Introduction and Guide to the Special Issue on Economic and Workforce Issues Facing Dentistry and Dental Education in the Twenty-First Century

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This August 2012 issue of the *Journal of Dental Education (JDE)* is devoted to the economic and workforce issues that face the dental profession in the twenty-first century. Many of the issues it addresses are enduring and have occupied our profession for a long time. Previous reports have addressed these issues as they were expressed in the environment of the time. Other issues are more recent. Whether enduring or recent, these issues must be addressed within the environment that we will face in the twenty-first century. I suspect that it will be as different from that of the twentieth century as the environment of the twentieth century was from that of the nineteenth.

This special issue is not intended to present a consensus of opinion, and readers will not find one in these pages. We sought the most qualified individuals to contribute articles and are content to let the chips fall where they may. We believe that is a strength of the issue. Readers will be exposed to a variety of viewpoints from a multidisciplinary group of authors. We are confident that our readers will be able to sort it all out. We expect some disagreement among readers; there was some disagreement among authors. Our effort would have been too cautious and sterile if that did not happen. We want you to think, debate, disagree, propose, and design new studies. This issue is not the final word, but we do hope that it is a new beginning.

In reading the articles, you will encounter a broad array of opinions among the authors; you will also discern a certain commonality among them on broad questions confronting our profession. We will be delighted if these articles inform the journal’s readership and help all to be more enlightened consumers of the information that economics and policy analyses can provide. Many changes are occurring in the financing and organization of health care in the United States. Dentistry has not yet been profoundly affected by national public policy. The class size of dental education has been expanding since the early 1990s. Now, new schools are being opened and others are planned. Total real expenditures for dental services have not increased for nearly a decade. Real per capita dental expenditures are at approximately the same level they were in 1988. Many dental schools are examining potential changes in their business models. New schools are trying innovative business models. Private group practice organizations are increasing, albeit they still represent only a small proportion of dental practice. With all of these changes, members of the profession will need to become more conversant with the issues presented in the following articles to participate effectively in the ongoing debate. This initial article is intended to function as a rationale, guide, and interpretation of the articles that follow.

Why the *Journal of Dental Education*

Other publications could have hosted this discussion. Non-dental journals provide this information for professional policymakers and economists. These journals are not widely read by or accessible to dental educators or practitioners. Monographs and books have been published that address some of these issues. However, these reports address the issues with respect to their contemporary environments. They have been read by relatively few. Our
intended reach is more ambitious. We want to reach a substantial proportion of the entire profession. It is vital that dentists, whether educators, practitioners, or administrators of public programs, be familiar with the issues presented in these articles because they examine powerful forces that will affect the interests of our profession and the public we serve.

The *JDE* is an appropriate vehicle to bring this information to the dental community because it is one of the leading chroniclers of intellectual discourse for the dental profession in the entire world. One of the primary focus areas of the *JDE* is “critical issues.” Without doubt, the articles presented in this issue address critical issues, not only for dental education but for the entire profession as well as state and national policymakers. We hope this information finds its way to a variety of audiences. Information empowers because it leads to better informed decisions.

Because of the widespread relevance of these issues, we have included articles from economists and researchers who focused their research on the practice of dentistry as well as those who focus on dental education. Cooperation among the various areas of the profession is essential because, as you read further, you will understand the profound relationship among components of our profession. The dental profession is a web of interrelated sectors that feed back into one another. Like it or not, we are joined at the hip. What happens in one sector will sooner or later impact other sectors. We are all members of the same profession; we all have important roles to play; and we all serve the same public.

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**Taking Some of the Mystery Out of Economics**

Readers should be forewarned: some of the articles will cover topics, concepts, and terms with which most of the journal’s readers are familiar but may not be technically conversant. This issue does not intend to make them economists; rather, it intends to place some of the latest dental economic and workforce information into the public literature where it can be available to the general dental community.

Like all disciplines, economics is replete with technical terms. When economists talk to one another, they use these technical terms, sprinkled with a lot of graphs and equations. Economists resort to “economic-speak” for efficiency and precision of communication. The problem with these technical terms and equations is that one must be a member of the club to follow the discussion. We intend to open the doors of that club to new membership.

Being educated in and spending my entire career working in this multidisciplinary environment has led me to realize the difficulty of interdisciplinary communication. While challenging, it is not impossible. Surely a few economic terms can be translated for a highly educated and articulate readership. Like any good marriage, the answer is not to live in our own separate worlds; the answer is to communicate. I recommend two valuable sources that explain basic economic terms without using highly technical language. The first is *Economics A–Z* (www.economist.com/economics-a-to-z), a dictionary of economic terms explained using nontechnical language, maintained by *The Economist*. The second source is *The Concise Encyclopedia of Economics* (www.economist.org/library/CEE.html), which has articles by the most eminent economists in the world, who use nontechnical language for most of their articles.

For our part as authors of the articles in this issue, we have attempted to keep technical terms to a minimum. The terms are explained in common, everyday language as much as possible. Only a few graphs and equations are used. To substitute nontechnical explanations for technical terms requires many more words, but we have tried to keep explanations concise and still communicate the needed information. Nevertheless, some of the explanations, especially in the chapters that describe the markets for dental services and dental education, are rather lengthy. We ask your forbearance. As you read this issue, please consult the two Internet sites as needed.

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**Organization of the U.S. Dental Services Delivery System**

For dental practice, the private delivery system is likely to remain the hugely predominant mode of delivery of dental services. The preponderance of private funding for dental services is vividly illustrated in Figure 1. The private delivery system has provided well for the majority of the U.S. population. Figure 2 breaks the total population into subpopulations based on barriers to access dental services. Those individuals represented by the orange boxes are served well by the private community-based delivery system. Those represented by other boxes encounter significant barriers to accessing that system.
Figure 1. Funding for dental services in the United States, 1965–2007

Figure 2. Total U.S. population divided into subpopulations based on barriers to access dental services

Note: The percentages are of the total population.
The dental profession is a nexus of interacting sectors. One cannot understand the forces that affect the profession by focusing on any of these sectors in isolation. Economists are accustomed to the study of interacting agents as well as interacting markets. It is taught as part of their education as economists and constantly reinforced by the practice of the discipline. This section will provide a brief account of those interactions in nontechnical terms.

Two markets are of primary interest to our discussion: the market for dental services and the market for dental education. (The third pillar of the profession is research, which is the engine of change for the dental profession; however, research will not be addressed this issue.) The two markets and the factors that influence them are shown schematically in Figures 3 and 4. Many factors influence the supply and demand for dental services, as well as the supply and demand for dental education. The factors that influence demand are the purple circles, and those that influence supply are blue. The green ovals are the equilibrating mechanisms for both markets. For the dental services market, prices (fees for dental services) serve as the equilibrating factor. For dental education, equilibration is determined by the balance of revenues versus costs. When they are out of balance, one or both must be adjusted to bring them into balance. This adjustment can influence the overall size of dental education in the United States.

Thus, the two markets are related but have different economic characteristics. When an individual visits a dentist and has a procedure performed, a fee is charged. This fee is necessary because resources are required to produce the service and those resources are not free. Staff must be paid, supplies replenished, and equipment replaced or maintained; plus, the rent or mortgage comes due monthly. The price (fee) for a service can include a money fee and/or it can include the time cost of missing work, waiting in the office, etc. For the service that is provided, payment is made either at the time or shortly thereafter when the insurance company reimburses the dentist for the service. Some dental offices do run credit accounts, but most keep the size of those accounts to a minimum to control their accounts receivable.

The patient may benefit from years of service from the procedure; this would be the case of an amalgam restoration, which lasts for years. Alternatively, the service may be completely used up at the time; an example would be a diagnosis. Hopefully, the diagnosis is accurate at the time it is given, but it can change quickly and become out of date. For example, a patient visits a dentist and receives a clean bill of health: no treatment is indicated. Driving home from the appointment, the patient is in a car accident, in which his or her mandible is fractured and several teeth are lost. Clearly, the recent diagnosis is no longer relevant.

Figure 3. Supply and demand in the market for dental services
The decision to become a dentist and enroll in dental school is an investment decision, much like a decision to start a business, buy a stock, or invest in a work of art. The major difference is that it is an investment in human capital for the individual. It represents a decision to acquire the knowledge and skills to practice dentistry. The commitment generally lasts for thirty-five to forty years. Economists and business analysts use the Rate of Return (ROR) to estimate the reward (later payoff, usually monetary) of an investment. The ROR is then compared to the RORs of alternative investments to decide which has the most potential payoff. The financial aspect of attending dental school is encapsulated in the ROR, and it can change rather rapidly. Its role in dental education will be explained in greater detail in a later article. 1

Of course, all dentists and prospective dentists understand that many factors play an important role in the decision to pursue a career in dentistry. Lifestyle, aptitude for a health profession, motor skills, owning one’s own business, or being employed by a larger organization, in combination or individually, are very important. However, these features of the profession do not change rapidly. If and when they do, they will have a large impact on one’s decision to attend dental school. In contrast, the ROR can change in a matter of a few years, and it exhibits cyclical patterns. Other factors that individuals consider when choosing a dental career change slowly in response to extended secular forces.

It costs a great deal to attend dental school. There are the obvious direct costs (tuition, books, equipment, etc.), but a student also incurs indirect costs. A major one of these is forgone earnings while attending dental school. Most students also incur debt associated with attending dental school, which must be paid off later from their earnings as dentists. The essential decision for a would-be student in dental school is the following: Is the investment in dental school worth the future payoff in earnings and lifestyle, compared to alternative careers? Historically, the answer has been a resounding “yes.” The ROR to dentistry has been large, anywhere from 15 percent to over 20 percent. These are far better returns than the stock market has delivered in the post-World War II period. The ROR for a general practitioner of dentistry may not be as large as for some specialties of dentistry or medicine, but neither is the time commitment for the preparation nor the lifestyle of the ensuing practice. Overall, dentistry has been and remains a good investment.

An exception was the period from the latter years of the 1970s through most of the 1980s, when the ROR declined. This followed a large expansion of academic dental institutions above their historical...
trend. The expansion was stimulated intentionally by public policy. As the number of dentists expanded, practicing dentists were not as busy as they would have liked, and their net incomes were negatively affected. Not long after the ROR declined, applicants and applications to dental schools also declined. Individuals were making the decision that the ROR was not as attractive, compared to alternatives, as it once was. The applicant-to-matriculant ratio declined from over 3.0 to perilously close to 1:1.

It behooves the profession to assess whether a similar period is in the process of developing. It may not be, but several factors are behaving in a way that suggests such a trend is not implausible. During the past decade, the profession has faced a period of level total real expenditures: that is, aggregate real expressed demand has been level at the same time that the population has been increasing. It follows that per capita expressed demand has declined. Net incomes of dentists have been declining for several years. Dental school tuition has been increasing. The average dental class size has increased steadily since the early 1990s. As new schools begin operations, the expansion could accelerate. This time, the changes have not been the result of explicit public policy. It is probable that they have resulted from the maturing of long secular trends on the demand side and declining public support for dental education, as well as sound business decisions (for the individual institutions) on the supply side. However, what is beneficial for individual decision makers who comprise an economic system may lead to adverse consequences for the entire system. If the total dental services and education markets become out of balance due to individual decision makers, both markets will adjust to the imbalance in order to bring supply and demand back into rough balance. Discussion of market adjustments will be provided in subsequent articles.

Although the dental profession may be buffeted by strong headwinds, consider the change occurring in medicine. It can always be worse. It would be overly simplistic to believe that either prospective physicians or dentists perceive the other profession as their only alternative. In the past, these individuals have been drawn to the two professions because of the intrinsic features of careers in those professions and because of the financial reward. These individuals have a broad choice of professional options; they are not limited to only two.

Workforces Emerging from Conditions in Both Markets

The previous discussion focused on predoctoral education of dental students because, under our current system, a dentist is the leader of a team of oral health personnel. This circumstance has been the subject of considerable debate.

For this discussion, the workforce must be more broadly understood than simply the number of practicing dentists. That may have been sufficient in the 1950s and reasonably workable in the 1970s, but as the article by Eric Solomon demonstrates, the modern dental workforce is comprised of many more members than dentists. In fact, the total workforce devoted to the delivery of dental services is approximately one million oral health personnel, of whom only about 17 percent are dentists. The dental workforce includes all oral health personnel: predoctoral dental students, postdoctoral dentists pursuing specialty education, all of the allied oral health personnel, and the nonclinical staff necessary for the delivery of care. All of the additional categories of personnel are increasingly critical to the delivery of dental services and for the composition of dental education.

The markets for dental services and education interact to determine workforce. For economists, the entire process of the development of an oral health workforce begins with the demand for dental services. In turn, this demand depends on a number of factors. The major ones are shown in Figure 3. The existence of the need for care is critical for demand to express itself in dentistry. The next article will go into greater detail on the special economic characteristics of the dental sector. The demand for workforce is derived from the demand for services. Dental education exists to prepare a workforce to deliver the demanded care safely and efficiently. Specific responsibilities within the dental workforce team are determined by the production characteristics of dental delivery and/or are prescribed by public laws and regulations.

If the demand for dental services increases, the supply of dental services can accommodate the increase in demand in one of three ways. First, if there is any slack in the system (e.g., appointment schedules are not full), idle resources can be employed to provide additional services. Individuals currently out of the dental labor market may be enticed back in with higher salaries. Second, existing resources can be uti-
lized more efficiently, thus providing more services with the same personnel. Third, more personnel can be prepared so the entire stock of oral health professionals expands to meet increased supply.

During most of the postwar period, the demand for dental services has expanded. The profession has accommodated the increased demand by a combination of greater productive efficiency and an expansion of the overall workforce. The greater efficiency was achievable because of better equipment, better management, including computerized practice management systems, and extraordinary scientific advances. An expansion of dental education produced an enormous expansion of the oral health workforce.

Of course, an opposite scenario, in which supply is growing faster than demand, follows a very different course. Fewer people attend the dentist, appointment books are more difficult to fill, fewer services are provided, real net incomes of dentists may decline, and ultimately, there is less demand for staff and less demand for the education of additional oral health personnel. This happened in the late 1970s and 1980s, when dentists were not as busy as they would have liked. Many established practitioners had to shorten the time to appointment to keep their schedules full, but idle time still crept into their practices. In response, they reduced staff hours and substituted their own time to keep costs down. Some new graduates had difficulty finding opportunities in private practice. Many opted for employed positions with public organizations or extended their preparation with postgraduate education. Others had to take jobs outside of dentistry. Applicants to dental schools declined by over half. Six dental schools, all private, closed.

The huge question is not what happened in the past. We all know that. The critical question is what is going to happen in the future; none of us knows that for sure. We need thinking and more research to develop a better understanding of our possible futures.

Populations That Experience Obstacles to Accessing the Private Delivery System

The huge majority of Americans have ready access to high-quality dental services, but some subpopulations must overcome barriers to access the private delivery system (Figure 2). The populations represented by orange boxes in the figure have the resources, mobility, and knowledge to utilize readily available dental services in the private sector. The services they receive are unsurpassed in the world. Those living in remote areas, the economically disadvantaged, those with severe medical co-morbidities or other special needs, and those who are institutionalized, especially the infirm and the mentally challenged, have difficulty accessing dental services under the best of circumstances. A privately funded, community-distributed delivery system presents exceptional obstacles to those patients. The obstacles are financial resources, distance, mobility, knowledge, and attitudes.

From an economic perspective, disadvantaged and remote areas usually express stagnant or declining demand for dental services. The populations in the red boxes at the bottom of Figure 2 face very different market adjustments than areas with robust, growing demand. Individuals represented in the two least-right red boxes are also economically disadvantaged, which compounds their difficulties. (Institutionalized and non-ambulatory patients present even more difficult problems for access and are not considered here.)

Prices, and as a result, net incomes of dentists remain the equilibrating mechanisms for both types of areas. However, lack of ability to express demand reduces the economic attractiveness of the area to existing dentists. In the longer term, dentists may decide to relocate, although the costs of relocation for an established dentist can be substantial. New dentists are not as likely to locate in the areas. The downstream consequence of this series of events is the accumulation of untreated oral disease in the population. As untreated disease persists, it frequently progresses in severity, leading to more complicated and expensive sequelae. These, in turn, go untreated. Across generations, the outcomes are acute episodes, accompanied by pain, incomplete treatment, and, all too frequently, tooth loss without replacement. Some options to intervene in those circumstances are covered in several articles in this issue.

Topics Covered in This Issue

While this issue of the JDE is not encyclopedic in coverage, it does provide one of the broadest assessments of the economic status of the dental
profession that has ever been undertaken. The fifteen articles contain important information and examine some of the leading economic issues facing the profession:

- the economic theories of the markets for dental services will be described;
- trends regarding dental expenditures, the number of dentists, and their net incomes will be identified;
- trends regarding applicants, enrollment, and graduates will be tracked;
- various factors that influence the demand for dental services and the demand for dental education will be discussed;
- the evolution of the dental workforce will be described;
- the contributions of various allied oral health professions, both existing and new categories under consideration, will be analyzed; and
- finally, summary and invited commentaries will complete the issue.

Despite the breadth of topics covered here, complete coverage of all the critical topics with economic consequences cannot be accomplished in one issue of a journal. Two important topics that are not addressed are 1) the future scope of responsibility of dentists and 2) possible changes in the variety of business models in dental education and dental practice.

REFERENCES