Professional Licensing and Competition Policy:
effects of licensing on earnings and rates-of-return differentials

Timothy R. Muzondo
and Bohumir Pazderka
En français: Réglementation professionnelle et politique de concurrence: effets de la réglementation sur les disparités de revenu et de rendement

Disponible au: Service des Communications Consommation et Corporations Canada Ottawa, Ont. K1A 0C9
PROFESSIONAL LICENSING AND COMPETITION POLICY:
EFFECTS OF LICENSING ON EARNINGS AND
RATES-OF-RETURN DIFFERENTIALS

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Revised: April 1979

Research Monograph Number 5
Research Branch
Bureau of Competition Policy
PUBLICATIONS IN THE MONOGRAPH SERIES OF THE RESEARCH BRANCH, BUREAU OF COMPETITION POLICY

1. Economies of Scale and Efficient Plant Size in Canadian Manufacturing Industries by P.K. Gorecki (1976)

2. Shipping Conferences in Canada by I.A. Bryan and Y. Kotowitz (1978)


Available in both official languages from:

Communications Service
Consumer and Corporate Affairs Canada
Ottawa, Ont.
K1A 0C0

FORTHCOMING IN 1980


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This study was financially sponsored by the Bureau of Competition Policy, Department of Consumer and Corporate Affairs. It was undertaken in May 1977, the first draft was submitted in October 1978 and the revised final version was completed in April 1979. Our regression analysis was performed by the Customer Services Division, Census and Household Surveys Field, Statistics Canada. Computer program NOVACOV used for this purpose was developed by Mr. A. van Baaren and we wish to thank him for his cooperation in executing the calculations.

We wish to express our gratitude to the officials of numerous provincial professional associations who completed our questionnaire. Among our research assistants, Irving Cheung deserves particular mention for his uncommon competence and diligence. Our thanks are due to Nick Skoulas of the Bureau of Competition Policy and to an anonymous referee for valuable comments on the first draft of the study.
Amendments to the Combines Investigation Act in 1976 extended the scope of competition legislation (from its primary concern with goods-producing industries) to include all services not previously covered. In recognition of this responsibility, the Research Branch initiated several studies, including the present one, designed to contribute to Bureau awareness of the economics and prevailing practices in certain service-oriented industries.

Many professions in Canada enjoy extensive powers of self-regulation under provincial statute, particularly in matters affecting such professional standards as entry requirements. However, commercial activities, such as the setting of fees, often are not covered by provincial law. Such activities then fall within the purview of the Combines Investigation Act.

The objective in this analysis of licensing in the professions is to identify the contribution to professional incomes of selected restrictive practices. More specifically, the study attempts to identify the effects of fee-setting, restrictions on entry and limitations on advertising, on earnings and rates of return in a variety of professions. And for five licensed professions -- medicine, law, dentistry, architecture and veterinary science -- estimates of the impact of restrictive arrangements on rates of return are presented. In order to isolate the impact of these particular arrangements, factors including education, experience and hours worked are taken into account as well.

Among the more interesting results of the study are estimates for 1970 (the latest census year) showing that fee-setting, constraints on mobility and advertising restrictions: (a) boosted average incomes in the professions under review by 11.2, 10.3 and 4.2 per cent respectively above those in non-restrictive professions, and (b) taken together, these three restrictions contributed nearly 17 per cent to the average incomes of that cross-section of professions.
Estimates presented in this study are based on data that predate changes in competition law specifically affecting fee-setting and private restrictions on entry. Nevertheless, the underlying message the authors convey is clear: the potential pay-off for the consumer from removal of certain professional licensing restrictions warrants consideration by policymakers.

In order to provide researchers with wide latitude in the presentation of their findings, it may be noted that the views presented are not necessarily held by the Bureau of Competition Policy.

D.F. McKinley
Director
Research Branch
October 15, 1979
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CHAPTER 1

SCOPE AND FORMS OF THE REGULATION OF PROFESSIONS

1.1 INTRODUCTION

The economic and legal aspects of the provision of selected professional services have been studied for a number of years. The health professions in particular have figured prominently on the list of targets for investigation by academic researchers, the professions themselves, consumer groups and governments.1 Recently, there has been an upsurge of interest in these issues in Canada which can be attributed to a number of factors affecting professions generally and to several specific policy changes which took place in recent years.

First, the development and specialization of knowledge have resulted in the appearance of new professions with demands for legal status and redefining of the boundaries of existing professional activities (psychologists, social workers, denturists, etc.). The long-standing problem of the appropriateness of the division of functions and jurisdiction between some established professional groups has also been given increased attention. For example, the Professional Organizations Committee of the Attorney General of Ontario was asked in April 1976 to examine some of these matters. They included the respective roles of architects and engineers in the design of buildings, the distinction between chartered accountants and accredited public accountants, etc. The closely related need for legal recognition and definition of the scope of practice and government of paraprofessionals is also being examined (see, for example, Leal, 1977, 321).

Second, the steadily increasing involvement of governments as the ultimate bearers of costs of some professional services (primarily in the health area) is a compelling reason for rethinking the governmental supervision of professional activities. The Quebec Professional Code enacted in 1973 provides an example of such development.

Third, the 1976 amendments to the Combines Investigation Act resulted, among other things, in inclusion of the service sector within the scope of Canadian competition law. Some questions concerning the applicability of federal law to provincially regulated services remain unresolved. However, the combines authorities are interested in evaluating the impact of the various restrictions connected with professional licensure on prices and quantity and quality of professional services. Recent court decisions in the U.S. have attacked restrictions on professional advertising and several professional bodies in Canada have made cautious voluntary moves in the same direction.

Fourth, the impact of consumerism is increasingly being felt in the markets for professional services. Consequently, the public is demanding more information and influence in decision-making related to access to professional services, their quality and pricing.

Fifth, the changes in employment prospects for university graduates which occurred in recent years have resulted in rapid growth of applications for admissions to professional schools. In some fields, the queues for entry into these institutions have lengthened; in others there has developed an oversupply of new graduates. Both phenomena have naturally heightened interest in the economics of professions.

In this chapter, we discuss in a general way the theoretical rationale for the various approaches to regulation of the practice of certain occupations and review their economic consequences. Special emphasis is placed on the way in which the self-regulatory powers of selected professions are exercised to control admissions into the professions, pricing of services and professional advertising of practitioners. In the final section of the chapter, we outline our approach to the analysis and measurement of the impact of these regulations on professional incomes and provide an overview of the structure of this study.

1.2 FORMS OF REGULATION OF ENTRY INTO SOME OCCUPATIONS

Entry into certain occupations in Canada has been regulated for a long time. For example, entry into medicine and dentistry has been regulated since the second half of the nineteenth century. However, the current system of entry regulation is the product of the 20th century and, to a large extent, the post World War II period.

It is useful to distinguish three forms of regulation of entry into an occupation. First, entry may be regulated by requiring that only those individuals who have a license can
practice. The license may either be purchased by, or granted only to, individuals satisfying stipulated educational and other admission standards. The economic consequences of this form of regulation depend on whether all individuals satisfying stipulated standards are allowed to practice or whether the number of licenses issued is fixed. Furthermore, it is of critical importance whether the admission standards and/or the number of licenses to be issued are determined by members of the occupation or by a public agency.

Second, entry into an occupation may be regulated by certifying members. A public agency, recognized educational institutions or an association of existing members may certify that an individual has acquired certain skills. Uncertified practitioners are permitted to practice but are, normally, prohibited from using the occupational designation. In some occupations, elements of the first and second forms of regulation are combined as when only certified practitioners are permitted to perform certain functions.

Third, entry may be regulated by registration. Under this form of regulation, individuals are required to register their names with a public agency. This arrangement has no provisions for preventing anyone from entering into the occupation and is often used as a device for gathering information and/or as a scheme for facilitating taxation.

Physicians, dentists, lawyers, barbers and veterinary surgeons, among others, are licensed. Nurses, physiotherapists and university teachers are de facto or de jure certified. Accountants and some engineers combine elements of certification

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2 If licensing requirements and/or the number of licenses are determined by a public agency then it is plausible to assume that, despite lobbying by members of occupations, its decisions will normally be based primarily on the desire to promote public welfare. The same cannot be said when these matters are determined by bodies representing members of occupations.

3 In 1970, 18 percent of all occupations, 70 percent of professional and technical occupations, 31 percent of crafts and production process occupations and 25 percent of sales occupations were subject to licensure by autonomous and semi-autonomous agencies. For further discussion of the impact of licensing in Canada, see, for example, Dodge (1972a).
and licensing because certain functions are restricted to chartered accountants and professional engineers. Taxi drivers in most cities are registered.

Regulation of entry into occupations imposes certain economic costs on society which economists, among others, have brought to the attention of public policy makers. In spite of this, regulation of entry into certain occupations is pervasive and the demand for it is increasing. Presumably, the perceived benefits are viewed as a justification for this state of affairs.

1.3 BENEFITS FROM REGULATING ENTRY INTO OCCUPATIONS

Proponents of entry regulation allege that it results in a number of benefits enhancing social welfare. These benefits can be discussed under three headings: consumers' lack of technical knowledge, externality, and the idea that "society knows best".

First, it is often argued that there is considerable dispersion in the quality of services supplied in certain service markets. In addition, it is also pointed out that some of these services are complex and a great deal of technical knowledge is required to evaluate their quality properly. Consequently, an ordinary consumer, lacking the necessary knowledge, is faced with considerable uncertainty in purchasing such services. Entry regulation, it is argued, reduces consumer uncertainty by narrowing the dispersion and increasing the average quality of services supplied by practitioners.

Sometimes it is also suggested that in the delivery of certain services the private costs borne by individuals involved in a transaction are lower than the costs borne by society. It is well known that in these circumstances individuals will ignore the social costs in making their private benefit-cost calculus. Public intervention in these markets is therefore deemed necessary in order to maximize social welfare. Licensing is one form of such intervention which supposedly corrects for the externality. The market for medical services is often cited to illustrate the divergence between private and social costs. For example, if an incompetent physician incorrectly diagnoses a disease, he may cause an epidemic, the social costs of which exceed the costs borne by his patient. Exclusion of such physicians from practicing by licensing is designed to minimize the extent of the social costs.

Finally, the "society knows best" argument for entry regulation is based on the notion that an individual consumer may underestimate the probability that he will be harmed by a particular professional service. The society is assumed to have
better information than the individual and should therefore protect him, for example, by restricting the practice of certain professions only to licensed persons.\textsuperscript{4}

1.4 ECONOMIC DOUBTS

Several questions have been raised about the alleged benefits of entry regulation in general and occupational licensure in particular and about the arguments put forward in their support. First of all, the proposition that licensure reduces uncertainty appears to be inconsistent with the usual practice of granting licenses to all existing members of an occupation even though some may not satisfy the standards set for new entrants. Furthermore, licensing arrangements often focus on the competence of members at the time of entry only and rarely require periodic re-examinations of licensed practitioners. Without periodic re-examinations the fact that an individual satisfied licensing requirements 20 or 30 years ago provides little or no information about his current level of competence.

Critics also point out that licensing may not be the best means of reducing consumer uncertainty about the quality of services. For example, a system of certification would provide at least as much information to consumers as licensing but would have the additional advantage of increasing the average quality and quantity of services consumed.\textsuperscript{5} With licensing, the quantity of services rendered falls because licensing reduces the number of practitioners in a licensed occupation. As a result, fees charged for services increase. The average quality of service consumed falls because individuals unwilling or unable to pay for the (now) higher-priced services turn to inferior substitutes.

\textsuperscript{4} For further discussion of the potential benefits of occupational licensing see, for example, Moore (1961).

\textsuperscript{5} Use of average quality of services supplied by practitioners or consumed seems to be an inappropriate criterion for evaluating the benefits arising from entry restrictions. This can easily be demonstrated by observing that maximizing average quality would significantly reduce the aggregate level of services supplied or consumed. For a discussion of a more suitable criterion see Chapter 5, Section 5.4.
Economists point out that licensing bestows monopoly power upon a licensed occupation. The monopoly power, and possibly its exercise, appear to be particularly significant in the case of self-regulating (S-R) professions. These are often given legal authority to set minimum standards of entry and develop codes of ethics independently of public control. The fact that the enforcement and administration of such standards and codes are in the hands of members of the licensed occupations themselves lends weight to the belief that the power bestowed by licensure is unlikely to be exercised solely in the interest of public welfare.

This does not mean that the presence of monopoly power always implies its exercise. However, certain aspects of the economic conduct of some licensed occupations (and this is particularly true of S-R professions) indicate that the monopoly power is exercised for the benefit of practitioners at the expense of social welfare. This applies especially to restrictions on fee competition and advertising, and to setting of minimum standards of entry which are only remotely related to improving the average quality of services supplied. Advertising is frowned upon as "unprofessional" even though it may lead to significant consumer benefits. Fee competition is restricted on the grounds that it reduces consumer confidence in the quality of services supplied. Empirical evidence in product markets, however, appears to be at variance with this view.

A comprehensive evaluation of the net welfare impact of occupational licensure would require quantification of, on one hand, its alleged economic benefits and, on the other, its economic costs. Because of data limitations, the quantification of economic benefits is more difficult than that of costs. Possible approaches to this task are illustrated in several recent U.S. studies.

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6 In this context, Adams and Fraser (1976, 15) note that over the period from 1950 to 1973, incomes of all taxpayers in Canada increased by 192.5 percent while incomes of professionals increased by 302.4 percent and incomes of one licensed profession (physicians) by 332.4 percent.

7 The idea that advertising is valuable to consumers because it is a source of information is emphasized by, among others, Nelson (1970, 1974). Advertising in the professions is discussed in detail in Chapter 5.

8 See, for example, Carroll and Gaston (1977a, 1977b).
1.5 RESTRICTIVE PRACTICES IN SELF-REGULATING PROFESSIONS

1.5.1 ADMISSIONS

In terms of impact on economic welfare, perhaps the most important restrictive practice in S-R professions is entry restriction achieved either by regulating minimum entry standards or by explicitly limiting the number of practitioners in a profession. Restricting entry has four undesirable social effects. First, it reduces opportunities for employment in the professions, thus forcing potential entrants to seek employment in occupations which they regard as inferior. Second, it raises fees for services supplied to levels higher than would obtain with free entry. Third, it increases economic inequality by increasing the earnings of those who manage to enter the restricted professions above the earnings of individuals in comparable unrestricted professions. Finally, it decreases the average quality of services consumed as consumers turn to inferior substitutes.

The control of professional licensing bodies over entry may be exercised in co-operation with educational institutions. In some cases, the decisions of the professional bodies are subject to provincial government approval or review. Educators (and, in some cases, laymen) are represented on governing bodies of some S-R professions. Typically, however, real decision-making power in these bodies rests in the hands of representatives of members of the profession who constitute the majority.

Admission requirements are generally of two types. Educational requirements include minimum academic prerequisites and success in professional examinations set by educational institutions and/or the professional associations. In some

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For example, Adams and Fraser (1976, 9-10) observed that the relative size of the health sector in Canada grew from 5.3 percent of GNP in 1960 to 6.9 percent in 1973. Yet, the size of the health professions relative to all professions increased only insignificantly. Furthermore, within the overall slight increase, the relative numbers of physicians, dentists and optometrists have declined while the numbers of nurses, technicians, therapists and other supporting personnel have increased. In their view, the relative decline in numbers of major health professionals may well be due to licensing procedures and restricted entry into educational institutions.
professions, a minimum number of years of on-the-job training is required before full membership in an association is granted. Non-educational requirements generally include age and moral character and sometimes also citizenship and place of residence.

Minimum educational standards are usually justified on the ground of ensuring a minimum "acceptable" quality of services supplied. Non-educational standards are supposed to ensure protection against fraudulent behaviour. It is, however, difficult to justify citizenship and/or residence requirements on either of these grounds.

Professionals licensed in one province or country may or may not be recognized as fully qualified practitioners in another. If they are not fully recognized, the out-of-province or country individuals may be required to take further courses and sit for examinations so increasing their entry costs. If local training facilities are operating at full capacity and competition for entry into the profession is strong and/or the pass rates in examinations are low, failure to recognize equivalent out-of-province or country qualifications could constitute an important entry barrier.

Restrictions on entry of practitioners duly qualified outside Canada may be justified on the grounds that the standards or nature of professional practice in other countries are significantly different from those in Canada. For instance, lawyers duly qualified in the U.S. or U.K. could reasonably be required to demonstrate their familiarity with Canadian statutes and procedures before they are granted licenses. This requirement is much less compelling, for example, in the case of physicians, dentists and veterinarians. Restrictions on mobility of practitioners in these professions duly qualified in other Canadian provinces are even more difficult to justify. The existence of such restrictions implies, among other things, that the average quality of services supplied varies so significantly from province to province as to give rise to public concern.

1.5.2 FEE-SETTING

Fee-setting refers to a practice of promulgating fee schedules by groups or associations representing members of an occupation. Fee-setting practices are widespread in S-R professions\(^\text{10}\) and have been justified on several grounds. It has

\(^{10}\) Crispo (1972) found widespread fee-setting practices in the professions. Our survey has also found these practices to be frequently employed in the S-R professions.
been suggested that fee schedules provide guidelines for individual practitioners, especially new entrants. In some cases (for example, funeral directing), fee schedules facilitate inter-firm transactions. Published fee schedules have also been said to provide a standard for consumers or governments who are then able to evaluate their fairness. For example, architects and engineers look upon their fee schedules as aids in persuading governments of the validity of their charges.

In some cases, including law, fee-setting is viewed as a means of restricting fee-cutting which is alleged to reduce average quality of services. Fee schedules have also been said to facilitate administration of welfare, prepayment and insurance plans of one kind or another.

There exists considerable variety in the criteria used to set fees by various S-R professions. Crispo (1972) mentions custom and tradition, average of fees obtained from surveys of practitioners, changes in the cost of living, changes in the cost of running a practice, wages and salaries in comparable occupations, increases in productivity, relative worth of the professional group and supply and demand factors.

1.5.3 BAN ON ADVERTISING

In most professions, practitioners are permitted to list their names, business addresses and telephone numbers in the local telephone directory. In some, including medicine and dentistry, they may indicate their specialty while in others, including law, listing an area of specialization is prohibited. Few professions permit individual practitioners to advertise their services and the fees they charge. Advertising by individual practitioners in most professions is, however, looked upon with distaste and regarded as an "unprofessional" means of soliciting business. It is also suggested that such advertising would mislead the public and destroy public trust and confidence.

The arguments against professional advertising appear to ignore the fact that it could yield significant benefits to consumers. In view of the considerable uncertainty associated with the quality of professional services, it seems clear that professional associations would better serve consumers by permitting the dissemination of more rather than less information on quality and prices.
1.6 EMPIRICAL EVIDENCE ON THE EFFECTS OF OCCUPATIONAL LICENSING

Few empirical studies are available on the economic effects of occupational licensing in Canada and the United States. In their classic work, Friedman and Kuznets (1945) attempted to quantify the extent of monopoly returns in five S-R professions in the U.S. Their study examined entry restrictions as the source of monopoly returns in the professions and did not consider fee-setting and restrictions on advertising and mobility of practitioners as contributing factors.

Moore (1961) tested several implications of the motives for licensing and concluded that legislators appear to license those occupations where public interest in licensing is strongest. This finding says little about the extent to which the licensed occupations exercise their monopoly power and thus gives no indication of the economic impact of occupational licensure. Nor does it suggest that the anticipated benefits of occupational licensure are in fact realized.

Dodge (1972a) tested the hypothesis that earnings differentials in various professional and technical occupations can be explained by the presence of licensing. He found evidence in support of the hypothesis. His method is somewhat crude and fails to adjust for other important factors accounting for earnings differentials, such as levels of human capital, hours worked, experience, etc. It is also unsuitable for disentangling the separate effects of entry restrictions, fee-setting, bans on advertising and restrictions on mobility.

Maurizi (1974) found that the power of licensing boards is often used to prolong the period in which higher returns are earned when excess demand exists for services of an occupation. He suggests that this is achieved by manipulating the pass rates in occupational entrance examinations.

Holen (1965) concluded that the interstate mobility of dentists in the U.S. was restricted by professional licensing to the same degree as the mobility of lawyers. However, as explained above, the interstate differences in the practice of law are considerably more pronounced than differences in the practice of dentistry. The mobility of dentists should, therefore, be greater than the mobility of lawyers. Shepard (1978) examined the impact of restrictions on interstate mobility of dentists on their fees and mean earnings. He found that fees and mean earnings are between 12 and 15 percent higher in jurisdictions which do not recognize licenses granted in other states as compared to the jurisdictions with reciprocal recognition of licenses.
Carroll and Gaston (1977a, 1977b) analyzed the relationship between occupational licensure and average quality of services supplied by licensed lawyers and veterinary surgeons. They found that restrictive licensing and quality of licensees are positively correlated in the case of lawyers. But restricting the number of veterinarians resulted in lower rates of disease detection and increased the danger of exposure to the general public.

1.7 PURPOSE AND SCOPE OF THIS STUDY

We analyze the restrictions on entry, mobility, fee competition and advertising imposed by provincial professional associations in Canada. We test the hypothesis that these restrictions enhance professional earnings of practitioners in professions which impose them and quantify the magnitudes of the contribution of each type of restriction.

The conceptual basis for this study is the human capital model as formalized by Becker (1964, 1967) and extended by others, most notably Mincer (1974). We specify and estimate an earnings function adapted to incorporate the presence of monopolistic behaviour in the market for professional services. The earnings function is used to compute the expected earnings in each profession (adjusted for monopoly earnings and other factors). These expected earnings are then used to compute the competitive rates of return to human capital. The difference between such rates and gross (of monopoly earnings) rates is a measure of the monopoly component of return earned in the professions.

Our sample consists of 4,571 individuals belonging to 20 professions. They include most of the S-R professions and a few others (see Table 1.1). Two sources of information are used. The data on individual earnings, endowments and social background variables was obtained from a specially created file from the 1971 Census of Canada. Information on restrictive practices was extracted from various sources including provincial acts and regulations, the professional codes of ethics and responses to a questionnaire we sent to provincial professional associations.

While measurement of the effects of occupational licensing on earnings has been attempted before, we are not aware of any study which incorporated specific restrictive practice variables in an earnings function. Some authors have included occupational (or professional) dummy variables to account for monopolistic behaviour. Interpretation of the coefficients of these dummy variables is complicated, however, by the fact that they capture
**TABLE 1.1**

THE LIST OF SAMPLE PROFESSIONS

<table>
<thead>
<tr>
<th>Title</th>
<th>1971 Census of Canada code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculturalists and Related Scientists</td>
<td>2131</td>
</tr>
<tr>
<td>Architects</td>
<td>2141</td>
</tr>
<tr>
<td>Chemical Engineers</td>
<td>2142</td>
</tr>
<tr>
<td>Chemists</td>
<td>2111</td>
</tr>
<tr>
<td>Dentists</td>
<td>3113</td>
</tr>
<tr>
<td>Economists</td>
<td>2311</td>
</tr>
<tr>
<td>Geologists</td>
<td>2112</td>
</tr>
<tr>
<td>Industrial Engineers</td>
<td>2145</td>
</tr>
<tr>
<td>Lawyers and Notaries</td>
<td>2343</td>
</tr>
<tr>
<td>Mathematicians, Statisticians and Actuaries</td>
<td>2181</td>
</tr>
<tr>
<td>Mechanical Engineers</td>
<td>2147</td>
</tr>
<tr>
<td>Nurses, Graduate, except Supervisors</td>
<td>3131</td>
</tr>
<tr>
<td>Optometrists</td>
<td>3153</td>
</tr>
<tr>
<td>Osteopaths and Chiropractors</td>
<td>3117</td>
</tr>
<tr>
<td>Pharmacists</td>
<td>3151</td>
</tr>
<tr>
<td>Physicians and Surgeons</td>
<td>3111</td>
</tr>
<tr>
<td>Physiotherapists, Occupational and Other Therapists</td>
<td>3137</td>
</tr>
<tr>
<td>Social Workers</td>
<td>2331</td>
</tr>
<tr>
<td>Surveyors</td>
<td>2161</td>
</tr>
<tr>
<td>Veterinarians</td>
<td>3115</td>
</tr>
</tbody>
</table>
non-pecuniary returns as well as monopolistic behaviour. Our approach is broader than that of previous studies. We cover more professions than published studies with the exception of Dodge (1972a). In addition, the effects of several restrictive practice variables are investigated simultaneously. These features make the results of our research particularly suitable for assessing the potential overall impact of the application of competition policy to the professions.

These attractive characteristics are not achieved without cost, however. One of the problems with our approach stems from the assumption that for each profession our measures of restrictive practice variables represent monopolistic misallocation of resources. It is also true that these restrictions, while increasing earnings, may raise the average quality of services supplied. Our assumption seems reasonable with respect to restrictions on fee competition and advertising, but may not, in some cases, with respect to restrictions on mobility and entry. For example, because of the nature of the practice of law and dentistry, we expect less mobility in law than in dentistry (Holen, 1965). Therefore, if observed mobility is the same for these two professions it implies a higher level of monopolistic restrictions for dentistry. Similarly, the effort to improve average quality of service is probably more socially justifiable in medicine than in veterinary surgery, so that the same level of entry restrictions in the two professions implies a higher portion of monopolistic incomes for the latter.

Another disadvantage of our approach is that it assumes the impact of any given monopolistic restriction to be uniform across professions. This is an inevitable result of our choice of the human capital framework for analyzing the contribution of monopolistic restrictions to earnings in several professions simultaneously. The assumption may be realistic with respect to mobility and entry restriction variables but may not with respect to fee competition and advertising variables. Even within a profession, the impact of advertising and fee competition is likely to vary according to size, reputation, specialty, etc., of a practice (see Chapter 4, Section 4.4). These intra-professional differentials in the impact of advertising are usually ignored even in studies like those by Benham (1972) and Benham and Benham (1975) which investigated a single profession in several jurisdictions.

This study examines several professions simultaneously. It therefore ignores, in addition, interprofessional differences in the effects of advertising and fee competition on earnings. In spite of these qualifications, the study is a significant
extension of the conventional earnings functions which assume competitive conditions or of those studies which represent restrictive practices by professional dummy variables (see, for example, Ashenfelter and Mooney, 1968).

Ideally, we would have liked to examine occupational licensure generally (that is, not only professions, but also technical, craft, production and sales occupations). Cost considerations led us to focus on the professions and a few technical occupations. The choice of the professions as our main target can be justified on two grounds. First, professions subject to licensure are often given self-regulating powers. It is plausible to assume that the potential for exploitation of the public is far greater in such cases than it is in non self-regulating licensed occupations. Second, although occupational licensing is widespread in Canada, it is concentrated in the professions. For example, in 1970, only 25 percent of sales occupations and 31 percent of craft and production occupations were licensed. On the other hand, 70 percent of the professional and technical occupations were subject to licensure. 11

All of the professions included in the sample are often referred to as "educated" professions. The majority of individuals in each have a college education. This choice resulted in the exclusion of barbers, real estate sales-persons, funeral directors, etc., which would have provided greater variance of competitive behaviour while increasing inter-occupational differences. The choice was guided by the desire to control, in a crude way, for ability, as a determinant of earnings and rates of return. Because of the nature of the sample of occupations it would be inappropriate to interpret the results as applying to all occupations.

Only males are included in the sample. Had we included both sexes it would have been necessary to add a sex variable which is highly collinear with, for example, education and hours worked. In addition, the proxy variable used for experience is based on age and years of training. It is a more reasonable proxy for experience for males who have a more continuous attachment to the labour force than it is for females.

The study is partial insofar as it focusses on resource misallocation emanating from restrictive practices without assessing the impact of restrictions on average quality of

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11 See Dodge (1972a, 144).
services. There are, however, strong a priori grounds for believing that the average quality of services consumed as opposed to that supplied by "qualified" practitioners is reduced as a result of restrictive practices.

In the next four chapters, we examine in some detail the main theoretical underpinnings of our methodology. First, in Chapter 2, we review those aspects of the human capital theory which are of particular relevance to the specification of an earnings function. Second, in Chapters 3, 4 and 5, we analyze, respectively, restrictions on entry and mobility, restrictions on price competition and restrictions on professional advertising and the way in which they interact with human capital in determining professional incomes.

The empirical techniques applied in our analysis of the determinants of professional earnings and rates of return and our numerical results are discussed in Chapters 6 and 7. A framework for public policy alternatives in this field is outlined in Chapter 8. It should be noted that our approach to the vast subject of the provision of professional services is to stay within the confines of the main theme of this study: analysis of the impact of restrictive practices inherent in professional licensing on professional incomes. We do not, therefore, attempt to cover the whole range of policies on the many aspects of the professional service markets. The same philosophy is applied in Chapter 9 where we summarize our main findings and suggest specific policy actions.
CHAPTER 2
HUMAN CAPITAL ANALYSIS

2.1 INTRODUCTION

In much of the economic literature dating back to Adam Smith, the basic approach to the problem of income distribution was based on allocation of economic functions within a society. This approach explains income differences when social classes correspond to economic functions, but does not address itself to the problem of differences in incomes derived from labour. Explanations of this latter phenomenon are based on two principles dating back to Adam Smith, Mills and Ricardo. Smith's compensatory principle assumes competitive markets and states that earnings differentials tend to equalize "net advantages and disadvantages" of work. Ricardo's principle of "non-competing" groups assumes labour market rigidities which give rise to earnings differentials.

Modern research on income distribution has generated numerous theories, each of which emphasizes one or more of the following factors as the source of income inequalities: ability, chance, individual choice, human capital, educational inequality, life-cycle characteristics, etc. The human capital approach provides the conceptual framework of this study. Section 2.2 outlines elements of the theory; section 2.3 reviews applications of the theory to explaining differentials in earnings; section 2.4 analyzes the treatment of hours worked in estimating earnings functions and computing rates of return to human capital; section 2.5 discusses some of the problems involved in computing rates of return to human capital.

2.2 HUMAN CAPITAL THEORY

Hints and suggestions of elements of human capital theory are found throughout the 18th and 19th centuries' economic literature. It was not until the early 1960s, however, that they were tied together. The formulation of the theory of human capital in its present form is due to Schultz (1960), Becker (1964) and Mincer (1962). Despite its recent origins, the literature on human capital is extensive and has been reviewed in

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1 This is the taxonomy developed in an excellent recent survey by Sahota (1978).
a number of excellent surveys.\textsuperscript{2}

Human capital theory is an application of the standard capital theory to individuals. It is based on the idea that individuals spend on themselves in various ways not merely for the sake of present enjoyment but for future rewards. They spend time acquiring education, they migrate to areas offering better economic opportunities, search for jobs with higher remuneration rather than accepting the first job that comes along, or they choose jobs with low current rewards but high future rewards. All these activities — education, on-the-job training, migration, job search — are investments in human capital.

Individuals may be viewed as facing demand and supply schedules for investment in human capital. The schedules relate the marginal rates of return and marginal costs of funds to the amount of human capital invested. Unlike physical capital, human capital is embodied in the investing individual. Because an individual's capacity for work is limited, after a certain point additional increments of human capital investment yield diminishing returns. This fact accounts for a downward sloping individual demand schedule for human capital as the amount of investment increases.

If capital markets were perfect and there were no transactions costs and market segmentation produced by special taxes/subsidies or legal constraints on borrowing and lending, the supply schedule of funds for investment in human capital would be horizontal. That is, all individuals would borrow at the same rate irrespective of the amounts borrowed. In the real world, imperfections exist. Secondary and post-secondary education is often publicly subsidized, borrowing and lending transactions costs are significant and human capital cannot be used as collateral in borrowing and lending. The result is that individual supply schedules of funds for investing in human capital are upward sloping.

If human capital were homogeneous (i.e., if all units of capital were perfect substitutes for each other), capital markets were perfect and all individuals had identical demand curves (i.e., equal abilities), then in equilibrium all individuals would have identical levels of human capital, identical earnings

\textsuperscript{2} See, for example, Mincer (1970), Blaug (1976) and Juster (1975).
and (hence) identical rates of return to human capital. If individuals have different levels of ability then in equilibrium the more able would invest more in human capital and earn more than the less able. The equilibrium rate of return on human capital would, however, still be the same for all. If the levels of ability are different and supply schedules are upward sloping, then the more able earn higher rates of return than the less able.

If all individuals were equally able, but faced different supply schedules for funds, then, in equilibrium, those with access to cheaper sources of funds would invest more in human capital and earn more, but would have lower rates of return than individuals facing more costly sources of funds. If those with access to cheaper sources of funds were also more able than individuals with access to more costly sources of funds, then the former would invest more in human capital and earn more than the latter. The inequality resulting from such a (positive) correlation between ability and access to cheaper funds is greater than with no correlation. Note that in the presence of correlation it is not possible to say anything in general about the equilibrium rates of return earned.

If the correlation were negative and the equilibrium levels of human capital were the same regardless of ability, then the more able would have higher earnings and rates of return than the less able.

These basic implications of the human capital theory are illustrated in Figure 2.1. In all the diagrams in this figure the level of human capital \( H \) is measured along the horizontal axis and the marginal rate of return \( r \) and the cost of borrowing funds \( i \) are measured along the vertical axis. \( D, S \) and \( E, i = 1,2 \) are, respectively, the demand and supply schedules and equilibrium points for individuals 1 and 2. Total earnings (total costs) for an individual with \( H \) level of human capital are given by the areas under the demand (supply) schedules between zero and \( H \) level of human capital. For example, in diagram (a) total earnings (costs) for individual 1 are given by the area \( D E H O (r E H O) \). Equilibrium is characterized by equality of

3 This result, as well as much of the human capital analysis, ignores consumers' income-leisure choice. The question is discussed in Section 2.4 below.

4 The fact that scholarships and grants are often based on merit supports the view that the correlation is positive.
FIGURE 2.1
COST OF FUNDS, ABILITY, RATES OF RETURN AND OPTIMAL LEVELS OF HUMAN CAPITAL

(a) Costs of funds, ability, rates of return and optimal levels of human capital. (b) Costs of funds, ability, rates of return and optimal levels of human capital. (c) Costs of funds, ability, rates of return and optimal levels of human capital. (d) Costs of funds, ability, rates of return and optimal levels of human capital.
the demand and supply schedules \((r=i)\). In cases where individuals 1 and 2 have different abilities we have assumed that individual 2 is more able.

Diagram (a) represents a case in which both individuals have the same perfectly elastic supply schedule for funds but have different levels of ability. It is clear that in equilibrium individual 2 has higher levels of human capital \(H\) and earnings \(D\ E\ H\ O\) than individual 1. However, both earn the same rate of return. The latter result is due to the assumption that the supply schedule is perfectly elastic. If the supply schedule had been upward sloping then individual 2 would earn a higher rate of return than individual 1. The other conclusions would remain the same.

In diagram (b) we assume a different supply schedules for each individual. We assume that both individuals are equally able but that individual 2 has access to cheaper sources of funds. In equilibrium, individual 2 will have higher levels of human capital \(H\) and earnings \(D\ E\ H\ O\) but will earn a lower rate of return than individual 1. Except for the conclusion regarding the equilibrium rate of return, these results are the same as those in diagram (a). In other words, differentials in ability and access to funds give the same qualitative results for the equilibrium levels of human capital and earnings.

In diagram (c) we assume differences in ability and access to funds. In particular, we assume that ability and access to cheaper sources of funds are positively correlated so that (the more able) individual 2 has access to cheaper sources of funds. In equilibrium, individual 2 invests more in human capital and earns more than individual 1. Whether or not individual 2 will earn a higher rate of return is ambiguous and depends on the importance of the difference in levels of ability relative to the difference in costs of funds. For example, if differences in ability are relatively more important than differences in access to funds, then individual 2 will tend to earn a higher rate of return than individual 1.

Finally, diagram (d) illustrates the case of negative correlation between access to funds and ability. In addition, we have assumed that the equilibrium level of capital is the same for both individuals. In equilibrium, individual 2 has a higher level of earnings and earns a higher rate of return than individual 1. If we assume different levels of human capital then the conclusions of this case are ambiguous.
The above discussion indicates the importance of ability and access to funds as factors affecting equilibrium levels of human capital, earnings and rates of return to human capital. In applications of the theory to estimating an earnings function or computing rates of return the importance of ability appears to be generally recognized. Differences in access to funds have received much less attention. This relative neglect would be of no consequence if markets for funds for investing in human capital were perfect. According to some authors, however, markets for such funds are, in fact, imperfect.5

In all three cases in which different levels of ability were assumed, ability and the equilibrium levels of human capital were positively correlated. The results in diagrams (a) and (b) also indicate a positive correlation between access to cheap sources of funds and the equilibrium level of human capital. These two observations suggest that estimation of an earnings function presents some difficulties which are discussed in the next section.

2.3 THE EARNINGS FUNCTION

The theory of human capital has been used as the conceptual framework for estimating the demand for education, earnings functions and calculating rates of return to human capital.6 The last two applications are relevant in explaining earnings and rates of return differentials among individuals in different professions.

Early estimates of earnings functions explained earnings differentials between university and high school graduates by differentials in the level of schooling.7 The estimates were

5 Becker (1967, 8-9) suggests that an individual supply schedule for funds for investing in human capital is a segmented step function. Funds from parents and relatives are cheaper than subsidized loans from governments and universities. The latter source is cheaper than funds from commercial loans.

6 For a survey and evaluation of some of these attempts see, for example, Blaug (1976).

7 See, for example, Hansen (1963) and Podoluk (1968).
biased because they neglected other factors accounting for earnings differentials some of which were correlated with schooling. Becker (1964) has suggested that the other important factors are ability, on-the-job training, experience, race, family and social background, and hours worked. Omitting ability, for example, would overstate the contribution of schooling to earnings because, as indicated in the previous section, ability and level of schooling (human capital) are positively correlated.

Below we provide a brief review of some past studies which have estimated earnings functions. It is not our purpose here to present an exhaustive survey of the literature in this area, but merely to illustrate the effects exclusion of certain factors has on the magnitude of estimated coefficients. An appreciation of the importance of each of these factors is useful in specifying the earnings function estimated in Chapter 6.

2.3.1 ADJUSTMENT FOR ABILITY

Several recent studies have adjusted the simple earnings function to include a variable representing ability. Griliches and Mason (1972) adapted the results of the U.S. Armed Forces qualifying tests as a proxy for ability and found that the university/high school earnings differential is reduced by 12 to 15 percent depending on specification of the model. Ashenfelter and Mooney (1968) used mathematical aptitude as their proxy and employed data based on Woodrow Wilson Fellows. They did not find a significant reduction in the education coefficient in their earnings function.

Morgan and David (1963) examined the joint effect of ability, motivation and other factors on earnings differentials in a sample of 3,000 individuals with various levels of schooling. The inclusion of these factors reduced the estimated contribution of schooling to earnings by one-half to two-thirds. However, the ability differences accounted for an insignificant portion of the correction.

Hause (1972) tested several hypotheses related to the effect of ability on earnings. He obtained significant coefficients on ability for individuals with 15 to 20 years of earning experience. For the early years of the earnings profile the ability coefficients were very small and in most cases insignificant.

Taubman and Wales (1972) experimented with several proxies for ability in the NBER, Thorndike sample of the U.S. Air Force volunteers for certain programmes. The coefficient on schooling
was affected only by exclusion of mathematical ability and the estimated bias ranged from 15 to 25 percent. When unpublished data from Wolfle on Minnesota high school graduates were applied, they found that the bias from exclusion of proxies for ability did not exceed 4 percent.

Leibowitz (1974) analyzed the Terman sample of personality traits of California school children who scored in the top 1 percent of the U.S. measured I.Q. distribution. She found a positive correlation between the level of schooling and ability (as measured by I.Q). However, when I.Q. was included in an earnings function, it was insignificant and the schooling coefficient remained virtually unchanged.

These studies suffer from two main shortcomings. The proxy variables used for ability are not universally accepted. They measure scholastic ability while what is called for is ability to earn income. Another problem is the correlation between ability and schooling. Inclusion or exclusion of the ability variable then creates difficulties in interpreting the coefficient of the schooling variable.

This issue is particularly serious in studies concerned with measuring the marginal contribution of schooling to earnings. Our main interest is different. We intend, primarily, to measure the contribution of certain restrictive practices to earnings of individual members of various professions. If there is no correlation between ability and belonging to monopolistic professions, then inclusion or exclusion of the ability variable in an earnings function does not bias the estimates of monopolistic earnings. On a priori grounds, we have no reason to believe that such a correlation exists.

2.3.2 ADJUSTMENT FOR SOCIAL BACKGROUND VARIABLES

Theoretical considerations call for inclusion of variables such as location and race in the earnings function since they affect opportunities for earning income. Several studies in the U.S. have included race as an explanatory variable and generally found it to be significant. With two exceptions, most Canadian

8 According to Becker (1967) the suitable measure of ability is ability to earn income. See also Arrow (1973b).

9 See, for example, Hanoch (1967) and Griliches and Mason (1972).
studies have not included race in their earnings functions. Based on data from a 1961 survey of 100,000 male workers in Montreal, Boulet and Raynauld (1977) found significant differences in the earnings of English and French speaking individuals. Workers of French origin earned less than the average for all workers in the sample. Workers of English and Jewish extraction were the highest paid of all ethnic groups. They explained these ethnic differentials in earnings by the presence of two distinct information networks - English and French - with very little interaction between them. Higher paying jobs, they argued, tend to be offered to English speaking workers because English speaking employers face lower search costs for English speaking employees than they do for French.

Haessel and Kuch (1977) utilized the 1970 Public Use Sample Census data to estimate an earnings function which included various ethnic origins as independent variables. They found that Jews had by far the highest mean earnings and mean level of schooling and the second highest mean level of experience. The Black-West Indian group had the second lowest mean earnings, the lowest mean level of experience and the second highest mean level of schooling. The French ethnic group had the third lowest mean years of schooling, the fourth lowest mean years of experience and the third lowest mean earnings. The British ethnic group had the fourth highest mean years of education and experience and the second highest mean earnings.

It appears that ethnic origin is a significant factor accounting for earnings differentials in the U.S. and Canada. Data on ethnic variables is readily available in our data base. In view of the significance of the ethnic variable in previous studies, it appears desirable to include it in the earnings function.

2.3.3 ADJUSTMENT FOR FAMILY BACKGROUND VARIABLES

Differences in family background are expected to affect earnings because they are related to ability, motivation, opportunities open to individuals and access to cheaper sources of funds for investment in human capital. Children from well-to-do families tend to invest more in education than children from poor families because they place a higher value on education. In addition, the well-to-do families usually have

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10 See, for example, Podoluk (1968), Stager (1968) and Dodge (1972b).
access to cheaper sources of educational funds and their children also tend to have better opportunities for entering into high paying professions because of access to a family network of social and business contacts.

Denison (1962) estimated that 7 per cent of the crude earning differentials are due to family background as measured by father's occupation. Rogers (1967) suggested that as much as 55 per cent of the crude earning differentials between high school and college graduates were due to regional and family background variables. Since regional variables did not appear to have a significant impact on earning differentials the study suggests a significant role for family background variables. Dodge (1972b) found family background important in explaining earning differentials for engineers and accountants, but not for scientists. The latter profession appears to be one for which social and business contacts are relatively less relevant.

Leibowitz (1974) examined, among other things, the impact of home investments on education and earnings. The level of parents' education, representing the quality and quantity of home investment, had a significantly positive effect on schooling, i.e., home investments did raise the amounts of human capital. However, inclusion of home investment in an earnings function did not affect the coefficient on schooling. Her results suggest that home investment may act as an intermediate goal in the learning process.

The family background variable appears to play two roles in an earnings function. First, it seems to affect the demand schedule in so far as individuals from well-to-do families can earn more than others even though they may have the same level of ability and education. Second, it affects the supply schedule of funds. In both roles, family background is positively correlated with the level of education so that inclusion or exclusion of the family background variable raises similar problems as inclusion or exclusion of ability.

For our purpose, the correlation between family background and belonging to professions engaging in restrictive practices is more important. On a priori grounds we would expect a positive correlation (i.e., favourable family background increases the chances of belonging to professions restrictive of competition). The evidence from Dodge's study appears to be consistent with this view. If this is the case, then exclusion of the family background variable would impart an upward bias on the coefficients of the monopolistic variables. Given the fact that the correlation between family background and restrictive practice variables is not likely to be as significant as, for example, the correlation between these variables and education (or
occupation) it seems reasonable to expect the bias to be minimal.

2.3.4 ADJUSTMENT FOR REGIONAL AND LOCATION DIFFERENCES

If labour mobility is perfect, there are no transactions costs and the labour market is in equilibrium, then regional differences per se would have no explanatory power on earnings differentials. In the real world, mobility is imperfect, transactions costs are significant and labour markets are rarely in equilibrium. Under these conditions regional variables may account for earnings differentials. There is some evidence that earnings vary significantly from one region to another. Table 2.1 gives mean employment incomes of male full-time practitioners by province in 1970. It shows that, for example, mean employment incomes for lawyers vary quite significantly from one region to another. Thus, in Newfoundland, the mean is $13,889, while it is $21,992 in Ontario.

Large urban populations attract professional workers with specialized training who demand and obtain high fees for their services. For this reason population concentration should also account for some earning differentials.

In previous studies the effect of including regional and locational variables in earnings functions has been mixed. Hanoch (1967) included rural/urban variables but they were not statistically significant. Regional variables were found to be significant by Holmes (1974), but not by Rogers (1967). Dodge (1972b), Podoluk (1961), Wilkinson (1965) and Stager (1968) did not include regional or locational variables in their analysis.

2.4 HOURS WORKED

In the theory of human capital, hours worked play a role similar to the role of the rates of utilization in non-human capital theory. The latter often assumes that capital is utilized at full capacity. An equivalent assumption in the case of human capital would require an individual to work for 24 hours a day. This would measure what Becker (1965) has called "full income". The assumption is unsatisfactory because it ignores differences in individual income-leisure preferences.

Amazingly little attention has been focussed on the importance of hours worked in human capital theory. Few studies have made adjustments for hours worked in empirical analysis.11

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11 See, for example, Eckaus (1973), Eckaus et al (1974) and Carrol and Ihnen (1967).
## TABLE 2.1

**AVERAGE EMPLOYMENT INCOME FOR MALE PRACTITIONERS IN 1970 BY PROVINCE AND PROFESSION**

<table>
<thead>
<tr>
<th>PROFESSIONS</th>
<th>BC</th>
<th>M.B.</th>
<th>N.B.</th>
<th>N.L.</th>
<th>ON</th>
<th>QUE.</th>
<th>S.A.</th>
<th>SASK.</th>
<th>ALTA.</th>
<th>CANADA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculturalists</td>
<td>9,834</td>
<td>9,226</td>
<td>10,045</td>
<td>10,497</td>
<td>9,270</td>
<td>9,912</td>
<td>9,823</td>
<td>8,759</td>
<td>9,283</td>
<td>9,039</td>
</tr>
<tr>
<td>Architects</td>
<td>9,834</td>
<td>9,216</td>
<td>10,045</td>
<td>10,497</td>
<td>9,270</td>
<td>9,912</td>
<td>9,823</td>
<td>8,759</td>
<td>9,283</td>
<td>9,039</td>
</tr>
<tr>
<td>Chemical Engineers</td>
<td>9,834</td>
<td>9,216</td>
<td>10,045</td>
<td>10,497</td>
<td>9,270</td>
<td>9,912</td>
<td>9,823</td>
<td>8,759</td>
<td>9,283</td>
<td>9,039</td>
</tr>
<tr>
<td>Chemists</td>
<td>6,660</td>
<td>5,913</td>
<td>7,724</td>
<td>8,437</td>
<td>8,857</td>
<td>9,152</td>
<td>8,359</td>
<td>8,964</td>
<td>7,806</td>
<td>8,234</td>
</tr>
<tr>
<td>Dentists</td>
<td>21,792</td>
<td>22,583</td>
<td>17,446</td>
<td>19,304</td>
<td>17,875</td>
<td>23,332</td>
<td>21,678</td>
<td>20,798</td>
<td>23,942</td>
<td>22,700</td>
</tr>
<tr>
<td>Economists</td>
<td>7,525</td>
<td>8,347</td>
<td>8,743</td>
<td>10,269</td>
<td>9,091</td>
<td>11,266</td>
<td>10,173</td>
<td>10,743</td>
<td>10,960</td>
<td></td>
</tr>
<tr>
<td>Geologists</td>
<td>6,660</td>
<td>5,913</td>
<td>7,724</td>
<td>8,437</td>
<td>8,857</td>
<td>9,152</td>
<td>8,359</td>
<td>8,964</td>
<td>7,806</td>
<td>8,234</td>
</tr>
<tr>
<td>Industrial Engineers</td>
<td>10,034</td>
<td>9,216</td>
<td>8,743</td>
<td>9,160</td>
<td>10,569</td>
<td>10,559</td>
<td>10,080</td>
<td>11,814</td>
<td>10,202</td>
<td>10,958</td>
</tr>
<tr>
<td>Lawyers and Notaries</td>
<td>13,889</td>
<td>13,002</td>
<td>16,157</td>
<td>18,809</td>
<td>16,337</td>
<td>16,328</td>
<td>20,408</td>
<td>17,495</td>
<td>19,850</td>
<td></td>
</tr>
<tr>
<td>Mathematicians and Actuaries</td>
<td>7,340</td>
<td>4,960</td>
<td>8,170</td>
<td>6,834</td>
<td>9,132</td>
<td>10,588</td>
<td>9,100</td>
<td>6,848</td>
<td>8,417</td>
<td>8,694</td>
</tr>
<tr>
<td>Mechanical Engineers</td>
<td>22,583</td>
<td>24,283</td>
<td>24,083</td>
<td>13,150</td>
<td>16,682</td>
<td>22,700</td>
<td>21,678</td>
<td>20,798</td>
<td>23,942</td>
<td>22,700</td>
</tr>
<tr>
<td>Nurses</td>
<td>N.A.</td>
<td>N.A.</td>
<td>4,193</td>
<td>4,641</td>
<td>5,484</td>
<td>5,901</td>
<td>6,104</td>
<td>6,214</td>
<td>6,275</td>
<td>6,675</td>
</tr>
<tr>
<td>Optometrists</td>
<td>12,809</td>
<td>9,707</td>
<td>8,835</td>
<td>8,086</td>
<td>13,196</td>
<td>15,806</td>
<td>10,238</td>
<td>23,229</td>
<td>23,563</td>
<td>16,714</td>
</tr>
<tr>
<td>Osteopaths and Chiropractors</td>
<td>30,138</td>
<td>22,583</td>
<td>24,283</td>
<td>24,083</td>
<td>13,150</td>
<td>16,682</td>
<td>22,700</td>
<td>21,678</td>
<td>20,798</td>
<td>23,942</td>
</tr>
<tr>
<td>Pharmacists</td>
<td>9,857</td>
<td>11,053</td>
<td>10,009</td>
<td>11,992</td>
<td>11,883</td>
<td>11,951</td>
<td>11,563</td>
<td>11,687</td>
<td>11,992</td>
<td></td>
</tr>
<tr>
<td>Physicians and Surgeons</td>
<td>31,820</td>
<td>25,012</td>
<td>26,215</td>
<td>26,467</td>
<td>22,793</td>
<td>10,359</td>
<td>26,251</td>
<td>24,271</td>
<td>28,115</td>
<td>26,990</td>
</tr>
<tr>
<td>Physiotherapists, Occupational and Other Therapists</td>
<td>4,333</td>
<td>4,004</td>
<td>N.A.</td>
<td>N.A.</td>
<td>5,353</td>
<td>7,372</td>
<td>5,326</td>
<td>N.A.</td>
<td>7,139</td>
<td>6,973</td>
</tr>
<tr>
<td>Social Workers</td>
<td>5,315</td>
<td>5,407</td>
<td>6,503</td>
<td>7,010</td>
<td>6,347</td>
<td>7,438</td>
<td>6,647</td>
<td>6,209</td>
<td>6,571</td>
<td>6,966</td>
</tr>
<tr>
<td>Surveyors</td>
<td>4,621</td>
<td>2,325</td>
<td>5,197</td>
<td>3,697</td>
<td>6,097</td>
<td>5,988</td>
<td>6,000</td>
<td>6,471</td>
<td>6,590</td>
<td>6,977</td>
</tr>
<tr>
<td>Veterinarians</td>
<td>30,138</td>
<td>29,583</td>
<td>24,283</td>
<td>24,083</td>
<td>13,131</td>
<td>11,959</td>
<td>13,473</td>
<td>13,759</td>
<td>12,871</td>
<td>14,520</td>
</tr>
</tbody>
</table>

Becker (1964) very briefly observed that earning differentials associated with differences in levels of education may, in part, be due to the relationship between education and hours worked. He rejected the hypothesis as there was no empirical evidence indicating any significant relationship.

Finegan (1962) and Eckaus (1973) suggested that the relationship between education and hours worked is ambiguous because education increases the wage rate so that the question of whether a more educated individual works fewer or more hours than a less educated one depends on the substitution and income effects. Assuming leisure to be a normal good the substitution and income effects act in opposite directions.

Lindsay (1973) and Hirshleifer (1976) examined the case of an individual with an initial property endowment which could either be invested in physical capital to earn income or could be invested in human capital. They concluded that if an individual invests his property endowment in human capital he should rationally work more hours than if he invested it in physical capital. This result appears to follow from the fact that no account is taken of the income effect. Another shortcoming of this argument is the static analytical framework which would seem inappropriate given the inherently dynamic nature of human capital theory.

Empirical studies which have included hours worked in an earnings function have generally found this variable to be significant. In calculating rates of return, adjustment for hours worked has often resulted in different magnitudes of the calculated rates. Chiswick and Mincer (1972) included the logarithm of hours worked and significantly improved their regression fit. Their rationale for inclusion of hours worked is unclear.12

In Muzondo (1978b) the implications of human capital theory for hours worked are analyzed with the help of a two-period dynamic model of individual choice. Individuals are assumed to have different levels of ability and initial amounts of human capital and varying tastes for income and leisure. Under competitive conditions it is shown that irrespective of tastes individuals choose optimal hours of work in order to equate rates

12 They merely state that "... the theory of human capital predicts greater stability of employment for workers whose investments are firm specific" (1972, 37).
of return from human capital to the market rate of interest. The model implies that hours worked are positively related to the level of human capital and the market rate of interest. Assuming an imperfect capital market it is shown that individuals facing higher costs of borrowing funds work longer hours than individuals facing lower costs. Given an upward sloping supply schedule for funds, higher amounts of investment in human capital are associated with higher costs of borrowing. This means that under an imperfect capital market, hours of work are also positively related to levels of human capital.

This fact raises the question of whether both hours of work and amounts of human capital should be included in an earnings function. Becker (1964) has raised a similar question with regard to inclusion of occupation as a separate variable. He argued that it should not be included because occupation is the means through which human capital investment decisions are implemented.13

It could similarly be argued that hours of work are the means through which investments in human capital are made productive and, therefore, should not be included in an earnings function. In Becker's words, their inclusion would "overcorrect" for the effects of human capital. However, most studies have included hours (or weeks) worked (see, for example, Chiswick and Mincer, 1972; Holmes, 1974 and Haessel and Kuch, 1977 and Duncan, 1976). To make our results comparable with these earlier studies both hours worked and weeks worked are included in the earnings function estimated below.

2.5 RATES OF RETURN

The notion of a rate of return to education is appealing for two reasons. Knowledge of such rates contributes to positive analysis of individual and social choices in the area of human capital. It might also be a basis for normative analysis of efficient resource allocation both at the individual and the social level. Rates of return might also be used to test for the existence of monopoly returns in licensed occupations.

A review of the literature on rates of return to human capital reveals several objections against their use. First, the assumption that individuals are motivated by pecuniary rewards to the exclusion of non-pecuniary advantages has been questioned. Second, some critics have pointed out that most rate of return

13 See Becker (1964, 86).
calculations are based on projections of future trends from cross-section data. As such, they ignore historical improvements in the quality of education as well as the effect of secular growth of the contribution of education to expected earnings. Third, it has been suggested that education, ability, motivation and social status are all interrelated and it is difficult to isolate the net effect of education satisfactorily. Fourth, it has been argued that much of the higher earnings attributed to education are in fact monopoly returns on the scarcity of parents who can afford to educate their children well and monopoly returns arising from barriers to competition in certain professions. Finally, some critics have pointed out that most rate of return calculations have failed to make appropriate adjustments for hours worked.

Several of these criticisms have been dealt with in the literature and there is no need for us to comment further. However, two of them are of particular interest for this study and warrant further discussion. Our sample includes professions most restrictive of competition and professions with the highest mean hours worked per week. The view that rates of return to human capital are, in part, returns to barriers to competition and the suggestion that they should be standardized for hours worked therefore deserve a comment.

While it may have been true in the past that there was a scarcity of parents who could afford to educate their children well, we believe that this is no longer the case. That is, if there is a "shortage" of physicians, dentists, lawyers, etc., it is unlikely to be due to a shortage of qualified applicants who are willing and able to pay the necessary educational costs. Evidence of the excess of demand over supply of places in professional schools strongly supports this view.

The suggestion that there may be monopoly returns due to barriers to entry into certain professions cannot be easily dismissed. We believe that rates of return to education calculated without taking account of this factor, along with other restrictive practices observed in some professions, overstate the true contribution of education to earnings. In Chapter 7, we suggest a technique to deal with this problem. Briefly, the method involves using estimated coefficients of an earnings function to adjust the observed earnings for the effect of restrictive practices observed in some S-R professions. Monopoly returns can then be identified by comparing rates of return calculated from adjusted earnings with those calculated from unadjusted earnings.

14 See, for example, Henderson-Stewart (1965), and Blaug (1965).
Data standardized for hours worked in rate of return calculations have often given substantially different results from data not standardized. Eckaus (1973) adjusted individual earnings to a standard 40-hour week, 50-week year. He found substantially lower rates of return using the adjusted compared with the unadjusted data. For example, the rate of return for high school over grade school graduates (i.e., the rate of return to high school education) was reduced from 21 to 4 percent! The rate of return to four years over one to three years of college was reduced from 22 to 11 percent!

Carrol and Ihnen (1967) adjusted their data for hours worked following a procedure which is equivalent to standardizing the number of hours worked plus paid leisure (holidays and vacations) with the latter being valued at an average hourly wage rate. The procedure was applied in calculating rates of return of technical school over high school graduates. As a result of the adjustment, the rate of return increased from 16.5 to 20 percent. The results of this study differ from Eckaus (1973) because of the inclusion of paid leisure in the standardizing procedure.

Lindsay (1973) computed net present values of the differentials in earnings of physicians and college graduates. Using unadjusted data the net present value of the earnings differential discounted at 10 percent was $24,376. When hours worked were standardized to a 45-hour and 40-hour week, the net present values were reduced to $1,950 and $ - 4,580 respectively.

The efforts to standardize rates of return on human capital for hours worked stem from two sources. One is the desire to make valid comparisons between equilibrium rates in occupations varying significantly in mean hours worked. It is suggested that the use of unstandardized data in such cases ignores an important cost component associated with returns to human capital - namely the foregone leisure (Carrol and Ihnen, 1967). This view implicitly assumes that in making optimal investment cum occupational choice decisions, individuals are guided by the standardized rates of return and that in a competitive equilibrium these are the rates which are equalized.

Another consideration is the desire to measure "real" returns to training in human capital analysis. According to this view the returns to human capital consist of two components: return to training and premium for hours worked. Adjusting rates of return to human capital is an attempt to remove or normalize the premium for hours worked. The problem is then to find the standard number of hours worked which yield an unbiased measure of the return to training (Lindsay, 1973).
In Muzondo (1978b), these justifications for standardized rates of return are examined critically with the help of a two-period model of individual choice. In a competitive equilibrium, it is shown that individuals in various occupations having varying preferences for income and leisure, earn the same rate of return to human capital. Standardized rates are not equalized and the fact that one such rate is higher in one occupation than in another is no indication of the relative profitability of human capital investments in the two occupations. In other words, individuals are not guided by standardized rates in making optimal investment decisions. These rates cannot, therefore, be used to indicate the presence (or absence) of labour shortages and/or barriers to entry into certain occupations. A major weakness of standardized rates is that they are arbitrary. An individual deciding to become a physician and, therefore, investing many years of training, is unlikely to base his decision on working (after he is fully trained) an arbitrary, say, 35-hour week when he knows he should optimally work 50.

The notion that failure to adjust for hours of work ignores an important cost component of returns on education is mistaken. An individual who works more hours sacrifices a larger quantity of leisure than one who works less. At equilibrium, the value of the marginal sacrifice of leisure is exactly offset by the marginal increase in income. The harder working individual is in no worse or better position than the individual consuming a larger quantity of leisure.

2.6 CONCLUSION

The human capital theory explains interpersonal income differentials by the varying amounts of investments in human capital possessed by different individuals. These investments consist of time and expense connected with education, on-the-job training, migration to areas offering better opportunities, search for jobs with higher remuneration, etc. Empirical analysis of earnings differentials, in addition, has to take account of other factors, some of which may be correlated with the levels of human capital. They include ability, social and family background, regional and urban characteristics of the place of work and the intensity of work effort as measured by hours and weeks worked during a typical year.

In this chapter, we discussed these factors and evaluated their importance with reference to the results of published research. The ability variable appears to be among the most intractable factors, both because of conceptual difficulties and
because of lack of data. While our data base does not provide information on ability levels of the sample individuals, previous research indicates that the bias imparted to the estimates of the determinants of earnings is minimal if the sample consists of highly educated individuals. Our choice of the sample professions satisfies this requirement.

We extended the human capital model by incorporating several specific variables reflecting the various restrictive aspects of professional licensing. The next chapter analyzes in detail restrictions on entry into professions and restrictions on mobility of practitioners qualified in other jurisdictions. In Chapter 4, we discuss the fee-setting practices of professional associations and Chapter 5 reviews the consequences of restrictions on professional advertising.
3.1 INTRODUCTION

 Much of the existing economic literature on restrictive practices observed in the S-R professions has focussed on one aspect - the extent to which they limit entry into professions (Friedman and Kuznets, 1945, and Rottenberg, 1962). However, entry restriction, though very important, is not the only means by which an S-R profession exercises its monopoly power. Some S-R professions exercise their monopoly power also by restricting fee competition, advertising and mobility. For some professions, these activities are even more important than entry restrictions because they are under the complete control of professional associations. In contrast, entry restrictions often require the co-operation of government agencies and/or educational institutions. In this chapter we discuss the economic effects of restrictions on entry and mobility. Regulation of fee competition in the professions is discussed in Chapter 4 and the economic effects of advertising restrictions are reviewed in Chapter 5.

3.2 ENTRY RESTRICTIONS

3.2.1 INCREASE IN THE COST OF ENTRY

 Analysis of the economic effects of restricting entry into a profession has been based on an application of ordinary supply and demand analysis to the labour market (Rottenberg, 1962). The effects depend on the manner in which restrictions are imposed. Two forms are usually identified: increasing the cost of entry and restricting the number of practitioners in a profession to an explicit figure. The former method allows the market mechanism to determine which individuals enter as well as their total number. The latter method relies on non-market mechanisms in determining which individuals should fill the fixed vacancies. These two methods are discussed, respectively, in this and in the next section.

 It is convenient to begin the analysis of the economic consequences of an increase in the cost of entry with the help of a simplified theoretical model. Consider a competitive economy producing three products, X, Y, and Z, by combining the services of physical capital and skilled labour. Suppose, for simplicity, that the demand schedules for X, Y, and Z are static and independent of the income distribution between workers.
Initially suppose that the capital market is perfect and that all individuals have identical tastes, abilities and experience. Finally, suppose that non-pecuniary advantages and disadvantages of work in the three industries are the same.

Under these conditions, equilibrium will be characterized by equality of wages and levels of skill in all the industries. Now, suppose that workers in industry X persuade legislators to allow new entry into industry X only to individuals who have acquired \( n \) additional years of education. Suppose the new licensing law has the "grandfather" clause provision, so that existing members are not required to have the additional educational requirements imposed on new entrants.\(^1\)

Because existing workers in industry X are exempt from the new requirement, the law will have no short-run effect. Over time, some workers in industry X exit because of sickness, death, retirement, etc. As the exit of original workers proceeds new entrants will not immediately replace them for two reasons. First, it will take at least \( n \) years before any potential entrants have completed the new educational requirements; second, a sufficient number of workers must exit from the industry before entry becomes attractive for new entrants whose entry costs have been raised by the licensing law.

The two reasons are related. The larger is \( n \), the larger must be the number of workers exiting from industry X before earnings rise enough to make entry attractive. Thus the rate of entry into industry X will depend on the number of additional years of education and the rate of exit from the industry.

When industry X attains long run equilibrium the following will be true: All workers in the industry will have identical earnings which will be higher than earnings in industries Y and Z. The average rate of return to human capital in industry X will be higher than in Y and Z. The reason is that the average rate of return for original workers will be higher than it was before the new law and higher than the rate of return for new entrants. The average rate of return for new entrants in industry X will be the same as in industries Y and Z. Less of X will be sold at a higher price and opportunities for employment in X will be fewer than before the licensing law. In this case we have explicitly assumed that the quality of X remains the same. This would certainly be the case in the short run, but in

\(^1\) The "grandfather" clause is almost universally included in licensing laws.
the long run the quality of the product may improve if it is positively related to the level of education.2

It is difficult, in this case, to say whether the source of earning differentials between workers in industry X and those in industries Y and Z is schooling or the entry barrier. To see this, let \( v \) be the proportion of new entrants to the total number of workers in industry X. If \( v \) is non-zero, then workers in industry X will have higher average years of schooling and higher average earnings than workers in industries Y and Z. However, this has come about because of monopoly power which resulted from the licensing law. The question is whether the higher average earnings in industry X are a return to schooling or a return to the entry barrier.

Earnings of original workers in industry X will be the same as those of new entrants and higher than those of workers in industries Y and Z. Their level of schooling is, however, the same as that of workers in industries Y and Z. The excess of earnings of workers in X over workers in Y and Z is not a return to schooling. However, this statement does not apply to the new entrants into industry X. For them the additional earnings are required to make it attractive to enter the industry.

If the quality of X remains the same, consumers of X incur a loss due to an increase in price and a reduction in quantity purchased. The extent of the loss is reduced if quality of the product improves. The licensing law may be regarded as resulting in an income transfer from consumers to workers in industry X. However, it is important to stress that, even though all workers in the industry have the same earnings, in equilibrium only the original workers earn monopoly returns.

Next consider the problem of estimating an earnings function using individual cross-section earnings data from the three industries. It may be supposed that both schooling as a measure of human capital and a variable representing the licensing law as a measure of the entry barrier have separate explanatory power. This is the case under certain conditions.

The importance of schooling and/or entry barriers in explaining earnings differentials will depend on \( v \), the

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2 This may well be the case in S-R professions, even though average quality of the service consumed may decrease. On this latter point see footnote 5 in Chapter 1.
proportion of new entrants to the total number of workers in industry X. This in turn depends on the time elapsed between enactment of the licensing law and the collection of data. First, consider the case where \( v \) is zero. This represents the period when exit is proceeding with no entry taking place. Since all workers have the same number of years of schooling, the schooling variable cannot explain earnings differentials. The entry barrier explains most of the differentials in earnings of workers in the three industries X, Y, and Z.

Consider the case in which \( v \) is equal to unity - that is all the original workers in industry X have exited. Since all workers in industry X earn more and have higher levels of schooling than workers in the other two industries, schooling will have an important explanatory power over earnings differentials. The entry barrier variable will also have explanatory power since individuals with higher earnings work in the licensed industry. The two variables will be collinear and it may be impossible to include both of them in a regression and to isolate their separate influences. In some intermediate cases in which industry X has a mixture of original and new workers the problem of multicollinearity will not be so severe. In other words, the degree of multicollinearity is a function of \( v \).

The above discussion is helpful in specifying an earnings function incorporating an entry restriction variable and in evaluating regression results in cases where schooling is employed as a barrier to entry into an occupation and cross-section data is used to estimate an earnings function. The explanatory power of schooling as distinct from a variable representing the presence of a licensing law depends on (a) the length of period between the imposition of the barrier and the collection of data and (b) the level of the barrier (number of additional school years) imposed. If the period is long enough so that \( v = 1 \), then including the number of years of schooling together with an entry barrier variable 'overcorrects' for the effect of schooling on earnings because it is the means through which the entry barrier is operating. This will not be the case if \( v \) is substantially less than unity.

Next consider calculation of rates of return to schooling from cross-section data. Suppose it is desired to compute the rate of return to additional years of schooling required in industry X. First, in the case where \( v \) is zero, all individuals in X as well as Y and Z have the same level of schooling and the rate of return cannot be computed. Second, take the case where \( v \) is unity. All workers in industry X have a higher level of schooling than workers in Y and Z and their earnings are higher by an amount sufficient to make it attractive for potential
entrants to invest in the necessary amount of schooling and enter the industry. A positive rate of return to the additional years of schooling can therefore be calculated.

Consider now an intermediate case in which \( v \) is between zero and one. Suppose that a rate of return to additional schooling is computed for workers within industry X. Since all workers have the same earnings but new entrants have more schooling the rate of return to schooling will be negative.\(^3\) The rate of return computed across industries would be positive because the mean earnings and mean years of schooling are higher in industry X than in Y and Z. Notice that if there were no restrictions on entry into industry X, rates of return computed within and across industries should be the same. However, it does not follow that equality of rates of return calculated within and across industries implies absence of entry restrictions.

Entry restrictions achieved by raising educational entry requirements or entry costs generally do not give rise to formation of queues of workers who wish to enter the restricted industry. That is, all individuals for whom it is profitable to enter into the industry can do so. If there are supply constraints in educational facilities providing qualifications needed to satisfy requirements for entry into industry X, queues will form. But they will be queues to enter into educational institutions rather than into industry X. The effects on earnings of limiting entry by raising entry requirements in this case are similar to the effects of limiting numbers to an explicit figure.

3.2.2 EXPLICIT RESTRICTION ON NUMBERS

Assume the same conditions as in the previous section except that instead of increasing entry requirements the workers in industry X persuade legislators to restrict employment in the industry to an explicit number.\(^4\) The interesting case is one in

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\(^3\) This follows from the fact that new entrants incur additional costs and yet earn the same income as the original workers in industry X.

\(^4\) In a dynamic framework this would require restricting the rate of flow to less than the equilibrium rate.
which the number is set below the current (i.e., before the new law) equilibrium number of workers.

The law will have no short-run effect. In the long run, while some workers in industry X exit, entry will not take place until enough workers have exited and the number of workers specified by the law is reached. When this number is attained each exit will be matched by a new entrant.

At this point the following will be true: all workers in industry X will be earning more than workers in Y and Z and all workers in X will earn monopoly returns. There will be a queue to enter the industry and entry will be regulated by non-price mechanisms. Less of product X will be produced and sold at a higher price and there will be fewer opportunities for employment in the industry than before the law came into force.

Earnings in industry X will be higher than earnings in Y and Z because of the forced reduction in the supply of labour. All workers in industry X will earn monopoly returns since no additional costs are required to enter the industry. While the level of training of workers in the industry remains the same, quality of product X could improve if the individuals who are allowed to enter possess higher abilities than the average for workers already in the industry. Queues to enter the industry will form because entrants earn monopoly returns.

In this case the additional earnings of workers in industry X are entirely a return on the entry barrier. This follows since the level of schooling in all the industries is the same.

Suppose it is desired to estimate an earnings function from cross-section data collected at a point in time when the number of workers in industry X is as stipulated in the new law. First, it is clear that years of schooling will have no explanatory power over earnings differentials since all workers have the same level of education. For the same reason it is not possible to compute the rate of return to additional years of schooling for workers in industry X. Second, a variable measuring entry restrictions will explain most of the earnings differentials in the three industries.

The barrier to entry into industry X could be measured by a dummy variable indicating presence of the restrictive law. It is important to point out, however, that excess earnings may also be the result of factors such as sudden increases in the demand for X. Even though the effects of excess demand may be transitory while the effects of restricting entry are permanent it is not possible, in general, to isolate the influence of both factors from cross-section data.
3.3 SOME QUALIFICATIONS AND SUMMARY

The above discussion was deliberately simplified in order to isolate the economic effects of the two forms of entry restrictions. In the real world, it is likely that entry restriction is achieved simultaneously both by increasing entry costs and by attempts to control numbers. For example, additional requirements may be set at levels such that a certain number of workers will enter into the restricted industry in the long run. The long-run adjustment may then be controlled by manipulating pass rates at professional examinations so as to prolong the period necessary to reach equilibrium. As a result, monopoly returns will be earned in industry X even by new entrants but the returns for new entrants would be smaller than in the case of pure restriction on numbers discussed in section 3.2.2.

The above conclusions remain substantially unaltered if demand conditions are changing over time. For example, consider the situation in which demand for X is increasing over time. Suppose that entry restrictions are achieved by increasing entry requirements into the industry. In this case it may no longer be necessary that exit take place before it becomes attractive to enter. The length of the period within which entry takes place may be determined solely by the time required to satisfy the new requirements. Existing workers will now earn monopoly returns earlier than was the case with static demand. Those who enter before the industry is in dynamic equilibrium will also earn monopoly returns.

If some workers are self-employed while others work for a salary, then, assuming risk aversion, we expect earnings to be higher for the self-employed to compensate for the greater risk associated with self-employment. Earnings would also be expected to be higher for the self-employed because of the need to provide for their own pension plans, dental plans, etc.

If the opportunities for choosing optimal number of hours worked within occupations are limited and occupations vary with regard to the number of hours worked then individuals will, other things equal, select occupations with hours corresponding to their preferences. The effects of entry restrictions remain essentially the same even after allowing for differential tastes.

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Maurizzi (1974) found evidence of this behaviour for a wide variety of occupations.
We may sum up the economic effects of entry restrictions as follows: if entry is restricted by raising (educational) entry costs, the original workers who do not have to satisfy the new requirements will earn monopoly returns. New entrants earn no monopoly returns. Product prices or service fees will go up and the quantities offered will fall as a result of the imposition of an entry barrier. The average quality of the product or service supplied by licensed practitioners will increase if it is related to the level of education.

It may or may not be possible to separate the effects of an entry barrier variable from the effects of education in an earnings function estimated from cross-section data. This depends on (a) the length of time elapsed between imposition of entry restriction and data collection; (b) the extent of the additional cost (number of years of schooling) imposed and (c) (if demand is static) the rate of exit from the profession.

If in (a) the time period is long enough so that most members are new entrants - that is, practitioners who entered after the barrier was imposed - then the variable measuring the entry barrier and the variable measuring the level of schooling will be collinear. No queues will form unless there is a shortage of educational facilities. If restrictions are achieved by specifying an explicit number lower than the equilibrium number of practitioners, queues to enter the profession will form. Both the original and the new members of the profession will earn monopoly returns. Most of the earnings differentials can be explained by the entry barrier variable. In the real world we observe a combination of barriers generated by raising entry costs and by limiting numbers, for example via manipulation of pass rates at professional examinations.

3.4 MOBILITY

There are three sources of supply of practitioners in a given profession and jurisdiction. First, individuals resident in a given jurisdiction who have satisfied or are in the process of satisfying the stipulated educational and/or licensing requirements at local institutions. Second, individuals from outside the jurisdiction who have satisfied or are in the process of satisfying the stipulated education and/or licensing requirements in the jurisdictions of origin. Third, practitioners duly qualified in jurisdictions of origin who may wish to re-locate or to supply their services to jurisdictions other than the ones in which they are currently licensed.

Interjurisdictional mobility (or, for short, mobility) refers to the way in which applications for admission by
individuals from the second and the third source of supply are treated relative to applications by individuals from the first source. Restrictions on mobility in a profession are absent if individuals from the second and third sources, possessing "equivalent" qualifications, are given identical treatment as applicants from the first source. In all other cases, restrictions on mobility are present. Unfortunately, this definition of mobility depends on what constitutes "equivalent" qualifications - a phrase often left to the discretion of the professional associations.

It is useful to distinguish between technical and economic mobility. Technical mobility is determined by technical characteristics of a profession. For example, lawyers need to be familiar with the statutes of the jurisdiction in which they are qualified to practice. The statutes, however, differ from one jurisdiction to another. As a result, technical mobility in law is relatively low. In medicine and dentistry on the other hand the body of knowledge and skills required to practice in, say, North American jurisdictions is fairly uniform. Technical mobility in these professions is, therefore, relatively high.

Economic mobility is influenced by professional associations and/or government agencies who may wish to discriminate between the three sources of supply and thus restrict the number (or the proportion) of practitioners trained from outside their jurisdiction. For example, public officials from provincial ministries of health and some provincial professional associations have voiced concern from time to time over the "high" proportions of foreign-trained doctors.

It seems that in some professions economic immobility is more important than technical immobility. In the U.S., Holen (1965) analyzed the extent of (average) inter-state mobility for lawyers, doctors and dentists. She found that mobility restrictions in dentistry were as high as in law even though one would expect (on the basis of technical mobility) the restrictions in dentistry to be lower. Maurizi (1974) also showed that 35 dental boards, which were not parties to reciprocal arrangements with dental boards in other jurisdictions, exercised their discretionary powers to limit entry of immigrant dentists. For example, they failed, on average, 22 percent non-resident new dental school graduates as opposed to only 9 percent of such graduates who failed in states offering reciprocal arrangements.

The overall (i.e., technical and economic) restrictions on mobility for the 20 professions examined in this study are indicated in Table 6.3 and described in Appendix B. Mobility is included as an independent variable in the earnings function. As
opposed to the variable measuring entry restrictions based on educational requirements, it is unlikely to be correlated with education.

3.5 CONCLUSION

Restrictions on entry and mobility are an important means by which the S-R professions exercise their monopoly power. In this chapter, we first analyzed in detail the two forms in which entry restrictions typically occur: increased cost of entry and limit on the number of practitioners. We showed that the first form of entry restriction yields monopoly returns to the practitioners who entered the profession before the restriction was imposed. New entrants, on the other hand, earn no monopoly returns. When entry is restricted by imposition of a limit on the number of practitioners, both the new and the original members of the profession earn monopoly returns.

In practice, the two types of entry restrictions are often applied together so that all practitioners earn some monopoly returns. More importantly, however, educational requirements are the most frequently encountered means by which entry into professions is regulated. The contribution of entry restrictions to professional earnings is thus not separable from the contribution of education. This conclusion has important ramifications for the specification of our earnings function estimated in Chapter 6: we are unable to incorporate entry restriction as a variable in our regressions.

In the second part of this chapter, we discussed the concepts of technical and economic mobility in the professions. We conclude that it is feasible and meaningful to measure the contribution of restrictions on mobility to professional earnings. An operational definition of mobility restrictions and the relevant information are provided in Appendix A and Appendix B. Their contribution to professional earnings is estimated and analyzed in Chapter 6.
CHAPTER 4

RESTRICTIONS ON PRICE COMPETITION IN SELF-REGULATING PROFESSIONS

4.1 MODELS OF ECONOMIC BEHAVIOUR OF PRACTITIONERS

The literature on economic behaviour of independent practitioners in S-R professions is scanty and unevenly distributed. It deals mostly with the medical profession under various market conditions and assumptions about motivations of independent practitioners.

Some writers assume that the market for services of physicians is competitive and that physicians maximize earnings. For example, Garbarino (1959) and Fuchs and Kramer (1971) wrote as if the price for physicians' services were determined by the intersection of supply and demand curves. Anderson and Anderson (1967) similarly suggested that price in this market is the result of "spontaneous play of supply and demand forces".¹

However, most writers view this market as imperfectly competitive and differ in specifying the nature and extent of the imperfections. Kessel (1958) assumed that individual physicians are price-discriminating profit-maximizing monopolists. Competition amongst physicians fails to establish a uniform price for identical services since the sanctions applied by organized medicine against potential fee-cutters are an effective control mechanism. Arrow (1963) has disputed the suggestion that physicians are profit-maximizing price-discriminating monopolists. He pointed out that the low price elasticities observed in this market are incompatible with such behaviour. Newhouse (1971) also observed that the spread of medical insurance may have reduced the ability to price-discriminate.

In order to derive estimable price and supply equations for medical services, Feldstein (1974) combined an extended theory of individual labour supply with a model of the firm in an imperfectly competitive market. The individual physician is assumed to be a fee-setter and to maximize a utility function with income, leisure and work characteristics as arguments. The model implies a three-way trade-off between income, leisure and work characteristics. For example, a physician may be willing to charge a fee lower than the profit-maximizing fee in order to generate excess demand so that he can choose his patients. The

¹ Anderson and Anderson (1967, 148-9).
model appears to suggest that a physician is able to set both fees and quantity independently. In addition, it ignores the influence of organized medicine in setting fees.

Evans (1974) has developed a supplier-induced demand model for physicians' services. He assumes that a physician has a target income and workload set on the basis of his training, expectations and experience. Discrepancies between realizations and targets lead to adjustment behaviour. For example, if the physician feels "overworked" and "under-paid" he increases his fees. If income and workload are below targets he induces an increase in demand for his services.2

In Newhouse (1971) the market for physicians' services is assumed to be monopolistic. He cites consumer ignorance about price and service quality caused, in part, by bans on advertising, as factors contributing to low cross-elasticities of demand for physicians' services. The physician is assumed to set fees to maximize short-run profits. He suggests that his model also applies if physicians formed a cartel.

Steinwald and Sloan (1974) employed econometric analysis of U.S. questionnaire survey data in an attempt to establish empirically what are the most important factors determining physicians' fees for a sample of four specific medical procedures. Their explanatory variables included three categories: physicians' practice and personal characteristics, patient and community characteristics and insurance-related variables. The single most important determinant of fees turned out to be salaries of the ancillary personnel. However, each of several demand variables, such as the income characteristics of patients and, for some specialties and types of treatment, the physician-to-population ratio and insurance coverage, had a definite influence as well. Quality of service variables (measured by physician age, specialty board certification and faculty appointments) proved inconclusive. Nevertheless, they may affect the physician fees and incomes indirectly, for example, via the service mix, organizational form of practice, etc. All in all, the authors concluded that their results tend to support the standard profit-maximization model of physician behaviour, diminish the credibility of the target-income model and do not support the theory of a markup-pricing mechanism.

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2 In general, a typical consumer cannot make an informed decision about the necessity for a particular medical treatment. He therefore relies on the recommendation of the physician. In this sense, demand for medical services, as well as for some other professional services, is not independent of supply.
Subject to some qualifications, some of the above models could apply to S-R professions other than medicine. It is obvious that the assumption of imperfect competition captures an essential aspect of the markets for professional services. Three other essential characteristics of these markets, however, appear to be ignored. One is the large number of practitioners supplying a service, another is service differentiation and the final feature is the role of professional associations in setting minimum fees. It seems that an adequate model of practitioner behaviour must incorporate all of these features.

In section 4.2 we discuss the pervasiveness of product differentiation in the markets for professional services and the role of fee schedules set and sanctioned by the professional associations. In section 4.3, we analyze the market interactions among practitioners supplying services of different qualities. Section 4.4 constitutes the core of this chapter. It presents a model of the determination of a minimum fee which the professional association must enforce in order to maximize the net earnings of its members. Finally, section 4.5 draws some conclusions.

4.2 SOME IMPORTANT ASPECTS OF PRICE FORMATION IN SELF-REGULATING PROFESSIONS

Most writers underline the importance of service differentiation in S-R professions. In a study of fee-setting practices in Canadian professions, Crispo (1972) observed that the market for professional services is dominated by product (service) differentiation and imperfect competition. Backman (1953) noted the source of service differentiation in this market:

3

there are great differences in experience, competence and reputation among persons within the same profession and fees tend to vary accordingly.

Although service differentiation characterizes all professions, it is not uniformly important. Its extent depends on (a) "real" or technological variations inherent in the service; (b) the role played by subjective criteria of quality; (c) the importance attached to purchasing a service regarded by consumers as superior.

3 Quoted from Crispo (1972, 23).
The number of practitioners in S-R professions is typically large. In Canada in 1970, there were 77,395 engineers, 26,015 physicians and surgeons, 15,735 lawyers and notaries, 6,290 dentists and 7,470 pharmacists. In any profession, the number of practitioners directly competing with each other is smaller because of specialization and geographical market segmentation. These factors are not equally important for all professions, however. For example, there is probably more direct competition among law, engineering or accounting firms in separate cities than there is among family physicians or dentists.

Licensing provisions of the provincial statutes also limit direct competition among practitioners in the same profession. For example, a lawyer duly qualified in Ontario is not licensed to practice in Quebec. The statutory restrictions on direct competition within a profession are not uniform, of course, across all professions. Some professions have reciprocal arrangements or national qualifying examinations, while in others professional qualifications valid in one province are not recognized in other jurisdictions. Within the same province, direct competition among members of a profession is impeded by professional codes of ethics and regulations. In addition to prohibitions on fee-cutting and advertising, they often prescribe listing of names, business addresses and telephone numbers in a telephone directory of an area other than that in which the practice is located.

In sizeable urban centres — in which most of the population and professionals are concentrated — the number of practitioners directly competing in a profession is likely to be large. In small urban and rural areas, the numbers are typically small. On balance, however, it appears safe to characterize the market for professional services as one in which there are large numbers of practitioners. In this sense the market appears to satisfy one condition for competition.

Most S-R professions in Canada promote fee schedules whether or not they have explicit legislative authority to do so. The recommended fees are characterized as minima which can

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5 Crispo (1972) has suggested that most professions fear that the courts may not uphold this practice. On this point, see also Henderson (1977)
be exceeded. The factors usually considered in setting fees in professional associations have been discussed in detail in Chapter 1. The most prominent among them appear to be supply and demand factors. In this regard Crispo (1972, 17) noted that:

> from a practical point of view, however, it is hard to believe that the ability to extract more from the market does not, in the final analysis, have a good deal to do with setting of fee schedules.

Given the large number of individual practitioners, one would expect considerable difficulties in promoting and enforcing fee schedules. In reality this does not seem to be the case. Kessel (1958) and others have suggested that, at least in medicine, there exist very effective sanctions against would-be fee cutters.

Some professions have legal authority to set fees (see Appendix B). In several professions, it is felt that fee-cutting implies lower standards of service. But perhaps the strongest sanction is moral suasion. According to Crispo (1972, 21):

> most groups apparently secure greater compliance through moral suasion than through potential penalties.

While in the past fee schedules were no more than yardsticks to be applied at the discretion of individual practitioners, Crispo (1972, 19) asserts that:

> there is a trend in favour of treating scheduled fees as minima which should not be breached except under unusual circumstances.

In the legal profession, for example, it is regarded as unethical for a lawyer:

> to hold himself out or allow himself to be held out as being prepared to provide professional services at less than prevailing tariff rates in order to obtain professional work.6

Architects and engineers appear to treat their fee schedules as unbreachable minima. The Ontario Dental Association specifies precisely the conditions under which fees lower than the set minima may be charged.

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In summary, unlike prices in product cartels, the fees in most markets for professional services appear to be successfully maintained at the agreed levels. This is in spite of the large numbers of practitioners and extensive differentiation of services involved. The most important factors responsible for this difference between the product and service markets are the regulatory powers of the professional associations and the pressures, including moral suasion, exercised in support of the fee schedules. The economic interest of different types of practitioners in establishing and maintaining a schedule of fees for professional services is discussed in the next two sections.

4.3 SERVICE DIFFERENTIATION, SUBSTITUTABILITY AND COMPLEMENTARITY

One difficulty professional associations face in determining the optimum fee structure for services supplied by their members is the interdependence of the demand schedules for different services. It is present at two levels: first, within a given profession, the demand schedules facing individual practitioners are not independent of each other since their services are substitutes. Second, services supplied by different professions may substitute or complement each other. An optimum fee structure clearly has to take account of both.

In most professions, there is normally a wide variety of services supplied. For example, in medicine they may range from a visit to a family physician to a complicated operation performed by a highly skilled specialist. In accounting, they include simple repetitive tasks such as preparing individual income tax forms or cost accounting as well as more complex tasks like financial planning or public accounting. In law, they may range from writing wills or executing real estate transactions to services involved in important lawsuits or constitutional cases.

In general, professional services can be arranged according to their complexity and hence according to the level of skills required to perform them. The services are supplied by practitioners varying in levels of training, experience, abilities, reputation, etc. These factors determine the qualities of practitioners in a profession. We assume that it is possible and meaningful to assign numerical values to these factors indicating the relative importance of each as determined by the market. Using the sum of these values for each practitioner it is possible to determine the quality levels of various practitioners in a profession.

Let $S$ denote a service of level of complexity $i$, $i = 1,$
..., M, and assume that the services are arrayed in ascending order of complexity. Assume next that there are M mutually exclusive quality ranges and let \( L \) denote the \( j \)th quality range. We assume that they are arranged in ascending order. For example, in engineering, a graduate engineer with a bachelor's degree, two years of experience and working under supervision may fall in quality range 1. A junior engineer, with the same amount of education but four years of experience and not requiring supervision, may fall in quality range 2. A chief engineer with a master's degree, 20 years of experience, and supervising the work of other engineers may fall in quality range 12.

In some professions, the type of training received is broad and the range of specialties limited so that a qualified practitioner can perform virtually all types of services supplied by members of the profession. In others, the range of specialties is so wide and the level of skills required to perform adequately in a specialty so high, that no amount of general training can prepare a practitioner to perform adequately all the services involved. Other professions lie somewhere in between these two extremes. Pharmacy appears to belong to the first type of profession; engineering and medicine to the second type; law, accounting and dentistry to the third.

Table 4.1 shows various services supplied by members of a profession belonging to various quality ranges. Each row indicates the number of practitioners of a given quality level supplying various types of services. Each column indicates the number of practitioners of various levels of quality supplying a given service. Each \( a_{ij} \) denotes the number of practitioners of \( j \) quality level \( i \) supplying service \( i \). Each \( a_{ij} \) may be regarded as a submarket of a particular service.

In a profession like pharmacy where specialization is relatively undeveloped, most of the \( a_{ij} \)'s in a given column or row are non-zero. In professions like medicine or engineering, where specialization is highly developed, most of the \( a_{ij} \)'s in a given column or row will be zeros. However, for a given row or column, at least one \( a_{ij} \) will be non-zero.

To determine an optimum fee structure, a professional association would need precise information about individual demand functions within each \( a_{ij} \). For a given \( j \), the association
TABLE 4.1
THE MARKET FOR PROFESSIONAL SERVICES

<table>
<thead>
<tr>
<th></th>
<th>$S_1$</th>
<th>$S_2$</th>
<th>$\ldots$</th>
<th>$S_{M-1}$</th>
<th>$S_M$</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>$L_1$</td>
<td>$a_{11}$</td>
<td>$a_{12}$</td>
<td>$\ldots$</td>
<td>$a_{1M-1}$</td>
<td>$a_{1M}$</td>
<td>$B_1$</td>
</tr>
<tr>
<td>$L_2$</td>
<td>$a_{21}$</td>
<td>$a_{22}$</td>
<td>$\ldots$</td>
<td>$a_{2M-1}$</td>
<td>$a_{2M}$</td>
<td>$B_2$</td>
</tr>
<tr>
<td>$\vdots$</td>
<td>$\vdots$</td>
<td>$\vdots$</td>
<td>$\ldots$</td>
<td>$\vdots$</td>
<td>$\vdots$</td>
<td>$\vdots$</td>
</tr>
<tr>
<td>$L_{M-1}$</td>
<td>$a_{M-11}$</td>
<td>$a_{M-12}$</td>
<td>$\ldots$</td>
<td>$a_{M-1M-1}$</td>
<td>$a_{M-1M}$</td>
<td>$B_{M-1}$</td>
</tr>
<tr>
<td>$L_M$</td>
<td>$a_{M1}$</td>
<td>$a_{M2}$</td>
<td>$\ldots$</td>
<td>$a_{MM-1}$</td>
<td>$a_{MM}$</td>
<td>$B_M$</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$A_1$</td>
<td>$A_2$</td>
<td>$\ldots$</td>
<td>$A_{M-1}$</td>
<td>$A_M$</td>
<td>$T$</td>
</tr>
</tbody>
</table>
would also need information concerning the interdependence between the a's for \(i = 1, \ldots, M\). Finally, for given \(i\), the \(ij\) association would need information about the interdependence between the a's for \(j = 1, \ldots, M\). It is likely that \(ij\) cross-elasticities of demand are higher within an a than between the a's. Indeed, it may be that in most professions \(ij\) the cross-elasticities of demand between say, a and a (i \(ij\) \(m\) are close to zero. For example, the services of a recent entrant into the law profession in defending an important court case may not be perceived by consumers as a substitute for the services of a leading lawyer performing the same function.

In some professions, there is significant interdependence between the a's in different columns. For example, in medicine, \(ij\) most services are either substitutes or complements. (Some family physicians compete with obstetricians or paediatricians. However, many specialists depend on family physicians' referrals for their supply of patients.) Such strong interdependencies of the a's across columns are, however, the exception rather than the rule.

In the model developed below we assume independence of sub-markets in different columns. In other words, the cross-elasticities of demand between a and a (j \(ij\) \(s\) in Table 4.1 are assumed to be zero. This assumption is not essential for the analysis in section 4.4 and, with a few exceptions, such as medicine, better describes the reality of most professional markets than the assumption of interdependence. On the other hand, within each column, only the demand for services of a few practitioners with exceptionally high reputation is independent of the other quality levels of the same service. (Below, we assume that there are \(k\) such practitioners, operating in sub-market a and that the cross-elasticity of demand between \(iM\) a and a , \(j = 1, 2, \ldots, M-1\), is zero.) All the other \(ij\) practitioners within a given column are assumed interdependent.
4.4 A MODEL OF OPTIMAL FEE DETERMINATION

4.4.1 PROFIT MAXIMIZATION IN A CARTEL SELLING HETEROGENEOUS SERVICES

The standard theory of cartels and its applications to the behaviour of professional associations have normally assumed homogeneous quality. Under this assumption it is well known that a cartel (professional association) maximizes profits (net earnings) by equating the industry marginal cost to the industry marginal revenue. Two methods of sales allocation are usually suggested to ensure that the optimal price and quantity can be maintained. One is the quota system, of which there are several variants. Another is non-price competition. Since professional associations do not appear to enforce quota systems, it is often suggested that the second method is used in the markets for professional services.

Cartel theory which assumes homogeneous quality and employs non-price competition as a method of allocating quantity, implies a uniform price (fee) for the product (service) supplied. In the market for professional services, however, we observe minimum fees set by professional associations, heterogeneous quality and a dispersion of fees for a given service. It is evident that an appropriate modification of cartel theory applicable to the market for professional services must come to grips with the problem of heterogeneous quality.

Assume that in a given organized S-R profession there are n (where n is a large number) independent practitioners supplying a specified service (or group of services). For example, if s is the type of service in question, then we assume that n practitioners supply their services in submarkets a , i = 1, 2, ..., M. All are assumed to have identical information and motivations. Each practitioner faces a demand schedule

\[ q^i = e^i(p^1, ..., p^n) \quad (i = 1, ..., n), \]  

(4.1)

where \( q^i \) and \( p^i \) are, respectively, the quantity demanded and the

7 See, for example, Ferguson and Gould (1975).

8 We have suppressed, for the sake of simplifying the notation, other variables such as income, advertising, etc.
th fee charged by the i th practitioner for the service. Because the service supplied by the i th practitioner is a substitute for the services supplied by other practitioners, the quantity he can sell at a given fee depends on the fees charged by the remaining (n-1) practitioners. Specifically, for a given fee, the i th practitioner can sell more of the quality of service he supplies if the j th practitioner increases his fee while the fees charged by others remain constant:

\[
\frac{\partial \theta_i}{\partial p_j} \geq 0, \quad \frac{\partial \theta_i}{\partial p_i} < 0 \quad (i, j = 1, \ldots, n) . \tag{4.2}
\]

Typically, the magnitude of the increase in quantity of a th service demanded from the i th practitioner when the j th practitioner increases his fee is imperceptible because the effect of the change in fee is spread over many practitioners. The total effect of such an act on all practitioners taken together is, however, not negligible.

A fee increase by the j th practitioner affects each of the other practitioners to a different extent. For some practitioners, their reputation, training and experience are such that the cross-elasticities of demand between their services and the services of their fellow practitioners are zero.9 We assume that this is the case for the first k practitioners (where k is a small number and k < n). In view of this we may write (4.2) as

\[
\begin{align*}
\frac{\partial \theta_i}{\partial p_j} &= 0 & (i \neq j, \ i = 1, \ldots, k) \\
\frac{\partial \theta_i}{\partial p_i} &> 0 & (i \neq j, \ i = k+1, \ldots, n) .
\end{align*} \tag{4.3}
\]

It is convenient to deal with inverse demand functions given by

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9 In terms of Table 4.1 this would be, say, practitioners in sub-market a for a given i.
\[ p^i = \phi^i (q^1, \ldots, q^n) \quad (i = 1, \ldots, n) \]  
(4.4)

\[ \frac{\partial \phi^i}{\partial p^i} < 0; \quad \frac{\partial \phi^i}{\partial p^i} \right) = 0 \quad (i \neq j, i = 1, \ldots, k) \]
\[ \frac{\partial \phi^i}{\partial p^i} < 0 \quad (i \neq j, i = k+1, \ldots, n). \]

Each practitioner has a cost function consisting of fixed and variable costs

\[ c^i = f^i (q^i) + b^i \quad (i = 1, \ldots, n) \]  
(4.6)

\[ \frac{\partial f^i}{\partial q^i} > 0; \quad \frac{\partial^2 f^i}{\partial q^i \partial q^j} > 0 \quad (i = 1, \ldots, n), \]

where \( f \) and \( b \) are respectively variable and fixed costs. Fixed costs include all the non-human capital invested in a practice (a dentist's chair(s), rent, receptionist's typewriter and desk, etc.). They exclude the human capital costs. Variable costs include all out-of-pocket expenses which vary with the quantity of service supplied (the receptionist's time, correspondence, materials, transportation, etc.). They exclude the practitioner's time because, as the hiring factor, he receives the residue.

The earnings of the \( i \)th practitioner may be written as

\[ \pi^i = q^i \phi^i (q^1, \ldots, q^n) - c^i \quad (i = 1, \ldots, n). \]  
(4.7)

We refer to (4.7) as a (net) earnings function rather than a profit function because the (opportunity) cost of the practitioner's time is excluded from the cost function.

We assume that the professional association sets fee schedules in order to maximize the aggregate net earnings of its members

\[ \text{Max } \pi = \sum_{i=1}^{n} [q^i \phi^i (q^1, \ldots, q^n) - f^i(q^i) - b^i] \]
\[ (i = 1, \ldots, n). \]  
(4.8)
The first-order conditions for a maximum are:

\[
\begin{align*}
\phi_i + q_i \frac{\partial \phi_i}{\partial q_i} &= \frac{\partial f_i}{\partial q_i} \\
&= \frac{\partial f_i}{\partial q_i} - \sum_{j=k+1}^{n} q_i \frac{\partial \phi_j}{\partial q_i} \quad (i = k+1, \ldots, n).
\end{align*}
\]

The term on the left-hand side is simply the marginal revenue, \( MR_i \), and the first term on the right-hand side is the marginal cost \( MC_i \). The last term on the right-hand side of the second equation is the total revenue loss to \( n-k-1 \) practitioners resulting from a unit increase in the quantity of service supplied by the \( i \)th practitioner \( (i = k+1, \ldots, n) \). We denote this amount by \( TR_i \).

In view of (4.5) it follows that

\[ TR_i < 0 \quad (i = k+1, \ldots, n) \]  

(4.10)

so that at the optimum

\[ MR_i = MC_i \quad (i = 1, \ldots, k) \]

\[ > MC_i \quad (i = k+1, \ldots, n). \]  

(4.11)

That is, in order to maximize the aggregate net earnings the professional association may allow the first \( k \) practitioners to maximize their own net earnings but must set fee schedules for the other \( n-k \) practitioners at levels higher than would be required for individual net earnings maximization.

Each of the \( n-k \) individual practitioners acting alone has an incentive to cut fees and sell more of his service. Since the reduction of fees by one practitioner has negligible effects on
other practitioners, it is unlikely that others will retaliate by cutting their fees. However, since each of the n-k practitioners stands to gain by cutting fees if others maintain theirs, it is likely that, without coordination, they will all reduce their fees and supply more. This would result in a higher aggregate quantity of service and lower aggregate earnings of the n-k practitioners than implied by (4.11). Realization of this fact generates strong demand for fee-setting in S-R professions.

It is of some interest to compare these results with those of the standard cartel theory. In the standard theory a single fee is set and methods of allocating quantities of service among practitioners devised. In the model developed above, a separate fee is set for each practitioner if his demand schedule is interdependent with other practitioners. If the demand schedule for a practitioner is independent of others, he is allowed to maximize earnings. Thus, this model predicts a dispersion of fees which is consistent with empirical observation.

4.4.2 OPERATIONAL APPROXIMATIONS

Rule (4.11) stipulates that a different fee be set for each practitioner in M-1 submarkets. Determination of the fees requires data on demand and cost functions for the M-1 submarkets. Obtaining such data may be costly and impractical. The professional associations are thus forced to resort to approximations of the rule.

One approximation to (4.11) involves developing a formula for assigning numerical values of quality to practitioners supplying the service in each of the M-1 submarkets (i.e., for different $a$ in Table 4.1). From surveys of practitioners, information on quality levels and fees actually charged is collected. On the assumption that the actual fees ignore interdependence of individual demand functions the professional association adjusts observed fees upwards to account for this factor. The adjusted fee schedule is then "suggested" to practitioners as a guideline in setting individual fees. How accurate an approximation this is to rule (4.11) depends, among other things, on the correspondence between quality as assigned by the formula used and quality as determined by the market. It also depends on the degree of accuracy achieved in adjusting upwards the fees currently being charged.

Some professional associations, including engineers and architects, use procedures which closely resemble this model. For example, the Association of Professional Engineers of Saskatchewan employs an elaborate system which enables members of
the association to determine their submarket and (hence) determine precisely what their earnings should be. Each member can determine a numerical value for his level of quality by employing a formula which assigns scores to quality variables. The sum of the scores then enables him to establish to which submarket he belongs. The professional association determines the average level of earnings in each submarket on the basis of information on current earnings of members and the earnings of comparable practitioners in other professions.

Another approximation to rule (4.11) involves setting a single minimum fee for a given type of service. Individuals wishing to charge fees above the minimum are allowed to do so. They are not required to adjust their fees to take account of the TR in (4.10). However, the minimum fee is designed in such a way that the weighted average of the minimum fee and the fees above the minimum maximizes the aggregate net earnings of practitioners supplying the service.

To make this rule operational, it is necessary for a professional association to estimate the "industry" demand schedule along with the demand schedules in each submarket. It is also necessary to estimate the "industry" supply schedule along with the supply schedules in each of the submarkets. On the basis of this information, the association determines the weighted average (or the "industry") fee for the service which maximizes the total net earnings of practitioners supplying the service.

4.4.3 THE MINIMUM FEE

Determination of the optimal minimum fee is complicated by the fact that it must take account simultaneously of the levels of fees charged above the minimum and the market shares of practitioners charging such fees. The above-minimum fees and the associated market shares in turn depend on the level of the optimal minimum fee. Given information on demand and supply schedules for each submarket, it is possible, through iteration, to arrive at the optimal minimum fee. If information on submarket demand and supply schedules is not available, it is still possible to arrive at the optimal minimum fee by a simple trial and error procedure.

10 This association employs consultants to determine its fee schedules.
From estimates of the "industry" demand and supply schedules, the association computes the optimal (weighted) average fee. From surveys of fees currently charged by members (including the current minimum), the association estimates the actual weighted average fee. If the difference between the optimal and the actual weighted average fee is positive then an increase in the minimum fee is called for and vice versa. The optimal minimum fee is that fee for which the difference between the optimal and actual weighted average fee is zero.

In his study of fee-setting practices in S-R professions, Crispo (1972) found that the factors most commonly considered in adjustment of minimum fees included changes in the cost of living, wages and salaries of comparable groups, productivity increases and changes in the relative worth of the professional group. Demand and supply factors were rarely mentioned. Our own survey (carried out for this study) basically confirms this pattern.

It would seem that adjustment of minimum fees on the basis of these factors is another way of stating that the current minimum fees are not optimal. As an example, consider changes in the cost of living accompanied by an increase in productivity. When the cost of living is given as a reason for increasing fees, the actual adjustment is often two or three percentage points above the actual increase in the cost of living. This differential is often justified by a productivity increase. However, if the minimum fee was optimal before the adjustment, then the optimal minimum fee should increase by less, not more than the cost of living increase. An increase in productivity should reduce rather than increase the optimal minimum fee.

Consider next an increase in wages and salaries of comparable groups. If the objective function of a professional association includes maintenance of "normal differentials" between professions, it may initiate fee adjustments. However, the objective of maintaining "normal differentials" appears to lack an economic justification, especially if the differentials are viewed as inflexible and independent of market conditions. In other words, if the minimum fee was optimal before the increase in incomes of comparable groups, there is no reason why it should not be optimal after. There is no economic ground for believing that in the short run a 10 percent increase in mean earnings of lawyers or architects should give rise to a similar percentage increase in the mean earnings of dentists or physicians. The same can be said about changes in the relative worth of a professional group. Changes in the perceived relative worth of a profession have no impact on the optimal minimum fee. If the current minimum fee is optimal, then adjusting it upward or downward leads to a further deterioration in the relative worth of the group.
4.4.4 IMPACT OF MINIMUM FEES IN THE SHORT RUN

All practitioners in a given profession can be classified into three groups, each of which is differently affected by the minimum fee. Group A includes all those whose fees are not affected by the minimum fee at all. These are the kth practitioners (in the M submarket) whose individual demand schedules are independent of the other submarkets. Group B includes all those whose demand schedules are affected by the minimum fee, but whose individual net earnings-maximizing fee coincides with the optimal minimum fee. Finally, Group C includes those whose demand schedules are affected by the minimum fee, but who charge the optimal minimum fee because their individual net earnings maximizing fees would be lower than that.

Broadly speaking, group A includes exceptionally talented and well-known practitioners. Group B may be thought of as well-established successful practitioners. Group C consists of recent entrants, less well-established or low-cost practitioners.

In Figure 4.1, we illustrate the short-run equilibria for typical practitioners in groups B and C along with the optimal minimum and weighted average fee. The diagram in panel III represents the "industry" demand and supply schedules. The horizontal axis in the diagram represents the aggregate quantity of service and D and S represent the demand and supply schedules. The fees $P_B$ and $P_m$ are, respectively, the optimal weighted average and the optimal minimum fee.

Panels I and II represent individual practitioners in groups B and C, respectively. The horizontal axes in both panels measure quantities of the service. The demand schedule $D$ in panel I assumes that the minimum fee is set at its optimal level $P_m$, that all other practitioners in group B charge fees which maximize their individual net earnings, and that practitioners in group C charge the optimal minimum fee. The demand schedules $d$ in panels I and II are subjective demand schedules based on the assumption that if a particular practitioner changed his fee, others would maintain theirs. The demand schedule $D$ in panel II assumes that the optimal minimum fee is set at $P_m$, that all other practitioners in group B maximize their individual net earnings. The schedules $mr$ and $mc$ are, respectively, marginal revenue and marginal cost.
Practitioners in group B maximize their individual net earnings by charging a fee $P_b (P_b > P_m)$. A typical practitioner in group C would have preferred to charge a fee $P_c (P_c < P_m)$ which maximizes individual net earnings, but is required to charge $P_m$.

The differential impact of minimum fee-setting can be analyzed by examining the effects of changing the minimum fee from the level $P_m$ to levels above or below it. First, suppose the professional association lowers the minimum fee to a level between $P_b$ and $P_c$. This would shift the demand curve $D$ in panel I inward and to the left as clients shift their purchases of the services supplied by group B practitioners to the (now) relatively cheaper services supplied by group C practitioners. In panel I the subjective demand schedule would also slide downward along the new demand schedule $D$ until the level of service supplied and fee charged (for which marginal revenue equals marginal cost) are on the new demand schedule $D$. At that point the fee charged, the level of service demanded and supplied and earnings are lower than they were before the decrease in the minimum fee.

A lower minimum fee means more clients for practitioners in group C. In panel II, a decrease in the minimum fee causes a shift of the demand schedule $D$ outward and to the right. The subjective demand schedule $d$ slides upward along the new demand schedule $D$. For some practitioners in this group, individual net earnings maximization now requires charging of fees above the (now lower) minimum fee. For others, the minimum fee may also be the individual earnings-maximizing fee. Finally, there may be some for whom individual net earnings maximization implies a fee lower than the new minimum fee.

For all practitioners in group C, earnings and levels of services demanded and supplied are higher. However, the increase in earnings for group C practitioners is smaller than the reduction suffered by group B practitioners. For this reason, the lower minimum fee would not be chosen in preference to $P_m$, the optimal minimum fee.

Consumers benefit from the lower minimum fee because the weighted average fee for the service decreases and the aggregate quantity of the service supplied increases. Thus a reduction of
the minimum fee from $P$ to some level between $P$ and $P^m$ may be seen as an income transfer from group B to group C practitioners and to consumers.

The result that individual earnings of group C practitioners increase depends on the extent of the reduction of the minimum fee. Small reductions of the minimum fee benefit all practitioners in this group. Larger reductions would reduce the earnings of the better established individuals within this group and increase earnings of the relatively less well-established. The relatively better-established individuals in group C and all individuals in group B would still prefer some minimum fee to having all fees set entirely by competitive forces.

Suppose now that the professional association decides to raise the minimum fee above the optimal minimum fee, $P^m$. This would result in a shift of clients from group C to group B practitioners. The demand schedule $D$ in panel I would shift outward to the right and the subjective demand schedule $d$ would slide upwards along the new demand schedule $D$. Practitioners in group B would now be able to sell more of their services at the previous fee or sell the previous level of services at higher fees. Total earnings and level of services demanded and supplied by practitioners in this group would increase.

Practitioners in group C would experience a shift in the demand schedule $D$ (in panel II) to the left and the subjective demand schedule $d$ would slide downward along the new demand schedule $D$. The quantity of services supplied by this group would fall. Since the aggregate level of earnings (for both group B and C practitioners) must fall and the total earnings for group B practitioners increase, it follows that the total earnings for group C individuals must fall. Since the aggregate level of services falls, it follows that the weighted average fee must increase.

An increase in the minimum fee may thus be seen as an income transfer from consumers and practitioners in group C to group B practitioners. For some increases, the total earnings of both group B and group C practitioners would fall even though there may be some practitioners in group B whose earnings increase.

This analysis suggests that practitioners supplying a differentiated service will strongly, but not universally, support the setting of minimum fees. Support for a specific level of the minimum fee would be less strong because of its differential impact on the earnings of various practitioners.
Generally, the less well-established or low-cost practitioners would prefer a lower minimum fee than their well-established colleagues. The analysis also shows that the total earnings of practitioners and the weighted average fee are higher with than without a minimum fee.

Enforcement of minimum fee schedules does not require surveillance of all members in the profession. Only some practitioners in group C have an incentive to cut fees. However, because most of them may be less well-established, and in some professions their success depends on maintaining good relations with their more senior colleagues, it is in their interest not to breach the professional codes of ethics. In some professions, including medicine, this is particularly so for new entrants. In addition, many practitioners in group C expect to increase the quality of their services over time to the level of practitioners in group B. They may therefore view the differential between their current (low) earnings (resulting from the current high minimum fee) and what they could have earned (had the minimum fee been lower) as an investment which will yield high returns when they increase the quality of their services. It is, consequently, to their advantage that the minimum fee not be decreased now and especially in the future when they expect to benefit more from the minimum fee schedules.

Recently lawyers and dentists, among other professions, in the U.S., have been allowed to advertise their services and the legality of setting minimum fee schedules has been thrown into question. The impact of these changes is similar to a reduction in minimum fee schedules. They give rise to a shift of demand from the more established and high-cost practitioners to the less well-established and low cost practitioners. The observed division among practitioners in the two professions with the less well-established and low cost practitioners supporting the changes and the other practitioners opposing them is consistent with the predictions of the above analysis.

4.4.5 IMPACT OF MINIMUM FEES IN THE LONG RUN

As already noted in Chapter 3, the long run monopoly rents in a profession depend critically on the form of the restriction on entry. In Figure 4.2, we illustrate the long-run equilibrium

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11 In Goldfarb v. Virginia State Bar, 95 S.Ct. 2004 (1975), the Bar lost over the issue of minimum fee schedule. A June 1977 decision of the U.S. Supreme Court permitted price advertising by lawyers.
FIGURE 4.1
SERVICE DIFFERENTIATION AND MAXIMIZATION OF AGGREGATE EARNINGS IN THE SHORT RUN

FIGURE 4.2
SERVICE DIFFERENTIATION AND MAXIMIZATION OF AGGREGATE EARNINGS IN THE LONG RUN
assuming that entry restrictions are achieved by increasing entry requirements. Except for the LMC and LAC which denote, respectively, the long-run marginal and average cost, the other schedules are the same as in Figure 4.1.

The assumption of free entry into a profession implies that no practitioner earns monopoly returns in the long run (the long run is so long that all practitioners have satisfied the existing requirement for entry into the profession). This is indicated in the diagrams by tangency of the demand schedules and the LAC schedules at the prevailing fees. The result that no practitioner earns monopoly returns does not affect the conclusion from the short-run analysis, namely that practitioner earnings are higher with than without fee setting.

If restrictions on entry into the profession are achieved by controlling the number of practitioners, then the LAC schedules in the diagrams would intersect the corresponding demand schedules, so that the prevailing fees would exceed the long-run average cost. As a result, monopoly rents would be earned. Their size would depend on the difference between the long-run equilibrium number of practitioners with free entry and the number specified by the restriction.

As shown above, imposition of a minimum fee increases the market share of the higher quality practitioners at the expense of lower quality practitioners. The average quality of service supplied by members of a profession is therefore raised. However, average quality consumed may fall as some consumers purchase lower quality services provided by non-members.

Setting lower minimum fee schedules has a similar impact as allowing more competition in the professions. It follows that increased competition would reduce the average quality of services supplied by "qualified" practitioners and increase the average quality of services consumed.

4.4.6 EXERCISE OF MONOPOLY POWER

So far, we have been assuming that a professional association attempts to exploit the full extent of its market power. In some cases this may not be the case for a variety of reasons. First, the association may be sensitive to public accusations that it is acting as a cartel. Second, blatant exercise of market power may invite government intervention in setting fees for services. Third, a professional association may have public representatives on its decision-making bodies who may exert a restraining influence. Fourth, if fees are negotiated with government agencies, insurance companies, etc., their desire
to minimize cost acts as a countervailing force. Fifth, the analysis above has shown that maximization of aggregate earnings would generate strong opposition from some members of the profession.

A reserve of market power may also serve as an "insurance fund" to be used in adverse conditions to maintain the earnings of members at a desired level. For example, if an association has no control over entry and is flooded with new entrants, there would be demands by some members to increase minimum fees so that their earnings can be maintained. Evans (1974) has suggested that faced with this prospect, professions such as physicians simply induce demand for their services. Other professions (architects, engineers, lawyers, accountants, etc.) may not have much capacity for demand inducement. Even in medicine and, perhaps, dentistry, the capacity to induce demand is not unlimited. In any case the existence of a reserve of unexploited market power in setting fees and/or the existence of unexploited power to induce demand is a comfortable cushion which protects professional earnings.

4.5 CONCLUSION

The model developed in this chapter appears to capture the essential elements of price formation in S-R professions. These are: (a) imperfectly competitive markets; (b) service differentiation; (c) large numbers of small-sized suppliers; (d) fee-setting by professional associations.

It is shown that to maximize aggregate net earnings of its members, a professional association should set fees at levels which would yield lower aggregate quantity of service and higher fees than would obtain without fee-setting. In some professions, this is achieved by prescribing all fees in each submarket of a given type of service, in others by setting an optimal minimum fee.

Not all practitioners will actually charge the minimum fee nor will all be equally affected by it. In the case of a few exceptionally talented practitioners (group A defined above) the minimum fee has zero impact on their fees. For the rest, the minimum fee will have an important effect on the fees they charge and on their earnings. This is true both for the practitioners who charge the minimum fee (group C) and for those whose fees are higher (group B). The less well-established or low-cost practitioners tend to favour lower minimum fees (or what comes to the same thing, more competition) than the better established or high-cost practitioners. A higher minimum fee means higher earnings for the latter group, derived partly at the expense of
the consumer and partly at the expense of the less well-established low-quality or low-cost practitioners. The model predicts that aggregate net earnings of practitioners are higher with than without fee-setting arrangements. This result is identical with the standard cartel theory which assumes homogeneous quality.

The optimal minimum fee can be determined by iteration if the association has information on demand and supply schedules for each group of practitioners. It can also be established by a simple trial and error procedure.

We have argued that a professional association may not want to fully exploit its market power for reasons similar to those encountered in many other markets. In the case of professional services our model also suggests that a full exploitation of market power will face strong opposition from some members of the profession.

Much of the published literature utilizes the standard theory of cartels, which assumes homogeneous quality, in analyzing the behaviour of professional associations. This theory appears unsatisfactory when applied to the professions because it predicts that all practitioners will charge a uniform fee. The model presented in this chapter predicts that while some practitioners will charge the minimum fee, others will charge fees above the minimum. This is consistent with the observed behaviour of most S-R professions.
CHAPTER 5

RESTRICTIONS ON PROFESSIONAL ADVERTISING

5.1 INTRODUCTION

The impact of advertising in product markets on economic welfare has been debated for a long time. Advertising is alleged to enhance welfare in several ways: (a) it makes possible the realization of economies of scale in production and distribution; (b) it is a source of information on alternatives open to consumers and thus helps them to reduce their search costs in locating lower-priced sellers; (c) it stimulates competition and technical progress; (d) it speeds up consumer reaction to price reductions thus enabling lower-priced sellers to realize sooner the benefits of being lower-cost suppliers.

On the negative side, some economists have argued that advertising is generally uninformative and may be misleading. It creates barriers to entry, lowers cross-elasticities of demand and is thus a source of monopolistic power. It has also been suggested that high levels of advertising lead to higher prices to consumers. Finally, advertising is viewed as wasteful because it merely allocates consumer spending among competing brands and also because in most cases it is provided at zero cost to the consumer although it has positive costs to society.1

The controversy over the economic effects of advertising has generally focussed on product markets with little reference to service markets.2 In this chapter, we examine the existing empirical evidence. The view that proscription of advertising is in the best interest of consumers of professional services is considered against the alternative view that it enhances the economic well-being of practitioners in organized professions.

1 See, for example, Kaldor (1950). For an excellent survey of the literature on the economics of advertising in product markets see, for example, Doyle (1968).

2 The few studies which have examined advertising in the market for professional services include Benham (1972), Benham and Benham (1975), Cady (1976) and Baird (1977).
5.2 SPECIAL CHARACTERISTICS OF PROFESSIONAL SERVICES

Several characteristics of professional services distinguish the service markets from the product markets. They include greater uncertainty about the quality of services as compared to the quality of products, inequality of information possessed by the buyer and by the seller, the fact that production of a service coincides with its consumption and the difference in the firm size of a typical supplier of services and a typical supplier of products. In this section, we briefly review the economic implications of these market characteristics.

First, it has been suggested that there is considerably more uncertainty about the quality of services supplied by professional individuals than exists in product markets generally.3 The quality of services or products is a measure of the extent to which they produce the intended effect. Uncertainty about the quality of most services is clearly more intense than uncertainty about quality of most products. For example, in lawsuits or criminal cases, the purchase of legal services yields a great deal of variance of possible outcomes. Similarly, the purchase of medical services only marginally affects the predictability of recovery from certain diseases.

In the case of most goods, however, (for example, experience goods discussed below) consumers learn about quality through experience, because there is an adequate number of trials. For certain services this is not possible because the services are purchased infrequently. The variability of utility from infrequently purchased goods like automobiles, houses, etc., is greater than from more frequently purchased goods. The variability of utility from consumption of certain services including important lawsuits, criminal cases and severe illnesses is even greater because it involves the risk of death, loss of freedom or of normal functioning of the individual.

The second special characteristic of professional services is the existence of inequality of information between the supplier and the recipient. Because of the great complexity of knowledge associated with the delivery of professional services, there is great disparity of information about the consequences of purchasing such services. For example, in a lawsuit or criminal trial the lawyer is in a superior position to his client in assessing the chances of success. The client, therefore, depends

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3 See, for example, Arrow (1963).
to a considerable extent on the advice of the supplier in deciding on the quantity and the type of service he should purchase. This requires the establishment of a trust relationship between the client and the supplier.

The third distinguishing feature of professional services is the fact that the product and the activity of production are identical. As a consequence, faced with imperfect information concerning quality, the consumer cannot test the service without consuming it. This may also be the case with such products as food and beverages in product markets but the difference is that product purchases are repeated and are often inexpensive so that testing by purchasing and consuming need not be a costly way to collect information. Since the demand for most professional services on the part of many consumers is irregular, infrequent or unpredictable, the collection of information by purchasing and consuming normally involves high costs.

The final special attribute of professional services is also connected with the fact that the product and the activity of production are identical. The firms supplying professional services are therefore much smaller than those supplying products. The number of patients that a physician or dentist can effectively attend to in a day has a definite and rather low upper bound.

There are, of course, "large" firms supplying professional services in law, accounting, engineering, etc., which involve several practitioners working together. Such firms may be more efficient than single practitioners because of economies of scale. However, since the delivery of services involves direct and personal contacts with clients, such economies of scale as may exist are soon exhausted. It is largely for this reason that concentration ratios in the service markets are (and will most likely remain) low.

5.3 BENEFITS OF PROFESSIONAL ADVERTISING

5.3.1 ECONOMIES OF SCALE

If economies of scale in production and distribution exist, advertising can contribute to their realization only to the extent that it stimulates demand for the product or service. Several studies of the product markets, including those by Schmalensee (1972), Taylor and Weiserbs (1972), Peles (1971) and Meissner (1961) found no evidence that advertising stimulates demand. This finding, however, was contradicted by, inter alia, Comanor and Wilson (1974) and Nerlove and Waugh (1961). Most
economists agree that advertising of new products speeds up the expansion of demand or counteracts adverse demand trends.  

Professions which prohibit advertising by individual practitioners often allow advertising by professional associations. Whether such advertising permits the realization of economies of scale depends on the extent to which demand is expanded and on the potential for any scale economies. Empirical evidence on the effect of advertising on demand for services is non-existent and evidence on economies of scale in the delivery of professional services is rather limited.

If the effects of advertising on the demand for new services (including services supplied by new entrants) are analogous to its effects on the demand for new products, then advertising by new entrants would speed up the expansion of demand for their services and reduce the time required to build up a viable practice. In most professions, new entrants who operate as independent practitioners have excess capacity during this period and could, therefore, realize economies of scale.

Advertising may also help realize economies of scale if some established practitioners operate with excess capacity. If fee competition and fee advertising were allowed, such practitioners may find it profitable to cut fees in order to expand the demand for their services, but this would not necessarily be profitable without (fee) advertising since only a limited number of potential clients would be aware of the lower fees.

It may safely be assumed that advertising in the professions will stimulate competition and induce practitioners to experiment with alternative forms of organizing the supply of services. For example, group practice is likely to increase, in part because of economies of scale in advertising.

The potential for deriving economies of scale from these three sources in any given profession depends on the number of new entrants, the number of practitioners operating with excess capacity and the growth of group practice. The importance of such economies depends on the extent to which advertising increases market shares of these categories of practitioners and on the reduction in their unit costs as the size of practice increases.

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4 See, for example, Borden (1942).
The published empirical research on economies of scale in professions concentrates almost exclusively on the medical practice. Frech and Ginsburg (1974) reviewed half a dozen U.S. and Canadian studies and noted a considerable lack of consistency in their results: some concluded that solo practice is marginally more efficient than group practice while others suggested that groups of over 30 physicians are most efficient.

Frech and Ginsburg applied the survivor technique to survey data on size distribution of medical practice during the period 1965-1969, published by the American Medical Association. Their analysis of the changes in market shares of different size groups indicates that medical practices may have an inverted U-shaped cost curve observed in some other industries.

Group practices were found to be more efficient at the margin than solo practices. Within the group practices, both the small and the large groups appear to be more efficient than the medium-size practices (7-25 physicians). A possible explanation for this pattern may be inefficiencies due to loss of coordination and control when a practice reaches medium size. After a point, however, it becomes economical to hire specialized management services and develop sophisticated remuneration systems. Both of these enhance the efficiency of the (large) groups which employ them.

5.3.2 TECHNOLOGICAL PROGRESS

The proposition that advertising promotes technological progress is based on two premises: first, that advertising provides incentives to seek higher standards of living and thus gives rise to greater degree of effort; second, that advertising protects firms from too great risks and thus encourages investment in research and development.

The view that advertising increases work incentives appears to be supported by international comparisons of standards of living and advertising expenditures. The evidence indicates a clear positive correlation between the two variables. However, it is unclear which way the causation runs. It is possible, as Doyle (1968) points out, that high levels of advertising expenditures are a result rather than a cause of high standards of living. In addition, it is implicitly assumed that advertising stimulates demand which then has to be satisfied by greater effort. As indicated above, evidence on this question in the product market is inconclusive and there is no reason to believe that it would be supported in the market for professional services.
The hypothesis that advertising reduces risks associated with research and development is based on the notion that large firms in concentrated industries are, largely because of their size and insulation from competitive forces, the sources of technological progress. This modern view of technological progress is incompatible with the classical view which sees competition as a spur to innovation.

Since the market for professional services is characterized by large numbers of small-sized practitioners the classical view is somewhat more appealing. For example, it has been suggested that removal of barriers to entry in the S-R professions is likely to encourage technological progress.5

It is often suggested that advertising stimulates competitive behaviour among practitioners which reduces professional interaction and, therefore, impedes progress in knowledge and technical change. This may be the case for those aspects of knowledge and technical change which are not related to productivity improvement. Advertising and competitive forces, however, are likely to increase incentives to acquire knowledge and technologies which improve productivity and competitiveness of practitioners.

5.3.3 ADVERTISING AS INFORMATION

In recent theoretical literature, advertising is discussed in the framework of the theory of information. Much of it is based on Stigler (1961) who postulated a market in which a homogeneous product is sold at different prices because information is imperfect and costly to acquire. The consumer can improve his position by searching for lower-priced sellers. His expected gain varies directly with the dispersion of asking prices. Assuming diminishing returns to information searching and constant or increasing marginal costs of search, consumer equilibrium is attained when marginal cost is equal to expected marginal savings from discovering lower prices. Over a number of periods the optimum quantity of search varies directly with the correlation of asking prices in successive periods.

5 For example, Friedman (1962) speculated that innovation in the delivery of medical services would be stimulated if entry barriers arising from licensure were removed. Similarly, Frech and Ginsburg (1974) argue that optimal organization of the medical practice industry is inhibited by bars against prepaid groups, corporate practice of medicine and advertising.
An extension of Stigler's theory deals with products of heterogeneous quality and the consumer is assumed to trade off the cost of additional information against the expected gain measured on a quality-price scale. The expected gain varies directly with the dispersion of both asking prices and quality. The search costs are higher because it is difficult to obtain and evaluate information on quality differences.

Nelson (1970, 1974) argues that the role of advertising as a source of information differs as between "experience" and "search" goods. Search goods (for example, an automobile or television set) can be inspected and their quality determined prior to purchase. This is generally impossible for the experience goods (for example, food and beverages). Stigler's theory applies only to search goods.

While the expected gain from information for search goods is the same as for experience goods, the costs of information are different. The optimal decision rule requires the consumer to continue to purchase information (by way of experience) until the expected marginal gain is equal to the marginal cost. For experience goods, the marginal cost is equal to the loss of utility from consuming a brand chosen at random rather than consuming the best brand one has already discovered.

The theory has two important predictions. First, firms will have greater monopoly power for experience than for search goods since search costs are greater for the former than for the latter. The number of experience goods searched and the number of competing brands will be smaller than in the case of search goods. Their cross-elasticities of demand will, therefore, also be lower. Second, the theory predicts that recommendations of others will be used more often for experience than for search goods. Since the frequency with which one can seek guidance from others is limited, a rational consumer will resort to this source primarily when purchasing goods for which information is most costly to obtain.

According to Nelson (1974, 32),

advertising of experience qualities increases sales through increasing the reputability of the seller, while advertising of search qualities increases sales by providing the customer with 'hard' information about the seller's product. (emphasis added)

His empirical evidence also suggests that advertising of experience goods consists predominantly of indirect information while advertising of search goods supplies predominantly direct information.
Professional services exhibit considerable quality variation so that Stigler's theory which deals with homogeneous products does not apply. Our earlier discussion suggests that they are experience rather than search goods. Recommendations of others play an important role in gathering information. Indeed, in most S-R professions, they are regarded as the only respectable and acceptable means of disseminating information about the quality of services provided by various practitioners.

In summary, the potential benefits from advertising of professional services appear considerable. In spite of licensing and fee-setting arrangements, the dispersion of fees and quality of professional services is large. Under these conditions, information theory predicts high search costs and important consumer benefits from lifting of bans on advertising.

Advertising would also reduce the degree of monopoly power in these markets by increasing the number of practitioners directly competing for any consumer. At present, most consumers rely on the recommendations of others in choosing practitioners and are thus able to obtain information only on a limited segment of the relevant market. Advertising would widen the information base and make it easier to compare both prices and quality characteristics.

5.4 POTENTIAL ADVERSE EFFECTS OF PROFESSIONAL ADVERTISING

5.4.1 IMPACT ON QUALITY OF SERVICES

Opponents of advertising in the professions usually advance three arguments in support of the view that its negative effects would outweigh its benefits. One is that advertising by individual practitioners would amount to self-praise rather than providing objective information; it would thus mislead the layman and create unrealistic expectations. Secondly, since consumers are unable to evaluate the quality of professional services, it is argued that advertising may help low-quality practitioners to gain customers at the expense of high-quality practitioners. The result would be a reduction in the average quality of services supplied by practitioners. Finally, it is suggested that the burden of advertising expenditures would force many practitioners to cut corners and thus reduce quality in attempting to stay competitive.6

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6 Baird (1977) disputes the contention that average quality would fall as a result of permitting advertising in the professions. Our analysis in Chapter 4 led to the conclusion that the average quality supplied by practitioners would fall since lower prices mean higher market shares for lower quality practitioners. However, as argued below, average quality is not the appropriate index of social welfare.
The first objection to professional advertising is based, to some extent, on historical evidence. At present, however, misleading advertising can be effectively regulated by appropriate legislation. Furthermore, evidence from product markets suggests that the public may be able to separate valuable information from the self-praising component of professional advertising.

The second objection is clearly invalid in those situations where professional services (for example, engineering, architecture, law, etc.) are sold to business firms and government agencies. These buyers typically have the ability and resources to assess their quality. Generally, however, we have argued above that advertising is likely to increase the market share of new entrants and practitioners with excess capacity. Since advertising would lead to lower fees, it would also increase the market shares of lower-quality practitioners (see Chapter 4). Therefore, the average quality of services supplied by duly qualified practitioners would be reduced.

This need not necessarily mean a net social loss. Friedman (1962) asserts that the appropriate measure of social benefits is not the average quality of services supplied, but average quality of services consumed. Since advertising would reduce fees, it would also lead to a reduction in the number of consumers who obtain services from unqualified practitioners. This would raise the average quality of services consumed.

The third argument against advertising which suggests that practitioners would cut corners to stay competitive has been disputed by Baird (1977). He points out that advertising expenditures would be paid from economic profits which are earned in most professions because of entry barriers. He argues further, that competition would make it risky to cut corners because it would lead to loss of customers. Baird's argument, while persuasive, concentrates exclusively on the response of individual practitioners, but it ignores the impact of advertising on the redistribution of market shares among practitioners of various qualities and the consequences for average quality of services discussed above.

The use of average quality (however defined) as a criterion appears to be based on a partial assessment of the net social benefits (or costs) of advertising. Maximization of average quality of services supplied by duly qualified practitioners would result in an enormous reduction in the number

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7 See, for example, Lees (1966, 25).
of practitioners and would not likely represent a net social benefit. A suitable criterion involves a comparison of social costs and benefits of advertising. The social costs are measured by, among other things, advertising expenditures and the value placed on the aggregate reduction (or increase) in quality. Benefits are represented by the increase in the value of services consumed (or purchased from practitioners) as a result of advertising. An increase in the average quality of services is not uniquely related to this measure of net social benefit.

5.4.2 EFFECT ON INDUSTRY CONCENTRATION AND ENTRY

Much of the vast literature on the relationship between advertising and competition explores the link between advertising spending and industrial concentration. The underlying rationale of these studies is the notion that concentration determines the degree of competitiveness and, ultimately, the level of economic welfare, although the validity of these inferences is increasingly being questioned.8

Kaldor (1950) hypothesized that the large absolute size of advertising expenditures confers a disproportionately large advantage on large firms and that, given an initial size distribution of firms, the larger ones will grow at the expense of the others. This occurs primarily because there exists a threshold of perception which, in some markets, can be overcome only by substantial amounts of advertising. Moreover, the negative impact of competitive advertising is felt much more strongly by the smaller than by the large firms. The results of several empirical studies, among them Else (1966) and Kaldor and Silverman (1948), are consistent with the hypothesis that advertising is the key factor explaining concentration ratios. On the other hand Jastram (1949), Telser (1964) Doyle (1968) and others, concluded that the hypothesis should be rejected.9

The related proposition that advertising is a barrier to entry assumes that established firms have an advantage over potential entrants. They may be prepared to forego short-run profits and deter entry by increasing their advertising expenditures and/or by reducing prices. According to this

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8 See, for example, McGee (1971), Demsetz (1973) and Peltzman (1977).

9 The many empirical studies on this issue have been reviewed for example by Weiss (1971) and Mann (1974).
hypothesis, advertising can be an effective entry barrier if there are increasing returns to scale in product differentiation or pecuniary economies of scale where unit costs of advertising messages decline with the quantity purchased.10

Empirical investigation failed to find pecuniary economies of scale in the magazine industry although some evidence suggests they exist in the TV industry.11 Studies by Dean (1951), Bain (1956), Telser (1964), Comanor and Wilson (1974) and others provided theoretical and empirical support for the existence of technical economies of scale in advertising. They concluded that advertising lowers cross-elasticities of demand, fosters oligopolistic market conditions and gives differential advantage to established firms over potential entrants.

The applicability of these conclusions to the market for professional services seems to be limited. The nature of production and distribution of professional services severely constrains the optimum size of firms. Even if there were technical economies of scale in advertising, diseconomies of scale in production and distribution would offset them. It is therefore unlikely that removal of bans on professional advertising would increase industry concentration.

The cost of setting up and operating a practice would, of course, increase. It is questionable whether this increase would give differential advantage to established firms over potential entrants and thus act as a barrier to entry. First, the proportion of advertising expenditures to total costs in this market is probably very small and the resulting barrier is not important. Second, if advertising is permitted and fee competition is allowed, then the benefits to new entrants are likely to more than offset the costs. Since new entrants charge lower fees while building up their reputation and gaining experience and advertising speeds up consumer reaction to a reduction in fees, the time necessary to build up a viable practice would be reduced. Third, advertising widens the range of practitioners considered by any one consumer, disrupts the existing client-practitioner loyalties and thus facilitates new entry.

10 Brozen (1974) offers a powerful criticism of the view that advertising constitutes a barrier to entry.

11 See, for example, Blank (1968) and Peterman (1968).
5.5 SOME EMPIRICAL EVIDENCE

We concluded above that empirical evidence on the effects of advertising in the product markets is inconclusive and in any case would be unlikely to carry over to professional services. Recent studies by Benham (1972), Benham and Benham (1975) and Cady (1976) provide some direct evidence for two such markets: eyeglasses and prescription drugs.

Benham (1972) analyzed the relationship between restrictions on professional advertising and prices of professional services. Using data from a 1963 U.S. survey of a national sample of individuals, he computed average prices of eyeglasses and of eyeglasses and eye examination combined, in different states. In those states where advertising was restricted, the price of eyeglasses alone was, on the average, $6.70 (or 25.4 percent) higher than in the states where it was permitted. For eyeglasses and eye examination combined, the difference was $3.86 or 10.4 percent. (These differentials are statistically significant at the 0.01 level and are unadjusted for socioeconomic factors.)

Benham also calculated partial differences due to advertising obtained from multiple regression analysis in which socioeconomic factors are included. The partial differences were, respectively, $7.48 and $4.33 for eyeglasses and eyeglasses and eye examination combined. These differences were statistically significant at the 0.05 level.

Benham and Benham (1975) examined the overall impact of professional control on the prices paid for eyeglasses and on the likelihood that individuals obtain eyeglasses during a given period. They constructed three indices of professional control, one of which was a set of three dummy variables measuring the extent of influence over dissemination of information. All professional control variables in their price equation had the expected signs and were significantly different from zero at the 0.01 level. In their demand equation, the price variable remained highly significant while all the coefficients of the professional control variables were less than 1.2 times their respective standard errors. Thus, the higher proportion of individuals obtaining eyeglasses in states with low degrees of professional control is not caused by the ability of unregulated sellers to lure the credulous and ignorant members of the public to their offices for the purposes of "fleecing them". Prices are 25 to 40 percent higher in markets with greater professional control and these higher prices are associated with a significant reduction in the proportion of individuals obtaining eyeglasses during a year.
Cady (1976) studied the impact of advertising on the average quality of service and prices in the market for prescription drugs. The mean price for a "basket" of 10 most-frequently sold drugs was $3.64 in states with no restrictions on advertising and $3.83 in states with one or more restrictions. The difference was significantly different from zero at the 0.01 level. The average quality of services was measured by the proportion of pharmacies offering delivery, prescription credit accounts, emergency services, family prescription monitoring and prescription waiting areas. States with no advertising restrictions provided better emergency service but worse family prescription monitoring. The differences in the other measures of quality were not statistically significant. These results support the view that permission of advertising in this market does not reduce the average quality of services supplied by practitioners.

While these studies suggest that advertising can significantly reduce prices and that the average quality of services supplied by practitioners need not be reduced, caution should be exercised in generalizing their results to other professions. The main reason is that both in pharmacy and in optometry, professional services are associated with the delivery of a product. This characteristic places these professions somewhere in between pure product and pure service markets.

5.6 CONCLUSION

In this chapter we have discussed certain characteristics of the professional service markets as a basis for determining the extent to which conclusions on the effects of advertising in product markets are likely to hold in the market for professional services. We have also reviewed recently published empirical studies which have examined the effects of advertising in two markets for professional services.

We conclude that advertising is unlikely to permit realization of significant economies of scale in production and distribution of services. The exception may be new entrants operating with excess capacity during the period when they are building a clientele and charging lower fees, or any other practitioners with excess capacity. In addition, advertising may also increase the number of practitioners in group practice which, at least in some professions, appears to be a more efficient form of organizing the supply of professional services.

It is uncertain whether advertising per se will spur technological progress in the professions. In product markets, the argument that advertising promotes technological progress assumes oligopolistic market conditions which do not prevail in
the market for professional services. However, the competition induced by advertising is likely to increase the application of knowledge and adoption of techniques which improve the productivity of practitioners.

The main benefit from advertising in the market for professional services is an increase in the supply of information on fees, qualifications, experience and specialty of practitioners. This will reduce consumer search costs and increase the number of practitioners sampled by a typical consumer. The effect would be to lower the dispersion of prices and increase cross-elasticities of demand. In other words, advertising in the professions is expected to reduce rather than increase monopoly power.

Advertising is unlikely to be a barrier to entry into the professions. On the contrary, it should make entry easier by shortening the period required by a new entrant to obtain a viable number of customers.

Limited empirical evidence in the U.S. markets for eyeglasses and prescription drugs appears to indicate that advertising can significantly reduce prices. The view that advertising leads to a deterioration in average quality of services supplied by practitioners is not supported. These markets are, however, atypical: the practitioners supply services as well as products. Extrapolation of the above conclusions to professional markets in general should therefore proceed with caution.
6.1 INTRODUCTION

In this chapter we specify an earnings function and analyze the results of its estimation. The rationale for our method of accounting for the effects of specific restrictive practice variables on earnings is discussed in section 6.2. In section 6.3, we review problems arising from attempts to measure monopoly earnings in a human capital framework. The two most widely used functional forms for estimating earnings functions are outlined in section 6.4. Section 6.5 gives a description of the data used in our empirical analysis; estimation is discussed in section 6.6 and the results are presented and analyzed in section 6.7. Monopoly earnings are quantified in section 6.8. Some qualifications to the empirical analysis are made in section 6.9, and section 6.10 concludes the chapter.

6.2 OCCUPATION AS AN EXPLANATORY VARIABLE

The conceptual basis of the earnings function is the human capital model as formalized by Becker (1964, 1967) and extended by Mincer (1974) and others. The model suggests that earnings differentials among individuals working in various occupations are mainly due to (a) differentials in endowments of human capital variables, experience, ability, family and social background variables; (b) differentials in non-monetary returns and risk associated with work in various occupations and the employment status of workers; (c) differentials in hours worked.1 It is disputed whether, in addition to these variables, the occupation to which an individual belongs is a separate explanatory variable.

Becker (1964, 86), and Rogers (1967, 27) have argued that occupation is not an independent explanatory variable in an earnings function because it is the means through which investments in human capital affect earnings. In Becker's words, inclusion of occupation "over-corrects" for the effects of human capital investments. Most empirical estimates of earnings functions have excluded occupation as an explanatory variable no doubt, in part, for this reason (Jencks, 1972, and Mincer, 1974).

1 For a comprehensive discussion of factors affecting earnings see Becker (1964).
In some studies, the variable has been included as a proxy for non-monetary factors like fringe benefits, working conditions and consumption benefits (Hanoch, 1967, 312). Others have seen it as representing differential barriers to entry into various occupations (Dodge, 1972a, 1972b). Dodge (1972b, 40) has gone as far as to suggest that if education is used as a barrier to entry then

'occupation (is) the appropriate variable to enter in the earnings model, not education.

Duncan (1976) examined the empirical relationship between non-monetary returns and education, experience and social background variables. He classified non-monetary returns into three categories: fringe benefits including employer financed medical and dental insurance and pension plans, paid vacations, sick leaves etc., which, in principle, can be quantified; working conditions consisting of factors related to health and safety characteristics of an occupation, rigidity of work schedule and degree of work autonomy; consumption benefits referring to the flow of satisfaction derived from one's work or work situation. Duncan found a strong empirical relationship between education and fringe benefits and working conditions.2 This implies that exclusion of non-monetary variables in an earnings function gives biased estimates of the coefficient on the education variable.

This taxonomy of non-monetary returns also suggests that it may be impossible to determine a priori the sign of the coefficient of the occupational variable in an earnings function. It is reasonable to assume that professions like medicine, dentistry and law provide better working conditions than, for example, engineering and surveying.3 However, because of the high proportion of self-employed individuals in the former professions, fringe benefits are lower than in the latter. In addition, it is not clear which professions provide more consumption benefits since the utility derived from these benefits depends, in part, on individual preferences. For these

2 No data on consumption benefits was available. In general, consumption benefits are difficult to quantify partly because their evaluation differs among individuals within and across occupations.

3 It could reasonably be argued that conditions of work in, for example, civil and mechanical engineering or surveying present greater safety hazards than those in law and medicine.
reasons and also because occupation and education are likely to be highly collinear, we are led to the conclusion that estimated coefficients on occupational variables are, at best, "coefficients of ignorance".

If occupation is included in an earnings function to represent differential entry barriers, it may be possible, under certain conditions, to determine a priori the signs of the occupational coefficients. For example, entry barriers may be represented by occupational dummy variables, one of which is dropped for the purpose of running the regression. If one knows a priori whether entry barriers in the dropped occupation affect earnings to a smaller or greater degree than in the remaining occupations, one can determine the signs of the estimated coefficients of occupational variables. However, it would be necessary to assume that occupational variables represent only conditions of entry, but do not reflect non-monetary returns and other restrictive practices including restrictions on fee competition and advertising. These assumptions appear to be unrealistic.

The position taken in this study is that it is best to exclude occupation as an independent explanatory variable in an earnings function partly for reasons advanced by Becker (1964) and partly for reasons outlined above. An appropriate method of accounting for monopolistic behaviour in the market for professional services is to include specific restrictive practices as explanatory variables. The fringe benefit and working condition components of non-monetary returns are measured by employment status as a proxy variable. The proportions of self-employed individuals in different professions vary significantly. For example, in Ontario in 1970 they ranged from a low of 0.003 for mathematicians, statisticians and actuaries to a high of 0.8109 for osteopaths and chiropractors. In addition, we believe that our variables measuring hours and weeks worked represent, in part, non-monetary returns of the working condition type.

The approach adopted here has several advantages. Statistically, specific restrictive practice variables are less likely to be collinear with, for example, schooling than the occupational dummy variables. Correlation will, of course, be present if (excess) schooling is one of the means through which restrictive practices work. This is most likely to be the case with respect to the variable measuring restrictions on entry. Furthermore, there is no reason to expect any correlation between the restrictive practice variables and omitted non-monetary variables measuring consumption benefits. This means that the coefficients of restrictive practice variables are not likely to be estimated with bias from this source.
The main advantage of our approach is its applicability to the formulation and enforcement of competition policy in the markets for professional services. The policy makers require some knowledge of the relative importance of the various restrictive practices in resource misallocation. In addition, for given restrictive practices, it is important to identify (in quantitative terms) their importance in different professions. On the basis of this information it is possible, in principle, to formulate optimal strategies in enforcement of competition policy.

6.3 COMPETITIVE AND MONOPOLY EARNINGS

Measurement of monopoly earnings in a profession presupposes knowledge of the competitive level of earnings. Human capital theory suggests that under competitive conditions an individual's earnings depend on his levels of human capital, experience, non-monetary returns in the profession in which he works, hours worked and family and social background variables. If the profession restricts competition then an individual's earnings will also depend on the levels of restrictive practice variables.

In this study we operationally define monopoly earnings as the earnings due to or explained by restrictive practices. Since different professions in different provinces may apply these restrictions with varying stringency, each restrictive practice has to be measured by a set of dummy variables. The varying degrees of restrictiveness are represented by levels (categories) within each set. In addition to the direct (primary) effect on professional income, some restrictive practices may also influence earnings by means of interactions with other variables. This problem arises in the context of linear earnings functions and we discuss it in section 6.4 below.

Assuming a linear earnings function with no interactions among the explanatory variables we may write

\[ Y_t = \mu + \sum_{r=1}^{m_z} \alpha_r z_{rt} + \sum_{i=1}^{m_x} \sum_{j=1}^{n_i} \beta_{ij} X_{ijt} + \epsilon_t, \quad t=1, 2, \ldots, T \]  

(6.1)

where
\[ Y = \text{the } t^{\text{th}} \text{ individual level of total wages, salaries, commissions and self-employment income.} \]

\[ z = \text{the } t^{\text{th}} \text{ individual level of the deviation of the } r^{\text{th}} \text{ continuous variable from its mean.} \]

\[ X_{ijt} = \text{dummy variable taking a value of 1 if the } t^{\text{th}} \text{ individual belongs to the } j^{\text{th}} \text{ category of the } i^{\text{th}} \text{ set of categories, zero otherwise.} \]

\[ T = \text{the total number of individuals in the sample.} \]

\[ m = \text{the total number of continuous variables.} \]

\[ z = \text{the total number of sets of primary dummy variables.} \]

\[ n = \text{the total number of dummy variables in the } i^{\text{th}} \text{ set of dummy variables.} \]

\[ \varepsilon = \text{the disturbance term for the } t^{\text{th}} \text{ individual.} \]

\[ \mu, \alpha_{ij}, \beta_{ij} \text{ are constants.} \]

and

\[ \sum_{j=1}^{n_i} X_{ijt} = 1, t=1, 2, \ldots, T; \ i=1, 2, \ldots, m_x. \]

The coefficients \( \alpha \) measure the additional earnings due to a marginal increase in the \( r^{\text{th}} \) continuous variable. The coefficients \( \beta \) measure the additional earnings due to the fact that an individual belongs the \( j^{\text{th}} \) category of the \( i^{\text{th}} \) set of categories.
Our model contains five restrictive practice variables: conditions of entry, mobility restrictions, fee-setting restrictions on professional advertising and citizenship requirements. The impact of the first four variables on earnings was discussed in detail in Chapters 3, 4, and 5. The fifth variable measures entry barriers created by the requirement that a potential entrant must possess specified citizenship status as a condition for licensing.

For each of the restrictive practice variables, several categories (ranging from 3 for citizenship to 5 for mobility) were identified according to the degree of restrictiveness of competition. (Definitions of the categories are given in Appendix A.) For each restrictive practice, the first (and in some cases the first and second) category defines an empirical approximation of unrestricted competition. Inclusion of professions like chemists, economists, and geologists in our sample ensures that this category has a non-zero number of observations. Its presence is important in interpreting estimated coefficients of the other or non-competitive categories (see Section 6.6 below).

By "competitive earnings", we mean earnings explained by human capital variables, experience, hours worked, employment status and the constant term. They exclude earnings explained by ethnic origin, marital status, economic region of work and all the restrictive practice variables. By "monopoly earnings", we mean earnings explained by restrictive practice variables. They exclude earnings arising from, for example, economic discrimination based on ethnic origin or marital status. General equilibrium considerations are not taken into account in specifying the earnings function (6.1). Our definition of competitive earnings therefore does not make them identical to the level of earnings which would obtain if competition was unrestricted in all professions.

To see the economic impact of abolishing barriers to competition in a general equilibrium framework, consider the removal of entry barriers. Specifically, suppose that licensing arrangements in all previously licensed occupations were abolished. This would reduce costs of entry into these professions inducing practitioners from previously competitive professions to enter. As a result, the mean earnings in the previously non-competitive professions would fall while mean earnings in the previously competitive professions would rise. The final equilibrium mean level of earnings in the previously competitive professions after the abolition of entry barriers is, therefore, higher than before. This suggests that what we are referring to as the competitive level of earnings, understates the level of earnings that would be obtained under free entry into all professions.
The impact of lifting restrictions on fee competition and advertising is less clear. Consider, for example, the impact on mean earnings of lifting restrictions on fee competition. Suppose, for simplicity, that there are two professions, X and Y, supplying two types of professional services. Initially, suppose that in profession X fees are set in order to maximize aggregate earnings (see Chapter 4) and there is free competition in profession Y. Other things remaining the same we would expect mean earnings to be higher in profession X than in profession Y (see Chapter 4). Our specification of the earnings function assumes that earnings in profession Y are competitive.

Next, suppose that fee-setting in profession X is abolished. The question is whether the mean level of earnings in profession Y is the same before and after fee-setting is abolished in profession X. This depends on, among other things, the relationship between services supplied by profession X and those supplied by profession Y. If the services are independent, earnings in profession Y are unaffected by the change in profession X. If the services are substitutes, then mean earnings in Y would fall because competition in profession X would cause fees to fall and cause an inward shift in the demand for services supplied by profession Y. Similarly, if the services are complements, mean earnings in profession Y would rise as a result of a reduction in fees in profession X.

The overall effect of restrictions on competition on earnings in the professions is the difference between earnings which would obtain in the absence of such restrictions and those which obtain in their presence. For reasons outlined above, our estimated "competitive" earnings are not precisely equal to earnings which would obtain in the absence of monopoly restrictions. Therefore, our measure of monopoly earnings which assumes that the estimated competitive earnings correspond to the true competitive earnings, is not an unbiased estimate of monopoly earnings. However, it is difficult to determine a priori the direction of the bias.

6.4 FUNCTIONAL FORM

Two functional forms of earnings functions are typically applied. The linear model (6.1) is the most widely estimated (see, for example, Duncan, 1976; Holmes, 1974; Schrank, 1977 and Ashenfelter and Mooney, 1968). Its main advantage is that its coefficients have a simple and straightforward interpretation. It also permits accounting for interaction effects between variables in a more flexible manner than non-linear functional forms.
One of its disadvantages is that with a moderate number of explanatory variables which are highly interactive, it may not be possible to include all interaction variables without encountering severe multicollinearity. Furthermore, even for a moderately sized sample, the number of observations in some categories of the interaction variables is likely to be small. As a result, statistical significance suffers. Since the cost of running a regression is a function of the number of explanatory variables, a linear model with a moderate number of explanatory variables may be very costly if all interaction variables are included. Finally, there is some evidence that the error term in a linear earnings function is heteroskedastic so that application of least squares leads to inefficient and unreliable estimates.4

Since the linear model is widely used, we have also experimented with it. To avoid the problems raised by an unwieldy large number of righthand variables, we have only considered a limited number of interaction terms. Specifically, we have incorporated the interaction between employment status and all restrictive practice variables. The marginal effects of restrictive practice variables on earnings appear to differ significantly between self-employed and other practitioners. The impact of fee-setting and bans on advertising is most direct and significant for self-employed practitioners. These arrangements affect the wages and salaries of other practitioners indirectly insofar as there is a "normal" differential in earnings between the two classes of practitioners. Similarly, some types of employers, notably federal and provincial governments, are usually exempted from rigorous application of licensing laws. As a result, entry and mobility restrictions are likely to have a differential impact on earnings in professions differing in the proportions of self-employed practitioners.

Our discussion in Chapter 4 led to the conclusion that the heterogeneous quality of services supplied by different practitioners in a profession results in a considerable dispersion of fees for a given service in spite of fee-setting arrangements. In Chapter 5, we noted that the impact on fees of abolishing restrictions on professional advertising depends, among other things, on the dispersion of fees. Since fee competition gives rise to greater dispersion of fees, it follows that fee-setting and advertising have an important interaction effect on earnings.

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4 See, for example, Dodge (1972b, 42), Rogers (1967) and Hunt (1963).
Nevertheless, we have not included any terms accounting for interactions between these variables in our regressions. Given the existing correlation between fee-setting and advertising variables, inclusion of interactions between them would have aggravated the problem of multicollinearity. We have also excluded the (possibly) important interactions between schooling and hours worked, on the grounds that the additional number of variables would be too large. This is so because both schooling and hours worked are specified as qualitative variables with several levels in each.

The linear earnings function with limited number of interaction terms incorporated may be written as

\[ Y_t = \mu + \sum_{r=1}^{m_z} \alpha_r z_{rt} + \sum_{i=1}^{m_x} \sum_{j=1}^{n_i} \beta_{ij} x_{ijt} + \sum_{k=1}^{m_w} \sum_{s=1}^{n_s} \gamma_{ks} w_{ks} + \epsilon_t \]  

for \( t=1, 2, \ldots, T \),

where \( W \) is the \( s \) category of the \( k \) set of categories of the interaction between employment status and restrictive practice variables, and \( \gamma \) are the additional earnings due to the fact that an individual belongs to this category.

The empirical results from estimating (6.2) were poor. This fact, along with the disadvantages of the linear model mentioned above, convinced us not to use this functional form as the main basis of our empirical analysis.

The semi-logarithmic form of an earnings function may be written as

\[ \log Y_t = \mu + \sum_{r=1}^{m_z} \alpha_r z_{rt} + \sum_{i=1}^{m_x} \sum_{j=1}^{n_i} \beta_{ij} x_{ijt} + \epsilon_t \]  

for \( t=1, 2, \ldots, T \).

It has two advantages over the linear form. First, it implies interaction without explicitly incorporating interaction variables. Second, it reduces heteroskedasticity in the error term. However, its coefficients do not have the simple interpretation as those of the linear form. The coefficient \( \alpha_r \)
measures the proportional increase in earnings due to a unit absolute increase in the r th continuous variable. The coefficient \( \beta = \log (1 + \Phi) \), where \( \Phi \) is the relative effect on earnings due to the fact that a profession belongs to the j th category of the i th set of categories.5

Since absolute difference in righthand continuous variables give rise to proportional increases in earnings the semi-logarithmic model implies rapidly increasing returns with respect to each continuous explanatory variable. In our case, the continuous variables are experience and experience squared. Since the coefficients of these variables have opposite signs their net effect implies the conventional inverted U-shaped age earnings profiles even though the underlying function is semi-logarithmic.

6.5 VARIABLES AND DATA

6.5.1 VARIABLES

The listing and definitions of variables employed in the regressions are presented in Table 6.1. For a variety of reasons, sex, pre-school training and ability are not among the explanatory variables. Pre-school training is usually measured by father's occupation or father's and/or mother's level of education (Leibowitz, 1974). Neither proxy is available in our data base. Similarly, our data does not provide information on ability of individuals in the sample.

The sample consists exclusively of male professionals. As explained above, if both sexes were considered, it would have been necessary to include a variable representing sex. Unfortunately, this variable is highly collinear with education

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5 In much of the literature, the coefficient of a dummy variable in a semi-logarithmic regression (multiplied by 100) is incorrectly interpreted as the percentage effect of that variable on the variable being explained (in other words, it is assumed that \( \beta = \Phi \)). For a discussion of this point, see Halvorsen and Palmquist (1979).
### TABLE 6.1
GLOSSARY OF DEFINITIONS OF VARIABLES USED IN REGRESSIONS

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Variable Name</th>
<th>Number of Categories</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>EMPLINC</td>
<td>CONTINUOUS</td>
<td>Total income received in 1970 as wages salaries and/or net income from professional practice</td>
</tr>
<tr>
<td>Z₁</td>
<td>EXP</td>
<td>CONTINUOUS</td>
<td>Experience = age less number of years of university training less number of years of post-secondary non-university training less 18.</td>
</tr>
<tr>
<td>Z₂</td>
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*For definition of categories, see Appendix B.
Explanatory notes on next page.
EXPLANATORY NOTES TO TABLE 6.1

The content and format of the information in this Table are based on "Tarela Data Dictionary for File" prepared by Statistics Canada for purposes of computer processing of the Census data. The following additional clarifications of the meaning of selected variables are extracted from the various 1971 Census of Canada Bulletins (especially 1.3-1; 3.3-1 and 3.7-1):

EMPLINC: The wages and salaries component consists of amounts before deductions for income tax, pensions, unemployment insurance, etc. The net income from self-employment (professional practice) is defined as gross receipts minus expenses of operation.

USUALHRS: The numbers reported exclude overtime hours unless they were usual, mealtime hours, time spent on other jobs or on own housework or on voluntary work.

NUMWEEKS: Respondents were asked to indicate whether the weeks were mainly full weeks of work or mainly weeks for which they worked only part of a week.

WORKPROV: In addition to the ten provinces, two territories and outside Canada, the Census recognizes "place of work at home" and "place of work not stated". Whenever a sample observation fell into either one of these two categories, the individual was classified by the place of residence.

ETHNIC: Individuals were classified according to their response to the question "To what ethnic or cultural group did you or your ancestor (on the male side) belong on coming to this continent?" If applicable, the language spoken at that time by the person or by his or her parental ancestor was used as a guide. The "Tarela Data Dictionary" recognizes 51 such categories. The seven groups chosen here for regression analysis are typically of most interest to researchers in the field of human capital and income distribution in Canada. All the remaining ethnic groups were included in the category "Others". The category "Canadian" is distinct from Native Indian or Eskimo. It was introduced in recent censuses to respect a person's right to report himself/herself as "Canadian". The number of persons indicating this response is typically low.
and experience (measured by age less years of schooling).6 In addition, our measure of experience is inappropriate for professionals whose attachment to the labour force is intermittent.

Perhaps the most significant omission is that of ability. As we pointed out in detail in Chapter 2, previous studies which have experimented with scholastic ability measures have found mixed effects of this variable on earnings. In our sample, 64.6 percent of individuals had four or more years of university training. It is plausible to argue that in a sample consisting largely of highly educated individuals, omission of the ability variable does not cause a serious bias in estimated coefficients. Ashenfelter and Mooney (1968) found that in such samples, exclusion of ability, measured by scholastic aptitude, has no significant effect on the coefficients of education variables. In addition, it is unclear that scholastic aptitude is the appropriate measure of ability in a human capital context. The appropriate measure is, unfortunately, non-operational (see Chapter 2).

6.5.2 THE SAMPLE OF PROFESSIONS

Our sample consists of twenty professions selected from among the "educated" professions. As of 1970, thirteen of them were licensed in at least one province (although in other provinces they may have been merely certified or not subject to any legislation). Four of our professions were neither licensed nor certified in any province.7

Nearly all self-regulating professions were included; the notable exceptions are accountants and psychologists. Accountants were excluded because their Census category consists of several heterogeneous groups including certified general accountants, registered industrial accountants, chartered accountants and "other financial officers". Assigning uniform degrees of competitiveness to such a heterogeneous group seemed

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6 See, for example, Holmes (1974, 9-10).

7 The last group is constituted by professions in which competition is unrestricted. They are represented in our sample by economists, chemists, geologists and mathematicians, statisticians and actuaries. The other professions restrict competition in one way or another.
less justifiable than was the case for the other professions included in the sample. Psychologists were not included because we were unable to obtain sufficient information about the conduct of their provincial professional associations around the year 1970.8

Other notable omissions were school and university teachers. University teachers were not considered because of the large difference in earnings between those teaching in professional schools and those teaching in non-professional schools and also because of the absence of provincial professional associations acting as bargaining units for members. School teachers were excluded because their total number, 89,545 males in 1970, was such that they would have constituted (too high) a proportion of the sample to be justified by the main issues of interest in this study.

It is evident that the professions in the sample are not a random selection from a population of all occupations. The sample is dominated by the most highly educated professions. Because of this characteristic, there should be less concern about exclusion of a (scholastic) ability variable (Ashenfelter and Mooney, 1968) and variables measuring non-monetary returns (Eckaus et al 1974) than would have been the case if the sample contained also the craft and trade occupations. Even though the professions are not randomly selected, we have no reason to believe that the results of the study do not apply to "educated" professions generally; but any implications for all other occupations should be drawn with considerable care.

6.5.3 DATA

Our sample consists of 4,571 males, randomly chosen from the 1971 Census of Canada file. The data on this file was our sole source of information on the human capital and background

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8 We were unable to find much information pertaining to psychologists in provincial acts and regulations and professional codes of ethics. The group also gave the poorest response to our questionnaire. In Ontario, psychologists are currently attempting to have the profession licensed. Apparently only holders of Ph.D.s in psychology would be licensed to practice if the demands of the Ontario Psychologists Association (OPA) were enacted in law (Psychology Today, September 1978, pp. 23-25). Predictably, the demands for licensure by OPA has aroused significant opposition from other affected groups of professionals.
variables. The Census method employs a 33-1/3 percent sample weighted or "influenced" to correspond to overall population characteristics. Our sampling procedure used the weights applied by Statistics Canada to make our sample comparable to population totals. Our observations consist of males who:

1. in 1971 were 15 years or older,
2. belonged to one of the 20 professions specified in Table 1.1,
3. usually worked for at least 1-19 hours a week,
4. had a positive income,
5. worked in one of the following regions: Atlantic, Ontario, Quebec, Prairies and British Columbia,
6. either were self-employed, with or without paid help, or worked for wages, salaries and commissions.

Data on restrictive practice variables was obtained from a variety of sources including replies to a questionnaire we sent to provincial professional associations (see Appendix D) and information contained in provincial acts and regulations and professional codes of ethics (see Appendix B). An analysis of this data enabled us to assign each profession in each province to one of several basic categories created within each of the five restrictive practice variables (see Appendix A for definitions of the categories). This classification is presented in Tables 6.2 - 6.6.

The information contained in the various sources was generally complementary. In the few cases where there was a discrepancy, the provincial laws and regulations superseded the questionnaire. Only one profession (psychologists) had to be dropped from the sample because of lack of adequate information on market conduct.

Given the lack of data and detailed knowledge of each of the sample professions, we did not attempt to make judgements as to the extent to which restrictions on competition may be more socially justified in one profession as opposed to another (see Sections 1.5.1 and 3.4 above). Our categorization of professions in Tables 6.2 - 6.6 is, therefore, based on the degree of

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9 For details on the weighting procedure, see Brackstone (1971).
### TABLE 6.2

**ASSIGNMENT OF PROFESSIONS INTO CATEGORIES REPRESENTING RESTRICTIVENESS OF CONDITIONS OF ENTRY**

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## TABLE 6.3

**ASSIGNMENT OF PROFESSIONS INTO CATEGORIES REPRESENTING RESTRICTIVENESS OF MOBILITY**

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</tr>
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<td>(2)</td>
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<tr>
<td>Physio. &amp; Occupational Therapists</td>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<td>1</td>
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<td>(1)</td>
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<td>2</td>
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<td>2</td>
<td>2</td>
<td>(2)</td>
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<td>Veterinarians</td>
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<td>3</td>
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<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>(3)</td>
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<td>1.95</td>
<td>1.95</td>
<td>1.95</td>
<td>1.95</td>
<td>1.95</td>
<td>1.95</td>
<td>1.95</td>
<td>1.95</td>
<td>1.95</td>
<td>1.95</td>
</tr>
</tbody>
</table>
NOTES TO TABLES 6.2 - 6.6

1. The Census category "Agriculturalists and related scientists" includes several professions, among them "Agrologists" who are licensed in all provinces except Newfoundland and Ontario while the other professions in this category are not licensed in any province. The level of restrictiveness indicated in our tables refers to agrologists only. Assuming that licensing enhances incomes, our inability to obtain income data separately for the licensed and unlicensed professionals in this Census category imparts a downward bias to the estimates of monopoly incomes due to licensing restrictions.

2. The Census category "Physiotherapists, occupational and other therapists" includes one profession (physiotherapists) which is licensed in all provinces except Quebec and Alberta and others which are not licensed. The figures describing the levels of restrictiveness in our tables refer to physiotherapists only. To the extent that licensing enhances professional incomes, this procedure imparts a downward bias to the regression estimates of this component of income.

3. The Census category "Osteopaths and chiropractors" includes two professions which differ both in the amount of training they possess and in the degree to which they are regulated in different provinces (for details, see Appendix B). While educational differences are accounted for by a separate variable, a choice had to be made as to the level of restrictiveness to be assigned to this Census category. Since chiropractors are numerically a much larger profession, the levels of restrictiveness indicated in our Tables refer to them.

4. The figures for all categories of engineers are identical since they all belong to a single professional association in each province.
restrictiveness implicit in the relevant laws and regulations unadjusted for possible differences in social justification.10

An examination of these tables leads to several broad conclusions:

1. There is greater interprofessional than interprovincial variation in restrictive practices. The interprovincial variation in mobility restrictions is greater than in restrictions based on citizenship. No significant interprovincial variation in restrictions on advertising and fee competition is present in any of the professions.

2. The interprofessional variation in restrictions on mobility is more pronounced than the variation in restrictions on fee competition and advertising.

3. Surveyors and pharmacists, dentists and lawyers, physicians and surgeons, and optometrists and veterinarians are, in descending order, the most entry-restrictive groups.

4. Lawyers, pharmacists, surveyors, engineers, architects and veterinarians are, in descending order, the most restrictive groups in terms of citizenship requirements.

5. Medicine and veterinary surgery and dentistry are, in descending order, the most restrictive of fee competition and advertising. Architects and engineers are also fairly restrictive in this respect.

6. N.B., B.C., P.E.I. and Saskatchewan are, in descending order, the most restrictive provinces in terms of entry requirements for all professions.

7. Manitoba and N.B.; B.C., N.S. and Nfld. are, in descending order, the most restrictive provinces in terms of mobility.

8. Quebec, B.C. and P.E.I. and N.S. are, in descending order, the most restrictive provinces in terms of citizenship requirements.

10 For an attempt to construct such indexes from, admittedly, very limited information, see Cathcart and Graft (1978).
6.6 ESTIMATION AND INTERPRETATION OF ESTIMATED COEFFICIENTS

We shall suppose that the standard conditions for applying least squares to (6.2) and (6.3) are satisfied. However, since all dummy variable sets are subject to the conditions

\[ \sum_{j=1}^{n_i} X_{ijt} = \sum_{s=1}^{n_s} W_{kst} = 1, \quad i=1, 2, \ldots, m_i; \quad k=1, 2, \ldots, m_w; \quad t=1, 2, \ldots, T, \]

the \((X'X)\) cross-product matrix is singular and, therefore, it is not possible to estimate the coefficients uniquely. There are two common solutions to the problem.

One approach is to estimate, say, (6.2), subject to constraints on the coefficients of the dummy variable sets. It can be shown that the cross-product matrix \((X'X)\) augmented by such constraints is non-singular. If the number of observations in each category of a given set of categories varies, it is usual to require that the weighted sum of coefficients in a set of categories be equal to zero:

\[ \sum_{j=1}^{n_{ij}} \beta_{ij} = \sum_{s=1}^{n_{ks}} \gamma_{ks} n_{ks} = 0, \quad i=1, \ldots, m_i; \quad k=1, \ldots, m_w, \]

where the weight, \(n_{ij}\), is the total number of observations in the \(ij\) category of the \(i\) set of categories and similarly for \(n_{ks}\).

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11 See, for example, Theil (1971).

12 See, for example, Graybill (1961) and Van Baaren (1973).

13 Since the weights are constant and the expression (6.5) is equal to zero, the weights could also be \(n_{ij}/n_i\) (the proportions of the number of observations in the \(j\) category of the \(i\) set). When the numbers of observations in all categories of a given set are identical, it is usual to require the unweighted sum of coefficients to be equal to zero. One problem of estimating (6.2) subject to constraints is that there exists no economic rationale for the constraints imposed.
Since the right-hand continuous variables in (6.2) are deviations from their respective means the constant term is estimated by the mean of the dependent variable. In addition, the estimated coefficients of the dummy variables measure the net differences between the mean of the dependent variable for all observations in a given category and the (overall) mean of the dependent variable when the effects of other variables are held constant (see Appendix C).

Our primary purpose is to measure monopoly earnings and, therefore, it is of interest to examine the implications of this approach for estimates of monopoly earnings. In Section 6.3 we pointed out that for each restrictive variable, the first category represents competitive behaviour. Therefore, when the effects of other variables are held constant, the difference should be negative between the mean level of earnings (the dependent variable) for the competitive categories and the overall mean level of earnings, since for any set of categories, the competitive categories constitute the lower bound of mean earnings. Since individuals in competitive categories earn zero monopoly earnings, it follows that the negative of the estimated coefficients of the competitive categories is an estimate of the mean monopoly earnings (see Appendix C).

The estimated coefficients for the non-competitive categories may be negative, zero or positive. For a given set of categories if an estimated coefficient of a non-competitive category is negative, its absolute value should be smaller than that of the estimated coefficient of the competitive category. This follows from the fact that estimated mean earnings in a competitive category constitute the lower bound of mean earnings for a given set of categories. If the estimated coefficient of a non-competitive category is zero, the estimated mean monopoly earnings are the same as in the competitive category (i.e., the negative of the coefficient of the competitive category). If the estimated coefficient of a non-competitive category is negative (positive), the mean monopoly earnings for the category are equal to the sum of the estimated coefficient of the category and the negative of the estimated coefficient of the competitive category.

An alternative and more common approach to estimating (6.2) is to omit one of the categories in each set. The

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14 See, for example, Sweeney and Ulveling (1972); and Boulet (1975).

15 See, for example, Suits (1957).
coefficients of the remaining categories are estimated as deviations from the coefficient of the dropped category. The constant term is augmented by the sum of the coefficients of all omitted categories. In order to estimate the mean monopoly earnings due to belonging to a non-competitive category, one omits the competitive categories in estimating (6.2). Since individuals in competitive categories earn only competitive incomes, the regression coefficients of the non-competitive categories are estimates of mean monopoly earnings for the respective categories. In Appendix C, we show that these estimates of monopoly earnings are identical to the estimates obtained from the first approach.

The second approach, however, has some important defects. First it is not possible to obtain estimates of coefficients of all categories (other than the competitive category for which a zero coefficient is assumed) unless the researcher has prior knowledge of the magnitude of the coefficients of the omitted categories (or unless they can be calculated indirectly as shown in Appendix C). Second, since the estimated coefficient of the constant term is augmented by the sum of all coefficients of omitted categories it is difficult to give it an economic interpretation. Finally, it is not always clear which category it is most meaningful to omit and, as a result, estimated coefficients can vary depending on the researcher.

All of these defects are not of great significance in computing the mean (or aggregate) monopoly earnings. However, they are important in developing the age-earnings profiles used for computing rates of return from education. The fact that the constant term incorporates coefficients of omitted categories of variables such as region, location, ethnic origin, etc., is a major drawback. This is because the constant term and the effects of education and experience are used to estimate earnings attributable to education and experience and should, therefore, exclude the effects of all other factors.

A major weakness of the first approach is that the interpretation and magnitudes of estimated coefficients depend on constraints used in estimation and usually there is no economic rationale for the choice of a specific constraint. Since our primary concern in this chapter is to estimate monopoly earnings, and both approaches give identical estimates for monopoly earnings, we have used the second approach in estimating our earnings functions. However, in computing the age-earnings profiles in the next chapter, we have modified estimated coefficients of non-restrictive practice variables other than education, experience and experience squared, in order to purge the constant term of the effects of the former set of variables.16

16 See Appendix C.
6.7 EMPIRICAL ESTIMATES OF THE EARNINGS FUNCTION

6.7.1 INTRODUCTION

As explained above, the earnings function is most commonly estimated either in linear or in semilogarithmic functional form. Our estimates of two versions of both specifications (equations (6.2) and (6.3)) are reported in Table 6.7. The first version (regressions 1 and 3) is an earnings function which explicitly includes several licensing restrictions as explanatory variables. The second version (regressions 2 and 4) was estimated without the restrictive practice variables. Our purpose here was to examine the impact of such misspecification on the estimated coefficients of the other explanatory variables, especially education and employment status.

Our linear regressions originally included several interaction terms. For reasons discussed above, the interaction variables were highly collinear with the variables measuring the primary effects and with each other. The statistical quality of our results was thus severely impaired.17 For this reason, the reported regressions do not contain the interaction terms.

17 For example, we estimated a linear earnings function which included, in addition to variables specified in regressions 1 and 3 in Table 6.7, also Conditions of Entry and five interactions. The magnitudes, signs and t-values of the estimated coefficients of all variables other than Worktype and restrictive practices were very close to those reported in Table 6.7. However, the coefficient on Worktype became negative and insignificant (t-value of 0.28), Conditions of Entry had a negative and significant coefficient (t-value of 0.30), the coefficient on Advertising became negative and significant at the 0.10 level (t-value 1.91), while Mobility and Fee-Setting retained positive sign, but their coefficients became insignificant (t-values of 1.55 and 0.13, respectively). Three of the five estimated coefficients on interaction variables had the correct signs and were statistically significant: Worktype with Mobility had t-value of 2.26; Worktype with Advertising had t-value of 7.31 and Advertising with Fee-Setting had t-value of 2.84. The coefficient on interaction between Worktype and Conditions of Entry was negative, but not significant (t-value of 0.69). The coefficient on interaction between Worktype and Fee-Setting was positive with a t-value of 0.03.
### TABLE 6.7

**DETERMINANTS OF EARNINGS FOR THE SAMPLE PROFESSIONS IN CANADA: ESTIMATED REGRESSING COEFFICIENTS**

(T-VALUES IN BRACKETS)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Regression 1</th>
<th>Regression 2</th>
<th>Regression 3</th>
<th>Regression 4</th>
</tr>
</thead>
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<tr>
<td>Constant term</td>
<td>6.8651 **</td>
<td>6.9215 **</td>
<td>-4,045.48 **</td>
<td>-3,216.18 **</td>
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<td></td>
<td>(65.63)</td>
<td>(65.98)</td>
<td>(2.11)</td>
<td>(1.67)</td>
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<tr>
<td>Experience</td>
<td>0.0636 **</td>
<td>0.0641 **</td>
<td>894.63 **</td>
<td>893.38 **</td>
</tr>
<tr>
<td></td>
<td>(25.44)</td>
<td>(25.63)</td>
<td>(19.31)</td>
<td>(19.25)</td>
</tr>
<tr>
<td>Experience squared</td>
<td>-0.0012 **</td>
<td>-0.0012 **</td>
<td>-16.96 **</td>
<td>-16.71 **</td>
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<tr>
<td></td>
<td>-(12.00)</td>
<td>-(12.00)</td>
<td>(17.29)</td>
<td>(17.00)</td>
</tr>
<tr>
<td>University education</td>
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<td></td>
</tr>
<tr>
<td>1 year</td>
<td>0.0441</td>
<td>0.0442</td>
<td>2,353.46 **</td>
<td>2,384.84 **</td>
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<tr>
<td></td>
<td>(0.70)</td>
<td>(0.67)</td>
<td>(2.04)</td>
<td>(2.06)</td>
</tr>
<tr>
<td>2 years</td>
<td>0.0992</td>
<td>0.1094 **</td>
<td>1,028.61 **</td>
<td>1,126.33 **</td>
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<tr>
<td></td>
<td>(1.92)</td>
<td>(2.50)</td>
<td>(1.08)</td>
<td>(1.57)</td>
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<td>3 years</td>
<td>0.2267 **</td>
<td>0.2443 **</td>
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<td>(5.83)</td>
<td>(3.61)</td>
<td>(4.07)</td>
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<td>4 years</td>
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<td>0.3992 **</td>
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<td>(11.25)</td>
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<td>(7.95)</td>
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<tr>
<td>5 years</td>
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<td>0.5003 **</td>
<td>5,106.13 **</td>
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<td>(12.94)</td>
<td>(14.81)</td>
<td>(8.02)</td>
<td>(9.23)</td>
</tr>
<tr>
<td>6 + years</td>
<td>0.5402 **</td>
<td>0.6092 **</td>
<td>8,083.07 **</td>
<td>9,137.85 **</td>
</tr>
<tr>
<td></td>
<td>(16.64)</td>
<td>(20.38)</td>
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<td>(16.70)</td>
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<tr>
<td>Other education</td>
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<tr>
<td>1 year</td>
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<td>-0.0171</td>
<td>-404.72</td>
<td>-486.32</td>
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<tr>
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<td>-(0.20)</td>
<td>-(0.37)</td>
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<td>(0.58)</td>
</tr>
<tr>
<td>2 years</td>
<td>0.0971</td>
<td>0.0885 *</td>
<td>918.29</td>
<td>843.67</td>
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<td></td>
<td>(2.07)</td>
<td>(1.88)</td>
<td>(1.07)</td>
<td>(0.98)</td>
</tr>
<tr>
<td>3 + years</td>
<td>0.1378</td>
<td>0.1444 **</td>
<td>2,044.91 **</td>
<td>2,095.52 **</td>
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<tr>
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<td>(4.49)</td>
<td>(4.86)</td>
<td>(3.63)</td>
<td>(3.71)</td>
</tr>
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<td>Usual hours</td>
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<tr>
<td>20-29</td>
<td>0.3005 **</td>
<td>0.3065 **</td>
<td>729.21</td>
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<td>(2.53)</td>
<td>(2.56)</td>
<td>(0.33)</td>
<td>(0.37)</td>
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<td>0.3186 **</td>
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<td>(3.15)</td>
<td>(1.50)</td>
<td>(1.33)</td>
</tr>
<tr>
<td>35-39</td>
<td>0.4579 **</td>
<td>0.4226 **</td>
<td>4,025.74 **</td>
<td>3,422.60 **</td>
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<td>(5.02)</td>
<td>(4.62)</td>
<td>(2.50)</td>
<td>(2.04)</td>
</tr>
<tr>
<td>40-45</td>
<td>0.4194 **</td>
<td>0.3984 **</td>
<td>4,083.50 **</td>
<td>3,765.88 **</td>
</tr>
<tr>
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<td>(4.64)</td>
<td>(4.30)</td>
<td>(2.46)</td>
<td>(2.26)</td>
</tr>
<tr>
<td>46-50</td>
<td>0.4337 **</td>
<td>0.4361 **</td>
<td>4,570.94 **</td>
<td>4,631.66 **</td>
</tr>
<tr>
<td></td>
<td>(4.63)</td>
<td>(4.63)</td>
<td>(2.66)</td>
<td>(2.69)</td>
</tr>
<tr>
<td>50 +</td>
<td>0.4858 **</td>
<td>0.5109 **</td>
<td>7,156.27 **</td>
<td>7,958.76 **</td>
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<td>(5.31)</td>
<td>(5.55)</td>
<td>(4.26)</td>
<td>(4.43)</td>
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### TABLE 6.7 (continued)

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<th>3</th>
<th>4</th>
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<td>Number of weeks</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14-26</td>
<td>0.7046 **</td>
<td>0.7025 **</td>
<td>725.36</td>
<td>712.83</td>
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<tr>
<td></td>
<td>(13.97)</td>
<td>(13.83)</td>
<td>(0.78)</td>
<td>(0.77)</td>
</tr>
<tr>
<td>27-39</td>
<td>1.1702 **</td>
<td>1.1941 **</td>
<td>6,616.64 **</td>
<td>6,913.64 **</td>
</tr>
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<td>(26.15)</td>
<td>(26.59)</td>
<td>(8.05)</td>
<td>(8.41)</td>
</tr>
<tr>
<td>40-48</td>
<td>1.1798 **</td>
<td>1.1876 **</td>
<td>4,389.77 **</td>
<td>4,258.31 **</td>
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<td>(30.55)</td>
<td>(30.61)</td>
<td>(5.91)</td>
<td>(5.60)</td>
</tr>
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<td>Province of work</td>
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<td></td>
</tr>
<tr>
<td>B.C.</td>
<td>0.0306</td>
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<td>(0.66)</td>
<td>(0.64)</td>
<td>(0.71)</td>
<td>(0.62)</td>
</tr>
<tr>
<td>Prairie</td>
<td>0.0588</td>
<td>0.0452</td>
<td>382.79</td>
<td>172.80</td>
</tr>
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<td></td>
<td>(1.34)</td>
<td>(1.02)</td>
<td>(0.47)</td>
<td>(0.21)</td>
</tr>
<tr>
<td>Ontario</td>
<td>0.1258 **</td>
<td>0.1298 **</td>
<td>1,624.77 **</td>
<td>1,631.17 **</td>
</tr>
<tr>
<td></td>
<td>(3.14)</td>
<td>(3.22)</td>
<td>(2.21)</td>
<td>(2.21)</td>
</tr>
<tr>
<td>Quebec</td>
<td>0.0135</td>
<td>0.0339</td>
<td>-898.86</td>
<td>-774.90</td>
</tr>
<tr>
<td></td>
<td>(0.29)</td>
<td>(0.73)</td>
<td>(1.06)</td>
<td>(0.91)</td>
</tr>
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<td>Ethnic origin</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>French</td>
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<td>0.0203</td>
<td>1,241.68 *</td>
<td>1,368.50 *</td>
</tr>
<tr>
<td></td>
<td>(0.50)</td>
<td>(0.62)</td>
<td>(2.06)</td>
<td>(2.27)</td>
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<tr>
<td>Jewish</td>
<td>-0.0392</td>
<td>-0.0279</td>
<td>-361.93</td>
<td>-89.90</td>
</tr>
<tr>
<td></td>
<td>(-0.95)</td>
<td>(-0.67)</td>
<td>(-0.48)</td>
<td>(-0.12)</td>
</tr>
<tr>
<td>Canadian</td>
<td>0.1657</td>
<td>0.1515</td>
<td>1,328.39</td>
<td>1,143.32</td>
</tr>
<tr>
<td></td>
<td>(0.95)</td>
<td>(0.86)</td>
<td>(0.41)</td>
<td>(0.36)</td>
</tr>
<tr>
<td>Negro/ W. Indian</td>
<td>-0.2533 *</td>
<td>-0.2722 **</td>
<td>-5,924.33 **</td>
<td>-6,191.29 **</td>
</tr>
<tr>
<td></td>
<td>(-2.24)</td>
<td>(-2.39)</td>
<td>(-2.85)</td>
<td>(-2.97)</td>
</tr>
<tr>
<td>Asiatic</td>
<td>-0.2399 **</td>
<td>-0.2270 **</td>
<td>-3,734.74 **</td>
<td>-3,671.14 **</td>
</tr>
<tr>
<td></td>
<td>(-5.13)</td>
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<td>(-4.35)</td>
<td>(-4.27)</td>
</tr>
<tr>
<td>Other</td>
<td>-0.0566 **</td>
<td>-0.0590 **</td>
<td>-1,180.19 **</td>
<td>-1,256.90 **</td>
</tr>
<tr>
<td></td>
<td>(-2.30)</td>
<td>(-2.47)</td>
<td>(-2.70)</td>
<td>(-2.87)</td>
</tr>
<tr>
<td>Municipal resid.- type</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Largest city</td>
<td>0.1855 **</td>
<td>0.1869 **</td>
<td>1,860.54 **</td>
<td>1,890.22 **</td>
</tr>
<tr>
<td></td>
<td>(5.15)</td>
<td>(5.15)</td>
<td>(2.81)</td>
<td>(2.79)</td>
</tr>
<tr>
<td>Urban core</td>
<td>0.2354 **</td>
<td>0.2433 **</td>
<td>2,389.27 **</td>
<td>2,414.29 **</td>
</tr>
<tr>
<td></td>
<td>(6.44)</td>
<td>(6.62)</td>
<td>(3.56)</td>
<td>(3.59)</td>
</tr>
<tr>
<td>Urban fringe</td>
<td>0.1973 **</td>
<td>0.2056 **</td>
<td>1,653.14 **</td>
<td>1,717.48 **</td>
</tr>
<tr>
<td></td>
<td>(5.43)</td>
<td>(5.62)</td>
<td>(2.48)</td>
<td>(2.57)</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Married</td>
<td>0.1454 **</td>
<td>0.1340 **</td>
<td>137.60</td>
<td>184.63</td>
</tr>
<tr>
<td></td>
<td>(5.53)</td>
<td>(5.82)</td>
<td>(0.88)</td>
<td>(0.38)</td>
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</table>
### TABLE 6.7 (continued)

<table>
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<th>Regression Variable</th>
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<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of work</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-employed</td>
<td>0.2721**</td>
<td>0.3325**</td>
<td>6,936.46**</td>
<td>7,947.61**</td>
</tr>
<tr>
<td></td>
<td>(10.22)</td>
<td>(13.41)</td>
<td>(14.19)</td>
<td>(17.51)</td>
</tr>
<tr>
<td>Mobility</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restricted</td>
<td>0.0424*</td>
<td></td>
<td>1,260.44**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.77)</td>
<td></td>
<td>(2.66)</td>
<td></td>
</tr>
<tr>
<td>Fee-setting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effective</td>
<td>0.1118**</td>
<td></td>
<td>742.81*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(5.44)</td>
<td></td>
<td>(1.97)</td>
<td></td>
</tr>
<tr>
<td>Advertising</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restricted</td>
<td>0.1028**</td>
<td></td>
<td>1,549.32**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(3.14)</td>
<td></td>
<td>(2.58)</td>
<td></td>
</tr>
<tr>
<td>$R^2$ adj. for d.f.</td>
<td>0.56</td>
<td>0.56</td>
<td>0.41</td>
<td>0.40</td>
</tr>
<tr>
<td>F ratio</td>
<td>157.60</td>
<td>166.54</td>
<td>84.56</td>
<td>90.04</td>
</tr>
<tr>
<td>N</td>
<td>4,571</td>
<td>4,571</td>
<td>4,571</td>
<td>4,571</td>
</tr>
</tbody>
</table>

** Indicates significance at the 0.01 level in a one-tail test.
* Indicates significance at the 0.05 level in a one-tail test.

** Notes:**
1) In regressions 1 and 2, the dependent variable is the natural logarithm of income; regressions 3 and 4 are linear.
2) For a glossary and definitions of variables see Table 6.1.
Regression 1 in Table 6.7 is a semi-logarithmic functional form of the earnings function which includes the restrictive practice variables. The estimated coefficients from this regression constitute the basis for our evaluation of misallocation of resources caused by professional licensing restrictions, as well as for calculating the internal rates of return to human capital in selected professions. The estimates of the other three regressions reported in the table are used primarily for purposes of comparison with regression 1 and critical evaluation of previously published studies.

By standard criteria, the results of regression 1 are very satisfactory. The $R^2$ adjusted for degrees of freedom is 0.56 which is good for a regression using cross-sectional observations. Of the estimated 39 coefficients, 27 are significant at the 0.01 level (one-tail test). The F-statistics for this and all the other regressions are highly significant.

Only the coefficient on "Other education, 1 year" has a clearly wrong sign. Since the omitted category in this variable consists of individuals with no "other education", the coefficients of the retained categories should all be positive. Given the fact that the negative coefficient is not statistically significant, this result may simply indicate that one year of non-university education does not enhance incomes in the sample professions.

Regression 2 was estimated without the restrictive practice variables. The results are satisfactory as well. Of the estimated 36 coefficients, all but six are significant at the 0.01 level, the $R^2$ is only marginally lower and the F ratio is highly statistically significant. Again, the coefficients on one year of other education and on the French ethnic origin have unexpected signs but are not significantly different from zero.

We first examine in some detail the estimated coefficients from regression 1. This is followed by an examination of the results of its linear counterpart, equation 3.

6.7.2 HUMAN CAPITAL VARIABLES

The estimated coefficients on the variables measuring experience and experience squared in equation 1 have the expected signs and are highly statistically significant. The positive sign on the first variable and negative sign on the second imply an inverted U-shaped age-earnings profile in conformity with the results of previous studies of similar professions.
The coefficients on all the categories (years) of university training have the expected positive signs. (The distribution of sample individuals by the number of years of university education and by profession is presented in Table 6.8.) The omitted category is represented by individuals with no university training; as expected, the magnitudes of the coefficients increase from lower to higher categories. Thus, for example, the earnings of a representative individual with three years of university training are 25.4 percent higher than those of an individual with none. Practitioners with six or more years of university enhance their earnings by more than 71.6 percent in comparison with those with none. The coefficient on the first category of this variable is not significantly different from zero; this suggests that a single year of university training does not appreciably change the level of earnings of those practicing in the sample professions.

The contribution to earnings of post-secondary education other than university training is considerably smaller than the contribution of an equivalent number of years of university. (The distribution of sample individuals by years of other education and by profession is presented in Table 6.9.) For example, individuals with three years of university training enhance their earnings by 25.4 percent as opposed to those with none. By comparison, three or more years of non-university training raise earnings only by some 14.8 percent above the level which would obtain if the individual had no such training. The coefficient of the one-year level of this variable is not statistically significant (it also has the wrong sign). This suggests again that a single year of training does not significantly enhance one's earnings.

\[18\]

As shown in section 6.4, \( \hat{\beta}_{ij} = \log \left(1 - \phi_{ij}\right) \), where \( \hat{\beta}_{ij} \) are the estimated coefficients reported in column 1 of Table 6.7 and \( \phi_{ij} \) are the relative effects on earnings of belonging to the \( j \)th category of the \( i \)th set. The corresponding percentage effect on earnings then is \( 100.\phi_{ij} = 100.\{\exp(\hat{\beta}_{ij}) - 1\} \). In this case, \( \phi_{ij} = 0.2267 \), we have \( e^{-1} = 1.2544 - 1 = 0.2544 \), or a 25.4 percent increase. For a discussion of the interpretation of coefficients of dummy variables in a semi-logarithmic regression, see Halvorsen and Palmquist (1979).
**TABLE 6.8**

**DISTRIBUTION OF SAMPLE INDIVIDUALS BY YEARS OF UNIVERSITY EDUCATION**

<table>
<thead>
<tr>
<th>Profession</th>
<th>Years</th>
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<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6+</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agrologists</td>
<td></td>
<td>59</td>
<td>2</td>
<td>7</td>
<td>10</td>
<td>50</td>
<td>24</td>
<td>37</td>
<td>189</td>
</tr>
<tr>
<td>Architects</td>
<td>18</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>16</td>
<td>44</td>
<td>43</td>
<td></td>
<td>129</td>
</tr>
<tr>
<td>Chemical Engineers</td>
<td>11</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>19</td>
<td>44</td>
<td>23</td>
<td>59</td>
<td>112</td>
</tr>
<tr>
<td>Chemists</td>
<td>49</td>
<td>7</td>
<td>6</td>
<td>19</td>
<td>44</td>
<td>23</td>
<td>59</td>
<td></td>
<td>207</td>
</tr>
<tr>
<td>Dentists</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>28</td>
<td>80</td>
<td>95</td>
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<tr>
<td>Economists</td>
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<td>4</td>
<td>6</td>
<td>20</td>
<td>36</td>
<td>20</td>
<td>43</td>
<td></td>
<td>166</td>
</tr>
<tr>
<td>Geologists</td>
<td>12</td>
<td>3</td>
<td>6</td>
<td>10</td>
<td>44</td>
<td>25</td>
<td>46</td>
<td></td>
<td>146</td>
</tr>
<tr>
<td>Industrial Engineers</td>
<td>281</td>
<td>17</td>
<td>24</td>
<td>25</td>
<td>54</td>
<td>41</td>
<td>29</td>
<td></td>
<td>471</td>
</tr>
<tr>
<td>Lawyers</td>
<td>17</td>
<td>0</td>
<td>6</td>
<td>42</td>
<td>79</td>
<td>43</td>
<td>33</td>
<td></td>
<td>524</td>
</tr>
<tr>
<td>Mathematicians and Statisticians</td>
<td>32</td>
<td>9</td>
<td>3</td>
<td>12</td>
<td>19</td>
<td>5</td>
<td>16</td>
<td></td>
<td>96</td>
</tr>
<tr>
<td>Mechanical Engineers</td>
<td>167</td>
<td>10</td>
<td>11</td>
<td>24</td>
<td>97</td>
<td>73</td>
<td>35</td>
<td></td>
<td>417</td>
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<tr>
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<td>13</td>
<td>4</td>
<td>5</td>
<td>1</td>
<td></td>
<td></td>
<td>130</td>
</tr>
<tr>
<td>Optometrists</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>10</td>
<td>10</td>
<td>11</td>
<td>7</td>
<td></td>
<td>46</td>
</tr>
<tr>
<td>Osteopaths and Chiropractors</td>
<td>7</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>13</td>
<td>3</td>
<td>6</td>
<td></td>
<td>33</td>
</tr>
<tr>
<td>Pharmacists</td>
<td>12</td>
<td>5</td>
<td>33</td>
<td>33</td>
<td>107</td>
<td>30</td>
<td>25</td>
<td></td>
<td>245</td>
</tr>
<tr>
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<td>0</td>
<td>6</td>
<td>2</td>
<td>27</td>
<td>89</td>
<td>73</td>
<td></td>
<td>863</td>
</tr>
<tr>
<td>Physio. and Occupational Therapists</td>
<td>19</td>
<td>0</td>
<td>2</td>
<td>7</td>
<td>6</td>
<td>2</td>
<td>0</td>
<td></td>
<td>36</td>
</tr>
<tr>
<td>Social Workers</td>
<td>54</td>
<td>8</td>
<td>10</td>
<td>22</td>
<td>21</td>
<td>29</td>
<td>35</td>
<td></td>
<td>179</td>
</tr>
<tr>
<td>Surveyors</td>
<td>212</td>
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<td>25</td>
<td>19</td>
<td>18</td>
<td>13</td>
<td>10</td>
<td></td>
<td>321</td>
</tr>
<tr>
<td>Veterinarians</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>8</td>
<td>22</td>
<td>25</td>
<td></td>
<td>55</td>
</tr>
<tr>
<td>Total</td>
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<td>102</td>
<td>163</td>
<td>278</td>
<td>732</td>
<td>610</td>
<td>1,609</td>
<td></td>
<td>4,571</td>
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</table>
### TABLE 6.9

**DISTRIBUTION OF SAMPLE INDIVIDUALS BY OTHER THAN UNIVERSITY EDUCATION**

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<th>2</th>
<th>3+</th>
<th>Total</th>
</tr>
</thead>
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<td>20</td>
<td>11</td>
<td>5</td>
<td>189</td>
</tr>
<tr>
<td>Architects</td>
<td>96</td>
<td>5</td>
<td>8</td>
<td>20</td>
<td>129</td>
</tr>
<tr>
<td>Chemical Engineers</td>
<td>95</td>
<td>6</td>
<td>1</td>
<td>10</td>
<td>112</td>
</tr>
<tr>
<td>Chemists</td>
<td>168</td>
<td>11</td>
<td>22</td>
<td>207</td>
<td></td>
</tr>
<tr>
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<td>3</td>
<td>1</td>
<td>7</td>
<td>206</td>
</tr>
<tr>
<td>Economists</td>
<td>137</td>
<td>6</td>
<td>8</td>
<td>15</td>
<td>166</td>
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<td>146</td>
</tr>
<tr>
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<td>224</td>
<td>38</td>
<td>30</td>
<td>78</td>
<td>471</td>
</tr>
<tr>
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<td>153</td>
<td>15</td>
<td>4</td>
<td>52</td>
<td>524</td>
</tr>
<tr>
<td>Mathematicians and Statisticians</td>
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<td>5</td>
<td>10</td>
<td>96</td>
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<tr>
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<td>20</td>
<td>88</td>
<td>417</td>
</tr>
<tr>
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<td>46</td>
<td>8</td>
<td>17</td>
<td>52</td>
<td>130</td>
</tr>
<tr>
<td>Optometrists</td>
<td>41</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>46</td>
</tr>
<tr>
<td>Osteopaths and Chiropractors</td>
<td>22</td>
<td>1</td>
<td>0</td>
<td>10</td>
<td>33</td>
</tr>
<tr>
<td>Pharmacists</td>
<td>224</td>
<td>7</td>
<td>5</td>
<td>9</td>
<td>245</td>
</tr>
<tr>
<td>Physicians and Surgeons</td>
<td>795</td>
<td>9</td>
<td>6</td>
<td>53</td>
<td>863</td>
</tr>
<tr>
<td>Physio. and Occupational Therapists</td>
<td>21</td>
<td>2</td>
<td>3</td>
<td>10</td>
<td>36</td>
</tr>
<tr>
<td>Social Workers</td>
<td>141</td>
<td>7</td>
<td>16</td>
<td>15</td>
<td>179</td>
</tr>
<tr>
<td>Surveyors</td>
<td>233</td>
<td>23</td>
<td>37</td>
<td>28</td>
<td>321</td>
</tr>
<tr>
<td>Veterinarians</td>
<td>52</td>
<td>2</td>
<td>5</td>
<td>1</td>
<td>55</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>3,696</td>
<td>187</td>
<td>189</td>
<td>499</td>
<td>4,571</td>
</tr>
</tbody>
</table>
Both the number of hours usually worked during a typical week and the number of weeks worked in a year have a strong positive effect on earnings. (The distribution of sample individuals by profession and by hours worked is presented in Table 6.10; the distribution by weeks worked is in Table 5.11.) The estimated coefficients on all categories of both variables are statistically significant at the 0.01 level and have the expected positive signs (the omitted categories in both cases consist of individuals who worked the smallest number of hours or weeks).

6.7.3 LOCATION, ETHNIC ORIGIN, MARITAL AND EMPLOYMENT STATUS

The extent to which the location of a professional practice in one of the five major economic regions of Canada influences earnings is somewhat less clear. (The distribution of sample individuals by profession and by economic region and the distribution by type of residence are presented in Table 6.12.) Although all coefficients of the estimated categories have the expected positive sign (the omitted region is the Maritime provinces), only one of them (Ontario) is statistically significant at the 0.01 level. It is not possible to comment on the relative magnitudes of the estimated coefficients and their economic interpretation.

Location of work by type of municipality, on the other hand, is a statistically significant determinant of earnings. With municipalities of rural type constituting the omitted category, the coefficients on the remaining categories all have the expected positive sign and are highly statistically significant. Location in an urban core enhances professional income by a slightly higher percentage than location in a large city or in an urban fringe.

Several U.S. studies concluded that race is a significant determinant of earnings (for example Hanoch, 1967; and Griliches and Mason', 1972). In Canada, Boulet and Raynauld (1977) and Haessel and Kuch (1977) found a statistically significant relationship between individual earnings and ethnic origin. In our regressions, the estimated coefficients of this variable measure the earnings differentials between professionals belonging to each of six ethnic groups and professionals of British origin (the omitted category).

The results show no statistically significant difference between earnings of individuals of British, French, Jewish and Canadian ethnic group. On the other hand, individuals of Negro/West Indian and Asiatic origin earn significantly less (28.8 and 27.1 percent, respectively) than those of British
TABLE 6.10
DISTRIBUTION OF SAMPLE INDIVIDUALS BY HOURS WORKED

<table>
<thead>
<tr>
<th>Profession</th>
<th>1-19</th>
<th>20-29</th>
<th>30-34</th>
<th>35-39</th>
<th>40-44</th>
<th>45-49</th>
<th>50+</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agrologists</td>
<td>1</td>
<td>0</td>
<td>16</td>
<td>68</td>
<td>72</td>
<td>17</td>
<td>15</td>
<td>189</td>
</tr>
<tr>
<td>Architects</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>50</td>
<td>36</td>
<td>19</td>
<td>19</td>
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<td>Chemical Engineers</td>
<td>1</td>
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<td>0</td>
<td>59</td>
<td>43</td>
<td>7</td>
<td>2</td>
<td>112</td>
</tr>
<tr>
<td>Chemists</td>
<td>0</td>
<td>1</td>
<td>5</td>
<td>89</td>
<td>88</td>
<td>10</td>
<td>14</td>
<td>207</td>
</tr>
<tr>
<td>Dentists</td>
<td>3</td>
<td>14</td>
<td>30</td>
<td>38</td>
<td>72</td>
<td>22</td>
<td>27</td>
<td>206</td>
</tr>
<tr>
<td>Economists</td>
<td>2</td>
<td>1</td>
<td>9</td>
<td>77</td>
<td>57</td>
<td>9</td>
<td>11</td>
<td>166</td>
</tr>
<tr>
<td>Geologists</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>53</td>
<td>60</td>
<td>12</td>
<td>17</td>
<td>146</td>
</tr>
<tr>
<td>Industrial Engineers</td>
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<td>1</td>
<td>6</td>
<td>190</td>
<td>217</td>
<td>28</td>
<td>28</td>
<td>471</td>
</tr>
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<td>10</td>
<td>24</td>
<td>79</td>
<td>132</td>
<td>105</td>
<td>168</td>
<td>524</td>
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<td>Mathematicians and Statisticians</td>
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<td>1</td>
<td>1</td>
<td>59</td>
<td>29</td>
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<td>4</td>
<td>96</td>
</tr>
<tr>
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<td>3</td>
<td>177</td>
<td>173</td>
<td>33</td>
<td>28</td>
<td>417</td>
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<tr>
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<td>2</td>
<td>47</td>
<td>60</td>
<td>5</td>
<td>8</td>
<td>130</td>
</tr>
<tr>
<td>Optometrists</td>
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<td>0</td>
<td>6</td>
<td>13</td>
<td>9</td>
<td>8</td>
<td>10</td>
<td>46</td>
</tr>
<tr>
<td>Osteopaths and Chiropractors</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>9</td>
<td>33</td>
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<tr>
<td>Pharmacists</td>
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<td>32</td>
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<td>33</td>
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<td>11</td>
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<td>98</td>
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<td>3</td>
<td>0</td>
<td>13</td>
<td>18</td>
<td>0</td>
<td>1</td>
<td>36</td>
</tr>
<tr>
<td>Social Workers</td>
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<td>53</td>
<td>68</td>
<td>12</td>
<td>16</td>
<td>179</td>
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<tr>
<td>Surveyors</td>
<td>2</td>
<td>2</td>
<td>9</td>
<td>57</td>
<td>194</td>
<td>26</td>
<td>31</td>
<td>371</td>
</tr>
<tr>
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<td>1</td>
<td>0</td>
<td>6</td>
<td>70</td>
<td>4</td>
<td>33</td>
<td>55</td>
</tr>
<tr>
<td>Total</td>
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<td>56</td>
<td>163</td>
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<td>462</td>
<td>1,135</td>
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</table>
### TABLE 6.11

DISTRIBUTION OF SAMPLE INDIVIDUALS BY WEEKS WORKED

<table>
<thead>
<tr>
<th>Weeks Worked</th>
<th>1-13</th>
<th>14-26</th>
<th>27-39</th>
<th>40-48</th>
<th>Total</th>
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<tr>
<td>Agrologists</td>
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<td>13</td>
<td>23</td>
<td>137</td>
<td>189</td>
</tr>
<tr>
<td>Architects</td>
<td>8</td>
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<td>3</td>
<td>115</td>
<td>129</td>
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<td>11</td>
<td>9</td>
<td>4</td>
<td>88</td>
<td>112</td>
</tr>
<tr>
<td>Chemists</td>
<td>19</td>
<td>10</td>
<td>14</td>
<td>164</td>
<td>207</td>
</tr>
<tr>
<td>Dentists</td>
<td>8</td>
<td>7</td>
<td>103</td>
<td>88</td>
<td>206</td>
</tr>
<tr>
<td>Economists</td>
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<td>8</td>
<td>121</td>
<td>166</td>
</tr>
<tr>
<td>Geologists</td>
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<td>12</td>
<td>99</td>
<td>146</td>
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<td>32</td>
<td>400</td>
<td>471</td>
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<td>64</td>
<td>410</td>
<td>524</td>
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<tr>
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<td>25</td>
<td>332</td>
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<tr>
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<td>10</td>
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<td>130</td>
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<tr>
<td>Optometrists</td>
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<td>6</td>
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<td>557</td>
<td>863</td>
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<td>Physio. and Occupational Therapists</td>
<td>5</td>
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<td>5</td>
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</tr>
<tr>
<td>Social Workers</td>
<td>18</td>
<td>23</td>
<td>23</td>
<td>115</td>
<td>179</td>
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<td>56</td>
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<td>34</td>
<td>197</td>
<td>321</td>
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<tr>
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<td>2</td>
<td>1</td>
<td>3</td>
<td>49</td>
<td>55</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>334</td>
<td>258</td>
<td>656</td>
<td>3,323</td>
<td>4,571</td>
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<td>Ont.</td>
<td>Prair.</td>
<td>B.C.</td>
</tr>
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<td>--------</td>
<td>-----</td>
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<td>16</td>
<td>36</td>
<td>64</td>
<td>16</td>
<td>25</td>
</tr>
<tr>
<td>Architects</td>
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<td>18</td>
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<tr>
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<td>11</td>
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<td>29</td>
<td>18</td>
</tr>
<tr>
<td>Dentists</td>
<td>12</td>
<td>44</td>
<td>89</td>
<td>34</td>
<td>27</td>
</tr>
<tr>
<td>Economists</td>
<td>4</td>
<td>48</td>
<td>91</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td>Geologists</td>
<td>7</td>
<td>11</td>
<td>30</td>
<td>77</td>
<td>21</td>
</tr>
<tr>
<td>Industrial Engineers</td>
<td>16</td>
<td>107</td>
<td>286</td>
<td>36</td>
<td>26</td>
</tr>
<tr>
<td>Lawyers</td>
<td>28</td>
<td>139</td>
<td>221</td>
<td>77</td>
<td>59</td>
</tr>
<tr>
<td>Mathematicians &amp; Stats.</td>
<td>5</td>
<td>18</td>
<td>60</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>Mechanical Engineers</td>
<td>18</td>
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<td>219</td>
<td>41</td>
<td>39</td>
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<tr>
<td>Nurses</td>
<td>4</td>
<td>59</td>
<td>26</td>
<td>26</td>
<td>15</td>
</tr>
<tr>
<td>Optometrists</td>
<td>3</td>
<td>15</td>
<td>15</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>Osteopaths &amp; Chiropractors</td>
<td>1</td>
<td>8</td>
<td>13</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Pharmacists</td>
<td>19</td>
<td>64</td>
<td>86</td>
<td>18</td>
<td>28</td>
</tr>
<tr>
<td>Physicians and Surgeons</td>
<td>63</td>
<td>239</td>
<td>323</td>
<td>140</td>
<td>98</td>
</tr>
<tr>
<td>Physio. &amp; Occu. Therapists</td>
<td>2</td>
<td>9</td>
<td>14</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Social Workers</td>
<td>14</td>
<td>37</td>
<td>63</td>
<td>41</td>
<td>28</td>
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<td>Surveyors</td>
<td>38</td>
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<td>122</td>
<td>56</td>
<td>40</td>
</tr>
<tr>
<td>Veterinarians</td>
<td>3</td>
<td>8</td>
<td>28</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>274</td>
<td>1,119</td>
<td>1,959</td>
<td>740</td>
<td>479</td>
</tr>
</tbody>
</table>
origin. For individuals with other ethnic backgrounds, the
differential is also significantly negative, but of much smaller
magnitude (5.8 percent).

Our results show that marital status is a statistically
significant determinant of earnings for the sample professions.
Married individuals earn some 15.6 percent more than unmarried
individuals with identical other characteristics. The literature
sometimes suggests that marital status is a proxy for effort
exerted by the practitioner (Dodge, 1972b), the a priori expec-
tation being that married persons have to work harder. Our
regressions, however, include both hours worked and weeks worked
as separate variables. 19

The employment status (type of work) variable has a large
positive and statistically significant coefficient. The earnings
of self-employed practitioners are 31.3 percent higher than
earnings of those with an employee status. As explained earlier,
there are two reasons for this differential. First, it
compensates the self-employed individuals for lack of a number of
fringe benefits available to employees (paid holidays, pension
benefits, medical and dental plans, etc.). Second, it is a
compensation for the greater risk associated with the
self-employment status.

6.7.4 RESTRICTIVE PRACTICE VARIABLES

Measurement of the impact of restrictive practices on
professional earnings is one of the main tasks of this study. In
the previous chapters, we have identified conditions of entry,
citizenship requirements, mobility restrictions, fee-setting and
restrictions on professional advertising as the five operational
means through which professions enhance earnings of their
members.

As anticipated in Chapter 3, the variable measuring
conditions of entry proved to be highly collinear with the
variables representing education. If educational requirements
are used as an entry barrier and if the latest change in such

---

19 There are grounds for believing that this variable may be
picking up the effects of effort and experience (or age). In
Muzondo and Pazderka (1979), an earnings function is estimated
using published aggregate Census data. Omission of the marital
status variable resulted in a dramatic change in the magnitudes
of the estimated coefficients of number of hours worked and
experience variables.
requirements took place a number of years before the Census year 1970, then most practitioners in our sample satisfy the currently valid conditions of entry. This is the case for most professions in our sample. Consequently, the impact of the stipulated entry conditions on earnings is indistinguishable from the impact of education. In our preliminary regressions (results not reported here), the entry variable had the correct positive sign, but the t-value of only 0.09. It was therefore not included in subsequent regressions.

Similarly, the estimated coefficient on the variable measuring citizenship restrictions had the wrong (negative) sign. The reason appears to be the fact that citizenship restrictions were heavily concentrated in the province of Quebec (see Table 6.4). Consequently, this variable seems to have measured the effect on professional earnings of practicing in Quebec as opposed to any other province rather than the effect of the citizenship requirements. It was therefore dropped from the reported versions of our regressions.

Each of the remaining three restrictive practice variables were initially incorporated into the regressions with the full number of levels (categories) of restrictiveness indicated in Tables 6.2 - 6.6. This resulted in quite a small number of observations in some categories. Moreover, the differentials in degree of restrictiveness between certain categories were not sufficiently pronounced. For both of these reasons, some of the estimated coefficients were not statistically significant.20

The estimates reported in regressions 1 and 3 are based on restrictive practice variables with the originally specified categories merged to yield only two levels of restrictiveness for each variable. Thus, we defined all professions in provinces with levels 4 and 5 in Table 6.3 as professions where mobility is

20 In a regression where Mobility categories 1 and 2 were dropped for purposes of estimation, the regression coefficient on category 3 was positive, but not significant (t-value of 0.73) while the coefficient on merged categories 4 and 5 was positive and statistically significant (t-value of 2.33). Similarly, with category 1 of Fee-setting dropped, the coefficient on merged categories 2 and 3 was negative and not significant (t-value of 0.38) while the coefficient on merged categories 4 and 5 was positive and significant (t-value of 3.97). Finally, in the case of Advertising, the estimated coefficient on category 2 had the correct sign, but was not significant (t-value of 0.72) and the coefficient on category 3 was positive with a t-value of 2.43.
highly restricted. The estimated coefficient thus measures the earnings differential between individuals belonging to professions in these categories and all others. Similarly, the coefficient on the fee-setting variable measures the earnings differential between professions in categories 4 and 5 of Table 6.5 and all others. Finally, the reported coefficients on the variable measuring advertising restrictions indicate the earnings differential between individuals belonging to professions in category 3 of Table 6.6 and all others.

The estimated coefficients on the advertising and fee-setting variables are statistically significant at the 0.01 level; the coefficient on mobility is significant only at the 0.05 level. The magnitudes of the coefficients indicate that practitioners in professions highly restrictive of mobility (levels 4 and 5) enhance their earnings by 4.3 percent as compared to others. Effective fee-setting (professions in fee-setting categories 4 and 5) enhances professional earnings by 11.8 percent. Stringent restrictions on professional advertising (level 3) increase earnings of those individuals in our sample who belonged to professions applying this type of restrictions by 10.8 percent.

Practitioners belonging to professions which impose all three types of restrictions have their earnings enhanced by 26.9 percent as compared to those who belong to non-restrictive professions. This figure, however, represents an incomplete estimate of the contribution of professional licensing restrictions to earnings in view of our inability to measure the impact of restrictions on entry separately from education.

6.7.5 A COMMENT ON SPECIFICATION ERRORS

Our assessment of the degree to which each of the sample professions restrict entry, mobility, price competition and professional advertising is summarized in Tables 6.2 - 6.6. It is apparent that some of the most restrictive professions also have high levels of education and large proportions of self-employed practitioners (medicine, law, dentistry, etc.). It is therefore of interest to examine the bias imparted on estimates of the contribution of education (especially university training) and the self-employment status to professional earnings by omission of the restrictive practice variables.

A comparison of the estimated coefficients in regression 1 (in which restrictive practice variables are included) with regression 2 (in which restrictive practice variables are omitted) indicates that the bias is considerable. For example, omission of the restrictive practice variables raises the
estimated coefficient for two years of university education by 30.4 percent, for three years of university education by 7.8 percent, for four years by 11.1 percent, for five years by 11.5 percent and for six and more years by 12.8 percent.

It is evident that the empirical studies which measure the contribution of (university) education to professional earnings without accounting for restrictive practices of the professions are biased. A part of the measured contribution of education to earnings should in fact be attributed to the various types of restrictions on competition. The bias imparted on estimates of the contribution to professional earnings of post-secondary education other than university training is much smaller.

Even our coefficients of educational variables are not estimated without bias. As explained above, we were forced to omit the variable representing restrictions on entry because it was collinear with education. Since the correlation between the two variables is positive, the estimated coefficients on education are biased upward.

Similarly, failure to control for the effects of restrictive practices seriously overestimates the economically justified compensation of self-employed practitioners for lack of fringe benefits and additional risk borne by them. A comparison of the estimated coefficients on the type of work variable in regressions 1 and 2 shows that the omission of restrictive practice variables raises the coefficient on self-employment by as much as 22.2 percent.

6.7.6 LINEAR VERSION OF THE EARNINGS FUNCTION

Regressions 3 and 4 in Table 6.7 represent the linear functional form of our earnings function: regression 3 incorporates the restrictive practice variables while regression 4 does not. Compared with the semi-logarithmic regressions, these results are poor. They are, however, satisfactory by usual standards - $R^2$ adjusted for degrees of freedom are 0.41 and 0.40 and the $F$ ratios are 84.56 and 90.04, respectively. In regression 3, of the estimated 39 coefficients, 17 are not statistically significant at the 0.01 level and nine are not significant even at the 0.05 level. Five coefficients (the constant term, one year of other education, region of work, B.C., region of work, Quebec, and French ethnic origin) have unexpected signs. Only two of these, however, are statistically significant at the 0.05 level.

The estimated coefficients on university education suggest that, for example, an individual with three years of university
training earns $2,790 more than an individual with none while an individual with six or more years of university enhances his earnings by $8,083. The magnitudes of the estimated coefficients on hours worked and weeks worked, on the other hand, do not confirm the presence of increasing earnings differentials with increasing effort. Similarly, with the exception of Ontario, there appears to exist no statistically significant relationship between professional earnings and economic region of practice.

The type of municipal residence does, however, significantly influence earnings. For example, a practitioner in an urban core earns $2,389 more than a practitioner in a rural area. Practitioners of French ethnic origin in our sample earn $1,242 more than practitioners of British origin, while members of the Negro/West Indian ethnic group earn almost $6,000 less. The variable measuring marital status is not statistically significant; this is perhaps not surprising in view of the fact that we have included separate variables measuring effort. Self-employed individuals earn almost $7,000 more than practitioners with equivalent characteristics who are employees.

Belonging to a profession which strongly restricts mobility (levels 4 and 5) increases individual earnings by $1,260. Enforcement of an effective fee-setting scheme (levels 4 and 5) contributes $743 to earnings of the participating practitioners while restrictions on professional advertising (level 3) enhance earnings by $1,549. A member of a profession which imposes all three kinds of restrictions thus finds his earnings increased by $3,552.

A comparison of the estimates of regressions 3 and 4 reveals that failure to include restrictive practice variables in an earnings function results in an overstatement of the contribution of education to earnings. The overstatement for 1 year of university education is only 1.3 percent, but it rises sharply to 44.5 percent for two years and ranges between 11.5 and 13.0 percent for all other levels of university training. Similarly, the importance of self-employment status as a determinant of earnings is overstated by 14.5 percent when restrictive practice variables are not included.

6.8 MONOPOLY EARNINGS

The extent to which the earnings of individual practitioners are enhanced by belonging to a profession which engages in certain restrictive practices, can be established from regression estimates of an earnings function. These estimates, discussed at length above, do not, however, represent a measure of the overall cost of these practices to consumers (i.e., the "monopoly
earnings"). In estimating such cost, one has to take into account the number of practitioners whose incomes are actually influenced by the restrictions in question.

In our calculations, we make use of the results of the semi-logarithmic regression 1, as opposed to the linear regression 3, although both contain the restrictive practice variables. Our choice of regression 1 is determined, in part, by its superior statistical performance and, in part, by the fact that regression 3 does not contain interaction terms and is thus misspecified.

The aggregate costs to consumers of the three restrictive practices incorporated in our regressions are reported in Table 6.8 for each of the 13 professions in our sample applying at least one type of restriction. For each profession, the figures in the table are the product of the number of individuals practicing in provinces belonging to the restrictive categories specified in regression 1 and the mean income for the profession multiplied by the percentage contribution to earnings of the restrictive practice in question.

The largest cost imposed upon the public by our sample professions is due to fee-setting (almost $159 million for the Census year 1970). Advertising restrictions resulted in $138.3 million of monopoly earnings to the professions (additional costs to the consumers) and restrictions on mobility in $50.3 million of monopoly earnings. The total cost to consumers of all three practices was $347.3 million. It is important to remember that this figure is an understatement of the total magnitude of monopoly earnings since it does not include the impact on earnings of restrictions on entry. In addition, it does not reflect the general equilibrium consequences of misallocation of resources originating in the professional markets under study (see Section 6.3).

The importance of each of the three types of restrictions varies from profession to profession. Physicians and surgeons, because of their large numbers and high individual incomes have the largest aggregate monopoly earnings of any profession derived from each of the three restrictive practices. In the overall ranking of monopoly earnings from all three sources, physicians and surgeons are followed by lawyers, dentists, pharmacists, industrial and mechanical engineers, architects, etc. (see Table 6.13).

With respect to mobility, lawyers derive the second highest monopoly earnings, dentists are third, pharmacists and surveyors fourth and fifth, architects occupy the sixth place, etc. The second highest aggregate monopoly earnings derived from
### TABLE 6.13

**AGGREGATE COSTS TO CONSUMERS OF THE PROFESSIONAL LICENSING RESTRICTIONS (DOLLARS)**

<table>
<thead>
<tr>
<th></th>
<th>Mobility</th>
<th>Fee-setting</th>
<th>Advertising</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architects</td>
<td>1,350,090</td>
<td>6,489,211</td>
<td>---</td>
<td>7,799,301</td>
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<tr>
<td>Chemical Engineers</td>
<td>49,860</td>
<td>4,197,288</td>
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<td>4,247,148</td>
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<tr>
<td>Dentists</td>
<td>4,464,385</td>
<td>15,546,033</td>
<td>14,227,009</td>
<td>34,237,427</td>
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<tr>
<td>Industrial Engineers</td>
<td>364,194</td>
<td>17,190,404</td>
<td>---</td>
<td>17,554,598</td>
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<tr>
<td>Lawyers</td>
<td>11,811,277</td>
<td></td>
<td>33,090,453</td>
<td>44,901,730</td>
</tr>
<tr>
<td>Mechanical Engineers</td>
<td>353,347</td>
<td>15,930,203</td>
<td>---</td>
<td>16,283,550</td>
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<tr>
<td>Optometrists</td>
<td>637,372</td>
<td>2,647,514</td>
<td>2,422,882</td>
<td>5,707,768</td>
</tr>
<tr>
<td>Osteopaths and Chiropractors</td>
<td>261,088</td>
<td>2,032,059</td>
<td>1,859,646</td>
<td>4,152,793</td>
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<tr>
<td>Pharmacists</td>
<td>2,523,012</td>
<td>10,134,943</td>
<td>9,275,030</td>
<td>21,932,985</td>
</tr>
<tr>
<td>Physicians and Surgeons</td>
<td>25,658,237</td>
<td>81,839,634</td>
<td>74,895,039</td>
<td>182,393,710</td>
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<tr>
<td>Physiotherapists and Occup. Therapists</td>
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<td>---</td>
<td>---</td>
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<tr>
<td>Surveyors</td>
<td>2,449,038</td>
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<td>2,449,038</td>
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<tr>
<td>Veterinarians</td>
<td>271,130</td>
<td>2,760,436</td>
<td>2,526,223</td>
<td>5,557,789</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>50,273,633</td>
<td>158,727,725</td>
<td>138,297,082</td>
<td>347,298,440</td>
</tr>
</tbody>
</table>
fee-setting accrue to industrial engineers, third to mechanical engineers, fourth to dentists, fifth to pharmacists, sixth to architects, etc. Restrictions on advertising yield the second largest aggregate monopoly earnings to lawyers, third to dentists, fourth to pharmacists, fifth to veterinarians, sixth to optometrists, etc.

6.9 SOME QUALIFICATIONS

As mentioned above, our measurement of the monopoly component of professional earnings is based on a partial equilibrium approach. The figures reported in Table 6.13 do not, therefore, incorporate the monopoly earnings generated in related markets by licensing restrictions imposed by our sample professions. In addition, we were unable to separate statistically the income-enhancing effects of entry restrictions from the contribution of education to earnings. Consequently, our estimates of the aggregate costs of licensing restrictions to consumers are understated for this reason. Similarly, the impact of such prerequisites for licensing as citizenship and residence requirements on professional earnings is not incorporated in our calculations.

On the other hand, certain kinds of restrictions on entry and mobility raise the average quality of services supplied by licensed practitioners. The contribution to consumer welfare resulting from this quality improvement should, ideally, be deducted from any estimates of welfare losses due to licensing restrictions. The measurement problems involved in such undertaking are, however, formidable. At the same time, there are grounds for believing that imposition of licensing restrictions forces a number of consumers to turn to inferior (unlicensed) substitutes. The overall average quality of services consumed therefore declines.

A special problem of interpretation of our results is inherent in our approach to estimating an earnings function for individuals belonging to a cross-section of professions. The magnitudes of the estimated coefficients for each restrictive practice variable have to be interpreted as applying equally to all sample observations. In other words, the income-enhancing effect of, say, restrictions on advertising, is assumed to be identical for all professions in our sample. However, there are reasons for believing that the impact of certain types of restrictions varies not only from profession to profession, but also as between practitioners within a given profession.
Our approach, which ignores these differentials, is analogous to the standard procedures which measure the contribution of education to earnings by estimating earnings functions on a cross-section of occupations. They assume that the impact of education or hours worked, etc., is uniform across occupations. Ideally, we would have preferred estimating a separate earnings function for each profession (or a group of similar professions, such as professions in medicine or in engineering and architecture). Unfortunately, this is not possible because of insufficient variation in competitive behaviour in the 10 provinces of Canada.

Our assignment of sample professions into categories of competitiveness was based on exhaustive examination of a variety of sources of information (see Appendix A and Appendix B). In the interest of preserving interprofessional comparability of our categories, some judgement had to be applied in classifying certain professions. In all such cases, our aim was to ensure that the assignment of a profession to a category is economically meaningful even though it may deviate from a strictly legalistic interpretation of the relevant laws and regulations.

The reasons for omission of a variable measuring ability from our earnings function were discussed in detail in Chapter 2 and in Section 6.5.1 above. The quantitative significance of this factor as well as the appropriateness of the various proxies used for its measurement are a subject of considerable controversy in the literature. The work by one of the authors of this study has also indicated that ability in the human capital context may not be independent of barriers to competition because it varies with the market value of goods and services produced.

Our omission of the ability variable from estimated earnings functions is supported by the evidence published by Ashenfelter and Mooney (1968). They found that the impact of ability on earnings (which they measured by mathematical aptitude) is relatively insignificant for samples consisting of highly educated individuals. We believe that our selection of sample professions from among those generally requiring certain minimum level of university education goes a long way towards reducing any remaining estimation bias. On the other hand, it restricts the applicability of our results and of the relevant policy conclusions to that segment of the service markets which is represented by "educated" professions.

Our preference for the semi-logarithmic functional form of the regression equation is not without implications for the ranking of professions by degree of restrictiveness. The semi-logarithmic functional form implies that belonging to a particular category of an explanatory variable enhances earnings
of all sample professionals by an identical percentage (and thus by differing dollar amounts). The coefficients estimated from a linear functional form, on the other hand, are dollar figures. They imply that belonging to a particular category enhances earnings of all sample professionals by an identical absolute dollar magnitude, i.e., by differing percentages.

6.10 CONCLUSION

In this chapter, we first rationalized in detail our specifications of the earnings function. Special attention was paid to the problem of including "occupation" as a separate determinant of professional incomes. We concluded that our approach of concentrating on those occupational characteristics which are associated with licensing restrictions has considerable merit. In particular, estimation of the separate contribution of each of several types of restrictions is immediately useful for formulating a strategy for enforcement of competition policy in these markets.

We define as "monopoly earnings" that component of professional earnings which is explained by the presence of restrictive practices specified in our regressions. The three types of restrictions, whose impact on earnings we were able to estimate separately, are restrictions on mobility, fee-setting and restrictions on professional advertising. The statistical insignificance of the variable measuring restrictions on entry was seen as resulting from the use of education as an entry barrier in the professions. Quantitatively, fee-setting contributed most ($158.7 million) to the aggregate earnings of our sample professions in the Census year 1970. It was followed by restrictions on professional advertising ($138.3 million) and on mobility ($50.3 million).

For purposes of comparison, we reported one version of the earnings function estimated without variables measuring restrictive practices. It is clear that the measured contribution of education and, to a lesser extent, of experience and hours worked is over-stated by the omission of restrictive practice variables. For example, the measured contribution of six or more years of university education rises by some 13 percent when the restrictive practice variables are not included in the regression. We suggest that previous studies which ignored barriers to competition in the professions have grossly overstated the contribution of education to earnings. This bias appears to be more important than that resulting from omission of a variable measuring ability differentials.
Our discussion of the relative merits of the two functional forms in which the earnings function is commonly estimated, led us to the conclusion that the semi-logarithmic specification is preferable. Our calculations of the magnitudes of monopoly earnings accruing to each profession (Table 6.13) as well as the ranking of professions according to their levels are thus based on the semi-logarithmic regression equation.

We concluded the analysis of our results by reviewing the sources of possible understatement or overstatement of our estimates of monopoly earnings. The most important among them include our inability to measure the separate impact of restrictive entry requirements on earnings, the effect of licensing restrictions on quality of professional services provided and the general equilibrium consequences of the restrictive practices under study.
CHAPTER 7

PRIVATE RETURNS TO HUMAN CAPITAL INVESTMENTS IN THE PROFESSIONS

7.1 INTRODUCTION

The concept of a rate of return to human capital is connected with the notion that the time spent in education adds to an individual's productivity and, therefore, increases the market value of his labour services. This may be achieved by imparting cognitive skills to students and/or by the process of socialization - that is a process of developing skills like carrying out assigned tasks, getting along with others, punctuality and so on. By increasing an individual's productivity, education enhances his lifetime earnings. However, education requires expenditure of valuable resources. Apart from direct expenses (such as tuition fees, books, transportation, etc.) education takes time during which an individual could be earning income.

Two approaches are commonly followed to determine the profitability of investments in education. The internal rate of return (IRR) is most commonly used, although it has well known weaknesses (Hirshleifer, 1958, and Feldstein and Flemming, 1964). The other approach is the net present value (NPV) calculation.

In the next section, we comment on the theoretical and practical problems in calculating rates of return to educational investments and review the results of several published studies. Section 7.3 presents the general formula for computing rates of return and net present values. In section 7.4, we discuss our method for adjusting earnings and generating age-earnings profiles and section 7.5 describes the cost data used in the computations. In section 7.6, we analyze our results and section 7.7 concludes the chapter.

7.2 RATES OF RETURN TO EDUCATION AND THEIR INTERPRETATION

Rates of return to education are considered useful in a number of areas of economic decision-making: in analyzing the extent to which individuals and society in fact make rational choices on investments in human capital, in deriving decision rules for optimal behaviour by individuals and society in this area (Blaug, 1965) and in determining the presence (or absence)
of monopolistic conduct and supply shortages in certain labour markets.1

Several authors have expressed skepticism about the value of calculated rates of return to education whether they are used prescriptively or descriptively (Thurow, 1970 and Eckaus, 1970). One of their shortcomings is that the available data does not permit identification of increments to earnings that are associated with increments in amounts of education. An unresolved, but much discussed, instance of this is the difficulty of separating the effects of education from those of ability (Hause, 1972; Taubman and Wales, 1972; Ashenfelter and Mooney, 1968; and Griliches and Mason, 1972).

The second reason for skepticism stems from the view that there are significant market failures on both the cost and the revenue side of educational investment and that their effects cannot be eliminated from data used for NPV and IRR calculations. On the revenue side, it is pointed out that education involves elements of individual consumption as well as consumption externalities. Their omission understates the true returns to educational investments. Other educational externalities include, for example, the creation of an environment conducive to more extensive and successful research and development activities.2 Market imperfections arise, in part, from the presence of monopoly in product and service markets and monopoly in labour markets. Earnings differentials, under these conditions, do not reflect productivity differentials (Dodge and Stager, 1972).

On the cost side, the use of average rather than marginal costs can be justified if the two are equal. This is the case if there are constant returns to scale and if there is no excess capacity in the supply of educational services. In practice these conditions are rarely satisfied.

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1 Sloan (1970) pointed out that use of calculated rates of return to gauge the importance of entry barriers may be inappropriate because of the diversity of non-monetary returns in various occupations. He suggests a more direct indicator such as excess demand for entry into an occupation. Lindsay (1973) argues that excess demand for entry is an ambiguous indicator of entry barriers.

2 For a discussion of externalities of this kind see Muzondo (1978a).
The misgivings about the meaning of calculated NPVs and IRRs are well known and, to a large extent, have been anticipated by proponents of their use (Becker, 1964; and Henderson-Stewart, 1965). Since there exist excellent balanced assessments of the applications of rate of return calculations (Blaug, 1965, 1976; and Eckaus et al, 1974), there is no point in further comments except perhaps to mention that much of the criticism is more relevant with reference to social rather than private returns. For example, the presence of consumption externalities on the revenue side and economies of scale or excess capacity on the cost side has no bearing on the prescriptive or descriptive value of computed private rates of return.

The presence of market imperfections means that earnings differentials do not reflect productivity differentials. However, as pointed out by Henderson-Stewart (1965), private rate of return analysis could be used for determining the returns to these imperfections. Our discussion of earnings differentials in the previous chapter has shown that it is possible to identify earnings due to certain types of market imperfections separately from those attributable to other factors. This appears to offer interesting possibilities for applying rate of return analysis to the identification and evaluation of returns to monopolistic behaviour in the market for professional services.

There are several approaches to computing rates of return to education, depending on their intended use. Most frequently, they have been calculated from data on a cross-section of occupations. Estimates of rates of return to high school, college or post-graduate training are of this kind. The rates are computed on the assumption that the contribution of education to earnings is uniform and relatively stable across occupations. This assumption may be realistic under static competitive equilibrium conditions, since rates of return to education are then independent of occupational choice (see Chapter 3). Social rates of return computed in this way may potentially be useful as an input into decisions concerning the optimal mix between various levels of education and the optimal mix between education and other areas of government expenditures.

Some rates of return to education have been calculated from data within occupations. The fact that such rates differ from rates computed from data on a cross-section of occupations has been interpreted as an indication of the presence of barriers to competition, created, in part, by occupational licensing.3

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3 See, for example, Dodge (1972a).
Private rates of return computed from data within occupations may be of some use to individuals who have already chosen an occupation but are seeking the best level of human capital investment.

Eckaus (1970) argued that differences in returns to education in various occupations may, in part, be due to failure of labour markets to achieve an equilibrium and, in part, to labour market imperfections reflecting the cost of occupational mobility. He suggests that a disaggregated approach with rates of return computed from income differentials between two occupational groups, such as university professors and secondary school teachers, is likely to be more useful than rates of return computed from a cross-section of occupations. His calculated rates show a remarkable degree of variation depending upon which two occupations are being compared. For example, the (unadjusted) rate calculated from income differentials between dentists and mechanical engineers is 17 percent while that between dentists and professionals not elsewhere classified is 37 percent (see Table 7.1).

Friedman and Kuznets (1945) computed rates of return to human capital in medicine and dentistry and found the rate of return in medicine to be significantly higher. In their view, the differential was due to higher entry barriers in medicine. On the other hand, Lindsay (1973) adjusted the earnings of physicians and surgeons for hours worked and found that the resulting net present value of earnings was "normal".

Our main purpose in this chapter is to compute private IRRs and NPVs for 15 of the 20 professions examined in this study. The main objective is to identify and analyze that portion of returns to educational investments which arises from monopolistic behaviour. We use estimates of the earnings function presented in the previous chapter to develop two sets of age-earnings profiles: first, age-earnings profiles attributable exclusively to education and experience and, second, age-earnings profiles attributable to education, experience and as the effects of monopolistic behaviour in professions where it is present. The differences between the two age-earnings profiles for each profession constitute the basis for calculation of monopoly NPVS and IRRs.

4 No comparable data on cost of education for the remaining professions is available.
TABLE 7.1

RETURNS TO EDUCATION FOR MALES IN THE U.S. AND CANADA: RESULTS OF SEVERAL PUBLISHED STUDIES (PERCENTAGES)

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Author(s)</th>
<th>1 to 3 years of college</th>
<th>4 years of college over 4 years of high school</th>
<th>5 years of college over 1 to 3 years of college</th>
<th>Post-graduate over 4 years of college</th>
<th>Profession over a selected group</th>
<th>Data Year</th>
</tr>
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<td>10.2</td>
<td>16.7</td>
<td>10.1</td>
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<td></td>
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<td>9.5</td>
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<td></td>
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<td></td>
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<td></td>
<td>Hanoch (1967)³</td>
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<th>4 years of college over 4 years of high school</th>
<th>4 years of college</th>
<th>post-graduate over 4 years of college</th>
<th>profession over a selected group</th>
<th>Data Year</th>
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<td></td>
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<td>1966</td>
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<td></td>
<td>B.A. general</td>
<td>1966</td>
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<tr>
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<td></td>
<td></td>
<td></td>
<td>engineers</td>
<td>1966</td>
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<tr>
<td>Dodge and Stager (1972)</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
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<td>1966</td>
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<td>Doctorate over Bachelor of Science 6.0</td>
<td>1966</td>
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<td></td>
<td>Doctorate over Bachelor of Science 7.7</td>
<td>1966</td>
</tr>
<tr>
<td>Holmes (1974)</td>
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<td></td>
<td></td>
<td>8.0</td>
<td></td>
<td>1967</td>
</tr>
</tbody>
</table>

**Explanatory Notes:**

1) The upper figure indicates rate of return on total resources invested in schooling, the lower figure indicates private (after tax) rate of return.

2) Rates of return for white urban males.

3) Numbers in parentheses are based on too few observations to be reliable.

4) Rates of return labelled (a) are based on unadjusted reported income. Rates of return labelled (b) are based on income adjusted for expected mortality, unemployment, taxes and standardized hours of work.

5) Social returns.

6) Private returns for individuals employed in the private sector.
There are two important differences between our rates of return and the rates presented in previously published studies. First, we calculated separately rates adjusted and unadjusted for monopoly earnings. Second, our rates of return are profession-specific, even though they are based on an earnings function estimated from a cross-section of 20 professions.

Since our primary purpose is to rank returns to education for 15 different professions, we have chosen high school graduates as our comparison group for computing the indirect costs of investments in education. The use of a single comparison group for all professions may result in some biases in estimates of net returns. (It implies, for example, that the earnings foregone by an engineering student are the same as those foregone by a nursing student in the same year of studies.) However, we believe that these biases are relatively small as compared with those which would result if we used different comparison groups.

We believe the rates computed here are useful as guides to high school graduates who choose a profession. More importantly, the rates, along with the analysis in the previous chapter, are useful in determining the extent of monopolistic earnings in the sample professions. Because of the sensitivity of the calculated returns to the choice of comparison group we would caution against interpretation of the results as a general indication of the profitability of educational investments.

7.3 RATES OF RETURN AND NET PRESENT VALUE METHODOLOGY

The rate of return to investment in human capital, $r$, is defined as the rate of discount which reduces the stream of net returns associated with the investment to a present value of zero. Equivalently, it is defined as the rate of discount which makes the present value of the cost and return streams associated with the investment equal.

The NPV of life-time earnings in a profession is given by the well-known formula5

$$\text{NPV} = \sum_{\tau=a}^{L} \left( Y_{jt} - C_{jt} - Y_{ht} \right) (1 + \rho)^{a-\tau}, \quad j=1, 2, \ldots, M. \quad (7.1)$$

where

---

5 See, for example, Becker (1964).
\[ a = \text{age at end of training in the alternative employment.} \]

\[ Y_j^t = \text{expected earnings in the } j^{th} \text{ profession at time } t. \]

\[ C_j^t = \text{expected direct costs of education in the } j^{th} \text{ profession at time } t. \]

\[ Y_h^t = \text{expected earnings in the } h^{th} \text{ occupation (the alternative employment) at time } t. \]

\[ M = \text{the total number of professions.} \]

\[ L = \text{age of retirement.} \]

\[ \rho = \text{the market rate of interest.} \]

The internal rate of return \( r \) is the discount rate for which (7.1) vanishes.

Application of IRR rather than NPV in choosing investment projects results in well-known difficulties (Hirshleifer, 1958 and Feldstein and Flemming, 1964). If the investment project is non-simple (i.e., if the net income stream changes signs more than once), the IRR is not unique. If investment projects are mutually exclusive, the IRR rule may result in incorrect decisions. This could also happen when lending and borrowing rates differ. In all such situations, however, the NPV rule yields correct decisions.

The weaknesses of the IRR rule mean that when individuals are choosing professions in which to invest their human capital they should rely on the NPV rule. Our main problem is to use the NPV and IRR criteria to rank professions according to monopoly returns. For this purpose, both criteria need some adjustments as can be seen from the following argument.

Suppose that it were possible to identify earnings resulting purely from investments in education and that individuals invested in education exclusively for monetary returns. Further, suppose that markets are in equilibrium. Under these conditions the NPV of returns to investment in education discounted at the competitive rate of return should be equal to zero for all professions, irrespective of the amounts of investments involved. Equivalently, the IRRs in all professions should be equal to the competitive rate of return.
Next, suppose that all the above assumptions hold except that earnings have not been adjusted for the effects of monopolistic behaviour. Then the magnitude of the NPVs of returns to investments in education discounted at the competitive rate is an appropriate index for ranking of professions according to the extent of monopoly earnings. That is, professions with the highest NPVs also earn the highest monopoly earnings. If the IRRs are computed under these (modified) conditions, the difference between the IRRs and the competitive rates is a measure of the monopoly rates of return. However, the resulting ranking of professions will not necessarily be consistent with the ranking based on NPV.

This procedure assumes knowledge of the competitive rate of return to human capital investments. It also assumes that all factors other than education and the effects of monopolistic behaviour have been controlled for. Lacking knowledge of the competitive rate of return, an alternative approach would be to use various discount rates to compute several monopoly NPVs. Unfortunately, the ranking of professions according to such NPVs is not invariant to the assumed discount rates. On the other hand, when the IRR method is applied, the ranking of professions according to the difference between an assumed discount rate and the calculated IRRs is invariant to the choice of the discount rate. In other words, it is more important to have an accurate estimate of the competitive rate of return when the ranking of professions is based on NPVs rather than IRRs.

If it is not possible to adjust earnings for factors such as non-monetary returns or ability, the NPV-based procedure could give misleading results. The "monopoly" NPVs obtained by discounting (at the competitive rate) earnings inclusive of the effects of monopolistic behaviour would also reflect the effects of factors not adjusted for. If these effects significantly differ from profession to profession, the resulting ranking of professions would be affected. In other words, it would not depend on the degree of monopoly alone.

Because of these difficulties, we use an alternative procedure which allows for a different "competitive" rate of return to education in each profession. These "competitive" returns are obtained by adjusting the observed earnings for all variables included in our earnings function other than education and experience. The NPVs and IRRs computed from the adjusted earnings are referred to as competitive NPVs and IRRs. Adding the effects of restrictive practices to "competitive" returns we obtain "gross" returns. The difference between the gross and the competitive NPVs and IRRs is our measure of monopoly NPVs and IRRs. This measure is largely independent of the success of identifying the true competitive returns to educational
investment. However, ranking based on monopoly NPVs need not be consistent with ranking based on monopoly IRRs. Furthermore, all such rankings ignore the aggregate amounts of monopoly earnings which are calculated in the previous chapter.

7.4 MEASUREMENT OF MONOPOLY RETURNS

In this section we present and discuss in detail our approach to measuring monopoly returns to investment in education in various professions.

Consider (6.3) with estimated coefficients substituted for population parameters

$$\log \hat{Y}_t = \mu + \sum_{r=1}^{m} \alpha_r z_{rt} + \sum_{i=1}^{m} \sum_{j=2}^{n_i} \beta_{ij} x_{ijt} + \hat{\varepsilon}_t,$$

where

$$\hat{\varepsilon}_t$$

are estimated residuals from the regression and the other variables are as defined in Chapter 6.

We assume that the coefficients in (7.2) apply equally to all professions. An estimate of the mean of log of earnings in, say, the h profession is

$$\hat{Y}_h = \hat{\mu} + \sum_{r=1}^{m} \alpha_r \bar{z}_{rh} + \sum_{i=1}^{m} \sum_{j=2}^{n_i} \beta_{ij} \bar{p}_{ijh}, \quad h=1,...,m,$$

where

$$\hat{\mu}, \bar{z}_{rh}, \bar{p}_{ijh}$$

are

$$\hat{Y}_h = (1/T_h) \sum_{t=1}^{T_h} \log \hat{Y}_t; \quad \bar{z}_{rh} = (1/T_h) \sum_{t=1}^{T_h} z_{rht};$$
\[ P_{ijh} = \left( \frac{1}{T_h} \right) \sum_{t=1}^{T_h} X_{ijt}, \]

\( T \) is the total number of individuals in the \( h \) profession, and \( P \) is the proportion of individuals in the \( j \) category of the \( i \) set of categories, in the \( h \) profession. If all individuals in a profession across all provinces belong to the \( j \) category of the \( i \) set of categories then \( P_{ijh} = 1. \)

Suppose that the first two sets of categories are, respectively, university and other education (i.e., our educational variables) and the next five sets are restrictive practice variables. Then (7.3) may be written as

\[ \hat{Y}_h = \mu + 2 \sum_{r=1}^{n_1} \alpha_r \bar{Z}_{rh} + \sum_{i=2}^{7} \sum_{j=2}^{n_i} \beta_{ij} P_{ijh} + \sum_{i=3}^{7} \sum_{j=2}^{n_i} \beta_{ij} P_{ijh} \]

(7.4)

\[ + \sum_{i=8}^{m} \sum_{j=2}^{n_i} \beta_{ij} P_{ijh}, \quad h=1, 2, \ldots, M. \]

The "competitive" mean of log of earnings is given by the effects of education and experience. The estimated mean of log of competitive earnings, \( \hat{Y}_h^c \), in the \( h \) profession may, therefore, be written as

\[ \hat{Y}_h^c = \mu - 2 \sum_{r=1}^{n_1} \alpha_r \bar{Z}_r + \sum_{r=1}^{7} \alpha_r \bar{Z}_{rh} + \sum_{i=1}^{7} \sum_{j=2}^{n_i} \beta_{ij} P_{ijh}, \]

(7.5)

where \( \bar{Z}_r \) is the overall mean level of the \( r \) continuous variable.
and $Z$ is the mean level of the $r^{th}$ continuous variable for $r$ individuals in the $h$ profession.

Since (7.2) was estimated by omitting a category in a given set of categories and since, with the exception of restrictive practice variables, the coefficients of the omitted categories are non-zero, it follows that the estimated constant term reflects the effects of omitted categories of ethnic origin, region, employment status, etc. These factors would have been eliminated from the constant term if (7.2) had been estimated subject to a set of constraints (see Chapter 6, Section 6). Alternatively, the effects of these categories can be eliminated from (7.5) by subtracting the sum of estimated coefficients of the omitted categories.

$$\sum_{i=3}^{m} \beta_{i1} = \sum_{i=3}^{m} \sum_{j=2}^{n_i} \hat{\beta}_{ij} T_{ij} / T_{i}$$

(7.6)

where $\hat{\beta}_{ij}$ is an estimate of the coefficient of the omitted category in the $i^{th}$ set of categories, $T_{ij}$ is the total number of observations in the $j^{th}$ category of the $i^{th}$ set, and $T_{i}$ is the total number of observations in the $i^{th}$ set of categories. Note that the effect of omitted categories of education variables is not eliminated from the constant term and that coefficients of the omitted categories of restrictive practice variables are assumed to be zero.

Making use of (7.6) in (7.5) we may write the "competitive" age-earnings profile as

$$\hat{Y}_{ht}^c = \hat{\mu} - \sum_{i=3}^{m} \beta_{i1} - 2 \sum_{r=1}^{l} \hat{\alpha}_{r} Z_{r} + 2 \sum_{r=1}^{l} \hat{\alpha}_{r} Z_{r h} + \sum_{i=1}^{l} \sum_{j=2}^{n_i} \sum_{i j} \beta_{ij} P_{ij}$$

(7.7)

---

6 See Appendix C.
where \( T = 0, 1, \ldots \), \( E \) is the \( T \) year of experience and \( E \) is the total number years of experience.

"Gross" (of monopoly earnings) age-earnings profiles, \( \hat{Y}_{hT}^m \), are obtained by adding to (7.7) the effects of restrictive practice variables

\[
\hat{Y}_{hT}^m = \hat{Y}_{hT}^c + \sum_{i=3}^{7} \sum_{j=2}^{n_i} \beta_{ij} \hat{P}_{ij}
\]

"Competitive" and gross NPVs and IRRs are computed by using (7.7) and (7.8), respectively, in (7.1). The difference between them are our estimates of monopoly NPVs and IRRs. Age-earnings profiles generated from (7.7) and (7.8) are given in Tables 7.2 and 7.3. The NPVs and IRRs are presented in Tables 7.5 and 7.6.

7.5 PRIVATE COSTS OF INVESTMENTS IN EDUCATION

Private costs of investments in education consist of direct and indirect costs. Indirect costs, which make the larger component, consist of foregone earnings that an individual could have earned had he taken the best employment opportunity open to him rather than undergo training. Direct costs include tuition fees, costs of books, supplies, equipment and transportation. Both types of costs vary from one program to another and both depend on the number of years of training. Indirect costs are higher in programs which train abler individuals and have higher educational entry requirements.

Rates of return from education appear to be extremely sensitive to the choice of the comparison group used in the estimation of foregone earnings. For example, Hansen (1963) found that the rate of return to four years of college education over four years of high school was 10.1 percent. On the other hand, the rate of return to four years of college education over one to three years of college education was 16.7 percent (see Table 7.1). The variation of computed rates based on different comparison groups are even greater within professional groups. For example, Eckaus et al (1974) reported that the rate of return to education in dentistry over mechanical engineering was 17 percent but the rate in dentistry over professionals not elsewhere classified was 37.5 percent. Similarly they found that the rate of return in pharmacy over accounting was 20.0 percent (see Table 7.1).
TABLE 7.2

COMPETITIVE AGE-EARNINGS PROFILES FOR SELECTED PROFESSIONS (SELECTED YEARS OF AGE) (DOLLARS)

<table>
<thead>
<tr>
<th>Age</th>
<th>Profession</th>
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<th>35</th>
<th>40</th>
<th>45</th>
<th>50</th>
<th>55</th>
<th>60</th>
<th>65</th>
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<tbody>
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<td></td>
<td>Agriculturalists</td>
<td>11,635</td>
<td>13,897</td>
<td>16,439</td>
<td>18,314</td>
<td>19,214</td>
<td>18,985</td>
<td>17,666</td>
<td>15,481</td>
<td>12,777</td>
</tr>
<tr>
<td></td>
<td>Architects</td>
<td>11,247</td>
<td>13,826</td>
<td>16,955</td>
<td>19,581</td>
<td>21,296</td>
<td>21,814</td>
<td>21,042</td>
<td>19,116</td>
<td>16,355</td>
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<td></td>
<td>Chemical Engineers</td>
<td>11,243</td>
<td>13,820</td>
<td>16,948</td>
<td>19,573</td>
<td>21,288</td>
<td>21,805</td>
<td>21,034</td>
<td>19,109</td>
<td>16,349</td>
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<tr>
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<td>11,384</td>
<td>13,860</td>
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<td>19,164</td>
<td>20,595</td>
<td>20,843</td>
<td>19,867</td>
<td>17,833</td>
<td>15,075</td>
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<td>Dentists</td>
<td>18,819</td>
<td>23,356</td>
<td>28,987</td>
<td>33,881</td>
<td>37,294</td>
<td>38,661</td>
<td>37,745</td>
<td>34,704</td>
<td>30,049</td>
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<td>13,057</td>
<td>15,857</td>
<td>18,095</td>
<td>19,446</td>
<td>19,681</td>
<td>18,758</td>
<td>16,838</td>
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<td>12,749</td>
<td>15,634</td>
<td>18,055</td>
<td>19,638</td>
<td>20,119</td>
<td>19,403</td>
<td>17,627</td>
<td>15,081</td>
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<td>9,623</td>
<td>11,493</td>
<td>13,596</td>
<td>15,146</td>
<td>15,891</td>
<td>15,701</td>
<td>14,611</td>
<td>12,804</td>
<td>10,567</td>
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<td>11,805</td>
<td>14,793</td>
<td>18,581</td>
<td>21,980</td>
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<td>25,691</td>
<td>25,385</td>
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<td>18,041</td>
<td>19,157</td>
<td>19,157</td>
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<td>16,001</td>
<td>13,365</td>
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<tr>
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<td>Mechanical Engineers</td>
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<td>13,095</td>
<td>15,867</td>
<td>18,106</td>
<td>19,458</td>
<td>19,693</td>
<td>18,770</td>
<td>16,848</td>
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<td></td>
<td>Optometrists</td>
<td>12,231</td>
<td>14,891</td>
<td>18,043</td>
<td>20,589</td>
<td>22,126</td>
<td>22,393</td>
<td>21,343</td>
<td>19,158</td>
<td>16,196</td>
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<td>19,620</td>
<td>23,489</td>
<td>26,484</td>
<td>28,122</td>
<td>28,122</td>
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<td>23,483</td>
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<tr>
<td></td>
<td>Surgeons</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Social Workers</td>
<td>10,168</td>
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<td>15,000</td>
<td>17,116</td>
<td>18,394</td>
<td>18,616</td>
<td>17,744</td>
<td>15,927</td>
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<td>Veterinarians</td>
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<td>23,445</td>
<td>25,807</td>
<td>26,753</td>
<td>26,118</td>
<td>24,014</td>
<td>20,794</td>
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</table>
### TABLE 7.3

**GROSS AGE-EARNINGS PROFILES FOR SELECTED PROFESSIONS**

*(SELECTED YEARS OF AGE)*

*(DOLLARS)*

<table>
<thead>
<tr>
<th>Age</th>
<th>Profession</th>
<th>26</th>
<th>30</th>
<th>53</th>
<th>40</th>
<th>45</th>
<th>50</th>
<th>55</th>
<th>60</th>
<th>65</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Agriculturalists</td>
<td>-</td>
<td>-</td>
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<td>-</td>
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<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td></td>
<td>Architects</td>
<td>14,243</td>
<td>17,508</td>
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<td>24,795</td>
<td>26,968</td>
<td>27,623</td>
<td>26,646</td>
<td>24,207</td>
<td>20,711</td>
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<td>Chemical Engineers</td>
<td>12,592</td>
<td>15,478</td>
<td>18,981</td>
<td>21,921</td>
<td>23,842</td>
<td>24,421</td>
<td>23,557</td>
<td>21,401</td>
<td>18,310</td>
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<td>Chemists</td>
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<td>-</td>
<td>-</td>
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<td>-</td>
<td>-</td>
<td>-</td>
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</tr>
<tr>
<td></td>
<td>Dentists</td>
<td>24,108</td>
<td>29,921</td>
<td>37,134</td>
<td>43,404</td>
<td>47,777</td>
<td>49,528</td>
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<td>44,458</td>
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<td>17,601</td>
<td>16,378</td>
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<tr>
<td></td>
<td>Statisticians</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>and Actuaries</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Mechanical Engineers</td>
<td>12,059</td>
<td>14,682</td>
<td>17,790</td>
<td>20,300</td>
<td>21,816</td>
<td>22,079</td>
<td>21,045</td>
<td>18,890</td>
<td>15,969</td>
</tr>
<tr>
<td></td>
<td>Optometrists</td>
<td>15,582</td>
<td>18,972</td>
<td>22,987</td>
<td>26,231</td>
<td>28,189</td>
<td>28,530</td>
<td>27,193</td>
<td>24,409</td>
<td>20,634</td>
</tr>
<tr>
<td></td>
<td>Physicians and</td>
<td>15,681</td>
<td>19,839</td>
<td>25,220</td>
<td>30,194</td>
<td>34,044</td>
<td>36,149</td>
<td>36,149</td>
<td>34,044</td>
<td>30,194</td>
</tr>
<tr>
<td></td>
<td>Surgeons</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Social Workers</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Veterinarians</td>
<td>16,327</td>
<td>20,263</td>
<td>25,150</td>
<td>29,396</td>
<td>32,357</td>
<td>33,543</td>
<td>32,748</td>
<td>30,110</td>
<td>26,072</td>
</tr>
</tbody>
</table>

Notes to Tables 7.2 and 7.3

1. In both tables, the age-earnings profiles are adjusted for hours worked and weeks worked.

2. The gross age-earnings profiles in Table 7.3 are not indicated for the "control" (i.e., competitive) professions.
The sensitivity of computed rates to the choice of a comparison group is, in part, due to market failure and, in part, to inability to identify returns due exclusively to education. An important instance of the latter problem is the difficulty in separating the contribution of education to earnings from the contribution of ability. For professional groups, or groups of highly educated individuals, variations in levels of ability are likely to be smaller than for other occupational groups. The main source of variation in computed internal rates of return is more likely to be market failure. Therefore, if rates of return to education were computed using different comparison groups for different professions, they would likely reflect differential effects of various types of market failure rather than the effects of education on earnings. For these reasons, we have chosen a single comparison group in computing private returns to investment in education in the professions. Since all professions in our sample required at least high school graduation we have chosen high school graduates as the comparison group.

The mean level of ability of high school graduates is likely to be lower than the ability of members of the professions. Our choice of comparison group therefore understates the indirect costs of education and overstates the NPVs and IRRs. Monopoly NPVs and IRRs are, however, not biased from this source.

The age-earnings profile for high school graduates was developed from an earnings function estimated by Holmes (1974) who used microdata obtained from the 1967 Survey of Consumer Finances conducted by Statistics Canada. The estimated constant term of his function was raised by assuming an annual growth rate of 5 percent in order to make its magnitude consistent with the 1971 Census data.

Data on student financial grants, scholarships, and part-time and summer employment income was obtained from the 1961-1962 Statistics Canada survey of university student expenditures and income. Annual growth rates equal to the rates of increase in the consumer price index between 1962 and 1970 were used to make the figures correspond to the Census earnings data. Direct costs were obtained from a published survey of Canadian universities.7 A breakdown of the costs used in the calculations is presented in Table 7.4.

7

See footnotes under Table 7.4.
TABLE 7.4
ESTIMATES OF PRIVATE ANNUAL COSTS
OF TRAINING IN 15 PROFESSIONS

<table>
<thead>
<tr>
<th>Profession</th>
<th>Forgone(^1) Earnings</th>
<th>Average(^2) Amounts Earned by Students</th>
<th>Tuition(^3)</th>
<th>Textbooks,(^2) School Supplies, Equipment and Transportation ((4))</th>
<th>Total Direct Cost ((3)+(4))</th>
<th>Total Cost ((1)+(5)-(2))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultrists and Related Scientists</td>
<td>5,359</td>
<td>2,376</td>
<td>449</td>
<td>189</td>
<td>638</td>
<td>3,621</td>
</tr>
<tr>
<td>Architects</td>
<td>5,359</td>
<td>2,376</td>
<td>472</td>
<td>189</td>
<td>661</td>
<td>3,644</td>
</tr>
<tr>
<td>Chemical Engineers</td>
<td>5,359</td>
<td>2,865</td>
<td>524</td>
<td>220</td>
<td>744</td>
<td>3,238</td>
</tr>
<tr>
<td>Chemists</td>
<td>5,359</td>
<td>2,376</td>
<td>468</td>
<td>189</td>
<td>657</td>
<td>3,640</td>
</tr>
<tr>
<td>Dentists</td>
<td>5,359</td>
<td>2,588</td>
<td>604</td>
<td>306</td>
<td>910</td>
<td>3,681</td>
</tr>
<tr>
<td>Economists</td>
<td>5,359</td>
<td>2,376</td>
<td>468</td>
<td>189</td>
<td>657</td>
<td>3,640</td>
</tr>
<tr>
<td>Geologists</td>
<td>5,359</td>
<td>2,376</td>
<td>468</td>
<td>189</td>
<td>657</td>
<td>3,640</td>
</tr>
<tr>
<td>Industrial Engineers</td>
<td>5,359</td>
<td>2,865</td>
<td>524</td>
<td>220</td>
<td>744</td>
<td>3,238</td>
</tr>
<tr>
<td>Lawyers and Notaries</td>
<td>5,359</td>
<td>2,529</td>
<td>504</td>
<td>215</td>
<td>719</td>
<td>3,549</td>
</tr>
<tr>
<td>Mathematicians, Statisticians and Actuaries</td>
<td>5,359</td>
<td>2,376</td>
<td>468</td>
<td>195</td>
<td>663</td>
<td>3,646</td>
</tr>
<tr>
<td>Mechanical Engineers</td>
<td>5,359</td>
<td>2,865</td>
<td>524</td>
<td>220</td>
<td>744</td>
<td>3,238</td>
</tr>
<tr>
<td>Optometrists</td>
<td>5,359</td>
<td>2,942</td>
<td>600</td>
<td>328</td>
<td>928</td>
<td>3,345</td>
</tr>
<tr>
<td>Pharmacists</td>
<td>5,359</td>
<td>2,221</td>
<td>600</td>
<td>200</td>
<td>928</td>
<td>3,938</td>
</tr>
<tr>
<td>Physicians and Surgeons</td>
<td>5,359</td>
<td>2,942</td>
<td>600</td>
<td>328</td>
<td>928</td>
<td>3,345</td>
</tr>
<tr>
<td>Social Workers</td>
<td>5,359</td>
<td>2,376</td>
<td>449</td>
<td>189</td>
<td>638</td>
<td>3,621</td>
</tr>
<tr>
<td>Veterinarians</td>
<td>5,359</td>
<td>2,376</td>
<td>449</td>
<td>189</td>
<td>638</td>
<td>3,621</td>
</tr>
</tbody>
</table>


2. From Dominion Bureau of Statistics, University Student Expenditures and Incomes in Canada, 1961-1962 Cat. No. 81-520, 521. The figures were updated by the annual rate of increase in the Consumer Price Index.

The number of years of training used in generating the age-earnings profiles was calculated separately for each profession as a weighted mean of the years of training actually possessed by individuals in our sample. The age at which an individual in a given profession is assumed to begin to work is then obtained by adding the calculated mean to 18 (the age of graduation from high school). This procedure is, in our judgement, superior to the use of some legally stipulated minimum number of years of education. One reason is that in some professions (for example, engineering and architecture), a number of years of work under supervision combined with an examination may substitute for university education. Another reason is that in professions with excess demand for places in educational institutions (for example, medicine and law) the actual years of preliminary training significantly exceed the prescribed minima.

7.6 EMPIRICAL RESULTS

The net present values of life-time earnings for 15 of our sample professions are presented in Table 7.5. The figures in this table are based on age-earnings profiles (unadjusted for hours and weeks worked) reported in Tables 7.2 and 7.3. In Table 7.6, we present the internal rates of return for the same 15 professions for competitive and gross earnings, adjusted and unadjusted for hours and weeks worked.

Both the calculated NPVs and the IRRs indicate that educational investment in the professions is profitable. Even at the high discount rate of 13.5 percent the gross NPV's for all restrictive professions in Table 7.5 are positive, although the competitive NPVs are negative for all professions except dentists, agriculturalists and optometrists. At the more realistic discount rate of 10 percent, only geologists, social workers and industrial engineers have a negative NPV of their life-time earnings.

Rational, wealth-maximizing individuals with a personal discount rate of 10 percent should, according to the results of Table 7.5, consider investing their human capital in professions according to the following ranking: first, dentistry, second, optometry, third, veterinary medicine, fourth, medicine, fifth, architecture, sixth, law, seventh, chemical engineering, eighth, mechanical engineering, etc.

The ranking is sensitive, of course, to the choice of the discount rate, since different professions have different time patterns of life-time earnings. For example, with the 5 percent discount rate, dentistry still has the highest NPV, but veterinary medicine is second, medicine, third, optometry,
TABLE 7.5
NET PRESENT VALUES OF LIFETIME EARNINGS IN SELECTED PROFESSIONS (DOLLARS)

<table>
<thead>
<tr>
<th>Discount Rate</th>
<th>5%</th>
<th>7.5%</th>
<th>10%</th>
<th>13.5%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Competitive</td>
<td>Gross</td>
<td>Competitive</td>
<td>Gross</td>
</tr>
<tr>
<td>Agriculturalists</td>
<td>65,096</td>
<td>---</td>
<td>35,203</td>
<td>---</td>
</tr>
<tr>
<td>Architects</td>
<td>60,621</td>
<td>122,622</td>
<td>24,271</td>
<td>62,961</td>
</tr>
<tr>
<td>Chemical Engineers</td>
<td>62,592</td>
<td>90,513</td>
<td>26,184</td>
<td>43,607</td>
</tr>
<tr>
<td>Chemists</td>
<td>61,858</td>
<td>---</td>
<td>27,618</td>
<td>---</td>
</tr>
<tr>
<td>Dentists</td>
<td>219,490</td>
<td>329,168</td>
<td>118,928</td>
<td>186,001</td>
</tr>
<tr>
<td>Economists</td>
<td>48,711</td>
<td>---</td>
<td>19,244</td>
<td>---</td>
</tr>
<tr>
<td>Geologists</td>
<td>42,544</td>
<td>---</td>
<td>13,011</td>
<td>---</td>
</tr>
<tr>
<td>Industrial Engineers</td>
<td>23,968</td>
<td>48,203</td>
<td>8,148</td>
<td>24,236</td>
</tr>
<tr>
<td>Lawyers</td>
<td>77,697</td>
<td>123,240</td>
<td>30,041</td>
<td>57,343</td>
</tr>
<tr>
<td>Mathematicians, Statisticians and Actuaries</td>
<td>54,384</td>
<td>---</td>
<td>25,416</td>
<td>---</td>
</tr>
<tr>
<td>Mechanical Engineers</td>
<td>50,449</td>
<td>77,435</td>
<td>20,878</td>
<td>38,066</td>
</tr>
<tr>
<td>Optometrists</td>
<td>80,560</td>
<td>149,948</td>
<td>39,018</td>
<td>84,109</td>
</tr>
<tr>
<td>Physicians and Surgeons</td>
<td>90,342</td>
<td>163,156</td>
<td>35,528</td>
<td>78,327</td>
</tr>
<tr>
<td>Social Workers</td>
<td>36,676</td>
<td>---</td>
<td>11,579</td>
<td>---</td>
</tr>
<tr>
<td>Veterinarians</td>
<td>99,652</td>
<td>168,189</td>
<td>45,759</td>
<td>87,672</td>
</tr>
</tbody>
</table>

Note: The "Gross" net present values are not indicated for the "control" (i.e., competitive) professions.
fourth, etc. In general, as discount rates (or interest rates at which funds can be borrowed) increase, it becomes less profitable to invest in professions with longer period of professional training (higher age at which the professional begins to earn income). For a given discount rate, the ranking of professions according to the NPVs based on competitive earnings will differ from that based on gross earnings. Nevertheless, the order of the top-ranking professions is essentially preserved.

The criterion of IRR yields a different ranking of profitability of professions than the NPV criterion. According to the IRRs calculated from gross earnings, unadjusted for hours and weeks (second last column in Table 7.6), dentistry, optometry and veterinary medicine occupy the first three ranks as was the case with the NPV at 10 percent discount rate. Architecture, however, is now fourth, medicine and industrial engineering share the fifth and sixth place, etc. However, as explained above, the use of IRRs in making occupational choices does not necessarily yield optimal decisions.

An inspection of Table 7.6 reveals that the calculated competitive IRRs for most professions tend to cluster within a relatively narrow range. Thus all but two of the 15 IRRs adjusted for hours and weeks worked, cluster between 9.75 and 12.75 percent. Similarly, all but three of the IRRs unadjusted for hours and weeks worked, have a value between 9.75 and 13.25 percent. This indicates the presence of a strong tendency towards equalization of rates of return across professions when the effects of restrictive practices are removed. It is of interest to note that, for example, the calculated competitive IRR for economists (a control profession) is identical to that for architects, lawyers, mechanical engineers and physicians and surgeons (all strongly restrictive professions).

Assuming identical non-monetary rewards for all professions, in a competitive equilibrium the rates of return normalized for ability should be equalized across professions. The NPV of competitive earnings discounted at this common rate should, of course, be equal to zero. In practice, the assumption of equal non-monetary rewards may be unrealistic. It could be argued, however, that some variables included in our earnings function (type of work and, to some extent, hours and weeks worked) partially correct for differentials in non-monetary rewards.

We assume that the IRR of 11.25 percent earned by a control profession such as economists, and, after adjustment for restrictive practices, also by architects, lawyers, mechanical engineers and physicians and surgeons, represents an adequate estimate of the competitive IRR in professions. (As explained in
### TABLE 7.6

**INTERNAL RATES OF RETURN ON HUMAN CAPITAL IN SELECTED PROFESSIONS (PERCENT)**

<table>
<thead>
<tr>
<th>Profession</th>
<th>Rate of Return</th>
<th>Competitive</th>
<th>Gross</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Unadjusted for Hrs. &amp; Weeks</td>
<td>Adjusted for Hrs. &amp; Weeks</td>
</tr>
<tr>
<td>Agriculturalists</td>
<td>17.25</td>
<td>18.25</td>
<td>----</td>
</tr>
<tr>
<td>Architects</td>
<td>11.25</td>
<td>11.75</td>
<td>16.25</td>
</tr>
<tr>
<td>Chemical Engineers</td>
<td>11.75</td>
<td>11.75</td>
<td>14.25</td>
</tr>
<tr>
<td>Chemists</td>
<td>12.25</td>
<td>11.75</td>
<td>----</td>
</tr>
<tr>
<td>Dentists</td>
<td>19.75</td>
<td>11.25</td>
<td>24.75</td>
</tr>
<tr>
<td>Economists</td>
<td>11.25</td>
<td>11.75</td>
<td>----</td>
</tr>
<tr>
<td>Geologists</td>
<td>9.75</td>
<td>11.25</td>
<td>----</td>
</tr>
<tr>
<td>Industrial Engineers</td>
<td>9.75</td>
<td>16.75</td>
<td>14.75</td>
</tr>
<tr>
<td>Lawyers</td>
<td>11.25</td>
<td>9.75</td>
<td>13.75</td>
</tr>
<tr>
<td>Mathematicians,</td>
<td>13.25</td>
<td>12.25</td>
<td>----</td>
</tr>
<tr>
<td>Statisticians &amp; Actuaries</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical Engineers</td>
<td>11.25</td>
<td>10.75</td>
<td>14.25</td>
</tr>
<tr>
<td>Optometrists</td>
<td>14.75</td>
<td>12.75</td>
<td>21.25</td>
</tr>
<tr>
<td>Physicians and Surgeons</td>
<td>11.25</td>
<td>9.75</td>
<td>14.75</td>
</tr>
<tr>
<td>Social Workers</td>
<td>9.75</td>
<td>11.75</td>
<td>----</td>
</tr>
<tr>
<td>Veterinarians</td>
<td>13.25</td>
<td>11.25</td>
<td>17.25</td>
</tr>
</tbody>
</table>

**Note:** The "Gross" internal rates of return are not indicated for the "control", (i.e., competitive) professions.
section 6.6 above, it is not an unbiased estimate.) It is then possible to discount the earnings of all professions at this rate. A net present value higher than zero for a given profession could then be labelled "monopoly NPV".

Alternatively, we can subtract the 11.25 percent from the calculated gross IRRs (second last column in Table 7.6) and arrive at a "monopoly IRR" for each profession. For dentists, this differential is 13.5 percent, for optometrists 10 percent, for veterinarians 6 percent, for architects 5 percent, etc.

7.7 CONCLUSION

In this chapter, we first reviewed the theoretical problems associated with measuring and interpreting returns to human capital. The rates of return to education calculated in several published studies were summarized to illustrate the sensitivity of such results to the choice of occupations to be compared. We took the position that, for our purposes, it is most meaningful to calculate rates of return based on high school graduates as the "comparison occupation".

The relative merits of the internal rate of return and of the net present value approaches to measuring return on investment were reviewed. We then discussed a method for modifying both in order to measure the monopoly component of the rates of return in our sample professions. Our approach consists of first adjusting professional earnings for the effects of all variables included in the earnings function except education and experience. This procedure yields "competitive" earnings which are then used to calculate competitive IRRs and NPVs. Second, we add to these earnings the returns derived from restrictive practices and calculate "gross" IRRs and NPVs. The difference between the two sets of measures of return then indicates the magnitude of monopoly NPVs and IRRs.

The age-earnings profiles we computed for 15 selected professions are presented in Tables 7.2 and 7.3. The rate of return measures themselves are reported in Tables 7.5 and 7.6. As expected, the ranking of professions differs depending upon the criterion chosen. However, both measures give a consistent ranking for the three most profitable professions. They are, in descending order, dentistry, optometry and veterinary medicine. The same ranking is preserved when the criterion is the monopoly component of the internal rate of return.
CHAPTER 8
POLICY

8.1 INTRODUCTION

In this chapter, we review several alternative approaches to public policies in the markets for professional services. We do not perceive our task as providing detailed policy analysis of individual professional groups - this has been done (for some professions at least) in the reports of various commissions of inquiry referred to in Chapter 1. Instead, we attempt to evaluate the relative merits of several broad policy choices in light of economic theory and available empirical evidence, including the results of this study.

Our quantitative analysis is based on data for a cross-section of 4,571 individuals belonging to 20 professions. Our estimates of the components of professional incomes attributable to the different restrictive practices should not, therefore, be mechanically extrapolated as applying to all professions. We do, nevertheless, suggest that our conclusions about the relative importance of the various components of professional earnings are indicative of the situation in all educated professions where the licensing practices described in previous chapters are encountered.

8.2 THE RATIONALE FOR PROFESSIONAL LICENSING

8.2.1 THEORY

In previous chapters, we have discussed in detail the various entry requirements which must be satisfied by persons desiring to practice in certain professions, or by persons wishing to change the location of their practice from one jurisdiction to another. We have also analyzed the theory of fee-setting by such professions and examined the means by which the fees are protected against competitive erosion. Finally, we have reviewed the role on advertising in markets for professional services and the effects of prohibitions on professional advertising imposed on practitioners in many of these markets.

Restrictions on entry and mobility, fee-setting and suppression of advertising derive largely from the self-regulatory powers conferred upon these professions by licensing laws. We now turn to a brief overview of the main aspects of professional licensing.
Professional licensing\(^1\) is sometimes seen as being analogous to regulation of "natural monopoly" in that both are designed to remedy the situation where competition does not guarantee a socially optimal outcome. It is argued that competition in the markets for professional services cannot be relied upon to protect the consumer. The competitive model assumes that the consumer, in his successive purchases, abandons the product he found unsatisfactory and will search for a better alternative. In some cases, however, the option of next purchase either may not be available or other means of rectifying the damage may not be fully compensatory. Some professional services (for example medical, legal) are obvious representatives of these "cases of no second chance".\(^2\)

A somewhat related argument for licensing is based on the presence of another kind of externality. This is the case where the private contract between a practitioner and a client requires the practitioner to reimburse the client for any damages caused by his incompetence (malpractice). Additional damages may, however, be imposed on the rest of the society as well (for example, the costs of an epidemic caused by an incompetent physician). To minimize both of these possibilities, the state enacts laws which license the supplies of such services and thus ensure that the buyers will choose only among sellers who meet certain minimum standards of competence.

If the general public is incapable of judging the qualifications of sellers of professional services, members of the legislative bodies are typically no better equipped for the task. Thus, the licensing functions are transferred to persons already qualified to practice in the area, i.e., members of the professional bodies themselves.

The licensing board controls not only entry into an occupation but also behaviour of established practitioners since it has the power to revoke or suspend their license. Its regulatory decisions do affect, of course, the welfare of each member of the licenced profession as well as the welfare of their competitors. It is thus only logical that pressures of

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\(^1\) The precise definitions of "licensing", "registration", and "certification" were given in Chapter 1. In this chapter, the term "licensing" is used to include the other two legal arrangements as well.

\(^2\) Barron (1965-66, 641).
well-organized professional groups are brought to bear upon the
design of legislation governing delivery of professional
services.

The practical implication of the theoretical arguments for
licensing is the requirement that the quality of services
delivered to consumers must be above some minimum level specified
by regulatory authorities. Licensing, therefore, results in
exclusion of sellers presumed to supply services of lower
quality from the market.

The negative consequences of such exclusion are numerous.
One writer's review of the literature produced the following
list:

Occupational licensing has typically brought higher status
for the producer of services at the price of higher costs
to the consumer; it has reduced competition; it has
narrowed opportunity for aspiring youth by increasing the
costs of entry into a desired occupational career; it has
artificially segmented skills so that needed services,
like health care, are increasingly difficult to supply
economically; it has fostered the cynical view that uneth-
ical practices will prevail unless those entrenched in a
profession are assured of high incomes; and it has caused
a proliferation of official administrative bodies, most of
them staffed by persons drawn from and devoted to
furthering the interests of the licensed occupations them-

selves.3

The substantive empirical question is how the impact of
these side-effects of licensing on social welfare compares with
its benefits. The empirical analysis is extremely difficult and
the few studies which exist provide only partial answers.

The argument that licensing guarantees quality is
deficient in several respects. First, competition, as opposed to
monopoly created by licensing, offers consumers a wider range of
products and qualities. Second, some consumers have tastes for
lower-quality, lower-priced goods and services. These cannot be
satisfied when licensing eliminates the supply of such products.
Third, licensing need not be the most efficient way of
guaranteeing quality since there exist general laws governing
safety and quality of products and services, weights and
measures, purity, labelling, zoning, building codes, etc. Also,
there are general laws against fraud, violence, breach of
contract and a whole gamut of available remedies, including
malpractice and class action suits.

The effects of abolition of licensing on the quality of professional services are complex, however. It would clearly reduce the average quality of services supplied by legally qualified practitioners, since some persons who did not meet the standards prescribed by licensing laws would not be able to practice. While the average quality of professional services would drop, the quantity supplied and consumed would rise due to the increased number of practitioners. It cannot be established a priori whether the drop in quality would be equal to, smaller or greater than the increase in quantity supplied. The direction of the change in total utility derived by consumers of professional services is, therefore, uncertain.

8.2.2 CANADA COMPARED WITH OTHER JURISDICTIONS

Licensing amounts to granting of self-regulatory powers to a profession. However, the state has reserved for itself a substantial amount of control even of those professions to whom it delegated autonomy. Thus, for example, it is the law that stipulates conditions for admission to study and practice, although regulations and bylaws promulgated by the profession may supplement the legislation. Generally, the state always controls the main conditions for admission and practice, although the professions have the right to specify the details. The greatest latitude is given to professions in defining specialties and in application of professional discipline.

There exists a great variety of ways in which professional bodies in different jurisdictions exercise their powers. For example, in most European countries, they are involved primarily in the field of discipline and the state generally does not attribute to them even the power to make complementary regulations as is the case for most professions in all Canadian provinces.

In the state of New York, the large majority of health professions are administered by the state Educational Act which accords the general jurisdiction over all professions to the regents of the State University of New York. Professions in the

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4 For an extensive comparative study of these issues in the health professions in selected countries, see Sheppard (1970).
state generally have no autonomy and conditions for admission, examinations, licensing, registration, practice, ethics and disciplinary procedures are determined by government authorities. The Department of Education may revoke licenses or registration, suspend, reprimand, or apply other disciplinary sanctions. It is worthwhile noting that the regulatory bodies are usually composed of practitioners. Their decisions can, however, be appealed to the Courts.

In California, the professions are regulated by a general act entitled "Business and Professional Code". The professions are administered by a number of commissions appointed by the Governor. All such commissions are integrated in a ministry called Department of Professional and Vocational Standards.

The Courts in the U.S. have occasionally declared licensing legislation in violation of constitutional provisions guaranteeing due process and equal protection of the law. A typical recent judgement declares that the interference with individual liberty due to licensing "must have a reasonable relation to the accomplishment of the legislative purpose and must not be unreasonable in degree, in comparison with the probable public benefit". Generally, however, the view of the students of this issue is that the U.S. courts "have become so deferential that legislation is construed to be constitutional if the legislature might have concluded that it was a reasonable means of regulation ... and .... had some rational policy basis".

Recently, a Canadian court has ruled on the case of a solicitor who was cited for violation of ethical code because he made regular radio broadcasts. While he was vindicated on appeal, the Court did not question the fact that acceptance of restrictions and adherence to rules of conduct are compulsory if a lawyer wants to practice his profession in the province.

5 Hartford Accident and Indemnity Co. v. Ingram, 226 S.E. 2d 498 504 (1976).


An exhaustive 1970 study of selected European and U.S. practices in regulation of health professions prepared for a Quebec government commission concluded that no other jurisdiction delegated its powers to the professions so easily as does Quebec (and most other Canadian provinces). The professional bodies in Quebec were more numerous and more powerful than in Ontario or in such countries as France, Belgium, and Germany. It was noted that countries as diverse as Sweden and the U.S. refuse to accord to the professional bodies autonomy even in the field of professional discipline which, for example, in France, Belgium, and Germany is almost entirely entrusted to the professions.

8.3 ALTERNATIVE POLICY APPROACHES TO PROFESSIONAL LICENSING

8.3.1 INTRODUCTION

One of the main economically justifiable functions of professional licensing is to provide information about the quality of professional services to buyers. Other justifications for licensing, discussed in detail in Chapter 1, include the existence of externalities in the market for some professional services, the social good argument, the need to establish a special kind of trust relationship between the professional and the client, etc.

One of the costs of this method of providing information is the exclusion of "unqualified" sellers. The assessment of seller qualification and exclusion are typically performed by licensed members of the same occupation who usually stand to benefit from reduced supply of the professional service. The search for policy alternatives should therefore be guided by the desire to find a way of providing equivalent information to the consumers with the minimum reduction in supply of services.

In principle, five different types of modifications of the currently prevailing systems of professional licensing can be identified:

1. Complete abolition of occupational licensing and reliance on the market mechanism to develop the necessary methods of consumer protection.
2. Replacement of the present "compulsory" licensing with "voluntary" or "optional" licensing.
3. Modification of the present licensing laws by redefining the scope of "licensed" activities. The purpose would be to allow unlicensed persons, especially "para-professionals" to perform a much larger range of professional functions.

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4. Replacement of the present self-regulatory powers with regulatory supervision by government authorities.
5. Application of competition law against professional price-fixing, advertising restrictions and exclusionary practices within the basic framework of existing laws and regulations relating to professions.

Below, we briefly discuss each of these alternatives. The results of our econometric analysis of a cross-section of Canadian professions as well as the empirical evidence generated by other studies of occupational licensing will be brought to bear upon the policy analysis.

8.3.2 ABOLITION OF OCCUPATIONAL LICENSING

The conceptual background for this approach to the supply of professional services has been most articulately formulated by Friedman (1962). His case against occupational licensing is twofold. First, the professions conform to the general pattern observed elsewhere: producer groups tend to be better organized and more concentrated politically than consumer groups. He concludes that the only way to offset the special producer interest is "to establish a general presumption against the state undertaking certain kinds of activities".9

The second argument against licensing is based on an examination of the actual, as opposed to the theoretical, use of licensing restrictions. Many of them are found to have no discernible relationship to raising the quality of professional services (see, for example, Cady, 1976). All of them lead to a decline in the average quality of services consumed (although the average quality of services supplied by licensed practitioners may be higher). The legal definitions of what constitutes practice of a profession are typically narrow. The amount of experimentation, incentives for research and thus the growth of knowledge in the particular field are thereby stymied.10

In the absence of licensing, maintenance of the minimum acceptable quality of professional services would, in Friedman's view, be guaranteed by other means. One such possibility is the formation of teams of professionals (group practice) which would

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9 Friedman (1962, 144).

10 See also Frech and Ginsburg (1974).
possess both the skill to judge the performance of their members and an interest in establishing a reputation for reliability and quality. This method of influencing quality would not apply, of course, to practitioners who are not members of such groups and to professions where group practice is not feasible. More generally, one could argue that subjecting the contracts for professional services to enforcement by means of malpractice legislation may provide an effective guarantee of quality.

Another consequence of the absence of licensing is likely to be the development of almost identical institutions via voluntary self-regulation. In discussing this concept, Arrow (1973a) uses the markets for professional services as a prime example of situations where the knowledge of the object of sale is unequal on the two sides of the market. Ethical principles have therefore developed to afford some protection to the client. The professionals benefit from their existence in two ways: First, the potential buyers may not have been willing to purchase such a service if some assurance of standard were not provided. Second, each professional wants his competitors to obey these principles because any violation may put him at a disadvantage and may have a negative impact on the profession as a whole, including those members who obey such principles.

It is obvious that any ethical code is useful only if it is widely accepted. One prerequisite for such acceptance is that the implications of the code for specific behaviour must be clear. Another is a general perception that acceptance of these ethical principles by all results in a mutual gain. The formation of professional associations is then a logical development. Their task is to formulate such codes and provide institutional support for their effectiveness.

The proposal for complete abolition of occupational licensing has not, to our knowledge, been contemplated at the policy-making level. One reason, undoubtedly, is the lobbying power of organized professional groups and their ability to prevent this legislative development. A second, and more important, factor is the problem of "no second chance", especially with respect to the delivery of some medical and legal services. Similarly, a feasible mechanism does not appear to exist for handling the damages which may be caused by incompetent practitioners to parties other than their clients. Even in the client-practitioner relationships, litigation (especially in cases of minor damages) may be an unwieldy and impractical alternative to licensing.
8.3.3 THE "VOLUNTARY" LICENSING\textsuperscript{11}

Under this system, the right to practice a profession is not restricted to those licensed. The law may, however, prohibit unlicensed persons from using designations such as "licensed" or "registered". Only persons who chose or were able to meet the prescribed educational requirements and pass the prescribed examinations would enjoy this right. Buyers would be able to choose between licensed and unlicensed practitioners. Their choice would thus not be restricted to the high-quality and high-price sellers.

An important element of this system is to allow anyone to sit for the licensing examination regardless of whether or not the applicant completed some prescribed number of years of university education, practical training under supervision, etc. Assuming the examination is properly designed, the means by which the applicant obtained his qualifications should be irrelevant. The logical consequence of this legislative change would be growth of training facilities supplied by private entrepreneurs. Their quality would be easily assessed by the performance of their graduates at the licensing examinations.

The licensing examination itself would acquire a different function from the system of compulsory licensing. All those who took the examination would be assigned a "grade", rather than simply determining who "passed" and who "failed" (i.e., did not reach a certain, more or less arbitrarily predetermined, mark). All those "graded" would be permitted to practice, but would be required to post their grade in their office, on their stationary, prescription blanks, etc. The grades could, of course, be changed upon re-examination and all practitioners would be subject to malpractice proceedings.

Given this information, buyers would be able to select that grade of practitioner which corresponded to their particular price-quality preferences. Any attempt by the licensing body to restrict supply of any particular grade of practitioners would be thwarted by the market mechanism: consumers would respond by substituting the services of some other grade of practitioners for those whose supply was restricted (and whose price increased as a consequence).

\textsuperscript{11} See, for example, Barron (1965-66) and Baird (1971) for a formulation of such models.
The concept of "voluntary" or "optional" licensing preserves the main justification for licensing, i.e., the provision of information to consumers. At the same time, it is bound to stimulate competition within a given profession and thus reduce some of the negative consequences of licensing. Its main drawbacks are similar to those encountered under complete abolition of occupational licensing: it seems to lack a mechanism for handling the externalities arising from delivery of some professional services. Furthermore, it places a heavy burden on private enforcement of malpractice claims. Finally, it is not clear whether the information provided on "quality" of each practitioner would be equally accessible and intelligible to consumers with different educational and cultural backgrounds, income levels and opportunity cost of time.

8.3.4 REDEFINING THE BOUNDARIES BETWEEN PROFESSIONAL FUNCTIONS

This approach to occupational licensing essentially proposes to increase the elasticity of supply of professional services by allowing a greater degree of interoccupational substitution (competition) within broad occupational groups. Its implementation would require changes in the legal framework within which professions operate. It would also lead to considerable modifications in the organization of delivery of some professional services.

These legal modifications may yield two alternative outcomes. In the case of some professions, competition will be stimulated by allowing for larger overlaps in the delineation of professional functions. For example, one can envisage workable licensing laws where certain functions are legitimately performed by both: architects and engineers; engineers and land surveyors; psychologists and physiotherapists; physiotherapists and chiropractors; etc. To some extent, such overlaps already exist in the present licensing laws, but they are often non-reciprocal or relate only to the distribution of functions between "junior" and "senior" professions. For example, physicians are generally permitted to perform functions assigned to most other health professions.

The other alternative outcome may mean less, rather than more, competition. The delivery of professional services would be characterized by an increased use of multiprofessional groups. Within such groups, the scope for existing para-professional personnel would be enlarged and new kinds of para-professionals would develop. The accompanying legal modifications would involve a trend toward "institutional licensure" as well as a development of adequate forms of remuneration to handle the "free rider" problem.
Several recent studies reviewed by Mechanic (1976) found that organized group practice is a growing form of delivery of medical services in the U.S. The difficulties with its proliferation at a much larger scale are typically due to the medical profession's fear of competition and eventual erosion of their economic position. Furthermore, whenever difficulties develop within existing groups, they can usually be traced to the distribution of remuneration, sharing of responsibilities and relationships among physicians in the group. Mechanic finds that the physicians' resistance tends to diminish where medical units such as prepaid practices, are financed on a capitation basis (regular payments per patient enrolled) and the rewards of each practitioner are tied to the economic performance of the group as a whole.

Baird (1971) argues that introduction of the profit principle into operation of health care institutions would stimulate interoccupational substitution. In his view,

there is no reason why surgical technicians with, say, two years of intensive training could not be employed to perform routine operations such as appendectomies and tonsillectomies. A full surgeon could be employed to oversee many such technicians, and average costs would be reduced.12

The feasibility and relevance of these modifications vary from profession to profession. For example, the group practice concept appears to be taking hold primarily in health professions while the definition of interprofessional boundaries and the role of para-professionals are under investigation in a number of disciplines (see, for example, Leal, 1977, 321). Empirical data on restrictive tendencies in the group practice systems are not available; comparisons with other methods of delivery cannot be made, therefore. It seems clear, however, that technical efficiency increases, primarily due to incentives for incorporation of para-professionals into the group.

8.3.5 DIRECT GOVERNMENT REGULATION OF PROFESSIONS AS A SAFEGUARD OF PUBLIC INTEREST

If the present system of professional licensing is to be essentially retained, significant improvement could result from a shift of regulatory responsibility away from members of the

regulated professions themselves toward members of the public and their elected and/or appointed representatives. In other words, it is preferable that the prerequisites for professional licensing be administered by a government body, not by members of the professions concerned. At least some members of the licensing authority must have experience in and knowledge of the profession being licensed. However, their income should not depend on the market price of the particular professional service whose supply they regulate. Certain number of positions on the licensing bodies should be reserved for members of other professions and the public.

One formulation of the argument for shifting of regulatory power from professional bodies to governments is due to Tuohy and Wolfson (1977). They constructed a model of professional behaviour and its interaction with the public interest, based upon the concept of "professional property" defined as the scope of practice delineated for each profession. Inherent in the professional property rights is a danger of an unwarranted appropriation of functions by professional groups for the purpose of charging monopoly price. Further, pressures develop for restricting entry and controlling the behaviour of individual members in order to maintain this artificially high price. Finally, since a professional acts as a purchasing agent on behalf of his clients, he might enhance the volume of professional services demanded and thus increase the return to the "professional property".

Tuohy and Wolfson suggest that Canadian public policy has not provided adequate safeguards against these dangers: first, the mechanisms for continuous governmental review of professional regulations are inadequate. Second, in most professions, the governments have not attempted to negotiate a "just price" for professional services. Third, the volume of services provided by individual practitioners has not been monitored. Where steps toward greater government involvement in all of these areas have been taken, they are directed primarily at the health professions where governments bear a major part of the cost burden.

This alternative to the present system of occupational licensing would require the creation of a government regulatory body with authority to over-rule the decisions of professional organizations. A recent example of legislative development along these lines is the enactment of the Quebec Professional Code in 1973.13 It applies to all 38 professional groups with licensing

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13 S.Q. 1973, c. 43.
powers, provides for lay representation on professional licensing bodies and establishes a government-appointed Professions Board to enforce the Code.

The Board effectively regulates or controls the professions subject to the Act. Every profession has a separate discipline committee, but the Board oversees the codes of ethics, regulations on advertising and tariffs of professional fees when appropriate. Since the professions are required to develop a "rational distribution of professional services", the legislation represents a step toward a more efficient employment of para-professionals.

While it is relatively early to evaluate the impact of the Code on the behaviour of licensed professions, some general observations about its general thrust and some potential problems can be made. The Code has been labelled "collectivistic" in its conception of public interest. Specifically, it has been argued that it offers inadequate protection to the rights of individual practitioners.

Whether the takeover of regulatory responsibilities by a government body can adequately protect the public interest is an open question. The classic argument advanced by Friedman remains valid: producer groups tend to be better organized and more concentrated politically than consumer groups. The presumption is, therefore, that they are capable of shaping the legislation in their interests.

8.3.6 APPLICATION OF COMPETITION LAW TO LICENSED PROFESSIONS

Traditionally, the professions have been protected from market pressures by licensing laws and the consequent self-regulatory powers of professional associations. At the same time, several legal doctrines have been interpreted as providing a shield against the reach of antitrust laws.

The first is the "state action" (Crown immunity) doctrine under which the state (provincial) governments or their officers and agents, when acting under the directives of its legislatures, are exempt from federal antitrust statutes.

14 Grey, Décary and Bernier (1976)

15 For a discussion of their relevance to the 1976 amendments to the Combines Investigation Act, see, e.g., Kaiser (1977).
The second doctrine, as formulated by Canadian courts,\textsuperscript{16} holds that industries might be exempt from the \textit{Combines Investigation Act} by virtue of the fact that they are regulated. The presumption is that the regulatory power is exercised in the public interest and restrictions on competition are illegal only if they hinder the functioning of the regulatory scheme.

Third, the professions have argued that some of their regulatory activities consist of suggesting (recommending) rather than requiring action. Since adherence to such regulations (for example, to the suggested fee schedule) is purely voluntary, there is no infraction of competition laws. The courts have rejected this argument where evidence showed that such regulations were recommendations in form only, while in substance they amounted to agreement and were generally adhered to.\textsuperscript{17} Recent jurisprudence on "conscious parallelism" suggests that a uniformity of behaviour (for example, pricing) may result in an inference of illegal conspiracy even though the underlying scheme may be voluntary or unwritten.\textsuperscript{18}

Fourth, the \textit{Combines Investigation Act}, in s. \textit{32(6)}, specifically exempts from prosecution agreements with respect to some matters which represent an essential component of professional self-regulation. They include setting of standards of competence and integrity, including reasonable requirements for entry into a profession.

In recent years, growing economic literature on occupational licensing has argued in favour of subjecting licensed professions to market pressures. The methodological approaches of the published studies include descriptive analysis of the abuses of occupational licensing (for example, Barron, 1965-66; Gellhorn, 1976; Cathcart and Graft, 1978); empirical analysis of social costs of certain specific

\textsuperscript{16}R. v. Canadian Breweries (1960) O.R., 601, 33 C.R. 1; c.c.c. 133.

\textsuperscript{17}R. v. Columbia Professional Pharmacists Society and Pharmaceutical Association of the Province of British Columbia, 64, C.P.R., 129.

licensing restrictions such as prohibition of advertising (for example, Benham, 1972; Benham and Benham, 1975); or restrictions on interjurisdictional mobility (for example, Holen, 1965; Shepard, 1978). Studies on the effects of licensing restrictions on professional incomes (Friedman and Kuznets, 1945; Maurizi, 1974; Shepard, 1978) have been recently supplemented by empirical analyses of the relationship between licensing and quality of professional services (Cady, 1976; Carroll and Gaston, 1977a, 1977b). The findings of this literature are, in the main, corroborated by the present study.

The legal problem of applying competition laws to services in general and to "learned professions" in particular has also undergone major changes during the past five years, both in Canada and in the U.S. After the passage of the 1976 (Stage I) amendments to the Combines Investigation Act, consensus has emerged on a number of issues related to the legality of certain activities of self-regulating professions in Canada.

Thus, the fee schedules promulgated by a number of professional associations could be subject to the Act (Henderson, 1977; McKeown, 1977). Among them are fees of medical associations determined outside government medicare systems, legal fees set by county bar associations, fees prescribed by professional associations in dentistry and architecture and brokerage fees. The existence of an explicit scheme of enforcement, while sufficient, may not be necessary to prove conspiracy. Following the doctrine of conscious parallelism, conspiracy may be inferred from behaviour such as an immediate adoption of a suggested increase in fees or tight adherence to existing fees by all members of an association.

In view of the exemption in subsection (2) of s. 32 of the Act, agreements to restrict advertising are not an offence. However, if they restrict price competition or competition in areas specifically enumerated in s. 32, the exemption no longer applies. Similarly, subsection (6) permits agreements to set standards of competence and integrity. It should not, however, be interpreted as a blanket exemption of the professional codes of ethics from the prohibitions of the Act (McKeown, 1977).

The proposed Stage II amendments to the Combines Investigation Act (Bill C-13) provide important clarifications as to the conditions under which regulated activities may be exempt. The following stipulations in particular would appear to bear upon the legal framework within which self-regulating professions currently operate.

The first is the provision that regulated conduct must be expressly required or authorized by an agency not appointed or
elected by those to be regulated or, alternatively, that the regulating body must be supervised by such an agency (s. 4.5 (2)(a)). It is doubtful that the current provincial laws on most professions would satisfy this condition. Of the 20 Census professional categories in our sample, 14 are subject to licensing in at least one province. As of 1970, the provincial governments exercised their supervision of these professions as indicated in Table 8.1.

It is apparent from the table that the regulatory powers of some professions (especially lawyers, and to a lesser extent physicians and surgeons) were subject to no supervision which would qualify under the proposed amendments to the Act. Moreover, considerable variation appears to exist in the degree to which any given profession is supervised by governments in different provinces.

The second proposed provision is that the regulating agency must be expressly empowered to regulate the conduct in the manner in which it is being regulated (Bill C-13, s. 4.5 (2)(b)). A brief examination of, for example, the fee-setting practices, reveals that the behaviour of most provincial professional associations would be inconsistent with this provision. As of 1970, the practice of promulgating fee schedules by, for example, the professional associations of lawyers, architects, engineers, dentists, etc., prevailed in all provinces (see Chapter 6, Table 6.5). Yet, an explicit authorization to do so at that time was found only in laws governing the legal profession in Quebec (similar powers were given to the law association in P.E.I. by an amendment passed in 1974 and in Newfoundland in 1977). Architects were authorized by law to fix fees only in Newfoundland, New Brunswick, Quebec, Manitoba and British Columbia, engineers in Quebec and Saskatchewan, while no provincial law explicitly authorized fee setting by dentists. Similarly, the right of the professional associations to regulate advertising is explicitly mentioned only rarely, although such regulations are widespread.

19 The Quebec Professional Code passed in 1973 is an exception.

20 Henderson (1977, 42) observes that these powers are generally assumed by professional associations to be "implied in the authority to regulate the practice and misconduct of the practitioners" and that "it is generally in the regulation of professional misconduct that rules respecting fees are established".
### TABLE 8.1

FORMS OF GOVERNMENTAL SUPERVISION OF SELF-REGULATING PROFESSIONS AS OF THE CENSUS YEAR 1970

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<td>N.L.</td>
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<td>3</td>
<td>2</td>
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<td>3</td>
<td>3</td>
<td>0,5</td>
<td>0,4</td>
<td>8</td>
<td>0,5</td>
<td>2</td>
<td>3</td>
<td>2,4</td>
</tr>
<tr>
<td>Chiropractors</td>
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<td>N.L.</td>
<td>1,5</td>
<td>N.L.</td>
<td>3,6</td>
<td>1,5</td>
<td>1,7</td>
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<tr>
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<td>8</td>
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</table>

**EXPLANATORY NOTES**

N.L. profession not licensed or no provincial act regulating the profession exists;

N.A. information not available;

0 the law contains no provision for approval of bylaws or regulations of the professional association by provincial legislature or government;

1 copy of bylaws including codes of ethics must be filed with the provincial government, but no procedure for their approval is provided for;

2 bylaws must be filed with the provincial government and the Lieutenant-Governor in Council or the provincial legislature are empowered by law to review them and to disallow any bylaw. Such right is sometimes subject to a time limit;

3 bylaws and codes of ethics of the professional associations must be approved by Lieutenant-Governor in Council;

4 the professional association is empowered to set tariffs of fees, but the law explicitly requires that they be approved by Lieutenant-Governor in Council;

5 the law empowers the association to set tariffs of fees without the requirement of government approval;

6 the Act itself defines what constitutes permissible advertising or the association is explicitly empowered to regulate professional advertising. Such regulations must be approved by Lieutenant-Governor in Council;

7 the association is empowered by law to regulate advertising, but no provision is made for government approval of such regulations;

8 only bylaws and regulations dealing with enumerated subjects must be approved by provincial government or legislature. All other bylaws and regulations are exempt from this requirement.

The table is based on information obtained exclusively from the Acts of provincial legislatures valid as of 1970. It does not contain information from provincial Regulations and other sources.
Related to the preceding provision is the requirement that whenever fee fixing or controlling of conditions of entry or of quantity or quality of products is explicitly authorized, it must be done in a manner least restrictive of competition (Bill C-13, s. 4.6 (1)). The criteria for deciding whether each of these activities is regulated in the least restrictive manner will, presumably, vary from profession to profession.

As a general guideline, with respect to fee-setting, fee schedules distributed strictly for information and guidance of members and potential entrants would not appear to be inconsistent with this provision. The stated purpose alone, however, is not decisive. The most important criterion is the extent and manner in which adherence to the fee schedules is enforced. It is sufficient if non-adherence to fee schedules resulted in lessening of respect to the fee-cutting practitioner (informal group sanction). McKeown (1977, 11) suggests that if such a schedule was arranged "in the expectation that it would be followed or substantially followed" it could be in violation of the Act.

The Combines Investigation Act as amended in 1976, appears to be able to reach, at best, only that part of the monopoly earnings of professionals which is due to price fixing and advertising restrictions. Those portions of professional monopoly incomes which are due to restrictions on entry and mobility can, in all probability, be reduced only by legislative means beyond the scope of the Act.

8.4 POLICIES ON PROFESSIONAL ADVERTISING

The conflicting policy positions on the relationship between advertising and competition reflect the long-standing theoretical controversy on this issue. As discussed in detail in Chapter 5, one theoretical view holds that advertising is a barrier to entry. Another school of thought considers advertising the most important means through which entry takes place. Crucial to the first view is the categorization of

21 The past jurisprudence has established that the fact that an agreement may have been advantageous or even necessary to the business interests of the parties is not a defence against a charge of unduly lessening competition. (Stinson-Reeb Builders Supply Co. v. The King (1929) S.C.R. 276, 52 C.C.C. 66, (1929) 3 D.L.R. 331 and R. v. Canadian Import Co. (1934) 62 C.C.C. 342 (1935) D.L.R. 330 (Que. C.A.).
advertising among the "product differentiation activities". These are engaged in by the sellers to emphasize in the buyers' mind certain inherent characteristics of a product or service. Advertising is most likely to succeed in creating for a particular product or service an image of superiority over alternative offerings where the object of sale is complex and expensive, not subject to frequent repeat purchases. If advertising stabilizes the purchasing patterns of consumers, entry into markets with heavy advertising is made more difficult. The new entrants may have to reduce prices or increase advertising spending to create sufficiently large advantage as compared with existing brands.

The opposing view holds that advertising is a vehicle of entry since it is capable of destroying existing brand loyalties. Evidence advanced in support of this argument includes the observation that new products are advertised more intensively than old products and that firms with the largest market shares do not always spend the largest percentage of their sales revenue on advertising. It is also suggested that customers in markets with heavy advertising switch brands more easily than in markets where advertising is less intense. Since advertising increases demand (or "develops the market") for the product or service in general, not just for a specific brand, the benefits accrue not only to the advertiser but also to his competitors. Indeed, the increased size of the market makes it possible for new suppliers to enter.

In our view, both the theoretical arguments and the empirical evidence tend to support the view that advertising is a stimulant to competition in most markets. The applicability of this conclusion to markets for professional services, however, should be further investigated. The a priori arguments typically advanced in support of the view that professional services fundamentally differ in this respect from

\[22\]
For a review and discussion of the large empirical literature on the subject, see Brozen (1974).

\[23\]
The notion of "advertising creating demand" has been the subject of extensive debate. For the above argument it is sufficient that advertising be able to move a firm's demand curve closer to the market demand curve and make it more elastic. Even when the market demand curve is shifted by advertising, it may be argued that demand is not really created but that the effective demand for the product or service is simply moved closer to the latent demand.
most other products and services, have been reviewed in detail in Chapter 5. Below, we briefly comment on the limited experience with professional advertising where it already exists and attempt to evaluate some of its consequences elsewhere.

The demand-increasing potential of advertising is one of the controversial aspects of its application to professional services. It is argued that the aggregate demand for some services, for example, health care, not only is but also should be fully determined by other factors. Furthermore, it is claimed that all the necessary information on specialized kinds of services (treatments) is readily available by means of the well-developed system of referrals between general practitioners and specialists.

Similarly, one of the traditional objections against legal advertising of legal services has been that it might encourage frivolous litigation. Others (for example, Kaiser, 1977, 21) have argued that advertising has a very limited potential for expanding the overall market, since the public already possesses adequate information about the type of services the law profession and other professions can provide.

The "ethical" arguments against advertising of certain professional services mostly stem from a paternalistic attitude towards the public. The allegation that, with advertising, consumers may choose practitioners on the basis of their message rather than on the basis of their competence appears inadequate. It is based on the unwarranted assumption that, without advertising, competence is the sole criterion of choice.

The demand-expanding effects of advertising are notoriously difficult to measure and no empirical studies related to markets for professional services exist. Nevertheless, some anecdotal evidence, such as advertising by plastic surgeons in California and other parts of the U.S., indicates that aggregate demand, at least in this segment of the health care market, is expandable.

A rather special case arises where international competition exists in the supply of professional services. In one such instance, Canadian consulting engineers have concluded that foreign consultants were often hired to perform jobs in Canada because the capabilities of Canadian engineers were not sufficiently known. In an attempt to enhance the competitive position of the domestic segment of the profession vis-a-vis its
foreign counterpart, Ontario consulting engineers removed most restrictions on professional advertising.24

Similarly, much of the literature on advertising of legal suggests that advertising would not only be effective in expanding aggregate demand, but that its absence violates constitutional rights. This view holds that large segments of the population are unaware of some of their legitimate rights and the possibility to assert them by means of litigation. It is argued that a typical individual requires legal services only infrequently and thus needs the largest possible amount of information, including that supplied by advertising, in order to make his choice. Since controls of advertising restrict access to information to those who need it most, they are discriminatory.25

The demand-expanding potential of advertising becomes economically most relevant in the context of licensing systems which allow for overlaps of functions between professions (see Section 8.3.4 above). Given the present system of licensing, advertising is utilized as a means of interprofessional competition only sporadically (for example, by chiropractors). Even without a modification of licensing laws, an increase in the volume of advertising after bans are lifted will result in enhanced competition. For example, advertising by lawyers is likely to attract certain parts of the business which previously went to accountants, tax consultants, realtors, etc.

24 Nevertheless, nine months after the removal of restrictions the volume of advertising actually taking place was reported to be negligible. Globe and Mail, "Consulting engineers not using new freedom", September 14, 1977.

25 Some indication of the expandability of the market for legal services can be obtained from the results of a survey of 1,035 households performed by Canadian Gallup Poll Ltd. Some 25 percent of respondents (60 percent in the under-30 age group) have not used a lawyer and of those who have, 51 percent were buying a house and 36 percent were drawing up a Will. Two thirds of the people who went to a lawyer did not discuss fees at any time. An overwhelming majority of people (80 percent) found their lawyer by word-of-mouth, 47 percent followed recommendations of friends or family, 17 percent chose a lawyer they knew socially or by business contacts. Globe and Mail, "Lawyer ad ban could be illegal, Allmand says", May 13, 1978.
The long-run impact of removal of restrictions on advertising is likely to be the result of both its potential for increasing demand and for redistributing market shares. For example, in the legal profession, the small firms and solo practitioners are likely to be most affected. The reason is that they tend to cater to those segments of the public which are currently less well informed and use legal services less frequently. The clientele of large firms, on the other hand, consists mainly of larger corporations and more affluent individuals who rely less on advertising. In other words, the incentive for and the payoff from advertising will be greater for the smaller firms and practitioners with lower-priced services.

8.5 POLICIES ON FEE-SETTING

A theoretical model of pricing in the markets for professional services was presented in Chapter 4. It was observed that, given the frequently large numbers of professionals in some markets and considerable differentiation in their services, the stability of professional fees makes them considerably different from prices in other markets. The reasons for this were found to be due in part to the authority to fix fees given to some professions by law and in part to the set of formal and informal sanctions based on codes of professional conduct which treat fee cutting as unethical.

The argument against price competition in the delivery of professional services usually takes two forms. It is claimed that price competition may lead some practitioners to reducing costs and clients may believe that price differentials reflect differences in standards of quality. Alternatively, the prohibition of price competition is viewed as an incentive for the practitioners to compete by improving the quality of their services.

Both versions of the argument implicitly assume that high standards and price competition are incompatible — an assumption which is contrary to much empirical evidence. (This reasoning is identical to the "service argument" for resale price maintenance in the product markets. It holds that price competition may make it impossible for the retailer to deliver a full range of services.)

At the same time, fee setting alone does not eliminate the incentive to reduce quality and thereby reduce costs and increase profits. Professional integrity, competence and quality of service are the result of the individual characteristics of the professional, his training and the ethical values of his professional group, etc.
Economic theory suggests that suppression of price competition reduces the pressure on efficiency and the incentive to search for new methods of delivery of products and services. In the case of the professions it inhibits, among other things, expansion of the use of para-professionals. Furthermore, the standard theory of cartels shows that lack of fee competition (and absence of "cheating") is beneficial to the profession as a whole.26

While economic theory and the limited empirical evidence lead to the conclusion that price competition in professional markets would improve consumer welfare, the argument against price cutting is not entirely without merit. Mechanic (1976, 51) recently reviewed the impact of competitive pressures on the nature of professional behavior of medical practitioners. Summarizing the results of several previous studies, he notes that in a situation where doctors have to compete for patients, their behavior will deviate both from their preferred pattern of work and from the best practice suggested by medical judgement. Thus, a doctor in the process of building up his practice is more likely to satisfy patients' demands for quasi-medical services, house calls, etc. It has been observed in this context that the provision of "unnecessary services" or "too frequent visits" are particularly encouraged by the fee-for-service practice. In general, where the physician is not sufficiently busy, there may be an implicit conflict between his economic self-interest and the patient's optimal interest.

Similarly, for Crispo (1972, 7-8) fee schedules are an important safeguard of professional performance. This is so especially in markets where the client is unable to assess the standards of performance. Under such circumstances, he cannot avail himself of such means of reducing the risks of inferior performance as enforcement of professional codes and disciplinary measures. Accordingly, he proposes that

26 The historical change in professional attitudes to price fixing is illustrated by a 1913 recommendation of the Discipline Committee of the dental profession in Ontario. It advised against instituting a tariff of fixed fees which dentists would charge on penalty of being fined. The reason the Committee gave for its opposition to such arrangements was that "....they are illegal, being in restraint of trade, are contrary to any adopted code of ethics and are likely to be considered by the public as in direct violation of the privileges and responsibilities conferred upon us by the Legislature when they entrusted the public to our tender mercies". Quoted from Macnab (1970, 72).
all fee schedules and fees should be subject to complete disclosure, both on a collective basis to the public at large and on an individual basis between the practitioner and his client

and

well-publicized appeal machinery should be made available in all areas where group fee-setting is common.27

In our view, the economic case for a complete abolition of professional fee-setting is very strong. Furthermore, our calculations reported in Chapter 6 suggest that the aggregate cost of this restrictive practice to consumers is considerable. The case for exempting "educated professions" from an application of legal prohibitions on price fixing is therefore not convincing.

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27 Crispo (1972, 33).
CHAPTER 9
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

9.1 INTRODUCTION

Three main types of theoretical arguments are typically advanced as a justification for professional licensing. One is based on the disparity in the amount of information possessed by buyers and sellers of professional services. Another stems from the existence of externalities in transactions involving the provision of some professional services. The third is based on the view that some professional services are a merit good.

The problem of information is inherent in the very definition of a profession: one of its essential components refers to the possession of a specialized complex body of knowledge and ability to apply certain skills and techniques on the part of the professional. The client, by contrast, generally, has only a limited capability to evaluate which type, quality and quantity of services offered by competing practitioners are appropriate to his needs. The institution of professional licensing is viewed as a device for reducing uncertainty faced by consumers. By restricting the practice of a profession to individuals approved by licensing authorities, the state purports to guarantee certain minimum standards of practice and to reduce the welfare loss due to consumer ignorance.

The externality argument derives from the observation that the client's choice of an incompetent practitioner may have unfavourable consequences not only for the client, but also for society as a whole. An individual client, however, makes his choice on the basis of his private cost alone, disregarding the potentially much larger social costs. Licensing purports to reduce these social costs by restricting the client's choice only to practitioners who are judged "competent".

Economic theory suggests that the implementation of licensing restrictions is bound to have a number of consequences detrimental to social welfare. In this study, we group these consequences into three categories. The first is a reduction of supply of professional services. It results from the fact that licensing excludes a certain number of individuals from practicing who would have entered the market if the profession were not licensed and restricts the mobility of practitioners between jurisdictions. The second is the development of collusive pricing patterns. It is facilitated by the ability of professional bodies to control entry into the profession and to influence the behaviour of licensed practitioners. The third is
the suppression of advertising which in other markets facilitates entry of new practitioners and undermines collusive pricing. All three types of licensing restrictions are particularly prominent in the self-regulating professions.

In what follows, each of these three categories of effects of licensing is discussed in a separate section. In each case, the discussion begins with a brief summary of the main points of the relevant chapters of this study. It is concluded by the highlights of empirical results derived in this study and the consequent policy recommendations.

9.2 EFFECTS OF LICENSING ON THE SUPPLY OF PROFESSIONAL SERVICES

The various means of regulating entry into professions were reviewed in Chapter 1 and discussed in detail in Chapter 3. A distinction was made between applicants for a license who have not practiced the profession before and those who are applying for a license in a given jurisdiction while duly qualified to practice the profession elsewhere. The licensing prerequisites which must be satisfied by the first type of applicants are referred to in the empirical part of this study as "conditions of entry". The requirements faced by the latter group are discussed under the heading "mobility".

Both conditions of entry and conditions of mobility generally include educational and non-educational requirements. Some of the non-educational requirements, for example, good moral character, are justifiable by a desire to protect the public against fraudulent behaviour. It is impossible, however, to rationalize on these grounds the requirement of previous residence in Canada or in a province or the requirement of citizenship status. These licensing prerequisites are referred to in this study as "citizenship".

In addition to the above licensing requirements, some professions are able to affect supply, and thus price, of their services by other devices. The most important are attempts to control entry by such means as manipulating pass rates at licensing examinations and use of discretionary powers in establishing "equivalency" of qualifications of candidates from other jurisdictions.

The educational requirements for licensing are closely related to the concept of "human capital" which provides the framework for analysis of professional earnings in this study. In Chapter 2, we discuss the proposition that earnings differentials among individuals are, for the most part, due to
the different amounts of human capital they possess. We show first that the amount of human capital a given individual acquires (by means of education, on-the-job training, migration, job search) will be influenced, among other things, by his access to funds and his abilities. These factors also determine the amount of total earnings generated by human capital and its rate of return.

We next discuss the conceptual problems encountered in combining the human capital variables with other determinants of incomes in the earnings function. The published literature typically deals with the individual's ability, his ethnic origin, family background, level of economic development of his region of work, number of hours worked in a typical week and sometimes his choice of occupation. A number of these variables are correlated with each other and with the human capital variables. Because of this, it is often difficult to identify their separate contribution to earnings. Furthermore, operational measures of the magnitudes of some of these variables, including ability and non-monetary returns, are not readily available.

In this study, we are concerned primarily with measuring the extent to which the restrictive consequences of licensing enhance professional incomes. We argue that unbiased estimates of these magnitudes can be obtained despite the lack of data on one important determinant of professional earnings, i.e., ability. Restricting our sample professions to those with certain specified levels of education partly controls for ability differentials. In addition, the lack of correlation between ability and restrictiveness of a profession guarantees unbiased coefficients on the variables measuring the restrictive consequences of licensing.

As explained in Chapter 6, both the variable "conditions of entry" and the variable "citizenship" were dropped from the estimated versions of the earnings function. Our discussion in Chapter 3 anticipated that the conditions of entry variable is not likely to be statistically significant if education is used as an entry barrier and most practitioners in our sample satisfy the current educational requirements. The citizenship variable had a wrong sign because of a concentration of these restrictions in one province (Quebec). It thus appears to have reflected more the characteristics of one province than the contribution of citizenship requirements to earnings. Among the remaining variables discussed in this section, fee setting and advertising restrictions proved to be the most important. Our estimates suggest that the reduction in supply of professional services due to fee setting enhanced the earnings of an average professional in our sample by some 11.8 percent. Advertising restrictions raised the average professional income by 13.8 percent and restrictions on mobility by 4.3 percent.
In Chapter 8, we critically evaluated a number of alternative approaches to guaranteeing adequate standards of professional services while minimizing the restrictive impact on supply associated with the present system of licensing. Each of these alternatives has associated with it a different level of restrictiveness of conditions of entry, mobility and citizenship.

Given the terms of reference and the methodology of this study, we are not in a position to offer specific policy recommendations on individual professions. (A recommendation to abolish citizenship as a prerequisite for licensing seems, however, warranted for all professions in our sample since citizenship restrictions do not appear to enhance the quality of professional services.)

9.3 EFFECTS OF LICENSING ON PRICING OF PROFESSIONAL SERVICES

An analysis of pricing behaviour in markets for professional services and its comparison with other markets reveals one major difference. The professional fee-setting arrangements tend to be more stable than similar arrangements in other markets. This is so in spite of the apparent potential for price competition due to large numbers of sellers and heterogeneity of services offered.

One factor contributing to this stability undoubtedly is the technical nature of most services which is conducive to geographic market segmentation. The far more important obstacles to intermarket competition in professional services, however, are legal and economic. The licensing laws generally prohibit a practitioner from supplying his services outside the jurisdiction where he is licensed. They also limit the potential for competition between professions in areas of overlapping competence.

The main determinant of pricing patterns within professions is, again, professional licensing. The power of professional bodies to regulate pricing is sometimes explicit in the licensing laws which give them the right to establish fee schedules. More often, however, it is derived from a general authority to govern the profession which is the essence of all self-regulatory systems of professional licensing.

The importance of these powers and of formal and informal sanctions applied against fee-cutters is clear from an analysis of the relationship between pricing and welfare of the professions. Our discussion in Chapter 4 demonstrates that
maximization of aggregate earnings of members of a professional association is consistent with setting and enforcement of a minimum fee.

We also showed that the optimal minimum fee established by a profession has different implications for different categories of professionals. Practitioners with an outstanding reputation are able to charge fees well above the minimum and are by and large unaffected by competition from others. The vast majority of established practitioners normally set fees above the minimum. Their fees are influenced, however, in a significant way by the level at which the optimal minimum fee is set. The less well-established and/or low-cost practitioners, on the other hand, may be disadvantaged by the prohibition to reduce fees below the prescribed minimum. The reconciliation of these conflicting interests is best accomplished by a system of enforcement of a fee schedule.

Our empirical results reported in Chapter 6 indicate that the monopoly earnings arising from fee-setting arrangements are considerable. We further suggest that the negative consequences of price-cutting in markets for professional services are more than outweighed by benefits to be derived from competition. In Chapter 8, we concluded that the fee-setting activities of professional associations are probably illegal under the present competition laws.

9.4 EFFECTS OF LICENSING ON PROFESSIONAL ADVERTISING

The various ways in which advertising may contribute to social welfare are reviewed in Chapter 5. We argue that characteristics of markets for professional services, such as large dispersion of prices and qualities offered, ignorance by some consumers about the availability of certain types of professional services and high turnover of sellers, suggest considerable social benefits to be derived from advertising.

The persisting dispersion of prices of homogeneous products in any given market can be explained only by lack of information on the part of buyers or by their inertia (brand loyalty). Advertising reduces search costs and thus speeds up the buyer response to price differentials. It also identifies new sellers and thus contributes to a shift in the existing loyalties. This potential is particularly important to newly qualified practitioners in the process of establishing clientele.

Our model developed in Chapter 4 suggests that introduction of advertising would redistribute market shares from high-quality high-priced practitioners to the lower-quality
lower-priced practitioners. The average quality of services supplied by "qualified" practitioners would thus decline. We argue, however, that the average quality of services consumed would rise and services would become accessible to a larger number of consumers. We argue that this outcome is preferred and thus there are net benefits derived from increased competition stimulated by advertising.

The ability of advertising to expand total demand for a given service is unclear. We suggest that consumer ignorance in some markets (for example, law) may suggest the need for advertising on these grounds. In some other markets, however, (for example, medicine with its developed referral system) the need to exploit the demand-increasing potential of advertising is much less compelling.

On balance, we believe that the theoretical arguments as well as the limited amount of empirical evidence available support the view that advertising of professional services is socially desirable. Our analysis of pricing in markets for professional services indicates that enforcement of fee schedules and imposition of advertising bans by professional associations are complementary. Both derive from licensing laws and both enhance the welfare of the professions.

We concluded in Chapter 8 that bans on professional advertising are contrary to valid competition law if they restrict price competition or competition in other specified areas. In our view, there exists a strong presumption that most advertising restrictions in markets for professional services have precisely this effect. This is consistent with the view that advertising is a source of information capable of accelerating buyer response to price differentials and disrupting brand loyalties. We therefore recommend that bans on professional advertising be removed (except, of course, for regulation of specified unethical practices).

9.5 PRIORITIES FOR ENFORCEMENT OF COMPETITION POLICY

In Chapter 8, we identified and discussed five different policy approaches to professional licensing. Most of them would affect, to varying degrees, the three main restrictive aspects of licensing: regulation of entry and interjurisdictional mobility, fee-setting and prohibition of professional advertising. Enforcement of competition laws as a policy alternative, taken alone, seems to be able to affect primarily fee setting and prohibitions on advertising.
Our empirical results suggest that, among the three restrictive practices we were able to incorporate in our earnings function, fee-setting contributes most to professional earnings and imposes the largest costs on consumers. An average practitioner in our sample enhances his earnings by 11.8 percent if he practices in a profession where such schedules are set and enforced. Physicians and surgeons derive larger monopoly earnings from this practice than any other profession. They are followed by industrial and mechanical engineers, dentists, pharmacists, architects, chemical engineers, veterinarians, optometrists, and osteopaths and chiropractors.

Restrictions on professional advertising contribute 10.8 percent of earnings of the average practitioner in our sample. The aggregate costs of these restrictions to consumers (i.e., the monopoly earnings derived by practitioners) are only by 12.9 percent lower than the costs due to price-fixing. Again, the contribution of this practice to the aggregate earnings of the professions is highest in medicine, followed by law, dentistry, pharmacy, veterinary medicine, optometry and osteopathy and chiropractic.

The aggregate cost imposed by restrictions on interjurisdictional mobility is roughly one third of the cost due to price-fixing. They contribute 4.3 percent of earnings of the average practitioner in our sample. The ranking of professions according to the criterion of aggregate amount of monopoly earnings generated by this practice is as follows: medicine, law, dentistry, pharmacy, land surveying, architecture, optometry, industrial and mechanical engineering, veterinary medicine, osteopathy and chiropractic, physiotherapy, chemical engineering.

The methodology we selected for the calculation of returns to educational investment in professions makes it possible to identify that part of the present value or internal rate of return which is attributable to restrictive practices. In Chapter 7, we explained that the ranking of professions according to monopoly NPVs need not be consistent with ranking according to monopoly IRRs. We also suggested that both of these measures indicate only the degree of monopoly, but do not reflect the aggregate amounts of monopoly earnings involved.

In the context of our study, one problem with these measures is that they do not indicate separately the monopoly components due to each restrictive practice. Another is that we calculated them only for the 15 professions in our sample for which good data on educational costs was readily available. The rankings of professions given below therefore refer only to the 15 professions listed in Table 7.6.
For the 15 professions, the two measures of degree of monopoly yield virtually the same ranking. Thus, the criterion of excess of gross IRR (unadjusted for hours and weeks worked) over a common "competitive" IRR indicates that dentistry is the most monopolistic profession, followed by optometry, veterinary medicine, architecture, medicine and industrial engineering, chemical and mechanical engineering, and law.

If the difference between the gross IRRs and the competitive IRRs (both unadjusted for hours and weeks worked) calculated separately for each profession is used as a criterion, the ordering of professions changes only marginally. Optometry is the first, followed by three professions with identical differentials (dentistry, architecture and industrial engineering), veterinary medicine, mechanical engineering, law and chemical engineering.

The criterion of excess of gross NPV over the competitive NPV calculated for each profession at the 10 percent discount rate identifies dentistry as the profession with the highest degree of monopoly. It is followed by optometry, veterinary medicine, medicine, architecture, law and the engineering professions.

Given the theoretical differences among the various measures of the monopoly component of professional earnings and rates of return discussed in this study, a multiplicity of orderings of professions inevitably results. Furthermore, as discussed at length in Chapters 6 and 7, certain aspects of our methodology and our data require that our figures be interpreted with caution. Nevertheless, the basic thrust of our results is clear. In our judgement, they indicate substantial payoffs from enforcement of prohibitions on price-fixing and restrictions on advertising in the professions.

9.6 SUGGESTIONS FOR FURTHER RESEARCH

The issues listed below all belong to the relatively narrow area of empirical research into the economic consequences of professional licensing. They do not deal with problems in the theory of human capital nor with the broad aspects of policies on the provision of professional services which are beyond the scope of this study.

First, as we emphasized in several different contexts throughout the text, our methodology employs empirical data on a cross-section of professions. This approach assumes that the impact of any given restrictive practice is identical across all professions. On a priori grounds, this assumption appears less
realistic for some practices and professions than for others. We suggest that a detailed study of individual professions or groups of related professions may yield an economically weighted set of measures of restrictiveness to be applied in an earnings function similar to ours. Another approach to verifying the validity of our results, at least for some professions, may be a series of profession-specific case studies utilizing time-series data on a cross-section of provinces. The feasibility of such studies, of course, critically depends on the availability of data on professions which exhibited sufficient variation in their restrictiveness over time.

Among the most pressing substantive issues, the cost-benefit analysis of professional licensing restrictions ranks very high on the list of research priorities. It should be undertaken as a complement to our study which concentrated on measurement of the contribution of licensing restrictions to professional earnings. These effects of licensing should be contrasted, in quantitative terms, with the impact of licensing on quality of professional services and its contribution to elimination of certain market externalities. A related, and perhaps even more difficult, task is a quantitative assessment of the general equilibrium effects of licensing restrictions.

A number of measurement problems need to be resolved in order to enhance the quality of empirical research in this area. The most important is the difficulty of separating the effects of variables measuring education from variables measuring entry barriers. A possible approach may be to disaggregate the entry restriction variables into several separate indexes which may better capture the distinction between socially necessary and restrictive educational requirements. Among these indexes, the ratio of registrations in professional schools to applications, and the variations in pass rates in professional examinations together with the supply-demand conditions in the relevant markets, may be worth examining. Similarly, measurement of the effects of restrictions on professional mobility could benefit from a detailed analysis of the various sources of new entrants and the treatment afforded to each by the licensing laws.

A full evaluation of the impact of professional advertising may have to be postponed until enough evidence is accumulated. Research on economies of scale in professional practice is feasible, however, and should be undertaken for a variety of different types of professions.

Finally, given the high degree of technical mobility of some professionals, the effectiveness of Canadian public policy in the area of professional licensing is undoubtedly affected by the policy environment in other countries, especially the U.S.
Surprisingly, a comprehensive analysis of international income differentials in the professions does not seem to have been undertaken as yet. Of particular interest in our context would be those determinants of income differentials which are connected with professional licensing, although other influences on the provision of professional services would have to be examined as well.
APPENDIX A

VARIABLES DESCRIBING RESTRICTIVE PRACTICES
OF ORGANIZED PROFESSIONS: MEASUREMENT

This appendix consists of two parts. First, the definitions of five qualitative variables describing the restrictive practices are given, together with a breakdown into categories of degrees of restrictiveness. The assignment of the sample professions in each of the 10 provinces into these categories is presented in Tables 6.2 - 6.6 in Chapter 6. Secondly, some general comments are made on the nature and sources of the information utilized for this purpose. The information itself is summarized in Appendix B.

THE VARIABLES AND CATEGORIES

CONDITIONS OF ENTRY

This variable describes those aspects of operation of the sample professions which make it possible to characterize a profession in a given province as certified, registered, or licensed.

Category 1: Practice or employment in the profession and use of professional designations are not restricted by an explicitly formulated set of standards and requirements (entry is free). All the "control professions" and some other professions in provinces where their practice is not regulated by law belong into this category.

Category 2: As in Category 1, practice or employment in the profession is not restricted. However, persons not registered and/or licensed may not use professional designations. This form of entry regulation is usually described as "certification".

Category 3: Practice or employment in the profession is restricted only to persons registered or licensed. The licensing or registration requirements are satisfied, however, by obtaining prescribed qualifications from educational institutions. No separate licensing or registration examination is required.

Category 4: In addition to qualifications obtained from educational institutions (as in Category 3), the risk and inconvenience of entry into the profession are increased by the requirement to pass a registration or licensing examination usually administered by a professional licensing body. The cases where the law transfers the power to administer such examinations to a university (or an advisory body composed of representatives of universities) also fall into this category.
MOBILITY

The primary purpose of this variable is to capture the influence exerted on the supply of practitioners in a profession via restrictions on international and interprovincial mobility.

Category 1: Whenever residents and non-residents of a given province with equivalent qualifications face similar admission requirements, the profession belongs to this category. This is so regardless of whether the profession is certified, registered or licensed. Situations where the law requires that the applicant be a duly qualified practitioner in good standing in his original jurisdiction also belong here.

To establish "equivalence of qualifications", the provincial licensing body may be empowered to review the qualifications of any applicant and require him to pass an examination. It may also make admission conditional upon the existence of reciprocal treatment extended to practitioners duly qualified in the province by the original jurisdiction of the applicant.

Category 2: Only applicants from the rest of Canada, selected Commonwealth countries and the U.S.A. with qualifications obtained from recognized or accredited educational institutions and/or registered or licensed in specified jurisdictions are admitted without examinations. All other candidates are subject to individual review of qualifications which may result in a requirement to pass a licensing examination or undergo additional training.

Category 3: Only applicants from other provinces of Canada are admitted without licensing examinations. Candidates from all countries, including Canada, may, however, be subject to a discretionary evaluation of their qualifications which may result in a requirement to pass an examination or undergo a period of training or work under supervision in the province.

Category 4: Registration or licensing examination for all out-of-province applicants is required. Certificates of national examining boards are accepted as equivalent of a licensing examination.
Category 5: Out-of-province applicants are admitted only after a period of additional training or work under supervision or a period of residency in Canada or in the province before admission. Licensing or registration examinations may or may not be required in addition.

CITIZENSHIP

Unlike the previous variable, this barrier to international mobility is entirely unrelated to educational and professional qualifications of the applicant.

Category 1: No specification of citizenship status. Residence in the province at time of admission or the landed immigrant status may be required.

Category 2: The applicant must be Canadian citizen or British subject.

Category 3: Canadian citizenship is required.

PRICE FIXING

Within this variable, professions are classified according to the nature and degree of the de facto influence of the activities of professional associations on incomes or fees of practitioners.

Category 1: Professional association either does not exist or has no input into income determination of its members.

Category 2: The association suggests fee schedules subject to limited enforcement. Their influence on professional incomes is, however, minimal since most practitioners are employees whose salaries are largely independent of such schedules.

Category 3: Professions with a large proportion of self-employed practitioners with suggested fee schedules subject to limited enforcement.

Category 4: Professions which negotiate or set elaborate fee schedules with evidence of considerable enforcement activity. Professions where the power to establish schedules or tariffs of fees is explicitly enacted in provincial laws, also belong to this category. The large majority of practitioners in each of these professions are employees whose salaries are only partly influenced by such schedules.
Category 5: Professions with fee schedules described under Category 4, where, however, the majority of practitioners are self-employed.

ADVERTISING

This variable characterizes the type of influence the professional associations exercise over advertising of services supplied by their members.

Category 1: Advertising is not applicable or if it exists, it is restricted only by the statutory provisions regarding misleading advertising and trade practices.

Category 2: Professions which restrict advertising of their members by regulating the choice of advertising media, volume, frequency and content of advertisements or prohibit advertising of fees for professional services. The large majority of practitioners in these professions are employees.

Category 3: Professions which regulate advertising in the manner described in Category 2. The majority of practitioners in these professions are self-employed.

NATURE AND SOURCES OF THE INFORMATION

The information contained in Tables 6.2 - 6.6 in Chapter 6 and in Appendix B describes the state of affairs as of the Census year 1970. In the text of Appendix B, occasional references are made to some interesting legislative developments after 1970, but this information is in no way incorporated in the tables.

The two main sources of data were provincial laws and completed questionnaires received from the provincial professional associations. (Responses by profession and province are indicated in Table A-1.) In cases of contradictions between the law and the questionnaire answers, the former generally took precedence.

Subsidiary sources of information include the provincial regulations, bylaws, codes of ethics and other materials supplied by the professional associations as well as scholarly literature. Among the government documents perused for this purpose, "Canadian Occupations: Entry Requirements" prepared periodically by the Occupational and Career Analysis and Development Branch of the Department of Manpower and Immigration proved especially valuable.
# TABLE A-1

**QUESTIONNAIRES RECEIVED**

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**Note:** Some professions have both a Provincial Professional Association and a Provincial Board (College). As indicated, questionnaires were completed by both of these bodies in several provinces.
Two versions of the questionnaire referred to above were distributed. Professional associations and licensing boards representing professions with extensive self-regulatory powers were asked to complete a somewhat longer version than associations representing the other professions. (The longer questionnaire together with the accompanying letter are reproduced in Appendix D below.) The bulk of completed questionnaires was received during September and October 1977; the responses to our reminder letter arrived mostly during the following three months.

The design of the questionnaire was intended to assist us in determining the following: first, the extent to which the powers conferred upon the professions by provincial laws are actually exercised; second, the type of regulatory activities the associations derive from a general authorization "to govern the profession and establish a code of professional conduct" rather than from a specific authority to, for example, set fees, regulate advertising, etc.; third, the frequency of application of various methods of enforcement of the professional codes of conduct; fourth, the type of entry requirements and restrictions on interjurisdictional mobility applied by the professional governing bodies; fifth, the means by which the professional associations influence incomes of their members and specific techniques of determining fee schedules and of their enforcement; sixth, the degree and forms of influence exercised over professional advertising.

The respondents were asked to answer all questions separately for the Census year 1970 and for the current (1977) year. Our purpose here was to identify the existence of any trends toward tightening or relaxation of the various restrictions. This task, as well as some of the tasks listed in the previous paragraph, could not be accomplished to the full extent originally envisaged. The reason for this was the lack of response by some associations and incomplete answers supplied by others. The information from completed questionnaires was, therefore, used primarily as a complement to the data obtained from provincial laws and regulations. A list of the relevant provincial Acts is provided in Table A-2.

The professions included in the sample widely differ from each other in a number of technical and economic aspects. Correspondingly, there exists great variety in the formulation of legal provisions governing them. While there were some difficulties in quantifying interprovincial variations for any given profession, by far the most difficult problems arose in making interprofessional comparisons. A certain amount of judgement had to be exercised in assigning professions to different categories of restrictiveness.
This problem occurred most often with respect to the variable measuring "mobility" where the licensing procedures exhibit two different patterns. Some professions (jurisdictions) impose what appear to be relatively stringent standards for admission of practitioners qualified elsewhere (discretionary additional training, work under supervision, examinations, etc.), but recognize professional qualifications from a wide range of countries. Other jurisdictions, on the other hand, do not appear to impose such requirements, but recognize only professional qualifications from a restricted range of countries or educational institutions. Analogous issues of interprofessional comparability were also encountered to some extent with respect to "price-fixing" and "advertising".
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<td>The Veterinary Surgeons Act, R.S.A. 1970, c. 383</td>
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<td>Agrologists Act, R.S.B.C. 1960, c. 6</td>
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<td>Architectural Profession Act, R.S.B.C. 1950, c. 15</td>
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<td>Engineering Profession Act, R.S.B.C. 1950, c. 128</td>
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<td>Dentistry Act, R.S.B.C. 1950, c. 99; S.B.C. 1959, c. 7</td>
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<td>The Legal Professions Act, R.S.B.C. 1950, c. 214; S.B.C. 1959, c. 15</td>
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<td>Registered Nurses Act, R.S.B.C. 1960, c. 335; S.B.C. 1957, c. 74; 1959, c. 32</td>
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<td>Optometry Act, R.S.B.C. 1960, c. 272</td>
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<td>Chiropractic Act, R.S.B.C. 1960, c. 54; S.B.C. 1954, c. 10; 1970, c. 5</td>
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<td>Pharmacy Act, R.S.B.C. 1960, c. 282</td>
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<td>Medical Act, R.S.B.C. 1960, c. 239; S.B.C. 1960, c. 26; 1970, c. 22</td>
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<td>Physiotherapists and Massage Practitioners Act, R.S.B.C. 1950, c. 283</td>
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<td>Land Surveyors Act, R.S.B.C. 1950, c. 211; S.B.C. 1969, c. 17</td>
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<td>Veterinary Act, R.S.B.C. 1960, c. 400; S.B.C. 1967, c. 55</td>
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APPENDIX B

VARIABLES DESCRIBING RESTRICTIVE PRACTICES
OF ORGANIZED PROFESSIONS: BACKGROUND INFORMATION*

AGRICULTURALISTS AND RELATED SCIENTISTS

The practice of agrology is regulated by legislation in all provinces except Newfoundland and Ontario. A distinction is made between persons practicing as "agriculturalists and related scientists" and persons practicing as "agrologists"). Only the latter practice is subject to provincial certification, licensing or registration requirements.

Conditions of Entry

Only persons registered may practice and use titles in all provinces where legislation exists, except Alberta and B.C. where the law prohibits merely the use of title by persons not registered. A degree from a recognized university constitutes a sufficient qualification for registration - no separate registration or licensing examination is required. Temporary permits to qualified persons who do not satisfy citizenship requirements may be issued in Quebec (for five years and for specific employment). Similarly, in B.C., temporary permits may be issued to non-residents.

Mobility

All provinces accept without examination duly qualified members of professional associations from other provinces. Quebec does so only on condition that reciprocal privileges are extended to persons qualified to practice in Quebec. Qualifications of applicants from outside Canada are individually evaluated in all provinces except Newfoundland, Ontario and Alberta (the only two countries explicitly mentioned are the U.K. and U.S.A.). In the majority of cases, they appear to be admitted without examinations.

* This Appendix summarizes the regulations governing the practice of selected professions as of 1970. Information on developments after that date is provided only in a few instances and has no bearing on the numerical magnitudes of variables measuring restrictive practices in this study.
Citizenship

In Quebec, the applicant must be Canadian citizen or British subject. In other jurisdictions, residence in the province is sufficient.

Price Fixing

Professional associations generally do not seem to exercise any influence on incomes or fees of their members. However, bylaw 6D of the Alberta Institute of Agrologists stipulates that "The Institute shall prepare, approve, maintain and circulate to all members a recommended professional fee schedule for the guidance of its members ..." (Alberta Regulation 376/67).

Advertising

Professional associations do not appear to exercise any influence.

ARCHITECTS

Conditions of Entry

All provincial laws prohibit practice of architecture and use of professional designation without registration and/or licence. (In P.E.I., the first Act regulating the profession was passed only in 1972. Until that time, architects in P.E.I. were members of the Provincial Association of Professional Engineers.) Exemptions from the prohibition to practice are typically granted to members of the engineering profession and also for work on projects not exceeding certain dollar value (this limit, however, varies widely from province to province). Temporary licences may be granted to architects from out-of-province, but they are usually restricted to a particular project or to a particular period of time. In some provinces, the out-of-province temporary licensee may only practice in collaboration with an architect from the province, or issue of such licences is restricted to architects from jurisdictions offering reciprocal privileges (P.E.I., Quebec, Saskatchewan, Alberta).

All partners in a firm of architects must be architects or professional engineers in P.E.I. and Alberta. In N.B., the majority of directors and principals must be qualified to practice and the majority of shares of each class must be owned by architects.
Educational qualifications for admission usually consist of a period of university education and practical training. In addition, a licensing examination is required in N.S., N.B., Quebec, Saskatchewan and B.C. An extended period of practical experience combined with an examination may often substitute for the university training.

**Mobility**

The conditions for interprovincial and international mobility in this profession are highly restrictive. Residence or domicile in the province at the time of admission is sufficient only in Newfoundland, Quebec, Ontario, Manitoba, Alberta and B.C. The provinces of N.S., P.E.I. and Saskatchewan require one year of prior residence in Canada, N.B. requires three years.

Nova Scotia, Manitoba and Alberta admit without examinations, architects qualified to practice elsewhere in Canada (Manitoba, however, requires examinations in professional practice from Quebec applicants who have not practiced outside the province). In P.E.I., applicants from Canadian jurisdictions must possess national certification, others are subject to review of degrees. In N.B., applicants from Canada are accepted without examinations, applicants from U.K. with examinations and others are "generally not accepted". Quebec and Saskatchewan exempt from examinations only applicants from some provinces of Canada (Saskatchewan also exempts U.K., applicants). Most associations have considerable discretion in imposing additional training in the province (Alberta and Saskatchewan appear to subject all applicants to a period of training in the province). British Columbia admits, upon passing an examination, only applicants who either were employed outside the province in an office of a "capable" architect for 15 years or practiced as qualified architects for eight years or were members of associations of architects in approved provinces for two years prior to application.

**Citizenship**

The status of landed immigrant is sufficient in all provinces except Quebec where the law requires Canadian citizenship. Exceptions may be made, however, for persons engaged in teaching at recognized schools of architecture or in assisting architects who are members of the provincial association.

**Price Fixing**

The provincial laws in five out of the 10 provinces (Newfoundland, N.B., Quebec, Manitoba and B.C.) empower the professional bodies to fix tariffs of fees for professional
services. Such tariffs are subject to approval by the Lieutenant-Governor of the province. Almost all professional bodies of architects do influence incomes of their members either by negotiating certain fees with the governments, suggesting dollar amounts, percentage of the project value or time-rate charges for selected services. According to questionnaire answers, violations of minimum fee provisions are subject to proceedings under the codes of ethics in N.S., P.E.I. (also overcharging) and Saskatchewan (also overcharging).

Advertising

The professional codes of ethics regulate the choice of advertising media, format, content and frequency of advertisements. Advertising of fees is prohibited or considered unethical.

ENGINEERS

Conditions of Entry

All provincial acts on the engineering profession contain prohibition to practice as a professional engineer and use the title unless registered and/or licensed. Lack of registration or licence implies that the person may not sign and seal drawings; he may, however, practice as an engineer (under supervision). The qualification requirements for admission into the profession are satisfied by obtaining a university degree in engineering and two years of practical experience. (A combination of extended practical experience and examinations may substitute for university training). Registration or licensing examinations for applicants with university degrees are indicated only in the provincial law in Ontario. However, the council of the association may exempt certain applicants at its discretion.

Partnerships and corporations must have a registered or licensed member as a partner or a full-time permanent employee or must be under supervision of such member in Newfoundland, N.S., P.E.I., Ontario and Alberta. Temporary licences may be issued to non-residents, but they are typically restricted to a certain project or specified time or permit the licensee to practice only under supervision of a registered or licensed member.

Mobility

Most provincial associations of professional engineers admit members in good standing of similar associations elsewhere provided their standards are at least equivalent. Admission examination is required only if the applicant's degree is from a
university which is not recognized as accredited (Nova Scotia) or when the applicants come from non-Canadian jurisdictions (Quebec). In some provinces (N.S., N.B., Manitoba) applicants from outside Canada are required to possess one year of Canadian or U.S. experience in engineering. Ontario and Manitoba admit only applicants from Commonwealth countries and the U.S.A. In Ontario, a period of work under supervision may be required in some cases. B.C. appears to admit only applicants from Canada.

Citizenship

Full status of Canadian citizen is required by law only in Quebec. Other provinces require merely residence in the province and landed immigrant status.

Price Fixing

Some provincial professional associations of engineers have developed elaborate schedules of professional fees and engineering salaries. The graduation of these schedules is designed to reflect the qualifications, experience and responsibility of individual engineers. Other associations suggest dollar amounts to be charged for certain services, percentage of the value of the project, time-rate charges, etc. Specific legislative authority for fixing fee schedules or minimum fees is found only in the provincial acts of Quebec and Saskatchewan.

Generally, price competition in the profession is regulated by a section of the Code of Ethics which provides that an engineer "will not compete with another engineer on the basis of charges for work by underbidding, through reducing his normal fees after having been informed of the charges named by the other".

Advertising

Regulations, bylaws and codes of ethics relating to advertising in engineering professions always prohibit advertising of fees, restrict the form, volume and frequency of other types of advertising and influence its content.

DENTISTS

Conditions of Entry

All provinces prohibit practice by persons not registered and/or licensed. The qualifications necessary for registration typically consist of two or three years of pre-professional university education, a degree in dentistry from a recognized
university and a licensing examination administered by the provincial professional licensing board or by the National Dental Examining Board.

In Nova Scotia, graduates from Dalhousie are exempted; in Quebec, the university examinations are accepted provided they are held in the presence of person(s) appointed by the Board. In Manitoba, the University of Manitoba is the sole examining body. In Saskatchewan, the final examinations prescribed by the University of Saskatchewan are sufficient; similarly for Alberta and the University of Alberta.

Mobility

Almost all provinces require that the out-of-province applicants possess, in addition to satisfactory academic qualifications, the certificate of the National Dental Examining Board or pass the provincial licensing examination. In Ontario, the law provides that the Board may accept without examinations candidates whose qualifications are considered of equal value. Similar exemptions may be granted by the University of Manitoba and University of Saskatchewan in their respective provinces. (Saskatchewan explicitly exempts applicants from the rest of Canada and U.S.A. as well as holders of degree from dental schools recognized by University of Saskatchewan and accredited by the Canadian Dental Association.) A provision for waiving of examinations also exists in the Alberta law, provided the applicant has qualifications at least equivalent to those required in Alberta at the time of graduation. In B.C., examinations may be waived for applicants who had practiced dentistry for 10 years in a country considered to have standards equivalent to B.C.

Granting of licence may be delayed for one year in P.E.I. if the applicant is not a Canadian citizen or has not resided in Canada at the time of application. Ontario may prescribe conditions for admission of applicants from outside the province. In Manitoba, graduates of other universities may receive a permit to practice under supervision of another dentist before writing examinations.

A number of provinces recognize only qualifications from selected countries. The rest of Canada, U.S.A., Australia, Denmark, Eire, New Zealand, Norway, Sweden, South Africa and the U.K. are recognized in Newfoundland and Ontario. In P.E.I., graduates of all non-Canadian universities must submit their credentials for evaluation by a Canadian dental school. Such evaluation may result in a requirement to attend a dental school in Canada for a specified period of time and pass dental school examinations.
The Quebec law provides that graduates of universities in other provinces of Canada may be granted licence if the Board considers their qualifications equivalent to those required in Quebec. Graduates of non-Canadian universities must take special written and practical examinations to qualify for a licence in Quebec.

Manitoba admits, after an examination, graduates of recognized dental schools in the U.K., Australia, New Zealand and the U.S.A. The University of Manitoba, which is the examining body, may grant standing to graduates of out-of-province dental schools "as seems just" and admit them without examinations.

Saskatchewan accepts dental degrees from recognized universities in the U.K., Australia and New Zealand. Graduates from universities in other parts of the Commonwealth must be recommended for examination by the University of Saskatchewan. The provinces of Alberta and B.C. accept graduates of recognized universities in Canada, U.S.A. and some Commonwealth countries. They must generally pass examinations and in some cases may have to take further training at a Canadian university.

Citizenship

Generally, either no requirement or merely residence in the province, landed immigrant status or application for citizenship at time of admission are sufficient. The P.E.I. law stipulates that the applicant must be either Canadian citizen or must have resided in Canada for one year prior to application and filed a declaration of intent to become a citizen.

Price Fixing

No dental association in any province of Canada is empowered by law to fix fees for professional services. However, some provincial laws do recognize disciplinary jurisdiction of the associations over "charging of exorbitant fees" (Newfoundland, P.E.I., Ontario, Saskatchewan, Alberta). Questionnaire answers indicate that this kind of influence is exercised in other provinces as well (Quebec). Certain professional fees are also negotiated with the provincial governments (Newfoundland, Saskatchewan).

Advertising

All dental associations consider advertising of professional fees unethical and discourage other types of professional advertising by restricting the choice of advertising media and the frequency and volume of advertising. However, only in the Quebec, Manitoba and Alberta laws are these powers of the associations explicitly mentioned.
LAWYERS

Conditions of Entry

In every province, only persons enrolled in the law society (admitted to the Bar) and/or holding annual certificate are entitled to practice. The qualifications required for admission typically include a law degree, a period of articling (from 9 to 18 months, depending on the province) and a bar examination administered by the provincial law society.

Mobility

The provincial laws in most cases define the conditions for admission of duly qualified lawyers from the rest of Canada and the Commonwealth. In N.S., N.B., Manitoba, Saskatchewan, Alberta and B.C., conditions are imposed upon applicants from the Commonwealth countries. To qualify, the applicant must have practiced law in his original jurisdiction for a certain period of time. A shorter period of prior practice is specified for solicitors than for barristers and advocates. The length of prior practice for lawyers from England, Eire, Australia and New Zealand is precisely stipulated; for the other Commonwealth countries, it is determined on a case-by-case basis by the society. (Saskatchewan does not have separate treatment for different Commonwealth countries.) The province of Ontario also admits lawyers from U.S.A., but only if they had five years of prior practice. Similar requirement of prior practice is also imposed on U.K. barristers and on Australian and New Zealand barristers and solicitors (three years only). All applicants from outside Canada must complete the Ontario Bar Admission Course; applicants from U.S.A. and Commonwealth countries other than U.K., Australia and New Zealand must also pass examinations for entrance into the course. In Quebec, a distinction is made between applicants from Canada and from all other countries. Those applying directly from another country appear to be excluded from consideration since the Bar Act, S.Q. 1966/67, c. 77 imposed the prerequisite that the applicant must have practiced law in Canada for three years prior to application.

Admission examinations on provincial Statutes and Practice and Procedure from all out-of-province applicants are required in Newfoundland, N.S., N.B., Ontario, Saskatchewan, Alberta and B.C. In Ontario, applicants from Quebec and all applicants from outside Canada must pass the Bar examinations; in Manitoba only non-Canadian applicants are subject to this requirement.

Additional training or articling in the province may also be imposed depending upon the applicant. Thus, Newfoundland and N.B. require six months of articling in the province if the
applicant had not practiced law for at least three years; articling may also be required in Nova Scotia. In Quebec, non-Canadian applicants must first study law in the province for three years and article for one full year. In Manitoba, all applicants from outside Canada must complete the Bar Admission Course which includes 11-1/2 months of articling. In Saskatchewan, additional training is required only if the country of the applicant's original jurisdiction requires it from Saskatchewan residents. In Alberta, holders of Canadian degrees with less than three years of practice must article for one year. Periods of articling may also be required from any applicant with a non-Canadian law degree while all holders of Canadian degrees with more than three years of practice are exempt. Similarly, in B.C., one year of articling is required from applicants from outside Canada and may also be imposed on Canadian applicants.

Citizenship

The law profession appears to be the most restrictive of all professions in the sample as far as citizenship requirements are concerned. Simple domicile in the provinces is satisfactory only in Newfoundland. The law in most provinces stipulates that the status of Canadian citizen or British subject is necessary (N.S., P.E.I., N.B., Ontario, Saskatchewan, Alberta and B.C.). In the Province of Quebec, the applicant must be a Canadian citizen. The Manitoba law stipulates that upon becoming a citizen of a foreign state or upon beginning to practice law in a foreign state, any barrister or solicitor ceases to be entitled to practice in Manitoba.

Price Fixing

The only provincial law association explicitly empowered by law as of 1970 to fix tariffs of professional fees is the Bar of Quebec. (Similar power was given to the Law Society of P.E.I. in s. 37q, S.P.E.I. 1974, c. 75 and to the Law Society of Newfoundland by the Law Society Act 1977, c. 77, s. 20p). The code of professional conduct, prepared by the Canadian Bar Association stipulates, that, among the factors to be considered in determining his fee, the lawyer is required to consider "tariffs or scales outlined by local law". Questionnaire answers indicate that the majority of law associations do influence fees either by directly suggesting amounts to be charged for certain routine services or by negotiating certain fees with the governments or by initiating disciplinary proceedings against members found guilty of overcharging.
Advertising

All provincial law societies restrict the volume, content, form and frequency of advertising by their members. The general format of such restrictions is guided by the Code of Professional Conduct of the Canadian Bar Association.

NURSES

Conditions of Entry

In most provinces, practice of nursing without registration or licence is not explicitly prohibited by law. Persons not registered and/or licensed are, however, prohibited from using the title "registered nurse". In Newfoundland, the law provides that no person shall practice as a nurse until they have obtained a licence and been registered. In P.E.I. and Quebec, practice is prohibited unless registered.

Mobility

In the majority of provinces, nurses from other provinces and countries with equivalent qualifications are, by law, entitled to registration. Depending upon the applicant's qualifications, however, a period of additional training and/or admission examination may be required in all provinces.

Presentation of a certificate of registration from the province or country of origin is explicitly required in Newfoundland, P.E.I., N.S., N.B., Quebec, Manitoba, Alberta, and B.C. The province of Newfoundland extends this treatment only to applicants from jurisdictions with reciprocal privileges for nurses registered in Newfoundland. Qualifications of candidates from the rest of Canada and from the U.S.A. are generally considered superior to all other countries.

Citizenship

Some provinces have not stipulated any conditions. Others merely require residence in the province at the time of admission and/or landed immigrant status.

Price Fixing

The large majority of nurses are employed by hospitals and similar institutions. Only a small number of them are self-employed (private-duty nursing). The professional incomes of the former group are determined by negotiation with employers. In some provinces, this function is performed on a province-wide
basis by nurses' unions, usually constituted separately from the professional body. As of 1970, such bargaining units were certified only in some provinces.

Fees charged by the private-duty nurses are influenced by the professional associations mostly in the disciplinary sense (cases of alleged overcharging are dealt with under the provisions of the codes of ethics). In Manitoba, the association also publishes recommended salaries for private-duty nurses and others who are not members of the union.

Advertising

Generally applicable only to private-duty nurses. The provincial associations typically do not impose restrictions substantially exceeding the misleading advertising provisions of the Combines Investigation Act.

OPTOMETRISTS

Conditions of Entry

In every province, persons not registered and/or licensed may not practice optometry and use professional designations. With two exceptions, the law requires that the applicants pass a licensing examination in addition to the education, training and practical experience prescribed by the relevant Act and regulations. The two exceptions are Quebec which does not require licensing examination from graduates of provincial universities, and Ontario. (All provinces do require examinations from applicants from outside Canada, however.) In Saskatchewan, the examinations are administered by the University of Saskatchewan in consultation with the council of the association.

Mobility

In every province, applicants from outside Canada must pass a licensing examination before being allowed to practice. Prince Edward Island may exempt holders of a certificate or licence issued after examination in any state of the U.S. where the requirements are equivalent to P.E.I., provided the state accords reciprocal privileges to members of the provincial association.

The majority of provincial bodies of optometrists have substantial amount of discretion in admitting duly qualified Canadian practitioners from out-of-province. Newfoundland and P.E.I. waive examinations if the original jurisdiction has
equivalent requirements and offers reciprocal privileges to their own residents. In N.S. and N.B., the out-of-province certificates may be accepted after evaluation of their qualifications at the discretion of the Council. In Quebec, all applicants except graduates of provincial schools of optometry may have to pass examinations; in Ontario, only applicants from outside Canada must satisfy this requirement. Alberta only accepts candidates with qualifications from approved colleges and may prescribe examinations. In Saskatchewan, a degree from recognized college appears sufficient.

A period of practical training under supervision before registration is required from applicants from outside Canada in Nova Scotia (six months), but a proof of education and experience satisfactory to the Board may be substituted. In N.B., even applicants whose qualifications are considered to meet Canadian standards may still be required to spend at least one year at a Canadian optometry school to become familiar with Canadian instruments, methods of practice and regulations. Quebec requires that the applicants other than graduates of the School of Optometry of the University of Montreal must have five years of practice before being allowed to write the provincial examination. Compulsory period of training under supervision before registration is required in Manitoba (one year) and in Saskatchewan (six months).

Citizenship

The only province where the law imposes a restriction is B.C. (the applicant must be Canadian citizen or British subject).

Price Fixing

According to the questionnaire answers, most professional bodies influence fees either by negotiating with the governments or by exercising their disciplinary powers in cases of overcharging by their members. In Quebec, the Optometrists and Opticians Act gives the association the right to fix tariffs of fees, subject to approval of Lieutenant-Governor and publication in the Official Gazette. The Ontario act makes it clear that the professional body is not authorized to interfere with prices of eyeglasses or fees for examination of eyes and prescribing.

Advertising

The amount of advertising actually done by optometrists is relatively small and advertising is generally discouraged. The choice of media, form and frequency of advertisements and their size are severely restricted by codes of ethics. Advertising of
fees and prices is usually prohibited or considered unethical. Explicit legislative authority for regulation of advertising by the profession is found only in the provincial Acts of N.S., Quebec, Saskatchewan and B.C.

OSTEOPATHS AND CHIROPRACTORS

These two professions are included in the same Census category. However, they do differ significantly in their educational requirements: the training at osteopathic college (all five such colleges recognized by the Canadian Osteopathic Association are in the U.S.A.) takes four years, must be preceded by three years of university training and followed by a one or two-year internship at an approved hospital. The chiropractic training in Canada is acquired in a four-year program at the Canadian Memorial Chiropractic College in Toronto.

The practice of osteopathy is regulated by special provincial legislation only in Manitoba and Saskatchewan. In Ontario, it is controlled by the Drugless Practitioners Act and in N.S., N.B., Alberta and B.C., by the medical acts. The remaining provinces (Newfoundland, P.E.I. and Quebec) have no legislation. Chiropractic Acts exist in P.E.I., N.B., Manitoba, Saskatchewan, Alberta and B.C. The Ontario Drugless Practitioners Act regulates the practice of chiropractic in that province while Newfoundland, N.S. and Quebec have no legislation on the profession.

Conditions of Entry

All provinces where legislation exists require registration or licensing examinations. Practice and use of titles by persons not registered and/or licensed are prohibited.

Mobility

The chiropractic licensing examinations are generally those of the National Examining Board of the Canadian Chiropractic Association. Persons who successfully pass the examination are therefore qualified to practice in other provinces as well. However, in order to be entitled to practice, N.B. and Alberta require reciprocal treatment on the part of the original jurisdiction. (Alberta may also prescribe a period of practice before registration). In B.C., the law gives the licensing board discretion over admission of chiropractors who obtained national registration from the National Examining Board.

As for applicants from outside Canada, the U.S. osteopathic qualifications are, of course, fully recognized. Similarly, graduates from accredited colleges of chiropractic are
admitted to writing the licensing examinations. Additional training is required only if the degree-granting institution had a shorter course of study than that required in the province (B.C.).

Citizenship

Residence in the province and/or landed status are satisfactory.

Price Fixing

The law in N.B., Manitoba and B.C. empowers the chiropractic associations to make regulations fixing fees for professional services. Questionnaire answers indicate that, in addition, the Ontario Osteopathic Association suggests fees as do the chiropractic associations in Saskatchewan, Alberta and B.C. Some fees are also negotiated with the governments (under various health insurance schemes).

Advertising

The provincial laws in P.E.I., Manitoba, Saskatchewan, Alberta and B.C. allow the professional associations to regulate advertising, including prohibition of "all forms of advertising that may be deemed to be subversive of the best interests of the Association" (Saskatchewan, B.C.). Questionnaire answers suggest that professional associations exercise stringent control of professional advertising in all provinces, including advance clearance of promotional material and complete restriction on fee advertising.

PHARMACISTS

Conditions of Entry

In all provinces, only duly qualified pharmacists may sell certain drugs, prepare compounds or dispense prescriptions. Every pharmacy must employ a duly qualified pharmacist and certain functions must be performed under his supervision. In Quebec, pharmacies must be owned by pharmacists or by physicians and no person may keep more than one pharmacy in a city with population of less than 50,000 and no more than three pharmacies in total. In Ontario and B.C., corporations operating pharmacies must have a majority of pharmacists as directors and majority of shares must also be owned by pharmacists. Saskatchewan has similar provisions, except that the shares must be owned by Canadian citizens or British subjects (not necessarily pharmacists). In Alberta, pharmacies must be owned by persons registered.
Educational requirements typically include a degree in pharmacy from a recognized university, a period of practical training and a licensing examination. Some provinces exempt graduates of selected institutions from the licensing examination (graduates from Dalhousie in N.B.; University of Saskatchewan graduates in Saskatchewan).

**Mobility**

Typically, the provincial laws give substantial amount of discretion to the pharmaceutical associations or licensing bodies. Depending upon their evaluation of the qualifications of out-of-province applicants, a period of additional training and/or admission examination may be assigned, although certificates of registration with the Pharmacy Examining Board of Canada are accepted by all provincial regulatory authorities except Quebec. In several provinces, the applicant must pass provincial examinations in addition to holding the certificate of the Pharmacy Examining Board. In Newfoundland, the Council of the provincial pharmaceutical association may prescribe courses and examinations for applicants who are registered members of any pharmaceutical association or society or college whose academic qualifications are not judged adequate. The N.S. law speaks only of "out-of-province Canadian citizens" and all applicants are subject to admission examinations except the P.E.I. and N.B. graduates of Dalhousie College of Pharmacy. (This reciprocal treatment also applies in P.E.I. and N.B.) Exemption from admission examination subject to reciprocal treatment by the original jurisdiction of the applicant is also emphasized in P.E.I. The provinces of Ontario, Manitoba and B.C. admit only those out-of-province applicants who had at least 12 months of experience in original jurisdiction. In Saskatchewan, foreign pharmacists who obtained the certificate of the Pharmacy Examining Board of Canada must serve one year of practical training under supervision in the province. Residence in the province prior to registration is required in Newfoundland (up to six months), Ontario (six months), Manitoba (three months) and Alberta (three months). In B.C., the applicants must satisfy the Provincial Elections Act qualifications (R.S.B.C. 1960, c. 306, s. 3), i.e., must have resided in Canada for 12 months and in B.C. for six months prior to admission.

**Citizenship**

Only N.S., P.E.I. (no longer in R.S.P.E.I. 1974, c. P 5) and Quebec require Canadian citizenship. In Manitoba, the applicant must be a British subject. The Saskatchewan act directs that bylaws must not require residential qualifications. In B.C., the applicant must be Canadian citizen or British subject.
Price Fixing

Quebec is the only province where the law authorizes the provincial professional body "to determine, change and replace the tariffs of fees for professional acts related to prescriptions". Questionnaire answers indicate, however, that in most provinces the pharmaceutical associations or colleges do influence fees as well (negotiating with the governments, suggesting application of the cost plus professional fee method and applying disciplinary measures in cases of overcharging).

Advertising

In all provinces, certain kinds of advertising by pharmacists are restricted or considered unethical. A reference to the right of the associations to do so is made only in the provincial laws in Quebec, Ontario and Alberta.

PHYSICIANS AND SURGEONS

Conditions of Entry

Only persons registered and/or licensed may practice. The law in Newfoundland and Saskatchewan also envisages the possibility of issuing a temporary licence for practice in specified (remote) areas to persons not otherwise qualified. In B.C., persons qualified to perform only certain functions are registered in "limited register". Other provinces (N.S. and Alberta) have "temporary register" or "courtesy register" for qualified practitioners appointed to public service or teaching, but not entitled to engage in private practice. The B.C. law provides for issuance of temporary certificates to persons appointed to public service or a hospital but not beyond the next regular examination of the College.

The qualification requirements for practice include a licencing examination beyond a medical degree from a recognized school of medicine and prescribed period of supervised training. In Alberta and Manitoba, graduates of provincial medical schools are entitled to registration without examination.

Mobility

Professional qualifications acquired at recognized universities in Canada, U.K. and selected Commonwealth countries are most frequently dealt with in provincial laws. Acceptance of U.S. medical qualifications is a more recent phenomenon; certificate of the National Board of Medical Examiners (U.S.) and licence in at least one state are required. Applicants from all
other countries, i.e., "graduates of foreign medical schools" are typically required first to pass examinations of the Educational Council for Foreign Medical Graduates. This allows them to obtain a temporary licence in a province which entitles them to serve as interns and to obtain an Enabling Certificate to write examinations of the Medical Council of Canada.

Newfoundland, N.S. and Saskatchewan accept without examinations duly qualified practitioners from jurisdictions in Canada, U.K. and selected Commonwealth countries. The province of P.E.I. admits without examinations only practitioners registered on the Home List of the General Medical Council of Great Britain and holders of certificates of the Medical Council of Canada. Applicants from other countries are treated as "graduates of foreign medical schools". In N.B., the Medical Council of Canada examination is required from all applicants for registration. Before taking this examination, graduates of approved medical schools in Great Britain, Eire or the U.S.A. must serve as interns for at least one year. Graduates of other medical schools must serve as interns in Canada for two years, one of which must be in New Brunswick. Quebec fully recognizes only medical qualifications obtained in the province. Other applicants must pass examinations of the Medical Council of Canada. Graduates of medical schools in Canada and the U.S.A. may write such examinations after internship of one year. Other applicants must have graduated from medical schools listed in the World Directory of Medical Schools, passed the examination of the Educational Council for Foreign Medical Graduates and completed two years of training in an approved hospital in Quebec before writing the examination.

In Ontario, only persons duly qualified in the provinces of Canada which offer reciprocal treatment to Ontario residents may register without examinations. Other applicants must pass the Medical Council of Canada examinations. The enabling certificate is granted to graduates of approved medical schools in the U.K., Ireland, Australia, New Zealand, South Africa and the U.S.A. Graduates of other schools may be subject to additional requirements at the discretion of the provincial College of Physicians and Surgeons.

Manitoba registers without examinations only graduates of the University of Manitoba, graduates of approved medical schools who passed the Medical Council of Canada examinations, persons registered in the U.K. Home list, graduates of two specified schools in Australia and one in New Zealand, provided the applicants are registered in either country. Graduates of other universities in Canada and the U.S.A. may be granted enabling certificates to write the Medical Council of Canada examinations.
Similarly, Alberta registers without examinations only graduates of provincial medical schools, holders of Medical Council of Canada certificates, recently dated certificates of registration in the U.K. Home List and holders of diplomas of the National Board of Medical Examiners (U.S.A.) licensed in at least one state. Others must apply for enabling certificates to write the Medical Council of Canada examination; a general prerequisite is completion of internship in a hospital acceptable to the University of Alberta.

All applicants for registration in B.C. must hold the certificate of the Medical Council of Canada. In addition, graduates of medical schools in Canada, U.S.A., Great Britain, Eire, Australia, New Zealand and South Africa must present evidence of having completed 12 months of rotating internship in an approved hospital. Graduates of continental European medical schools must have served one year of internship in the province or in an approved Canadian hospital. Graduates of other medical schools must hold the certificate of Educational Council on Foreign Medical Graduates, pass the provincial examination on basic sciences, hold the Medical Council of Canada certificate and have served two years of internship.

Citizenship

Residence in the province at time of application and/or landed immigrant status are generally sufficient (with the exceptions listed above). Quebec, however, requires citizenship and one year of residence in the province prior to admission.

Price Fixing

Questionnaires completed by provincial medical associations indicate that almost all associations influence incomes of their members by negotiating on their behalf with provincial governments. In some provinces, overcharging for professional services may be subject to disciplinary action by the association. The provincial medical bodies in N.B. and Quebec are explicitly empowered by law to establish a "minimum scale of fees" or "tariffs of professional fees". Similarly, the Manitoba Medical Association publishes and maintains the "Profession's Schedule of Fees".

Advertising

In all provinces, professional advertising is under regulatory influence of the provincial medical bodies. All advertising is generally discouraged and fee advertising is restricted or considered unethical. The legislative authority over these matters is expressly granted by the provincial laws only in N.S. and Quebec.
PHYSIOTHERAPISTS, OCCUPATIONAL AND OTHER THERAPISTS

This Census category includes physiotherapists, occupational therapists and some numerically small professions such as speech therapists. Most provinces, however, have separate acts for physiotherapy only (except for Quebec).

Conditions of Entry

Generally, the law prohibits practice of physiotherapy and use of titles by persons not registered and/or licensed. The only exceptions are Quebec where no legislation exists and Alberta where only the use of titles is prohibited. Educational requirements for entry into the profession are satisfied by a three-year diploma course or a four-year degree course. The educational institutions in Canada administer examinations prepared and coordinated by the national professional bodies; separate licensing or registration examinations are thus not required. Occupational therapists, on the other hand, do not have to be registered or licensed. However, employers do often specify that the prospective employee must be eligible for membership in the Canadian Association of Occupational Therapists. Graduates of schools of occupational therapy recognized by the World Federation of Occupational Therapists who are eligible for membership in their own national organization, are eligible for membership in the Canadian Association.

Mobility

In physiotherapy, licensing or registration in all provinces depends upon the applicant's eligibility for membership in the national association. Admission of out-of-province applicants to membership in physiotherapy associations is generally guided by the standards of the Canadian Physiotherapy Association. This implies that candidates from the rest of Canada, U.K. and from approved schools in selected Commonwealth countries are eligible without examinations. Others, including applicants from the U.S.A., must write admission examinations.

In occupational therapy, the relevant standards are those of the World Federation of Occupational Therapy. Applicants from jurisdictions not accredited with the World Federation and applicants whose membership has lapsed for extended period of time may be required to enrol into training in the province. In Quebec, all applicants without a B.Sc. degree are subject to admission examination.

Citizenship

There are no requirements beyond residence in the province and/or the landed immigrant status.
Price Fixing

The large majority of therapists in all categories are employees; as of 1970, they were generally not unionized. The influence of the professional associations on fees and incomes is therefore minimal or non-existent.

Advertising

Not applicable for the large majority of therapists who are employees rather than self-employed professionals.

SOCIAL WORKERS

Conditions of Entry

The provincial laws in N.S., N.B., Quebec, Manitoba, Saskatchewan, Alberta and B.C. prohibit use of professional designation by persons not registered or not members of the provincial association. Practice of social work itself, however, is not prohibited. As of 1970, the other provinces did not have legislation governing the practice of the profession. Newfoundland and P.E.I. did not even have provincial professional associations.

Mobility

A degree from approved school of social work or experience satisfactory to the professional body are sufficient for admission. Admission examination and a period of supervised practice may be required if qualifications were obtained outside North America; the procedure is one of individual evaluation and a large amount of discretion is given to the regulatory bodies.

Citizenship

Residence in the province or landed immigrant status are sufficient prerequisites for registration.

Price Fixing

The professional associations exercise no influence over incomes of their members.

Advertising

Professional associations exercise no influence.
SURVEYORS

Conditions of Entry

All provincial laws contain a prohibition to practice and use titles by persons not registered. In some provinces, the law further provides that no plan or survey shall be accepted unless signed by a duly qualified surveyor. Ontario also requires that the majority of shares of corporations practicing surveying must be registered in the names of members of the surveyors' association.

The qualifications for admission typically include a period of study, articling and a registration or licensing examination administered by the professional association.

Mobility

The restrictions on international and interprovincial mobility in land surveying are the most stringent of all professions in the sample. Most provinces require that surveyors duly qualified elsewhere take a period of additional training (articling) in the province and also pass an examination before being admitted to practice. Nova Scotia accepts certificates from other provinces if the Board is satisfied that requirements in the original province are equivalent. The law does not specify the country of original jurisdiction of applicant in Newfoundland and Ontario; the law in N.S., N.B., Quebec and Saskatchewan speaks only of candidates from "other provinces" while Manitoba, Alberta and B.C. laws consider persons qualified in the Commonwealth.

A period of articling in the province is required in all provinces. In most cases, minimum of one year is specified; in N.B., the period is 2 years for applicants without degrees and one year for applicants with degrees. The laws in P.E.I., Ontario, Manitoba and B.C. leave it at the discretion of the provincial professional bodies to determine the examination requirements and term of apprenticeship (articling) in the province.

Citizenship

Some provinces require residence in the province only (in Newfoundland, however, the applicant must have lived in the province for one year). In N.S., N.B., Quebec, Saskatchewan and B.C., the applicant must be Canadian citizen or British subject.
Price Fixing

The questionnaire answers suggest that professional societies in most provinces influence fees by suggesting dollar amounts and time rate. Provincial acts authorize setting of tariffs of fees in N.B. (this power no longer appears in the 1976 Act) and in Quebec where the tariffs must be publicly posted in the Courts. In Saskatchewan, the law makes "fraudulent and exhorbitant charging of fees" subject to disciplinary proceedings. In Alberta, the Association is empowered to adopt a "tariff of minimum professional fees and charges for survey work" (Alberta Reg. 91/66). The Code of Ethics contained in the same regulation prohibits the surveyor from offering professional services at a lower fee than prescribed by such tariffs. (This part of the Code of Ethics was modified in 1974 to imply "guidance" only and was repealed altogether in 1977.)

Advertising

Regulation of advertising by the professional association is not dealt with by law in any province. In Quebec, the statutory regulations prohibit advertising on radio or TV, regulate the content of advertisements in newspapers and magazines as well as the content of letterheads, information in the phone directories, etc. The Alberta regulations on advertising are considerably more general and amount essentially to a prohibition of soliciting.

VETERINARIANS

Conditions of Entry

Provincial laws stipulate that only registered and/or licensed persons may practice. (The province of Newfoundland has no legislation governing the practice of veterinary medicine.) Nova Scotia suspends certain qualification requirements for remote areas where services of a duly qualified practitioner are not available. In B.C., a similar provision applied, but no longer appears in the 1967 version of the Veterinary Medical Act. The Quebec law declares the practice of certain professions incompatible with the practice of veterinary medicine (agronomist, physician, dentist, pharmacist, all liberal professions). In B.C., an interim certificate may be issued to a veterinarian appointed to the public service and entitles him to practice until the next scheduled examination.

Qualifications for practice consist of university education and examinations prescribed by the provincial licensing body or by the National Examining Board of the Canadian
Veterinary Medical Association. In some provinces, graduation from specified schools is sufficient (P.E.I., Quebec, Saskatchewan, Alberta).

**Mobility**

Most provinces accept only those out-of-province applicants who are members in good standing of a veterinary medical association in another province. Certificate of the National Examining Board or provincial licensing examination are generally required. Quebec may accept final examinations from any recognized school, but the acceptance is subject to approval of the Veterinary Medical School at St. Hyacinthe. Ontario may subject candidates from accredited schools to an admission examination depending on individual evaluation and graduates of non-accredited schools may have to undergo additional training. In Saskatchewan, graduates of Ontario Veterinary College or any recognized Commonwealth college are accepted without examinations; others are accepted at the discretion of the council. Similarly, N.B., Manitoba and Alberta accept without examinations graduates of certain specified schools in the U.K. and the U.S.A.

Residence in the province at time of application is usually sufficient. The Quebec Veterinary Surgeons Act, however, requires prior domicile in Canada for five years.

**Citizenship**

Canadian citizenship is stipulated by law only in Quebec. In other provinces, residence in the province and/or landed immigrant status are sufficient.

**Price Fixing**

According to questionnaires completed by provincial veterinary associations, the fees for large animal practice in some provinces are negotiated with the government. Complaints of overcharging are handled by appeal to professional ethics. No reference to the power of the associations to fix fees is contained in any provincial law.

**Advertising**

All advertising is discouraged. Advertising of professional fees is restricted or considered unethical.
APPENDIX C

ESTIMATION WITH DUMMY VARIABLES

It is well known that estimating (6.2) when some variables are qualitative is not possible because the observation matrix has less than full rank. A common solution is to omit a category for each set of categories (Suits, 1957). A less common solution is to estimate the equation subject to constraints on the coefficients of each set of categories (Andrews et al., 1967; Sweeney and Ulveling, 1972; and Boulet, 1975). Under certain conditions, it is possible to modify the coefficients estimated by the first method so that they are equal to those obtained by the second method (Sweeney and Ulveling, 1972).

In this Appendix we derive formulas for adjustments of coefficients estimated by omitting categories. The need for such adjustments is discussed in Chapter 7. We also show that our estimates of monopoly earnings are independent of the method of estimation.

Consider (6.2) with interaction variables omitted for simplicity.

\[ Y_t = \mu + \sum_{r=1}^{m_z} \alpha_{zt} + \sum_{i=1}^{m_x} \sum_{j=1}^{n_i} \beta_{ij} X_{ij} + \varepsilon_t, \quad t=1,2,\ldots, T, \quad C.1 \]

where the variables are as defined in Chapter 6, Section 6.3.

Since

\[ \sum_{j=1}^{n_i} X_{ij} = 1, \quad t=1,2,\ldots, T; \quad i=1,2,\ldots, m_x, \quad C.2 \]

the observation matrix used in estimating C.1 is singular.

Suppose that the first category from each set of categories is omitted. Applying OLS to C.1 in this case yields

\[ Y_t = \hat{\mu} + \sum_{r=1}^{m_z} \hat{\alpha}_{zt} + \sum_{i=1}^{m_n} \sum_{j=2}^{n_i} \hat{\beta}_{ij} X_{ij} + \hat{\varepsilon}_t, \quad t=1,2,\ldots, T, \quad C.3 \]
where

\[ \hat{\mu}^* = \hat{\mu} + \sum_{i=1}^{m_x} \hat{\beta}_{il} \]  

\[ \hat{\beta}_{ij}^* = \hat{\beta}_{ij} - \hat{\beta}_{il}, \quad j=2,3,\ldots, n_i; \quad i=1,2,\ldots, m_x. \]

That is, an estimate of the new constant term is equal to the sum of the estimate of the original constant term and estimated coefficients of omitted categories. Estimates of coefficients of categories not omitted from the regression are equal to the difference between the estimates of the original coefficients of these categories and estimates of coefficients of corresponding omitted categories. Estimates of coefficients of continuous variables are not affected.

Now suppose that C.1 is estimated subject to a set of constraints, one for each set of categories:

\[ \sum_{j=1}^{n_i} \beta_{ij} n_{ij} = 0, \quad i=1,2,\ldots, m_x, \]

where \( n \) is the total number of observations (individuals) in the \( ij \) th category of the \( i \) th set.

If continuous variables enter the regression as deviations from their respective means (Sweeney and Ulveling, 1972), then applying OLS to C.1 subject to C.6 yields the following estimates of the constant term and coefficients of qualitative variables

\[ \hat{\mu} = \bar{Y} \]

\[ \hat{\beta}_{vv} = \bar{Y}_{vv} - \bar{Y} - C_{vv}, \quad v=1,2,\ldots, n_v; \quad v=1,2,\ldots, m_x. \]
where

\[
C_{vv} = \frac{1}{n_v} \left( \sum_{r=1}^{m_z} \sum_{t=1}^{T} \sum_{i=1}^{m_x} \sum_{j=1}^{n_i} \beta_{ij} X_{vvt} X_{ijt} \right)_{i \neq \dot{v} \; \text{if} \; j = \dot{v} \; \text{or} \; i = \dot{v}; \; j \neq \dot{v} \; \text{if} \; i = \dot{v};}
\]

\[
v = 1, 2, ..., m_x; \quad \dot{v} = 1, 2, ..., n_v,
\]

and \( \bar{Y} \) is the overall mean level of earnings (the dependent variable) and \( \bar{Y}_v \) is the mean level of earnings in the \( v \)th category of the \( v \) set.

That is, under these conditions the constant term is estimated by the overall mean of the dependent variable. An estimate of the coefficient of the \( v \)th category of the \( v \) set is the difference between mean earnings of individuals in the category and the sum of the overall mean of earnings and a term accounting for the effects of other variables.

Next we show that given C.6, estimates from C.3 (obtained by omitting categories) can be modified to equal those in C.7 and C.8. From C.5 and C.6 we obtain

\[
\beta_{il} \Sigma n_{ij} = \Sigma \hat{\beta}_{il} \Sigma n_{ij} = 0 \quad i = 1, 2, ..., m_x, \quad C.10
\]

or

\[
\hat{\beta}_{il} = -(1/n_i) \Sigma \beta_{ij}^{*} n_{ij}, \quad i = 1, 2, ..., m_x. \quad C.11
\]
Making use of C.11 in C.4 and C.5 yields, respectively

\[ \hat{\mu}^{**} = \hat{\mu}^* + \sum_{j=1}^{m_n} \sum_{j=2}^{n_i} \beta_{ij}^* n_{ij}/n_i = \bar{\nu} \]  
C.12

\[ \hat{\beta}_{ij}^{**} = \hat{\beta}_{ij}^* - \sum_{j=2}^{n_i} \beta_{ij}^* n_{ij}/n_i, \ i=1,2,...,\ m_x. \]  
C.13

The right-hand side of C.12 is the same as the right-hand side of C.7. It can also be shown (by substituting \( \hat{\beta}_{ij}^* \) with its OLS estimating expression) that the right-hand side of C.13 is equal to the right-hand side of C.8. Therefore,

\[ \hat{\mu}^{**} = \hat{\mu} \]  
C.14

\[ \hat{\beta}_{ij}^{**} = \hat{\beta}_{ij} i=1,2,...,\ m_x; \ j=1,2,...,\ n_i \]  
C.15

In other words, if continuous variables enter the regression as deviations from their respective means, then use of C.6 to modify coefficients estimated by omitting a category in every set of categories gives results identical to those obtained from estimating C.1 subject to C.9.

Next, we consider measurement of monopoly earnings computed from estimates of coefficients obtained using both methods. Suppose that for each set of categories of restrictive practice variables the first category represents competition. Further suppose that the first category in each of the restrictive practice variables is omitted in the process of estimation. Since the contribution to earnings of competitive categories of restrictive practice variables is zero, it follows that the estimated coefficients of the non-competitive categories are the mean monopoly earnings for the respective categories. That is, mean monopoly earnings of the \( v \) \( th \) category (\( v \neq 1 \)) of the \( v \) restrictive practice variable are given by \( \hat{\beta}^* \).

\[ \text{th} \]

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If C.1 is estimated subject to C.6 then overall mean monopoly earnings of a given restrictive practice variable may be calculated as the difference between the overall mean earnings and mean earnings of observations in the competitive category of the variable after controlling for the effects of other factors. This is equal to the negative of the coefficient of the competitive category of the restrictive variable in question.

\[- \hat{\beta}_{vl} = \bar{Y} - \bar{Y}_{vl} + C_{vl} \]  \hspace{1cm} C.16

The estimated coefficients of non-competitive categories are given by the difference between the overall mean of earnings and mean earnings in corresponding categories after controlling for other factors. However, the overall mean earnings are obtained from all professions in the sample; they, therefore, already include some monopoly earnings. It then follows that the coefficients of these categories understate the true mean monopoly earnings. The understatement is equal to the difference between the overall mean of earnings and the mean earnings in competitive categories after controlling for the effects of other factors. Therefore, an unbiased estimate of mean monopoly earnings for the \( v \)th non-competitive category (\( v \neq 1 \)) of the \( v \)th restrictive practice variable is

\[ \hat{\beta}_{vV} - \hat{\beta}_{vl} = \bar{Y}_{vV} - \bar{Y}_{vl} + C_{vl} - C_{vV} \]  \hspace{1cm} C.17

Since the left-hand side of C.17 is equal to \( \hat{\beta}^*_{vV} \) (see C.5) it follows that monopoly earnings estimated from both methods are identical.
Dear Sir or Madam:

I would like to request your assistance in obtaining information on some aspects of the functions and responsibilities of your Association. Your answers to the attached questionnaire will be an essential part of a study of the economics of professions currently undertaken by my colleague, Professor T.R. Muzondo, and myself.

Drawing upon the results of the 1971 census of Canada, we are attempting to analyze the determinants of employment incomes of the members of some 30 professions in all ten provinces. Among the factors of special interest to us are the length of professional training, experience on the job, number of hours worked during a typical week, the range of activities of the professional associations, etc.

We believe that quantitative studies of these factors are important for several reasons. One of them is the desirability of developing more sophisticated public attitudes toward professions. An essential prerequisite, in our opinion, is the availability of unbiased, empirically and theoretically sound research. A somewhat related rationale for studies of this kind is derived from the recent amendments to the competition legislation which extended its coverage to the service sector. Again, we believe that the various levels of government as well as the professions themselves can only benefit from a quantitative evaluation of the elements involved in this area of public policy.

We would very much appreciate if you could spend a few minutes filling in our questionnaire. In addition we would be grateful for a copy of the results of any membership surveys you may have conducted, policy statements and other materials related to the activities of your Association.

We would be pleased to send you a brief summary of the results of our study. Please check the appropriate box on the attached questionnaire if interested.

Thank you very much for your cooperation.

Yours sincerely

Bohumir Pazderka
Assistant Professor

BP/ha
ENCLOSURE

Please send the completed questionnaire BEFORE AUGUST 31, 1977 to:

Professor B. Pazderka
School of Business
Queen's University
Kingston, Ontario K7L 3N6
QUESTIONNAIRE

For a "yes" answer, please check one or more boxes attached to the questions below. Do not hesitate to add explanatory notes, comments and qualifications whenever appropriate.

Part I: THE ASSOCIATION

1. Membership of the Association as a percentage of all active members of the profession in the province
   1970: ....%  1977: ....%

2. Estimated average number of years of active practice of a typical member before retirement
   ....  ....

3. Nature of regulatory supervision the Association exercises over its members
   a) investigation and disciplinary proceedings related to breaches of internal code of ethical conduct
      .... ....
   b) inspection (auditing) of some professional records of members
      .... ....
   c) disciplinary powers over selected activities ordinarily subject to criminal prosecution
      .... ....
   d) responsibility for professional standards and qualifications (details in a special section below)
      .... ....
   e) influence on professional fees (details in a special section below)
      .... ....
   f) influence on professional advertising (details in a special section below)
      .... ....
   g) other (please specify)
      .... ....
4. The Association's approach to the planning of supply of professional services in the province

a) no established policy  

b) deliberate effort to maintain a desired ratio of the active membership to the size of the relevant market in the province
- by influencing the levels of enrolment at the educational institutions
- by adjusting the admission and licensing requirements
- by other means (please specify)

Part II: PROFESSIONAL QUALIFICATIONS

5. Minimum educational requirements for admission to the profession

a) number of years of post-secondary schooling required  

b) number of years of supervised training (internship, residentship, etc.) required in addition  

c) last year in which educational requirements were changed

number of years of training added
6. Admission examinations

a) none beyond a degree or diploma from recognized educational institution

b) additional examinations
   aa) national
   bb) provincial
   cc) formulated by
      - the Association
      - educational institutions
      - government body
      - other (please specify)

7. Admission requirements for practice of the profession are set by

a) the Association
b) educational institutions
c) government body
d) others (please specify)

8. Admission requirements other than professional qualifications include

a) residence requirements
   - must have lived in the province for ....yrs ....yrs
8. (continued)

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<td>- must have lived in Canada for</td>
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<td>- must be Canadian citizen or British subject</td>
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<td>- other (please specify)</td>
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b) other than residence requirements (please specify) | [ ] | [ ] |

9. Procedure for admission of applicants with professional qualifications obtained outside the province

a) fully recognized if applicant from

- rest of Canada | [ ] | [ ] |
- U.K. | [ ] | [ ] |
- U.S.A. | [ ] | [ ] |
- other (please specify) | [ ] | [ ] |

b) licencing examination required if applicant from

- rest of Canada | [ ] | [ ] |
- U.K. | [ ] | [ ] |
- U.S.A. | [ ] | [ ] |
- other (please specify) | [ ] | [ ] |
9. (continued) 1970 1977
   c) additional training required if applicant from (please specify the number of years)
      - rest of Canada
      - U.K.
      - U.S.A.
      - other (please specify)

10. Membership fees
    a) admission (entrance) fee ....$ ....$
    b) annual membership fee ....$ ....$

11. Consequences of unsuccessful application for membership in the Association
    a) the applicant may not practice in the province
    b) may practice but may not use professional designation
    c) may practice but loses certain advantages of membership (please specify)
    d) please estimate the proportion of admissions into the profession to total applications ....% ....%(1976)
12. The most important reasons for the choice of your profession by a typical new application are

a) monetary rewards

b) personal prestige and social status

c) independence associated with the practice of the profession

d) other (please specify)

Part III: FEE SETTING POLICY

13. The Association in no way influences, negotiates or sets fees of its members

14. Fees (professional incomes) are negotiated between the government and the Association

15. The Association acts as a collective bargaining unit on behalf of its members

16. The Association suggests the $ amounts to be charged for various (routine) professional services

17. The Association specified the method of calculating fees for professional services

a) percentage of transaction value

b) time-rate charge

c) cost plus professional fee

d) other (please specify)
18. In preparing modifications of the fee schedules the Association takes account of

a) the level of fees currently charged by most members

b) wages and salaries of employees in related occupations

c) trends in the costs of operating a professional establishment

d) trends in the cost of living

e) changes in productivity

f) what the market will bear

g) other (please specify)

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19. Measures applied by the Association against members violating the minimum fee provisions

a) no action

b) appeal to the professional ethics

c) references to the courts of law (please estimate the number of cases)

..... ..... (1976)

d) disciplinary action by the Association (please specify and estimate the number of cases)

..... ..... (1976)
20. Measures applied by the Association against members overcharging for their services

a) no action
b) appeal to the professional ethics
c) reference to the courts of law (please estimate the number of cases)
d) disciplinary action by the Association (please specify and estimate the number of cases)

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Part IV: POLICY ON PROFESSIONAL ADVERTISING

21. How do the members advertise their services in the media and professional press?

a) not at all
b) providing information on the type of services available
c) providing information on fees for some selected professional services

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22. Does the Association attempt to influence the nature of advertising by individual members?

a) restrictions on selected kinds of unethical advertising practices (please specify)

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22. (continued)
   b) advertising of fees is restricted
      or considered unethical
      
   c) all advertising is discouraged
      
The Association is interested in
receiving a brief summary of the
results of the study

Address:
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