

A Political Economic Theory of the Dental Care Market

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Abstract: A theory of the dental care market is introduced which proposes that the vertically integrated (local/state/national) structure of the profession serves as an organizational vehicle both for intra-professional debate and for developing provider-oriented dental care policy. We suggest that a special relationship exists between professionalism and professional regulation. Such regulation has functioned simultaneously to limit competition and to foster a prized consumption commodity for providers: professionalism and professional esteem. The organized pursuit of this commodity inherently dampens competition. Professionalism itself plays a crucial role in: 1) securing for organized dentistry a form of state regula-

tion in which the providers themselves are the principal decision-makers; and 2) influencing provider and consumer market behavior in several significant respects, the net result being the formation and maintenance of a type of "leadership cartel" in the local market. Thus, a political-economic theory of the dental care market formally acknowledges professionalism as valued by established dentists and recent graduates as a central determining influence. Traditional models of pure competition and monopoly emerge as special, extreme cases of the general theory. Hypotheses are offered regarding consumer and provider behavior, market dynamics, and health policy and regulation. (*Am J Public Health* 1982; 72:665-675.)

Introduction

A significant feature of the dental profession is a relatively well-integrated vertical organizational structure that parallels the local/state/federal hierarchy of government in this country. Dentistry may be unique in that over 90 per cent of practicing dentists are members of a mandatory three level membership association that consists of local (or district) and state constituent societies of the American Dental Association (ADA) at the national level. In contrast, only 37 per cent of physicians are members of the American Medical Association (AMA), and an even smaller proportion of nurses are members of the American Nurses' Association (ANA). Such a professional structure has reinforced dentistry's leverage over the content of governmental legislation and regulations affecting the profession, thereby influencing the market for dental care. In addition, public confidence in the expected professional behavior of dentists has traditionally made it possible for the profession to obtain the programs, policies, and regulations it desires.

The market theory presented here is based on the proposition that a special relationship exists among health care, professionalism, and health policy. This political economy has functioned simultaneously both to limit competition in a variety of ways and to foster a prized commodity for providers—professionalism—whose organized pursuit inher-

ently dampens competition still further. In such a theoretical setting, models of pure competition and monopoly must be recast to acknowledge the systematic influences of factors of regulation and professionalism. The market theory we advance explicitly recognizes the local/state/federal structural hierarchy of the dental profession and the market circumstances of dental patients and dentists whose role in the competitive market may be dependent on their capital investment capabilities.

Previous Market Theories

Over the years much informed discussion has concerned the structure of the dental care market, as to whether it is competitive, monopolistic, or something else, perhaps representing collusion. Meanwhile, the econometric analyses of a number of researchers (e.g., Boulier,¹ Feldstein,² and Maurizi³) have necessarily reflected assumptions about the structure of the market. Most often the assumption in such contexts is that competition prevails.

In 1978, Kushman and Scheffler⁴ reported efforts to test whether the market for dental services is monopolistic or competitive (presumably at the local level). They concluded that the data are consistent with a simple monopolistic model of dentists' behavior (assuming constant cost and linear demand) and inconsistent with the competitive model (assuming linear supply and demand curves). However, in another (and unrelated) empirical confrontation between the two market models, Kushman, *et al.*,⁵ found that dentists' behavior is consistent with competitive profit-maximizing.

In a perceptive critique of his own and other's work, Kushman⁶ recently concluded that, "If the evidence is not entirely consistent with a monopolistic or competitive market, these two textbook extremes must be dismissed. The

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question remains whether the findings can be reconciled by another model, perhaps including some characteristics of each." One such alternative characterization is found in recent work by House.⁷ His model differs substantively from earlier work in that money price is not the sole equilibrating mechanism. Consumers placing a relatively high value on time will seek out more time-efficient dentists, other things being equal. But to increase his service rate, a dentist must expand input usage and thus costs. In equilibrium, the "full" (money plus time) price of care equalizes across the market, with the more time-conscious patients paying higher money prices, and vice versa.

None of these models formally considers the regulatory and professional environment in which the dentist and potential patient operate. In addition, current market theories do not explain the relationships among: 1) the professional organization of dentistry, 2) the form and content of government regulations on the profession, and 3) the structure and performance of the dental care marketplace. Paul Feldstein⁸ recently analyzed the link between (1) and (2) above. Our purpose is to make a start toward a broad, political-economic market theory that acknowledges the intersections among (1), (2), and (3).

The Consumer's Decision

The consumer is assumed to demand dental services for satisfaction-yielding attributes embodied in them. (For a more formal statement of the consumer's problem, see the Appendix.) These attributes may include a high probability of successfully treating current, and preventing future, dental disease, proficiency in controlling pain, or the maintenance of an aesthetically pleasing appearance. A strong trust relationship often develops between dentist and patient that emphasizes caring as well as curing by the dentist and loyalty and confidence by the patient.

If perfect information about the distribution of desired attributes across all dental practices could be obtained, the consumer would simply select that practice that maximizes total satisfaction. But it is unlikely that the consumer will be so informed because of two factors: 1) "ethical" (and formerly legal) restrictions on the advertising of both quality attributes and the prices of services, and 2) the inherent difficulty of conceptualizing the level of certain attributes in a given practice prior to the actual receipt of services.

As a result, the rational customer will attempt to infer the attribute levels obtainable about a dentist whom he has not visited from knowledge of certain attribute-indicating characteristics of the practice such as specialty status; educational qualifications (and perhaps attractiveness) of auxiliaries; vintage of office equipment; personal amenities; appearance and location of the practice site; word-of-mouth descriptions of the dentist's personality and reputation; and dentist's age and length of service in the community—proxies for experience and vintage of training.

Should the patient choose to stay in the practice of a dentist he has already visited he can infer his resulting level of economic satisfaction fairly directly. Such is not the case

for other practices. Of course, the patient will probably accrue virtually costless word-of-mouth information through friends and neighbors, but his knowledge of most of another dentist's characteristics will be diffuse; hence, he will find it difficult to make precise inferences about the attributes of another dentist.

Consequently, we assume that before actually choosing between two practices, one of which is known to him, the patient faces another decision: whether to seek additional information about the unknown practice that may alter his perception of the attributes of that practice. It can be shown (see Appendix) that the patient chooses: 1) to stay with his current dentist, 2) to switch to a "new" dentist without first searching, or 3) to search first for information about a "new" dentist before deciding, according to which decision is expected to yield the greatest economic satisfaction. If there were many dental practices in the patient's market area, the patient would apply the same logic in a sequential fashion to choose a satisfaction maximizing strategy.*

Over time, the patient's decision is complicated by two types of dynamic market forces: 1) changing dental care technology, which alters the nature of many practice characteristics (and perhaps the attributes themselves), and 2) the entry and exit of dentists from the market. These considerations intertwine since new technology is more likely to be "embodied" in recent dental school graduates, who, in turn, represent most of the immigrants in a given market.

The view that patients, with imperfect information on attributes, make market decisions on the basis of practice characteristics has important implications for the form and content of dental codes of ethics and state regulations. Some of these, such as advertising bans, have increased the cost of search. Others, such as restrictions on task delegation and practice size, have diminished the range of variation in characteristics—and thus the consumer's inferred range of variation in attributes—across practices. The net effect is to reduce the rational basis for consumer search and, thus, to weaken competitive pressures from the demand side of the market. From the perspective to economic theory, the consumer behavior model here draws from several sources in the literature: Lancaster's¹² view that the consumption of commodities can and should be recast as the consumption of bundles of commodity characteristics; Spence's¹⁸ concept that consumers rely on market signals transmitted by producers in deciding how to search for a set of maximizing purchases; and Rosen's¹³ extension of perfect competition

*The patient's decision-making environment may be a systematic function of the nature and size of his local dental market. Relative to the patient in a large city, the consumer in a suburban or rural community may accumulate a greater store of free (non-search) information on dentists in his local market. Further, search costs to achieve any given amount of new data will probably be lower in the smaller community than in a large city, where social contacts and information sources, in general, are more diffuse.

For simplicity we ignore special consumer choice problems in dentistry, such as emergency visits, and referrals to specialists, such as oral surgeons. Each of these categories represents only a small fraction of all dental visits and could be analyzed within the framework described here and developed in the Appendix, given small modifications of the framework.

theory to show that a market whose consumers behave as Lancaster suggests can achieve a static equilibrium involving all consumers and producers.

Producers, Consumers, and the Dental Care Market

We now introduce a theory of the local dental market in which a combination of state regulations and professionally sanctioned norms-of-good-practice function as basic mechanisms for stabilizing and controlling critical market variables. This local market is hypothesized to resemble a "loose" price-leadership cartel, except that the leadership element attempts to control not only price but also the observable ranges of variation in practice characteristics.

This theory categorizes dentists into two groups:

- Those who have practiced in the local market for a substantial period, have developed a solid professional reputation in the community and among peers, and have tended to participate regularly in local or state dental society activities, i.e., the Established Dentists (EDs).

- Those who are new in the local market, usually recent graduates of dental schools, who hold relatively little power in the local or state dental society, and seek not only a secure financial base but collegial acceptance locally as a "professional," i.e., the Recent Graduates (RGs).

In actuality, a continuum exists between recent entries into the market and well-established dentists in a community or state. Since a major purpose of this paper is to identify underlying main effects and forces within the dental care market, the theory presented here will consider only the poles of this continuum.

To operationalize the ED-RG classification, it is convenient to partition market characteristics into three subsets: C_1 , C_2 , and C_3 .

- C_1 : *Those characteristics inherent in ED group membership.* A high score on C_1 indicates high scores on such attributes as technical proficiency as a result of relatively lengthy experience in the community, "paternal" caring, and participation in civic and professional affairs. Patients garner a prestige benefit by receiving care from a respected ED. From a consumer perspective, a dentist's appeal is always positively related to the perceived level of C_1 .

- C_2 : *Those characteristics inherent in membership in the RG group.* The situation regarding C_2 is more complicated than that regarding C_1 for youth may imply relative incompetency due to inexperience, relative competency due to recent and technically advanced training, or some uneasy reconciliation of these two viewpoints.

- C_3 : *The characteristics which theoretically may be utilized equally by all dentists in the local market.* Thus, members of the ED can choose the location of their offices, hire attractive or technically efficient auxiliaries, arrange their office hours to accommodate their patient's schedules, or advocate a more comprehensive approach to preventive dentistry.

Consumers will tend to see increases in the elements of C_3 as satisfaction-enhancing amenities or as inconsequential.

Dentist Choices

For each dentist—ED and RG alike—overall satisfaction is a function of three variables: income (Y), leisure time (L), and the perception of one's own professional esteem or prestige (E). (For a more formal statement of the dentist's decision, see the Appendix.) But there are basic asymmetries between EDs and RGs that have implications for market structure. If one assumes that prestige is positively related to C_1 and negatively related to C_2 , then the EDs prestige-generating capabilities are inherently greater than the RGs. Further, whereas the typical RG has considerable flexibility in establishing his desired work/leisure trade-off, he cannot freely grant himself increases in professional esteem. Only the EDs can confer professional esteem on the RGs. Such peer acceptance manifests itself in tangible rewards like patient referrals, hospital appointments, or "junior" membership on committees of the local dental society. Such appointments may also hasten the journey from RG to ED status.

Operationally, at the beginning of each period, the dentist chooses—subject to constraints—the optimal levels of fees for all services, practice characteristics, and own-practice-time on the basis of his assessment of the entire configuration of fees and characteristics across dental practices in his market area during that period. Dentists know that the demand functions for his services will be a function of this configuration plus "exogenous" variables like income, education, and the extent of fluoridation which generally affect aggregate demand for dental care. At the beginning of the next planning period, each dentist reassesses the situation and chooses anew.

How does the hypothesized leadership-cartel emerge from these models of individual behavior? What is the nature of the local market structure? To simplify the discussion below (and to establish a notational correspondence with the Appendix), we assume that each practice j produces its own brand of "composite" dental service whose "price" will be denoted p_j .

Capitalizing on their economic and socially superior position in the profession hierarchy, the ED group functions as if it were a utility-maximizing dominant firm. This is not to say that all ED dentists are identical; but it does assume they can endorse and attempt to enforce, overtly or tacitly, a composite fee level, p , and characteristics levels that maximize their "consensus" collective welfare. The local dental society is assumed to play a key role in the formation and maintenance (although this control may be weaker in larger communities). Among the principal economic functions of the society are establishing a forum for such consensus development and a professional milieu which, like that of many professional societies, extends comradeship to members in proportion to their conformance with organizational norms. Such a professional association also serves to create a supply of fellowship or collegiality—a commodity its members may be willing to purchase at the price of the earnings which would be foregone were they to break with

the "cartel" and, for instance, shave fees significantly. Here again, the size and degree of urbanness of a locality may influence a local dentist's decision to risk loss of professional esteem.

Market Structure

The existence of an ED leadership cartel—even a very tight one—does not logically imply some one particular local market structure. The latter will be a function also of the preference orientation of the RGs there, plus a number of market variables such as the ED-to-population ratio, the RG-to-population ratio, the strength of consumer demand, and the strength of professional control. Some interesting local market equilibrium scenarios can be developed by investigating polar cases regarding presumed RG behavior.

Complete Cartel—In some situations, such as those of small cities, towns, and rural areas, the EDs may have been successful not only in unifying their own actions but also in making professional acceptance a dominant consideration for the RGs. In particular, assume that for such RGs, the combined utility of the income-leisure-prestige-maximizing model is replaced by a model in which professional esteem is maximized subject to the constraint of achieving some minimum target income and leisure. It can then be shown that the EDs will select, and be able to enforce, the price-and-characteristics set that maximizes their own collective welfare.

Constrained Competition—Alternatively, suppose the RGs have virtually no concern for peer approval. The EDs would then lose its "dominant firm" status because the commodity it can supply—professional esteem—is not demanded by the RGs. A number of plausible scenarios become consistent with the evolution of a reasonably stable local market equilibrium, but virtually all of them imply a systematic variation across dentists in both fees and characteristics. The nature of this variation hinges on such factors as the particular dentist composition of the local market, the "tightness" of legal restrictions on the use of certain C₃ characteristics, and the degree of ED solidarity.

The cases considered above are but two of many possible ones. In the "complete cartel" case, if one replaces the ED goal of general satisfaction maximization with income maximization, the result is analogous to the classical profit-maximizing cartel with firm leadership. In the "constrained competition" case, assume now that both the RGs and the EDs maximize income. The result is a form of competition similar to that envisioned by Rosen¹³ and consistent with that proposed by House.⁷ (For a formal mathematical presentation of the theory see the Appendix.)

In summary, one can hypothesize a number of specific alternative local market forms, including: "complete cartel I"—ED and RG both maximize a combined utility; "complete cartel II"—EDs, maximize income, RGs maximize combined utility; "constrained-competition I"—EDs maximize combined utility, RGs maximize prestige subject to income and leisure constraint; "constrained competition II"—EDs maximize combined utility, RGs maximize income; and "competition"—EDs maximize income, RGs maximize income.

Thus, rather than simply regarding local markets "competitive" or "monopolistic" in the usual sense, the theory implies that a given group of local markets may vary along a spectrum of competitiveness. The location of markets along this spectrum will be a function, in turn, of such factors as the supply of dentists, the mix of EDs and RGs in the total supply, strength of consumer demand, and various market regulators, such as the willingness of the RGs to forego traditional professional prestige.

Dental Market Hypotheses

It has been argued that in a regulated and internally well-organized service industry like dentistry, market-related activities proceed at three distinct levels. From a short-run perspective, individual dentists operate in a local market where the supply of dentist competitors, the legal environment of practice, and the determinants of the demand for care are given. But simultaneously, certain dentists work through their district and state societies to establish state regulations and ultimately national policy positions which, in the long run, significantly influence the supply and distribution of dental care, the legal environment of dental practice, and consumer demand. It should be noted that the initiation of several demand-affecting policies, such as dental insurance and use of fluorides, came largely from the public health sector working in concert with organized dentistry. The profession has nearly always supported policies that reinforce these payment and prevention programs.

In this regard, the local dental organization (whether structured formally or informally) plays two main roles in the local market. First, it serves as an arena where the professional dominance of the EDs is asserted, where professional esteem is granted or withheld as a mechanism for modulating local dentist behavior, and where critical market information can be shared at relatively low cost. Secondly, it serves as a forum for the airing of individual viewpoints and the formation of professional policy positions. In the largest metropolitan areas these dynamics are likely to be substantially diluted; however, smaller collectives within a city may operate as local social or neighborhood units. It is hypothesized that the EDs, and not the RGs, emerge as the principal forgers of local policy. This follows not only from their intramarket professional dominance over the RGs but also because they are more likely to have developed strong intermarket communication networks with their ED counterparts in other local markets and with professional leaders in the state such as the state board of dental examiners.

In nearly every state, the board of dental examiners or registration has effective control over the licensing and certification of dentists and dental hygienists, as well as other regulations which shape the content and ease of transmission of practice characteristics in each local market, e.g., the extent of advertising permitted and the scope of permissible task delegation to auxiliaries. Professional policy at the national level (e.g., on dental school funding, the restricted role of auxiliaries, national health insurance, and support for dental research) has historically emerged as the

consensus of policy positions of state leaders interacting through such mediums as the American Dental Association (ADA), the regional boards within the American Association of Dental Examiners, the American Association of Dental Schools, and the American Association of Dental Research.

Stigler¹⁹ and later Paul Feldstein⁸ suggest that industries will tend to demand government policies which provide for direct subsidies, control over entry of new rivals, encouragement of complements, suppression of substitutes, and price-fixing. We use their categorization now to deduce policies that are likely to be demanded by the supply side of the dental care market. However, the agents in their discussions were pursuing, at least implicitly, income maximization goals. Since in some cases firms here are assumed to pursue more complex objectives, the behavioral implications deduced by Stigler and Feldstein may not follow unambiguously.** To date no published study has tested the interactions between regulations and economic and practice variables at the state level. Nor have there been analyses which discuss or test explicit hypotheses about the local market as such. The hypotheses presented here follow from our theory and are intended to provide guidelines for future empirical research.

Subsidies (Demand-inducing Policies)

Hypothesis 1: *Dentists—EDs and RGs alike—will support local, state, and national policies and programs designed to stimulate demand.*

Such policies expand the opportunity sets of virtually all providers. As Feldstein⁸ has noted, the ADA in recent years has supported national health insurance that focuses on the poor, dental care programs for children, and private dental insurance (e.g., the Delta Dental plans). The profession now supports increased Medicaid payments, and increasing support for Medicare can be predicted. By stimulating demand, these programs serve to subsidize the incomes of dentists. Local markets (whether monopolistic or competitive) are inherently concerned with the level of demand.

Control over Entry of New Rivals

For a given dentist in a given local market of professionals, a new rival could appear in one of three forms: 1) a fully-licensed dentist migrating into the local market to practice in a private, nonprofit, or public health setting; 2) an RG applying for a new license; or 3) an extended-function dental auxiliary (hygienist or assistant) or laboratory technician permitted under state regulation to perform certain services (e.g., dentures, diagnosis, prevention, or primary restorative care) under the indirect supervision of a dentist.

Hypothesis 2: *Dentists will oppose the entry of all rivals into the market as competition increases.*

**Building on Stigler's¹⁹ framework, Feldstein⁸ produced predictive hypotheses about the types of legislation the dental profession will seek. Feldstein's discussion assumes that dentists maximize income; and, to that extent, his predictions and ours could be expected to differ, as our theory includes leisure and professional esteem as variables which can be weighed to produce overall provider satisfaction.

Hypothesis 2A: *In a few states where the dentist-population ratio is relatively high or growing, independent state clinical examination pass-rates will be lower, preliminary requirements for examination will be more stringent, and reciprocity agreements with other states will be fewer in number and relatively restrictive.*

Hypothesis 2B: *All dentists, RGs and EDs alike, will oppose the independent practice of auxiliaries and types of new practitioners.*

For the income-maximizing dentist, an increase in the number of independent suppliers can only chip away at the dentist's market share. For the utility-maximizing dentist, the legalization of denturists and indirectly supervised auxiliaries presents an additional problem. These types of new practitioners are not dentists, and yet they are permitted to perform certain tasks previously restricted to dentists. The erosion of the dentist's sense of "professional dominance" (to use Freidson's²¹ term) is a real possibility, and this prospect may be intermingled with a genuine concern over quality control.

Attempts to Control Practice Characteristics

Hypothesis 3: *Organized dentistry will seek to control the ranges within which the characteristics vector (C_3) is perceived to vary across practices within a local market area.*

All dental practices are differentiated to some extent; but any two firms may be viewed as providing dental care with some degree of substitutability. The success of EDs in establishing a strong "dominant-firm" position depends, in part, on their ability, through professional influence or by state government regulation, to establish effective bounds on the values of C_1 , C_2 , and C_3 . Certain state regulations and formal codes of ethics augment the ability of EDs to keep a rein on characteristics levels in the local market. There are two principal mechanism for accomplishing this: (A) restricting the flow of information among consumers in the local market, and (B) establishing legal limits on the use of certain characteristics of type C_3 .

A. Until recently, professional codes of ethics at all levels—ADA, state, and local—forbade the competitive advertising of fees and practice characteristics except such basics as the location, specialty type, and hours of operation of the practice. Many state dental practice rules and regulations suggested limits on the kind and amount of information that could be displayed on site or disseminated through the media. However, in 1977 the ADA and the Federal Trade Commission reached an agreement under which the association would strike from its ethics code all prohibitions on advertising except in cases in which it is deemed "false or misleading in a material respect."

Our theory would predict that EDs in any of the market structures will not welcome this new ruling, and that the motivation of an RG to break with ED policies on fees and practice characteristics is going to increase.*** The reason-

***That the ADA changed its position on advertising does not, we think, contradict our basic premise that national dental policy generally reflects a consensus of local and state policy positions. In

ing here has two main strands. First, advertising reduces consumer search costs and raises the probability that any RG who breaks with the leadership cartel by shaving fees and advertising it will succeed in generating a gain in income sufficient to compensate for the concomitant loss in professional prestige.

Second, without making prior judgments on whether an RG covets professional esteem more than an ED, one can argue that RGs are more likely to initiate advertising because they lack prior precedent-setting professional behavior. With C_1 assumed to be more utility-enhancing to consumers than C_2 , EDs have a systematic market advantage over RGs. If RGs choose to compete openly, it must be by offering fees and values of C_3 which are sufficiently compensatory to lure patients away from EDs. Advertising is the medium through which the RG may most efficiently transmit these characteristics.

Hypothesis 3A: *Organized dentistry (dominated by EDs) will continue to limit the depth and visibility of advertising in the local market; but as the supply of RGs increases, these efforts will become increasingly less successful.*

B. The second major external policy instrument available to EDs for controlling product differentiation involves state government regulations and codes of ethics that establish boundaries on the values of elements of characteristics subset C_3 . One example is the existence of regulations in most states stipulating that only dentists may own dental practices. Such policies would attempt to prevent commercial interests from directly offering dental services. There are rational reasons for any ED to oppose this innovation. First, the large retailer can establish lower prices than a solo private practitioner offering comparable services through the use of dentistry as a loss leader to gain other business advantages. Second, the retailer, presumably an income-maximizer, will have little ideological attachment to professional policies and thus little aversion to breaking with them. To EDs, the big retailer or newly organized HMO network is indeed the RG *enfant terrible*. Probably no single development could be as devastating to an effective ED local market policy.

Hypothesis 3B: *Organized dentistry will attempt to limit the ownership and operation of practices to licensed dentists.*

It is the dentist (as opposed to a corporation for profit investment) whose market behavior is most likely to be influenced by concerns over professionalism—that commodity which EDs alone both define and dispense. Nonetheless, we hypothesize that as the local market becomes increasingly crowded with dentists and innovative delivery systems,

EDs themselves may utilize their accumulated leverage to maintain some sense of market control. Therefore:

Hypothesis 3C: *As the ratio of RGs to EDs increases in a local market, some EDs will attempt to use their capital investment advantages to become owner-employer dentists.*

As our basic theory implies, any income foregone by the dentist in the pursuit of professional ideals and images is regarded as a loss; the lower the dentist's actual or anticipated income, the more significant the loss. Consequently, there will be a tendency for dentists—EDs included—to sacrifice certain professional behaviors as they become more "expensive" over time. As the RG to ED ratio rises, the income of EDs is probably increasing at a decreasing rate or perhaps not increasing at all. Under such strained circumstances, EDs are more likely than before to pursue profitable ventures, like setting up large, efficient practices in a shopping mall, that look unprofessional by traditional standards. They, in turn, would seek to staff these practices with RGs operating on a salaried basis, which probably would serve to reduce the ratio of RG to ED firms in the local market and tend to consolidate the EDs' market power relative to the RGs'. All else equal, an ED is more likely to pursue this corporate path the lower his annual increase in net income, the less his attachment to professionalism as a commodity, and the greater his accumulated capital.

RGs may be increasingly motivated to accept salaried positions. First, capital start-up costs for a new practice in such a market will probably be increasing faster than the expected net income. For dental graduates already in significant debt from educational expenses, this prospect is not attractive. The security and early steady earnings from a salaried position would have a strong appeal despite not being what the RG had originally envisioned.

Returning now to policies to control practice characteristics, a second major, and somewhat more debated, restriction on C_3 takes the form of state regulations prescribing which dental procedures may be delegated to auxiliaries working under the supervision of dentists. Numerous studies indicate that these expanded function dental auxiliaries (EFDAs) have high productivity potential. However, a recent paper by Battalio and Kagel[‡] suggests, somewhat indirectly, that dentists in many states are not now delegating tasks to the extent earlier research would have indicated to be compatible with the goal of income-maximization. Surveys and experiments indicate that many dentists do not want, and cannot effectively handle, the accompanying managerial responsibility. In addition, the dentist's self-image as an independent, skilled professional may become threatened as task delegation increases; in Friedson's²¹ terms, there may be an erosion of "professional dominance."

fact, recent court decisions, e.g., *Bates v. The State Bar of Arizona*, 97 S. Ct. 2691 (1977) that it is unlawful for local state bar association to attempt to restrict certain market behaviors of attorneys, e.g., advertising, made it all but inevitable that similar market-restricting activities by organized dentistry would be struck down in a court test. Consequently, a reasonable interpretation of the ADA's decision is that, by 1977, it had very few options left. To battle the FTC in court would have been expensive, probably image-tarnishing, and, in all likelihood, a futile effort.

[‡]Battalio RC, Kagel JH: An Empirical Analysis of The Impact of State Legal Restrictions on Paraprofessionals in the Dental Industry. Paper presented at the 106th Annual Meeting of the American Public Health Association (Dental Section), Los Angeles, October 1978.

These disparate observations point to no simple predictions about the profession's attitude toward expanded-function auxiliaries, and, indeed, neither does our theory. Recall that the individual dentist is assumed to maximize satisfaction by choosing the optimal obtainable combination of income, prestige, and leisure time. Under reasonable assumptions within this theory, the impact of EFDAs on overall dentist satisfaction appears to be ambiguous. Current evidence suggests that for some dentists, use of EFDAs may expand the productivity of the practice but at the same time reduce professional prestige. Whether such a dentist advocates the EFDA role hinges, therefore, on how this trade-off is assessed.

Hypothesis 3D: *Controlling for the cohesion of the local market cartel, an income-maximizing ED is more likely than a utility-maximizing ED to support the EFDA concept. Controlling for income, leisure time, and professional esteem trade-offs the ED in a well-disciplined cartel is more likely to support the EFDA than the ED in market structures where the RGs compete more independently.*

The first prediction arises from the fact that the dentist who seeks maximization of income alone will not be deterred from advocating EFDAs on grounds of diminished professionalism. The second prediction is based on the notion that the EDs will be less concerned about obtaining external controls over the use of any C_3 characteristics (e.g., EFDAs) the greater the internal discipline they are able to enforce across the local market. One may have hoped our theory would slice through these ambiguities to a clear-cut prediction about EFDA policies, and yet it is worthy of note that there is greater interstate variation in regulations regarding task delegation than in any other major policy area in dentistry.

Promotion of Complementary Inputs

Hypothesis 4: *Organized dentistry at the national and state levels will support the development of inputs that are complementary in the production process.*

In fact, the profession has fostered what can be regarded as a type of complementary service: the care rendered by the licensed hygienist operating under the direct supervision of the dentist. Although preventive dentistry activities might be demand-depressing for certain services in the long run, the hygienist has been shown to have a relatively high marginal revenue product in the short run (see Feldstein²). Indeed, the ADA has traditionally testified in Congress for large increases in support to train hygienists, as Feldstein noted.

The Supply of Regulation to the Dental Care Market

Stigler¹⁹ argues that an occupation can more effectively influence the suppliers of regulation, the lower the organizational costs of formulating a coherent set of policy positions and mobilizing concentrated, visible support for it. The costs of effective political influence are held relatively low in dentistry because of the existence of a well-established organizational hierarchy, which serves as an efficient mechanism for eliciting, and then coalescing, grassroots policy

viewpoints. Membership in local (district) and state "constituent" societies are required by the ADA.

Another basic factor (consistent with Stigler's theory) in dentistry's historic ability to obtain favorable legislation has been the absence of formidable opponents. Most of the market-shaping principles embodied by state practice acts were adopted long before the consumerism movement and FTC investigations of the professions.

Why has state government granted the profession such discretion and why has the profession remained relatively unchallenged within government? Several factors appear to relate to this market regulation question. First, dentistry as a profession obtained most of its regulatory influence decades ago when public respect for health profession institutions ran high and the quality of care was highly variable. Second, once a profession like dentistry obtains regulation-establishing legislation, it usually is able to secure self-regulation. State public health departments never had, from the beginning, a staff of "in-house" dentists available for such purposes. Finally, many of the regulatory issues in this profession (and others) are ambiguously double-edged. Thus, stringent licensing requirements can serve both to reduce the likelihood that a given dentist is incompetent and to slow the growth of total supply of dentists in the state. In any debate over such policies, the profession can cite its duty to safeguard the public's health and safety.

Conclusions

The model of the dental care industry introduced here proposes that the vertically integrated (local/state/national) structure of the profession serves as an efficient organizational vehicle for sharing market information, airing and reconciling professional debate, and obtaining favorable regulation. To develop this theory, we exploited a relatively unexplored complementarity among several theoretical constructs: Lancaster's¹² "new view" of consumption; Spence's¹⁸ notion of market signals as an equilibrating mechanism; Rosen's¹³ concept of (static) market equilibrium with hedonic prices; Stigler's¹⁹ economic theory of regulation; recent work on the search for information and consumer equilibrium; and Freidson's²¹ theory of "professional dominance" within medicine.

In a regulated and well-organized service industry like dentistry, market-related activities have two distinct focuses. Individual dentists lie on a continuum between newly licensed recent graduates and senior established dentists, and compete in a local market where the supply of competitors (and many of their characteristics), the legal environment of practice, and the demand for care are all relatively stable in the short run. Dentist satisfaction and certain market behaviors are a function of the combined value of income, leisure time, and professional esteem. All the while, dentists can lobby through their own organizations to promote government policies which, in the long run, will alter the supply, the legal environment, and the demand for care. Within the framework of Stigler's economic theory of regulation, we built upon the recent work of Feldstein to analyze

both the profession's demand for specific types of regulation and government's incentive to supply such regulation. In the contemporary national economic environment, predicting the precise strength of consumer demand is precarious. An important test of the health professions political economy, the outcome of which drastically affects the market for health services, may well be played out in the fate of the pro-competition legislation being currently proposed as a national health policy.

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APPENDIX

The Consumer Decision

Assume for simplicity there is only one alternative dental practice, j, to the consumer's current one, i. Were he to return to practice i, the consumer's resulting level of satisfaction could be obtained directly by solving

$$(1) \max U = U [\alpha_1 (s_{1i}, \dots, s_{Ri}), \dots, \alpha_A (s_{1i}, \dots, s_{Ri}), X], \text{ s.t.}$$

$$(2) \sum_{r=1}^R (p_{ri} + t_{ri} w) s_{ri} + (p_x + t_x w) X = y + w T.$$

where:
 U = the consumer's satisfaction (or utility) function;
 s_{ri} = the particular "brand" of dental service r offered at practice i;
 α_a = the ath dental practice attribute, assumed to be a function of the R service brands available at the practice;
 X = a "composite" non-dental commodity whose role in equations (1) and (2) is related to the optimal allocation of resources across all commodities, one of which is dental care;
 p_{ri} = the money price (fee) for service r at practice i;
 t_{ri} = the total amount of time required by the typical person to consume a unit of service r at practice i (i.e., the "own-time price" of r at i);

also, p_x = the money price of X; t_x = the own-time input per unit of X; w = the consumer's wage rate; y = non-earned income; T = the total amount of time available for market activities and own production of goods and services; R = the number of services offered at the practice; and A = the number of dental service attributes of importance to the consumer.

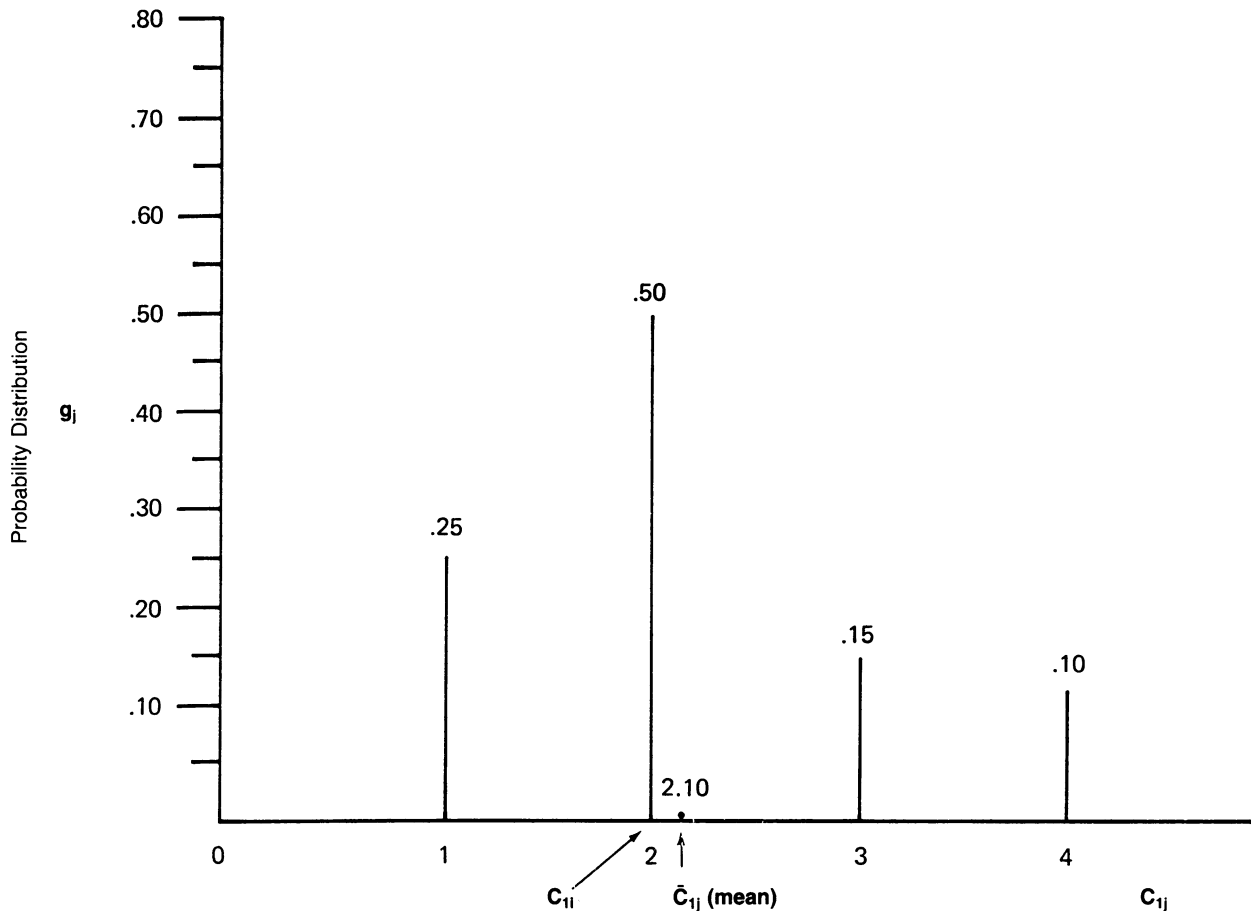
This formulation is a slightly more complex version of a well-known model introduced by Acton.⁹ It is assumed that (1) and (2) are twice differentiable, that the first derivatives of U are positive, that the second derivatives of U are negative, and that all cross-derivatives are positive. Note that by including "time price" components in (2), we are consistent with the assumptions of House's model.⁷

The consumer's next problem is to estimate the satisfaction obtained from choosing, without search, some other practice, j, about which he has no first-hand knowledge. In this regard, the consumer is presumed to possess a Bayesian (prior) probability distribution, g_j, over the possible sets of characteristics to be found at practice j. Based on this prior, the consumer's expected satisfaction if practice j is selected is given by:

$$(3) \bar{U}^j = \int_{C_{1j}} \dots \int_{C_{Kj}} \{U[\alpha_1 (s_{1j}(\cdot), \dots, s_{Rj}(\cdot)), \dots, \alpha_A (s_{1j}(\cdot), \dots, s_{Rj}(\cdot)), X] - \lambda \left[\sum_{r=1}^R (p_{rj}(\cdot) + t_{rj}(\cdot)w) s_{rj}(\cdot) + (p_x + t_x w) X - y - wT \right] \} g_j((C_{1j}, \dots, C_{Kj})) dC_{1j} \dots dC_{Kj}$$

where s_{rj}(·), p_{rj}(·), and t_{rj}(·) are functions of the K characteristics, (C_{1j}, . . . , C_{Kj}). When j = i (a practice the consumer has already patronized), the density function g_j is concentrated at the point (C_{1i}, . . . , C_{Ki}), and the problem reduces to the standard deterministic optimization problem of finding values of s_{1i}, . . . , s_{Ri}, and X, which lead to Uⁱ, the (certain) satisfaction level attainable from choosing to return to i.

However, at this point the consumer has the option of searching for additional information about practice j that would lead to exact



APPENDIX FIGURE 1—Consumer’s Probability Distribution for the Level of Characteristic C_1 at Dental Practice j , Prior to a Decision to Search for Additional Information about Practice j .

knowledge about one or more of its characteristics. For example, examination fees and structural practice characteristics could be ascertained from j by phone. If the consumer were willing to invest more resources, he could seek out a sample of j ’s patients.

To pose more formally this dilemma about whether to search, we introduce the notion of a “search-contingent” prior, which is defined as the probability distribution over the consumer’s choice of characteristics vectors in the next period, given (1) the prior g_j , (2) the known vector at i , $\langle C_{1i}, \dots, C_{Ki} \rangle$, and (3) the decision to search for the identity of the characteristics vector of practice j . Now the consumer’s very decision to search implies—before any search occurs—that the characteristics vector domain of g_j can be partitioned into three subsets: (1) an “inferior” subset, each of whose vector members is associated with a set of service brands offering the consumer less utility than those of practice i (following search); (2) a “superior” subset each of whose members imply brands yielding more utility than is available from i (following search); and (3) the “boundary” subset consisting, at most, of the single vector $\langle C_{1j}, \dots, C_{Kj} \rangle = \langle C_{1i}, \dots, C_{Ki} \rangle$. Such a search-contingent prior may be expressed in the form of a probability density, $g_j'(\langle C_{1j}, \dots, C_{Kj} \rangle)$, which satisfies the following conditions: (a) imputes a zero probability of next-period consumption to all inferior characteristics vectors in j ; (b) “lumps” the entire probability mass associated with these inferior vectors at the single point, $\langle C_{1i}, \dots, C_{Ki} \rangle$, to reflect the fact that discovery of an inferior vector for j would lead to retention of practice i (and its associated vector); and (c) is identical to g_j over all superior characteristics vectors for j .

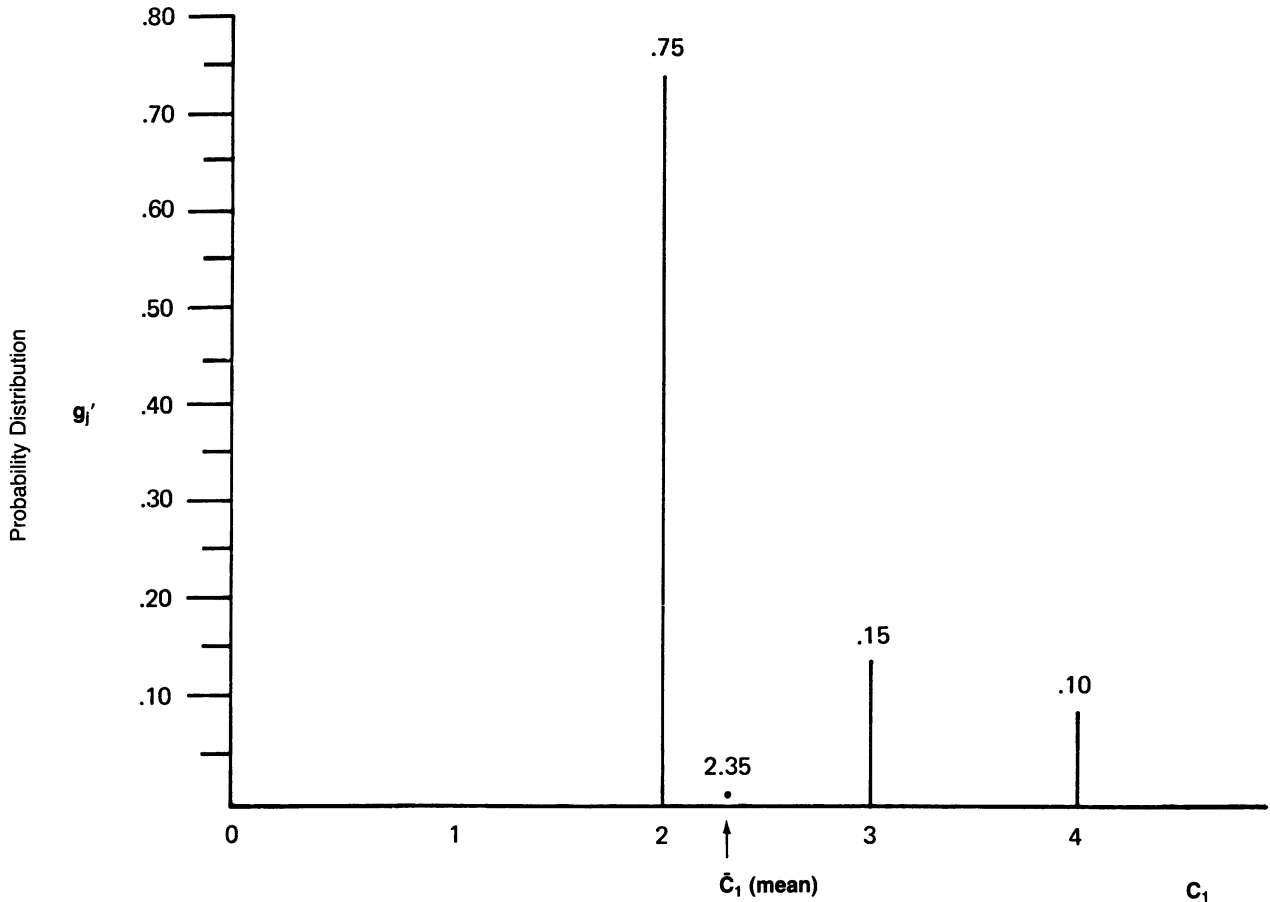
The relationship between g_j and g_j' is illustrated in Figures 1 and 2. For simplicity, only one characteristic C_1 , is considered and g_j is assumed to be discrete, with mean of 2.10 units. C_{1i} is known to be 2 units. On the basis of prior information only, the consumer

would switch from i to j if $U^i < \bar{U}^j$. Note however, that one could not infer that j is preferred to i simply because $\bar{C}_{1j} > C_{1i}$. In particular, there is a positive search cost, d_{ij} (assumed to be known with certainty) which reduces income. Thus, the final impact on welfare is not obvious and must be resolved case-by-case by reference to equation (3) above.

Assume that before making a decision to search, the consumer computes U^{kj} for each of the four possible values of C_1 (allowing each time for the income loss d_{ij}) and finds $U^{1j} < U^{2j} < U^{3j} < U^{4j}$. The C_{1j} is inferior, C_{3j} and C_{4j} are superior, and C_{2j} is (by definition, anyway) the boundary value. Were this person to search and discover that $C_{1j} = 1$ or 2, he would not switch to practice j . If he discovered $C_{1j} = 3$ or 4, he would switch from i to j following this search. Knowledge of this fact has the effect of raising from .50 to .75 the prior probability that the searching consumer will subsequently choose a practice with $C_1 = 2$, as indicated in Figure 2; the mean of g_j' is thus 2.35 units. Assume that g_j' leads, via (3), to the new expected utility, $\bar{U}^{j'}$. Then the consumer will choose to stay at i , switch (without search) to j , or first engage in search before deciding according to which is the greatest of U^i , \bar{U}^j , or $\bar{U}^{j'}$.

The key insight here is that the decision to search itself guarantees that the consumer will never have to face characteristic values, e.g., $C_{1j} = 1$ above, that are computed *a priori* to be inferior. The same cannot be said for the consumer who does not search but simply chooses between practices i and j on the basis of U^i versus \bar{U}^j . Recall, finally, that because search involves a reduction in income, the act of acquiring the prior g_j' does not guarantee *ipso facto* that $\bar{U}^{j'} > \bar{U}^j$.

From here the consumer’s problem can be generalized in obvious ways, to searching among several practices in the local market, but the logic of the choice process is unchanged. In the final



APPENDIX FIGURE 2—Consumer's Probability Distribution for the Level of Characteristic C_1 Attainable on his Next Dental Visit, Given a Decision to Search for Additional Information about Practice j Prior to Selecting a Practice.

analysis, the consumer selects that strategy that maximizes (3).

This overall view of consumer behavior emphasizing the problem of determining the optimal combination of utility-yielding attributes has been developed in recent years by Becker,¹⁰ Muth,¹¹ Lancaster,¹² and Rosen,¹³ among others. In the health services literature, this perspective has been adopted and refined by Fuchs and Kramer,¹⁴ Newhouse and Phelps,¹⁵ Goldman and Grossman,¹⁶ and Feldman.¹⁷ The interactions among the characteristics of firms and consumer search have been analyzed by Spence.¹⁸ The general theory of consumer search has been investigated by a number of economists, including Stigler¹⁹ and Kohn and Shavell.²⁰

The Dentist's Decision

In stating dentist j 's optimization problem, a single composite service brand, s , will be assumed for notational simplicity. The subsets C_1 , C_2 , and C_3 will each be treated as composite characteristics.

- (4) $\text{Max } V(Y_j, L_j, E_j; \underline{B}_j)$ s.t.
- (5) $s_j = s(H_j, C_{ij}, C_{3j})$, $i = 1$ or 2
- (6) $p_j = p(s_j, C_{ij}, C_3; \underline{C}_1, \underline{C}_2, \dots, \underline{C}_d, \dots, \underline{C}_D, Z)$, $i = 1$ or 2
- (7) $E_j = E(p_j, C_{ij}, C_{3j})$, $i = 1$ or 2
- (8) $H_j + L_j = \bar{T}$
- (9) $Y_j = p_j s_j - K(C_{3j})$
- (10) $C_3^l \leq C_{3j} \leq C_3^u$

where:

V_j = the dentist's utility function, H_j = dentist j work time, Y_j = net income, L_j = leisure time, s_j = the rate of production of composite service brand s_j , and \bar{T} = total time, a constant. E_j = an index of j 's self-perceived esteem within the local network of dentists, \underline{C}_d = the vector of quality-indicating characteristics dentist j expects to exist at practice d over his (j 's) current planning period (including the price charged by practice d), Z = a vector of exogenous demand-affecting factors (e.g., per capita income) which j expects to prevail over the planning period, \underline{B}_j = a vector of exogenous factors that affect j 's utility function (e.g., the income of "reference" groups in the market area, such as physicians), K = total cost function, C_3^l , C_3^u = the state-imposed lower and upper limits, respectively, within which the usage of characteristic C_3 must fall, and p_j = the money price (fee) for a unit of composite service brand at practice j .

In the production function (5), all of the characteristics are listed as inputs. Some of these (included in C_{3j}) will be flows of physical factors of production, such as the presence of modern equipment, while others will be flows of a less palpable nature which help establish the quality, or brand, of the service, e.g., the ability of the dentists to reassure. For a member of the ED group, $i = 1$ (implying $C_{1j} > 0$ and $C_{2j} = 0$), while for an RG, $i = 2$ (implying $C_{1j} = 0$ and $C_{2j} > 0$).

Equation (6) is the demand function dentist j assumes he faces over the current planning period. The money price required to sell any quantity of j 's brand depends generally upon the distribution of brands, money prices, and time prices offered by all other dentists, plus the overall strength of consumer demand for dental care in the local market. These factors are represented in (6) respectively, by

the set of characteristics vectors (the \underline{C}_d) for all other of the D dentists in the local market and a vector \underline{Z} consisting of all consumer demand determinants as seen by dentist j . Thus, \underline{C}_d implies the vector $(C_{1d}, C_{2d}, C_{3d}, p_d)$, and fully describes dentist d . To the extent that dentist j is highly esteemed in the community, this will show up in a higher score on C_{1j} or C_{2j} (depending on whether he is an ED or an RG). The vector \underline{Z} includes parameters such as population size, demographic composition, and income distribution.

In (7) the potential impact of the fee level on professional prestige is recognized. The cost structure in (9) reflects the simplifying assumption that all inputs (other than dentist own-time) can be represented in the composite characteristic C_3 . The most general form of a regulatory restraint is given in (10). For any particular augmentable characteristic, there may be only an upper limit (e.g., on the scope of task delegation to auxiliaries or the extent of advertising), only a lower limit (e.g., on the state licensing examination taken by the hygienist), or no legal limits at all (e.g., on the attractiveness on the hygienist).

The model (4)–(10) may be solved for utility-maximizing values

of characteristics, own-time, and money price.

As with the consumer's utility function, we assume that V is twice differentiable in each of Y_j , L_j , and E_j ; that all second derivatives are negative; and that all cross derivatives are positive. Thus increments in each of Y_j , L_j , and E_j contribute positively to dentist utility, but at a decreasing rate. The relative importance of Y_j , L_j , and E_j in V may vary with dentist age and other factors, but we ignore these complications here.

Finally, depending on the particular structure of the local market (see examples in the text), there will emerge some configuration of fees and practice characteristics levels across dentists in the market. Under the assumptions noted in this Appendix and the text, it can be shown that within a finite time interval: all dentists will establish stable values for fees and characteristics, the rational basis for consumer search will diminish, and finally all search will cease. Market equilibrium will be established: each consumer will have a "family dentist" and each dentist, a practice of patients. Of course, "shocks" to the local market, such as the entry of new dentists, disturb this equilibrium, and the adjustment process begins anew.

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