Treasury Board
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Government Intervention in the Marketplace and the Case for Social Regulation

One of a Series of Studies on
Government Regulatory Activity

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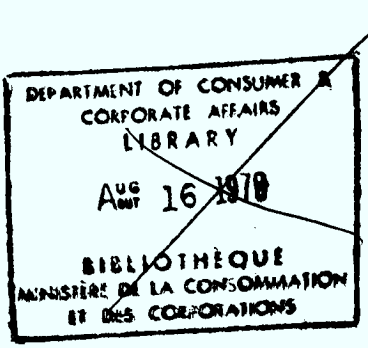

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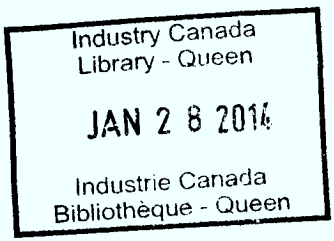

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Foreword

In recent years, increasing concern has been expressed both inside and outside government about the social and economic impact of government regulatory activity. On the one hand, the regulatory process itself has been faulted for being insensitive to public needs and opinions while, on the other hand, doubts have been expressed concerning the efficiency and effectiveness of particular regulations, standards or guidelines. More specifically, with the onslaught of serious inflationary problems, it has been argued that regulations may be unnecessarily adding to costs and prices. In fact, it was in the context of the establishment of the Anti-Inflation Board and the resulting debate on controls and post-controls policies that the Cabinet directed the Department of Consumer and Corporate Affairs and the Treasury Board Secretariat to assess the feasibility of applying cost-benefit and related methods of analysis to government social regulations, and to suggest modifications to the regulatory process which might encourage greater public participation.

In response to this mandate, a Working Group on Social Regulations, chaired by François Lacasse of the Treasury Board Secretariat, was established. In the Department of Consumer and Corporate Affairs, the project was originally directed by Lawson Hunter and subsequently by Dale Drr. Other members of the Working Group included Harry Baumann (Project Manager), Bruce Montador, Michel Proulx, André Morin and Joan Huntley (Treasury Board Secretariat) and Lee McCabe and Ron Hirshhorn (Consumer and Corporate Affairs). As well, the Working Group received advice on legal matters from Allan Rosenzveig (seconded to CCA from the Department of Justice). The Federal-Provincial Relations Office made available the services of Richard Schultz as a consultant on jurisdictional problems between levels of government in the regulatory area. In addition, the Working Group received considerable help on technical matters from the Departments of Transport, Environment, Health and Welfare, Energy Mines & Resources as well as the National Research Council and the Atomic Energy Control Board.

Because of the nature of the mandate and the limited resources, the Working Group pursued the following operational strategy. First, it concentrated on health, safety and fairness regulations leaving aside economic or rate-setting regulations. This decision proved to be fortuitous since little research on social regulations has been carried out in Canada, and more extensive provisions exist for public participation in the rate-setting process. Second, the Working Group decided to study both the allocative and non-allocative effects of regulations. In other words, the Working Group was concerned not only with the impact of regulations on economic (market) efficiency, but also their impact on (a) the distribution of income - who pays, who benefits (b) technical progress (c) international competitiveness (d) regional balance (e) market structure (f) inflation. Third, the Working Group decided to prepare two types of background papers. The first type were general studies on the reasons for social regulation, the US experience with regulatory reform, the regulatory process in Canada and techniques for the evaluation of regulations. The second group of papers consisted of case studies of representative regulations of recent vintage in the health, safety and fairness area.

Since a major purpose of this project was the examination of various mechanisms for encouraging greater public input into the regulation-making process, we have decided that selected background papers and case studies prepared by the Working Group should be published in order to increase public awareness of this very important aspect of government activity.

Sylvia Ostry
Deputy Minister-CCA

Maurice LeClair
Secretary-TBS

Summary

There is a fairly widespread belief among economists that social regulation is one of the least effective tools available when government intervention is needed to correct failures in the market economy.

Although this ineffectiveness has been fairly extensively documented for regulations of the economic (or rate-setting) type, to apply this conclusion to social regulations (health, safety and fairness), which are the primary focus of this project, appears somewhat premature.

This study examines the need for such intervention and the various tools available for responding to that need. The theoretical superiority of non-regulatory methods of intervention is found to be partially circumscribed by some theoretical and practical considerations. In particular, questions of uncertainty about results (such as the effect of effluent charges on pollution levels) and of timing (how long would other methods take to produce results: no one really believes that market equilibrium is instantaneous) lend some theoretical respectability to the case for regulations. That case is, however, found to rest more on their greater administrative and political feasibility than on arguments about market efficiency. Regulations are seen to facilitate the consideration of non-allocative factors such as income distribution and technical progress, and to have the political advantage of appearing to respond directly to the problems at hand (pollution, worker safety, etc.).

The study finds that economists' fears about market inefficiency arising from the use of regulations have considerable justification, but that the various practical arguments in favour of regulation preclude widespread deregulation as a solution to the problem of inefficiency. The study then concludes that there is a case for regulation, largely on practical grounds, but that proper evaluation of proposed regulations is required to ensure that the cost of the market inefficiencies is not significantly greater than the practical advantages. However, the argument for evaluation is less strong for minor regulations because the resources needed to carry out the evaluation may outweigh any possible savings.

Government Intervention in the Marketplace and the Case for Social Regulation

I Introduction

Economists have recognized and accepted for a long time the need for government intervention to resolve problems in the individual markets of a free enterprise economy, but the scope and form of such intervention has been the subject of much controversy. This paper attempts to describe the more frequent types of malfunction that can occur in market economies and the various remedies proposed.

An examination of the problems and the possible solutions will show that regulation can play a useful role more often than is commonly credited. Political and administrative factors are the principal reasons for preferring regulation to more market-oriented solutions, but there are theoretical justifications as well, at least in some circumstances. Regulation may well be justified in areas of considerable uncertainty, such as possibly dangerous food additives or occupational health. Nevertheless, the theoretical case for limiting regulation as much as possible remains strong. The assessment of proposed regulations can be seen as a partial reconciliation of economic and administrative considerations, even though regulations cannot force the market to internalize all the social costs and benefits, which is what economic theory recommends.

II The Reasons for Intervention

Government intervention in a specific market is usually justified on the basis of the existence of externalities, of social costs (or benefits) that differ from private costs, or of market failure. These concepts are in reality the same thing -- a failure of the market to equate marginal social benefits and costs. Such failures occur when participants in market transactions neglect the benefits (and costs) which do not affect them. In this section we will endeavour to provide an inventory of the various types of market failure.

A. Small Number Externalities. This refers to a type of market failure in which transactions affect only a small number of 'outsiders', often those close to the location where the transaction occurs. The impact of an unpainted fence or a noisy dog on a neighbour's peace of mind (or his property's value), and the benefit to a beekeeper from the apple blossoms in a nearby orchard are but a few examples.

B. Large Number Externalities. These occur in cases where the number of affected non-participants is quite large (without 'equaling' society as a whole). A factory's noise or dust could disturb the life of its neighbours within some limited radius; a new office building could create traffic problems or, alternatively, provide additional business for nearby shops and restaurants. The number of 'outsiders' involved implies an organizational problem in any negotiations which may take place. Similar difficulties can occur when the number of participants is large, regardless of the number of affected non-participants; for example, the littering of a public beach affects adversely the business of adjacent hotel owners.

C. Monopoly Power. When one party to a transaction (or both) is not a perfect competitor, there is a resulting misallocation of resources whose impact is, in some sense, felt by society as a whole. The monopolist produces too little output and sells it at too high a price relative to production and prices in competitive sectors. This misallocation of resources and the resulting welfare loss is well documented in the economic literature (cf. for example Hirshleifer, Price Theory and Applications, p. 285). The argument becomes more complicated in the case of an oligopoly, where the major problem is an over-emphasis on non-price competition (advertising, etc.), but it remains essentially the same.

D. Market Failure due to Uncertainty or Lack of Information. When there is a high risk that an expected profitable return will not be realized, and when insurance against this risk is not available in the marketplace, a desirable undertaking may not occur. In other cases, a lack of information about the true nature of the benefits and costs may result in over- or under-utilization of some good or service. The lack-of-insurance case could arise when a project is of an insufficiently common type -- there would then be no actuarial basis for setting premiums. With few potential customers, there is little chance that a market would develop. Such a situation could arise for some types of research-and-development projects (for example, efforts to develop new energy sources or cures for cancer.) Incorrect or insufficient information may well produce results that are less desirable than those arising from full information. These problems may well be among the most common; two examples are the insufficient use of insulation in homes, because of a lack of information about the impact of the change in real energy prices, and too much smoking as a result of a lack of knowledge about the pain and suffering associated with lung cancer.

A separate category of market failure due to uncertainty is the frequently cited 'imperfect capital market' which does not allow individuals to borrow as much as they should be able to, given their expected stream of future income. Many examples of such 'capital market failures' are discussed in the economic literature -- students' difficulties in obtaining loans through normal banking channels are the most well known. The inability of future generations to participate in current market activities is related to this type of market failure. This problem is important when questions of investment or the environment are discussed.

E. Market Failure when the Benefits or Costs Accrue to Society rather than the Participants. Some types of transactions have costs or benefits which fall to society as a whole rather than to any specific group. The cases referred to in section B overlap this case when the number of affected non-participants increases as a proportion of society as a whole. Examples include assumption by the state of medical costs (and of workmen's compensation) with a consequent lowering of an individual worker's level of safety precautions below the social optimum; or types of pollution (radioactive fallout, ozone depletion) with pervasive effects. Situations in which the community as a whole receives benefits from the transaction (for example defence, national parks) are described in public good literature.

Before discussing the various solutions which have been proposed, and the choice of solutions most appropriate for each type of problem, it is necessary to eliminate one of the types of market failure from the discussion. Monopoly power (Case C), the resource misallocation which results from it, and the proposed forms of government intervention (including 'rate-setting'), are a large and well-known part of the

economic literature. These questions are beyond the scope of this project, which is limited to problems which are not simply the misallocation of resources associated with inappropriate production or price levels. The impact of both market failures and proposed solutions on the competitive nature of a market will be considered, as well as the effects of a non-competitive market on the presence and persistence of externalities (for an example of possible dynamic or technological effects, cf. Lee McCabe: A Case Study of Consumer Product Safety: Glazing Regulations Under the Hazardous Products Act).

III The Instruments of Intervention

This section lists the various corrective measures which have been proposed from time to time as solutions to the problems of market failure.

A. Morality in the Marketplace. It is unduly cynical to attribute to participants a single-minded pursuit of maximum profit or personal utility since few activities are carried out entirely without regard for their consequences for health, safety or the environment. The social concerns of market participants are sometimes said to be sufficient to ensure an adequate preoccupation with the types of problems under consideration. Rather less naïvely, self-policing (by industrial associations for example) can produce significant changes in business practice, especially when it is designed to forestall a more active intervention by the authorities.

B. Private Market Action. In those cases involving a small number of individuals or firms, voluntary agreements (compensation or 'bribes') between the parties will produce the most acceptable trade-off. If dust from one factory lowers the productivity of a neighbouring laundry, the victim can 'bribe' the polluter to reduce his activity until the marginal benefit he gets from the reduced pollution equals the marginal cost in the lost production profits of the polluter. (The interested reader will find in Appendix A a diagrammatic analysis of this case and a discussion of the impact -- or lack thereof -- of the assignment of property rights in such circumstances.)

C. Private Legal Action. When property rights are clearly defined (for example, the right to unimpaired enjoyment of waterfront property) the legal system permits injured parties to sue for damage. Even in cases where the number of 'victims' is large, class action suits facilitate the enforcement of such property rights.

D. Public Market Action. One method, designed to control pollution economically, involves direct government action to set fees for the right to pollute (with the fee being based on the physical amount) or to conduct auctions of pollution permits. In essence this implies that the government (society) owns the assets (air, water) and, in a manner quite similar to the private market action described above, it sells the right to pollute in an effort to reduce pollution in an economically efficient manner. (This point is discussed more fully in Appendix B.) Both of these market solutions could involve legal action in order to enforce the agreements undertaken, but their essential feature is the use of market mechanisms to achieve cost minimizing solutions.

E. Public Legal Action. Government regulations are enforceable through the legal system and, in addition to the damages that might be recoverable by private interest, legal sanctions (including prison terms) can act as a deterrent to would-be violators. If the government owns the natural environment, for example, it can set specific limits, including outright prohibition, in order to reduce pollution.

F. Public Fiscal Policy. This last major category includes many different types of intervention tools: differential taxes for polluters and non-polluters; subsidies to encourage correction of undesirable practises; direct government expenditure for goods and services, such as municipal water treatment plants, or on information, such as the advertising campaign to promote increased use of insulation in homes.

IV The Assignment Problem: Which Instrument to Use

In discussing the various problems that intervention is supposed to solve and the different forms that it may take, it will be seen that some solutions are inappropriate and others are appropriate only for some problems.

1. The idea that morality and social responsibility on the part of businessmen will solve the problems discussed earlier is one which does not have a great deal of support outside the business community. Too many recent events -- thalidomide, the cargo doors of DC-10s, hexachlorophene in baby powder, ozone depletion by some aerosol sprays, and so on -- have left the public dubious about self-policing by industry. Some would argue that such incidents demonstrate that business altruism is at least inefficient since by its nature it forms part of the market forces. However, if business performance was less than optimal because of a lack of information, not just about a product's hazards, but about the very possibility that it might be dangerous, this would not <u>of itself</u> prove the inability of business morality to tackle the problem. Nevertheless, the degree of social responsibility exhibited by business is unlikely to be sufficient.

In the case of large, well-known companies, however, the danger of costly adverse publicity may be important enough to force them to internalize social costs and benefits. Self-policing on social questions by an industry may occasionally be efficient -- if the reduction in results is offset by the saving that arises from not having to set up a mechanism to enforce the socially optimal standards.

2. Economic theory suggests that where only a small number of winners and losers are involved, agreements freely arrived at by the parties will lead to the optimal solution (cf. Appendix A.). The only difficulty that could require intervention is the existence of market

power on one side of the negotiations -- an industrial firm has more resources at its disposal than do a small number of citizens living near its smoky factory. As an example of both aspects consider the case of the BP and Volvo factories in Göteberg, Sweden. After negotiations BP agreed to restrict the refinement of low-quality petroleum, the by-products from which corroded both the metal inventory and the newly painted cars at Volvo's site, to when the wind was blowing from Volvo towards BP. Of course the people who lived on the other side of the oil refinery did not participate in the negotiations.

3. The idea of private legal action or of class action suits is one that is suggested more and more frequently as a means of obtaining damages for flawed or dangerous goods, or for the inconveniences and losses due to pollution. In cases where a large number of parties are involved class actions may encourage the seeking of redress. However, a problem results from the decision criteria used by the legal system. In many cases the decision of a court will be based on an all-or-nothing approach to the assignment of blame. Even in cases where partial liability is possible (e.g. automobile accidents) the burden is assigned on grounds that have little or nothing to do with economics. Moreover the uncertainty in which the results of judicial process are clouded makes it even less likely that individuals can arrive at a near optimal position through the courts, and the costs of initiating legal action may well prevent them from trying.

4. In cases of market failure where the large number of actors prevents negotiation (and where legal solutions, if any are possible, are costly and inefficient) the standard prescription of the economic theorists has been the use of taxes, subsidies, fees, and, where necessary, direct government expenditure (the public goods case). This proposition suggests that distortions that arise from market failure should be removed by introducing precisely offsetting distortions, allowing market forces to achieve the desired allocation of resources. However, subsidization and tax credits to encourage 'good' behaviour (effluent control

for example) do have the disadvantage of being in part a direct assumption by the government of the cost of projects which might have been undertaken in any case by private industry (and paid for by the users of the trouble-causing good or service). Moreover, such policies may even encourage an undesirable expansion of a polluting industry by attracting new participants to a market. A per unit tax or fee for the right to produce 'bads', or an auctioning-off of the rights is widely regarded as the best policy. It achieves a given desired reduction in the production of 'bads' for the least economic cost (cf. Appendix B).

The idea of government regulation is generally dismissed by theorists as an unnecessary and expensive interference with the market economy (cf. Stigler, "The Theory of Economic Regulation"). They argue that government regulations inhibit the flexibility with which the market can adjust to changes, in part because of the sluggishness of the regulatory process. There is a widespread belief that this rigidity inhibits competition among existing market participants and creates barriers to the entry of new participants. These barriers are sometimes said to be created by the regulatory commissions or agencies themselves after they have been captured by the firms which they are supposed to police. Although the 'capture' theory of regulation was originally formulated for the economic regulatory agencies that deal with the problems of monopoly (e.g. CTC, the American ICC) it has been extended to include social regulation of the 'food and drug' type.

More recently both the 'capture' theory and the 'public interest' theory (which describes the supposed goal of regulation and, hopefully, of the regulators) have been judged overly simplistic. A more eclectic view has emerged. Different factors appear in different cases -- in the US the ICC favours the trucking industry over the railroads for example, and the regulators' highest loyalty sometimes goes 'neither to the "public interest" nor to the regulated industry, but to regulation itself'. This eclecticism does not mask the fact that the forces of

market competition are restricted, however, and economists' analyses are still generally unfavourable. The tax system is still the orthodox economist's preferred method of correcting market failure.

Nevertheless, the conclusion that market-type solutions (taxes, fees, etc.) are the appropriate solution is not without its problems. The first and obvious one is the need to establish an appropriate fee structure. If the goal is to approach the optimum, to reduce total pollution by 70 per cent for example, it would require considerable knowledge of production possibilities to be able to set the appropriate fees. Moreover a trial-and-error approach would be most undesirable because of the large and differing investments that might be appropriate for different fee structures, so that frequent or even occasional changes in fees could be very costly. In addition, the costs of maintaining and enforcing a fee structure may reduce the comparative disadvantages of regulation. Another objection is the political difficulty that can arise when such a discharge fee policy (in the case of pollution) is interpreted by the public as toleration of pollution (or some other undesirable consequence of the market system). The public wants prohibitions or quantitative restrictions because they are more reassuring than reliance on mysterious market forces.

For some types of externality total prohibition may be the only solution. These include: toxic, non-degradable pollutants (mercury, lead and other heavy metals in some of their uses) except in closed systems; dangerous cosmetics and food additives with no redeeming features; and misleading advertising when consumers are not in a position to know the true facts about a product.

Recently, some economists (cf. Baumol and Oates, The Theory of Environmental Policy, and Appendix C) have come to the conclusion that under certain circumstances a strong case exists for regulation of pollution and other forms of market failure, in combination with a fee

structure. What are these circumstances? Basically they involve situations of uncertainty or of incomplete knowledge of the ultimate effects of these ultimate social costs. In the case of non-degradable substances, especially those which accumulate over time, a healthy margin of error provided by tight regulations (or outright prohibition) may be desirable. In pollution cases, regulation may be necessary in order to permit differential use (swimming, fishing, industrial use, etc. of various rivers and lakes, for example) although differential fee structures could have a similar effect. Even in the standard analysis of such problems and their elimination, it might be necessary to introduce some regulations in order to prevent random events from producing an unacceptably high level of a 'bad' in spite of the presence of taxes. (The effect of freak weather patterns on air pollution is an example of this type of problem.)

An oft-quoted example of intervention which uses a veritable potpourri of tools to correct pollution problems is the Genossenschaften which control the water supply of the Ruhr Valley. These co-operatives have mandatory membership and combine effluent charges with the provision of public goods (recreation facilities and an aesthetic exterior for the 'drains') while occasionally using regulation (such as a ban on 'hard' detergents). The fee structure recognizes the importance of equating the marginal costs of abatement across sectors (although it does not take into account the possibilities of 'peak-load' pricing). Some problems have yet to be dealt with -- in particular the downstream costs of some pollutants, salts in particular, are not (yet) removed from the Ruhr where it joins the Rhine.

5. In some cases the problems of ignorance can best be treated by an information campaign, a possible example being the case of home insulation and energy conservation. This is because any effort to regulate may be far too costly, and subsidies and tax credits tend to pay in part (sometimes in large part) for private expenditures that would be made in any case, thus redistributing resources in a manner which may well be inequitable.

A more vexing problem occurs when the expected costs of a market transaction -- or any other private action -- are borne by society rather than the transactor. A case in point is the problem of safety when medicare covers medical benefits. Current Canadian medical insurance schemes preclude any differential premium structure. Moreover, many of the risky actions for which higher premiums might be charged may be undetectable after the fact (e.g. not wearing car seat belts if the victim can get himself out of the car). Regulation or prohibition -- with random enforcement -- is more likely to produce near-optimal behaviour. However, this type of action raises the difficult question of individual freedom. Existing policies dealing with alcohol and tobacco are also examples of the government 'knowing what is good for you'. This is a fundamental social question. Alcohol and tobacco taxes can, in principle, be designed to recoup the additional social costs not borne by the individual (the U.K. proposes to tax cigarettes in proportion to their tar and nicotine levels) but differential taxes and fees are not always possible, especially when private action concerns unsafe behaviour rather than the consumption of hazardous goods.

V The Particular Problems of Social Regulation

It is difficult to draw any hard-and-fast rules from the foregoing discussion. Regulation may be justified on theoretical grounds or for political or administrative reasons. It may not be justified at all. However, the question that must be answered is not only 'to regulate, or not to regulate?' but also, 'how much regulation is needed?' The analysis of the advantages and disadvantages of the various forms of government intervention suggested that relative costs and benefits (in the form of administrative and market flexibility, costs of operations, target efficiency, etc.) should determine the choice of intervention tool. In fact the choice of an instrument, and its strength, should both result from a careful analysis of the costs and benefits that intervention will produce. The need for such an assessment is particularly acute in the case of social regulation, where the problem being tackled is often quite removed from any direct economic considerations (e.g. pollution, hazardous products). If the regulator is preoccupied with the problem itself, economic factors may be forgotten in deciding either the type or the extent of regulation that is required.

Of course the assessment of regulations, or of any other government activity, is itself costly. The desirability of ensuring that regulatory activity be as efficient as possible (within the framework under which it is conducted), both by itself and with respect to changes in the economy over time, does not mean that all regulations ought to undergo an economic assessment. Some will be too urgent, such as matters that pose an imminent threat to public health. In other cases the actual costs of an evaluation would be larger than the possible losses from inefficiency. However, one of the fears often expressed (by business in particular) is that a steady flow of such individually insignificant regulatory changes will have an important cumulative effect. These small changes may not even have a measurable effect if considered one by one, and yet the need to put them in an economic context is the same as

it is for more important regulations. The problem is to some extent intractable, since a series of minor changes would only have an important (measurable) cumulative impact some time after the first changes were made, so that it would difficult to obtain data that represent the path not followed (see Appendix E for details).

The appropriate way to select an intervention tool is therefore to measure the efficiency of the whole spectrum of possible policy instruments. More specifically, it is important to select the appropriate policy instrument on the basis of its effect on various administrative, political and legal considerations, on distributional equity, on the level of competition, and on technical progress (dynamic efficiency), as well as on the basis of its effect on static, market efficiency narrowly defined.

Another paper in this series (see M. Proulx, Evaluation Methodologies for Social Regulations) describes the methods of evaluation that can be applied to the regulatory process and the special problems that occur with such use. It will explain that acting upon the results of a cost-benefit analysis ensures efficient resource allocation for all government intervention in the economy, while cost-effectiveness analysis ensures efficiency in obtaining a given reduction in particular external effects. However, an analysis of the non-allocative effects (also explained in Proulx) must be carried out in order to account for the additional macro-economic factors discussed earlier. Of course, the use of various techniques of analysis in combination means that the findings must eventually be weighted in some arbitrary manner in order to derive a firm policy conclusion.

VI Conclusion

Although economists would favour the consideration of a fairly wide range of policy options (negotiation, auctioning property rights, taxes and fees as well as direct controls), they have often been critical of prohibitions and regulations. They favour other policy tools (and even recommend deregulation) because

i) they tend to emphasize market efficiency while ignoring problems such as equity, which in theory can be solved by other, purely redistributive measures; and

ii) controls have a strong tendency to exceed their appropriate bounds because the regulators, having a vested interest in regulations, are more likely to err on the side of too much rather than too little.

These fears about market inefficiency have considerable justification, but the various practical arguments in favour of regulation (as well as some theoretical lacunae in the deregulators' arguments) preclude the wholesale abandonment of regulation, particularly social regulation, as a policy tool. However the case for regulation does not remove the need for the proper evaluation of proposed regulations. Indeed such evaluations are required to ensure that the cost of the market inefficiencies associated with the regulatory process are not incommensurably greater than its practical advantages.

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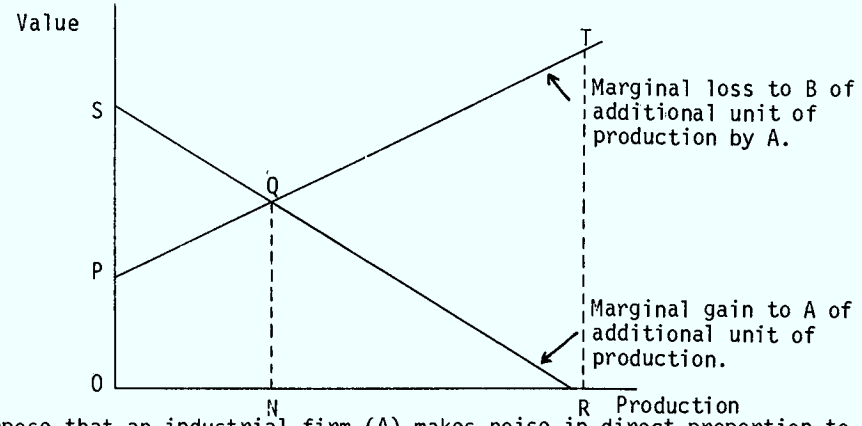
Exchangeable Property Rights

This appendix illustrates the ability of private negotiations between affected and affecting parties to control the level of an externality -- producing activity in an optimal manner. This possibility arises from the unambiguous assignment of exchangeable property rights. When the number of parties on one or both sides is large, the analysis on which this result (known as the Coase theorem) depends no longer holds true. In the simplest case, where the activity of one agent affects unfavourably the well-being of another, this appendix gives a diagrammatic proof of the result.

Consider the following diagram (from Turvey)



Suppose that an industrial firm (A) makes noise in direct proportion to the scale of its (continuously variable) production. A nearby recording studio (B) must filter out this noise to be able to record. If firm A maximizes profit without regard for the cost to B it will produce at the level OR and its total profits will be given by the triangle ORS. The cost to B of filtering out the noise also varies with the level of A's activity and the marginal cost of additional filters increases. If A produces on a scale of OR the total cost to B is the quadrilateral OPRT. If A and B are the only agents involved and if A is not responsible for the costs generated by its noise -- if it has the property right of

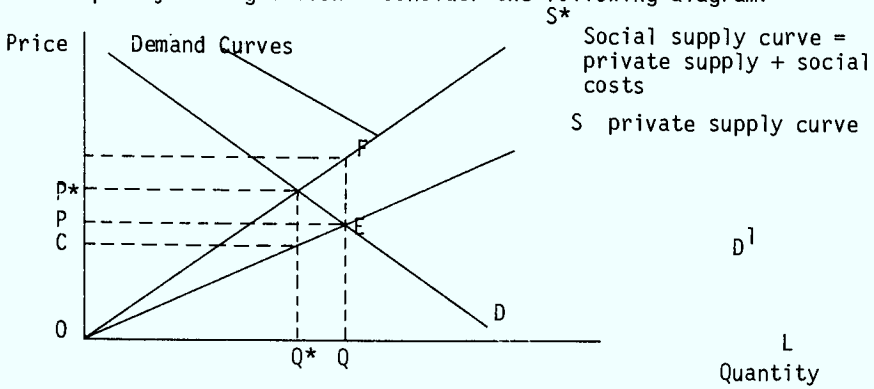
making as much noise as it wants -- then A would produce at the level OR and society would lose on balance as B's total losses exceed A's total gains. However, an examination of the diagram shows that with the cost curves as illustrated, it would be in A's interest to accept anything greater than NQR from B in return for limiting its production to ON, and that B would be willing to pay A anything up to NQTR in return for such a limitation. In fact if A and B have full knowledge of each other's cost curves then a move from OR to ON gives them a gain of QTR to divide between them.

Moreover, this solution is independent of the assignment of property rights for, if the recording studio had the right to absolute silence, it would still pay both parties to move from no production to ON, with the area SQP to divide between them after A has compensated B by (at least) the amount PQNO.

This analysis is very simplistic and depends upon the limited number of parties, the certainty of the property right assignment and of the knowledge of costs and benefits, as well as relying on the saleability of the property rights. However, it does illustrate some of the possibilities for private market solutions to the problem of externalities.

Externalities and Taxes

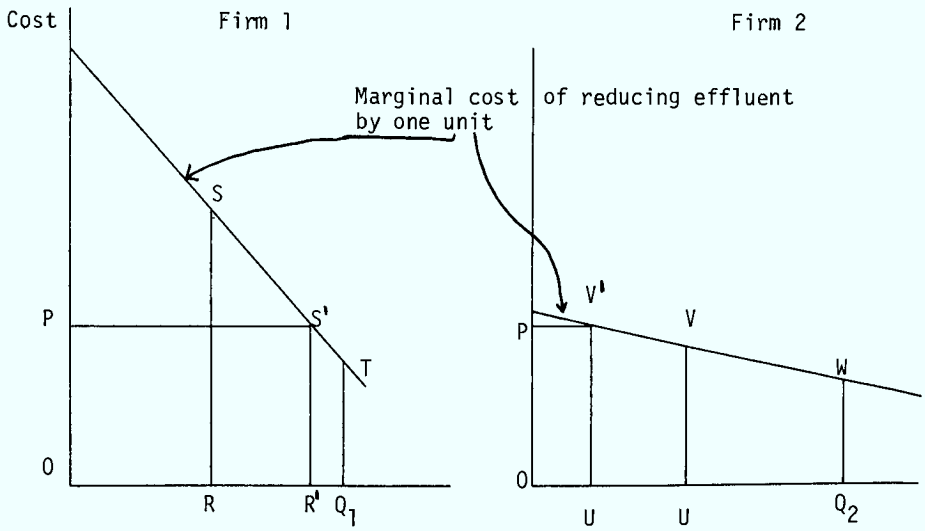
This appendix illustrates why standard economic theory prefers a tax or fee policy to regulation. Consider the following diagram:



If an industry's production entails social costs which are external to the producer and to the purchasers, then the traditional economic analysis of demand and (private) supply curves (which would give an equilibrium output of OQ and a price of OP) do not describe all the impact of the activity. Purchasers are paying EF less than the true social marginal cost of the last unit of the good. The optimal level of production is OQ*, and the market would then clear if the price to the purchaser were OP* while the producer got OC. A regulated level of production would force the industry to produce only OQ* but the producer would be able to get the full price of OP*. The fact that producer received excess revenues of CP* per unit would create pressure to avoid or to remove the regulatory constraint on production. Moreover, any change in the demand curve would mean that a different level of production would now be optimal. Regulations are usually adjusted somewhat slowly. On the other hand if the government, instead of imposing a quota of OQ* on producers, imposed an ad valorem tax on the production of the good just sufficient to raise the private supply curve to OS* from OS, the optimum would be attained with no incentives for violation and with enough flexibility to cope with demand changes - as can be seen by

shifting the demand curve from D to D^1. Neither regulations nor ad valorem taxes can cope automatically with shifts in the supply schedules. If the private supply curve shifts and the other social costs stay the same the appropriate per unit tax would not require adjustment.

A more dramatic illustration of the theoretical superiority of taxes over regulations can be seen in the case where two plants with differing methods and equipment are polluting the same river. Regulations will tend to be uniformly applied to the two plants (for administrative reasons and to ensure fairness). Consider what this means in the cases illustrated in the following diagrams:



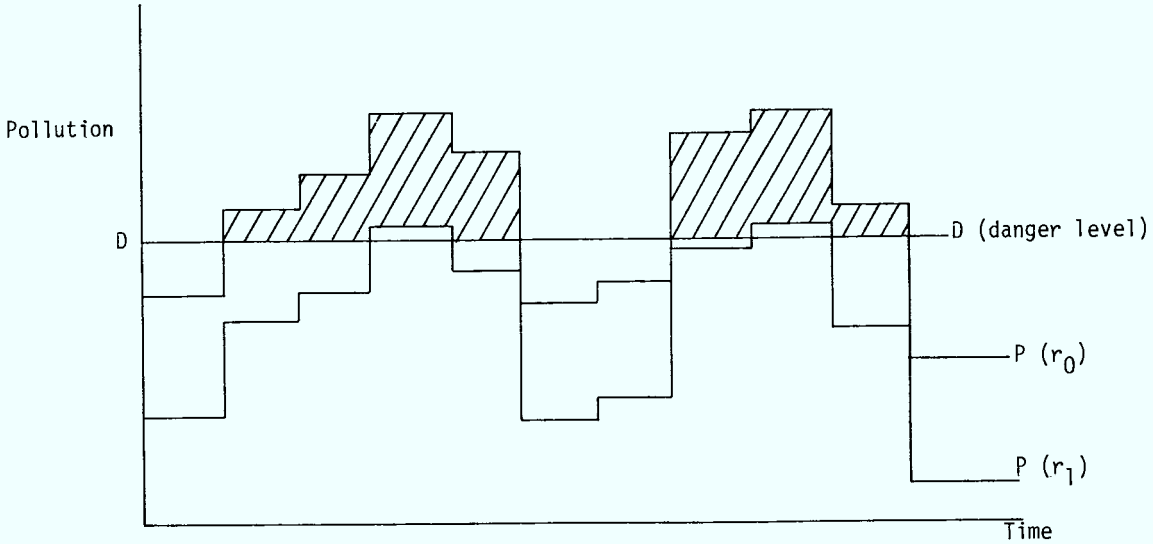
Suppose the two plants were initially producing effluent at rates of Q_1 and Q_2. If society wished to reduce the amount of effluent by 50 per cent it could order each plant to reduce its effluent discharge by half, or it could impost a tax of OP per unit of effluent discharged into the river. In the first case the cost of the reduction will be the sum of the quadrilaterals RSTQ and UVWQ, whereas with the tax the second firm would lower effluent output to U' in order to save paying the tax while the first firm would only lower output to R'. The total cost to society of the reduction would be the sum of R'S'TQ and U'V'WQ; this amount represents a saving of at least SNS' when compared with the case where the firms were regulated. This type of scheme is also discussed in White, "Effluent Charges as a Faster Means of Achieving Pollution Abatement", and Kneese and Bower, Managing Water Quality. A related scheme that has had considerable recent discussion in the literature proposes a system of auctions for the 'right to pollute' (cf. Dales, "Land, Water and Ownership" and Pollution Property and Prices).

This discussion is of course highly simplified. The need to adjust tax rates in order to cope with changes in the cost curves may be administratively difficult, while regulatory changes may be easier to obtain.

Uncertainty and Regulation

Recently Baumol and Oates, in The Theory of Environmental Policy, have shown that in cases where the social costs of an activity are uncertain there may be a justification for imposing direct limits to the amount of an undesirable externality instead of taxing it.

This situation can best be illustrated by an example: if there is an inviolable limit to some form of pollution beyond which one cannot allow polluters to go, even for a single period, then the optimal policy of pollution control that is usually prescribed -- effluent charges or taxes -- may have to be modified. When the pollution which results from a given system is a single-valued (deterministic) function of the tax rate one can determine an appropriate tax policy, as was illustrated in Appendix B, which will in particular prevent the system from ever going beyond the maximum tolerable level of pollution. If, however, the pollution impact can vary for a given tax rate (because of random and uncontrollable variations in the weather, for example, such as the temperature inversion phenomenon) it may be necessary to combine direct controls with an appropriate tax rate. The diagram that follows illustrates this point. If DD represents the maximum permissible level of pollution and if $P(r_0)$ and $P(r_1)$ represent the pollution profiles over time with tax rates r_0 and $r_1 (r<r_0)$ then the diagram shows that there is a trade-off between higher taxes and more periods of direct control. If direct controls are costly, and more costly the longer they are actually in effect, it is possible to find a tax rate which minimizes the cost of pollution control (cf Baumol and Oates, Chapter II).



indicates that controls are required if the tax rate = r_0

and indicates that controls are required if the tax rate = r_1

Economic Regulations

This paper has dealt with the rationale for and the appropriate limits of social regulation. It has deliberately ignored the question of economic or rate-setting regulations which apply to regulated industries and specifically to public utilities in the energy, communications and transportation sectors. In this area many economists (probably a majority) favour deregulation or, at the minimum, more flexible pricing behaviour. In theory this conclusion readily follows from economic analysis, but in practice it is difficult to identify the resulting losers and winners and to arrange appropriate compensation for the losers in order to obtain their acquiescence.

Economic regulation has thus been left out of this particular study because:

(a) as the above discussion mentions, the area of economic regulation has already been thoroughly examined on the analytical level, and

(b) the mandate for the current project has been redrafted to exclude economic regulation in part because the resources required to deal with all areas of regulation were not available.

The Assessment of the Effects of Marginal Regulatory Changes

A major problem faced in assessing regulations is that the effect of a series of regulations, each of which is too limited to have costs that are important enough to justify an evaluation, or even to have effects which are measurable, cannot be accurately measured.

This type of regulatory evolution is in fact quite common. For example, the regulations dealing with food and drugs or requiring particular forms of packaging or labelling are composed of a multitude of individual regulations (the Food and Drug Regulations fill more than 320 pages), most of which are of little economic importance by themselves. Adjustments will often take the form of small changes to some of these minor regulations. Such changes have a limited impact and any evaluation of proposed regulatory innovations is unlikely to examine their value or be able to do so.

Faced with a high proportion of marginal changes in a sea of proposed new regulations, a system of regulatory evaluation would have to attempt to establish some control over this part of the regulatory process. No simple answer is apparent, but part of the problem might be dissipated by an increased recognition of the importance of effectiveness and economic efficiency as a result of the on-going assessment of major regulations. However, even if this somewhat optimistic development occurs, some systematic method of dealing with incremental changes in regulations will be required. One suggestion which is occasionally made is to regulate in a framework analogous to the 'zero-base budgeting' treatment of government expenditures.

A policy of zero-base regulation would see a periodic reassessment of whole sets of regulations such as the food regulations or the packaging and labelling requirements for consumer goods. At intervals of five or 10 years the entire set of regulations would expire and a

new version would be drafted; this procedure would in fact be analogous to that involved in the periodic revisions of the Bank Act. Unfortunately, the reassessment of a set of regulations could not be complete. If a regulation of some importance is introduced one can attempt to compare the state of society with and without the regulation, but when questioning the value of a set of regulations that have existed for some time, it is much more difficult to describe the state of a world without the regulations, because any distortions that they may have caused will be too firmly part of the social and ecnomic structure to be easily assumed away for purposes of comparison. A true economic analysis is therefore a difficult, if not impossible, task. Although the prospect of major efficiency gains from such a 'sunset clause' being added to the regulatory process seems dim, the idea may still have some merit. A periodic reconsideration of a set of regulations would at least permit consolidation and internal rationalization of them, even if a true evaluation of their worth is not possible.

During the regulation project's examination of various recent and forthcoming regulations, a proposed case study on the new cosmetics regulations turned out to be a case of incremental changes impossible to assess. Although they were in a completely rewritten form, the economic impact of the changes appeared to be minor. No attempt was made to examine the new rules in detail to ensure that this rewriting had succeeded in removing internal conflicts and oddities; no such problems appeared on the surface and in-depth examinations of this type are not really the province of the economist. (Indeed it should be noted that zero-base regulatory evaluation, because of the limitations of economic analysis mentioned previously, will call principally upon organizational and legal specialists rather than on economists).

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