Chapter 4
An Application of the Internal-Rate-of-Return Method: Rates of Return to Medical and Dental Education

The internal-rate-of-return method examined in Chap. 2 is an approach frequently used to analyze college-going behavior. In this chapter, we will compute internal rates of return using actual data and use the computation results to consider problems concerning college-going behavior.

We consider in this chapter medical and dental education as special cases of higher education which have some interesting features. Firstly, these are the two most popular types of higher education today in Japan. An important reason for this is probably that physicians and dentists earn extremely high incomes. If we apply the internal-rate-of-return method we can quantify attractiveness of investment in medical and dental education.

Secondly, investments in these types of education relate to the question of socially optimal numbers of physicians and dentists. This is very important when considering the welfare of a society, and interests many researchers. The internal-rate-of-return method can again provide useful information in answering this question.

Thirdly, computation of rates of return to medical and dental education has a scarcity value. As we saw in Chap. 2, the world has countless computation examples of rates of return to general higher education. In comparison, there are much fewer computation examples in the fields of medical and dental education.

With these points in mind, this chapter will compute internal rates of return to medical and dental education and consider economic problems related to these types of education. Sect. 4.1 will discuss the basic theory of supply of and demand for physicians and dentists, with special emphasis on the problem of regulation of their numbers. Sect. 4.2 will examine a view which is used in actual policy making but which differs markedly from that of this book and can be a good object for comparison. Costs and benefits of medical and dental education will be measured in Sects. 4.3 and 4.4 using data available for Japan. Sect. 4.5 will show the computed internal rates of return and evaluate them for policy implications.

It should be added that in this chapter “physicians” implies all kinds of medical doctors except dentists. Also, this section sometimes shortens “internal rates of return” simply into “rates of return”. The author would like to report that computation of the rates of return shown in this chapter was possible because he could access data which were unpublished.

K. Arai, The Economics of Education
© Kazuhiro Arai 1998
4. Rates of Return to Medical and Dental Education

4.1 The Supply of Physicians and Dentists

4.1.1 Why the Numbers of Physicians and Dentists are Regulated

The supply of ordinary workers working for private enterprises does not become an important economic issue. This can be seen in such examples as assembly line workers, computer operators, and sales people. The reason is that free competitive markets are considered to determine supply automatically. More precisely, when such workers are scarce, wages will go up, and in response supply will increase up to optimal levels. On the other hand, when they are abundant, wages will go down, and in response supply will decrease up to optimal levels.

In contrast, the supply of physicians and dentists becomes a very important economic issue because it is determined by artificial means or policies rather than by the market mechanism. Even if the earnings of physicians and dentists are outstandingly high, one cannot freely become a physician or dentist.

There are two basic reasons to use policy to determine the supply of physicians and dentists. Training costs for physicians and dentists are extremely high, and also, medical and dental services may deal with issues of life and death. If training costs are high, medical and dental education need to rely partially on public subsidies, which suggests that the numbers of physicians and dentists will be policy determined. The necessity of maintaining the quality of medical and dental services tends also to invite determination of the supply of physicians and dentists by policies. A similar example can be found in the legal profession, where it can be said that the number of successful candidates in a judicial examination is determined artificially to maintain the quality of judges and lawyers.

It should be noted, however, that from a purely theoretical viewpoint, high training costs and maintenance of the quality of medical and dental services could not be the absolute reasons for policy determination of the numbers of physicians and dentists. Optimal numbers could be determined automatically by supply and demand in free competitive markets provided that the following two conditions are satisfied: that the capital market is perfect and thus individuals can borrow freely to invest in education, and that there is an institution which accurately evaluates the quality of physicians and dentists and which makes this information freely available.

This chapter assumes that this kind of free market determination of optimal numbers of physicians and dentists does not occur, and argues considerations that should be taken into account when policy determination is used. The internal-rate-of-return method discussed in Chap. 2 will be very useful in such an argument. It should be added, however, that the main purpose of this chapter is not to undertake rigorous computation of the specific numbers of physicians and dentists necessary today. To do so would require a large volume of data and detailed estimation but would not interest many readers. Rather, the main purpose of this chapter is to discuss the basis of how to determine optimal numbers of physicians and dentists using the internal-rate-of-return method. If we make some simplifying assumptions, this discussion will enable us to examine whether or not the real economy has insufficient physicians and dentists.