

THE ROLE OF PRICE IN
GUARANTEEING QUALITY*

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I. Introduction

Economists have long considered business firm "reputations" and the threat of loss of future business in continuing transactional relationships as important competitive factors promoting product quality.¹ The accepted vague theoretical notion is that firms will not generally supply lower than anticipated quality to a consumer if there is a high probability of repeat sale. However, the same economists who claim that consumer repeat purchase is sufficient to prevent firms from cheating by intentionally deteriorating quality also generally maintain that firm cheating behavior is likely to occur to make collusive arrangements highly unstable. This apparent contradiction indicates an inadequate specification of the conditions under which it will be wealth maximizing for a firm to obtain a temporary increase in profit by breaking a potentially long-term agreement. A major result of the analysis that follows is that repeat purchase is not a sufficient condition to assure quality. It is also necessary that there be some cost to the firm implied by the loss of future sales. A higher product price than would exist under a perfectly competitive (zero information cost) equilibrium may therefore be required.

While Adam Smith more than 200 years ago posited the notion that an increased price could assure higher quality supply² and competitive quality

¹See, for example, Marshall (1949, bk 4, ch. 11) and Hayek (1949, p. 97).

²Smith (1937, p. 105) noted that a higher wage, by giving an individual rank in society (a form of forfeitable brand name collateral in our framework), created increased trust.

enforcement mechanisms have recently been analyzed more fully by Klein (1974) and Becker and Stigler (1974), the existing theoretical analysis remains incomplete and the empirical implications of the analysis remain largely unrecognized. This paper corrects these deficiencies by presenting a theoretical model of the role of price relative to avoidable (salvageable) costs as a method of guaranteeing quality.

The model develops the circumstances under which firms' brand names will have positive economic value and, further, investigates how competition leads to the investment in quality guaranteeing brand name capital. The basic approach we adopt concentrates on the circumstances which cause a continual stream of income obtained from providing a high quality to be more profitable than a larger, one time wealth increase obtained from production of deceptively low quality. This then leads directly to the investigation of the competitive process in devising production, distribution and marketing techniques that minimize the cost to consumers of obtaining an assured high quality.

An initial assumption of our analysis is that consumer prepurchase quality determination costs are prohibitive beyond some quality level. Hence the quality of the good being considered beyond that level is what Nelson (1970) labelled an "experience" characteristic which can be determined only after purchase. We also assume that contracts explicitly specifying quality are unenforceable. Because of contracting costs involved in specifying all elements of quality and because of litigation and enforcement costs, transactors are assumed to rely on the threat of termination of the business relationship for enforcement of

implicit quality promises³. This assumption is consistent with the pioneering work of Macauley (1963), where reliance on formal contracts and explicit legal sanctions was found to be an extremely rare element of inter-firm relationships.⁴

We, thus, rely solely on "coercion free" market solutions by utilizing a model of wealth-maximizing firms (i.e., where managers are assumed to place no direct value on honesty per se), to determine when promised quality will be supplied and when firms will choose instead to supply a quality lower than anticipated. In order to emphasize the ability to guarantee quality in an unregulated market, a simple model which assumes complete prepurchase consumer ignorance of a product's quality and full consumer knowledge of firm production costs is analyzed in section II. We find that firms will not cheat on promises to sell high quality if price is sufficiently above nonsalvageable production costs. When all production assets are salvageable, the analysis implies that high promised quality is supplied only if the market price exceeds the perfectly competitive price. This difference is called the quality assuring price premium. In section III methods by

³In a world of stochastic product quality production a firm may guarantee to replace units of the good that are clearly inferior or defective. These guarantees contractually specify in a general way the anticipated quality of the product and can insure against the stochastic element present in all production processes. However, quality may generally be a complicated vector of characteristics with high costs of contractually specifying all quality elements under all contingencies. More importantly, contractual warranties do not guarantee against intentional quality depreciation. When enforcement costs are positive, promises to supply particular levels of quality may be worth little unless the guarantee is guaranteed by the firm's "reputation."

⁴Macauley provides some sketchy evidence that business firms prevent nonfulfillment of implicit (i.e., legally unenforceable) contracts by the use of effective non-legal sanctions consisting primarily of the loss of future business when such contracts are violated.

which the capital value of these premium payments are dissipated in a free entry equilibrium are analyzed. The quality guaranteeing nature of non-salvageable, brand name capital investment is emphasized. The competitive process is extended in section IV to include methods of lowering the premium required to assure quality. Finally, in section V, we emphasize market responses to consumer uncertainty about quality assuring premium levels. Advertising, investment in "conspicuous" assets, and manufacturer imposed price and entry restrictions are all examined as responses to simultaneous quality and production cost uncertainties.

II. Price Premiums and Quality Assurance

Assume initially that consumers costlessly know all market prices and production technologies but not the qualities of goods offered for sale. For simplicity, the good being considered, x , is assumed to be characterized by a single objective quality measure, q , where quality refers to the level of some desirable characteristic contained in the good. Examples are the quietness of appliance motors, the wrinkle free or colorfast properties of clothing or the gasoline mileage of an automobile. We also assume initially that the economy consists of a fixed number of infinitely long-lived consumers who consider buying x each period.^{5,6}

Any identical technology is available to all entrepreneurs such that there are many potential firms with identical total cost functions, $C = c(x,q) + F$, where x is the firm's output, $c(x,q)$ is total variable production costs, and F is fixed (invariant to rate) costs.⁷ Higher quality and higher quantity production require higher production costs, $c_q > 0$ and $c_x > 0$. Marginal cost,

⁵ Consumers are obviously finite lived. However, our assumption of a repeat purchase pattern over an infinite time horizon is relevant if we extend the notion of a consumer from individuals to families and other communities of individuals over which quality information is transmitted temporarily. Further, the fact that many goods, particularly durables are purchased only infrequently, sometimes only once in a lifetime by particular individuals (e.g., an appendectomy), will also not invalidate our analysis. While increased durability will increase the price required to guarantee quality in our framework, communication of quality information between different consumers insures a repeat purchase pattern necessary for our quality guaranteeing mechanism to operate. In this context, increased firm size may facilitate quality information transmission between consumers because the greater a firm's output the more likely it is that one will learn from other consumers about the quality of its product.

⁶The length of a period is of course arbitrary and is taken here to be defined by the life of product x .

⁷The assumption that quality is produced only by variable costs greatly simplifies the following exposition. When quality is produced by both fixed and variable costs, the mechanics of the following analysis change. However, the economics remains unchanged. In Leffler (1976) the case where quality is produced by fixed costs (e.g., the training required for high quality medical service or economic consulting), is considered in detail.

is assumed to initially decrease then increase with output. Average variable and total production costs curves are thus U-shaped.

When buyers are costlessly informed about quality the competitive price schedule, P_c , for alternative quality levels is given by the minimum average production costs for each level of quality, i.e., $P_c = p_c(q) = \frac{c(x^M(q), q) + F}{x^M(q)}$, where x^M minimizes average production costs. Suppose, however, that the quality of product x cannot be determined costlessly before purchase. For simplicity assume prepurchase inspection reveals only whether quality is above or below some minimum level, q_{\min} , and that the costs are prohibitive of determining quality levels above q_{\min} prior to purchase.⁸ Obviously, whenever the market price for high quality exceeds the cost of the minimum quality, a producer can increase his initial period profits by producing the minimum quality and deceptively selling it as a higher quality product.

If producers are to have an incentive to produce high quality products (in the absence of enforceable contracts), consumers must reward high quality production in some way. We assume that a consumer who receives a quality at least as high as expected continues to purchase from the sampled seller as

⁸Allowing the level of q_{\min} to be an endogenous variable does not substantively alter the analysis as long as the level of search cost is functionally related to consumers' demands for quality.

long as prices are unchanged.⁹ On the other hand, if quality is less than expected, the consumer ceases to purchase from the sampled firm.¹⁰ Since this reaction on the part of consumers can be carried out costlessly when there are many identical firms, sellers will know that all future sales are lost if quality lower than anticipated is supplied.¹¹

Consider now a single firm that assumes all other firms are pathologically honest (in that they produce according to the costless information price schedule, P_c), and further that all consumers expect such "honest" production. Given the resulting market price for some high quality, $p_c(q_h)$, this particular firm can increase its initial period quasi-rents by producing minimum quality and selling it at the high quality price.¹² However, since the number of potential buyers is fixed and other firms act honestly, all future customers are

⁹The expectations of consumers as to the qualities available at alternative prices are, of course, crucial and are addressed below. Here we assume for exposition purposes that expectations are exogenous.

¹⁰A consumer's expected quality can be thought of as the "switchpoint" quality resulting from a standard sequential search process. Smallwood and Conslin (1974) analyze numerous alternative consumer reactions in a model where price is fixed and where consumers do not reduce the quantity consumed when poor quality outputs are sampled. The consumer reaction assumption used here most easily emphasizes the role of price and repeat sales in motivating sellers' output characteristic choice. Since we shall establish equilibrium market prices wherein producers, believing that consumers are committed to such a firm termination strategy, will always act honestly, no consumers actually ever switch producers.

¹¹Such a commitment will be more difficult to make credible if it were costly for consumers to alter suppliers. The problem of whether consumers will follow a termination strategy against a firm who produces lower quality output than anticipated even though such a strategy imposes additional costs on the consumer is discussed later.

¹²A firm planning to depreciate its quality would rationally promise infinite quality. However, since we seek to establish a price schedule that promotes quality maintenance for alternative quality levels, it is convenient to consider the returns from quality depreciation for alternative quality levels.

lost.¹³ Whether sales of high or deceptive minimum quality maximizes the firm's wealth depends simply on whether the capital value of future quasi-rents from continued-high quality production exceed the differential initial period quasi-rent from quality depreciation. Assuming unchanging cost and demand conditions and an infinite horizon, the present value of the quasi-rent stream from continued production of high quality output is given by equation (1).

$$W(p, q_h) = \frac{p(q_h) \cdot x(p, q_h) - c(x(p, q_h), q_h)}{r} \quad (1)$$

where r is the rate of interest and $x(p, q_h)$ is the output level equating price to marginal costs for the quality q_h . With costless quality information, the competitive quasi-rent stream would provide only a normal rate of return on the firm's initial fixed cost investment, i.e., $W(p, q_h)$ would equal F .¹⁴

¹³ Entry of new customers will serve to lower the cost to the firm of producing minimum quality since, even if current customers switch, all future sales are not lost. Indeed, if consumers do not communicate with each other and if a firm can costlessly produce a mix of quality levels, it is always profitable to produce some minimum quality output (equal to expected new consumer purchases). If, however, production costs are such that a single quality level is chosen, new customer inflows cause no qualitative changes in the following analysis.

¹⁴ Equation (1) assumes the production assets are infinitely lived. If the fixed assets are of a finite life the quasi-rent from quality maintenance will include a negative capital replacement cost term. No fundamental problems are introduced; the returns from future sales must simply be sufficient to motivate capital replacement.

If, alternatively, the firm were to deceptively produce minimum quality output, we assume it would receive a one period quasi-rent, the present value of which is given by equation (2).

$$W(p, q_{\min}) = \frac{[p(q_h) \cdot x(p, q_{\min}) - c(x(p, q_{\min}), q_{\min})]}{1 + r} + V \quad (2)$$

where V is the salvage value of the firm's assets.¹⁵

The relative magnitudes of the capital values given by equations (1) and (2) are not known a priori. If the salvage value of the firm's assets equal the costs of the assets, ($V = F$), the firm will necessarily deceive consumers by promising high quality but supplying the minimum quality product. Since the costless information competitive price for high quality output, $p_c(q_h)$, is equal to average production costs, the capital value of the stream given by equation (1) is equal to F (i.e., profits are zero). By supplying minimum quality the firm can obtain this capital value (which also equals V in equation (2)) plus the extra return from selling additional, lower cost output in the initial period.

¹⁵We therefore are explicitly distinguishing between "fixed" costs in the sense employed here of constant (invariant to output) costs and "sunk" (non-salvageable) costs. We are assuming that all variable costs are avoidable (salvageable) without excluding the possibility that so are some or all fixed costs. The usual textbook analysis that a firm will not shut down production as long as price is greater than average variable cost blurs this distinction and implicitly assumes that all fixed costs are also sunk costs.

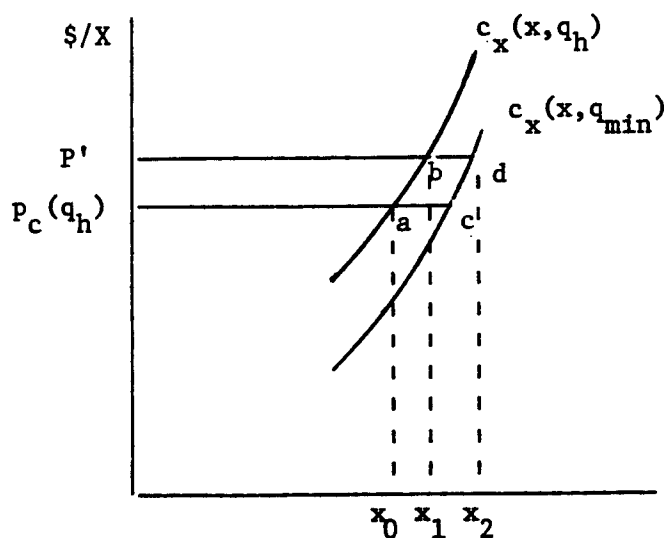
The highest valued alternative use of the entrepreneurial skills is included in salvageable fixed production costs. The firm considered here is assumed to face the same opportunities elsewhere as the firms that are pathologically honest in production of X . The producer choosing to depreciate quality will of course select the technology which minimizes the cost of a single run. This may favor a less capital intensive technology or the use of more salvageable capital as expanded on in IV.B. below. In this case, any capital savings should be considered part of the quasi-rent available to quality depreciation.

In such a situation, rational consumers would recognize that regardless of producers' promises they would never obtain the higher quality product. Therefore, consumers would be willing to pay only the costless information price of the minimum quality output that they can verify pre-purchase. Because of such consumer anticipations, firms will not be able to cheat, but desired high quality output will not be supplied.

There may, however, be a price higher than the perfectly competitive price $p_c(q_h)$, that will: (a) motivate honest production of the high quality good and (b) not completely dissipate the consumers' surplus from purchase of higher quality. If so, such a price premium will be the price of obtaining quality assurance. A necessary condition for such a price, above the minimum of average cost, to promote quality maintenance is that the higher price increases the wealth of the firm from continued high quality production by more than it increases the wealth from one time deceptive minimum quality production.

Figure 1 illustrates the quasi-rents from high quality versus minimum quality production when the price increases from the perfectly competitive

FIGURE 1.



price of high quality, $p_c(q_h)$, to some higher price p' . At this higher price, p' , competitive firm output expands from x_0 to x_1 and production of high quality now yields an additional, continual premium flow shown by the area $p_c abp'$. Deceptive production of minimum yield a larger addition to the initial period quasi-rent because of the greater output profitable at the lower marginal cost of minimum quality, x_2 . This differential initial period return is shown in figure 1 by the area $abcd$. As the figure makes clear, it is only the quasi-rent on the additional units due to lower marginal costs that favors quality depreciation as the price increases. Indeed, since continual production of high quality yields a continual flow of quasi-rent resulting from the price increase ($p_c abp'$), price increases favor the choice of high quality if the discounted quantity from production of high quality exceeds the quantity when minimum quality is produced. Intuitively, a price sufficiently high to motivate the production of high quality exists whenever the difference between the profit maximizing output level for minimum quality and high quality production becomes "small" as the price increases.¹⁶

¹⁶A general sufficient condition for the existence of a price that guarantees quality is that the discounted high quality output level exceed the minimum quality output level for all prices above some price and that the difference between the discounted output levels not go to zero as price increases.

Two specific sufficient conditions illustrate the reasonableness of the existence of price guarantees. First there will be a price that guarantees quality as long as the maximum output for a given high quality divided by the maximum difference between the outputs for minimum quality production and for high quality production exceeds the interest rate, i.e.,

$$\frac{\text{MAX}(x(p, q_h))}{\text{MAX}[x(p, q_{\min}) - x(p, q_h)]} > r$$
 where $x(p, q_h)$ is again the output equating marginal cost to price for quality q_h . Note that this condition is always satisfied if the output differences are bounded and the minimum quality output increases without bound. Alternatively, if the difference in marginal costs for equal output levels is bounded, there is a quality guaranteeing price as long as $\partial x(p, q_{\min}) / \partial p \leq \{ \text{MAX}[c_x(x, q_h) - c_x(x, q_{\min})] \cdot x(p, q_{\min}) \}$. This latter condition is always satisfied by U-shaped cost functions with a bound on the difference in marginal cost. These conditions are derived in Leffler (1976).

To gain an intuitive feel for the conditions implying quality guaranteeing prices when producers face infinitely elastic demand curves and also to see the reasonableness of these conditions, consider the case illustrated in Figure 1. In this case quality changes, by assumption, cause vertically parallel shifts in U-shaped average production cost and convex marginal production cost curves.¹⁷ As the price increases, the marginal cost curves of high and low quality approach one another and thus the outputs of a quality maintaining and a quality depreciating firm coverage. The added initial period gains from deceptive minimum quality production hence go to zero with price increases. Eventually a price will be reached where the capital value of the quasi-rents available from high quality production necessarily exceed the current production cost savings from minimum quality production plus the salvage value of the fixed assets. At all prices above this price, firms will choose to produce high quality output.

The potential role of price premiums as quality guarantors is also applicable to markets where firms face downward sloping demands (due, for example, to economies of scale, or to locational or specific informational advantages). In this case, the inability of firms to increase sales without reductions in price limit the gains available from deceptive minimum quality production. The existence of a price sufficient to guarantee quality now depends on the elasticity of demand in addition to the cost savings from quality reductions

¹⁷This assumes a cost function of the form $C = h(x) + x \cdot g(q) + F$. This is a reasonable case corresponding for example to using better parts in production (maintenance free motors in appliances) or an additional step in production (using more finely ground flour in making bread). Also, a cost function of this general form should describe the cost of retailing when retailers face competitive suppliers.

at various quantities.¹⁸ In particular, if marginal costs were horizontal (a condition which necessarily implies production only of minimum quality in the competitive model since initial period deceptive minimum quality output and hence profit would be essentially infinite), a monopolistically competitive quality assuring price premium is defined independently of output and is equal to the rate of interest times the differential initial period costs savings from minimum rather than high quality production.^{19,20}

When firms are price searchers, and do not have stable future demands, consumer knowledge of cost conditions is not sufficient to estimate the quality guaranteeing price. The anticipated future demand vis-à-vis current demand is also relevant. Consider the case where consumers expect a growing demand for the output of a firm who continues to produce high quality output. In this case, the quasi-rent flow from high quality (or future deceptive minimum quality) production increases over time.

¹⁸ Because of firm specific informational or locational advantages in a monopolistically competitive environment it will be costly for consumers to carry out their policy of terminating business dealings with firms that supply output of less than anticipated quality. But we will continue to assume here that their committed reaction strategy remains unchanged. A more complete analysis is presented in the reciprocity discussion in Section IV, C, below,

¹⁹ Regardless of the actual demand, the price fixes the output level under monopolistic competition. The actual output level that can be sold at a given price is important only if the per unit savings from deceptive minimum quality output changes with output.

²⁰ If consumers know firm's outputs in addition to costs, expansion of output in the price taking model will indicate intention to deceive. In such a case, a firm's output will be solely determined by the marginal cost of high quality. This implies that a quality guaranteeing price exists regardless of cost conditions. It will of course be less than the price we have derived under the contrary assumption of consumer ignorance of the total firm supply.

As compared to a firm with the same initial demand but no expected growth, the growing firm receives a larger capital value return at any price from high quality production in the initial period. Firms facing expected demand growth will therefore require smaller quality assuring price premiums.

We have therefore shown that under reasonable conditions prices alone can assure quality. Throughout the remainder of the paper we assume the existence of a quality guaranteeing price. The minimum quality guaranteeing price will depend upon the level of quality considered and the schedule is denoted by $p^* = p^*(q, r, q_{\min}, d^*)$. Our analysis implies that the quality guaranteeing price will increase as quality increases and as the interest rate increases, and will fall as minimum quality increases (for all q greater than q_{\min}) and as the anticipated growth in demand, d^* , increases,

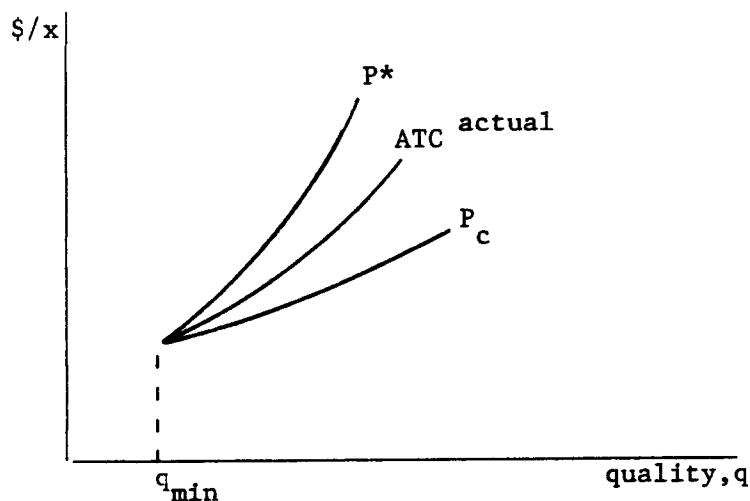
Intuitively, the quality guaranteeing price treats the opportunity costs of not producing the minimum quality as an explicit cost to the firm. Hence the price must not only compensate the firm for the increased average production costs incurred when quality above that detectable prior to purchase is produced, but must also yield a normal rate of return on the foregone gains from cheating. This price "premium" stream can be thought of as "protection money" paid by consumers to prevent cheating. Although the present discounted value of this stream is equal to the short-run gain the firm can obtain by cheating, consumers are not indifferent between paying the "premium" over time or instead permitting firm cheating. The relevant rational consumer choice is between demanding minimum quality output at a competitive price and paying a price "premium," which is both necessary and sufficient, for higher quality output. The price "premium" is a payment for higher quality

in the face of pre-purchase quality determination costs that must be compared by the consumer to the increased consumer surplus from the purchase of higher quality output.

Figure 2 illustrates the relationship between product quality, the quality assuring price, P^* , and the costless information competitive price, P_c , for the vertically parallel average cost competitive case examined in Figure 1.

FIGURE 2

Quality Guaranteeing Price, (P^*), Actual Average Total Production Cost, (ATC^{actual}), and Costless Information Price (P_c) as a function of Product Quality



For simplicity the quality assuring price at q_{\min} is assumed to equal the minimum of average production costs, i.e., the costless information competitive price, P_c . For higher qualities, the costless information price (equal to minimum average production cost) rises exactly with increases in minimum average variable production costs, while the quality guaranteeing price schedule increasingly diverges from average variable production costs as quality rises. The increased divergence of the costless information and quality guaranteeing prices occurs because fixed production costs are assumed unchanged as quality increases. Therefore an increase in price equal

to the increase in average variable costs does not change the present value of the quasi-rent from high quality production $W(p, q_h)$, while the quasi-rents from low quality production, $W(P, q_{\min})$ are increased. Since the quality guaranteeing price equates these quasi-rent streams, this price must rise faster than average variable production cost. Also, the competitive firm's profit maximizing output when the market price equals the quality guaranteeing price is greater than that minimizing average production costs and this increased output increases as quality increases. Therefore, the actual average total cost incurred when P^* is the market price diverges from the minimum average total costs as quality increases, as shown in Figure 2 by the divergence of ATC^{actual} and P_c .²¹

The cost of determining quality prior to purchase is overcome only by paying a quality assurance premium. The required premium may or may not exceed the increased individual consumer surplus of purchasing a particular higher quality rather than a minimum quality product. Therefore although a quality guaranteeing price exists, a higher quality product may or may not be produced.

Nonetheless, if a quality greater than the minimum level is to be produced, the price cannot fall below $P^*(q)$. Indeed, consumers with knowledge

²¹In figure 3 below, drawn for a given quality product greater than q_{\min} , x_1 is the output rate of the higher quality good when the price is the quality guaranteeing price, P^* , and x_0 is the output rate at the minimum of average total production cost. The actual average total cost of producing x_1 is $(C/x)_1$, which is greater than the minimum average total production costs (or the competitive zero information cost price), P_c .

of the production cost conditions recognize that prices below the quality guaranteeing price must result in quality depreciation and will base their demands and expectations on this fact. That is, consumer quality expectations are given by the inverse of the $P^*(q)$ function.

As long as both consumers and firms have the same information about production cost conditions, they will make the same estimate of the potential short-run gain from cheating. Hence consumers either pay the minimum price premium that will prevent deceptive quality supply or, if this premium is too large, they purchase a quality level detectable prior to purchase.

Consumers will prefer the lowest price that still assures quality. Hence, under competition with costly quality information, the price of assured quality will be the minimum guaranteeing price, P^* . All firms supplying a "promised" quality, q , above the minimum face a horizontal demand curve at $P^* = P^*(q)$. This demand curve is of an unusual nature in that prices above or below P^* result in zero sales. Consumers know that any price below P^* for its associated promised quality results in the supply of q_{\min} . They therefore will not purchase from a firm promising quality at a price lower than P^* . In equilibrium the quality supplied by firms always will equal that anticipated.²²

²²As opposed to the Darby and Karni (1973) analysis, this analysis implies an equilibrium quantity of "fraud" equal to zero, where fraud is the difference between anticipated and actual quality. Given the symmetrical information assumptions regarding cost functions, parties to a contract know when and by how much a contract will be broken. An unanticipated broken quality contract is therefore not possible. The implicit economic (as opposed to common usage) concept of "contract" refers to anticipated outcomes and not to verbal promises or written agreements; thus there will be no broken quality "contracts."

Finally, note that the quality guaranteeing price schedule is derived under the assumption that non-deceiving firms anticipate producing forever (equation (1)). However, if firms do not expect to produce forever and the last period of production is known, the arrangement to guarantee high quality production by the payment of a price premium will unravel. No matter how high the premium paid by consumers for a high quality good in the last period, firms will supply "deceptive" minimum quality because there are no future sales to lose. Consumers aware of the last period will therefore demand only the minimum quality in that period. But then the next to the last period becomes the last period in the sense that firm wealth is maximized by supplying minimum quality independent of the price premium. Consumers will then only pay for minimum quality output in the next to last period, and so on. High quality will never be produced.²³

The necessary unraveling of the premium solution to guarantee high quality requires consumer knowledge of the exact date of firms' last period. If, however, consumers know only that firms have finite lives but are uncertain as to the date of any particular firm's last period, price can guarantee quality. While consumers are aware that some transactions will be with a firm in its last period and hence cheating will occur, the expected gain from purchasing high promised quality can be positive. That is, the

²³One possible solution to this problem is some Schelling-type of commitment by the consumer to purchase in the last period at a price premium even though he knows he will only receive minimum quality. This solution, however, is contrary to the assumption of our model regarding the unenforceability of explicit contracts. If irrevocable, narrowly irrational commitments are costlessly made, firms would simply guarantee quality directly.

the probability that the random firm currently maximizes by production of promised quality may be sufficiently high to offset the probability that deception will occur. In order for the premium solution not to unravel, the consumer estimate of the probability that a firm is in its last period must never reach the point where consumer risk aversion towards the deceptive purchase of minimum quality implies that the high promised quality high price transaction is not made.²⁴

In other words, the maximum probability in any particular period of a firm unintentionally failing (i.e., due to inefficiency or demand shifts rather than cheating) must be low vis-à-vis the consumer's surplus from purchase of high quality output. If the probability of firm unintentional failure is sufficiently low in the current period and if this probability is estimated to be independent of time or to decline over time, then less than infinitely risk averse consumers will currently transact for high quality output. While consumers know that sometime over the infinite time horizon economy the firm actually will be in its last production period and therefore cheat them, the price premium guarantee solution will not unravel

²⁴The price premium-repeat business quality enforcement mechanism is analytically equivalent in form to the "super-game" solutions to the Prisoners Dilemma problem developed in the game theory literature. A general result of this analysis is that a cooperative solution can exist if one assumes either an infinitely long super-game (as we have assumed previously), or a super game of finite length but with transactors who have sufficient uncertainty regarding the period when the super-game will end (as we are now assuming). See, for example, Luce and Raiffa (), and Friedman ().

as long as the prior probability estimate of any particular period being the actual last period is not sufficiently high.²⁵

Rather than explicitly deal with this more general and complex but essentially equivalent stochastic firm life model, we will continue to assume for the remainder of the paper that firms and consumers expect to transact over an infinite horizon.

²⁵If the consumer estimate of the probability of a firm being in its last period increases over time, the probability may eventually reach the critical no transaction point and the unravelling process begin from that particular time period back to the present so that high quality supply would not be transacted for. The evidence indicates that firm failure rates are greatest in the first few years of business and to decline over time. For example, in 1971 the probability of a "random" firm in business five years or less failing was over twice that of firms in business 6 to 10 years and 18 times as great as for firms in business over 10 years (Dunn and Bradstreet (1972)).

This may explain why established firms often advertise how many years they have been in business. The analysis also suggests that existing firms have a lower guaranteeing premium compared to potential entrants. Risk averse individuals will then not purchase the same good from new firms at the same price they can buy it from established firms. In the perfectly competitive framework, this "barrier" to entry is most severe since consumers will never purchase from a new firm when established firms are available unless the new firm is expected to have lower costs. In a monopolistically competitive framework, new firms can also gain customers by producing a new distinct variety or convenience level (e.g., location) of product which appeals to a particular subgroup of consumers sufficiently to overcome the price premium differential.

This factor may explain why managers of firms in declining industries, where consumers and suppliers perceive that the probability of the firm unintentionally failing in any particular period is rising inexorably over time, will search for merger prospects. Independent of any desire to "save" their jobs, we may be able to rationalize conglomerate expansion by managers in declining markets such as cigarettes, railroads, and even the oil companies (where output is declining and where recent increased rents are industry but not firm specific) as a means of avoiding anticipated last period problems and therefore increased prices that would have to be paid, for example, in the purchase of inputs.

III. Competitive Market Equilibrium: Brand Name Capital Investments

The previous analysis implies that firms producing quality greater than q_{\min} at the guaranteeing price will earn positive economic profits. Therefore the market cannot be in full equilibrium. When the price is high enough to guarantee a particular high level of quality, additional firms will have an incentive to enter the industry. But if additional firms enter, the summation of the individual firms' outputs will exceed market demand. However, this output surplus cannot result in price reductions since the quality assuring price is, in effect, a minimum price constraint "enforced" by rational consumers. Competition to dissipate the economic profits being earned by existing firms must therefore occur in non-price dimensions.²⁶ The zero profit equilibrium can be reached only by a very particular form of profit absorbing nonprice competition. The competition involves highly firm specific "quality assuring" capital expenditures that we will call brand name capital investments.

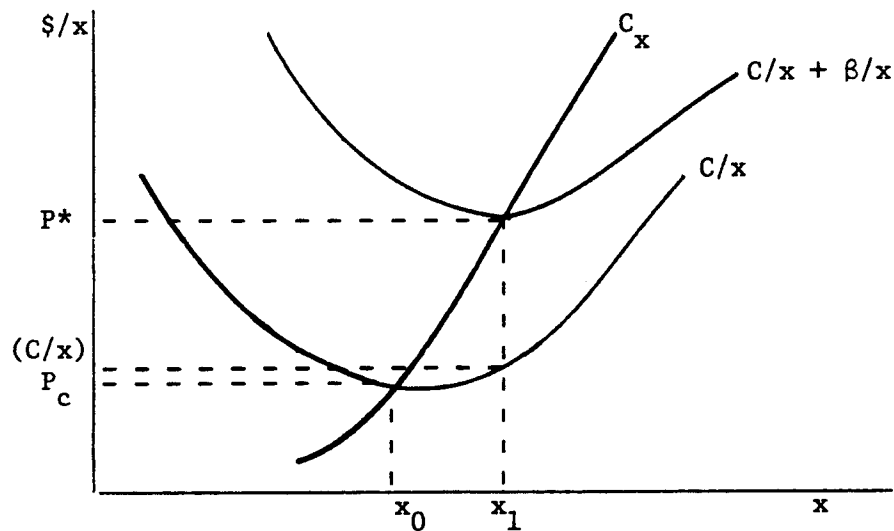
The brand name capital competition causes firms to purchase assets with sunk costs equal to the capital value of the premium stream earned when high quality is supplied at the quality assuring price. Such capital expenditure increases average costs but not the quality assuring price. That is, if $P^*(q)$ is not to increase, the investment leading to zero profits

²⁶When quality information is costly, the relevance of price as a guarantor also implies that producers are constrained in their promotion activity. Producers are concerned with the effects of sales prices on quality expectations. For example, marketing consultants advise using "trade coupons" run by individual retailers rather than direct manufacturer coupons since "couponing by a 'third' party doesn't directly affect brand image" (Robinson, 1977, p. 50). Sony has recently claimed that price reductions by its dealers have reduced the sales of Sony televisions by negatively influencing consumers' quality expectations (WSJ, 3/20/78).

must be highly firm specific and depreciate to zero if the firm cheats and supplies q_{\min} rather than the anticipated quality. The brand name capital costs must take the form of "sunk" investments in highly specific assets such as, for example, the design of a firm logo or an expensive sign promoting the firm's name.²⁷

Competition among firms in seeking and making these highly specific brand name capital investments will continue until the profit and therefore the incentive to enter the industry is eliminated. Assuming for simplicity that the salvage value of fixed production assets equals their costs, the zero profit equilibrium is shown in figure 3, where average "total" cost

FIGURE 3
Production of High Quality Output at Quality Guaranteeing Price
in Competitive Market Equilibrium



²⁷ On the contrary, competitive investments cannot take the form of something like air conditioning for the firm's retail outlet. Although an asset such as an air conditioner is a fixed capital cost and therefore does not affect variable costs of production, it is highly salvageable if the firm deceives consumers regarding quality. Hence such assets do not fully serve as a form of collateral which the firm completely loses if it breaks its implicit contract regarding high quality.

which includes average production ("avoidable") costs, C/x , plus average brand name capital (i.e., nonsalvageable "selling") costs, β/x , just equals price, P^* .²⁸

The equilibrium firm specific "sunk" capital costs must equal not just the difference at a point in time between $P^*(q)$ and the actual average cost of producing the particular quality level, $C/x(q)$, but the anticipated present discounted value of these continual differences over time. This is necessary so that if a firm decides to cheat he will experience a capital loss at any point in time equal to its anticipated future profit stream. Since $P^*(q)$ is derived so that the threat of loss of this future profit stream motivates guaranteed quality, this "brand name capital," β , which serves as an explicit hostage to prevent cheating, equals:

$$\beta = \frac{[P^*(q) - C/x(q)] \cdot x(p^*, q)}{r} \quad (3)$$

That is, the market value of the competitive firm's brand name capital is equal to the value of total specific or "sunk" selling costs made by the firm.

Similarly, the brand name capital, if it is to serve the purpose of providing a form of collateral to the consumer, must be purchased outright rather than rented. Only in this way is the firm explicitly giving the present value of its future premium stream represented by the value of the assets to consumers as a "hostage" guaranteeing non-deceptive behavior.

²⁸ If all fixed production costs are not avoidable, i.e., $F \neq V$, then the equilibrium average brand name capital costs, β/x , plus average avoidable costs ($c/x + V/x$) plus average sunk production cost $((F-V)/x)$ will equal P^* . Equation 3 must also be appropriately modified for this case.

If this "sunk" capital were rented short-term rather than purchased, although the current period's profit would be eliminated with the current period's capital rental expenditure, the firm would have nothing to lose in the future if it deceptively supplied minimum quality output.²⁹

When the quality guaranteeing price exceeds production costs, market "competition" takes the form of investing in "sunk" capital assets which provide the greatest direct service value to consumers. However, the direct services which consumers derive from the brand name capital investments are necessarily valued at less than their costs. Otherwise firms would have invested in them regardless of quality guaranteeing considerations. The competitive process will force firms to invest in those brand name assets which yield the highest valued stream of services, thereby minimizing consumers' "effective" price, P^E , of purchasing a quality assured good. The effective price is defined as the purchase price of a product, P^* , less the value of the services yielded by the jointly supplied brand name assets.

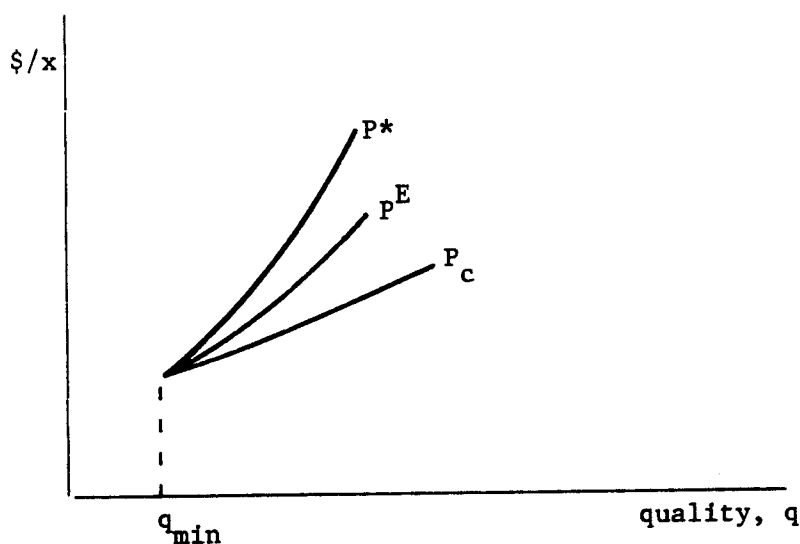
The relationship among the quality guaranteeing price, P^* , the costless information competitive price, P_c , and this effective price, P^E , is shown in Figure 4 for the vertically parallel cost case. Due to diminishing marginal rate of substitution, the marginal valuation of the services supplied by brand name capital assets will be negatively related to level of such assets

²⁹ Long-term rental agreements, if there are transaction-litigation costs of a firm violating the agreement, provide some firm specific collateral and hence quality assurance services. But long-term agreements are not likely to provide nearly the quality assurance service stream that is created with ownership of the firm specific assets. In addition, as discussed in Klein, Crawford, and Alchian (1978), highly firm specific nonsalvageable assets such as logos and trademarks are also likely to be owned because of the severe opportunism problems that are likely to be created by rental arrangements.

and hence to the level of quality. This is indicated in Figure 4 by the slope of the P^E curve approaching that of P^* as quality increases. The per unit "cost" to consumers of using price as a quality guarantor is thus given by the difference between the effective price, P^E , and the costless information competitive price, P_c .

FIGURE 4

Quality Guaranteeing Price, (P^*), Costless Information Price (P_c)
 and Effective Price (P^E) as a function of Product Quality



As an empirical proposition, P^E may be minimized by the investment in specific selling assets with some positive salvage value (V_0), such as an air conditioner, even though this results in an increased quality guaranteeing price. This can occur because the relevant price to consumers is the effective price. Assets with positive salvage values may yield differentially large direct consumer service flows. All brand name capital assets must, however, satisfy a necessary condition that the salvage value

per unit of output be less than the consumer service value, or that rV be less than the value of the total consumer service stream. Firms, competing to minimize P^E , will choose specific assets by trading off increased consumer service value with decreased salvage value and may efficiently use specific assets with less direct consumer value if they simultaneously have lower salvage value. This may therefore explain why stores which supply high quality products often have amenities, (such as a luxurious carpet cut to fit the particular store with the firm's logo in the pattern), even though only small direct consumer services are yielded relative to cost.³⁰

³⁰ If the "sunk" asset yields absolutely no consumer services then the firm will not use it. Even though profits would be eliminated by purchase of such an asset consumers would be indifferent between a firm that invested in the asset and a firm that did not. In a world where consumers do not possess full knowledge of cost conditions, however, use of obviously specific assets may be employed even if yielding no direct consumer service flow because they may efficiently inform consumers regarding the sunk capital cost to the firm. This is discussed in greater detail in Section V.

IV. Competitive Techniques to Decrease the Quality Guaranteeing Price

The market equilibrium developed above implies an effective price for high quality that is higher than what would exist in a zero information cost world. While the costless information solution is meaningless as an achievable standard of "efficiency," alternative marketing arrangements may be usefully compared to this benchmark. Viable, competitive firms will adopt the arrangements which, considering all transacting and contracting costs, minimize the deviations between the costless information price and the effective price. In this section, we consider potentially efficient alternatives or supplements to the pure price premium method of guaranteeing quality.

A. Forfeitable Bonds

Both producers and consumers can obviously be made better off by an effective joint agreement not to "waste" real resources on the purchase of brand name capital assets. Competitive equilibrium without brand name capital could in principle, be reached by a lump-sum payment by firms to consumers. The quality guaranteeing lump sum would equal the present value of the price premium stream and would be forfeitable if the firm supplied quality less than anticipated. This lump sum payment is simply an explicit collateral bond equal to the brand name capital investments defined above in equation (3). This alternative selling arrangement

would, in principle entail no social costs in terms of investments yielding service flows valued at less than costs.³¹

In addition, consumers would, in the non-deceiving equilibrium, merely be paying to the firm the interest earned on this lump sum which they hold. Since this quality guaranteeing payment could therefore be made per unit time rather than per unit sold, the price of the product would not have to be raised and the arrangement would not alter relative prices of high versus low quality output. The effective product price would thus equal the costless information price. In principle, any quality could be costlessly guaranteed by the appropriate initial lump sum payments.

However, this forfeitable collateral bond arrangement for guaranteeing quality, while analytically quite similar to our price premium-specific capital solution, leads to two difficulties absent in that solution. First of all, this alternative arrangement entails the large transaction costs involved with a firm making small individual lump sum payments to each of

³¹ An appropriate lump sum entrance or licensing fee paid by the firm to the government (the interest on which would be returned to consumers as a group) would also, in principle, be more efficient than the "waste" of brand name capital investments, even if the payment to consumers is unrelated to the quantity consumed. Firms would be earning in equilibrium a normal rate of return on this lump sum investment which would be lost to the firm if the government revoked the license for poor performance. Revocation of valuable licenses for poor performance is analytically equivalent to direct government enforcement of quality with entry restrictions a means of economizing on enforcement costs. However, "due process" constraints would likely limit such direct quality enforcement whenever quality is difficult to specify and measure.

Direct entry restrictions can also reduce the social costs of guaranteeing quality by creating nonsalvageable monopoly rents and thereby limiting the brand name capital competition. In this regard, our analysis implies that when quality information is costly, the standard "costs" of monopoly will be overstated since a change to competition can result in increased average cost.

many consumers. Secondly, the forfeitable bond arrangement lowers the cost of opportunistic "cheating" behavior by consumers towards firms.

In order to develop this latter point consider the case of franchising where the franchisee can be thought of as a firm with the potential to cheat the franchisor (analogous to our consumers) by supplying a quality of product less than anticipated, thereby depreciating the reputation and hence the profit stream of the franchisor (and possibly other franchisees). In this case, the first problem with forfeitable bonds seems minimal since the number of transacting partners is small.³²

The obvious solution to the franchisee quality cheating problem, a large initial lump sum payment made by the franchisee to the franchisor equivalent to a forfeitable bond upon which the franchisee's premium stream is merely a normal rate of return.³³ The extent of short-run franchisee

³²This example is also relevant as an illustration of our model because the franchisor can be expected to know rather precisely the costs of production of individual franchisees (similar to our current assumption that consumers know production costs of firms). Therefore a franchisor would know the correct "premium" stream which an individual franchisee must earn to prevent him from appropriating some of the value of the franchisor's trade name.

³³Ozenne and Hunt (1971) report that only 12 percent of franchisors require a lump sum bond. But an initial lump sum franchise fee, while legally somewhat different, is analytically equivalent to a bond (since most franchise contracts stipulate sale of terminated franchise under quite unfavorable conditions) and are much more common. Ozenne and Hunt (7/23) report a significant positive correlation between the size of the initial franchise fee and the franchisee's subsequent net income, which is related to our concept of a premium stream. In addition, initial overpayments by franchisees for fixed inputs purchased from the franchisor are also analytically equivalent to initial lump sum bonds. See Klein and Saft (1979) and Klein, McLaughlin, and Murphy (1979) for further discussion and relevant evidence on this issue.

cheating, or our previously exogenous concepts of minimum quality and time to detection, can usefully be considered endogenously determined in this case by franchisor quality policing expenditures. Efficiency (minimizing costs of assuring quality) requirements within the forfeitable bond arrangement would imply an arbitrarily low level of franchisor policing expenditures and a correspondingly low probability of detection of franchisee cheating offset by an extremely high level of the initial lump sum franchise fee.³⁴

However, an extremely large forfeitable bond (and corresponding premium payment) creates significant moral hazard problems. In particular, the franchisor has an incentive to falsely claim franchisee cheating in order to unjustifiably claim the large initial lump sum bonds that would be put up by the franchisees under such an arrangement.³⁵ The temptation for the franchisor to cheat becomes larger as the forfeitable bond increases in size.

³⁴This is similar to the propositions regarding the cost savings and social efficiency of lowering the probability of apprehension and conviction of criminals while keeping the expected cost and quantity of criminal activity constant by raising the penalties if convicted. See Becker ().

³⁵Reliance on some third party such as the government to prevent franchisor cheating is, of course, contrary to the spirit of our analysis which attempts to rely solely on market (non-legal) mechanisms of contract enforcement. Nonetheless, lump sum collateral arrangements are more likely to produce governmental interference and litigation costs compared to the implicit brand name investment arrangement. That is, a franchisor (or a consumer) claiming the lump sum dollar collateral could very easily be challenged in court by the franchisee (or the firm). On the other hand, a firm experiencing the capital loss of the depreciation of its brand name investments could not sue terminating consumers for breaking an implicit contract regarding future purchases.

This increasing risk suggests that the interest rate must be paid by franchisees to borrow the funds for a very large collateral bond may exceed the market interest that could be earned by the franchisor to make a premium payment.³⁶

The increased incentive for violation of (implicit or expressed) contracts by the party facing the costly quality information is a major difference between the brand name specific investment solution and the alternative forfeitable bond solution. Brand name capital is analytically similar to a collateral bond except for the fact that the firm's capital loss when it supplies quality less than anticipated is not a capital gain to consumers (as is the case with a bond). This asymmetric or one-way gain collateral provision limits the incentive for consumers to cheat on firms by falsely claiming unanticipated poor quality. The threat by individual consumers to terminate a firm unfairly has no effect on the wealth of a competitive firm and therefore a moral hazard problem does not exist. In addition, under imperfectly competitive circumstances, consumers gain from false claims about received quality only by engaging in a costly negotiation with the supplying firm. Price guarantees thus reduce the extent of reverse cheating by increasing its cost compared to the forfeitable bond arrangement.

³⁶Premium payments over time to franchisors, similar to the payments made by consumers to producers, will minimize the franchisor cheating incentive. A combination of payments over time and a lump sum fee can eliminate either party's opportunism incentive. For this solution to exist, the present value of the differential efficiency of decentralized franchisee operation must exceed the gains from franchisee quality cheating. The franchisee can then receive a per period return that yields a fair return on the lump sum payment sufficient to insure quality maintenance (with a residual payment to the franchisor). Note, that if an integrated franchisor operation eventually becomes efficient (i.e., cost minimizing), "unfair" termination will necessarily occur.

B. Specific Productive Assets

In order to simplify the analysis of the role of price premiums in guaranteeing quality, we have assumed that all production costs, including fixed costs, were "avoidable." However, firms have some control over the salvage value of the fixed assets employed in the production process. When quality information costs are positive, the efficient production technique is no longer that minimizing the average cost of production. Since "sunk" production capital now accomplishes two functions -- the supply of production services and the supply of quality assuring services, increases in average production costs accompanied by larger increases in sunk production assets may minimize effective consumer product price. Efficiency requires firms to trade off "inefficient" production technologies and the quality assurance cost savings implied by the presence of firm specific (or sunk) capital assets in the productive process and therefore the reduced necessity for the firm to make sunk selling cost investments. In addition, since capital assets generally have a salvage value less than cost, positive quality information costs favor a more capital intensive production technology.³⁷

As an example of the role of specific capital, consider again franchising operations. Rather than large initial franchisee collateral fees or brand name capital investments, franchisors can assure quality by requiring franchisee investment in specific production capital. Termination of the franchisee then implies

³⁷ Also, as quality rises, the value of sunk capital's quality assuring services increase. Hence, more specific capital is expected for the production of higher quality goods (e.g., highly trained specialized labor).

a penalty equal to the cost of the assets (less depreciation) less salvage value.³⁸

The franchisee quasi-rent on this sunk investment, i.e., the normal rate of return on the specific capital, may be sufficient to guarantee non-cheating quality supply behavior by the franchisee. That is, the difference between the value of the specific capital investment and its salvage value is greater than the short-run wealth gain from cheating, thereby eliminating any need for a price premium.

Unlike contractual franchisor termination rights, the general use of specific capital to guarantee quality requires no explicit contract. For example, as mentioned above, the choice of ownership rather than leasing of productive assets will be influenced by the quality assuring services provided by sunk costs. In this regard, the design of distinctive assets with differential value in current use (e.g., uniquely designed retail outlets,

³⁸ Franchisors can also increase the specificity of capital assets by limiting the market transfer of the assets. For example, terminated franchisees frequently are contractually bound to sell their outlets only to a franchisor approved buyer or directly to the franchisor, often on the basis of arbitrary formulas which depreciate the franchisees initial investment and make no allowance for inflation or increases in franchisee produced good will. (See Klein and Saft (1979) for examples taken from recent FTC cases.) This procedure while apparently "unfair" on the surface, decreases the effective salvage value and thereby can efficiently increase the level of franchisee supplied collateral.

The recent legislative, regulatory and to some extent judicial movement towards "protecting" franchisees against such seemingly opportunistic behavior by franchisors such as their ability to terminate on demand is likely to result only in the use of more expensive explicit contractual and direct policing alternatives to the problem of guaranteeing quality supplied by franchisees or lead to increased vertical integration by franchisors of their retailing operations.

warehouses or delivery trucks) will lower both assets' salvage values and the quality guaranteeing price.

An interesting example of the possible intentional creation of specific fixed investments as collateral is provided by Tastee-Freeze, a soft ice-cream franchisor. Tastee-Freeze required its franchisees to purchase all the equipment (e.g., the freezers) necessary to make soft ice cream. However, they refused to sell the final patented feeder mechanism which was attached to the equipment and was necessary to make use of the freezers. Instead, Tastee-Freeze would only rent the feeder to franchisees, at the nominal price of one dollar per month. The compulsory rental of the feeder may efficiently serve to substantially reduce the salvage value of the equipment owned by terminated franchisees.³⁹

Unlike the lump sum collateral bond method of assuring quality, the use of specific capital does not increase consumers' incentives to falsely claim low quality supply in the competitive case. However, the use of specific production assets is similar to the use of specific brand name capital assets in that symmetrical opportunism problems may exist under imperfect competition. For example, what is to prevent the franchisor from falsely claiming franchisee cheating behavior in order to purchase franchisee specific assets at a price

³⁹ See Tastee-Freeze International 82 F.T.C. 1195 (1973) and the discussion in Klein and Saft (1979).

less than value? These reverse cheating problems are less severe than those associated with the use of a lump sum collateral bond (which can merely be taken) since negotiation and bargaining are required, but they will exist. Again, a combination of premium payments and specific capital investment can mitigate the problems.

C. Reciprocal Arrangements

The potential symmetrical nature of opportunism when quality information is costly indicates a difficulty with the price premium enforcement mechanism developed above. Unlike the assumptions of our models, it is generally not costless for consumers to terminate firms who supply quality below expectations. Analytically, the cost to consumers of changing suppliers reduces the quality (and the expectations of quality) that will be supplied at any price. Since this exacerbates the cost of premium quality guarantees, we might expect consumers to spend resources and develop institutions to convince firms that they are committed to their termination reaction strategy.⁴⁰ More specifically, transactors may arrange bilateral monopolistic situations which decrease the relative cost to an individual of punishing another (i.e., the own cost of imposing a dollar cost on the other.)

⁴⁰

A consumer's commitment to terminate a cheating firm may not be narrowly rational and therefore the obvious question is why a consumer will enforce such a strategy. One answer relies upon a "survival" theory of economic action. For example, Trivers (1971) discusses enforcement mechanisms such as "moralistic aggression" which he claims have been genetically selected to protect reciprocating altruists against free-riding cheaters.

Reciprocal buying agreements between firms can be one way of lowering the price premium required to assure quality. That is, if a buying firm is also a seller to a firm offering a good of uncertain quality, it can impose costs upon the latter selling firm even if there is no price premium at all. The existence of "transaction" costs of finding new suppliers is sufficient for termination of both buying and selling transactional relationships to impose larger costs on a cheating seller than mere termination of the single relationship. Refusal to sell to a firm that has violated an implicit supply contract is in a narrow sense irrational. Yet if such actions are anticipated, the quality guaranteeing price necessary on each transaction taken in isolation is reduced when the transactions are reciprocally made.

A similar analysis also suggests why individuals may prefer to deal in business relations with individuals who are members of their own social group (for example, members of the same church or the same country club). When individuals have social relationships in addition to business relationships, both social sanctions and withdrawal of future business, can be imposed against those supplying minimum quality. If the specific investments (of time and money) by individuals in social relationships yield sufficient non-pecuniary returns, such social "collateral" can, in principle, reduce the quality guaranteeing price premium to zero.⁴¹

⁴¹Kessel (1958, p. 46) notes that members of "ingroups" are easier to control. Yet he then claims (p. 48) that Jews are discriminated against in terms of entry into the medical profession because they have developed over time "competitive attributes" and therefore are notorious price cutters. Rather than concentrating on supposed special "attributes" of a group, a more consistent and powerful economic explanation would rely on the significant potential for an individual doctor to cheat on the brand name of the group and the decreased social sanction that could be imposed on an "outsider."

V. Consumer Uncertainty: The Role of Advertising and Other Marketing Techniques

The discussion to this point has assumed full consumer knowledge of firms' cost of producing alternative quality outputs and of the current and future demand facing monopolistically competitive firms. However, in actual markets consumers are uncertain about both demand and cost conditions. In such circumstances, consumers may not know the minimum price required to assure quality. In this section, we incorporate market responses to pre-purchase quality uncertainty when demand and production costs are also uncertain.

If consumers are risk averse, uncertainty about the cost savings from deceptive production of minimum quality increases the premium that will be paid to assure quality. The premium will include both a (presumably unbiased) estimate of the quality guaranteeing premium and an extra payment to reduce risk. Competitive investment in brand name capital now is no longer constrained to assets which yield a direct consumer service flow the present discounted value of which is greater than the salvage value of the assets. Implicit information about the sufficiency of price as a guarantee can be supplied by "conspicuous" specific asset expenditures. Luxurious store fronts and ornate displays or signs may be employed by a firm even if yielding no direct consumer service flows. Such firm specific assets may inform consumers of the magnitude of sunk capital costs and thereby supply information about the quasi-rent price premium stream being earned by the firm and hence the opportunity cost to the firm if it cheats. That is, the brand name capital asset supplies valuable information about costs independent of any other services. Competition to minimize the effective consumer price via brand name capital investment will still lead to a zero profit equilibrium. However, both the informational services and the direct utility producing services of assets are now relevant.

Advertising

The value of information about the magnitude of a firm's specific or "sunk" capital cost, and therefore the competitive price premium, may be a motivation for advertising. Indeed, the role of premiums as quality guarantors provides a foundation for Nelson's (1974) argument that advertising, by definition, supplies valuable information to consumers -- namely information that the firm is advertising. It is not simply, as Nelson claims, that consumers know "best buys" are advertised more, but rather that the highly specific investment which the advertising represents will earn a normal rate of return only if the firm makes repeat sales at a premium.⁴² In addition to informing consumers of products' availability and claimed attributes, a sufficient investment in advertising implies that a firm will not engage in short-run quality deception since the advertising implies a nonsalvageable cost gap between price and production costs, i.e., the existence of a price premium. Thus, advertising does not directly "signal" the presence of a "best buy," but "signals" the presence of firm specific selling costs.⁴³

⁴²The argument presented here essentially reverses Nelson's logic. It is not that it pays a firm with a "best buy" to advertise more, but rather that advertising implies the supply of a "best buy."

Nelson's argument is based on an assumption similar to the Spence-type screening assumption regarding the lower cost to more productive individuals of obtaining education. Nelson's argument, however, is somewhat circular since consumers react to advertising only because the best buys advertise more and the best buys advertise more only because consumers buy advertised products. Schmalensee (1978) has shown that the Nelson scenario may imply "fly by night" producers advertise the most and also deceptively produce minimum quality.

⁴³Like Spence's signaling model, the government could, in principle, tax this investment and thereby save real resources without reducing the effectiveness of this information if consumers were aware of the tax rate. However, advertising also can supply valuable consumer information about the particular characteristics of a product. For optimality the government would therefore have to determine the appropriate tax rate for each advertising message and consumers would have to be aware of each of these particular tax rates.

A purpose of the advertising is to indicate that a nonsalvageable selling cost of a particular magnitude has been incurred so that the consumer is valuably informed that the price of the good is greater than production costs by a particular magnitude. While a highly visible sunk cost such as advertising is irrelevant in determining future output quality decisions by the firms, it does inform consumers that such a firm specific initial investment would not have been made if the firm did not anticipate future sales at a price premium. Our analysis therefore implies that independent of excludability or collection costs, advertising is likely to be sold at a zero price and "tied-in" with the "marked up" product being advertised.⁴⁴

This is also why endorsements by celebrities and other seemingly "non-informative" advertising such as elaborate (obviously costly to produce) commercials, sponsorship of telethons, athletic events and charities are valuable to consumers. In addition to drawing attention to the product, such advertising indicates the presence of a large sunk "selling" cost and the existence of a price premium. Firms may also provide valuable informa-

⁴⁴Mishan (1970) has argued for legislation which would require advertising to be sold separately at a price which covers advertising costs. This would completely destroy the informational value of advertising we are emphasizing here.

⁴⁵This theory also explains why firms advertise that they have advertised (e.g., "as seen on the Johnny Carson show"). Rather than serving a direct certifying function (e.g., as recommended by Good Housekeeping magazine), information about past advertising informs consumers about the total brand name capital investment.

In this context where consumers are assumed to be ignorant of production costs, merely dumping money in the ocean (a true "sunk" cost) would, in principle, (i.e., if consumers were aware of the dumping say by TV commercials), serve the informational function we are emphasizing here. Many existing commercials appear essentially to do just this, i.e., advertise that a large expenditure of money has been made (by, for example, placing a car on the top of a mountain or having hundreds of singing dancers announce that "Coke adds life.")

tion by advertising the large fees paid to celebrities for commercials.⁴⁶

We have emphasized the informational value of advertising as a sunk cost. Other marketing activities can serve a similar informational role in indicating the presence of a price premium. For example, free samples, in addition to letting consumers sample the product, provide information regarding future premiums and therefore anticipated quality. Such free or low price samples thus provide information not solely to those consumers that receive the samples but also to anyone aware of the existence and magnitude of the free low price sample program. More generally, the supply by a firm of quality greater than anticipated and paid for by consumers is a similar type of brand name capital investment by the firm. By foregoing revenue the firm provides information to consumers that it has made a nonsalvageable investment of a particular magnitude and that a particular future premium stream is anticipated to cover this initial sunk alternative cost.⁴⁷

This general analysis of advertising implies that consumers necessarily receive something when they pay a higher price for an advertised brand. It

⁴⁶ Advertisement of large endorsement fees would be unlikely if the purpose were to simulate an "unsolicited endorsement" of the product's particular quality characteristics rather than the existence of a price premium. Viewed in our context, it is obviously unnecessary for the celebrity to actually use the particular brand advertised. This is contrary to a recent FTC ruling. See Federal Trade Commission, "Guides Concerning Use of Endorsements and Testimonials in Advertising," 16 CFR Part 255.

⁴⁷ The recent newsworthy introduction and continued sale of the Mazda RX-7 at a price greatly below market clearing may be an example of advertising (of anticipated quality of the other Mazda models).

is not that untutored consumers are "fooled" by advertising into believing, for example, a name brand aspirin is better than unadvertised aspirin, but rather that the advertising indicates the presence of a current and future price premium. This premium on future sales is the firm's brand name capital which will be lost if the firm "messes up." Therefore a consumer knows by paying for the advertising that the firm will necessarily take more precautions in the production process.

While it is the higher price itself which implies a loss from supply of low quality, it is consumer ignorance of production costs which induces the "high" price to be accompanied by advertising investment. Advertising is likely the most firm specific, nonsalvageable brand name capital investment available. The premium required to assure quality is minimized by such nonsalvageable investment and advertising can most cheaply indicate the existence of a "high" price -- production cost difference.

Consumers are thus not "irrational" to pay a higher price for an advertised rather than an "identical" unadvertised aspirin. Two producers with equal production costs but different prices are not economically equivalent in terms of quality supply incentives. The problem for a consumer is not whether to buy a high priced brand name product, but how much name quality assurance to buy.⁴⁸ When consumers are uncertain about production costs,

⁴⁸The greater is the cost of obtaining deceptively low quality to a consumer, the greater will be the demand for quality assurance. The very low market share of "generic" childrens' aspirin vis-a-vis generic's share of the regular aspirin market is consistent with this implication. [Aspirin market data available 2/26/79]. Individuals who claim "all aspirin is alike," apparently pay the extra price for their children where quality (e.g., dosage) assurance is considered much more important.

competition causes a positive relationship among brand name capital, advertising and actual quality assurance.⁴⁹

Retail Price Maintenance and Entry Restrictions⁵⁰

Most marketing arrangements have manufacturers of products selling through many retailers. If consumers have downward biased estimates of the quality guaranteeing retail price (because of, for example, downward biased estimates of the manufacturer set wholesale price or manufacturer quality policing expenditures or the potential short-run profit potential from deceptive quality supply), then the manufacturer may impose retail price maintenance. In the absence of retail marketing constraints, competition among retailers would drive price to the consumer estimate of quality guaranteeing level and induce deceptively low quality supply when, in fact, a wealth maximizing vertically integrated manufacturer-retailer monopolistic operation might imply high quality supply⁵¹.

⁴⁹ Consumer uncertainty about cost conditions will also explain "brand loyalty." If demand and cost are expected to be reasonably stable, even though unknown, past success with a product provides information about the relationship of price to the quality assuring price. New entrants will thus have to overcome this implied informational advantage of existing firms. This provides an additional motivation (see fn. 25) for firms to advertise how long they have been in business. Information about the past (and thereby the current) relationship of product price and the gains from deceptive minimum quality supply is implicitly being provided.

⁵⁰ The following brief discussion is taken from the more complete analysis in Klein, McLaughlin and Murphy (1979).

⁵¹ We are continuing to assume here perfect consumer identifiability of sellers and full liability (in terms of loss of future sales) solely imposed on the particular retailer that supplies lower than anticipated quality output. That is, we are ignoring the "free riding" problem present in any selling arrangements where consumers may not know whether any deviation of quality from anticipated levels is due to a particular retailer's behavior or due to the manufacturer which would increase the price premium required to assure retail quality supply. In the large numbers, perfectly competitive case where an infinite number of perfectly indistinguishable retailers exist, essentially all the cost of individual cheating would be borne by other retailers and there is no finite price that would guarantee quality.

One solution to this problem is the grant by the manufacturer to the retailer of an exclusive territory which creates market power on the individual retailer level. The rents earned on such a valuable exclusive territorial grant may be sufficient to guarantee that a wealth maximizing retailer will not deceptively supply low quality output.⁵² Direct manufacturer policing and termination of cheating retailers rather than relying solely on consumers to enforce quality may decrease the short-run profit from deceptively low quality supply and hence the size of the exclusive territory necessary to guarantee high quality supply. However, reasonable policing expenditures may still imply an exclusive territory that is much larger than optimal for a wealth maximizing manufacturer. In particular, if the total market demand for the product is positively related to the number of retail outlets, resale price maintenance may serve as an efficient substitute on the margin for a reduction in the number of outlets. Rather than increase the market power of individual retailers by increasing their exclusive territories, manufacturer imposed price collusion may generate the rent stream required to guarantee high quality supply.⁵³

⁵²The exclusive territorial grant represents highly specific capital which the retailer will lose if he cheats consumers. We are assuming that the grant is a perpetual property right that will not be taken from a retailer unless he does, in fact cheat. The successive monopoly problem that is created by the use of such an exclusive territory arrangement is here assumed away by additional contractual provisions such as an initial manufacturer imposed lump sum fee rather than a monopolistic wholesale price.

⁵³Some limited entry restraints must of course, remain in the final equilibrium. In addition, manufacturer restraints on particular forms of non-price competition including advertising may also be imposed.

This analysis of resale price maintenance is clearly distinct from Telser's () pathbreaking "special services" analysis and may explain the existence of the practice in many recent court cases (e.g., Coors and Levis) where it is extremely difficult to find important "special services" supplied by retailers. All that is necessary to apply this analysis is the possibility that the retailer can affect the quality of the product marketed. See Klein, McLaughlin, and Murphy (1979) for a discussion of recent court decisions within this analytical framework and the possible applicability of the analysis to the case of governmentally regulated entry, price and non-price competitive constraints in particular industries as a means of guaranteeing high quality supply.

Uncertain Demand

In a price-taking environment, where many firms sell products with the same level of quality assurance, consumer knowledge of demand conditions is unimportant. Marginal cost alone determines the profitable output levels. However, most markets are characterized by monopolistic competition. When a firm's sales at alternative prices depend upon demand conditions, the quality assuring price premium depends upon the demand expected in the future. Likewise, the quality incentive implied by advertising investment, depends upon consumers' expectations about future demand. The relevant variable indicating an incentive to produce high quality is then the level of advertising investment compared to anticipated future sales.⁵⁴

⁵⁴The fact that advertising supplies anticipated quality information as a function of anticipated units to be sold implies that advertising is not a pure public good input in a firm's production function. This recognition illuminates the monopolistic competition debate of the past four decades. In particular, Chamberlain's () major distinction between production costs and selling costs is seen somewhat more clearly. This distinction was blurred by Demsetz (1959) who aggregated Chamberlain's two separate non-price variables -- the nature of the product (or quality) and selling costs -- into one variable called "demand increasing costs." Although Chamberlain defines the difference between production and selling costs numerous times in his book, the least ambiguous definition occurs in his appendix F, "The Definition of Selling Costs," where production costs are defined as what is included in the "package" that passes from seller to buyer, while selling costs (e.g., advertising) are not part of the package transferred. This suggests that selling costs may be usefully thought of in the Chamberlain framework as a privately supplied collective factor. Selling costs, for example, expenditures by a firm on a sign, should be thought of to some extent as an investment in a public good and clearly not analytically equivalent (as Demsetz (1968) maintains) to quality costs such as copper costs so that as the number of units sold increases, holding selling costs constant, there is a necessary decrease in the average quality of a unit sold. But the sign's effectiveness in guaranteeing quality is related to the firm's sales since an increase in the anticipated number of units sold implies a decrease in the advertised premium. Therefore, our analysis, which maintains that the quality assurance information supplied by selling costs is related to the number of units sold by the firm, justifies to some extent the original seemingly arbitrary assumption made by Demsetz.

Advertising must imply a per unit premium stream large enough to make deceptive minimum quality production a less profitable alternative than higher quality production. Regardless of whether advertising increases demand when anticipated quality is held constant, a quality assuring equilibrium will obtain if consumers and producers have symmetrical information regarding the effects of advertising on demand. In such a case, consumers will demand a level of advertising or other brand name capital which yields a zero profit price premium sufficient to guarantee quality.

When future demand is uncertain and, in particular, when consumers have upward biased estimates of anticipated demand growth, manufacturers face problems that are analytically similar to those discussed above with regard to the imposition of resale price maintenance in that competition among retailers will lead to a price that implies too small a price premium and therefore induce quality cheating. The recent movement towards manufacturer imposed self-serve, non-repair stations in the marketing of gasoline may be partially explained in these terms. The large unanticipated decrease in future demand growth in 1973 implied a corresponding increase in the quality guaranteeing price that may not have been fully recognized by many consumers. For this biased subgroup used to paying a particular price premium over "discount" gas to assure quality service, failure to recognize the large demand shift creates a large incentive on individual retailers to cheat.⁵⁵

⁵⁵ Different cost and demand estimates between different consumers may be a possible explanation for the increase of split (service versus self-serve) islands since 1973.

Even among those consumers that recognize the large current and future demand decrease due to the OPEC initiated price increase, major last period problems are created. A significant number of dealers are now anticipated to go out of business due to the decrease in demand. While knowledgeable consumers therefore are aware that price premiums paid must increase on average to reflect this increased probability, once particular dealers recognize that they will be the particular retailer that is very likely to fail, there is no price premium sufficient to guarantee that he supply high quality service. Deceptively low quality will be supplied until consumers also become aware of the likelihood of dealer failure, with a corresponding externality of the poor service imposed on the dealers with the same trade name that remain. The obvious response is therefore a manufacturer policy of pre-emptive dealer termination until the number of remaining dealers implies a sufficiently low probability of failure to insure that the price premium mechanism can function.⁵⁶

⁵⁶ Because these terminations are in response to anticipated rather than actual dealer cheating behavior they may likely occur before significant low quality service is supplied and therefore appear to be "unfair." The recent "dealer day in court" legislative response to these terminations is therefore understandable. However, because the legislation effectively limits manufacturer ability to terminate dealers, it has produced increased vertical integration and other direct controls (e.g., compulsory self service) on retailer promises and supply of quality to consumers.

VI. Conclusion

We have shown that even in the complete absence of enforceable contracts, markets alone can, in principle, "overcome" costly information about product quality. Indeed, consumers can be expected rationally and successfully to use price as an indicator of quality. It is important to recognize that such consumer behavior does not destroy the essence of competition. Scitovsky (1944), for example, mistakenly notes that: "Another important index of quality is price. Economists all want to minimize the importance of this factor, fearing the havoc it may wreak with the whole theory of choice." (p. 100) and "the situation becomes paradoxical when price is the index by which the average buyer judges quality. In a market where this happens price ceases to be governed by competition and becomes instead an instrument wherewith the seller can influence his customer's opinions of the quality of his wares." (p. 101) Scitovsky's confusion arises from considering price as a quality indicator without analyzing how price influences the quality decisions of profit maximizing producers. While price influences buyers' expectations, it also influences producers' incentives. With quality guaranteeing prices, buyers' expectations conform to producers' profit maximizing behavior.⁵⁷

⁵⁷ Additional confusion on this issue is generated by marketing literature purporting to find upward sloping consumer demand curves. This evidence (Gabor and Granger (1965), Leavitt (1954) or Lambert (1972)) on positively sloped demand curves is always of an experimental nature, wherein subjects are presented with choices of "identical" or similar products differing in label and price. The higher priced products are frequently chosen in these experiments. Yet the experimenters have noted that "the frequency of choosing high priced brands is positively correlated with perceived variations in product quality" and "a positive relation between an evaluator's uncertainty about ability to assess product attractiveness and the use of price as an evaluation criterion is discovered." (Monroe (1973)) This suggests that consumers have learned that a higher price can and will guarantee a higher quality. Subjects without experience trials of the products should reject low priced brands if they prefer a higher quality than the low price guarantees. Economists' estimates of demand curves show a notable absence of Giffen goods. These estimates result however from actual market data and will thus generally include only profitable firm pricing behavior; the price observations will lie at or above the quality guaranteeing price level.

We do not claim that use of implicit (price premium-specific investment) contracts is always the best way to assure quality supply. When quality characteristics can cheaply be specified precisely and litigation costs are anticipated to be low, explicit contractual solutions with governmentally enforced penalties (or, more generally, some outside, third party enforcement or arbitration) may be optimal. Alternatively, when explicit contract costs and the quality guaranteeing price premium are both high, outright government supply⁵⁸ or vertical integration (e.g., home production or consumer cooperatives)⁵⁹ may be cheaper alternatives. We have here, however, emphasized the generally unrecognized power of market prices as a way to make quality promises credible. This model suggests that familiar, but previously difficult to rationalize, marketing arrangements can convincingly be interpreted as elements of the quality assuring competitive process. Future empirical work remains to document more fully the existence and implications of this market mechanism of enforcing quality guarantees.

⁵⁸See, for example, Klein (1974).

⁵⁹See Klein, Crawford, and Alchian (1978).

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