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Working Paper No. 1

REGULATION AND ITS ALTERNATIVES*

by

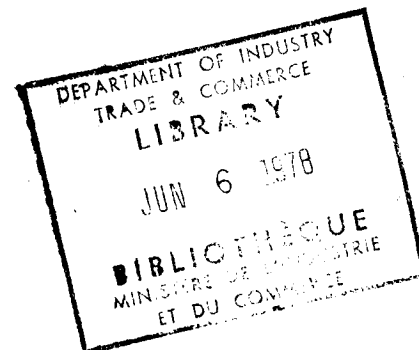
Almarin Phillips



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REGULATION AND ITS ALTERNATIVES*

by

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FORWORD

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I. Old Sanford and the "Passing of the Public Utility Concept"

In 1940, Horace M. Gray analyzed the state of government regulation of business. He wrote optimistically of "the passing of the public utility concept."¹ The concept, Gray held, was rooted in the notion "that private privilege can be reconciled with public interest by the alchemy of public regulation."² Noting the spread of regulation to communications, electric power, motor transport, air transport, and natural gas, Gray condemned "the policy of state-created, state-protected monopoly [which has become] firmly established over a significant portion of the economy and . . . the keystone of modern public utility regulation."³

Regulation, Gray saw, was rationalized by some advocates because of alleged "natural monopoly" structural characteristics in many markets. Regulated firms were seen by their protagonists as "good" monopolies, entitled to a "fair return on a fair value". They were organized to produce efficiently, to utilize resources to the best advantage, to maintain high standards of service, to secure capital at least cost, to manage their affairs to the best interest of the public, and to prevent excessive charges and discriminations.⁴ But whatever the ostensibly beneficial

reasons for their creation, it was observed by Gray that "protection of consumers" was subsequently superceded by "protection of property". Obsolete economic organizations were preserved by regulation, new types of businesses which offered competition to older, regulated firms were brought under the umbrella of regulation, and antisocial pricing practices prevailed. The public utility concept, as seen in practice, was a price example of "institutional decadence".⁵

Gray believed that "institutional inventiveness" would, of necessity, cause not just the end to the expansion of the application of the public utility concept to new industries and markets. "Like other outmoded institutions, [the concept] seems destined to decline in relative significance and ultimately be superceded by new and socially superior institutions."⁶

The world has hardly moved in the directions that Gray predicted and desired. Indeed while there has been continued discussion of deregulation⁷ and in a few areas re-regulation is being attempted,⁸ the nature and scope of regulation generally display remarkable resistance to change. A short story may make the point.

Not long ago, my wife and I had occasion to wander through New Market, a restored section of Philadelphia. There, harnessed to a renovated, four-wheeled Studebaker carriage, was a well-aged bay horse. Neatly lettered on the side of the carriage was "P.U.C. 3714". For a regulated price of \$10, old Sanford, as the horse was called, would take passengers for a regulated ride of one-half hour.

Shortly after our ride, I had occasion to talk with Commissioner Helen O'Bannon of the Pennsylvania Public Utility Commission. "Why", I asked after describing the delights of travel with old Sanford, "is that business regulated?" Commissioner O'Bannon, a reform-oriented member of the Commission, replied, "You know as well as I do. It started before there were automobiles in the taxi service, and no one has seriously pressed for deregulation. As a matter of fact, there has been a filing for a new rate increase!"

The story of old Sanford has much to do with the topics covered in this paper on regulation. Whatever is the validity of arguments for deregulation, old Sanford is still there - and still regulated.

II. The Scope of Regulatory Concern

It is possible that "entrenched property interests" are the sole reason for the retention of government regulation of business. These interests may to this point in time have been so pervasive and so persuasive that "social inventiveness" has been unable to provide the supercession of regulatory regimes. Alternatively, it is possible that, in spite of its critics, regulation has some redeeming social value. In certain market circumstances, and considering social objectives, some types of regulation may be warranted.

Scale and Operating Economies

In economics, if not in law, the classic reason for regulation is the existence of economies of scale⁹ Decreasing long-run average costs for individual firms make competition impossible when they extend over the entire market.¹⁰

A cursory examination of Sanford's operation would lead one to suppose that economies of scale are insignificant both now and at the time the regulation was commenced. The facilities required for production are small, indivisible and duplicable units, suggesting that

industry long-run average costs would be constant, even though each production unit might experience first decreasing and then increasing costs with varying levels of output. Entry should be easy. At first blush, it is hard to see a need for regulation.

A closer examination raises some problems about economies, however. Sanford and other horses pulled carriages in a transportation network or, better perhaps, a maze. The service purchased by consumers was measured not only in passenger miles, but also in terms of waiting times, availability of service (even when none may have been actually demanded), travel time and other qualitative aspects of service. Moreover, the cost of providing the service - especially if measured only in passenger miles supplied - probably varied inversely with population density or, in modern terms, with load factors. Costs tend to fall as the ratio of passenger miles demanded rises relative to seat miles supplied.

There are other problems, too. Ignoring the history of other technologies, a dispatching system coordinating the movements of the several carriages between pickups at one node, travel, and discharge at another node, might be more efficient than uncoordinated movement. Empty hauls could be reduced and additional passengers could be picked up and discharged along routes reasonably proximate

to the origin and destination of the initial fare. The central nexus for this coordination might be a local Carriage Hack Trade Association, but this is fraught with dangers of combinations in restraint of trade. Should there be public intervention?

The provision of Sanford's services, it turns out, requires more than just the horse, the driver and a carriage. A barn, or terminal, is needed, along with the purchase and storage of necessary inputs - hay, grain, the cleaning and servicing of equipment, a blacksmith, etc. It is quite conceivable that, to some extent, increasing the capacity of a terminal is less costly than the duplication of a terminal for each production unit. In addition, there are locational factors involved in the siting of terminals and these include the geographic distribution of demand, transportation costs for inputs and the costs of waste disposal. For cost minimization, jointly operated and shared terminals may be required. The factors raise antitrust problems also.¹¹

It is obvious that we are not just considering Sanford. Other industries which may be affected by some or all of these cost factors include commercial aviation, railroads, trucking, ocean shipping, telecommunication services (telephone, radio, television, CATV, satellites and their earth receiving stations, electronic funds transfers,

computer networks, etc.), milk distribution, electricity distribution, gas distribution, petroleum distribution, fisheries, and, of course, Sanford's modern counterpart, the taxicab. All have geographical network demand and supply factors, dispatching factors and terminalling factors involved in their operations. Again metaphorically, Sanford is still there and still regulated, either publicly or privately, for these reasons if for no others.

Other Private Cost and Revenue Characteristics

In the absence of regulations to the contrary, entry into the carriage hack trade is easy. Anyone with a horse and a carriage, together with stable facilities, can ply the streets if and when it seems profitable. Thus, people who keep a horse primarily for private use can, as the occasion warrants, get into and out of the business with very low entry and exit costs.

To be more concise, anyone with a horse and carriage has a number of costs that must be borne whether or not the unit is used for hire. The marginal costs of supplying a seat mile of commercial service is very low once the equipment has been purchased. These short-run marginal costs, however, are much below long-run marginal (and average) costs through most ranges of short-run output

possibilities. Only when Sanford and his rebuilt Studebaker are used to the point that his food consumption rises drastically, or both he and the carriage are depreciating rapidly, do short-run marginal costs rise and approach or exceed long-run costs.

There are revenue considerations, also. Revenue per seat mile supplied varies with the load factor, or in this case, with traffic density. This means that people with equipment not dedicated to public transportation will tend to "skim" the market. Acting individually rather than in concert, they will provide service in areas and during hours when passenger demand is high, tending to keep the fare per seat mile at or near the level of short-run marginal costs even in peak load periods. Only those with alternative uses for the equipment at other times and places (e.g., personal or private business use), with an alternative value adequate to cover the difference between the short-run marginal costs of taxi service and the long-run average costs, including ownership, will remain in the carriage hack business in the long-run.

This result looks good from a narrow parochial efficiency point of view. It does not, however, look good to professional operators nor to users who want service in locations or at hours of low passenger density. The competitive structure and operation of the carriage hack

trade would prevent the "cross-subsidization" of low density traffic from the revenues of high density traffic. The price of low density service, if offered at all, would tend to be high because the marginal cost of that service (viewed to include foregone revenues from other services) would be high. Service frequency would be, of course, low. Some might wish to regulate in order to avoid this result.

What other industries have similar problems? A good many. They obviously include modern taxi service as well as the airlines,¹² long line telecommunications,¹³ radio and television,¹⁴ computer services, travel agents,¹⁵ petroleum extraction¹⁶ and bituminous coal.¹⁷ Sanford is not alone with his regulatory problems.

Externalities

It is possible to argue that the provision of local transportation services to low density geographic areas and time periods has some positively valued externalities. It may tend to spread population more evenly, to reduce congestion, to lower the costs of police and fire services, water, sewage and trash systems, to reduce the development of concentrated ethnic and racial areas, etc. Although this can be argued, curing all of these problems is a large task to put on Sanford's shoulders and on the incomes of selected persons who use his services.

It is easier to argue that in his present function in New Market, Sanford provides a positively valued externality to the businesses of the district. He lends charm and ambience to the restoration. Some people like only to look at him or to pat his head and stroke his mane, without taking a ride. The same people are customers of the local bars, restaurants, book stores, and parking lots and of the other modes of transportation used to travel to and from New Market. If this positive externality is considered, a price equal to even the long-run marginal cost of the provision of the rides fails to capture the full social value of Sanford's being in New Market.

There are negatively valued externalities too. Sanford moves slowly on narrow, heavily trafficked streets. He causes congestion. He occupies a space on a public square that could be used alternatively. He is not charged for the maintenance of public streets, and he has the additional characteristic of depositing manure which must be removed if unpleasant odors, insects and disease are to be avoided.

Regulations aimed at dealing with negative externalities abound. They form the basis of the common law of nuisance which provides for private remedy for noise, smoke and sunlight violations against property. They also are the basis for common law riparian rights which, not

coincidentally, vary among jurisdictions with the amount of water freely available to all. In years gone by rendering plants (poor Sanford) had to be placed on the leeward side of towns and operators of steam locomotives were required to stoke their fires and bed them with anthracite before entering urban areas. Zoning, building codes, health codes - even stop signs and traffic lights - are manifestations of regulations which interfere with private decisions that might otherwise exhibit negative externalities.

Health and Safety

Related to externality problems are others more directly incident to Sanford's operation. First there is the question of Sanford's own well-being. The hours of use which might maximize profits could conflict with use restrictions conceived by some as necessary for his welfare. The same could be true of feeding and veterinary care.

Second, there are questions about the safety of passengers. Is the driver adequately trained for the tasks and responsibilities? Are various emergency situations properly anticipated?

Third, there are questions about the driver. These relate to his working conditions, including hours worked, the adequacy of his training, the availability of sanitary facilities and, quite possibly, wages.

The public health and safety is also involved in matters other than just manure, since Sanford might bite, bolt or break down in socially costly ways. Someone could get hurt even though he had no intention of being involved with Sanford at all.

The enumeration of parallel regulatory concerns in other industries is impossible because of its extensiveness. For a few illustrations, consider the Federal Aviation Administration's control of pilot training, pilot physical condition, pilot hours, aircraft design and certification, aircraft maintenance and operating rules, instrumentation, airport construction and airport operations. Also remember the Bureau of Mines, the Food and Drug Administration, the Product Safety Commission, the Environmental Protection Agency, the Department of Labor, state and local boards of health, and the myriad of licensing and certification agencies for nurses, doctors, dentists, veterinarians, podiatrists, chiropractors, barbers, plumbers, electricians and, of course, teachers. Note that the Interstate Commerce Commission, is required to consider the effects of its regulations on employees of the regulated industry, as are many other regulatory agencies.

Without attempting to weigh the merits of such interferences with market processes, it is clear that health and safety issues have been used to extend regulation into

many facets of the economy. Sanford is just an isolated case.

III. Regulatory Alternatives

When the scope of regulation is seen in even this abbreviated survey, it is difficult to conclude that the public utility concept is passing or that social inventiveness has created new, general techniques to deal with regulatory failures. If anything, the scope of regulation has increased. New agencies and commissions have been created and the responsibilities of existing ones have been enlarged. Public utility regulation, in practice if not in concept, has been extended to activities which were beyond those suggested so eloquently by Justice Brandeis in the New State Ice case.

As a general principle, regulation is appropriate whenever the aggregate gain in social welfare from regulation exceeds the aggregate social cost of regulation, including all side effects. Given this initial condition, the form and amount of regulation should be that which maximizes the difference between the benefits and the costs. This second condition seems at first to imply the usual marginal conditions of maximization, but the matter proves to be considerably more complex than that.

In the first place, a function describing the social costs of regulation is not independent of a function describing social gains. Different kinds of regulatory machinery entail different costs and produce different results. Thus, there is conceptually a family of different cost functions associated with a family of different benefit functions. By itself this is not a difficult theoretical problem, but the kinds and degrees of regulation may be virtually infinite in number and the actual relationships between the regulatory costs and the associated social gains are not and cannot be known.

Second, something like a general equilibrium model, or a general equilibrium model truncated to include only significant interrelationships, is needed to account for the effects of regulating one market on other markets in the system. The other markets may be unregulated or regulated in some way. Changes in natural gas regulations affect the market for gas furnaces, electric heating units and the regulated distribution of electricity. And these are only first order interactions.¹⁸

Third, as a practical matter, solutions to many of the regulatory problems raised above require a fairly explicit specification of a social welfare function. It is not enough to use narrow Paretian terms, even when these are

modified by Scitovsky-type "bribe" conditions. As we observe social values through social decisions, the welfare function has arguments covering income distribution, ethical propositions of many types, political and institutional preferences, and complex issues involving time and intergenerational transfers. Moreover, there are differences in individual values and hence, differences with respect to what variables should be included in the social welfare function and the weights attached to these variables.

Fourth, there are "second-best" problems. The conditions necessary for optimization in a system with a single objective function and a single constraint do not universally apply when an additional, non-redundant constraint is added. With respect to regulation, this means that the rule of equating price to marginal cost does not maximize welfare when any constraint other than that arising from the production function and factor costs is introduced.¹⁹

Finally, if these problems in narrow economic theory are not enough, there are the very real considerations of the costs of the regulatory activity and the behavior of regulators. It is obvious that commissioners and their staff must be paid and that they incur expenses. Less obvious are the explicit or implicit

regulatory objectives and the behaviour of commissions. Are they "captives" of the regulated, as Gray, Stigler and others have suggested? Do they behave as "satisficers" rather than optimizers? Does the organization of a commission matter? Are commissioners politically sensitive? Do they really behave in their own best interests and serve the public welfare only as it coincides with their own?²⁰

What to do About Old Sanford?

Deciding how to regulate old Sanford optimally, including the alternative of not regulating him at all, now proves to be a difficult if not impossible task. Suppose, for example, that the only problem was that there were the classic form of scale economies. It is not enough to say that all that needs to be done is to set price equal to marginal cost. As we all know, this would yield a negative net return, and Sanford would disappear even though some people would be willing to pay a higher price for his services. Further, forming and operating a regulatory commission itself imposes a social cost. Should Sanford's passengers pay for that?

In theory, lump sum subsidies, neutral with respect to resource allocation, could be used, but the supporting taxes and the subsidies would have to be adminis-

tered even if, as is unlikely, a truly neutral tax-subsidy device could be discovered. The standard solution of a "fair return on fair value", would violate the $P = MC$ rule and, indeed, the rule would have to be violated for the "second best" result with this additional constraint. This too requires administrative costs. Perhaps, but only perhaps, a system of perfect price discrimination would lead not only to the "competitive" output but would also cover the average costs of production.²¹ Yet is it unreasonable to think that any regulator or any operator could enforce anything approaching a perfectly discriminating pricing system, especially if a commodity rather than a service is involved.²²

The issues raised by waiting times, service availability and varying demand densities involve vexing regulatory problems. Charging for a service whether or not it is used, or charging a flat fee irrespective of the volume of use is generally condemned as a violation of the marginal cost pricing rule. However, it need not be a violation if the demand function has incorporated availability as well as actual use, as may well be the case for Sanford, taxis, telephones, televisions, banks, airlines, and many other industries. Maintaining service availability also has a marginal cost but it would be expressed in terms of the partial derivative of costs with

respect to seat miles available, waiting time for a dial tone, an extra TV channel, or other related services, instead of the partial with respect to ordinary output measures. A two-part tariff could then be justified if there were an extension of the usual marginal rules, although this type of tariff would add to administrative complexity.²³

The value placed on waiting times and availability varies for each customer. Those who place a high value on time are willing to pay more for availability than others with lower time costs. If, in years past, Sanford's carriage was seen displaying an "Out of Service" or "On Call" sign and the driver was waving off flagging potential riders, it could well have been that he was responding to another fare who was willing to pay more. This is discrimination, of course, but it is not obvious that it violates the extended marginal conditions for optimality or near-optimality.

This may be clearer in the case of varying traffic densities, which is really just a variant of the service availability illustration. The cost per seat mile remains much the same across differing densities; the cost per passenger mile varies inversely with density. If, because of the demand for availability, the price elasticity of demand per seat mile varies directly with density - i.e., a

low price elasticity accompanies a low density - price discrimination would yield more profit because of both demand and cost factors.

By previously accepted theory, the fact of higher marginal cost per passenger mile should be taken into account in establishing price differences, but the less elastic demand should not. This is in accord with the $P = MC$ rule. But, as Baumol and Bradford have shown,²⁴ the existence of a binding rate of return constraint leads to a second-best "inverse elasticity" rule for departures from marginal cost pricing. Price discrimination based on elasticity differences is not so bad after all. It follows that any other additional and binding constraint would also require departures from $P = MC$. The theory, however, is clearer than the means by which regulatory agencies might enforce the proper rules.²⁵

In this context, peak load pricing is a response to the demand for availability. It is generally recognized that those who are willing to pay for more capacity - i.e., more availability - should pay capital costs as well as operating costs. The same reasoning applies to those who wish service in low density locations or during low density hours. It applies to anyone wishing service which requires additional capital costs.

Alternative regulatory schemes to handle the economies associated with dispatching and terminal facilities are few. The terminals could, it seems, be publicly owned, with space auctioned to competing users.²⁶ The dispatching might also be a public service. Relegating these facilities to a government hardly does away with regulatory burdens, however. Moreover, the questions of whether the sum of the bid prices would cover the governmental capital and operating costs, whether discrimination should be allowed, whether certain "standards" need to be established in addition to price, and whether the industry may not dominate the decisions of the agency would remain.²⁷ The structure of the purchasing firms, whether monopsonistic, oligopsonistic, or competitive, obviously affects answers to these questions.

Full faith in competition, in a market with sellers' possessing complete knowledge and with no transactions or "set up" costs, provides a solution to the problem of operators who enter and leave the service on the basis of short-run marginal costs. It is ideal that way. But what if knowledge is imperfect? What if actual and potential operators do not know when it is going to rain during rush hour, or when the winter is going to be unusually cold or the summer unusually hot, or if OPEC is going to impose an embargo? It is not clear at all that the

capacity for service which comes from "stanbys" will adjust to such eventualities. What if there are transaction costs or other entry costs requiring either or both time and resources? Again, the competitive response may be inadequate, and the "fly-by-night" operators may prevent optimal allocation.

Optimal capacities, as optimal inventories, require provision for buffer stocks to handle random demand and non-random, uncertain events. An unpopular way of achieving this in some industries is to bar the entry of the "fly-by-night" operators, require or permit standby capacity of certified operators, with compensating departures from $P = MC$ for those operators. One wonders whether the costs borne by users to meet contingencies are properly allocated and whether they should not be borne by society generally. Further, one wonders about permitting non-price competition to be the incentive for creating the added capacity and the low load factors necessary to handle contingencies. Still, complete deregulation may not be the best alternative in all cases.

The market mechanism, it is alleged by some, will also handle externality difficulties. If Sanford provides positive externalities to business and community, contracts would emerge between his owner and those benefited. These contracts, plus the fees paid by those riding, would capture

full social values. If Sanford causes odors and congestion of traffic, his owner would pay those offended or they would pay him not to operate in so offensive a manner. These payments would capture full social costs.

Were there full information on the nature of external costs and benefits, were there no transaction costs, and were there no possibilities of "free riders" because of the quasi-public goods aspects of Sanford's presence, the Coasian solution would be the correct one.²⁸ But there is not full information, there are transaction costs and there are likely to be "free riders" when large numbers are involved. Consequently, markets fail, as Williamson has so cogently pointed out in a different context.²⁹ One might, indeed, want to tax those receiving positive externalities, tax Sanford for the negative externalities, etc., but these policies have administrative burdens and allocative implications. Perhaps direct regulation is sometimes preferable.

Similar considerations affect health and safety, and matters of distributive justice. Markets will fail where health and safety externalities exist. No one has really suggested seriously that markets attend to distributive matters. It is convenient in the theory of regulation to assume - usually implicitly - that equitable distribution, and perhaps health and safety, are handled by

other mechanisms, particularly the tax structure. In fact they are not and there is a great temptation to use the regulatory machinery for this purpose.

It is necessary to repeat that when any of these problems is introduced into the regulatory scheme, the objective function or the constraints imposed on the attaining of objectives become different from those usually contained in regulatory theory. Then the $P = MC$ rule is no longer correct. Departures from $P = MC$ are required.

IV. Conclusions

To be perfectly clear, this overview is not intended as an apologia for the continuation of regulation in its present guise. With Commissioner O'Bannon, I suspect Sanford is regulated because, in history, he always has been. On balance, it seems that deregulating Sanford would not impose new social costs equal to the cost reduction involved in deregulation. There probably would be net social benefits.

The overview is intended, however, to sound a note of caution. Re-regulation, not total deregulation, may be the prime necessity today. There is the potential for market failure if complete deregulation - whatever that means - were to be effected.

There is another intention. If useful social inventiveness is to occur to fulfill Gray's prophecy, economists will have to contribute more than restrictive equations and graphs. The long worked-over $P = MC$ rule is not very helpful, even if more competition, taken generically, may be in order. People and institutions are involved, with all the complexities in objectives and constraints they imply.

Sanford's situation is still with us and will be for the rest of our lives.

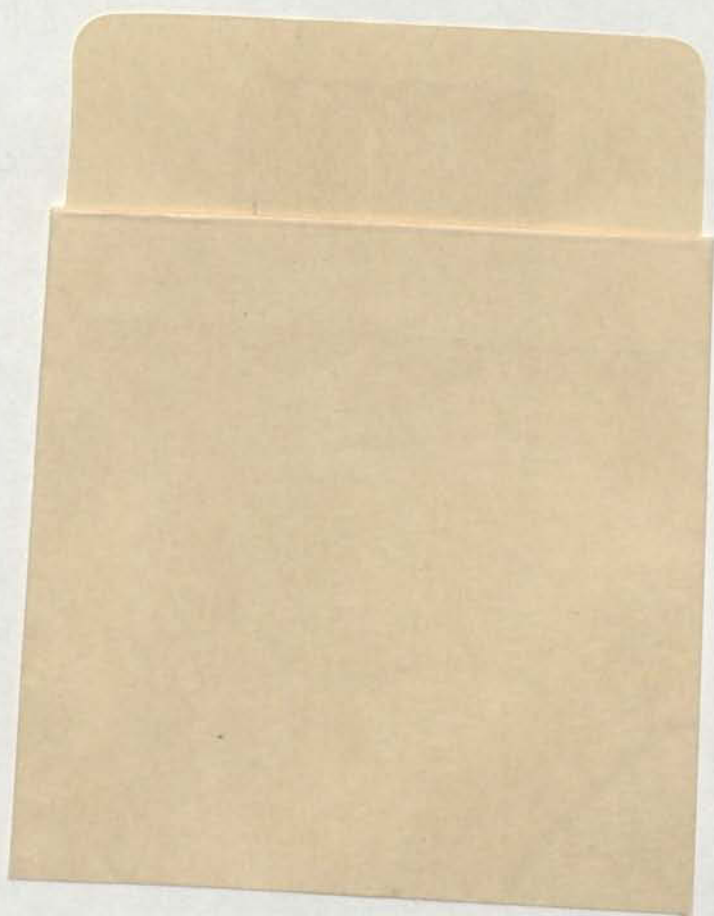
FOOTNOTES

- 1 Horace M. Gray, "The Passing of the Public Utility Concept", Journal of Land and Public Utility Economics (1940), reprinted in Readings in the Social Control of Industry (Philadelphia, 1949), pp. 280-303.
- 2 Readings, loc. cit., p. 281.
- 3 Ibid., p. 283.
- 4 See, generally, Ibid., pp. 284 - 285.
- 5 Ibid., pp. 286-295. For similar and more recent lines like these, see G.J. Stigler and C. Friedland, "What Can Regulators Regulate? The Case of Electricity", Journal of Law and Economics (October, 1962); R.A. Posner, "Theories of Economic Regulation", Bell Journal of Economics (Autumn, 1974); W.A. Jordan, "Producer Protection, Prior Market Structure and the Effects of Government Regulation", Journal of Law and Economics (April, 1972).
- 6 Loc. cit., p. 302. Fifteen years later, in Walter Adams and Horace M. Gray, Monopoly in America: The Government as Promoter (New York, 1955), the "new and socially superior institution", proposed for regulating reform was the force of competitive markets. See Chapter 3, especially pp. 58-72.
- 7 See, for example, A. Phillips (ed.), Promoting Competition in Regulated Markets, P.W. MacAvoy and R.S. Pindyck, "Alternative Regulatory Policies for Dealing with the Natural Gas Shortage", Bell Journal of Economics (Autumn, 1973) and the references in Fn. 5, above. A new journal, Regulation, published by the American Enterprise Institute, and publications by that Institute frequently argue the case for deregulation.

- 13 The story of MCI and its rates relative to those of AT & T is pertinent. So is the current CN - CP and Bell Canada litigation. In addition to the references in Fn. 10, see J.C. Panzer and R.D. Willig, "Free Entry and the Sustainability of Natural Monopoly", Bell Journal of Economics (1976).
- 14 The FCC has historically regulated to see that signals are available to low density population areas. This interest is manifested in recent rules concerning local origination of programs to the exclusion of network-originated programs. Regulators of telephone and electricity have also used "cross-subsidization" for low density service.
- 15 In the regulation of banks and bankholding companies, firms engaged principally in computer services and travel agents have sought and received restrictions on the performance of similar services by banks.
- 16 This is a special case where owners of adjacent properties can extract oil from pools at long-run costs much lower than those of the original successful driller who bears the exploration costs.
- 17 The short-run marginal cost of an unemployed miner to use a pick and shovel to dig in a unused shaft or open strip is very low relative to long-run average costs. This is the story behind UMW v. Pennington, 381 U.S. 657 (1965) and, less, directly, Tampa Electric v. Nashville Coal Co., 365 U.S. 320 (1961). On this, see O.E. Williamson, "Wage Rates as a Barrier to Entry: The Pennington Case in Perspective", Quarterly Journal of Economics (1968).
- 18 In theory, this is the problem of separability.

- 19 See W.J. Baumol and D. Bradford, "Optimal Departures from Marginal Cost Pricing", American Economic Review (June, 1970) and W.J. Baumol, "Quasi-Optimality: The Welfare Price of a Nondiscriminatory Price System", in Pricing in Regulated Industries: Theory and Application, John T. Wenders (ed.) (Denver 1977). The welfare pricing rules for departures from $P = MC$ when markets are not separable and when one market may be added to or subtracted from the regulated set have not been established.
- 20 In addition to Posner, op. cit., see G.J. Stigler, "The Theory of Economic Regulation", Bell Journal of Economics (Spring, 1971), M.H. Bernstein, Regulating Business by Independent Commission (Princeton, 1955), S.G. Breger and D.W. MacAvoy, Energy Regulation by the Federal Power Commission (Washington, 1974), H.J. Friendly, The Federal Administrative Agencies: The Need for Better Definitions of Standards (Cambridge, 1962), D.W. MacAvoy, The Economic Effects of Regulation (Cambridge, 1965) and Crisis of the Commissions (New York, 1970), R. Noll, Reforming Regulation (Washington, 1971), and A. Phillips, "Additional Notes on a Behavioral Theory of Regulation", in J.T. Wenders (ed.), Pricing in Regulated Industries: theory and Application (Denver, 1977).
- 21 The idea of using price discrimination to yield gross revenues at least equal to total costs dates back at least to A.T. Hadley, Railroad Transportation: Its History and Its Laws (1885).
- 22 Unless one makes bold assumptions about compensated and uncompensated demand curves being identical, the result is not the competitive output in any case. Since so much has been written about regulatory bias and the A-J effect, this additional problem of optimal resources reallocation with rate of return regulation is omitted here.

- 23 It has been shown that a two-part tariff can also be used to extract revenues equal to the perfect price discrimination case. See W. Oi, "A Disneyland Dilemma: Two-Part Tariffs for a Mickey Mouse Monopoly", Quarterly Journal of Economics (February, 1971). Thus the requirement of a fair return can sometimes be met by two-part tariffs even when demand and cost functions run in terms of only one output variable. When demand runs in other output variables, the first part of the tariff may be the marginal cost of another valued output.
- 24 Op. cit., and also Baumol, "Quasi-Optimality . . .", op. cit.
- 25 It is ironic that just at the time many regulators have been persuaded to the $P = MC$ rule, theory has shown it to apply in only very special and restrictive cases. Further, the $P = MC$ rule, is really related to a "shadow price" MC, not accounting records of MC.
- 26 See H. Demsetz, "Why Regulate Utilities?" Journal of Law and Economics (April, 1968).
- 27 Just these reflections make a proposal to auction spectrum space more complicated than it appears.
- 28 R.H. Coase, "Externalities", Journal of Law and Economics (1966).
- 29 O.E. Williamson, Markets and Hierarchies (New York, 1975).



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