On the Quality and Quantity of Accounting Services Under Alternative Market Structures

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1. PRELIMINARIES

The rules and regulations that affect public accounting firms' behavior are largely determined within the private sector via, for example, the Financial Accounting Standards Board (FASB) and the American Institute of Certified Public Accountants (AICPA). Some of these rules and regulations take the form of "ethical standards"; others pertain to such operational issues as the appropriateness of auditing procedures.[1] To be sure, these rules and regulations can also be set by governmental bodies, such as the Securities and Exchange Commission (SEC) and states' Boards of Accounting. But even this is usually based on input (solicited and unsolicited) from the private sector, usually under the auspices of the FASB or the AICPA. These organizations are, in turn, substantially influenced by the accounting profession itself. In this paper, we attempt to explain the standard-setting process in the accounting profession as the result of collusive behavior on the part of producers of a service. We recognize that this approach represents a severe abstraction from reality and that a number of interesting features of the "real world" are missing from our formalization. This abstraction does, however, permit us to focus clearly on what we believe to be a central feature of the process by which the accounting profession is regulated, and, in our view, the benefits of the abstraction are worth the costs. In any event, it seems clear that the collusive standard setting that applies to accounting is similar to the collusive "product standardization" activities that take place in other industries -- activities that deal with, e.g., interchangeability of parts, product testing and labeling standards, performance standards, etc. (see, e.g., Caves and Roberts [1975] and Hemenway [1975] for an overview of these activities) -- and we attempt to exploit this similarity.

We shall examine some implications of this standard setting framework

under different structures of the market for accounting services (e.g. auditing, financial statement preparation, management accounting services, etc.). The structure of this market has received considerable attention lately, in part because of several major investigations of accounting and some recent applications of "industrial economics" to accounting issues.[2]

Illustrations of how inferences are made about the nature and effects of competition in the accounting industry are provided by the Metcalf subcommittee's Staff Study and the numerous responses to, and critiques of, that study; see, e.g., the collection of works in Buckley and Weston [1980]. This Staff Study relies heavily on conventional arguments about market structure and performance. In particular, it presumes that unambiguous statements about the quantity and quality of accounting services -- and ultimately about the efficiency of resource allocation -- can be based on inferences about market structure. In this regard, the extent to which the accounting industry is "competitive" was the major issue addressed. This led to an extensive use of observed concentration ratios and other data presumed to be associated with market structure. Subsequent works on this issue have used similar data for similar reasons. For example, Dopuch and Simunic [1980] examined results based on market shares (as measures of concentration), CPA examination success ratios (as measures of barriers to entry), and the variability of auditors' fees (as evidence of price competition). As in the case of the Staff Study, the Dopuch/Simunic and similar works presume that inferences about market structure have unambiguous implications for the performance of the accounting industry. This remark applies to papers that infer the existence of noncompetitive attributes as well as those that infer the nonexistence of such attributes.

A major conclusion of our analysis is that market structure has no

unambiguous implications for the performance of the accounting industry (i.e., the quality and quantity of accounting services and, more generally, the efficiency of resource allocation in accounting). Thus, when this performance is of ultimate interest, empirical analyses such as those described above seem misdirected.

2. PERSPECTIVE ON ACCOUNTING FIRMS

These firms supply services whose quality can be varied. Each firm must select the level of human capital to be used in its operations. This is the only factor of production selected by firms on private account. I.e., we shall deal with a single-factor production function, with the single factor being human capital.[3]

In our setting, quality standards -- subsumed into "accounting rules and regulations" -- for each industry (of accounting firms) are collusively set by all firms in that industry. For our purposes, the industry to which an accounting firm belongs is defined in terms of the demand function faced by that firm. Demand function differences across firms may be due to the firms' geographic specialization, the services that constitute their specialty (e.g. tax work versus management services), the sizes of their clients, the industries of their clients, etc. We also assume that membership in the standard-setting group of a particular industry is mandatory for each accounting firm that chooses to enter that industry. This is equivalent to assuming that the benefits of participation in this group's activities are sufficient to discourage exit and encourage entry. In line with this, each member of an industry bears part of the costs of that industry's standard-setting activities, along lines described later. Mechanics and details aside, the critical aspect of our standard-setting scenario is that accounting firms (in pursuit

of their own self-interests) collusively set accounting rules and regulations (directly or indirectly) and they willingly bear the costs (explicit and implicit) of their standard-setting activities.

In order to emphasize the implications of market structure, we shall deal with each of two extremes with respect to accounting firms' output markets: perfect competition and perfect nondiscriminating monopoly. We do not explain how these settings arise or evolve. They are exogenously-fixed institutional settings. Also note that these market settings pertain only to the market for accounting services. For both settings, the decisions about quality are made collusively.

The quality setting body for each industry is assumed to incur costs that vary directly with quality. These costs are incurred for such things as technological developments, advertising, and enforcement. The costs incurred by a given industry's quality-setting body are assumed to be borne by the accounting firms in that industry. For most of our analysis, we assume that the total regulatory costs per accounting firm is a fixed cost, independent of the quantity of output. At a later point, we shall consider the differential effects (if any) of a regulatory cost that is a constant amount per unit of output. Clearly, these two cost conditions are quite simplified. But they do capture the extremes of totally fixed and totally variable. Hence, they do provide some insights on the sensitivity of our conclusions to the behavior of a firm's regulatory costs.

Throughout, we shall treat each accounting firm as if it is affected by one quality-setting body. This, too, is a simplification. One can assume, equivalently, that each firm is affected by several regulatory bodies and that the latter act in unison. Or one can assume that each firm is affected by several regulatory bodies -- perhaps because it belongs to several industries

-- and that those bodies act independently of each other. In this case, our analysis pertains to the consequences of one of the regulatory bodies' actions. A formal treatment of interactions among regulatory bodies is far beyond the scope of our analysis.

3. QUALITY AND THE DEMAND FOR ACCOUNTING SERVICES

Let x_i denote the quantity of an accounting output (e.g., audit work, tax work, etc.) demanded by the ith consumer (e.g., an individual or a firm). This variable might, for example, be expressed in terms of manhours. More on this later.

Secondly, let the scalar a represent the level of quality that characterizes the output quantity x_i. This variable will be discusssed in greater detail below. For the moment, one can think of a as a measure of the level of sophistication of the accounting process and/or accountants.

We assume that the services consumed by the ith user are given by a function $Z(x_i,a)$, where $Z(\cdot,\cdot)$ is strictly increasing in (x_i,a). The user's problem, therefore, is to select a level of x_i so as to maximize utility (or "profits"), $U\big(Z(x_i,a)\big)$, subject to a budget constraint (for a "consumer") or a production function (for a "firm") and conditional on the price per unit of x_i. We assume that $U(\cdot)$ is a strictly increasing concave function of Z. For users in the aggregate, the resulting inverse market demand function is denoted by $p(x,a)$, where x is the level of aggregate output.

Throughout, we assume $\partial p/\partial a > 0$. This is consistent with their being a demand for increased "sophistication" or "quality" of accounting even if the government (via, e.g., the SEC or the IRS) does not require it. And this is, in turn, consistent with evidence suggesting that firms have in the past

demanded accounting services even when not required to do so by governmental regulations (see, e.g., Watts and Zimmerman [1981]). The above characterization of user behavior is used throughout our analysis.

4. MODEL DETAILS: PERFECT COMPETITION WITH RESPECT TO ACCOUNTANTS' SERVICES

Selecting its input of human capital is the task facing each perfectly competitive accounting firm. The total investment by each firm consists of its outlay for human capital, a fixed set-up cost, and a per-firm levy imposed by the accounting firm's standard-setting body, henceforth called its regulatory body. This levy is imposed by the regulatory body to finance its standard-setting activities. Since some of our results are quite dependent on the form of this levy, we shall also discuss the effects of using an alternative scheme, viz. a Pigouvian type per-unit-of-output levy.

As indicated earlier, each accounting firm is presumed to behave as if it provides one type of service. Hence, it pays a levy to only one regulatory body.

Each regulatory body's per-firm levy is presumed to be based on its "rational expectations" conjecture about the equilibrium number of firms in its industry (or domain of authority), conditional on the level of its standard-setting activities. Of course, a balanced budget for each regulatory body requires that this conjectured number equal the actual number at a market equilibrium.

The following notation will be used. No special notation is used to distinguish one firm from another.

c = set-up cost for each firm, measured in units of output;

K = total investment in human capital for each firm;[4]

$f(K)$ = quantity of services produced when K is employed (we assume $f' > 0$ and $f'' < 0$);

n = the number of firms in a given industry;

$x = f(K)n$ = aggregate industry output;

a = capital (human or nonhuman) employed by a given industry for standard-setting and enforcement activities;

i = return per unit of capital in the best alternative employment activity;

$p(x,a)$ = the inverse demand function facing a given industry (this function specifies the price, p, at which the industry's aggregate output, x, can be sold when a units of capital are employed by the industry's regulatory body).

The perspective leading to our representation of the inverse demand function was explained earlier (in Section 3). At this point, some additional remarks on our representation of quality are in order.

The level of real expenditures on quality, a, can be viewed as a measure of the sophistication of the accounting process and/or accountants. One cost of increasing this level of sophistication is the cost of developing, imposing and enforcing standards of practice and of entry into the accounting profession. This is the type of cost subsumed into a. The level of a is not, therefore, a measure of the thoroughness of a particular engagement (e.g. a management consulting task, a particular audit, or a specific tax preparation engagement). The level of a for a given industry pertains to all work done in that industry. (We assume all of the regulatory authorities' regulations are perfectly enforced -- perhaps because firms voluntarily adhere to them.) There is no heterogeneity across tasks with respect to quality within a given industry.[5]

Note that a is not an indicator of the nature of the outcome of any particular task. Thus, for example, a high level of a for the auditing

industry does not imply that any particular audit engagement will be concluded with a "clean" opinion. Whether or not such an opinion is "clean" is determined only after an audit is completed, whereas the level of a is determined before any audit takes place. Similarly, a low level of a in the tax-work industry does not, for the same reasons, imply an adverse IRS ruling on any particular client's tax filing.

We shall not present any empirical work in this paper. But our notion of "quality" may be clarified by considering some proxies that might be used for this concept in empirical work. Two obvious possibilities are: (1) the number of years of graduate accounting education, and (2) the grade-point average required of those who sit for, say, the CPA or CMA exam. The resources spent by the states' professional organizations on alleged cases of negligence or other alleged improprieties can also be used as a proxy for our "quality" variable. Another possibility is the expenditure on (or manhours devoted to) in-house training (conducted by private firms) or continuing education courses conducted by or for professional organizations. Note that none of these possible proxies refers to the thoroughness or care with which a particular task is conducted. Each proxy pertains to some aspect of the overall sophistication of the accounting process or accountants and, therefore, to all engagements.[6]

We can also consider empirical proxies for our quantity-of-output, f(K). At first glance, this might seem to present some insurmountable aggregation problems. It should be clear, however, that we shall not encounter this problem because we are interpreting each accounting industry as providing only one type of service.[7] Conditional on this approach, an acceptable empirical proxy for our output variable would be the number of manhours supplied by a firm's human capital. Another possibility is to interpret our output variable

as representing "productivity units" along the lines suggested by Robinson [1969]. This last interpretation requires that an accounting industry be a collection of accounting firms having the same production function.

With the above as background, we resume our analysis of perfect competition. Each competitive accounting firm takes a and its levy, a/n, as given. Also taken as given is the price per unit of output, p. Conditional on these exogenously-determined variables, each firm selects K so as to maximize its profit function

$$\Pi^C = pf(K) - i\big(K + c + (a/n)\big) \quad , \tag{1}$$

where Π^C denotes the profits of a competitive firm. The corresponding first-order condition is

$$pf'(K) = i \quad . \tag{2}$$

Given free entry and exit, equilibrium in an accounting industry, for each value of a, requires that the following zero-profit condition hold:

$$pf(K) - i\big(K + c + (a/n)\big) = 0 \quad . \tag{3}$$

The value of n consistent with (3) is the equilibrium size of the industry, which depends on a.

Combining (2) and (3) gives the following equilibrium condition:

$$\frac{f(K)}{K + c + (a/n)} = f'(K) \quad , \tag{4}$$

which is illustrated in Figure 1.

The equilibrium value of an accounting firm's human capital and the equilibrium size of the firm's industry are, in general, dependent on the expenditure on standard-setting activities, a. We shall often denote these

values, therefore, by $K(a)$ and $n(a)$ respectively. The optimal value of a is selected by the industry's standard-setting body so as to maximize industry-wide profits:

$$\left[p\left(nf(K),a\right)f(K) - i\left(K + c + (a/n)\right)\right]n \quad . \tag{5}$$

We shall assume that each standard-setting body takes account of only the direct effects of its activities on its industry's demand function -- via the partial derivative $p_a(x,a) = \partial p(x,a)/\partial a$. Since the equilibrium values of both K and n depend in general on a, this precludes recognition of an indirect effect of a on price via an effect on the aggregate quantity of output $x = f(K)n$. This is consistent with our assuming that each accounting industry is perfectly competitive. That is, we shall not allow any standard-setting body to use its regulatory activities as means of indirectly attaining the effects of a monopolistic producer.

At least two sets of assumptions are consistent with this perspective and the optimality conditions given below for a. First, one can assume that each standard-setting body behaves as if it has no effect on aggregate output when it varies a. Thus, from this body's perspective, the total effect of a on price is equal to the direct effect, p_a.[8] Conditional on this assumption, the optimal value of a satisfies

$$p_a\left(n(a)f\left(K(a)\right),a\right)f\left(K(a)\right)n(a) = i \quad . \tag{6}$$

This first-order condition is also obtained when the standard-setting body is allowed to recognize an effect of a on aggregate output but when no indirect effect on any price -- either $p(x,a)$ or the dictated "price of standard setting," (a/n) -- is recognized. This scenario can be interpreted as follows. The trade association behaves as if there is always an infinitely

elastic supply of firms at the equilibrium price for each level of standard-setting expenditures, a. I.e., as far as the relationship between price and output is concerned, the trade association behaves as if the industry faces a horizontal inverse demand function whose height is determined by the value of a. It must also behave as if the ratio $(a/n(a))$ is independent of a. Given these assumptions, the standard-setting body does not actually ignore the influence of a on an individual accounting firm's selection of K and on its industry's size, n -- and thus on aggregate output. But, since the values of K(a) and n(a) satisfy the conditions given by (2) and (3), respectively, the envelope theorem implies that the total derivative of (5) with respect to a is equal to the partial derivative of (5) with respect to a for fixed $(a/n(a))$. Thus, we again end up with the first-order condition given by (6).

5. MODEL DETAILS: NONDISCRIMINATING MONOPOLY WITH RESPECT TO OUTPUT

For the purpose of comparing monopoly and competition, it is important to be sure that the ceterus parebus assumption is satisfied. That is, it is important to be sure that only the market structure has changed. In particular, we want to be sure that in moving from monopoly to competition, we do not change the technology. For this reason, we permit the monopolist to open more than one office. Our monopolist will, therefore, choose an optimal number of offices and an optimal level of human capital for each office. Each office will require a set-up cost of c and use a technology that is described by the production function f. The number of offices opened by the monopolist is analogous to the number of firms in the competitive industry. This approach is necessary because of the fact that f exhibits decreasing returns to human capital. If the monopolist were restricted to opening only one office, that

office would, because of decreasing returns, be less well-suited for the production of large amounts of services than would the multi-firm competitive industry.

We shall therefore view n, K, and a as being selected simultaneously to maximize the monopolist's profit function

$$n\left[p\big(nf(K),a\big)f(K) - i(K + c)\right] - ia \quad . \tag{7}$$

The resulting first-order conditions are:

$$p\big(nf(K),a\big)f(K) + p_x\big(nf(K),a\big)nf(K)^2 - i(K + c) = 0 \quad ; \tag{8}$$

$$p\big(nf(K),a\big)nf'(K) + p_x\big(nf(K),a\big)n^2f(K)f'(K) - in = 0 \quad ; \tag{9}$$

$$p_a\big(nf(K),a\big)nf(K) - i = 0 \quad . \tag{10}$$

If we denote marginal revenue by $MR(x,a)$, where

$$MR(x,a) = p(x,a) + p_x(x,a)x \quad , \tag{11}$$

then (8) and (9) become, respectively,

$$MR\big[nf(K),a\big]f(K) - i(K + c) = 0 \tag{12}$$

and

$$MR\big[nf(K),a\big]f'(K) - i = 0 \quad . \tag{13}$$

Conditions (12) and (13) jointly imply that the monopolistic accounting firm chooses K to equal K_m, where K_m satisfies

$$f'\big(K_m\big) = \frac{f\big(K_m\big)}{K_m + c} \quad . \tag{14}$$

6. COMPARATIVE RESULTS

Much of accountants' interest in market structure issues is due to conflicting statements about the "Big Eight's" influence on the markets for accounting services and about the implications of this influence for resource allocation.[9] The benchmark usually implicit in these statements is the conventional perfectly-competitive market. In this regard, it is relevant to ask whether that benchmark is consistent with a setting having both perfect competition and cooperative standard setting. Also relevant are the differences between perfect competition and imperfect competition when there is collusive standard setting. It is, after all, possible that claims about the "Big Eight's" influence and about the implications of this influence are faulty because they are based on faulty benchmarks.[10] Some insights on these issues can be had via a comparative analysis of results under our two extreme settings of perfect competition and perfect nondiscriminating monopoly.

The first part of the analysis will take a as exogenous. The competitive and monopolistic equilibria will be compared in this case and the comparative statics of a changes will be described. This analysis will provide the basis for our investigation of the case in which a is endogenous.

We begin this analysis by investigating the role of fixed costs in the competitive and monopolistic models just outlined. We will denote these costs by γ. For the monopolist, the fixed cost γ_m incurred in setting up each of its n offices is $\gamma_m = c$. For each competitive firm (which is analogous to an office for a monopolist), the fixed cost is $\gamma_c = c + a/n$, where a/n is each firm's share of a. In the case of the monopolist, the equilibrium level of K, K_m, is determined by γ_m via Equation (14). Similarly, the competitive K level, K_c, is related to γ_c by Equation (4). Thus, when $\gamma = \gamma_m$, K_m is the solution, $K(\gamma)$, implicitly defined by

$$f'\big(K(\gamma)\big) = \frac{f\big(K(\gamma)\big)}{K(\gamma) + \gamma} \tag{15}$$

In the same way, K_c is the solution to (15) when $\gamma = \gamma_c$. Thus, the problem of comparing K_m and K_c can be solved as an exercise in comparative statics; i.e., we can simply observe that implicit differentiation of (15) yields

$$K'(\gamma) = \frac{f'\big(K(\gamma)\big)}{f''\big(K(\gamma)\big)\big[K(\gamma) + \gamma\big]} > 0 \quad ,$$

and then combine this observation with the fact that

$$\gamma_c = c + a/n > c = \gamma_m \quad ,$$

to conclude that K_c exceeds K_m.

The next step is to use the fact that K_c exceeds K_m to describe the relationship between the marginal costs of competitors and monopolists. This is, in fact, a simple task, since the competitors' and monopolists' marginal costs are respectively

$$MC_c = \frac{i}{f'(K_c)} \quad \text{and} \quad \frac{i}{f'(K_m)} = MC_m \quad .$$

Since $K_c > K_m$ and $f'' < 0$,

$$\frac{i}{f'(K_m)} < \frac{i}{f'(K_c)} \quad , \tag{16}$$

i.e. competitors have higher marginal costs than the monopolist.

The next step in our comparative analysis is to use the expressions for MC_c and MC_m to give standard interpretations to conditions (2) and (13). Specifically, condition (2) can be rewritten as

$$p(x,a) = MC_c \quad , \tag{17}$$

the familiar "price equals marginal cost" condition for competitors.

Similarly, (13) can be rewritten as

$$MR(x,a) = MC_m \quad , \tag{18}$$

the usual "marginal revneue equals marginal cost" condition for a monopolist.

Up to this point, we have identified two ways in which the competitive and monopolistic equilibria differ. One of these differences is the usual distinction between monpoly and competition; monopolists equate marginal revenue and marginal costs while competitors equate price and marginal cost. The other difference between the monopoly and competition is unique to our model; it is that monopolists have lower marginal costs than competitors. Competitors have higher marginal costs because they face higher fixed costs than the monopolist.[11] The excess fixed cost of the competitors is accounted for by the share of a each competitive firm is forced to cover.

We can now proceed to a graphical analysis to describe the effect of each of these influences. Unfortunately, these influences do not operate in the same direction and as a consequence the results are ambiguous. The two possible cases are described in Figures 2 and 3.

Figure 2 depicts the case where the monopolistic price is higher than the competitive price and the monopolistic supply is therefore less than the competitive supply. This is what usually emerges from comparisons of competitive and monopolistic firms when both types have the same cost function but different marginal revenue functions. We get this conventional result even though our competitive accounting firms differ from our monopolistic firm in terms of <u>both</u> marginal revenue and marginal cost functions, so long as the competitive marginal cost function, MC_c, is not too high relative to the monopolistic marginal cost function, MC_m. This will be the case when the equilibrium number of firms in the competitive industry, n, is sufficiently

large relative to a so that $|MC_c - MC_m| > 0$ is sufficiently small. Therefore, our analysis points to a somewhat novel role of the number of firms in an industry. Typically, a large number of firms is used to distinguish a perfectly-competitive industry from an imperfectly-competitive one. In our analysis -- with its exogenously-given market structure -- a large number of firms (relative to a) reduces the cost function differences between competitors and a monopoly. Consequently, for sufficiently large n, the conventional marginal revenue function differences between competitors and a monopoly dominate the marginal cost function differences. Unless otherwise indicated, we shall presume that this is what prevails.

Before proceding to the discussion of the determination of a in the competitive and monopolistic cases, we analyze the effect of a changes on the monopolistic and competitive equlibria when a is exogenous. The monopoly case is simple if we assume, for all x and a,

$$\partial MR/\partial a = p_{xa}(x,a)x + p_a(x,a) > 0 \quad . \tag{19}$$

By assumption, $p_a > 0$. I.e., tighter standards increase the price of accounting services at every level of service output. The cross derivative, p_{ax}, measures the influence of output quantity on this "standard-setting effect." Inequality (19) is necessarily satisfied when the "standard-setting effect," p_a, is increasing in the scale of consumptive activity, in the sense that $p_{ax} > 0$. More generally, it is satisfied when the output elasticity of that "standard-setting effect" is greater than minus unity, i.e.

$$\frac{p_{ax}}{p_a/x} > -1 \quad .$$

When condition (19) does hold, Figure 4 describes the effect of a change in a on x_m. Since MC_m is a constant -- and thus independent of a -- the

rise in MR caused by an increase in a will cause x_m to rise. The specific relationship between x_m and a will be determined by the equation

$$MC_m = i/f'(K_m)$$

and the condition

$$MR(x,a) = MC_m \quad .$$

The analysis of the relationship $x_c(a)$ implied by (17) and the equality $MC_c = i/f'(K_c)$ is complicated by the fact that the competitor's marginal cost, MC_c, varies with a, a fact we emphasize by writing $MC_c(a)$. Thus even if the demand function shifts upward when a increases (i.e. even if $\partial p/\partial a > 0$), $x_c'(a)$ may be negative. Such a case is depicted in Figure 5.

In Figure 5, x_c falls when a increases because MC_c rises with a. Note, however, that an increase in MC_c is not sufficient to cause x_c to fall. The increase in MC_c must be sufficiently large to offset the effect of the demand shift, p_a. I.e., the "cost function effect" of a, $\partial MC_c/\partial a$, must offset the demand function effect, $\partial p/\partial a$. Figure 6 depicts a case in which MC_c increases but x_c rises.

When MC_c decreases in a, then x_c unambiguously rises. This case is illustrated in Figure 7.

Since the direction of the effect of a on $MC_c(a)$ is critical in determining the slope of $x_c(a)$, it is worth noting that the behavior of $\partial MC_c/\partial a$ is determined by $K_c'(a)$, which is in turn determined by (4). Since $MC_c(a) = i/f'\left(K_c(a)\right)$, we have

$$\frac{\partial MC_c}{\partial a} = -\frac{i}{\left[f'\left(K_c(a)\right)\right]^2} f''\left(K_c(a)\right) K_c'(a) \quad . \tag{20}$$

Since

$$-\frac{i}{[f'(K_c(a))]^2} f''(K_c(a)) > 0 \quad ,$$

(20) implies that $\partial MC_c/\partial a$ has the same sign as $K_c'(a)$. The sign of $K_c'(a)$ can be determined by implicit differentiation of (2) and (4). Unfortunately, the result is ambiguous. Sufficient conditions for $K_c'(a) < 0$ are given in Gonedes and Kihlstrom [1984; Appendix A2]. The critical elements in these conditions include: the price elasticity of output demand, the elasticity of total capital demand with respect to changes in the price of capital, and the elasticity of the price of accounting services with respect to standard-setting expenditures.

When it is necessary to use the sign of $x_c'(a)$ in our analysis, we shall assume $x_c'(a) > 0$.

The relationships $x_c(a)$ and $x_m(a)$ describe the influence of standard-setting on output when accounting output is optimally chosen conditional on any level of standard-setting, a -- not necessarily the optimal level. For the competitive case, $x_c(a)$ is obtained from condition (17) and $MC_c(a) = i/f'(K_c)$. For the monopoly case, $x_m(a)$ is obtained from (18) and $MC_m(a) = i/f'(K_m)$.

We can now complete our analysis by comparing monopolistic and competitive equlibria when a is endogenous. When a is endogenous, it becomes necessary to consider the optimality condition on the level of standard-setting activities, a -- condition (6) for perfect competition and (10) for monopoly. These conditions, which were ignored in the preceding analysis, are in fact identical. We proceed by letting $x_*(a)$ denote the relationship between accounting output and standard-setting activities implied by (6) -- or

equivalently (10). We have, after implicitly differentiating (6):

$$x_*'(a) = -\frac{(p_{aa})x_*(a)}{[p_a(x_*,a) + p_{x_*a}(x_*,a)x_*(a)]} \quad . \tag{21}$$

If $p_{aa} < 0$ and if condition (19) holds for $x_*(a)$, then $x_*'(a) > 0$. We shall restrict our attention to this (seemingly plausible) case.

The profit-maximizing combination of output quantity and standard-setting activities is given by the intersection of $x_c(a)$ and $x_*(a)$ for our competitive case and of $x_m(a)$ and $x_*(a)$ for our monopolistic case. Two cases are possible; they are depicted in Figures 8 and 9. The equilibriuim levels of standard-setting activities under competition and monopoly are denoted by a_c and a_m respectively.

Note that in Figure 8 the monopolistic output and standard-setting activities exceed the corresponding competitive levels.[12] This occurs because x_*' is smaller than both x_c' and x_m'. From condition (21), it can be seen that x_*' would be small if $-p_{aa}$ is small or if $[p_a + p_{x_*a}x_*]$ is large. Since $[p_a + p_{xa}x]$ is our monopolist's marginal revenue, $x_m'(a)$ will be large when marginal revenue is large, other things equal. The relationship between x_c' and $[p_a + p_{xa}x]$ is less clear. If, however, $[p_a + p_{xa}x]$ is large because p_a is large, then x_c' should vary directly with $[p_a + p_{xa}x]$. Thus, Figure 9 can be identified with cases in which the marginal revenue

functions facing our monopolistic and competitive industries are heavily affected by changes in standard-setting activities. Conversely, Figure 9 prevails when p_a and $[p_a + p_{xa}x]$ are small. In this case, equilibrium entails $x_c > x_m$ and $a_c > a_m$.

Summing up, we found that the equilibrium level of output of accounting services by our monopolist varies directly with the equilibrium level of quality, as represented by standard-setting activities. This is conditional on assuming that marginal revenue increases with quality. For our perfectly competitive accounting firm, the situation is ambiguous even when its marginal revenue (= price) varies directly with the quality of its services. However, we did supply sufficient conditions for a direct variation between a perfect competitor's output and the quality of its services. In addition, we supplied a comparative analysis of the monopolistic output and quality levels with, respectively, the perfectly-competitive output and quality levels. We supplied sufficient conditions for both output and quality to be higher under perfect competition than under monopoly. Yet equally plausible sufficient conditions for the converse to hold were also provided. Thus, even if we were convinced that, say, the Big Eight accounting firms were behaving as if they were one monopolist, we would have no basis for claiming that -- as a result

of this monopolistic behavior -- the quantity and quality of accounting services are below the levels that would otherwise prevail.

WELFARE ANALYSIS

Researchers who have attempted to exploit theories of industrial organization in their work on the market for accounting services often attempt (sometimes implicitly) to cope with "social welfare" issues.[13] Our analytical framework can be used in a straightforward way to deal with such matters. As will be seen, our results differ from what is usually claimed to characterize accounting.

Assuming a demand function without "income effects," the socially efficient levels of n, K and a are those that jointly maximize consumer surplus:

$$S(n,K,a) = \int_0^{nf(K)} p(x,a)dx - i\left[a + n(K + c)\right] \quad . \tag{22}$$

The socially-optimal (n,K,a) vector, therefore, satisfies the following first-order conditions.

$$\partial S/\partial n = f(K)p\left(nf(K),a\right) - i(K + c) = 0 \quad ; \tag{23}$$

$$\partial S/\partial K = n\left[f'(K)p\left(nf(K),a\right) - i\right] = 0 \quad ; \tag{24}$$

and

$$\partial S/\partial a = \int_0^{nf(K)} p_a(x,a)dx - i = 0 \quad . \tag{25}$$

Conditions (23) and (24) imply that if $(\hat{n},\hat{K},\hat{a})$ is efficient, then

$$p(\hat{x},\hat{a}) = i/f'(\hat{K}) \quad , \tag{26}$$

and

$$f'(\hat{K})(\hat{K} + c) = f(\hat{K}) \quad . \tag{27}$$

Condition (26) is the usual condition for efficiency in supply. Using (2) and (13), one sees that this condition is satisfied when the market for accounting services is competitive but not when it is monopolistic.

Condition (27) is the usual condition for technological efficiency. It is the same as condition (14), which is implied by monopoly but not by perfect competition.

In general, condition (25) differs from the first-order condition for the level of standard-setting activities a under either competition or monopoly; see (6) or (10). However, some useful comparative results can be obtained by considering a case for which (25) reduces to (6), or equivalently (10). Specifically, consider the separable demand function:

$$p(x,a) = \beta(a) + \gamma(x) \quad , \tag{28}$$

where $\beta(a) > 0$, $\beta'(a) > 0$ and $\gamma'(x) < 0$. In this case,

$$\int_0^{nf(K)} p_a(x,a)dx = \beta'(a)nf(K)$$

and, therefore, (6), (10) and (25) all reduce to

$$\beta'(a)x = i \quad . \tag{29}$$

Conditions (26), (27) and (29) can now be used to compare the monopolis-

tic and competitive (x,a) vectors with that required for efficiency. In what follows, let $x_E(a)$ denote the efficient level of output, implied by (26) and (27), and let p_E denote the corresponding equilibrium price.

Recall that the value of $x_m(a)$ can be smaller or larger than $x_c(a)$ and the corresponding equilibrium prices under monopoly and competition -- p_m and p_c respectively -- could be such that $p_m > p_c$ or $p_m \leq p_c$. Figures 2 and 3 depicted these results. Corresponding to Figures 2 and 3, we now have Figures 2E and 3E, which incorporate the values of x_E and p_E. Note that Figure 2E depicts less distortion (= departure from efficiency) under competition, whereas Figure 4E depicts less distortion under monopoly.

From (28), we have $p_a = \beta'(a) > 0$. Thus, $x_E'(a) > 0$. Figure 4E depicts this. Using this result and those depicted in 2E and 3E, we can depict $x_E(a)$ as in Figures 8E and 9E, which are modified versions of Figures 8 and 9.

Recall that Figures 8 and 9 assume that the technological inefficiency that arises under competition (because of (4)) is less important than the supply distortion introduced under monopoly (because of (18)). That is, these figures presume that $x_c(a) > x_m(a)$; see the discussion in Section 6, above.

As in the previous section, Figures 8E and 9E incorporate the relationship $x_*(a)$ given in (21). For the case at hand -- which assumes the separable demand function (28) -- this relationship is the quantity-of-output/level-of-quality relationship implied by an efficient choice of quality, a. Thus, the intersections of $x_*(a)$ with $x_E(a)$, $x_c(a)$ and $x_m(a)$ define, respectively, efficient equilibrium, competitive equilibrium and monopolistic equilibrium in (x,a) space. These equilibria are depicted in Figures 8E and 9E.

As was the case with Figure 8, Figure 8E can be identified with cases wherein p_a and $[p_a + p_{xa}x]$ are relatively large. In these cases, both

competition and monopoly result in excessive quality for accounting services and excessive output of accounting services. The distortion caused by monopoly is greater. This occurs because $x_c(a)$ lies below $x_m(a)$. And this is due in turn to assuming that the technological distortion of competition is less important than the supply distortion of monopoly. If the monopolistic distortion were relatively unimportant, then the positions of $x_m(a)$ and $x_c(a)$ would be reversed in Figure 8E, and a monopolistic accounting industry would result in less distortion than a competitive accounting industry.

In Figure 9E -- which can be identified with relatively small p_a and $[p_a + p_{xa}x]$ -- both competition and monopoly result in inadequate standard-setting activities and quantity of output. The distortion is greater under monopoly.

8. RESULTS UNDER AN ALTERNATIVE SCHEME FOR FINANCING STANDARD-SETTING ACTIVITIES

Our results are quite dependent on our use of a per-firm levy to finance industry-wide expenditures on quality, a. The fact that a perfectly-competitive firm's marginal cost depends on this levy, (a/n), induces the result that a perfectly-competitive firm does not attain technical efficiency. This situation can be altered by substituting a Pigouvian-type levy -- which is a per-unit-of-output charge -- for our per-firm levy. This changes the levy from a strictly fixed cost (with respect to output quantity) to a strictly variable cost, from a firm's perspective. This alternative does eliminate some of the drawbacks of the per-firm levy. But it also introduces some problems of its own. For example, a Pigouvian-type levy leads to results that conflict with the welfare conditions for efficiency of supply. Thus, in the end, it is not clear (especially on efficiency grounds) which levy is "superior." For details, see the technical results provided by Gonedes and

Kihlstrom [1984].

9. SUMMARY

This paper considered quality of accounting services provided by two market structures: perfect competition and nondiscriminating monopoly. In the model described here, output decisions are made by individual firms, but, for both market structures, quality decisions are made collusively by a regulatory body acting on behalf of its member firms. We argued that such collusive standard-setting activities seem to capture the essence of "real world" public accounting because accounting rules and regulations are largely determined within the private sector via specially-sanctioned state and professional organizations, such as the Financial Accounting Standards Board and the American Institute of CPAs.

Our analysis allows for different types of accounting services, distinguished by, e.g., client size, geographic location of clients, publicly-traded versus privately-held firms, or by the nature of the services (such as audit work, tax work, etc.). In our model, each type of acounting service defines an "industry." There is one regulatory (or "standard setting") body for each industry. All firms that choose to enter a particular industry are assumed to participate in the collusive standard-setting activities pertaining to that industry. The cost of each regulatory body's standard-setting activities is borne by the firms that enter that body's industry. For much of our analysis, we assume that each body imposes a uniform per-firm charge on each firm over which it has authority. We do, however, briefly consider an alternative (per-unit-of-output) levy in the penultimate section of our paper.

The level of output selected by each perfectly-competitive firm, conditional on its industry's quality level, is found to satisfy consumptive

optimality conditions but not technical efficiency conditions. The reverse is true for a nondiscriminating monopolist. For our monopolist, the equilibrium level of output varies directly with the equilibrium level of quality when it is assumed that marginal revenue increases with quality. This occurs because the monopolist's marginal cost of output is independent of the level of quality. Such is not the case for our perfectly-competitive firm. Thus, even when the latter firm's marginal revenue (= price) of output increases with quality, the effect of quality on output is, in general, ambiguous. Sufficient conditions for a direct variation between a perfect competitor's output and the industry's quality level are, however, derived. We also compare the monopolistic output and quantity levels with, respectively, a perfect competitor's output and quality. We provide sufficient conditions for both output and quality to be higher under perfect competition than under monopoly. But equally plausible sufficient conditions are provided for the converse to hold. Thus, even if one were convinced that the Big Eight accounting firms behave as if they were one monopoly, one would have no basis for claiming that, as a result of this monopolistic behavior, the quantity and quality of accounting services are below the levels that would otherwise prevail.

The final section of our paper deals with social welfare (assuming no "income effects"). We note that both monopolistic and competitive market structures can result in either too much or too little quality and output relative to the socially-efficient levels. Moreover, the monopolistic structure can result in either more or less "distortion" than that associated with perfect competition. In short, neither market structure is, in general, superior to the other as far as attaining social efficiency is concerned. By itself, this seems to contradict the arguments of those who claim that accounting markets are noncompetitive and then condemn the alleged noncompeti-

tiveness on efficiency grounds. Such a condemnation is usually found in work that uses the "structural theory" of industrial organization; see Buckley and Weston [1980; preface] for an overview. A seemingly extreme application of this approach is Steven's [1981] characterization of the market for accounting (especially auditing), which is based on his claims about the Big Eight accounting firms' influence on that market. Stevens is one of those who ignores the fact that an optimizing monopolist will fully internalize some costs that will generally be fully or partially ignored by optimizing perfectly competitive accounting firms. The cost of setting quality standards that have external effects is one such cost.

This is one of the ways that "conventional" comparative results on competitive nad noncompetitive firms do not seem transferable to accounting markets, as modelled herein. Another is that equilibrium output under monopoly may exceed equilibrium output under competition, conditional on the level of standard-setting activities. The upshot of this is that conventional empirical and theoretical methods for dealing with market structure (or "industrial organization") issues may not be directly applicable to accounting markets because of the prevailing institutional framework for setting standards and regulating quality with respect to accounting services.[14]

To be sure, our analysis is (not unexpectedly) based on simplifying assumptions. We do not, for example, allow for heterogeneous firms within any accounting industry. Thus, e.g., we do not allow for nonuniformity in the costs borne by firms (within an industry) for standard-setting activities. Nor do we allow for intra-industry differences regarding firm size, etc. Secondly, we do not consider any constraints on the quality of any accounting service -- such as a minimum level of quality. We recognize that these restrictions limit the generality of our results. Yet, we also recognize that

such restrictions are unavoidable in any single attempt to deal with fundamental issues.

Finally, we note that our quality variable is similar to the one considered by, e.g. Swan [1970], Spence [1975], Sheshinski [1976], and Kihlstrom and Levhari [1977]. Relative to the results provided in the last reference, some of our main results may appear surprising -- particularly our conclusions about the equilibrium levels of quality in monopolistic and competitive markets. The differences between our results and the others are due to differences regarding critical assumptions. First, unlike the other papers, we did not assume that the total "services" provided by quality are proportional to the quantity of output. Second, in our main analysis the cost of quality for any firm is independent of its output level. This cost is like a "set-up cost" (or, more precisely, an entry fee). Finally, given the institutional setting used here, expenditures on quality shift the common demand function faced by every firm in a given industry, because quality decisions are made collusively via a (private sector) regulatory body acting on behalf of its members. Thus, from the view of each firm, quality decisions have external effects. This sort of externality issue did not arise in the references cited above.[15]

FOOTNOTES

1 In this regard, it is well to note that the certifying exams administered by the profession (e.g., the CPA exam and the CMA exam) can also be viewed as parts of the profession's quality-regulating apparatus. These exams can have a substantial influence on the education and views of those who take such exams.

2 See Buckley and Weston [1980] for an overview and numerous references.

3 This seems to be the single most important factor for accounting firms.

4 This could just as easily be used to denote total capital -- both human and nonhuman. But human capital seems to be the more important imput for accounting firms. Note also that all units of K are homogenous with respect to quality. This common level of human capital may be altered by the industry's standard-setting activities. But conditional on those activities, no firm has a direct choice over a. Once a firm enters an industry, the level of quality established by its regulatory body is exogenous from each firm's point of view.

5 Thus, as far as any industry is concerned, expenditures on a constitute a fixed cost with respect to aggregate industry output. Expenditures that result in, say, more thorough work in given situations (within a given industry) would, on the other hand, be components of variable costs. The latter situation is not the one contemplated here.

6 Of course, proxies pertaining to particular services (i.e. "accounting industries") supplied by accountants (e.g. tax services, management advisory services, and audit services) are acceptable under our notion of quality. In-house training expenditures pertaining to different services are possible proxies for the quality levels pertaining to different services.

7 Firms providing multiple services would, thus, belong to multiple industries. As indicated, in the case of multi-service firms, we require that the different service activities be pursued independently of each other or that they be pursued in fixed proportions.

8 In general, this behavior may not be rational. Presumably a private-sector regulatory body such as ours would try to attain an "indirect" monopoly via the indirect effect of a on price -- the effect that occurs as a result of the quality level's effect on aggregate output. Allowing for this possibility would give rise to another set of equilibrium conditions that may or may not be the same as our pure monopoly setting (discussed below). We are ignoring this third possibility because we want to focus on two pure cases: perfect competition in the output market and perfect nondiscriminating monopoly in the output market.

9 The "Big Eight" CPA firms are: Arthur Anderson, Arthur Young, Coopers and Lybrand, Ernst and Whinney, Deloite, Haskins and Sells, Peat Marwick Mitchell, Price Waterhouse, and Touche Ross.

FOOTNOTES (cont.)

10 Prototypical claims can be found in, e.g., V.S. Congress: Senate, The Accounting Establishment: A Staff Study, prepared by the Subcommitttee on Reports, Accounting and Management of the Committee on Governmental Operations, 94th Congress, 2nd session; Washington, D.C., Government Printing Office, 1976. Additional characterizations (speculations?) are provided by Stevens [1981].

11 It may seem paradoxical to assert that marginal costs increase between of an increase in fixed cost. This occurs because the marginal cost in question is the marginal cost at which marginal cost equals minimum average cost. The increase in fixed cost clearly does increase minimum average cost.

12 This result conflicts with the claims of those who view the market for accounting services as noncompetitive. See, e.g., U.S. Congress [1976; pp. 43-46].

13 See, e.g., the overview given in Buckley and Weston [1980] and the remarks of Lieberman [1970; chapter 9].

14 Similar remarks may apply to other industries with self-regulatory features.

15 Note, however, that this externality need not be an "inherent" aspect of expenditures on quality. In some cases, expenditures on quality by one fimr may have implications for that firm alone, rather than its entire industry. On the other hand, if its expenditures introduce new consumers into the market of if they have a general "halo" effect on all consumers' assessments of all accounting firms' quality levels, then those expenditures would have "inherent" external effects. In our model, the external effect perceived by each firm is due to the exogenously-given institutional setting for making quality decisions.

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FIGURE 1

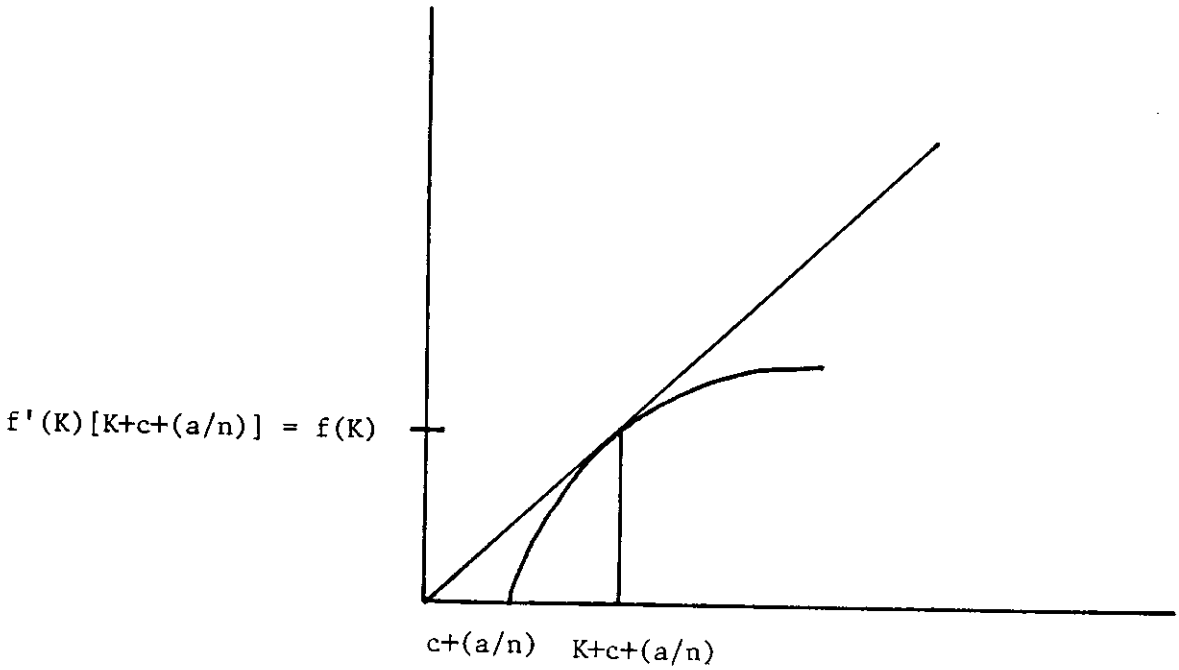

FIGURE 2

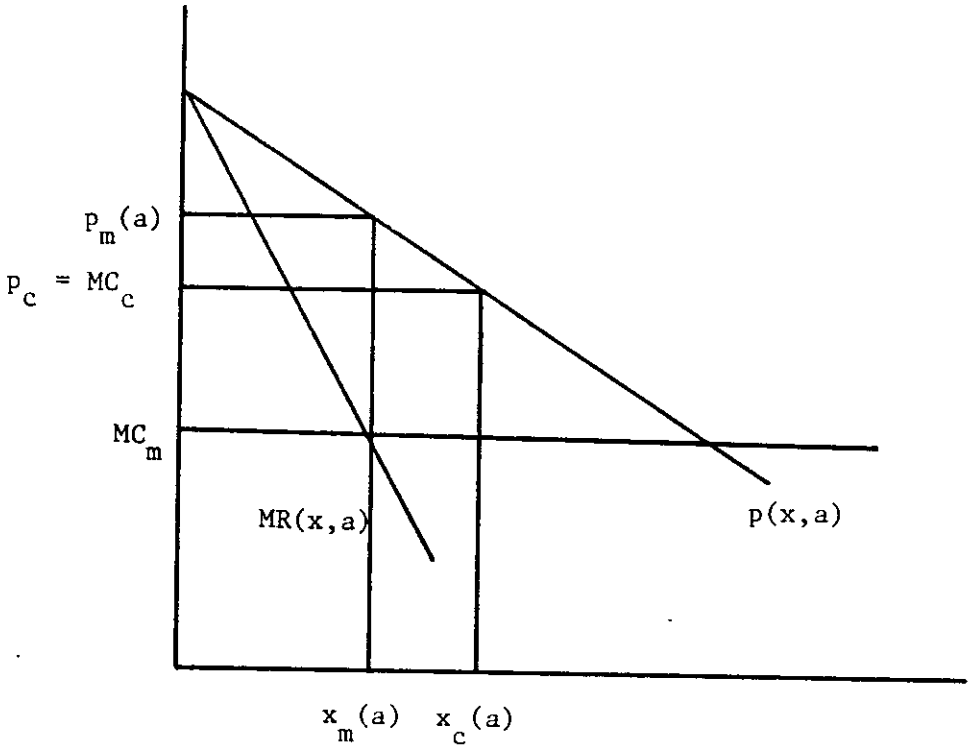

FIGURE 3

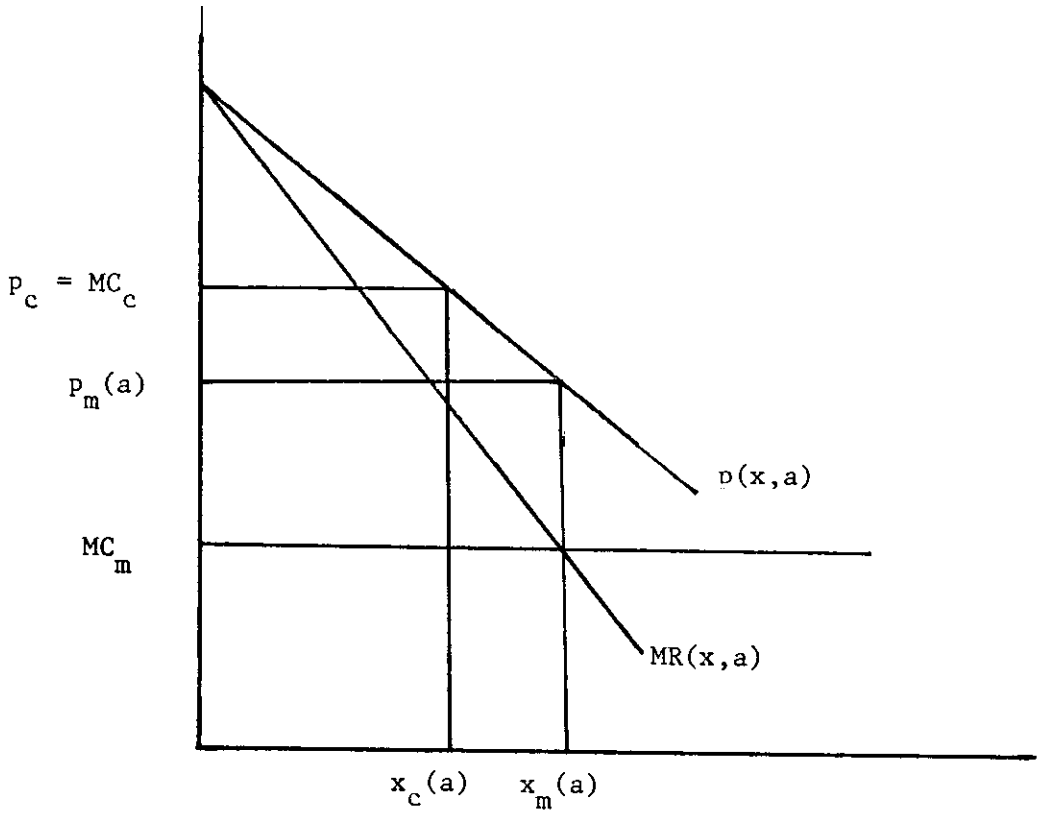

FIGURE 4

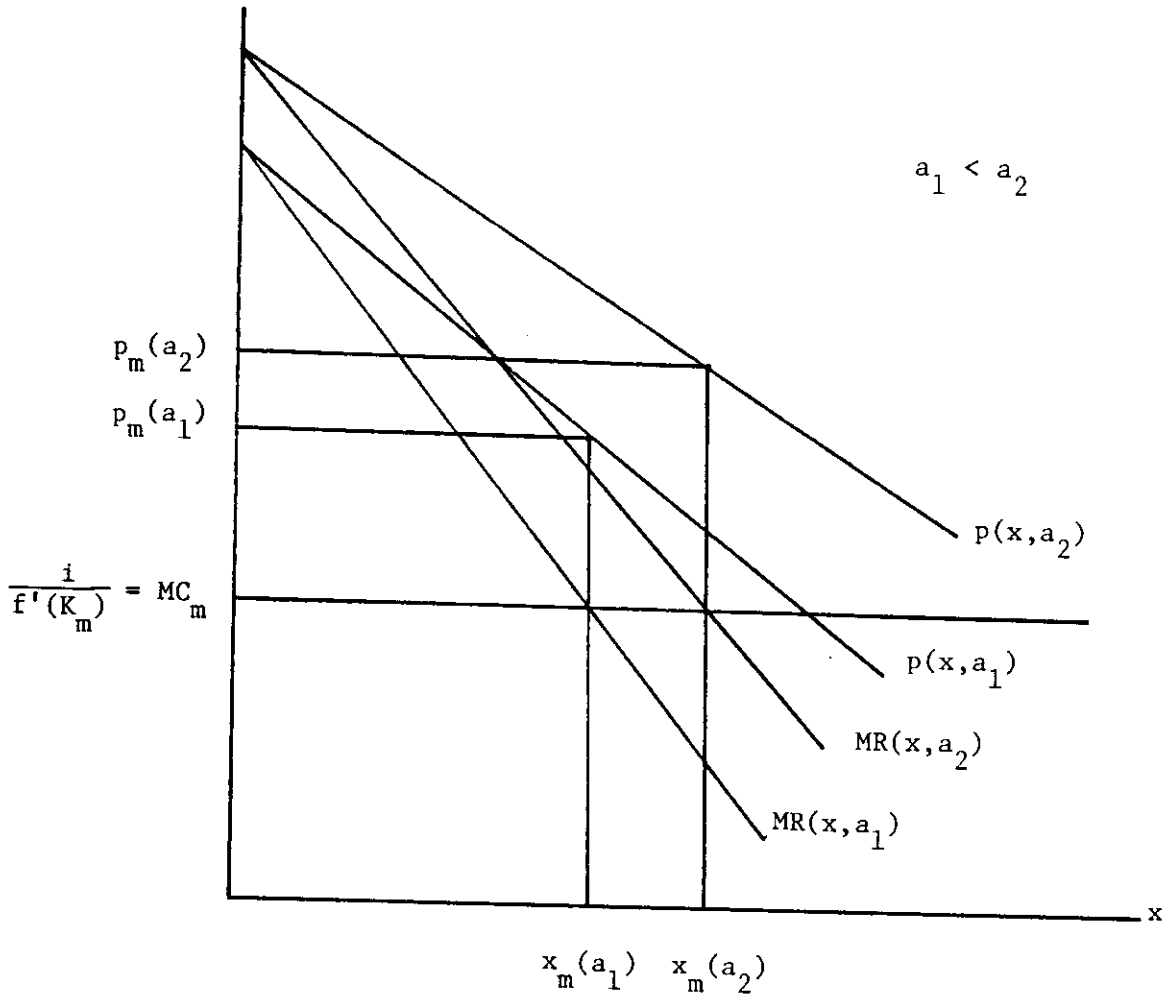
$a_1 < a_2$
$p_m(a_2)$
$p_m(a_1)$
$\frac{i}{f'(K_m)} = MC_m$
$p(x,a_2)$
$p(x,a_1)$
$MR(x,a_2)$
$MR(x,a_1)$
x
$x_m(a_1)$
$x_m(a_2)$

FIGURE 5

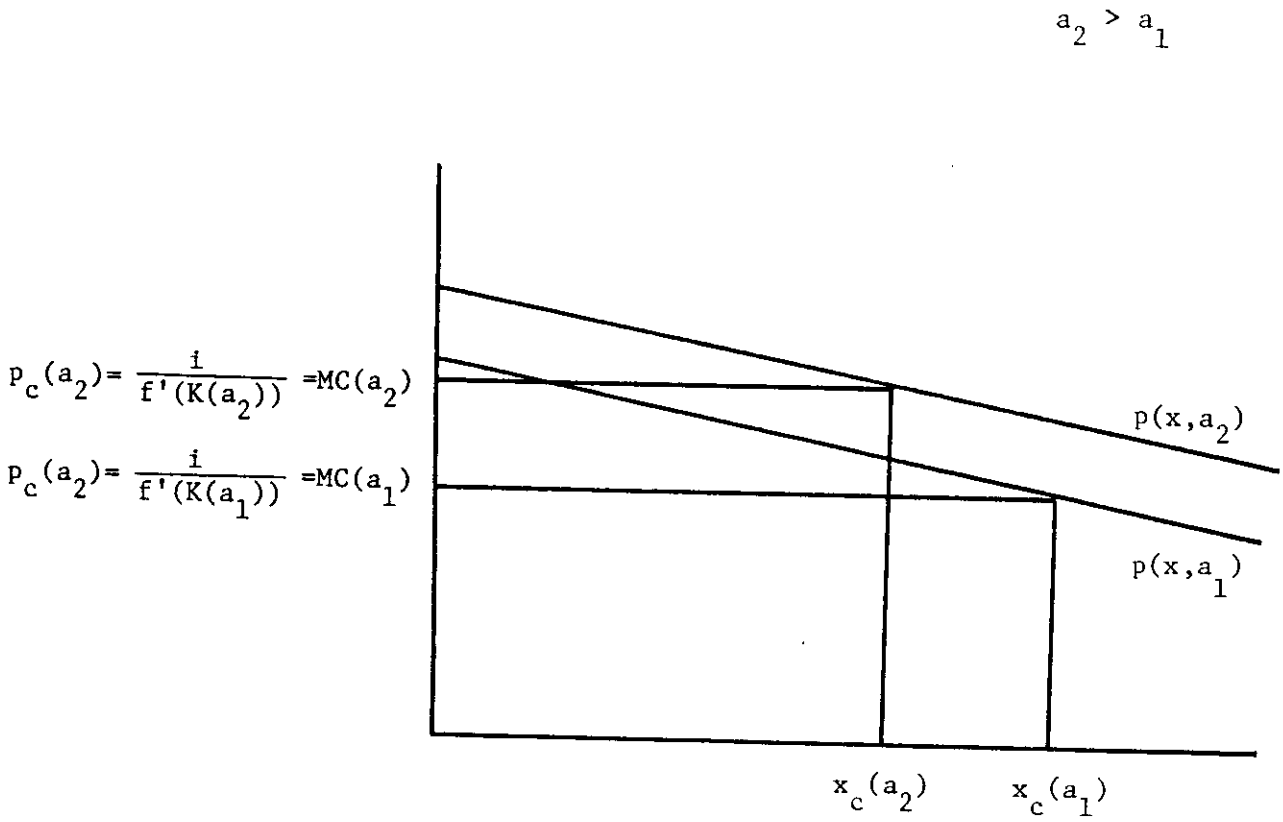
$a_2 > a_1$
$p_c(a_2) = \frac{i}{f'(K(a_2))} = MC(a_2)$
$p_c(a_2) = \frac{i}{f'(K(a_1))} = MC(a_1)$
$p(x,a_2)$
$p(x,a_1)$
$x_c(a_2)$
$x_c(a_1)$

FIGURE 6

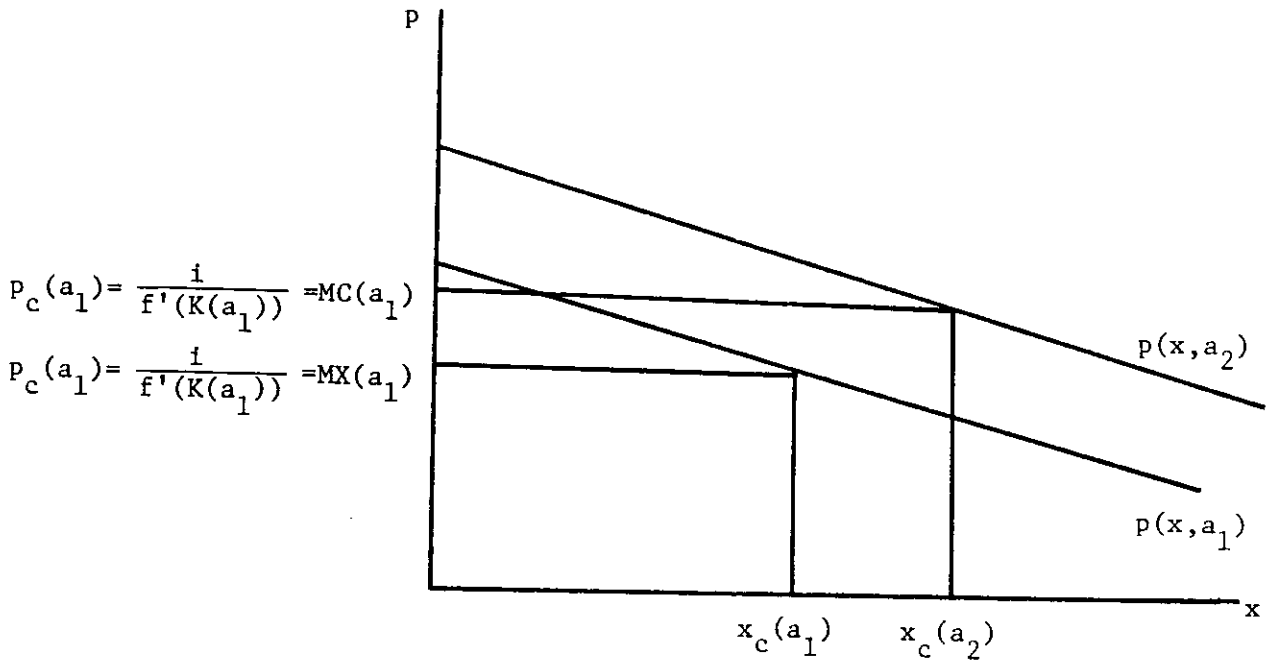
$P_c(a_1) = \frac{i}{f'(K(a_1))} = MC(a_1)$
$P_c(a_1) = \frac{i}{f'(K(a_1))} = MX(a_1)$
P
$p(x,a_2)$
$p(x,a_1)$
x
$x_c(a_1)$
$x_c(a_2)$

FIGURE 7

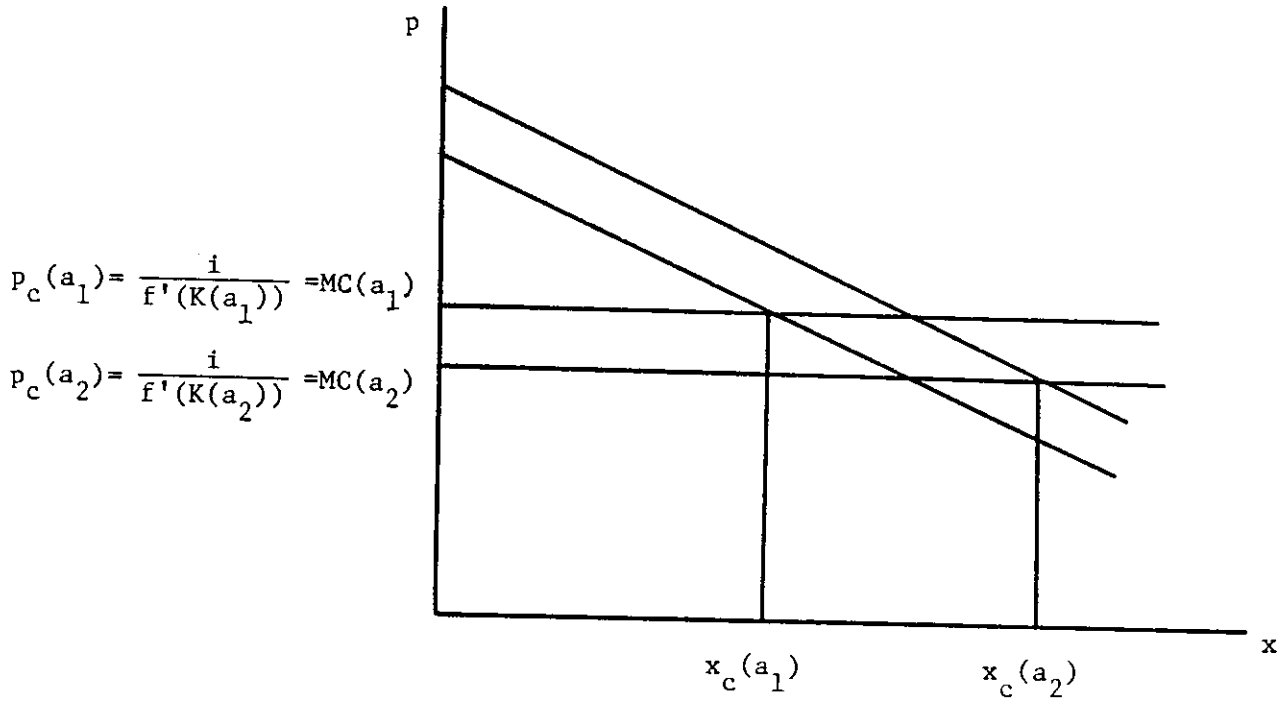

FIGURE 8

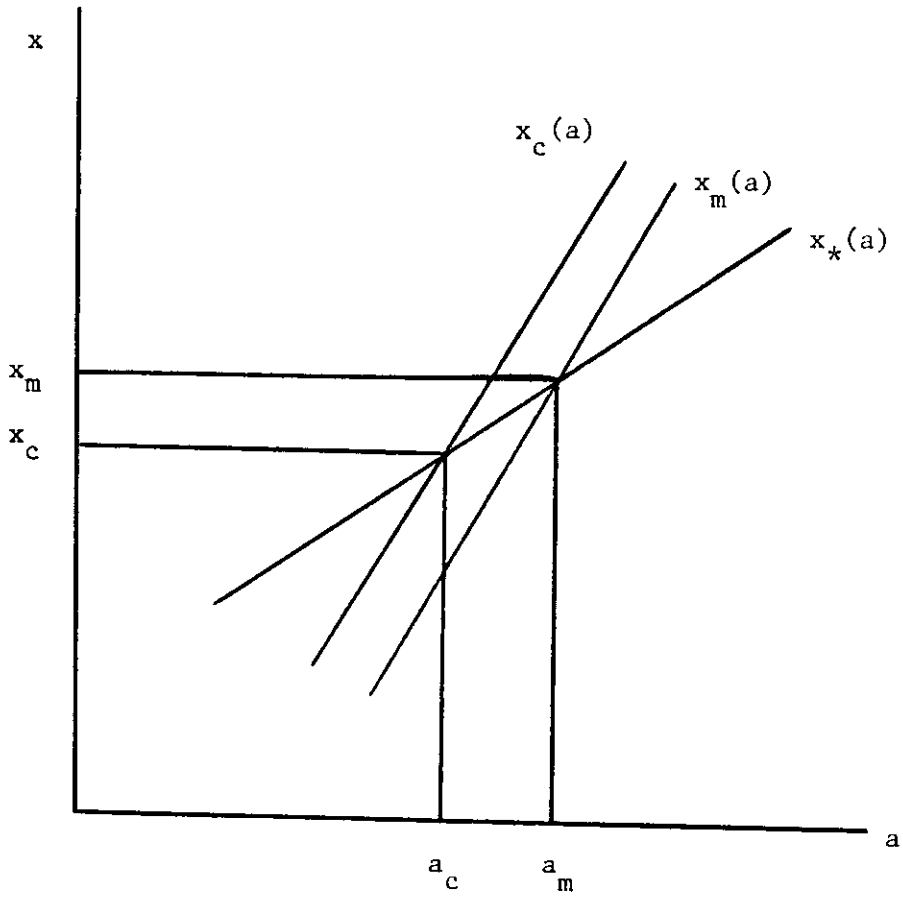

FIGURE 9

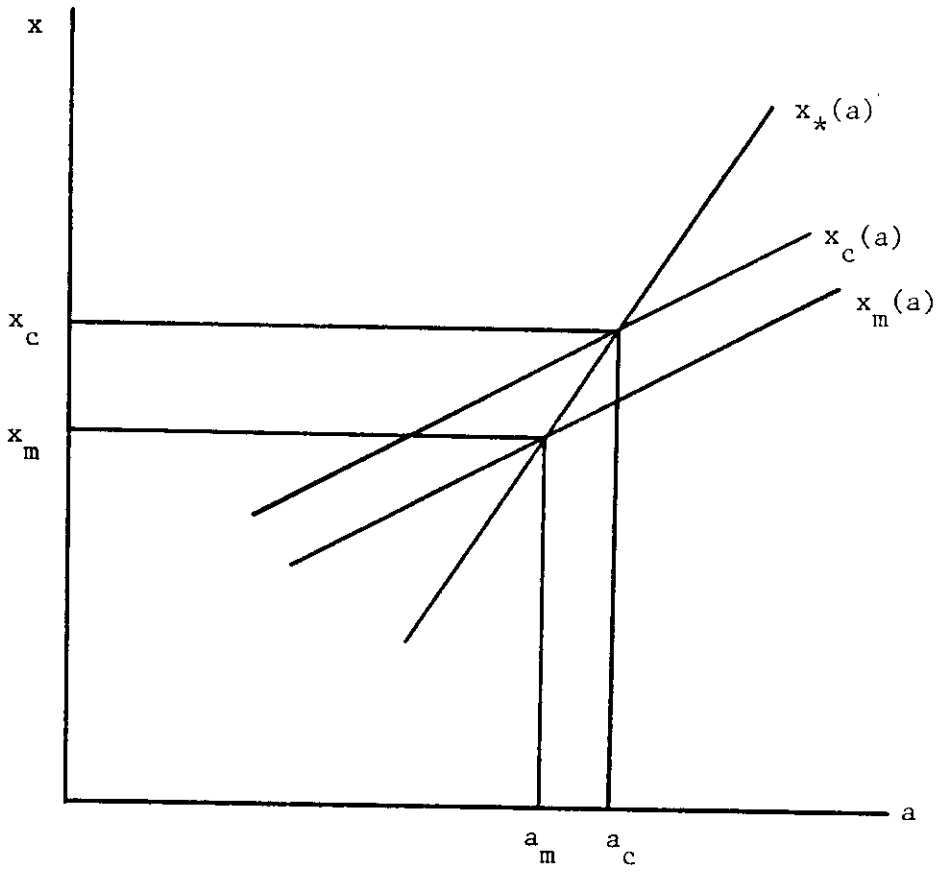

FIGURE 2E

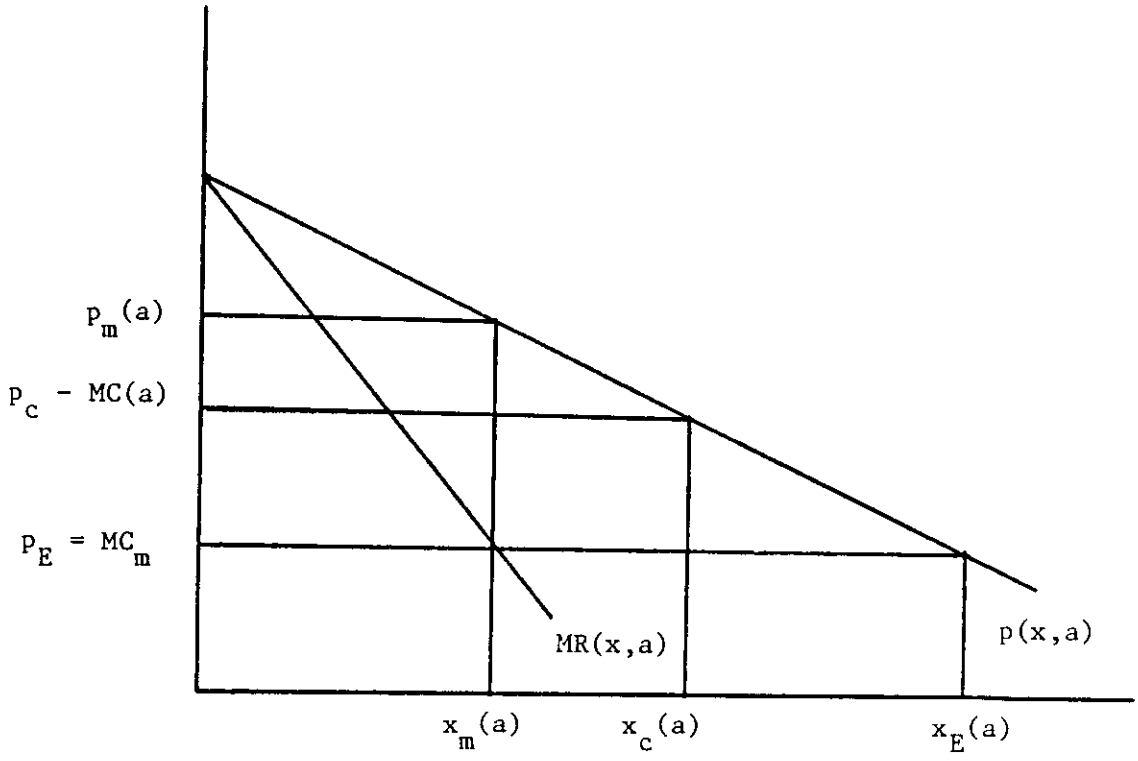

FIGURE 3E

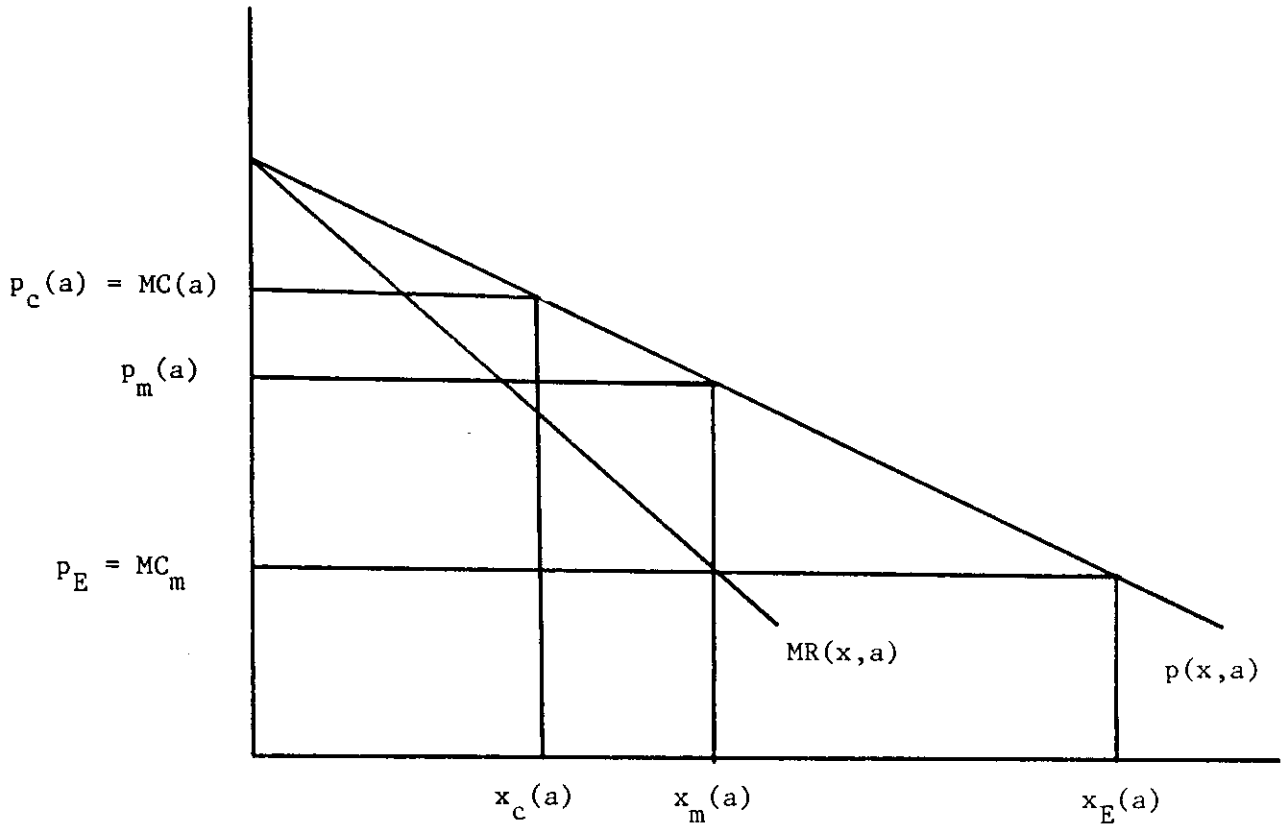

FIGURE 4E

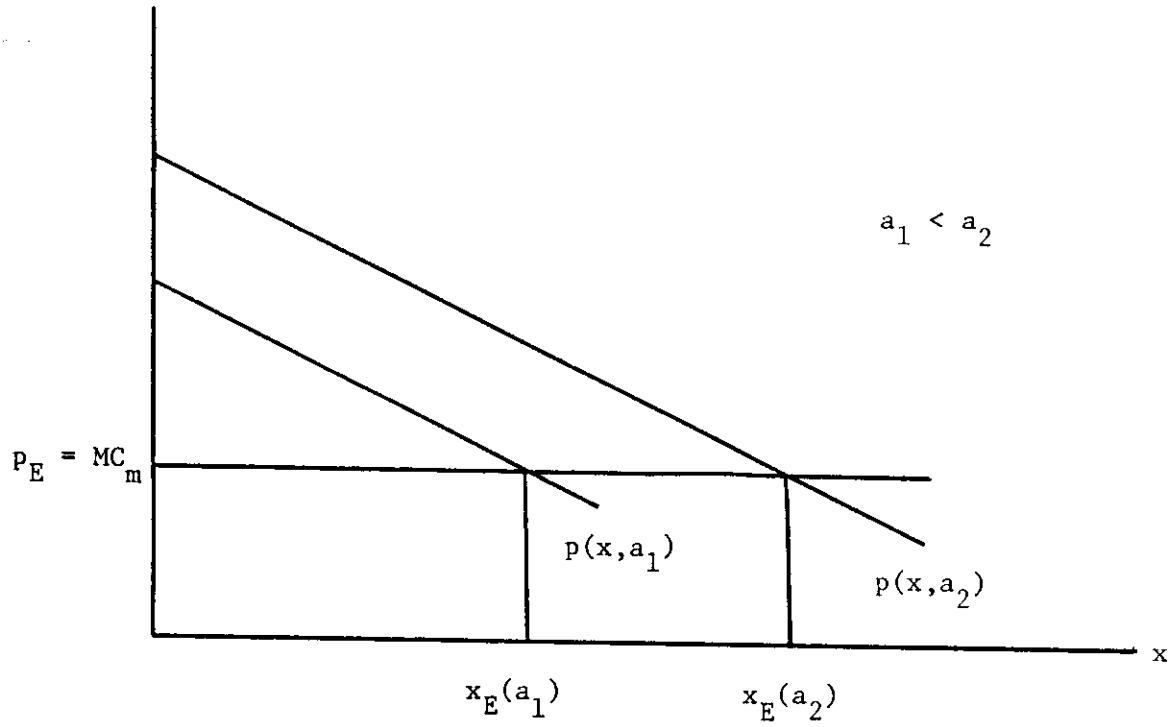

FIGURE 8E

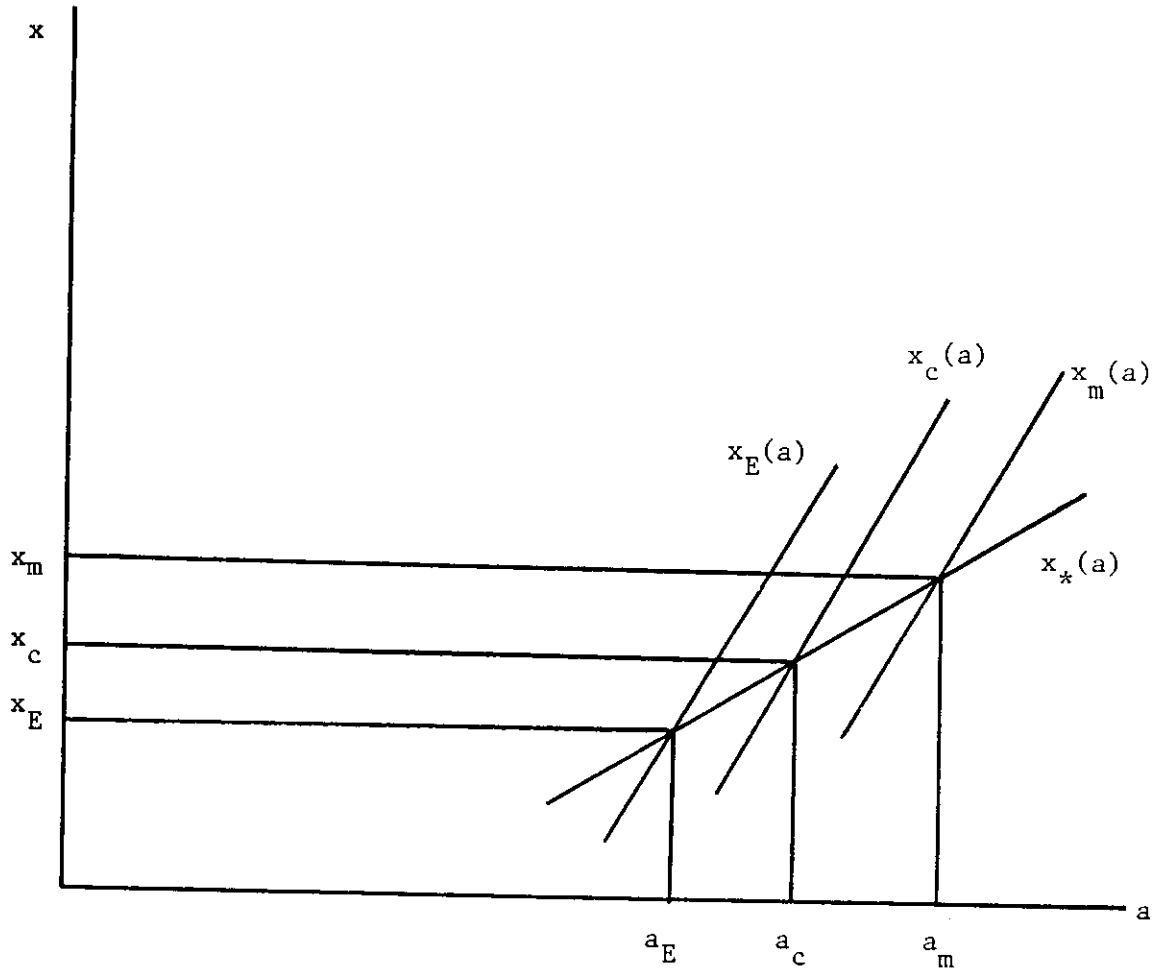

FIGURE 9E