specifically, engage in detailed studies of the effects of the various policy options that are available so that policy analysis reflects both the actual operation of market processes and the means through which government implements these policies.

28. Coase's references to blackboard economics appear already in the 1960s. Given that he continued to make these statements as recently as 1988, it would appear that developments in modern economics have done little to change his mind on this score.

6. Coase's Views on Economics and Economic Method

Coase's receipt of the Nobel Prize attests to the enormous influence of his work. Yet he is of the mind that he has been misunderstood and that most economists do not share his conceptions of the scope and method of economics (Coase, 1988e, p. 1). His perceptions on this score are largely true, and to understand them we must turn to a discussion of his views on economics and economic method.

6.1. *Economics, Economic Institutions, and Transaction Costs*

In his 1991 Nobel Memorial Lecture, Coase suggests that modern economics focuses primarily on the analysis of a highly decentralized economic system governed by a system of prices. This focus, he says, has left so many areas of economic activity unexplained that "it seems as though economists conceive of their subject as being concerned only with the pricing system and anything outside this is considered no part of their business" (Coase, 1992a, p. 714). The adoption of Lord Robbins's definition of economics as the science of human choice in a world of scarcity has opened up to economic analysis all areas in which choices are made – law, political science, sociology and so on. Yet, this view of economics, which gives it its wide applicability, is, in Coase's eyes, also its major short-coming. The problem, he says, is that the approach has become divorced from its subject matter – the decision makers within economic analysis are totally lacking in substance because of the failure of economists to seriously analyse the agents doing the choosing and the context in which these choices are made (Coase, 1988e, p. 3)[29]. The economic system and

29. The failure of economists to study the behavior of economic agents, and their assumption that individuals are rational utility maximizers, is called into question by Coase (1978), and his qualms about the assumption of rational utility maximization are an important component of his (1977b) criticism of economists' imperialistic forays into other disciplines. While a dim view of economic imperialism may seem odd coming from one so closely associated with law

the study of economics revolve around consumers, producers, markets and government. Yet, in Coase's view, the treatment of each of these in economic theory is either incomplete, misguided or wrong. The reason for this, he says, is our "lack of knowledge ... of economics. We ... *have a primitive analytical system* to handle the firm, the market, the process of contracting and property rights – all vital elements in the working of our economic system" (Coase, 1978, p. 244, emphasis added). What we have, he says, are "consumers without humanity, firms without organization, and even exchange without markets" (Coase, 1988e, p. 3). As a result, "we are appallingly ignorant about many aspects of the working of the economic system" (Coase, 1974a, p. 171).

Coase is firmly of the mind that an understanding of the economic system cannot take place until the activities and impacts of institutions, such as the firm, the market, and the law, are more fully understood and incorporated into economic theory. As described above, Coase believes that modern economics has proceeded for decades without any real theory of the firm *per se* and instead has been content with the analysis of price and output levels. Similarly, the analysis of markets has focused almost exclusively on price and output determination but is silent on the determination of and explanation for what and how much is actually traded (Coase, 1988e, pp. 7-8). Furthermore, the attempts by economists to analyse market structure ignore the role that social institutions, such as the law, play in the exchange process. Coase maintains that the central role played by the law within the economic system becomes clear when one recognizes that what are traded on the market are not physical goods, but rather "bundles of rights, rights to perform certain actions", and that what is traded, and how much, depends "on what rights and duties individuals and organizations are deemed to possess – and these are established by the legal system" (Coase, 1988a, p. 656). Moreover,

and economics, and with the Chicago school, where Gary Becker, George Stigler, and Richard Posner, among others, have done so much to further the expansion of economics into traditionally non-economic realms, this serves only to reinforce the pitfalls of aligning Coase with the Chicago view (and perhaps of assuming a homogeneous Chicago school approach).

the law also influences the costs of transacting and thus the workings of the exchange process. Given the importance of institutions in channeling economic performance, it is rather mystifying to Coase that economists could construct a theoretical apparatus that essentially ignores them. "It is", he says, "as if one studied the circulation of blood without having a body" (Coase, 1984, p. 230)[30].

Given the close association of Coase's name with the development of modern law and economics, Coase's emphasis on the law should come as no surprise. But yet, Coase's discussions here have a different flavor than one might expect, for he is decidedly ambivalent about much of modern law and economics[31], a position that has its roots in his vision of law and economics. For Coase, the important issues of law and economics revolve around the effects of law and legal change upon economic activity, and the incorporation of the study thereof within economic analysis. Modern law and economics, in contrast, is largely concerned with the application of economic theory to the law, or legal theory. Thus, when Coase (1992a, p. 717) says in his Nobel lecture that "The Problem of Social Cost" has thus far had little influence on economics, he is referring, at least in part, to the fact that economists have not yet seized upon the importance of studying the interrelations between law and economy – interrelations which he sees as an important component of the working of the economic system[32].

30. This sentiment is expanded on by Coase in his Nobel Memorial Lecture. Coase (1992a), p. 718.

31. See, for example, Coase (1992a, 1993b). Posner, for one, finds himself puzzled by Coase's attitude here. Posner (1993b), pp. 203-204.

32. Two further points may be noted here. First, Coase sees himself as an economist, not a legal scholar (and this in spite of his long association with the Law School at the University of Chicago), and thus is more interested in the influence of law on the economy than on the application of economic techniques in the realm of legal theory – even though his work has been used by others to engineer a revolution in legal thinking. See Coase (1993b). Second, Coase (1977b) is rather pessimistic about economic imperialism generally, and his views on the application of economic methods to the law fit squarely within this perspective.

For Coase, transaction cost play a central role in the analysis of economic institutions, and their importance is evidenced very clearly in his analysis in "The Nature of the Firm" and "The Problem of Social Cost". The recognition of the role played by transaction cost is, for Coase (1988e, p. 6), essential in order for economist to analyse understand the economic system, and for providing usefull policy recommentations. This is especially important given the magnitude of transaction costs in the economy. Citing the work of Wallis and North (1986), who find that transaction costs may amount to as much as fifty per cent of GNP in the US, Coase (1988d, p. 36) says that "their influence is bound to be pervasive. The range of goods and services supplied, the pricing practices, the contractual arrangements, the forms of economic organization, all will be affected, and affected significantly". Coase (1992a, pp. 713, 716) is well aware of the fact that incorporating transaction costs into economic analysis will fundamentally transform the character of the analysis and that this incorporation process will be a formidable task given their magnitude and complexity. Yet, he is of the mind that the benefits will be worth the costs, in that it will greatly enhance the explanatory power of economic theory. For Coase, this does not imply the overthrow of mainstream economic theory, the basic thrust of which he finds rather congenial. Rather, his goal is to enhance the descriptive power of this theory through the recognition of the roles played by institutions and transaction costs in economic activity.

6.2. *Realism, Mathematics, and Quantitative Analysis*

Coase's emphasis on the analysis of institutions and transaction costs, and his criticism of the lack of such analysis within mainstream economic theory, are reflective of his belief that economic theory needs to be grounded in reality, and this in two senses: the assumptions should be realistic and the theories should be pointed toward an understanding of the economic system as it actually operates. Modern economic theory, as Coase sees it, exhibits a great deal of "detachment from the real world" (Coase, 1988e, p. 23), both in its assumptions and in its analysis. This, he says, has unfortunate results: "[W]hen economists find that they are unable to analyze what is happening in the real world, they invent an imaginary world which they are capable of handling" (Coase, 1988c, p. 24). It is not the case that Coase is against abstraction. Rather, "the right degree of abstraction depends on the problem that is being analyzed. What I object to is mindless abstraction or the kind of abstraction which does not help us to understand the working of the economic system" (Coase, 1993a, p. 97). This emphasis on the importance of realistic assumptions puts Coase squarely and consciously at odds with the popular notion, owing to Friedman (1953), that the ability of a theory to predict well is all that matters. The generally accepted view ignores the greater role that theory plays in economic analysis. Besides generating testable hypotheses, theory provides a framework for organizing our ideas, and thus allows us to attain a greater understanding of the economic phenomena under consideration (Coase, 1982b, p. 6). The acceptance of theories based solely on their ability to predict well will not enhance our ability to explain how the actual economic system works, thus leaving theory deficient in performing its central task.

Coase's writings contains no mathematical analysis and virtually no quantitative analysis, and his comments on these techniques reveal that he is rather suspicious of them, although more so of the way that they have been employed than of their use *per se*. This suspicion revolves around the realism of mathematical techniques and the degree of confidence that one can put in statistical analysis. Coase's central criticism of the use of mathematical formalism in economics is that it tends to rob economics of its realism in favor of a world of assumptions which strip theory of the power to explain reality. In Coase's mind, too much of the profession's time is spent showing, with glorious mathematical flourishes, the optimal properties of dream worlds[33]. Furthermore, he believes that excessive reliance on mathematics has had a tendency to reduce the scope and depth of inquiry to those matters that can be handled with mathematics. Yet, he says, there are

33. See, for example, Coase's discussion of Baumol (1972), cited in note 11, above.

many subjects that may not be amenable to mathematical analysis, or which require a great deal of non-mathematical development (which he believes has not occurred) before the mathematics can be fruitfully applied. Marshall suggested that mathematics be used as a shorthand language rather than as an engine of inquiry. Coase (1975) is of the mind that economists have often reversed this emphasis, with most unfortunate results. However, Coase is not opposed to the use of mathematical techniques in economics, and he explicitly refutes claims of his supposed hostility to mathematics in his Nobel lecture (Coase, 1992a, p. 719). The key, for Coase, is that of the appropriate use of these techniques: they must be used in the construction of theories that are built upon a solid real world base so that they help us to understand the workings of the real world economic system. And, as he says in his Nobel lecture, "once we begin to uncover the real factors affecting the performance of the economic system, the complicated interrelations between them will clearly necessitate a mathematical treatment, as in the natural sciences, and economists like myself, who write in prose, will take their bow. May this period soon come" (Coase, 1992a, p. 719)[34].

Coase's perspective on the use of quantitative techniques parallels his views about the use of mathematics – that the techniques are not inherently bad, but that their application to this point leaves much to be desired. The qualms that Coase has about the use of quantitative techniques in economics are several. To begin with, he is concerned about the tendency of economists to come up with results that conform to their theoretical predispositions, an idea reflected in his now-famous assertion that "if you torture the data enough, nature will always confess" (Coase, 1982b, p. 16). Coase is also concerned with the problems that can arise from the rote application of quantitative tools. Already in 1938, Coase (1938, p. 153) cautioned that economists must go beyond the surface meaning of their results because the underlying meaning may turn out to be rather different. He is also concerned that reliance on quantitative analysis as the tool of theoretical validity reduces

34. Coase's views on the use of mathematics in economics are parallel to those which he finds expressed in Alfred Marshall. See Coase (1975).

the scope of economic inquiry to those questions which easily lend themselves to quantification (Coase, 1974a, pp. 180-181). The result, he says, has been a tendency to develop theories that are empirically testable, and to neglect or assume away those elements which are not measurable. This serves to limit both the relevance of the theory and the usefulness of the quantitative results.

How do these calls for greater realism transfer into the way in which economists do economics? For Coase, the answer lies in a greater emphasis on inductive, as opposed to deductive, analysis[35]. Coase (1975, p. 28) clearly identifies understanding the real world economic system with the use of inductive methods, and much of his own work reflects such an approach. We will touch on just two examples here. First, his pathbreaking analysis of the firm was largely the result of his spending an academic year in the United States visiting various industrial concerns and attempting to discern the forces which determine the extent of firm versus market organization. Second, the pitfalls that can attend excessive reliance on the deductive method are illustrated by Coase's analysis of lighthouse provision in Great Britain – which was largely an historical study using a vast assembly of public records on the subject. If one assumes non-rivalry and non-excludability, the necessity of public provision of lighthouses follows logically. What Coase showed, however, was that such assumptions were incorrect in this instance, and thus that the deductive method had led economists in the wrong direction. Coase has repeatedly called for economists to make more detailed studies of the economic system, and especially of the activities of firms and the structure of industries, the effects of law and of government policy generally upon economic activity, and the forces which motivate individual decision making, in order to further our understanding of the economic system. In Coase's mind, the types of studies that result from the adoption of an inductive approach make the real – world eco-

35. The most insightful discussion by Coase on this topic is in his analysis of Alfred Marshall's views on economic method (Coase, 1975), and the importance of the inductive method in the analysis of Smith and Marshall factors prominently in Coase's esteem for their work. See, respectively, Coase (1977c, 1975).

nomic system the starting point for economic analysis and can provide the foundation for an economic theory that more adequately explains the working of the economic system and which is thus more useful for undertaking policy analysis.

However, none of this should be construed to imply that Coase is against the use of the deductive method. As with abstraction, mathematics, and quantitative analysis, the issue, for Coase, is one of extent. There are certain places which inductive reasoning cannot take us or where reality is sufficiently complex that inductive methods cannot be fruitfully applied. For Coase, as for Marshall, both inductive and deductive methods have an important role to play in the process of theory construction. What seems to emerge most strongly from Coase's writings is the idea of using inductive methods to construct the foundation upon which deductive theorizing is conducted, or from which one can do deductive theorizing that is more solidly based. But from a more general perspective, the implication that one can draw from Coase's discussions is that he is calling economists to pay greater attention to the theory construction process and the importance of both induction and deduction in constructing useful economic theories.

7. Conclusion

While Coase is well known for his work in "The Nature of the Firm" and "The Problem of Social Cost", there are important insights to be gained from the entire body of his writings. Moreover, many of these insights add to an understanding of his best-known pieces and reveal a perspective that at times conflicts with the image of his work that has emerged in the literature. Particularly important here are the central themes appear throughout Coase's work: the importance of economic institutions, in particular the firm, the market and the law, and the need to carefully assess the merits of alternative institutional structures; the role played by transaction costs in economic activity; the virtues of the market and the pricing system; the need for economists to engage in detailed and systematic studies of the real-world economic system; and the importance of building economic theory and policy analysis on a real-world base, largely by incorporating more inductive analyses into the process of theory construction and policy analysis.

Several elements of the above discussion stand at odds with the received view of Ronald Coase – the Coase who has been so closely identified with the Coase theorem and the Chicago school. It has been established here and elsewhere[36] that the Coase theorem is relatively unimportant for Coase as a construct for understanding the working of the economic system. The above discussion also suggests that there are some important divergences between Coase's writings and that body of analysis that falls under the Chicago-school umbrella. Coase's pessimism about the insights provided by economic imperialism, including his direct critiques of modern law and economics and of Stigler's work on the economics of the political process[37]; his repudiation of Friedman's methodological position[38]; and his pragmatic approach to the economic role of government all serve to distance Coase's work from that of his Chicago colleagues. The fact that Coase claims that we remain ignorant about much of the working of the economic system also speaks to this point, given the enormous scope of the analysis done within the Chicago paradigm. Moreover, it is the New Institutional Economics, not the Chicago school, that has seized upon Coase's work on transaction costs and institutions to further the construction of an economic theory that is responsive to these concerns. Finally, it is the New Institutional Economics, not the Chicago approach, that Coase (1984, p. 231) has labelled "economics as it ought to be".

It is apparent that Coase is not wholly enamored of much of what goes on in modern economics, and the approach that he advocates is sometimes at odds with standard economic practice.

36. See Coase (1988e; 1993b) and Medema (1994b), Chapter 4.

37. On this latter point, see Coase (1994), p. 206. However, this essay on Stigler also contains a great deal of praise for the man and his work.

38. For a Chicago-oriented defense of Friedman against Coase, see Posner (1993a), pp. 76-77. Posner also claims in this article that it is wrong to identify Coase with the Chicago school. Posner (1993b), p. 206.

Yet, it bears keeping in mind that it was precisely this approach – including the emphasis on realism, the use of legal cases, the exploration of business practices, etc. – that led Coase to many of his important discoveries. The picture that emerges from Coase's work is one of an economist deeply concerned that economic theory mirror economic reality, and whose analysis made important advances toward that end.

References

ALCHIAN, A. A. and HAROLD DEMSETZ (1972), "Production, Information Costs, and Economic Organization", *American Economic Review*, December, 62 (5), pp. 777-795.

BAUMOL, W. J. (1972), "On Taxation and the Control of Externalities", *American Economic Review*, June, 62 (3), pp. 307-322.

BERG, S. V. and J. TSCHIRHART (1988), *Natural Monopoly Regulation: Principles and Practice*, Cambridge: Cambridge University Press.

BOND, E.W. and P.A. SAMUELSON (1984), "Durable Good Monopolies with Rational Expectations and Replacement Sales", *Rand Journal of Economics*, 15(3), pp. 336-45.

BROWN, S. J. and D. S. SIBLEY (1986), *The Theory of Public Utility Pricing*, Cambridge: Cambridge University Press.

BUCHANAN, J. M. (1969), *Cost and Choice*, Chicago: Markham Publishing Co.

CALABRESI, G. (1961), "Some Thoughts on Risk Distribution and the Law of Torts", *The Yale Law Journal*, 70, pp. 499-553.

CHEUNG, S.N.S. (1983), "The Contractual Nature of the Firm", *Journal of Law and Economics*, April, 26 (1), pp. 1-21.

COASE, R. H. (1935), "The Problem of Duopoly Reconsidered", *Review of Economic Studies*, 2, pp. 137-43.

— (1937a), "The Nature of the Firm", *Economica*, n.s., November, 4 , pp. 386-405.

— (1937b), "Some Notes on Monopoly Price", *Review of Economic Studies*, 5, pp. 17-31.

— (1938), "Business Organisation and the Accountant", in *Studies in Costing*, edited by D. Solomons, London: Sweet and Maxwell, 1952.

— (1946a), "The Marginal Cost Controversy", *Economica*, n.s., August, 13 (51), pp. 169-182.

— (1946b), "Monopoly Pricing with Interrelated Costs and Demands", *Economica*, n.s., November, 13 (52), pp. 278-294.

— (1950), *British Broadcasting: A Study in Monopoly*, London: Longmans, Green and Co.

— (1954), "The Development of the British Television Service", *Land Economics*, August, 30 (3), pp. 207-222.

— (1955), "The Postal Monopoly in Great Britain: An Historical Survey", in *Economic Essays in Commemoration of the Dundee School of Economics 1931-1955*, edited by J.K. Eastham, London: William Culcross and Sons.

— (1959), "The Federal Communications Commission", *Journal of Law and Economics*, October, 2 (1), pp. 1-40.

— (1960), "The Problem of Social Cost", *Journal of Law and Economics*, October, 3 (1), pp. 1-44.

— (1961), "Why Not Use the Pricing System in the Broadcasting Industry?", *The Freeman*, July, 11 (7), pp. 52-57.

— (1964), "Discussion of 'Direct Regulation and Market Performance in the American Economy', by R. E. Caves, and 'The Effectiveness of Economic Regulation: A Legal View', by R. C. Cramton", *American Economic Review*, May, 54 (3), pp. 194-197.

— (1966), "The Economics of Broadcasting and Government Policy", *American Economic Review*, May, 56 (2), pp. 440-447.

— (1968), *Educational TV: Who Should Pay?* (with Edward W. Barrett), Washington, D.C.: American Enterprise Institute.

— (1970), "The Theory of Public Utility Pricing and Its Application", *Bell Journal of Economics and Management Science*, Spring, 1 (1), pp. 113-128.

— (1972a), "Durability and Monopoly", *Journal of Law and Economics*, April, 15 (1), pp. 143-149.

— (1972b), "Industrial Organization: A Proposal for Research", in *Policy Issues and Research Opportunities in Industrial Organization*, edited by V.R. Fuchs, Cambridge: National Bureau of Economic Research.

— (1974a), "Economists and Public Policy", in *Large Corporations in a Changing Society*, edited by J. F. Weston, New York: New York University Press.

— (1974b), "The Lighthouse in Economics", *Journal of Law and Economics*, October, 17 (2), pp. 357-376.

— (1975), "Marshall on Method", *Journal of Law and Economics*, April, 18 (1), pp. 25-31.

— (1976), "Adam Smith's View of Man", *Journal of Law and Economics*, October, 19 (3), pp. 529-546.

— (1977a), "Advertising and Free Speech", in *Advertising and Free Speech*, edited by A. Hyman and M.B. Johnson, Lexington, MA: DC Heath.

— (1977b), "Economics and Contiguous Disciplines", in *The Organization and Retrieval of Economic Knowledge*, edited by M. Perlman, Boulder, CO: Westview Press.

— (1977c), "The Wealth of Nations", *Economic Inquiry*, July, 15 (3), pp. 309-325.

— (1978), "Economics and Biology: A Comment", *American Economic Review*, May, 68 (2), pp. 244-245.

— (1981), "The Coase Theorem and the Empty Core: A Comment", *Journal of Law and Economics*, April, 24 (1), pp. 183-187.

— (1982a), "Economics at LSE in the 1930's: A Personal View", *Atlantic Economic Journal*, March, 10 (1), pp. 313-314.

— (1982b), "How Should Economists Choose?", G. Warren Nutter Lecture in Political Economy, Washington, DC: The American Enterprise Institute for Public Policy Research.

— (1984), "The New Institutional Economics", *Zeitschrift für die gesamte Staatswissenschaft*, March, 140 (1), pp. 229-231.

— (1986), "Professor Sir Arnold Plant: His Ideas and Influence", in *The Unfinished Agenda: Essays on the Political Economy of Government Policy in Honour of Arthur Seldon*, edited by M.J. Anderson, London: The Institute of Economic Affairs.

— (1988a), "Blackmail", *Virginia Law Review*, May, 74 (4), pp. 655-676.

— (1988b), "The Nature of the Firm: Origin", *Journal of Law, Economics, and Organization*, Spring, 4 (1), pp. 3-17.

— (1988c), "The Nature of the Firm: Meaning", *Journal of Law, Economics, and Organization*, Spring, 4 (1), pp. 19-32.

— (1988d), "The Nature of the Firm: Influence", *Journal of Law, Economics, and Organization*, Spring, 4 (1), pp. 33-47.

— (1988e), *The Firm, the Market, and the Law*, Chicago: The University of Chicago Press.

— (1990), "Accounting and the Theory of the Firm", *Journal of Accounting and Economics*, January, 12 (1-3), pp. 3-13.

— (1991), "R.H. Coase, Autobiography", mimeo, Stockholm: The Nobel Foundation.

— (1992a), "The Institutional Structure of Production", *American Economic Review*, September, 82 (4), pp. 713-719.

— (1992b), "On the New Institutional Economics: Comments", in *Contract Economics*, edited by L. Werin and H. Wijkander, Cambridge, MA: Basil Blackwell.

— (1993a), "Coase on Posner on Coase", *Journal of Institutional and Theoretical Economics*, March, 149 (1), pp. 96-98.

— (1993b), "Law and Economics at Chicago", *Journal of Law and Economics*, April, 36 (1, Pt. 2), pp. 239-254.

— (1994), "George J. Stigler", in *Essays on Economics and Economists*, Chicago, University of Chicago Press.

Coase, R. H., R. S. Edwards and R. F. Fowler (1938), *Published Balance Sheets as an Aid to Economic Investigation: Some Difficulties*, Accounting Research Association Publication no. 3.

— (1939), *The Iron and Steel Industry 1926-1935: An Investigation Based on the Accounts of Public Companies*, London and Cambridge Economic Service Special Memorandum no. 49.

Coase, R. H. and R. F. Fowler (1935), "Bacon Production and the Pig-Cycle in Great Britain", *Economica*, n.s., May, 2 (6), pp. 142-167.

Coase, R. H. and N. Johnson (1979), "Should the Federal Communications Commission Be Abolished?", in *Regulation, Economics, and the Law*, edited by B. H. Siegan, Lexington, MA: Lexington Books.

Cooter, R. (1987), "Coase Theorem", in *The New Palgrave: A Dictionary of Economics*, edited by J. Eatwell, M. Milgate and P. Newman, London: Macmillan.

DeSerpa, A. C. (1993), "Pigou and Coase in Retrospect", *Cambridge Journal of Economics*, March, 17 (1), pp. 27-50.

Eggertsson, T. (1990) *Economic Behavior and Institutions*, Cambridge: Cambridge University Press.

Friedman, M. (1953), "The Methodology of Positive Economics", in *Essays in Positive Economics*, Chicago: University of Chicago Press.

Grossman, S. and O. Hart (1986), "The Costs and Benefits of Ownership: A Theory of Vertical and Lateral Integration", *Journal of Political Economy*, August, 94 (4), pp. 691-719.

Jensen, M. C. and W. H. Meckling (1976), "*Theory of the Firm: Man-*

agerial Behavior, Agency Costs and Ownership Structure", Journal of Financial Economics, 3, pp. 305-360.

KARP, L. S. (1993), "Monopoly Extraction of a Durable, Nonrenewable Resource: Failure of the Coase Conjecture", *Economica*, February, 60 (237), pp. 1-11.

KITCH, E. W. (1983), "The Fire of Truth: A Remembrance of Law and Economics at Chicago, 1932-1970", *Journal of Law and Economics*, April, 26 (1), pp. 163-233.

MALUEG, D. and J. SOLOW (1990), "Monopoly Production of Durable Exhaustible Resources", *Economica*, February, 57 (225), pp. 29-47.

MEDEMA, S. G. (1994a), *The Legacy of Ronald Coase in Economic Analysis*, 2 Vols., Aldershot: Edward Elgar Publishing.

— (1994b), *Ronald H. Coase*, London: Macmillan.

MUTH, J. F. (1961), "Rational Expectations and the Theory of Price Movements", *Econometrica* July, 29 (6), pp. 315-335.

PASHIGIAN, B. P. (1987), "Cobweb Theorem", in *The New Palgrave: A Dictionary of Economics*, edited by J. Eatwell, M. Milgate and P. Newman, London: Macmillan.

PIGOU, A. C. (1962), *The Economics of Welfare*, 4th ed., London: Macmillan.

POSNER, R. A. (1972), "A Theory of Negligence", *Journal of Legal Studies*, January, 1 (1), pp. 29-96.

— (1992), *Economic Analysis of Law*, 4th ed., Boston: Little, Brown and Company.

— (1993a), "The New Institutional Economics Meets Law and Economics", *Journal of Institutional and Theoretical Economics*, March, 149 (1), pp. 73-87.

— (1993b), "Ronald Coase and Methodology", *Journal of Economic Perspectives*, Fall, 7 (4), pp. 195-210.

PRIEST, G. (1977), "The Common Law Process and the Selection of Efficient Legal Rules", *Journal of Legal Studies*, January, 6 (1), pp. 65-82.

ROBERTSON, D. H. (1923), *Control of Industry*, London: Nisbet and Co.

ROBINSON, J. (1933), *The Economics of Imperfect Competition*, London: Macmillan.

RUBIN, P. (1977), "Why is the Common Law Efficient?", *Journal of Legal Studies*, January, 6 (1), pp. 51-63.

SMITH, A. (1759), *The Theory of Moral Sentiments*, edited by D. D. Raphael and A. L. Macfie, Indianapolis, N.: Liberty Press, 1982.

— (1776), *The Wealth of Nations*, edited by Edwin Cannan, New York: Modern Library, 1937.

SOLOMONS, D. (1952), *Studies in Costing*, London: Sweet and Maxwell.

STIGLER, G. J. (1966), *The Theory of Price*, 3rd ed., New York: Macmillan.

VAN ZANDT, D. E. (1993), "The Lessons of the Lighthouse: 'Government' or 'Private' Provision of Goods", *Journal of Legal Studies*, January, 22 (1), pp. 47-72.

WALLIS, J. J. and D. C. NORTH (1986), "Measuring the Transaction Sector in the American Economy, 1870-1970", in *Long-Term Factors in American Economic Growth*, edited by S. L. Engermand and R. E. Gallman, Chicago, University of Chicago Press.

WILLIAMSON, O. E. (1975), *Markets and Hierarchies: Analysis and Antitrust Implications*, New York: The Free Press.

— (1985), *The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting*, New York: The Free Press.