The Market for Dental Services

Kent D. Nash, Ph.D.; L. Jackson Brown, D.D.S., Ph.D.

Dr. Nash is President of Nash & Associates, an economic consulting firm; and Dr. Brown is Editor of the Journal of Dental Education. Direct correspondence and requests for reprints to Dr. Kent D. Nash, Nash & Associates, Inc., P.O. Box 382, Millican, TX 77866; nashkd@suddenlink.net.

Keywords: oral health care market, dental services market, dentists, supply and demand, economics

Economists identify two major groups that comprise the market for oral health care services. The significant elements of these two groups include the following: 1) demand side—patients and patient demographics, financing of care, need for dental care, economic ability to purchase, travel, appointments and office waiting, payment of fees, and receipt of dental care; and 2) supply side—dentists and dentist demographics, office and treatment hours, practice staffing, practice organization and location, costs of operating a practice, dental fees, and gross receipts. The dental services market exhibits several distinctive though not unique characteristics. Other markets, especially in the health care arena, feature many of the same characteristics. The key market characteristics for dental services are the following.

In the first category—the exchange of services—most dental care is purchased and sold in a private dental market. Dentists provide services to patients for a fee. Some individuals have dental insurance that pays all or a portion of the fee. Employers provide the huge majority of dental insurance. Either the premium for the insurance is covered fully by the employers, or the employee is required to pay a portion of it. Only a small portion of dental care is provided through public financing, with or without patient copayment. A still smaller proportion of services are actually produced by governmental or nonprofit organizations.

In the second category—patients—almost all individuals are aware that they are at risk for developing oral disease. Some seek regular checkups and preventive services with the intention of keeping oral disease from developing; others wait until they experience symptoms before they seek care from dentists. Patients need to physically meet with the dentist or dental hygienist in order to receive dental services. Patients must intimately participate with the dentist in the delivery of the service because dental procedures are performed in the oral cavity. This unavoidable involvement with a sensitive part of one’s body can be uncomfortable, a source of anxiety, and sometimes causing pain. Since patients do not reside in the same locations as the dentist, travel is required to meet with the dentist. Appointment scheduling and waiting in the dental office may also be required in order to receive care. The travel, appointment, and waiting times all contribute to the full cost of dental care to the patient (in addition to paying the fees charged by the dentist).

Dentists are responsible for choosing both the appropriate treatments to meet the dental needs of patients and the appropriate resources necessary to render care. Since dentists provide individualized services to meet the specific conditions presented by patients, these services cannot be mass-produced before the patient is examined and the specific needs determined. Therefore, a reserve of identical services (an inventory) cannot be maintained by dentists. However, an inventory of supplies and personnel to provide services can be maintained. All practicing dentists and dental hygienists must be licensed to practice by the state where they practice. Only graduates of accredited dental schools and dental hygiene education programs are eligible for licensure. While dentists and dental hygienists are well prepared to provide services, they operate in an environment that exhibits some uncertainty. Things can go wrong, requiring additional intervention, often very quickly. Because of this uncertainty, oral health professionals must acquire a depth of knowledge that permits them to deal effectively with difficult and unexpected events. This need requires that they be proficient in a broader base of knowledge and operational skills than may be routinely needed for the procedure they are providing at a particular moment. This need, in turn, requires extended educational preparation.

Demand for Dental Services

Theory of Dental Services Demand

The general theory of demand assumes that goods are the immediate objects of individual
preferences (wants). Consumers’ choices (buying decisions) are constrained by their income and the price they are charged for the service. Actual choices (decisions) made by consumers reveal their preferences. Changes in observable choices are explained by changes in relative prices and in family financial resources. If an individual alters his or her choices, absent changes in prices or financial resources, the different set of choices is attributed to a change in the individual’s preference structure (changes in knowledge or what the person values most). If an individual chooses to receive a service or buy a product, it is because that service or product is the ultimate object of individual preferences or desires.

For dental services, this assumption defies credibility. One may desire a good bottle of wine simply for the pleasure of drinking it; likewise, a dinner at a great restaurant or a good book. It is hard to believe that an individual’s desire to go to the dentist and receive dental treatment is simply due to the joy of the experience. Rather, it is more reasonable that people seek oral health professionals because they need something that the professional can provide. If they believe they do not have a need, they will not go to a dentist as a pleasurable event as they would to a concert.

For medicine and dentistry, in particular, it is necessary to modify the general theory to fit the characteristics of these markets. A popular demand model for medicine and dentistry is called the health production function model. In this model, health is the ultimate object of individual desire. Individuals choose to receive dental services because they believe they have a need for those services to maintain their oral health. The problem with this approach is that health is difficult to define and even more difficult to measure objectively. It is more feasible to measure manifestations of the lack of health, such as observable disease, physiological function, diagnostic tests, symptoms, discomfort, or dysfunction. In fact, that is the approach that practicing physicians and dentists use to diagnose a person’s condition and plan appropriate therapy.

We adopt that approach here. Oral disease and the resulting need for information, therapy, and rehabilitation are the starting point for the demand for dental services. The basic premise is that the demand for oral health derives from an individual’s need for dental services and realization of that need. Both need and awareness of need are required for a person to act.

If a person is unaware of a need for care, chances are less that he or she will seek care. These individuals can benefit from health education and promotion. However, if that individual continues to eschew professional care, the progression of the disease or condition will probably bring the person to understand that a need exists. It may require an episode of acute pain, teeth getting loose, or some other consequence, but the need will express itself sooner or later.

The vast majority of Americans are aware that they are at risk for oral disease and may have some disease although they do not experience perceivable symptoms. They make regular visits to dentists to obtain information about the current condition of the oral cavity. Dentists provide that update with diagnostic services. Patients also receive preventive services to keep disease from occurring. When disease is detected, they receive therapy to treat oral disease, relieve pain or discomfort, restore function, or correct malocclusion.

Under this theory of demand, disease patterns will have a strong impact on the demand for dental services. Over the post-World War II period, caries and periodontal diseases have become better understood, and prevention has reduced their incidence, prevalence, and severity in the United States. Empirical studies have documented changes in oral disease patterns. A previous study documented that reduction in the extent and severity of oral disease has changed the types and frequency of dental services provided to patients. White in this issue addresses disease patterns.

### Responsiveness of Demand for Dental Services to Changes in Fees

The sensitivity of the market participants to changes in price or income on their purchasing and production decisions is called “elasticity” by economists. Elasticity is a measure of the responsiveness of one variable to changes in another. It is usually measured in percentage terms; for example, one could find that a 10 percent change in price (the fee for a dental procedure) results in an X percent change in quantity demanded for that procedure. If the percent change in quantity is more than the percent change in price, the product is price elastic; if it is less, the product is inelastic.

The elasticity that we focus on here is price elasticity. Specifically, we concentrate on the price
elasticity of demand and supply. These factors measure the percent change in the quantity of a good demanded (bought) or supplied (sold) for a certain percent change in its price (fee). (See Economics A–Z at www.economist.com/economics-a-to-z for more information on this concept.)

If the demand for dental services were extremely elastic, a change in price (dental fees), even a small one, would have an enormous impact on the quantity of oral health care demanded. Even a small increase in price would cause the utilization of services to plummet. This is obviously not the case for dental services: they are too valued and too necessary for that type of response and have few, if any, substitutes. At the other extreme, the price elasticity of dental services could be very inelastic. In that case, an increase in price would have very little effect on the demand for dental services. This condition is also unrealistic for oral health demand.

The elasticity of demand for total dental services is somewhere in between these extremes, and it varies by type of procedure. The demand for tooth whitening could be rather price elastic, especially since over-the-counter alternatives exist. The most reliable data suggest that overall dental services are somewhat inelastic, in the range of 0.5 to 0.7 for patients who pay out-of-pocket or with private dental insurance.\(^4\,8\,14\) The downward sloping demand curve means that people value dental services enough to purchase them, even if the fees increase. Inelastic demand means that when fees increase by 10 percent, the quantity demanded declines by less than 10 percent. This also means that, under inelastic demand, total expenditures on dental services increase when fees increase, as does the revenue received by the dentist.

Expenditure is simply the quantity of service multiplied by the fee. Price-induced changes in total expenditure (price times quantity) depend on the relative price elasticity of demand. If demand is relatively elastic (>1.0), then changes in price cause total expenditures to change in the opposite direction. An increase in dental fees results in a decrease in dental expenditures. If demand is relatively inelastic (<1.0), as the empirical estimates indicate, then changes in price cause total expenditures to change in the same direction. An increase in dental fees would increase dental expenditures, while a decrease in fees would decrease expenditures. If demand is unit elastic (=1.0), then changes in price do not cause any change in total expenditures.

### Third-Party Payment

The discussion of demand responsiveness leads logically to a discussion of third-party payment. Figure 1 illustrates an impact of third-party payment on demand for care. It does not matter that much whether the third-party payment is private insurance (most economists view dental insurance as a form of prepayment, rather than a true insurance, which covers uncertain, relatively rare events that entail large losses) or publicly funded programs, as far as its effect on demand is concerned.

A result of greater third-party payment is a reduction in costs to the patient at the point of exchange (more is paid by a third-party plan). In Figure 1, the black demand line could be demand without insurance and the patient pays the full price of care. The blue demand line is a demand in which the amount paid for dental care by the patient is greater than zero but less than 100 percent. At any given price, the quantity demanded is greater on the blue demand curve compared to the black curve because the patient has to pay less than the full fee. Compared to the black demand, the blue demand is more inelastic, meaning that patients are less sensitive to changes in price of care since they pay only a portion (less than 100 percent) of the price of care. The red demand line is a demand in which the amount paid for dental care by the patient is zero. This means patients are totally insensitive to changes in price since they pay nothing for care anyway. This latter condition would identify demand as perfectly inelastic, meaning that when there are changes in fees charged (such as increases in fees), there is no change in the quantity demanded.

In fact, under perfectly inelastic demand, patients would demand a quantity equal to the full quantity when price is zero. From Figure 1, at any given price of care, the quantity demanded increases as the patient pays a smaller portion of the fee due to insurance (i.e., moving from the black demand to the red demand curve). It should also be noted that this description of third-party payment focuses on the fees charged for care and the portion paid by the patient. Under the concept of a full price of dental care, the cost to the patient would still be positive even if the portion of fees paid by patients were set to zero. Patients still face the cost of travel to the dentist and the opportunity costs of waiting time, which can be significant and act as a barrier to care even if the patient’s price is zero. As a result, with third-party coverage one of several conditions is likely to oc-
cur: 1) consumers use dental services to the point of their satiation (which may depend on their attitudes towards the importance of dentistry and knowledge of oral health); 2) consumers use dental services to the capacity of the supply available, at which point services will be rationed by queues and time costs; and 3) dental services are rationed by nonmarket methods, in which limitations on the eligibility for types of services are imposed by outside sources.

Other articles in this issue address the extent of insurance overall and by various subpopulations. Wall et al. found that changes in insurance coverage have had a noticeable effect on the percentage of the population that utilizes dental services as measured by a visit to a dentist in the previous year. Public insurance coverage has increased among children ages two to twenty years over the period from 1997 to 2010, and their utilization increased over the same period. Private insurance coverage decreased in the adult non-elderly population (twenty-one to sixty-four years of age) during the same period, and their utilization declined. Of course, insurance is only one of several factors that influence demand for services, as discussed by Wall et al. White provides substantial information on third-party payment and discusses such factors as insurance, population size and composition, and disease patterns. In addition, Guay et al. describe trends in group practice organizations.

**Supply Side of Dental Market**

**Size and Organization**

According to the 2009 American Dental Association (ADA) distribution of dentists report, “There were 186,084 professionally active dentists (who indicated at least one of the following as their primary and/or secondary occupation: private practitioner; dental school faculty or staff; armed forces dentist; government-employed dentist at the federal, state, or local level; graduate student, intern, or resident; or other health and dental organization staff member).” This study also found that “48,088 dentists reported that they were either pursuing a degree in another field, not in practice, currently looking for openings, waiting for boards, retired, or working in an unrelated occupation. An additional 4,511 dentists were missing occupation data.” In addition, according to this report, 91.7 percent (170,694) of professionally active dentists indicated at least one of the following as their primary and/or secondary occupation: private practitioner; dental school faculty or staff; armed forces dentist; government-employed dentist at the federal, state, or local level; graduate student, intern, or resident; or other health and dental organization staff member.”

![Figure 1. Impact of the extent of dental insurance coverage on price elasticity and quantity of dental services demanded](image)

Note: Black demand line (D) is demand in which patient pays full cost of care. Blue demand line (D) is demand in which patient pays more than 0 but less than 100 percent. Red demand line (D) is demand in which patient pays none of the costs of care.
active dentists “were engaged in the private practice of dentistry as a primary or secondary occupation. Of all professionally active dentists in the United States, about four-fifths (78.8 percent) indicated general practice (GP) as their practice, research, or administration area; the remainder were practicing various specialties of dentistry.” Regarding gender, “In 2009, 22.2 percent of all professionally active dentists and 21.6 percent of all active private practitioners were female.”

Table 1, derived from the 2009 distribution of dentists report, lists the percentages of general practitioners and specialists. According to the U.S. Bureau of the Census 2007 report on the economic census of the service sector, the number of dental establishments (single location) increased from 108,804 in 1992 to 127,057 in 2007. Table 2 shows the distribution of practices by ownership for general practitioners and specialists in private practice. The most prevalent type of dental practice has one dentist who is sole proprietor of the practice: 61.4 percent for general practitioners and 58.5 percent for specialists. Independent nonsolo practice is the next most common. This form of private practice is slightly more common among specialists. Among nonsolo practices, two- and three-dentist practices predominate. Practices with more than three dentists are uncommon but do exist. Employed dentists represent less than 10 percent of all dentists in private practice. Independent contractors, who contract with other dentists for use of office space and equipment and do not receive a salary from the owner dentist, are very uncommon. Their income is derived from fees charged to their own patients in rented space. Group practice organizations are increasing but still represent a small proportion of all practice delivery modes. See Guay et al. for more details.

The entire workforce of the private practice sector of dentistry numbers approximately one million, of which 17.5 percent are dentists. The number of dental hygienists is approximately the same, maybe slightly more, but more of them work part-
time. See Solomon for details on the dental workforce and its evolution over time.

### Competition in the Dental Services Market

The supply side of the dental market is typical of a private market system with many small firms (offices). These markets are usually very competitive. Firms do not have the power to set prices at whatever level they want; rather, they are almost forced to accept market-determined prices. Hence, the supply side of dentistry does not exhibit the market imperfections typical of monopolies or sectors with a few large firms that have the power to influence prices.

However, the supply side of dental services markets does exhibit the characteristics listed above. In addition, asymmetry of information between the patient and the oral health professional does exist. This creates the need for dentists and dental hygienists to act as agents for patients. Agents should act in the best interests of their clients. Professions with agency responsibility stress professional integrity and are subject to malpractice laws to protect patients from dentists who would take advantage of them. In addition, dentists and dental hygienists are licensed and with a few exceptions must graduate from accredited programs. Many jurisdictions require

<table>
<thead>
<tr>
<th>Area of Private Practice</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Practice</td>
<td>80.3%</td>
</tr>
<tr>
<td>Oral and Maxillofacial Surgery</td>
<td>3.6%</td>
</tr>
<tr>
<td>Endodontics</td>
<td>2.6%</td>
</tr>
<tr>
<td>Orthodontics and Dentofacial Orthopedics</td>
<td>5.5%</td>
</tr>
<tr>
<td>Pediatric Dentistry</td>
<td>3.0%</td>
</tr>
<tr>
<td>Periodontics</td>
<td>2.7%</td>
</tr>
<tr>
<td>Prosthodontics</td>
<td>1.6%</td>
</tr>
<tr>
<td>Other</td>
<td>0.4%</td>
</tr>
</tbody>
</table>

Note: Percentages do not total 100% because of rounding.

<table>
<thead>
<tr>
<th>Area of Private Practice</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Practice</td>
<td>80.3%</td>
</tr>
<tr>
<td>Oral and Maxillofacial Surgery</td>
<td>3.6%</td>
</tr>
<tr>
<td>Endodontics</td>
<td>2.6%</td>
</tr>
<tr>
<td>Orthodontics and Dentofacial Orthopedics</td>
<td>5.5%</td>
</tr>
<tr>
<td>Pediatric Dentistry</td>
<td>3.0%</td>
</tr>
<tr>
<td>Periodontics</td>
<td>2.7%</td>
</tr>
<tr>
<td>Prosthodontics</td>
<td>1.6%</td>
</tr>
<tr>
<td>Other</td>
<td>0.4%</td>
</tr>
</tbody>
</table>

Note: Percentages do not total 100% because of rounding.

### Table 1. Percent distribution of U.S. private practitioners by area of practice, 2009

<table>
<thead>
<tr>
<th>Area of Practice</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Practice</td>
<td>80.3%</td>
</tr>
<tr>
<td>Oral and Maxillofacial Surgery</td>
<td>3.6%</td>
</tr>
<tr>
<td>Endodontics</td>
<td>2.6%</td>
</tr>
<tr>
<td>Orthodontics and Dentofacial Orthopedics</td>
<td>5.5%</td>
</tr>
<tr>
<td>Pediatric Dentistry</td>
<td>3.0%</td>
</tr>
<tr>
<td>Periodontics</td>
<td>2.7%</td>
</tr>
<tr>
<td>Prosthodontics</td>
<td>1.6%</td>
</tr>
<tr>
<td>Other</td>
<td>0.4%</td>
</tr>
</tbody>
</table>

Note: Percentages do not total 100% because of rounding.

### Table 2. Percentage of private practitioners by type of employment, by general practitioners, specialists, and all private practitioners, 2007

<table>
<thead>
<tr>
<th>Type of Employment</th>
<th>Solo</th>
<th>Independent Nonsolo</th>
<th>Employed</th>
<th>Independent Contractors</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Practitioners</td>
<td>61.4%</td>
<td>27.3%</td>
<td>8.9%</td>
<td>2.4%</td>
</tr>
<tr>
<td>Specialists</td>
<td>58.5%</td>
<td>31.8%</td>
<td>6.7%</td>
<td>3.0%</td>
</tr>
<tr>
<td>All Private Practitioners</td>
<td>60.9%</td>
<td>28.2%</td>
<td>8.5%</td>
<td>2.5%</td>
</tr>
</tbody>
</table>

Note: Percentages may not total 100% because of rounding.
continuing education for oral health professionals to maintain their competence after graduation.

Practitioner Objectives and Incentives

Private dental offices, whether independent or part of a group organization, seek to maximize revenues and minimize costs in order to maximize profits. For small self-employed business operators, this is tantamount to maximizing their net incomes. Since dental practice is largely comprised of owners of small businesses, this behavior applies very well to the dental services markets. Gross revenues are easy to understand: they are gross billings for services provided less the uncollected portion. Total costs are all costs of operating the practice: salaries and fringe benefits, supplies, equipment, maintenance, rent or mortgage, and various forms of insurance.

Owning a business is risky. A dental office may not have as large a clientele as desirable. The owners have to pay the staff even if the office has downtime due to missed appointments. In addition, staff can miss work due to illness, jury duty, or paid vacation. When any of these occur, the owner still incurs the cost of the staff member but does not obtain the use of the individual. This reduces productivity. Equipment can malfunction, which also causes downtime, and costs are incurred to get it repaired or to buy replacements.

As a consequence, net incomes of owner dentists usually include an implied salary for their work as a dentist plus a little extra for their business risk. If the reward of ownership is not worth the risk, then dentists would have an incentive to sell their practices and work as employee dentists. Since the huge majority of dentists have some ownership in their practices, one may conclude that their net incomes are sufficient to keep them with a good return on their risk for ownership (i.e., their net incomes are sufficient to keep them in ownership positions rather than non-ownership). Because ownership is so prevalent compared to employed dentists, we will lump these two components of net income together and focus on net income as the maximizing objective of owner dentists during our subsequent discussion of market adjustments.

Market Equilibrium

The market for dental care can be summarized, again using the economic approach, by the supply and demand model for dental care shown in Figure 2. In this model, the demand for dental care discussed in the previous section is represented by the downward sloping line D, indicating that, with other factors held constant, consumers buy more dental care the lower its price. That is, the quantity of dental services consumed varies inversely with the fees charged to purchase the service.

The supply curve is represented by the upward sloping line S in Figure 2. According to the supply curve, keeping other things constant, more care will be rendered by dentists the higher the price of care. That is, the quantity of dental care provided varies positively with the price of care. It is the forces behind supply and demand that determine the price and quantity of care produced by the market. At price P*, the quantity demanded Q* is equal to the quantity supplied Q*. Economists call this a short-run equilibrium in the market because no forces exist to change price and quantity.

To clarify, the entire market is in equilibrium. That does not imply that the entire market is completely static, with no change whatsoever. It also does not mean that every dental office has the same fees, costs, gross receipts, or net incomes; neither does it mean that every practice sees the same profile of patients with the same need or demand. Variation and change can occur within a market in equilibrium, but the changes balance out, leaving aggregate supply and demand in the market unchanged. One need look no further than the variance in the price of a gallon of gasoline at service stations at the same intersection to know that a market in equilibrium is consistent with price variation within the market and with net income differences among dentists.

We must understand that market equilibrium means that, across the entire market, the fees that patients are willing to pay for services are, on average, the same as what dental offices charge for the services they deliver. There is another important stipulation: the patients must be satisfied, on average, with the amount of care they are receiving at existing fees, and dentists must be satisfied that their net incomes are competitive with dental markets in other towns or states. If something happens to systematically change the balance between supply and demand, the market begins to adjust to bring supply and demand back into balance. Once again, that does not mean that supply and demand return to the levels of the previous equilibrium. The market may reach equilibrium at a different level of fees, a different amount of dental services exchanged, or a different
When a shift in supply, demand, or both occurs, the market begins to adjust to the new conditions. The adjustment may be quick or prolonged depending on the extent of the shift and the responsiveness of supply or demand. Unless the factors that caused the shift to return to what they were prior to the shift, a new equilibrium will be established at a different price (fee) level and a different quantity (dental services) exchanged. (For more information, see http://en.wikipedia.org/wiki/Demand_curve.)

Demand shifts. We focus on shifts in demand first because the demand for services drives the entire process. Demand for care, based on a perceived need, is the reason the dental profession exists. Sometimes the changes in underlying factors are cyclical and temporary. A brief recession with a quick return to economic growth at the prerecession pace is an example. Sometimes, however, the changes in factors (determinants of demand) are secular and permanent, at least for the foreseeable future. Changes in population and its demographics, as well as changes in disease patterns, are examples on the demand side of dental services. Scientific and technical changes are examples on the supply side. Shifts in demand or supply can affect a single market, most of the markets in a region, or the entire country.

The extent of the area that experiences a shift in demand has important implications for the time it number of dental practices with different levels of dentists’ net incomes.

There are two types of adjustments. One is called a change in quantity demanded. The second is called a shift in demand and/or supply. Distinguishing between the two is important.

Change in Quantity Demanded
Change in quantity demand is a movement along a given demand curve: neither the demand curve nor the supply curve changes its shape or position as shown in Figure 2. This adjustment is the result of a change in price. Underlying factors that influence demand or supply do not change.

With this type of adjustment, if the price returns to its previous level, so will the amount of dentistry provided. We can then say the market will be in equilibrium at the starting price (fee level) and quantity of dental services exchanged.

Shifts in Demand and Supply
A shift in demand or supply is caused by changes in those underlying demand and/or supply factors. (See Figure 3 in Brown for a list of the major factors for dental markets.) Economists call these factors determinants of demand or supply. They also refer to these factors as shifters of demand or supply.

When a shift in supply, demand, or both occurs, the market begins to adjust to the new conditions. The adjustment may be quick or prolonged depending on the extent of the shift and the responsiveness of supply or demand. Unless the factors that caused the shift to return to what they were prior to the shift, a new equilibrium will be established at a different price (fee) level and a different quantity (dental services) exchanged. (For more information, see http://en.wikipedia.org/wiki/Demand_curve.)

Demand shifts. We focus on shifts in demand first because the demand for services drives the entire process. Demand for care, based on a perceived need, is the reason the dental profession exists. Sometimes the changes in underlying factors are cyclical and temporary. A brief recession with a quick return to economic growth at the prerecession pace is an example. Sometimes, however, the changes in factors (determinants of demand) are secular and permanent, at least for the foreseeable future. Changes in population and its demographics, as well as changes in disease patterns, are examples on the demand side of dental services. Scientific and technical changes are examples on the supply side. Shifts in demand or supply can affect a single market, most of the markets in a region, or the entire country.

The extent of the area that experiences a shift in demand has important implications for the time it
takes to achieve a new equilibrium. A single market can respond rather rapidly. Dentists can relocate, or new graduates can come into the market. Patients can travel to an adjacent market to get services. Their travel time and distance are affected, so the change in their home market must be substantial. For an entire region, the response is slower on both sides of the market. The shift in population from the Northeast and Upper Midwest to the Southeast and West regions of the United States has occurred over decades. These population shifts have affected the regional distribution of dentists. Proportionately more are located in or near the growth regions, but it has taken decades for this realignment to occur. When a shift in the underlying factors affects the entire nation, the adjustment can be long and arduous, but it does happen. Consider the pattern of services that dentists provide now compared to 1950. There has been an extraordinary change in the distribution of services rendered by dentists. The underlying reason is the change in oral disease patterns and severity as well as scientific and technological advances. In the following discussion, we discuss shifts that affect the entire nation or large portions of it. We will provide a series of examples from both demand and supply and end with a more complicated but realistic situation.

Shifts in demand are shown in Figure 3 (an increase in demand) and Figure 4 (a decrease in demand). While focusing on demand shifts, supply (S) is assumed not to shift immediately, but it can and will respond unless supply was at its full capacity before the demand shift. In the longer term, supply may respond later with a shift of its own. Holding the supply curve constant as shown in these two figures will be relaxed later.

Figure 3 depicts an increase in demand. D₀ is the position of the demand curve at equilibrium. A shift that increases demand is depicted by D₁. The demand curve shifts out, to the right of the original demand curve. Prices increase (P₁ > P₀) and the amount of dental services provided also increases (Q₁ > Q₀). Since both prices and services increase, expenditures must also increase. In the short term, the number of dentists is fixed; therefore, their average net income will increase. The market’s first response will be for the existing dental offices’ appointment schedules to become more filled. Once the appointment schedules are filled and extend into the future as far as both the office and patients are comfortable, the office may have to extend its hours, hire more staff (including bringing in an associate dentist), or refuse to accept new patients. Office waiting time may increase for patients as dentists attempt to accommodate the increased work schedule.

In the longer term, the market will signal a demand for more dentists in the market, which carries implications for the dental education industry. Dentists will hire associates, and new graduates will begin to locate practices in the dental services market. If the shift in demand pertains to a single market or a

---

**Figure 3. Shift (increase) in demand (D₀ to D₁) for dental services while supply (S) stays the same**
that has been the long-term trend for the dental market during the last sixty years. The aggregate supply curve for the nation has been shifting to the right, outward, as depicted in Figure 5, during most periods over the last sixty years. The increase in supply over this long period has been stimulated by an increase in the aggregate demand for dental services over the same period. The reasons for the shifts in both demand and supply have been changes in the determinants of both. Population, economic growth leading to greater disposable income, and oral disease patterns are among the potent shifters on the demand side.

Supply has been responding by increasing the amount of dental services that can be produced in the United States. The reasons that supply has been able to increase are also due to underlying supply shifters. The number of practicing dentists has increased by multiples. The impact of the increase in dentists has been enormously augmented by the even larger expansion of other components of the dental workforce. Dental hygiene emerged as a profession and increasingly provided more of the preventive services for dental offices, until currently they produce the huge majority of those services as well as helping with diagnostic services. This workforce development has freed dentists’ time to provide therapeutic services like restorations, prosthetic services, both

---

**Figure 4. Shift (decrease) in demand (D₂ to D₀) for dental services while supply (S) stays the same**
fixed and removable, and many other complicated procedures. Chair-side dental assistants have also enormously amplified the productivity of dental offices, and front office staff members have taken the administrative load off the clinical team. Scientific advances have improved long-standing equipment and made possible the development of new equipment and procedures that could hardly have been imagined sixty years ago. A competent dentist of 1950 vintage would have a difficult time navigating the modern dental office.

Figure 5 depicts an increase in supply without an increase in demand. That could certainly happen in a small market. An additional dentist locates in the market, perhaps the son or daughter of an existing dentist coming home to practice with his or her father or mother. The results of that type of shift are also shown in the figure. Price (fees) decline ($P^{**} < P^*$), but more services are provided ($Q^* > Q^{**}$). Total expenditures may increase or decrease depending on the shapes of the supply and demand curves. More precisely, expenditures could remain the same, increase, or decrease, depending on the comparative elasticities of supply and demand (i.e., expenditures will increase if the percent increase in quantity of services is greater than the percent decrease in price).

Figure 5 is very relevant for single small markets. It is not as relevant for multiple markets covering an entire region or the nation. However, supply can increase faster than demand for short periods of time because increases depend on greater utilization of capacity and staff. The increase in supply over a large number of markets was probably originally stimulated by increases in demand that slowed or stopped, leaving a condition in which supply increases without a commensurate increase in demand. This has happened several times over the sixty-year period that we are reviewing. Recessions, either nationwide or regional, can cause that situation. However, without the accompanying and commensurate increase in demand, an increase in supply cannot endure over an extended period.

Figure 6 shows a decrease in supply; again, demand is held constant. The figure also shows the effects on price and quantity. Prices will increase ($P^{**} > P^*$), but quantity of services will decrease ($Q^* < Q^{**}$). The impact on expenditures is uncertain and depends as before on the comparative elasticities of supply and demand. If total expenditures in the market increase, then dentists’ incomes may not be affected; however, their workload will increase. If a dentist leaves practice in a small town, it will put a greater workforce load on the remaining dentists in the short term. However, their incomes may increase or decrease. To reduce the workload pressure, an additional dentist would have to locate in the market, either as an associate or by opening a new office. Alternatively, the remaining dentists can expand their

**Figure 5. Shift (increase) in the supply ($S$ to $S'$) of dental services while demand ($D$) stays the same.**
capacities in order to offset the loss in supply from the leaving dentist.

Increases in Both Supply and Demand

These are the typical and more realistic situations. First, we will consider the situation in which both supply and demand are increasing. This has been the most prevalent condition during most of the last sixty years, in which both supply and demand have been expanding most of the time. This circumstance is shown in Figure 7, which is only one depiction of many complicated market possibilities.

Although since 1950 the real price of dental care has remained constant or increased for most periods, since 1980 the real price of care has almost consistently increased from year to year. From our previous discussion, we know why both supply and demand are increasing: their underlying shift factors are driving them to increase. The figure indicates that both price and quantity of services increase as a result of the increase shifts on both sides of the market. Note that we use the term “price” in this article to mean real price, adjusted for inflation. As the supply and demand are drawn in Figure 7, quantity increases relatively more than price. This need not be the case. If the curves had different slopes, price could increase more than quantity. The actual changes in both again depend on the relative responsiveness (elasticity) of supply and demand to price changes.

When both supply and demand increase, there will be an increase in the market quantity of care. The change in price from these shifts is, however, uncertain. Whether price increases, stays the same, or decreases depends on the magnitude of the changes in demand and supply. The result shown in Figure 7 is where the increase in demand (which increases price) more than offsets the increase in supply (which decreases prices) and leaves a net increase in price. For the case shown in this figure, the effects on expenditures are not uncertain as to direction; they will increase. How much they will increase and whether the increase is more due to increases in price or the amount of dental services provided depends again on those elasticities. In general, however, the change in dental expenditure is uncertain depending on whether price increases, stays the same, or decreases from an increase in both demand and supply.

Supply Increasing and Demand Decreasing

Finally, we turn to the market conditions that have been observed in recent years. Aggregate supply of dental services is increasing, but the demand for dental services is level at times and decreasing at times. This is across all markets. It is better in some
increase in the number of graduates is already baked into the cake and may increase apace.

Conclusions

Throughout the post-World War II period, the demand for dental services has increased. Supply has expanded in response. During the early part of that period, until about 1980, dentistry was a growth sector of the U.S. economy. This means that the dental sector expanded faster than the overall economy. For most of the time since 1980, dentistry has not been a growth sector of the economy when compared to the overall U.S. economy or when compared to other sectors in the health industry such as physician services. Instead, the dental sector has expanded more slowly than the overall economy most of that period. As a result, dentistry as a percentage of the overall economy is declining.

For some of us, it is no coincidence that the demand for dentistry has been slowing during the period since the 1980s. In 1981, the National Institute of Dental Research (now National Institute of Dental and Craniofacial Research) published the first evidence of a decline in caries in U.S. children. Since then, those birth cohorts have grown to middle age, and the reduction of caries is still observed. Some of the decrease in caries seen in children in 1979
We have said repeatedly and we repeat it here. Everyone knows the past, but none of us knows the future with certainty. We can use economic theory and, equally important, the trends in the underlying shift factors to make some educated guesses about the future, as we do in the rest of this issue.

REFERENCES