POLICIES FOR PRICING COMMERCIALY-USEFUL SPACE SYSTEMS
RESULTING FROM GOVERNMENT PROGRAMS

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ABSTRACT

Policies for pricing commercially-useful systems resulting from government programs include four principal options: (1) marginal cost pricing (similar to what NASA, in pricing launch-vehicle services, has called "identifiable additional cost"); (2) average cost, or "full-cost," pricing; (3) profit-maximizing (or "monopolistic") pricing; and (4) multi-part pricing. For efficient service allocation: in the short run, options (1) and (4) are optimal, whereas (2) and (3) are not. (Here "optimal" means, for example, that the amount of space shuttle services marketed will be such that the cost of producing the last unit exactly equals its market value.) This conclusion requires an assumption that externalities and implementation costs are not so different for the several alternatives as to alter the result. Choosing among alternative policies on the basis of long-run efficiency is more complicated and less conclusive, entailing such elusive considerations as public and congressional reactions to operating deficits and shuttle revenues, stimulating technological advance, etc. Finally, the alternatives can be evaluated in terms of distributional criteria: how they affect costs and benefits paid or received by taxpayers, industry, and potential domestic and foreign users of space shuttle services.

I. INTRODUCTION

The invitation to write this paper requested a discussion of "...the basic problems, possibilities and issues confronting a government agency which must in the rather near future establish a pricing policy for utilization of the space shuttle." In responding to this request, we wish to make certain qualifications and disqualifications clear at the outset. Our principal qualification is familiarity with what economic theory has to say about pricing policies for public and private goods and services sold in various types of markets and under varying conditions of costs and demand. A major disqualification is a lack of familiarity with the space shuttle program, including both its "hard" aspects relating to performance, scale, schedule, and costs, and its "softer" aspects (e.g., relating to the state of discussion and commitments in the Congress and the Executive Branch, the conditionality of political and budgetary support for the program, etc.). Our limited exposure to the space shuttle program was nearly two years ago in connection with a study for NASA dealing with pricing and recoupment policies for commercially-useful technology resulting from NASA programs.\(^4\)


In that study, we considered the pricing policy options for NASA's launch vehicle program, and acquired some limited familiarity with the space shuttle program as it stood at that time. In the following observations, we will be drawing heavily on this earlier study, in terms both of the economic analysis, and the circumstances existing at that time relating to the launch vehicle activities of NASA and the space shuttle program. However, we should emphasize that, since that time, the authors have been out of touch with this range of problems.

We will therefore construe the original invitation in quite limited and specific terms. Our aim is to set forth certain salient economic principles which are germane to the formulation and consideration of alternative pricing policies; that is, to provide a decisionmaker's primer on the economic theory needed for analyzing and comparing alternative pricing policies. We will formulate several alternative policies, and suggest their advantages and disadvantages. Our concern then is to suggest a way of thinking about the pricing policy issues facing the space shuttle. Economics has important and useful things to convey on this matter. However, in this, as in many and perhaps most, other policy domains, economics does not lead to an unequivocal conclusion invariant with respect to various considerations external to the economics of the matter.

II. COMPLEXITY OF THE PROBLEM

The complexity of the choice among alternative policies for pricing goods and services produced from government programs is suggested by: (a) the confusing formulation of the original User Charges Statute of 1951;\(^5\) and (b) the conflicting implications of the conventional wisdom and common sense clichés that surround the matter.

The User Charges Statute declared that whenever a federal agency confers a benefit on, or performs a service for, an identifiable person or group, the provision of such service or the conferring of such benefit shall be "self-sustaining to the full extent possible." The head of each federal agency was authorized to prescribe "fair and equitable fees, charges or prices, taking into consideration: (1) the direct and indirect cost to the government; (2) the value to the recipients; (3) the public policy or interest served; and (4) any other pertinent

\(^5\)See 31 USC 483a or 5 USC 140.
One does not have to think very hard about these four considerations to realize they can lead in very different and conflicting directions. For example, cost to the government may be low while value to the recipient is high; the public interest (e.g., in advancing new technology, or conferring benefits on particular foreign countries), may be very substantial, or all or even negative, respectively. In an analytic sense, the result is a policy maze rather than a policy direction and this even without going into the question of 'other pertinent facts'!

When one turns to conventional wisdom and common sense clichés, the picture is equally confusing. On the one hand there is the view that "he who benefits should pay." Yet government agencies in general, and NASA in particular, are urged "to promote technological progress," which might conflict with making beneficiaries pay. Policymakers are also admonished "to cover your costs," to try "to make money" and to be more "businesslike," to "be fair to taxpayers and reduce the tax burden," and to make foreign users "pay their fair share."

In order to clarify this confusing background, it is worthwhile to distinguish between two sets of criteria for evaluating alternative pricing policies: those relating to efficiency, and those relating to distribution or equity.

Efficiency criteria evaluate alternatives from the standpoint of their contribution to resource productivity of the national product. In general, for resources to be allocated and utilized efficiently, the price of a good or service must equal the cost of providing the last or marginal unit of that good or service. If, for example, price exceeds marginal cost, the national product will be raised by increasing utilization and output of the service or good, while if price is less than marginal cost, the national product will generally be raised by decreased utilization and output, and a transfer of the saved resources to other uses.

Equity or distributional criteria evaluate alternatives from the standpoint of which particular individuals, groups, or sectors would benefit and which would pay. Distributional considerations are also reflected in the specific objectives of individual NASA programs and projects such as the space shuttle, as well as in the objectives of NASA as an agency, or of the Executive Branch or the Legislative Branch of the government. For example, these objectives may include (a) furthering technological collaboration with foreign countries, (b) demonstrating to Congress the validity of agency claims that technological spinoffs from NASA programs are highly valued by the private sector, or (c) the interest of NASA management in maintaining employment levels at the agency's facilities. Each of these examples reflects concern for the benefits received by, or the costs imposed on, a particular group or sector. It is also worth noting that among the distributional considerations, the goals of primary concern to NASA as an agency may or may not be the same as the primary goals of other parts of the government.

It is important to distinguish between efficiency and distributional considerations because each pricing policy may entail different tradeoffs between them. A policy that contributes most to the efficient use of resources may not be the policy whose distributional consequences are preferred, and vice versa.

III. ALTERNATIVE PRICING POLICIES

Policies for pricing commercially-useful systems resulting from government programs consist of four principal options:

1. Marginal cost pricing, in which price is set equal to the additional cost of providing an extra unit of the specified good or service. Marginal cost pricing is similar to what NASA, in pricing launch-vehicle services, has called "identifiable additional cost;"

2. Average cost pricing, in which price is set equal to the total cost of providing the specified product or service divided by the number of units produced. Average cost pricing is similar to what is commonly referred to by NASA as "full-cost" pricing;

3. Profit-maximizing (or 'monopoly') pricing, in which price is set so as to maximize the difference between total receipts and total costs; and

4. Multi-part pricing, in which more than one price is charged for use of the space shuttle, and all users pay the same price.

The first three pricing policies are illustrated in Figure 1. They are all "single-part" options in that only one price is charged, say for use of the space shuttle, and all users pay the same price.

In Figure 1, the curve AC shows the average cost of providing different quantities of output; MC is the marginal or extra cost of providing successive units of output; DD is the demand curve showing how much users will buy at different prices; and MR is the marginal or extra revenue resulting from selling additional units. These cost curves characterize a decreasing cost industry, such as space shuttle services. Long-run fixed costs (e.g., the initial development expenditures) and short-run fixed costs (e.g., for program administration and annual upkeep at support facilities) are large relative to the cost of an extra launch. Hence, average

Although NASA is not, strictly speaking, legally bound by the User Charges Statute by virtue of its own independent enabling legislation, the statute still exerts an indirect effect. NASA's general pricing policies, and the pricing of space shuttle services in particular, depend on policy decisions by the federal government, and these in turn are influenced by the background and precedents of the 1951 statute.

Monopoly pricing maximizes profits given the constraint that only one price can be charged to all buyers. See below, p.5 ff., for a discussion of profit maximizing through multi-part pricing.
cost, in both the short and long run, declines sharply with the number of launches. Marginal cost, in both the short and long run, is probably fairly constant, since the costs of fuel, tracking, ground support, and other launch-specific services are similar for each launch.

As illustrated in the figure, marginal cost pricing leads to price $P_1$ and output $Q_1$, while average cost pricing leads to price $P_2$ and output $Q_2$, and monopoly pricing leads to price $P_3$ and output $Q_3$. Under the special supply and demand conditions reflected in Figure 1, average cost pricing and profit-maximizing pricing result in output levels that are less than optimal (that is, inefficient), in the sense that additional units of output would add more to total national product than they would cost.²

In contrast to the pricing policies illustrated in Figure 1, all of which involve charging a single price to users, multi-part pricing is illustrated in Figure 2. Three variants of multi-part pricing are illustrated in Figure 2, having in common that more than a single price is charged for different units of the product or service. The three variants are: entry fees; two-part pricing; and price discrimination.

Under entry fee pricing, all units are sold at the marginal cost $P_5$ in Figure 2, but the purchaser is required to pay an entry fee to gain access to the market. In principle, a separate entry fee would be determined for each purchaser, designed to be as high as possible without forcing him to withdraw from the market. (This maximum fee would be equal to the area below the purchaser's demand curve and above the marginal cost price, the area ABC for the demand curve shown in Figure 2. Total entry fee collections would be the sum of the individual entry fees, equal to the corresponding area in the aggregate demand curve for all consumers of the service.)

²If the demand curve were assumed to be completely unresponsive to price, which seems unlikely, and hence DD became a vertical line rather than a negatively sloped curve, as is shown in Figure 1, output would be the same under all pricing rules. In this case, moving from marginal cost pricing to average cost pricing or to profit-maximizing pricing would simply raise prices and thereby redistribute real income from the users of space shuttle services, or of other technology by-products, to the general taxpayer, or to the government, without affecting the efficient allocation of resources.

Each purchaser, once having paid the entry fee, is given an incentive to continue buying additional units because all units are priced at the marginal cost of the last unit purchased, thereby contributing to efficient allocation of resources.

Two-part pricing entails a variation of this concept. The first $q$ units are sold to a particular buyer at a price greater than marginal cost, such as $P_1$ in Figure 2 (with quantity equal to $q_1$), while additional units ($q_4$, $q_5$) are priced at marginal cost $P_5$. Additional units beyond $q_5$ are still priced at their marginal cost, and therefore resources are allocated efficiently. Essentially, two-part pricing spreads the entry fee evenly over the first $q$ units purchased, where $q$ is arbitrary but must be less than the total number of units the buyer is expected to purchase. In the illustrated case, where $q = q_3$, this means that area GEFC equals area ABC.

Price discrimination, the third variant of multi-part pricing, is possible when each unit can be priced and sold separately, without resale. In Figure 2, output $q_1$ is sold at price $P_1$, output $(q_2 - q_1)$ is sold at price $P_2$, and so on for the subsequent outputs and pricing. Each buyer purchases his marginal unit at marginal cost, so again resources are allocated efficiently. At the same time, his total payments equal the area under his demand curve, so net revenues are maximized.

In principle, multi-part pricing can therefore simultaneously bring about resource efficiency and maximize net revenues. If they can be appropriately designed, multi-part pricing schemes will yield more revenue than single-part profit-maximizing (monopoly) pricing. Further, because marginal units are always sold at marginal cost, multi-part pricing can also achieve efficient utilization of services.
However, practical difficulties of implementation may offset the theoretical advantage of multi-part pricing. Determining the appropriate prices in each case would require knowledge of each purchaser's demand schedule, and these may be hard to estimate, as well as subject to change. Furthermore, resolution of the bargaining problem likely to arise between buyer and seller would entail time, uncertainty, and information costs that may exceed the theoretical advantages. Moreover, substantial variation in the entry fees charged to different individuals, or in the prices charged to different users, may encounter legal problems connected with the law's rejection of "unreasonable discrimination."**

Nevertheless, when the technical conditions do not preclude it, and administrative and legal considerations make it possible, multi-part pricing does provide a policy option in which price can exceed marginal cost without causing efficiency losses. Efficiency losses are avoided because the marginal unit is priced at its supply cost, even though other units are charged higher prices. It is worth noting that, notwithstanding administrative and other difficulties, multi-part rules have been applied, usually with satisfactory results, to electricity pricing and to the pricing of computer services.

Besides the principal pricing policy options we have been discussing, two other options might be mentioned for completeness. One option is to charge a price between marginal and average cost, where the intermediate price is selected so that a particular group of infra-marginal users receives a subsidy from the government (such as they would receive if all infra-marginal units were priced at the cost of the last unit), nor provides net revenues for the government (which would be the case if "full" or average costs were to be charged).***

Finally, a zero pricing option can be considered where services (for example, knowledge or research findings) are "public" goods, rather than private goods, in the sense that they can be made available to additional users at zero marginal cost.*

IV. EVALUATION OF PRICING POLICIES

How do the various pricing policies stand up to evaluation in relation to the criteria of allocative efficiency, on the one hand, and distributional equity, on the other?

Policies (1), marginal cost pricing, and (4), multi-part pricing, meet the strict test of allocative efficiency mentioned earlier, while policies (2), average cost pricing, and (3), profit-maximizing, do not. The efficiency losses associated with profit-maximizing pricing may be greater or less than those associated with average cost pricing, depending on the precise location of demand and cost functions. It seems to be the case that, within fairly wide bounds of the relevant parameter values, the efficiency losses associated with average cost pricing are not likely to be very large in comparison with the efficient pricing policies; namely, marginal cost pricing, and multi-part pricing.++

In general, the more inelastic is the demand (that is, the more the curve BD in Figure 1 approaches a vertical line), the less will be the efficiency losses associated with pricing policies other than (1) and (4). Therefore, assuming or at least trying to estimate more accurately the elasticity of demand for space shuttle services, would be of considerable importance to NASA in choosing among alternative pricing policies.

It is important to note that these conclusions with respect to the efficiency of alternative pricing policies depend on an assumption that the implementation costs, as well as the externalities, associated with the several policy alternatives are not so different as to alter the conclusions. In fact, as we have already suggested, these associated implementation costs may be quite different among the alternatives: for example, the practical problem of implementing multi-part pricing may more than offset its theoretical efficiency. Moreover, if one believed that there are likely to be considerable positive or negative externalities associated with expanded use of space shuttle services (e.g., positive externalities through the advance of science and technology, and the discovery of new resources in planetary space, or negative externalities associated perhaps with a stimulus to international arms competition), then one might want, respectively, to choose a policy below marginal cost, or move toward an average cost, or profit-maximizing, price.

Evaluating the several pricing policies according to distributional criteria is still more difficult and less conclusive. Distributional criteria, which consider who benefits and who pays, entail a large number of issues easy to identify, hard to quantify in general, and hard to apply to the specific case of choosing an appropriate pricing policy for the space shuttle.

The principal distributional considerations include the following:

1. Should Cost Burdens be Distributed from Taxpayers to Users?

It can be argued that those who benefit most from NASA's activities--the aerospace and telecommunications industries, for example--should be obliged to help defray their costs, thereby reducing some of the burden on the general taxpayer. Hence, pricing policy should be used to shift part of the burden from taxpayers to users. On this ground one might argue for a pricing policy that moves from what is allocatively efficient (e.g., marginal cost pricing), to a pricing policy that yields larger revenues (e.g., average cost pricing, or profit-maximizing pricing).

*See also below, p. 6.
**See Wolf, Harris, Kiltgaard, et al., op. cit., p. 112.
***For a fuller discussion of pricing between marginal and average cost, see Appendix C, by John Stein, in Wolf, Harris, et al., op. cit., pp. 164-166.
++See Wolf, Harris, et al., op. cit., p. 6.
Insofar as the choice of a pricing policy generates revenues for the Treasury, it is a form of taxation. Consequently, pricing policy should be considered as part of the question of whether such government projects as the space shuttle ought to be funded through "general" or "specific" taxation. General taxes—such as income, excise and real estate taxes—do not single out specific economic activities for taxation, while specific taxes, such as liquor and gasoline taxes, road tolls or postal charges, do.

As a major means of revenue collecting, general taxes are preferable to specific taxes because of the difficulty, and frequent impossibility, of collecting specific taxes from those who actually benefit from a particular government service. In many cases, it is precisely the impossibility of identifying or singling out beneficiaries (such as the beneficiaries of military preparedness, or space exploration) that calls for government programs and expenditures in the first place. One person's consumption of military preparedness or space exploration cannot be had without simultaneous enjoyment of the same benefits by everyone else. So no individual would be willing to purchase these "public" goods, and specific taxation would be impossible.

The question remains, if most government projects must be funded from general tax revenue, should some projects still be funded from specific taxes, to the extent possible? The question is difficult, and the answer depends on both distributional and efficiency considerations in specific cases.

If, for example, charging a price greater than marginal cost for a wide range of government services used by a wide range of beneficiaries, were to result in a payment burden whose incidence would be similar to that of a general tax burden, then no distributional advantage would be gained, regardless of its apparent distributional equity in a particular case. So if some government services benefit certain individuals, while other services benefit different individuals, and if the aggregate effect is only a small redistribution of the tax burden, then the distributional benefits resulting from the excess of price over marginal cost are probably not worth the effort.

Looking just at the case of NASA activities rather than government services in general, a pricing policy of charging above marginal cost would be hard to justify on distributional grounds if the economic sectors that benefit from these NASA activities broadly serve the entire economy. In this instance, the paying and benefiting groups would be roughly coterminous. However, if the particular NASA service disproportionately benefits a particular sector of the economy, there may be a valid argument for a specific charge on these beneficiaries, i.e., for charging a price above marginal cost. It might be argued, for instance, that telecommunications more broadly benefits society than does aerospace. If the premise is correct, the distributional argument for charging a price above marginal cost would be stronger with respect to NASA's aerospace activities than to its telecommunications activities.

In the particular case of the space shuttle, it is therefore highly important for evaluating the alternative pricing options for NASA to try to identify the precise composition of the consuming and benefiting public. Are the principal users expected to be in aerospace, telecommunications, mining and mineral exploration, or other fields? Identification of the particular industries or sectors expected to benefit from the space shuttle is thus important in considering the distributional argument for charging a price above marginal cost.

Note that this argument still leaves open the question of which among several pricing policies should be chosen, since average cost pricing, monopoly pricing, and multi-part pricing all have in common this characteristic of specifically taxing shuttle users. To choose among these latter alternatives, one might argue further that the distributional issue should be pushed as far as possible; that is, the goal of net revenue maximization should be sought. However, as noted earlier, if multi-part pricing is impractical, then the efficiency losses associated with a pricing policy that pushes toward monopoly pricing are likely to be considerably greater than those associated, for example, with average cost pricing. In the final analysis, to be justifiable, a price yielding net revenues must lead to redistributional gains that are considered to outweigh efficiency losses—an outcome which, as noted earlier, is more likely if the demand for the space shuttle is inelastic.

2. Should Pricing Policy Attempt to Eliminate Excess Profits?

A second distributional argument relates to the elimination or capturing of excess profits earned by firms that directly benefit from NASA's activities. Whether or not these companies narrowly or broadly serve the entire economy, they may in any case be able to extract excess profits in the process. Charging suitable launching fees, it is argued, can help correct this situation.

However, the government generally has other mechanisms for regulating profits of telecommunications firms and other firms working on government contracts, the likely users of most space shuttle services. If these firms, without directly earning excessive profits, it would seem preferable to change regulatory practices and federal contracting procedures, rather than to rely on launch pricing for this purpose.

In general, this argument would not seem to provide much justification for choosing an inefficient pricing policy.

3. Should Pricing Policy be Used to Tax Foreign Buyers?

A variant of the argument that pricing policy should be used to shift part of the burden of space shuttle costs from taxpayers to users of the shuttle applies to potential foreign buyers of shuttle
services. Foreign buyers of shuttle services will not usually have contributed to the general tax revenues of the U.S. Treasury. Hence, the case for a redistributive use of pricing policy is stronger in this context because the benefiting and the paying groups are clearly different. Furthermore, to the extent that foreign demand for space shuttle services is relatively inelastic, the net revenues derived from a pricing policy that charges foreign users a price above marginal cost would be increased.

The principal arguments against such a policy are political rather than economic or distributional. They include, too, the cost of retaliation by other countries which could entail economic as well as political losses for the U.S. Yet these economic losses might be less than the gains for two reasons: foreign governments probably already apply such pricing policies on their sales abroad of government-subsidized technology to a greater extent than does the United States; and the volume of such sales by foreign countries is currently and prospectively less than those by the United States. However, even if the retaliation by foreign countries did not occur, or the impact of such retaliation inflates costs on the U.S. less than the gains that such a pricing policy for space shuttle services would entail, foreign policy consequences might result that would be undesirable. NASA has a responsibility for promoting technological cooperation with other countries both in the interests of technological progress and of advancing U.S. foreign policy relationships with other countries. A pricing policy that charges foreign users more for space shuttle services than domestic users might be expected to provoke resentment, especially among NATO allies and Japan, and a resulting penalty for U.S. interests and its relationships with these countries in other realms quite apart from aerospace technology. Furthermore, a discriminatory pricing policy might induce potential foreign users to further develop their own launch capabilities. Because economies of scale are so pronounced in shuttle services, foreign competition in launch services should not be unmindfully encouraged.

Sometimes the line between distributional and efficiency considerations is not entirely clear. We referred earlier to the possibility that implementation costs associated with an otherwise efficient pricing policy, namely multi-part pricing, might make that policy more costly, hence less efficient, to adopt than one of the other options. This is particularly likely to be the case for multi-part pricing options because they require a fairly complete knowledge of the relevant demand functions of different space shuttle users. But implementation problems also arise in connection with other pricing options as well, particularly where distributional considerations enter prominently into the Congressional authorization and appropriation for government programs in general, and for the space shuttle in particular. To an appreciable extent, launch services in the past and the space shuttle program currently and prospectively, have been "sold" to the Congress on grounds that they would have positive and substantial commercial payoffs. Insofar as Congressional backing for the program, based on Congressional views of "equity" or other reasons, is predicated on the understanding that some considerable part of the R&D and other "fixed" costs attendant to the space shuttle program would be met from the prices charged for shuttle services, then a pricing policy charging greater than the marginal costs can be justified. In this case, moreover, the justification can be made on efficiency as well as distributional grounds. In effect, a portion of the costs that are fixed are marginal costs, from the standpoint of the original Congressional authorization and authorization for the program.

VI. CONCLUSIONS

Economic theory is helpful in providing an analytical framework for structuring and thinking about the "problems, possibilities, and "uses" relating to the choice of a pricing policy for the space shuttle. However, the framework does not, in this case as in many other policy contexts, lead to an unequivocal conclusion. Resolution of the preferable tradeoffs between efficiency and distributional considerations depends, for the first instance, on clarifying and specifying what the tradeoffs are, but in the final analysis depends on the relative weights and emphasis that policymakers choose to give to these considerations.

The following guidelines can be drawn from the preceding discussion with respect to the choice of a preferred pricing policy for the space shuttle:

1. In determining pricing policy, it is important to try to estimate the elasticity of demand for space shuttle services. The more highly price elastic is the demand, the more likely are substantial efficiency losses to result from a policy that sets price greater than marginal cost. (Incidentally, if the cost of a nearly equal-effective payload launch by the Titan 3C is in the neighborhood of $30 million, then charging a price for shuttle services in that neighborhood is likely to encounter a highly elastic demand.)

2. In evaluating the elasticity of demand, NASA should also be concerned with the composition of demand, in order to ascertain how generally and broadly representative of the taxpaying public are the potential users of space shuttle services. Clearly, the more broadly-based are the users and beneficiaries of shuttle services, the less decisive is the argument for charging a price above marginal cost on grounds of equity and redistribution.

3. In considering the composition of shuttle services demand, attention should also be directed toward the impact of alternative pricing policies

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*However, the potential competition of French and Japanese launch programs would tend to increase the elasticity of foreign demand for the shuttle.*

**C. Wolf, et al., op. cit., pp. 32-34.**

***These "other reasons" may include Congressional interest in obtaining more reliable information concerning the alleged benefits from the shuttle or other R&D programs to the private sector than is involved in the usual testimony presented by interested companies at Congressional hearings. Although net revenues above marginal costs are at best only a lower-bound estimate of such commercial value, Congressional concerns may be more directed toward reducing the risks of over-estimating such private sector spinoffs rather than under estimating them. See, for a fuller discussion, Wolf, Harris, et al., pp. 24-26.***
on foreign users, for example, on their incentive to develop their own launch capabilities (which is likely to be enhanced the higher is the price charged for the shuttle by NASA), as well as the impact on U.S. political relationships with other countries, especially NATO allies and Japan.

4. The more clearly does the legislative history accompanying the space shuttle indicate promises and commitments were made to the Congress that the program's deficits would be limited because of revenues derived from commercial sales, the more appropriate it is to consider a part of the initial or investment costs associated with the program as appropriately "marginal," and hence an appropriate part of the price to be charged to shuttle users.